Impact of Computerization on Public Universities' Administration

A Case Study of Higher Education Commission of Pakistan's Pilot Project

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Abstract

The aim of the research was to explore the impact of a recent computerization process launched by the Higher Education Commission (HEC) of Pakistan which sought to improve the universities' administrative performance. My research followed and observed the effects of the computerization process within two universities that participated in a pilot project. Performance was observed on an iterative basis in the shape of '*form*', '*performativity*', and '*formation*'. Actor-Network Theory was applied as an approach to explore the socio-technical environment. The sites were visited to observe the transformed environment and its changed nature after the completion of computerization project. Besides observing the sites, interviews, documentation reading and storytelling methods were used to capture qualitative data. The research's outcome enhanced theoretical and practical knowledge. The study findings provided an insight on the university work realm engulfed in a body of politics where power and information circulation changes when the computerized campus management system is introduced as an element of change. The study demonstrates that localization of the computer software system required changes to be made within the work environment. However, during this process the element of change itself had to be changed to some extent, in order to meet the particular needs of these universities. The thesis also emphasises the various types of resistance that the computerization process faced within these universities. The findings may also be used by the Higher Education Commission of Pakistan to fine tune their universities' computerization process for continuation of the project of providing campus management system for all public universities.

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Abbreviations

ABAP	Advanced Business Application Programming
ANT	Actor Network Theory
CAQDAS	Computer Assisted Qualitative Data Analysis Software
CBT	Computer Based Training
CD	Compact Disc
CMS	Campus Management Solution
DGIT	Director General Information Technology
DUHS	Dow University of Health Sciences
ECM	Enterprise Content Management
ERP	Enterprise Resource Planning
HEC	Higher Education Commission of Pakistan
HMO	Health Management Organization
ICT	Information and Communication Technology
ID	Identification
IT	Information Technology
JIT	Just in Time
MAD	Materiality Agency Development
MIS	Management Information Systems
NVivo	Non-numerical Unstructured Data Indexing
RFP	Request For Proposal

SAP	Systems Applications & Products
SCOT	Social Construction of Technology
SQL	Structured Query Language
SSK	Sociology of Scientific Knowledge
SSSS (4S)	Society of Social Studies of Science
SST	Social Shaping of Technology
STS	Science and Technology Studies
UETP	University of Engineering and Technology Peshawar, Pakistan
UETP	University of Engineering and Technology Peshawar
UGC	University Grants Commission of Pakistan
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNSTD	United Nations Commission on Science and Technology for Development
VC	Vice Chancellor

Chapter 1 Introduction

1.1 Preface

Organizational change is a ubiquitous phenomena that happens across the world. Organizations adopt emerging technologies to economize, systemize and improvise the work environment. The computerization revolution started in developed countries in the late 1970s and early 1980s with the advent of personal computers and their linkage with telecommunication mediums (Stanback, 1987). The reduction in size and prices enabled personal computers to be part of the organizational change that led to massive industrial and domestic use. Their linkage with telephone network and satellites enabled the back and forth movement of digital to analogue data to be transferred across territorial boundaries. The boundaries of organizing were blurred as computerization created new organizational possibilities.

During this period, universities within the United States were swarming with computers in comparison to its earlier limited research based use. According to Stanback (ibid), computerization had a significant impact on the existing university working environment. This impact was differentiated by employee, depending on their nature of work. For example secretarial and clerical work skills had to be altered as the technical nature of this work was transformed to an abstract level. Letter generation and file keeping suddenly changed from typewriters and file cabinets to word-processors with editing abilities and virtual folders to store and retrieve. Similarly, administrative and senior management functions where also transformed as computerization played a greater role in planning and control. The telephone line and other communication mechanisms became data cables carrying digital signals across short distances and analogues signals for long distances. Similar technologies were also introduced into the

universities as well. The computerization of universities' administrative work in the early 80's had a transformational impact within the organization. Since then the computerization has been seen as a success story for the transformations of universities' administrative work. The transformation process in organizing changed the work perceptive of the people working at various levels.

> *Organization worked upon its management information systems at the beginning of the 1990s. And, in particular, of the way in which it introduced a new management accounting system. And so created new forms of knowledge, of representation. But at the same time created a new organizational world or object. And a new kind of knowing subject or manager* (Law, 2012:p.283).

The introduction of management information systems enabled the mangers and accountants to dispense with their routine jobs of entering information in account ledgers, developing 'T' accounts, producing the balance sheets, financial and income statements. Now management information systems could automatically perform all of these tasks. Therefore, the skills required for management transformed to interpret and take decisions based on the information produced by the information systems, rather than manually performing the calculations.

Developing countries also wanted to join the computerization bandwagon to bring them closer to the developed countries. The United Nation's Commission on Science and Technology for Development—UNSTD—conducted a study in 1998 about the utilization of information and communication technology (ICT) (Mansell and Wehn, 1998). The study findings showed that the diffusion of these technologies within developing countries had extremely uneven effects. Each country had its own set of problems and issues surrounding the ICT implementation. Based on the UNSTD report,

Star and Bowker (2006:p.158-159) point out that the move by the developed countries to enhance the IT infrastructure in developing countries may face some scepticism. *"Some in developing countries see this as a second wave of colonialism: the first pillaged material resources and the second will pillage information."* With the prevailing scepticism about developed countries, the post-colonial developing countries were very cautious in utilizing the developed countries' technologies as they saw it as another move from their former conquerors and emperors to create unfair relationships of dependency –this time through a new set of technologies. Information technology for sustainable development is surrounded by many diverse issues that range across micro and macro levels:

> *The question in every case becomes: in which specific world are technologies of order production generated, how do they circulate, and who or what are their subjects/objects? What or whose agendas and interest do they translate, with what effects? The design of technology in this sense materializes possibilities for action, among other ways through the location of design itself* (Suchman, 2009).

My study has such variation where entities of different stature are being observed not because of their sheer structures, but because of their associations. To trace what, of whose agenda and interest and with what effect, we have to trace the paths in the past to realize the connectives between various entities that played their role in bringing the technologies to the sites of implementations.

The UNSTD report (Mansell and Wehn, 1998) on providing information technology for sustainable development to developing countries was a precursor to the computerization project within universities introduced by Higher Education Commission of Pakistan. The Higher Education Commission (HEC) of Pakistan was formed through a

Presidential Ordinance (No. L.III) in 2002 with a mission to *"facilitate institutions of higher learning to serve as engines for the socio-economic development of Pakistan"* (Higher Education Commission of Pakistan. accessed 08/092009). The targets were to evaluate, improve and promote the higher education sector in Pakistan. In the light of these strategic aims defined by the UNSTD report, the reforms were initiated in the shape of faculty development programmes and improvements to existing facilities. The focus of my study is on the latter part of the strategic move, where the HEC initiated a project for computerizing the administrative work of public sector universities' of Pakistan[1]. Whilst this initiative was started in 1980's in the USA, Pakistan did not imitate the project until 2004, which makes for a gap of approximately 24 years that needed to be somehow closed. The advancement of information technology had an impact on the project, as Pakistan used the latest technologies, rather than those of 24 years old prior. The element of anxiety was that *"unless individual and societies urgently join the information superhighway, they risk being relegated to the fringes of the national and global information economy"* (Bloomfield and Vurdubakis, 1995:p. 546). The idea was based on localized improvements to compete the globalized standards.

Despite starting from a different baseline, with the latest generation computers and high-speed fibre-optic networks, the scale of the challenge for universities in Pakistan was significant since at that time they were managing student information manually or with limited computerization: "*Everything related to student administration including enrolment, fee records, and exam results were handled by different departments at each university"* (Oracle Customer Case Study, 2008). Each department within a university was working either manually or using Microsoft Excel's limited data processing

[1] As per 2009 statistics published by HEC, there are 128 degree awarding institutions (of which 70 are public sector and 58 are private sector) in Pakistan working under HEC's guidance.

abilities. The lack of complete computerization was causing delays in processing student information at various levels. Considering the insufficient state of existing work processes, in 2006 the HEC decided to take the initiative by forming an expert-group to map out the problems and design the requirements, in 2006. Based on the groups' design specifications, Oracle's PeopleSoft Campus Management Solution[2]--CMS--offered by Techlogix—a business partner of Oracle—was selected after exploring SAP[3] and other Enterprise Resource Planning—ERP—solutions offered by local organizations. The HEC decided to launch an approved computerization solution in two public sector universities as a pilot project. The pilot project was introduced in the University of Engineering & Technology, located in Peshawar, a city located in the Northern Western Province of Pakistan now known as Khyber Pakhtunkhwa Province and Dow University of Health Sciences[4] located in Karachi, a city situated in the Sindh Province south of Pakistan. Techlogix started the project in mid-2007 and they were able to complete the two universities' computerization by July 2008. Oracle's published customer case study (ibid) claimed that the computerization reaped benefits in terms of improved performance of the universities' administration by processing the data in a centralized manner using web interfaces that were equally beneficial for students, faculty and administration. Following the trial of this case study, the present research was initially undertaken to observe the success of the project. Furthermore, its impact on the existing performance of administrative work would provide an insight on the change process.

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[2]Oracle's off-the-shelf enterprise solution that provides students with data warehousing facilities with flexible information access tools based on structured query language.

[3]Systems Application Products, an enterprise resources planning (ERP) solution currently owned by International Business Machines (IBM)

[4] Named after the British Governor of Sindh Province who laid the foundation stone of the Dow Medical College in December 1945. The university status was awarded by the current Governor Dr.Ishrat-ul-Ebad in December 2003 after 58 years.

The research project was initiated in 2009 to observe the changes and measure success within the two universities that took part in the sub-pilot project that Oracle case study claimed as 'The Pilot Project' (Oracle Customer Case Study, 2008). Oracle's claim to the success of the pilot project within the trailblazers' universities may also be endorsed as upon completion of the pilot project, the HEC decided to computerize the administration of four more public universities, using the same software—currently under the deployment process. The aim of my study will be to investigate the pilot project initiated by HEC and observe the socio-technical changes associated with the computerization including the apparent enhancement of '*performance'*. The study calls for the exploration of the various aspects that range from, history, information systems, computer sciences and networks, organizational behaviour, administrative styles and sources of power within management. Due to the nature of diverse disciplines involved the aim is provide a relational account of the organizing process where computerization is seen as an element of change.

The permission to study was graciously granted by the HEC's Executive Director. The study will help to provide understanding in the issues relating to the computerization of Pakistan's universities by using the systemic approach of Actor Network Theory. After completion of the study, a report will also be developed for the HEC, in order to make use of the outcomes of research and convert it into practice for the other public universities' computerization.

1.2 Theoretical Perspective:

In order to observe performance, the study has to be focused on '*forms'* –the shape taken for movement, '*performativity'*—actions and '*formations'*--changed state with multidiscipline development (Latour, 2007). The infrastructure utilized within the

universities' structure will be explored (Star and Bowker, 2006). Considering the structures as infrastructure will provide the possible range of techniques that have been applied within the university realm (Bess, 1988). The research will follow Latour in analysing the '*formation of objects'*, '*formations of concepts'* and '*formations of strategic choices'* that will ultimately shed light on the *transformation process* engulfed in a political realm (Latour, 2008b). Politics contains issues of power (Clegg, 1994) that due to its relational and productive nature will emerge through *forms*, *performativity* and *formations* (Foucault, 1984a). As Foucault states, power, like knowledge, is something that circulates in a network manner and indeed the two often appear as inseparable parts of the same complex. The advantage of taking such a philosophical stance is that my research work will be able to explore objects—human, non-human, instruments, practices, social networks and institutions - 'together' based on the sociotechnical nature of the study.

The information systems understanding is grasped on the basis of the apparent need for a *"machine-user interface that provides information to management for decision making"* (Parker and Case, 1993 p. 14). Going a step further, the study is being done to explore the elements of resistance emerging from circulation of power. Keeping the practice-based perspective which brings even the codified—explicit—knowledge into a tacit form of knowledge (Hislop, 2005), the research will attempt to examine the tacit nature of knowledge—deriving from information—that exists within the organizations under study. Within the organizational learning perspective, the study will attempt to observe the process of modification of behaviours, skills creation, acquisition and transfer of knowledge that ultimately affected organizations' '*performance'* (Lilly *et al.*, 2004: p. 160). Since, knowledge in its tacit formation can be exchanged through socialization (Nonaka *et al.*, 2000) and the study itself has a 'socio' element, further

exploration necessitates finding a sociological approach that is suitable for the action oriented research. The proposed pragmatic sociological stance (Benatoul, 1999) also known as the sociology of association/translation, introduced by Latour (1987b), Law and Callon (1986) is based on actions. The study of actions will lead to observe associations amongst human and nonhuman objects. An account of these sets of entities and their interrelations enables a symmetrical development that will ultimately lead to theory building.

1.3 Posing the Research Questions

Based on the philosophical stance and literature review, the following research questions are posed. The key question to be investigated will be:

> What is the impact of implementing the software for computerizing universities' administrative work and its usage for decision making in the universities of Pakistan?

In order to assess the impact, the following sub-questions have been framed:

1. How does the performance of human and non-human objects change as a result of the process of implementing the software?

2. What is the impact of computerization on power and authority that exists within the university and among the educational institutions?

3. How does the relevant social system adapt, interact and change? If it does not absorb changes, does it propel it outside or hide it within the culture?

1.4 Methodological Framework

After considering the compatibility of the conceptual framework of the study with the philosophical stance and socio-technical nature of action-oriented research work, Actor Network Theory—ANT—is proposed as an approach to probe the socio-technical environment. ANT, with its background in Ethnomethodology and Sociology of Scientific Knowledge—SSK, combines elements of semiotics—relational materiality—and performance (Law and Hassard, 1999: p. 4). The advantage of ANT is that it *"treats entities and materialities as enacted and relational effects, and explores the configuration and reconfiguration of those relations"* (Law, 2004:p. 157). Originally formulated by Latour, Callon and Law in the early 1980s, ANT is a sociotechnical approach to the study of processes of ordering and organizing. It is sometimes referred to, by Latour, as following the tradition of 'sociology of translation or association'. Within '*Actor Network Theory'*, '*Actor'* represents the human and nonhuman objects of study based on the assumption that the action of any actor is dependent on other actors. The '*Network'* is a concept—not a thing—that is framed by capturing actors, intermediaries and mediators through their movement from one place to another. The 'Theory' is based on the outcome of the research conducted. Latour (1987) explains that ANT does not have the realities of '*Actors', 'Networks'* and *'Theory'* built into the approach; instead the three words have been used metaphorically. The acronym ANT was retained more than as a mere abbreviation as it represents the 'ant' like working nature of the approach.

ANT's epistemological stance lies with its constructivist ideas. However, it diverges from the idea of strict social constructivism where reality is seen to be constituted exclusively by social forces. For ANT, the constructivist idea lies in the appropriation of

facts by mobilizing various entities, through which 'the social' emerges from the construction process (Latour, 2007:p. 91). The ontological stance for ANT claims that it is built on relativist ideas. However, "*ANT claims that we will find a much more scientific way of building the social world, if we abstain from interrupting the flood of controversies. We, too, should find our firm ground on the shifting sands. Contrary to what is so often said, relativism is a way to float on data, not drown in them"*(Latour, 2007:p. 24). Latour demands that we explore data from its associations and connectivity's perspective rather than going into the (false) depth of attempting to establish what it really means. By working and exploring the links between the shifting frames of references, ANT attempts to reveal patterns that lead to accounts of sturdy relations. The belief in such ideas provide us with a 'network'-oriented, relativist ontological stance that relies on in-depth coverage of controversies.

ANT's implementation strategy is based on two different phases. Phase I is ANT's deployment phase, where data is collected and uncertainties are ascertained. While phase II deals with analysis by stabilization and compositions. In phase II, three analytic moves are performed to accomplish a localizing of the global, redistributing the local and connecting the sites.

Phase I involves the capture of five sources of uncertainties, by locating the controversies related to the deployment of software within the computerization process. The first source is group formations within and among organizations i.e. Techlogix the software company, the HEC and two universities. First, I will identify the group spokespersons from their '*voices'* or '*designations'* then try to observe the kind of controversies that occurred during the computerization process. Here, the observation will also identify the role of *intermediaries*—who simply help transfer input to output as

predicted—and *mediators*—who can change the predicted outcome. The second step will observe the actions taken by examining by 'whom', 'when', 'why' and 'where' actions were taken. The third step demands granting agency to non-human objects. In my case, the most evident non-human partners to the research that can be granted agency are the software and computers. Other nonhuman elements will emerge as the research progresses by exploring the times of innovations (Conway and Steward, 2009), occasions, accidents and breakdowns, documentations, memoirs, etc. The nonhuman objects performance will be focused more then on their nature of materiality. In the fourth step, I will try to capture and distinguish matters of fact from matters of concern by probing into the organizations. The fifth steps demands exploration of the documentation and this will be done using hard and soft formats, in order to supply the four different types of notebooks that will provide accounts of a logbook nature—for appointments, reactions and surprises; of chronological order; of idea; and of metaphor, capturing the effects of written documents on actors, please see Appendix B. NVivo—version 7—will be used to store all the data/information.

Phase II of rendering associations will start after data collection. In this phase, there are three 'moves' of analysis that will be performed, in order to reveal a social that will inculcate the technical environment within itself. The three moves will be based on the data collected and following the actors to observe how the controversies were resolved by building formats and standards. This will be done by fully recognizing boundaries, categories and settlements within the network. The last part is to observe how the assemblage has been made and what sort of new things emerge from it (Latour, 2007:p. 227).

The first move provides the translation by identifying the *mediators'* co-existences, rather than exploring the causality between them. By exploring the *mediator's* actions, the transformation process will become evident. The formation of a meshed network enables the macro level applicability to be viewed under the micro level in an '*oligoptic'* manner[5]. The micro level analysis will be compared with the image provided to others about the project--the concept of panoramas given by ANT. In the second move, the production site and local interactions will be examined by adding the nonhuman agencies—known as *plug-ins*—that will include the semiotic aspects as well. Based on the network and formation analysis in the prior moves, the third and final move will identify types of connections—by framing networks—that transport the agencies e.g. forms available, *mediators* e.g. documents, software systems changing nature of work—used in the transportation process—*intermediaries* that transmit from one point to other without change—and identification of *plasma*—i.e. beyond our empirical analysis playing its role on the network. The analysis in the shape of three moves will bring out the socio-technical environment where power shifts will be evident from the performance and formation of actors can be observed for enhancement of knowledge.

1.5 Tools for Data Collection

After examining the requirements which ANT placed upon data, semi-structured interviews are recommended for capturing the interactions. Following ANT's stance on interactions' deficiencies, ([6]isotopic, not synchronic, does not provide a synoptic account, and cannot be homogenous), the inter-action (in this case semi-structured

[5] In comparison with Foucault's panoptic, oligoptic is where multiple inputs are received for observation.
[6] Isotopic in the sense that acting is based on multiple actions, distant locations and materials and emerging from remote invisible actors. Non-synchronic means that the whole interaction is weaved in a timeframe that is difficult to find. Non-synoptic means that there are many hidden actors that need to be identified.

interviews) has to be stretched and information gaps left in interactions have to be filled through the observance of semiotics. This will be done by exploring documents, visiting the sites with different perspectives, observing human and nonhuman interactions, voice tones, and looking at visual expressions and gestures. In order to further explore the past accounts related to computerization development and implementation, the interviewees will also be asked to tell a story about any event they can remember which is related to the automation process. Storytelling is being used due to its narrative nature—which ANT also incorporates, its ability to visualize information (Gershon and Page, 2001) and pointing to multiple notions (Gabriel, 2000). The storytelling method may provide an insight into identifying actors, power, politics and emotions that have to be counter-checked for their subjectivity from the methods mentioned earlier.

1.6 Organization of the Study

Chapter 2, Literature Review explores the meaning of *content* and *context* and their utilization for the research work. The requirement of such study emerged due to Avegoreu's (2001) study that demanded a context based research for the developing countries is required to explore the emerging IT domains. Actor Network Theory is introduced and critically examined for its applicability towards the implementation of the project. The allied theories and contents related to Computerization process are also explored here.

Chapter 3 discusses ANT's deployment processes for the sake of data analysis. Based on Latour's (2007) version of ANT, the framework is explored from the five steps in identifying the uncertainties and three moves to develop the network formation. These network formations are based on human and non-human associations and their connectivity. Latour's version of ANT is expressed in detail for its operationalization

for the research endeavour. Reflections of deploying the ANT are also included within the demanded steps.

Chapter 4, the first data analysis chapter introduces the main entities/actors within the framework for analysis. ANT's terminology is deployed to identify its elements throughout the chapter while positioning the story to introduce itself with a historical context.

Continuing with previous chapter of analysis, Chapter 5 and 6, this chapter analyses the case study of the university based in north of Pakistan and the university based in south of Pakistan. These chapters introduce the resistance towards computerization process. It is identified within various fragments of networks. For ease of understanding the two universities, though compositely made the computerization 'pilot project', were discussed as two separate cases. Resistance sources are framed by exploring the language, group shifts, change of authority and shifting of boundaries that generated uncertainties. Power is observed in the circulation but its role is not discussed within the chapter. Despite the resistance evident in the previous chapter, there was some evidence of implementation and changed performance. The utility of *form* as *transport vehicles* were identified within the fragmented networks of the two universities.

Chapter 7 is the discussion and conclusion chapter which attempts to identify the variations of resistances faced within the transformation processes. Within the transformations, the changed processes are being looked at from the human and non-human stakeholder's point of view. Last but not the least; the chapter concludes the studies by presenting assumptions, reflections and limitations.

Chapter 2 Literature Review

"The great inventive power of science is born in these confluences, where heterogeneous projects, social practices and ideas become mixed together"

(Brown, 2002:p. 9)

2.1 Preface

This chapter is divided into two main sections. The first section explores Actor-Network Theory—ANT's emergence, its difference with other types of frameworks and critical review of its development. The second section is based on ANT's associated literature to explore its applicability for the research endeavour undertaken.

The first section explores the way that ANT uses notions of 'context' and 'content' in comparison to other frameworks. 'Content' is considered as the technical side and 'context' as the social side. This is explored through the literature from the perspective of considering ANT's suitability for socio-technical studies. Latour (2007) proposes ANT as a radical sociology based on 'associations' in comparison with traditional sociology that he defines as 'sociology of social'. In order to compare the two sociologies, one case from each side has been discussed to accentuate the difference with regard to questions of the content and context of the studies. ANT's ontological and epistemological stance is identified through its use of the concept of 'network; in order to explore the performativity and transformational aspects of research endeavours. ANT is critically evaluated on the grounds of its deploy-ability and related outcomes through the use of the network concept. ANT's flexible stance enables it to utilize its framework in many different ways. The literature attempts to explore some popular versions of ANT and attempts to discuss their modalities.

With the aim of providing an alternative to traditional structures and theories, the second section is based on identifying possible techniques that can be considered to provide order and accountabilities within the organization. Proposed practices are transformed when the element of change is introduced. Communication channels modes are also changed with the introduction of the change element. The university sector is explored through the components that constitute its particular body of politics. Foucault's account of 'technologies' are also considered as part of an ANT framework. The understanding of business process, culture mobilization, power circulation and possible resistance faced within ANT's network is being explored from the business process management perspective.

2.2 Variations in Portraying Context and Content

In a review of Information Systems (IS) research performed within the developing countries, Avgerou (2001) argues for the necessity of understanding '*context'*. He notes that many countries that have implemented information Technology—IT—systems in their institutions with reference to global business objectives and internationally adopted practices around information and communication technologies advancements. This a-contextual way of implementing IT has created many failures within organizations and frustrated local efforts (Schware and Kimberley, 1995). The failures suggest that implementation on its own does not provide the required improvements. Equipment transfer and software installation is important but it is only half of what is required to complete the project. This 'content' can only be useful if they are implemented within a particular context. Avgerou (2001:p.44) suggests that the study of information systems—IS—innovation in developing countries should have following characteristics to build up the *context*:

> *"it considers IT innovation in relation to socio-organizational change; it considers not only the organizational, but also the national and international context; it considers not only the technical/rational decisions and action involved in the innovation process, but also the cultural, social and cognitive forces of such a process*. (p.44)"

Avegrou (ibid) calls for more complexity within IS studies of developing countries in such a way that the social and technical sides are equally considered. The implementation process should be looked at from multiple perspectives, including international, national and cultural levels. The problems with information systems studies that are based on single sided view is that they treat technological change in relation to either the *contents* or interaction between technology and social change as *context*. In socio-technical systems, there is a division between these two sides and each is treated separately from one another. Latour (2007) defines such kind of research as 'Sociology of social' where the social is treated as separate from the technical. In this kind of research, the social is fixed in the shape of well-defined structures that are repeatedly referred to while providing findings. The theories here are well defined and impose hypothesis on the studies. But even the some of the early social shaping approaches also used an understanding of the social formation of technology but with a slight deviated proposition that the "*capacity of the technology is equivalent to its political circumstances of production*" (Grint and Woolgar, 1997:p.19). The social remains in place as fixed context that is aloof from technology considered as the content. Furthermore, both were seen existing within a clearly defined body of politics.

Grint and Woolgar (ibid) explains that how the Sociology of Scientific Knowledge—SSK—spawned social constructivist approaches to technology—where the social is

required to be developed rather than working it with a prefix social. SSK's sociological inquiries were based on science's *"contingent social process, situated in specific socio-historical locations"* (Tyfield, 2008:p. 63). The shift from purely scientific studies was based on assertions that facts themselves cannot determine the scientific knowledge; beliefs arising from historical and political contexts had determinate effects. This meant that the difference between *true* and *false* scientific statements had to be explored from the context of people's beliefs, rather than accepting them as established facts (Hollis and Lukes, 1982). These approaches included Social Construction of Technology—SCOT—by Bijker*et. al*. (1987) and Social Shaping of Technology—SST. SCOT was essentially applied relativism (Klein and Kleinman, 2002) based on a notion of social groups where *"all members of the certain social group share the same set of meaning, attached to a specific artifact"* (Bijker *et al.*, 1987). SST provided the conceptual basis for an early ANT by capturing vast array of ideas:

> *Central to SST is the concept that there are 'choices' (though not necessarily conscious choices) inherent in both the design of individual artefacts and systems, and in the direction or trajectory of innovation programmes. If technology does not emerge from the unfolding of a predetermined logic or a single determinant, then innovation is a 'garden of forking paths* (Williams and Edge, 1996:p. 866).

The main aim for these approaches was to "*take the account of technology itself or take seriously the content of the technology"* (Grint and Woolgar, 1997:p. 19).The emphasis here was on fixed understanding of the social. All these approaches now reside under

the banner of Science and Technology Studies (STS) working under 'Society of Social Studies of Science' (4S) (Hackett *et al.*, 2008).

Latour's differentiated his version and attempted to pitch ANT as an alternate sociology by calling is the 'sociology of association' (Latour, 2007). Latour (1993:p. 4) explains difference from traditional sociology lies in exploring associations that ANT attempts to capture. *"Research does not deal with nature or knowledge, with things-in themselves, but with the way all these things are tied to our collectives and to subjects."* The difference here is that all human and non-human entities are treated on a single level. Subjects and objects are being looked at in terms of their connectivity. Association and disassociation provides the account of such research endeavours. These concepts are being approached from two sides i.e. the '*content'* and '*context'*. Latour (2007) explains the tensions between the two kinds of studies where '*context' and 'contents'* are studied in such a way that distinctive separations between the two side remains. Traditional sociological theory points to fixed structures. Instead, ANT approaches the *contents* to form a whole that constitute a social. Technical artefacts unleash their material agencies within the social as determined by the researcher in the shape of heterogeneous networks. According to Akrich (1997:p. 206) "*Technical objects participate in building heterogeneous networks that bring together actants of all types and sizes, whether human or nonhuman.*" The term 'participate' indicates that agency ought to be accorded to technical objects as well. Under the umbrella of the sociology of social, socio-technical studies propose that organizations should be understood as two elements working side-by-side. Sociology of association/translation critiques the other side that by arguing that the separation of '*content'* and '*context'* simplifies matter for the analyst, but also obscures complex issues (Callon and Law, 1989a). In order to

understand the '*context'* and '*content'* based research, this chapter attempts to explore both sides to observe whether the two are mutually exclusive or inclusive of each other.

2.3 Difference of Social in two Sociologies

The next two passages provide an account of organizations studies from the sociologies of the social and association and attempts to understand variations among the generation of *contexts*. The two studies discussed have been picked not on the basis of authorship, but instead on the typical outcomes that two sides tend to depict.

Studies done in traditional sociology provide an account of factors involved in transformations but with fixed *context*. The study conducted by Lavikka (2004) on computerisation impacts ("*Fulfilment or Slavery? The changing sense of self at work"*) provides an account of transformations in the working environment. Lavikka's(2004) findings suggest that computerization changes the allocation of work, skills and competencies by overcoming existing working boundaries and developing new arenas based on the skill and professional alliances (ibid:p. 148). The new alliances could become communities of learning around the new technologies. If they are provided proper guidance, they could also change the organizational culture. The embedding of computers systems—now commonly known as information communication technologies (ICT)—has become the backbone of the other systems. It provides a knowledge intensive environment that demands new skills to be developed as well as new practices to be incorporated within the organizations. Lavikka (ibid), following traditional sociology claims that the introduction of ICT has changed the division of labour based on peoples' specialization of work as upper white collar are now involved in producing innovations, whilst the lower white collar are now working on co-operation and integration, and blue-collar workers work on assuring the flow of

production processes and securing quality and delivery times. Although she proposes this as a significant transformation in modern organisations, it seems that the nature of work has not changed that drastically. Work-displacement is not being detected with the introduction of computerized process other than the aspect of *'standardization of skill sets'*. The other change that may also occur could be at the level of associations. Lavikka (ibid) suggests that network alliances could be changed towards common learning goals provided there is favourable social environment. She seems to ignore that the social atmosphere is not limited to the organization's internal environment, as pressures and stress on employees might be generated from their family-life or anywhere outside the workplace. Although Lavikka describes the transformations and identifies the key factors that are making changes within the existing social, the study poses the universalization of these changes to all the computerized systems. The element of situated-ness and the *content's* individualization is ignored here. The '*contents'* (i.e. technical skill sets) have been standardized and committed to the *context* of ICT for all situations and countries. Though she transforms the '*context'* with side-by-side enactment of *content* of ICT, its nature is fixed and applicable universally. The network alliance is analytically limited to the human social ties and it does not extend its level to material. But it is the technology that is making the change. Therefore, traditional sociological study of *content* separates it from *context*. This distance reifies technical techniques as they are the ones making changes within the social *context*, despite the claim that it is social that is changing and shaping the technical. According to Grint and Woolgar (1997:p.2), *"In the context of long-term development of culture, other commentators have remarked upon the naivety of our persistent reliance upon technology to produce dei ex machine*[7]*"*.

[7] Latin Phrase for "making god out of the machine".

Moving on from the traditional sociology, ANT that attempts to explore social changes where the social and technical are not the effect of one other. Rather, it is a mixture of techniques that are represented within the actions analysed. These techniques emerge from the fluctuation of various '*content'* and 'contexts'. The multiplicity of the techniques does not explore the boundaries between various groups, instead looks at the group formations itself. A group is here defined as a combination of human and non-human objects (Latour, 2007).

Latour (1996b) reveals the chain of hidden inscriptions in *"Social Theory and the Study of Computerization Work Sites"* when he describes a train journey commencing from Paris to London. Purchasing a computerized ticket relies upon so many hidden inscriptions that are activated in the form of recordkeeping for travelling, insurance, local and international legal bindings. The journey done through/by the train is simultaneously happening within information communication technology as well. These hidden inscriptions are only activated when an event related to their interest is triggered. Embedded within these inscriptions are techniques that emerge from various domains— management, international laws, local laws, cartography, managerial, logistic, transportation, etc.—that activate momentarily to enable the journey. The whole process of transformation of a fast train journey is described through the study of artefacts and human interactions. The train as a '*transportation vehicle'*[8]takes Latour through multiple inscriptions that were laid down in the shape of multiple disciplinary contracts. Connectivity amongst them is digitized to enable the passenger's journey. The combination of these inscriptions act from moment to moment to transfer him from Paris to London. As a passenger of the train, the '*contents'* working from Micro to Macro level enables inscriptions and makes his own transformation complete in the

[8] Latour uses this term for defining 'Form' in ANT.

shape of reaching London. As an outcome of '*contents',* the '*context'* is being changed on moment to moment basis to perform the transformational journey. While travelling back to Paris the transnational train is yet another transfiguration that will be done using the same entities. The *malleable media* and mediums also have the agency on the traveller as well. By swapping the *content* and context from moment to moment, the sociology of association provides an account of network formation. Therefore the technical is not limited exploration of *content* only but the same *content's* usage in the formation of *context* has to be detected.

Woolgar (1991) suggests *content* and *context* mutually elaborate each other. The reason is that the outcome of *context*—social—actually becomes the *content*—technical—for the next moment. The *context* and *contents* switch with the change on constant basis. There is "*entirely pragmatic, permeable and revisable boundary between context and content*" (Callon and Law, 1989b). The distinctions between them fade fairly quickly as their signs of identification changes rapidly. Therefore observing both content and context in a mixed formation provides a better insight of the outcome in a form of a mixture.

We have now seen how '*context'* is treated by both sides. From the traditional sociology, context is seen to emerge from universal applications and standardization pointing to fixed structure, which acts to keep the social and technical separate. By contrast, ANT provided us with more local applications where global configurations are being activated in the localized realm. The advantage of using ANT is that it enables an exploration of global perspectives within the localized actions which gives more insight into the impacts of computerizations as the outcome is the production of sociality—

context—which is not fixed in a structure. Something new might be understood or produced (Latour, 2007).

2.4 Actor Network Theory Framework

The word 'actor' or 'actant' is used in Actor-Network Theory—ANT—to refer equally to human and non-human participants within a given action. The subject and object together creates the realm of actors. ANT grants actors the ability to make up their own theory of what is social and it simply follows the actors' lead. The word network is often confused with the idea of a computer network where connections are established between computers and are quite visible (Latour, 2007). In this type of network, information is simply transported without deformation from one connection to another. On the contrary, ANT perceives a network to have flow of translation where *intermediaries* and *mediators* are playing their roles. Philosophically, there is nothing but networks (i.e. there is nothing 'outside' that is also not a part of another network). Importance is given to identifying *mediators* as they play a key role in the *transformations*. The *inscriptions* play a key role within the networks as they provide the agency to actors and more importantly the traces for observing the social account. ANT does not provide accounts of social-networks[9] instead it intends to produce social theory out of the networks by exploring the associations (Latour, 1997). "Each element of networks '*relays'* and '*prolongs'* the action in itself" (Law and Hassard, 1999:p.223). Networks generate hard[10] facts by extending themselves spatially (ibid: p. 34). Latour (2007) provides a metaphor of a fishnet for ANT's view of networks. Just like fisher's net, ANT provides a point to point connection that is physically traceable. Any hole or

[9] Social network adds information on the relations of humans in the social and natural world.
[10] The compound bodies are 'hard' meaning they retain both their constituent and their overall general shape when they extend their surfaces as far as possible. (Idea taken from Spinoza (1993, p. 51)

disconnection of points will leave the fishnet as well as Actor-network empty of findings. The complexity of fishnet knotting within Actor-network's weaving is complex and requires immense effort. After the re-knotting, the fishnet would be same, but not the Actor-Network. The difference between the fishnet and Actor-Network is that you can hang the fishnet but the actor-network has to be traced *"anew by the passage of another vehicle, another circulating entity"*(Latour, 2007:p. 132). The Actor-Network would have a different account of performativity each time it is laid out. The multiplicity of the act in more than one network with the agency lying in network is framed in a stacked manner that ANT attempts to highlight (Muniesa, 2009). Latour (2007:p. 220) explains these stacked networks as *"an anatomist would see if she could simultaneously colour all the nerve, blood, lymph and hormone pathways that keep organisms in existence. 'Admirable networks' is the word some of the histologists have used to register some of these wondrous shapes*". The last word in ANT is theory. For ANT, a theory of the social emerges from the utilization of ANT itself. According to Latour (2007)*"there is no actor, network or theory in ANT",* all three words have been used as a metaphor. Therefore, ANT should be seen as an approach or a conceptual framework to explore the social research endeavours that lie within the science and technology domains. The acronym ANT was retained due to its 'ant' like nature which works steadily to achieve its objective. While it is widely believed that ANT's philosophical stance lies within the postmodernist philosophy—some even doubt whether it is a philosophy or not – Latour (2007:p 12) refuses its association with it by explaining that:

> *ANT has been confused with a postmodern emphasis on the critique of the great narratives and Eurocentric or hegemonic standpoint. This is however a very misleading views. Dispersion and destruction and deconstruction are not the*

goals to be achieved but what needs to be overcome. It's much more important to check what are the new institutions, procedures and concepts able to collect and to reconnect the social (Latour, 2007).

The ANT epistemological stance lies in constructivism. However, it is different from the idea of social constructivism where reality is made of sociality. For ANT, the constructivist idea lies in the notion of the construction of fact by "*mobilizing various entities whose assemblage could fail*" (Latour, 2007:p. 91). The ontological stance of ANT claims that it is built on relativist ideas. However, *"ANT claims that we will find a much more scientific way of building the social world if we abstain from interrupting the flood of controversies. We, too, should find our firm ground: on the shifting sands. Contrary to what is so often said, relativism is a way to float on data, not drown on them"* (Latour, 2007). By working and exploring the links between the shifting frames of references, ANT attempts to reveal patterns that lead to an account of sturdy relations. The belief in such existence provides us a *'network'* oriented relativist ontological stance that does not leave ground quickly and relies on in-depth coverage of controversies.

2.5 Critical Analysis of Actor Network Theory

Management and organization studies often tend to refer to structures and ordering mechanisms (McLean and Hassard, 2004). McLean and Hassard (ibid) build a critique of Actor Network Theory—ANT—for providing insufficient symmetrical contents to produce the accounting process. The problem of using ANT in this domain lies in inclusion/exclusion, human/non-human issue, privileging status, agency/structure, heterogeneous and political issue. According to Law (1999:p.3-4) all *"these divides have been rubbished in work under taken in the name of actor-network theory"*. Yet

these are points of confluences and conflicts where researchers of both sides attempt to draw lines in-between. In terms of inclusion/exclusion, the problem with ANT is that it cannot identify the cuts and assemblage directions driven by the researcher. In response, Law (1991) suggests that narratives cannot be narrowed down to the level of subjects and unimportant actors tend to fade away from the network by themselves. The researcher cannot follow the actors everywhere, thus ultimately they have to indulge in practices of ordering, sorting and selection. The perceived images of researcher provide the approximation of reality. ANT is associated more with the research of worksites, where hybrids interaction is taking place, rather than studying humans, technical and social separately (Kaghan and Bowker, 2001). *"Residual categories are vital to the form and to the aesthetics of all formal systems, and their usability. They are the defining white space around a formal system's objects, just as in art"* (Star and Bowker, 2007:p. 275). The aspect of adding surrounding effects from these *white spaces* enables to understand the objects and gives meaningful understanding to there working formations. Inclusion/exclusion of these white spaces depends upon making '*accountable cuts'*. These cuts are based on admittance of associations where barring is based on gradual fading of connectivity. Within associations, big and powerful actors are likely to have greater impact on organizing and ordering the shape of heterogeneous network[11](Amsterdamska, 1990; Elam, 1999). Therefore, both success and failure should be looked at to assess their shared influences and confluences (Latour, 1992b). The human and non-human symmetry in ANT has also been criticized to leading to impotent and prosaic case studies (cited in McLean and Hassard, 2004; Collins and Yearley, 1992). The mundane stories attempt to provide an alternative and diverse way of thinking, rather than providing an exposition of outcomes presented by an expert

[11] Feminist thinking where ANT is perceived as Machiavellian management theory of control.

scientist. This manifests itself and attempts to include all actors within the network. The openness of actor network provides for the *"...inevitability of unanticipated contingencies and of the innumerable ways in which messes can overflow the frames constructed to contain them" (Kaghan and Bowker, 2001:p. 265)*. The ventriloquist—analyst—does speak but for multiple puppets. Through such framing where society and material are treated as a mangle, ANT gains an advantage over other socio-technical methodologies based on unique understanding of form and *formations*. *"ANT is not, I repeat is not, the establishment of some absurd symmetry between humans and non-humans"* (Latour, 2007:p. 76). The mangle provides a new way to think about *things.* The network *"..entails both an understanding of categories of those designing and using the systems, and set of analytics questions derived from our own concerns as analysis"* (Bowker and Star, 2000:p. 42). The constitution of a mangle for this research would engulf the multiple categories of elements interacting at inter and intra-level from their pre-fixed boundaries simultaneously. The attempt here would be breakout the elements from their conventional standardized categorization and test them through mangle to frame the outcome. Gad and Jensen (2010) provide a *'post-plural attitude'* or a *'non-humanist disposition'* notion for ANT - "*ANT texts neither as sociological theories or methodological guides but as additions to and transformations of the study of various networks"* (ibid:p.73). The puppeteer provides the voice but the determination of which voice takes more importance is decided by the puppeteer him/herself (Latour, 2007:p.215). ANT has been blamed for according higher status to artefacts over humans. In response to this critique, Latour (2007) attempts to clarify that humans do have superiority over artefact. The purpose to give a voice seems to be related to ANT's study of *effects*. If the voice of the artefact is not given then it might be treated as a cause. *"If action is limited a priori to what 'intentional' 'meaningful'*

humans do, it is hard to see how hammer, a basket, a door closer, a cat, a rug, a mug, a list, or a tag could act. They might exist in the domain of 'material' 'causal' relation, but not in the reflexive symbolic domain of the social relation" (ibid.p:71). The aim here is to highlight and observe the objects' metaphysical shades on humans by granting voices to them. ANT grants agency to structures but without their recognition. The two sides—agency and structure—are treated as antithetical (McLean and Hassard, 2004) but their mutual constitution can be seen in the work of Giddens (cited by Mutch, 2002) and Callinicos (1985)(cited by Mutch, 2002)

. The apprehension is that role of technology presented through techniques only would relinquish social and grasp technical determinism. (Grint and Woolgar, 1997).Grint and Woolgar (ibid) suggest the utilization of ethnographic elements and the exploration of text would restrict ANT from leaning towards technical determinism. For Latour, leaving structure is not the aim for ANT since this would be to fall back into postmodernism *"I have not found word ugly enough to designate the intellectual movement—or rather, this intellectual immobility through which human and non-humans are left to drift"* (Latour, 1993:p. 61).Realizing the need for structure, Law (1997) provides this through the mediation of objects that emerge from the research. This is done by shifting actions to a *form* of analysis that focuses on events (McLean and Alcadipani, 2007). In this process the mega structures lose their magnanimity as – Foucauldian style—governmentality turn into ordering, administration turns into accountability and cultural norms turns into a resource to be utilized within the network. The structures turn into infra-structure for network to be explored through the mediated objects (Star and Bowker, 2006). The infrastructures have the capabilities to sink and embed itself into the existing social and technological structures ((Bowker and Star, 2000:p.35). This abstraction opens up an avenue for ANT to explore the prevailing

structure within network formations. Rather than relying on Law's efforts, Latour suggests formulating throwaway explanations within the network formation (Gad and Jensen, 2010). Latour refutes the accusation of ANT being non-political through its ignorance of the way the whole network exists within a body of politics (Latour, 2008b). All representations of classifications and orders interplay within the body of politics. Such notions should be taken into account only when they emerge, rather than accepting them as universal. The body of politic engulfs heterogeneous elements that need to be considered at par. Latour (2008a) accepts that ANT does not account the hierarchical formations as it limits itself to the network connection (Latour, 7 March 2012). The heterogeneity does not distinguish between ranking's rigidity. It is in such crossroads that ANT is located. ANT is in continuous movement and it is still going through transformation process. Its niche usage towards the contemporary technological systems provides the account of our mode of existence, but more importantly gives us a new way of exploring the associated processes and practices (McLean and Hassard, 2004). The effort of Post-ANT—explained in the Actor Network theory—is not to restrict it to a theoretical perspective or method, rather the aim was to open up its avenues of usages in the multidisciplinary areas (Gad and Jensen, 2010). It can be used as understanding the socio-technical phenomena and technical innovations.

2.6 Flavours of ANT

Actor Network Theory—ANT—was introduced by Bruno Latour, Michel Callon and John Law in the early 1980's. ANT as defined by Law (2004) is an *"approach to socio-technical analysis that treats entities and materialities as enacted and relational effects and explores the configuration of those relations"*. According to Law (1999:p.3-4),

ANT is about *semiotics* and *performativity*. *Semiotics* explains the formations of entities and attributes in relation to other entities. The attempt is to remove all fixations, divisions or distinctions and comprehend these notions as *effect* or *outcomes*. *Performativity* on the other hand provides the account of how performances are shifting due to changed atmosphere. "*Actor Network Theory has passed from one place to another. From one network to another. And it has changed, become diverse"* (Law, 2006:p. 54). According to Law (ibid) ANT has gone through its own network and evolved in many shapes mainly due to its usage at various places and by multiple researchers. This diversity has made it both week and strong at the same time. It's weakness relies on researchers'' betrayal from ANT original aims, whereas, its strength lies within the varied styles that it is been used without compromising the basics that ANT demands to be incorporated within its narratives. Despite of its varied operationalization, ANT's could be categorized into three closely attached and somewhat diffused versions of the framework given by the three authors. Law (2009:p.146) sticks with his generic version of ANT by defining the parts as "*semiotic relationality (it's a network whose elements define and shape one another), heterogeneity (there are different kinds of actors, human and otherwise), and materially (stuffs is there aplenty, not just 'the social').*"Callon's *translation* is based on the narration of *problematization*, *interessement*, enrolment and mobilization, but he does incorporate the three main elements defined in Law's version (Clegg, 1994:p. 205). *Problematization* engages agents based on the indispensability of the solution to the identified problem. The attempt here is to identify the *obligatory passage points* through which problem solving could be achieved. *Interessement* deals with fixing the membership and meaning in certain categorization device. The process is done with three entities applying their agencies and committing to certain transaction. The first

entity in between ensures a locking of the other two. *Enrolment* is a process where agencies create alliances between their memberships that is attained through fixation of understanding. *Mobilization* points to a set of methods that are applied to ensure the representatives' representations. Last but not the least is Latour's (2007) version which projects the sociology of association by exploring *uncertainties* and then stabilizing them *by reassembling the social*. It explores *uncertainties* within five domains that are group formations, *Group formations, Actions—is overtaken, Objects to have agency, Comparing matter of facts with matter of concerns and Writing down the risky acco*unts. Unlike Callon's translation that ends at mobilization, it demands three moves: *Localizing the global, Redistributing the Local and finally connecting the sites for assemblage.* Latour provides his detailed account of five uncertainties and three moves whilst giving due acknowledgment to Callon's translation process as well (Latour, 2007).

After considering the three options, Latour's version was preferred for conducting the research on the grounds of its suitability towards exploring fragmented processing, the nature of distributed organizing, situated planning and ease of comprehension towards assemblage. The literature review and data collection phase demonstrated that there are tangled processes but these processes or forms[12] could only be understood within fragments of organizing, rather than drawing upon Callon's model where the elements are subsumed into one big story. The idea was to learn one lesson at a time. Since it is the latest version of ANT, Latour seems to incorporate techniques that were considered missing within the older ANT frameworks. Furthermore, Callon's model explores a stable environment; whereas the crux of Latour's version is on *uncertainties*. However, Callon's version of ANT does seem to appear in some fragments of network where

[12] Latour defines processes as form

temporary stability was achieved. The aim was to capture greater number of *uncertainties* within the *form* and *formations*. Actor's behaviour within and across the fragments transform, therefore one big network does not suit the study. Being a nomad to ANT, Latour's (2007) book also had an agentic effect. His ANT version provided a clearer understanding in differentiating antithetical differences between sociology of social and associations. Furthermore, it gives specific guidance to operationalize research projects.

Moving on from exploring ANT the next section of this chapter explores the literature that can be used with the ANT's framework for exploring organizational aspects. In what follows I will try to re-read some of the traditional theories described in the last chapter the lens of ANT to reveal processes of ordering, practices, and body of politics, organizing understanding business processes, power and resistance.

2.7 Ordering Through Set of Techniques

If we accept bureaucracy as a *form*, then according to Latour's (2007) interpretation, it becomes a *vehicle of transport* that connects various actors within a network to communicate with its combination of techniques. By making such claim, bureaucracy loses its stature from a standard to a mode. Instead of looking at it from an angle of a fixed structure, its techniques are being explored within actions. As per Law's (2009:p. 149) interpretation, the mode of bureaucracy consists of relational entities that provide ordering through a set of defined processes, sets of competent offices and an accounting system to preventing fraud. The ordering mode (ibid) can be seen as set of techniques that form a certain way of organizing. The standardized and structured strategies in the shape of enterprises and bureaucracies were easy to use for the university administration as these modes were routinized in the system through education. The different modes of

ordering are not mutually exclusive within organizational operations. Based on Foucault's (2002) ideas of ordering, Law (ibid:p.149) gives an example of laboratories' working. He claims that labs would have been strangled in the red tape had they conducted business solely on a bureaucratic ordering mode. Conversely, the enterprise ordering mode could run into illegality, if it were to run on its own. To provide ordering and accountability, a combination of set of technique is required. The fixation on any particular mode for ordering limits the realities falling out of their discourses. The combination of ordering modes is where the balance is achieved. However, Law (1994) insists that the outcome of such a mixture within a network is precarious; they do not necessarily produce a stable environment. Taking this concept further, Hernes (2008:p. 40) questions ANT notion of assemblages for their stabilized and normalized nature of the routine-ized entities defined by Latour and Callon as *black-boxes. For* Hernes, these black-boxes are also '*Shaky or Leaky'* Therefore, ordering should be seen as a set of techniques that frame processes and practices for accountability. This leaves more emphasis on studying the mixing of techniques rather than exploring the fixed *context* as it would emerge momentarily and then diffuse into the techniques—content—again. For this research endeavour, sets of techniques are built into the momentarily located standards that are creating a social where the introduction of computerization would not impact on the social, rather a new social would emerge out of changed processing and practices. It is the associations, convergences of multiple entities that would account for the changed performativity.

The purpose of such alignment of techniques was to make people accountable for the laid down rules and regulations exercised built into the bureaucratic techniques (Boland and Shultze, 2012). From ANT's —i.e. Latour's version—perspective, bureaucracy can be seen as a '*form'* that provides the '*vehicle for transportation'* of to transmit agencies

of actors—human and non-human entities. During the transportation of rules and regulations from one place to another, bureaucracy borrows techniques from other domains and mixes them to constitute its own flow. For example, bureaucracy utilized the agency of pen and paper to demonstrate its own features as tools that were inculcated into the professional writings, in order to communicate bureaucratic technicalities (Groth, 1999). Furthermore, the use of the typewriter as a tool—although built in using other techniques constituted an artefact—provided an alternate method for writing and helped standardized writing styles. It was considered as advancement from pencil and paper. Grint and Woolgar(1997:p. 70) suggest that even text becomes technology when the reading is seen as process of construction and writing provides the guidance to usage of machine—e.g. bureaucracy as a machine.

2.7 Practices Emerge and Submerge

Like its preceding technologies, the computer is an invention that is made of material as well as intellectual parts consisting of hardware and software (Groth, 1999:p 113). In terms of its materiality, the computer has succeeded gain its position within organizations through its fast processing capabilities, its ability to provide auxiliary memory in considerably small storage spaces. But when it comes to its intellectual use i.e. the software usability, the results have been achieved at much slower pace due to increased complexity within the organizational realm. The sets of equipment used within the techniques actually play a vital role within the use of other techniques—be it technological or social—and ultimately transforms organizations. This is where the context and content shift from moment to moment within the processes and practices.

Clegg (1990:p.186-187) claims that the technical tools that are included within organizations as new piece of technology have to be refined and modified while the

skilful workforce is using them. Installing a pre-packaged technical solution within the organization could actually create problems as the artefact is being added into a socio-technical environment. This means that the '*content'* of the artefact has to be altered in such a way that it suits '*context'* of the organization—i.e. is the organizational demand. The technical—(i.e. sets of techniques) —also provokes organizations to change its social-context. This means that both *contents* and *context* have to be aligned to generate the change. This gives us an account where social and technical are going side by side but are not the same thing. Organizations operating in the real world have greater complexity in their formations in the sense that the *contents* and *context* interchange from time to time.

There are various disciplines that have their own set of technicalities or '*contents'* which are specified in their '*context'*. Yet, when applied to an organizational set of practices, these disciplines/subjects utilize its own—or borrowed but claim to be their own—techniques to provide account of actions. To bring about change, multiple discipline/subjects need to mixed to acquire the techniques that become part of the plans that invoke further actions.

Suchman (2009:p. 197) explains that in between the techniques and actions, there is a plan. For Suchman (ibid:p. 13) a plan is always situated. It is formed through set of techniques and collected from different disciplines/domains that enact. On the basis that

> *planning is an imaginative and discursive practice (now underwritten by a wide range of more or less effective technologies) through which actors project what they might do and where they might go, as well as reflect on where they are in relation to where they imagined that they might be.*

One can create a master plan to get an overview of what needs to be done, but its actual activation and '*contents'* depends upon localized activities. The situated-ness of activities demand changes within the techniques selected at the time master plan was made. Therefore, plans are almost always situated as they change at the time of their enactment. Such '*content'—technical*—based exploration demand performativity to be studied within pseudo-laboratories—(i.e. organizations)—where *contexts* are diluted within *contents*. Within these pseudo-labs, people, practices and materials are iteratively shaped, reworked and translated many times (ibid:p. 197)[13]. The creation of software and its improved versions is an example where the master plans get re-planned every time its newer version is launched. The improvements are generally based on the feedback from its organizational and user's usage. The practice of the software usage gives a feedback for its newer version to be improved. The observation of practices provides knowledge about the working nature of the organization as well as the utilization of the technologies—in a larger perspective. The actions in the shape of practices become more visible with the changed environment. Changes rupture the existing '*context'* and provide us a new account of social within the organizational realm.

Communication channels play a key role towards converting the new set of processes into practices. ANT can facilitate such duality where formal and informal communication can be captured using the Actor Network Theory framework. Formal communication can be captured through prewritten scripts in the shape of rules, regulations, numeric and graphic representations. The informal communication has to be captured from the interaction of human and materiality.

[13] Based on Turnbull's (2000) of catholic churches.

> *Electronic communication systems give voice, albeit a written and virtual one, to a multitude of organizational members un-tethered by traditional on boundaries of space and time* (Boland and Shultze, 2012: p. 65).

Communication is seen as key for coordination where social and technology is side by side. ANT utilizes the communication as a medium where *"communicative actions occur in particular moments of actual time, in particular relationship of simultaneity and sequence. These relationships in time, taken together, constitute a regular rhythmic pattern* (2009:p.85; Ericksen, 1982:P. 72 quoted in Sucham)*."*

The definitive nature of communication in this case is now converted to the conditionality of relationships. Thus communication does not render itself to be the only source for planning. Instead, the variability within the relationships provides situated actions that are required. If these relationships (which may be considered as protocols) are not considered beforehand then communication itself could actually become a source of uncertainty. The relationships are primary to communication. The rhythmic pattern mentioned within the above quote places the relationship as the important element of understanding between the communicator and communicated. Within such practices, the group size or its nomenclature does not matter so much as the agentic effects that it incurs on others.

ANT brings in the *content* element as it is organized based on its historical structures, but adds the interplay between entities as it is situated within their existing relationships. This gives more insight to forces in action rather than giving a prefixed account that is available through traditional sociology. Moving on from practices, the next section explores the existence of universities as bodies of politics.

2.8 Universities as Organization or Bodies of Politics

The structures within universities—or any other organization—are designed to provide accountability. According to Munro (2012:p.4), accountability is based on alignment and identity work. Alignment refers to the lining up of account, whereas identity work is based on the image of accounts depicted by the participant. Based on ethnomethodology, Munro (ibid) gives more importance to the participants' accounts then considering them to be signs. However, we can adapt this work for ANT by keeping level of significance of participants' account as an important issue. From the ANT perspective, the organization models and structures can be seen as a mode adopted for organizational purposes. Although these modes are identified separately, the individual features are entangled with one other. There is the possibility of having a hierarchical environment where conflicts would erupt and certain individuals would be given more priorities. As politics is everywhere, we cannot rule out any modes, or in other word we cannot work analytically with the idea of a single particular mode. As Latour (2007:p. 179)explains "*It's because an organization is even less a society than the body politic that it's made only of movements.*" The models mentioned in the previous passage are normative in nature. These models are themselves the product of a particular ordering process, such that they are not exclusive but rather indexed to particular kinds of network of processes. Therefore, the ordering models are within the frame of particular network that guides its modus operandi. For example under bureaucracy, the flow of information to a lower hierarchal level is restricted by its design (Kallinikos, 2006). The design of techniques must have emerged within the network that developed bureaucracy. From ANT's perspective, the body of politic is constituted through contents—a technique—as social is an outcome of analysis of techniques. According to Boland and Schultz (2012:p.65), hierarchical formations

particularly explore the accounting functions. People are categorized according to their technical skills and operate on the basis of continuous competition, comparison and contrast. Based on a mechanistic scheme, individuals internalize norms and notions and attempt to provide a system of one-way visibility. The word mechanist used here is based on the technological engulfment of the model where techniques are focused to provide accountability. Foucault explains these technologies *"are a matrix of practical reason and each is associated with a certain type of domination"*(McKinlay and Starkey, 1998:p. 152). These technologies are defined by Foucault as:

> *1)Technologies of production, which permit us to produce, transform or manipulate things; 2) technologies of sign system, which permit us to use signs, meaning symbols or signification; (3) technologies of power, which determine the conduct of individual and submit then to certain ends or domination, an objectivising of the subject; and 4) technologies of the self, which permit individual effect by their own means or with the help of others a certain number of operations on their bodies and souls, thoughts, conduct and way of being, so as to transform themselves in order to attain a certain state of happiness, purity, wisdom, perfections and immorality*.(Foucault, 1988:p.18)

By explaining the variety of technologies, Foucault also accepts that humans as '*programmable machines,* but through this matrix of technologies. The sociology of association does not attempt to search elements in-depth and backtrack to locate particular techniques. Instead, it attempts to observe the existing state where the interplay of this matrix of these technologies produces the social. According to Woolgar(1996) *context* does not live in isolation. A machine is constituted by social relations. Utilizing this concept, the social can be kept flat (i.e. without any standard or

structure to start with) and then used to constitute provide a cartographic account of paths (Latour, 2007). In the formation of normative university models discussed in the previous literature review chapter, humans were treated as the prime resource. In this case, a mixture of human and material is considered as a resource that needs to be explored. Any conflict, moral dilemma and personal/personnel development in a particular mode then falls under the interplay of techniques defined within technologies. By adding these technologies within the body of politics, suddenly the research becomes diversified. The alignments and identity work becomes extremely difficult to capture. The problem is how to comprehend the techniques in the ray of technologies within the matrix. Considering this to be almost impossible, ANT limited itself to an appreciation of the current situation and prefers not to backtrack the sources recommended in the Foucauldian methods, in the shape of discursive formations and enunciative modalities (Foucault, 1989). It is in this realm that accountability has to be made within the organization. The creation of an information system model that suits all becomes almost impossible. The dimensions covered in Foucaldian matrix are based on a vast array of variables. However, its overlapping sequences can provide highly situated set of techniques to be followed because the variables of matrix would change each time an information system is designed to suit a particular organization. Global information systems can only specify a minimal standard. The rest has to be added from the localized environment. This was also evident from Suchman's situated planning as well (Suchman, 2009). In ANT, one can start with techniques identified within the Foucauldian matrix's set of technologies, but to distinguish their identity after they are mixed is difficult since they form a fluid social. However, the same fluid can be added to other techniques to transform into another type of social. *"The technologies do not*

originate at a point and spread out. But instead they are passed. And that as they are changed. Become less and less recognizable" (Law, 2006:p.48-49).

2.9 University Organization Shifting Towards Organizing

Latour's (2008b) formula for a successful organization resides in shifting the nature of work towards organizing. To make the organizing mode successful the focus should be on fragments, rather than pointing to macro structures. Instead of exploring substance the exploration should be on subsistence. The exploration of substance gives us its structures; whereas subsistence relies in its qualities for existence. This could be achieved by relying in the adverb formations in the shape of religiously, politically, legally, psychologically and scientifically—and not religion, political, legal or psychological. Adverbs pose questions such as 'how,' 'when,' 'where,' 'how much'. Rather than focusing on definitions, the aim is to explore the body of politic through these adverbs that presents the qualities. The organizing mode enables them to flourish by exploring the gaps and leaping forward from other organizations. Changes of mode also demand the body politic to change in such a manner when conversion of speaker as well as addressee is happening simultaneously. To use again in Whitehead's terms: *"what lasts (the essence of the school) is generated by what does not last (the constant work of taking it up again)"*(Latour, 2008a). The essence can also be called as DNA of the university that has to read and understood. The selection of "*which part has to be encoded and which part has to leave depends on the actors*" (Latour, 2008b).

ANT does not provide identification of hierarchical structures within organizations (Latour, 2008b: video 1). The circulation of information as well as transformation is dependent between time duration –from T to T+1. Observing these times would give account of university transfiguration as well as the essence it is following for the future.

The answer to the universities' transformation lies in within Latour's (2008a) version of organization where the concept of organization vanishes altogether. By eliminating structure, the organization suddenly disappears and switches itself to a form which is moment to moment organized by its entities. Organizations do not have their own inertia. It is the movement of these entities that provides forward movement. They alternate to structures that govern an organization is provided in the shape of scripts. These scripts are the artefacts available in shape of rules, regulations, orders, charts or graphs. These scripts have the capability to become part of the other artefacts. At one time the script is enacted on the entities and the other time it is enacted by the entities following it as an oracle. This flip flop nature provides an account of organizing. Organizing is done in such a way where the fragments are approached for problem solving. The problem in this method that it is difficult to interface the hierarchies as the study renders them unrecognized. It is the work process that vaguely gives the account of organizing mode.

The next section will attempt to apply the organizing mode by matching the conceptual account of the sociology of social where structures are clearly defined to observe whether sociology of associations would be able to gain any meaningful insight in the university realm.

2.10 Understanding Processes

According to Hernes (2008), organizations work in two modes at parallel. In one mode they follow organizational models and metaphors. Utilizing models, they attempt to provide general order and understanding. In the second mode *situatedness* is explored by handling actions, experimentations and intuitions. There is an oscillation between the two modes. Latour (1999:p. 71) advises an investigation of how the two modes engage

in mutual transformation. "*Realists, empiricists, idealists, and assorted rationalists have fought ceaselessly among themselves around the bipolar model. Phenomena, however, are not found at the meeting point between things and the forms of the human mind; phenomena are what circulates all along the reversible chain of transformation, at each steps losing some properties to gain others"* (ibid). Following such ideas Latour's(2007) process of transformation is based on the idea of *form*, *transformation* and *formation*. *Form* is described as *transporting vehicle* within the network. Therefore, in Actor Network Theory—Latour's version—the *form* gives the account of process. Hernes(2008) also agrees that process can also be seen as *form*. He claims that:

> *the worlds [two modes discussed above] do not stay apart. They are brought into contact with one another as the models of organization, or the words and vocabularies, enter and re-enter a world of tangled processes. Therefore, the process is not just a matter of translation between two worlds in linguistic sense. It is about movement and journeying between the two worlds, where the vocabularies or models are entered and re-entered into fluid, complex and ambiguous world. The relationship between the models and world is a tangled one.*(ibid:p.6)

Hernes(2008) represents the processes as a set of *tangled* formations that can be framed in a network. He gives the example of the Al-Qaida network, where the social in its fluid state is seen in the interaction of actors in a point of time. The set of ordering used for organizing is dynamic where the Al-Qaida's processes *entangle* the processes conducted worldwide. These processes have a flow of information between each other using both primitive and the latest technologies. Their business set in body of politic is connected with actors ranging from flow of religious beliefs, communications, money,

weapons and some ulterior motives as well. Al-Qaida is currently operational in Pakistan and blamed for creating disasters and claiming approximately 40000/- people's life only within Pakistan (Crawford, 2011), out of those 35000 were civilian deaths caused by bomb explosions and target killings. Despite of huge organization structures in the shape paramilitary and armed force's presence, Al-Qaida with the fluid nature of organizing and network formation seems to be competing and achieving their motives. Though the example of Al-Qaida's network seems to out of the domain of this research conducted within public universities, it is somewhat connected to university realm. Its terror and influence in the computerization process could be seen within universities changed nature of processing modes depicted within analysis chapters[14]where society is represented. Similar to Al-Qaida's ways of processing that are both '*in-here'* and '*out-there'* (Hernes, 2008:p. 2) university processes are also entangled with society. According to Latour (2007:p.221), society is an assemblage of variety of actors. The congregated society connects to university realm thorough their interactions. By having such influences within the universities, the differentiation between of '*in-here',* '*out-there'* blurs and processes get *tangled*. In such a tangled world of processes, agencies diffuse both ways. But this does not mean that all organizations and institutions have the same kind of entangled processes. This variation is based on "*unique product of circumstances and unique producer of circumstances in turn"(Hernes, 2008:p. xv).* These unique entanglements of processes are seen by Law as '*messy'* (2004). Society and universities have a confluence through their mutual influences. This represents a reservoir—with dual side flow—of *potentialities* where the thinking and acting takes place. The *potentialities* exist in the *form* of people, technologies and institutions or be it a combination of all (Hernes, 2008:p. 3). To some extent these entities were also

[14] Working behaviour of people. Security and surveillance issues, reduced work timing due to suspected act of terrorist attack within universities leading to changed performances.

presented within business process management model—people, change management, people and empowerment, project—suggested by (Jeston and Neils, 2009).

Latour (1999) perceives that when a process in transition goes off-course, it may stabilize again or emerge in another *form* altogether by the help of *intermediaries*. For example the soil studies conducted in Brazil depicted the researchers with complex understanding of the area as *intermediaries* who could create a model that conveyed their message to other actors. Callon (1990:p.86) explains the *"the notion of intermediary...serves to designate everything which passes from one actor to another, and which constitutes the form and the substance between them—scientific articles, software, disciplined human bodies, technical artefacts, instruments, contracts, money and so on".* It is the mixture of entities that relay their effects within a social and technical realm that are being deployed in a specific context The network *"..entails both an understanding of categories of those designing and using the systems, and set of analytics questions derived from our own concerns as analysis"* (Bowker and Star, 2000:p. 42). The constitution of a mangle for this research would engulf the multiple categories of elements interacting at inter and intra-level from their pre-fixed boundaries simultaneously. The attempt here would be breakout the elements from their conventional standardized categorization and test them through mangle to frame the outcome.

The medium—is also an actor—can also be seen as a source of creating tension, reflexivity, recursions or dialect. The temporary stabilities within the process are achieved through mediation within the actors. Latour and Callon (1981) call these stabilized tangled processes *black-boxes*. Refuting the original idea of *black-boxes* as stable, the claim now is based that duration of its stable state depends on the strength of

association among the actors (Latour, 1987b:p. 127). Within these associations and processes, every individual actor's is bigger than the organization itself (Latour, 2008a:p. 10). Hernes (2008:p. 69) sees this as a strength test of the actor/actant within a network. Each actor's performance matters predesigned within the order/scripts. The robustness of the medium also serves as source of stabilization. For Middleton and Brown (2005), there is an object in-between the relationship/associations that provide the *form* of stability. The *quasi-objects* could be human and non-human entities. The advantage of such *quasi-objects* is that the reflexivity, recursions or dialects could be transported within and outside institutions. From the actor's side it also confers identity on actors.

For this research endeavour, the computerization software—Enterprise Resource Planning: ERP--and its visual report writers functions as a *quasi-object* which could provide a medium for actors to act upon. Latour (2007) calls these *quasi-objects* as *obligatory passages* for the processes of accounting. These centre of calculations provides the *"lines of visibility into which participants are drawn by being accountable...*" (Munro, 2012:p 3). For Munro (ibid) such processes integrate accountabilities into everyday work. Groups within organization have methods through which the member's conduct is sanctioned, in order to give them membership. The same sort of idea is given in Actor Network Theory in the shape of enrolment (Hernes, 2008). According to Law (2012:p.301)*"...knowing is a process. Or better many different processes. Process of deferral. Process that involves perpetual displacement from one mode of knowing to another."* With such kind of enrolment within processes, there are issues that relate to power circulation within the business processes. It is a question of membership that occurs on routine basis within organizations (Hernes, 2008:p. 73) .

2.11 Culture as Mobilized Resource

From ANT's perspective, groups are not limited to human beings, but are extended to non-human entities as well. Culture is constituted inside of networks in order to accomplish certain strategic goals. Therefore, culture is a resource that can be strategically mobilized as a source of assistance or resistance. Within a network *"..there are doubtless many translations to be understood in the course of tracking how such an institution is able to make itself irreversible. But it is not this that interests us here. It is rather the machines themselves, or more precisely the idea of something which, once set in operation goes on beyond the time and place of its inception*" (Brown and Capdevila, 1999).

Kaghan and Bowker (2001) consider ANT as a rationalist/culturalist theory on the grounds of its size and scope of activity. The hybridity of actors and their interactions provides the social account. The *artefacts* and *quasi-objects* where culture tends to divulge more become the part of study in ANT. Thus culture is identified with these hybrid actors and their behavioural patterns and norm systems that can be identified through their representations. Organization-wide problems are *messy* and *tangled*. These messes overflow from one network to another. *"...these overflowing 'messes' may become occasions for network-building where new and novel role systems and role culture may be constructed over the remnants of older understanding" (ibid:p.263).* As a part of the process of innovation, culture is a part of the network that constitutes the social. But more important is the understanding of cultural role within the processes. ANT approaches to unfold the process at different work places. The diversity of culture is alluded within the social.

Ideas of sociology accounting for how society is held together, varies on the social stance from the first approach by abolishing the sole existence of social domain in various disciplines. As per this approach, there is no social dimension, *context* or force that can be accounted for separately from the discipline. All elements in the activity jointly constitute the social. In this approach, the analyst attempts to bring out associations among heterogeneous elements. The social will remain changing as any new element added will change the meaning of social. Therefore, for ANT, *"I am going to define the social not as a special domain, a specific realm, or a particular sort of thing, but only as a very peculiar movement of re-association and reassembling"* (Latour, 2007:p 7).

For ANT neither society nor social exists. It is only traceable through the actor-network. Unlike traditional view of society, which rule is treated as order and change or creation is an exception, ANT demanding that rule be seen as emerging from performance and explanation of troubling exceptions and attempts to provide stability over long term (ibid:p.35). *"Society is not what holds us together, it is what is held together"*(Latour, 1986:p. 276). Culture, society would become more meaningful when they are explored within their performativity, rather than discovering their ostensive nature (ibid). The outcome of network presents the social of the organization.

2.12 Power from ANT Perspective

Foucault's contributions are well recognized on power, especially when his ideas are treated as '*transformationalist' rather* than structuralist or poststructuralist (Andersen, 2003:p.2-3). He analyses the power at the micro-level of its command and execution

within the social body, rather than from sovereign power. Foucault attempts to explore power in such a manner that it captures strategic effects. Instead of exploring the sovereignty of power, Foucault diverts his attention towards the study of multiple of bodies, which are constituted as tangential subjects, as a result of the effects of power. In contrast with sovereign power, Foucault divides power into disciplinary and bio-power (Clegg, 1994). While disciplinary-power focuses on individuals and group behaviours, bio-power is related to subjugation of bodies and control of population in general. For disciplinary power, Foucault focuses on the methods of surveillance and assessment of individuals that he initially observed in prisons. These methods are already being implemented in schools, army and even in the business organizations with variation of styles. The methods have so strongly implemented that they constitute power. Since these methods are institutionalized in the organizations as discursive practices, they constitute practical knowledge as well (ibid). The knowledge acts in such a way that it disciplines body, regulates minds and operates on emotions. The new perspective gained by the individual through disciplinary practices provides him/her the order and understanding of world. However, the power of disciplinary practices should not be confused with feudal power, which demands blind submission without understanding. The power of disciplinary practices varies on individuals as:

> *There is not, on the one side, discourse of power, and opposite it another discourse that runs counter to it. Discourses are tactical elements or blocks operating in the fields of force relation; there can run different and even contradictory discourses within the same strategy; they can, on the contrary, circulate without changing their form from one strategy to another, opposing strategy.*(Foucault, 1984c)

Foucault's (Foucault's interview by Gordon, 1980:p. 95-99) concept of power is with the shifting nature that resides in the formation of a network of alliances. These alliances change on the grounds of practices and discursively constituted interests. Due to the resistance that will emerge within networks, alliances will change, regroup and alter their strategies. In such situations, power operates in a multiple force manner and constitutes its own organization. The organization of these multiple forces points to a hegemonic account of power, which becomes more evident through manoeuvres of these groups that may bring out the resistance and fissure within the organization. This same concept is available within Actor-Network Theory. Transformations are described in Latour's (Law, 1986b:P.265) earlier work where he argues that "*the amount of power exercised varies not according to the power that someone has, but to the number of other people who are brought into the composition"*. The same idea is also available in ANT but with the exception of granting power to non-human elements as well. This power can be seen through the actions' convergence between human and no-human. While Latour stays on the synoptic level by floating on data (Latour, 2007), Foucault on the other hand attempts to explores the depth through his bio-power, as he approaches from sexuality with focus on expressivity and reproduction of species. Foucault (1998) observed that despite the Victorian repression, sexual and behavioural patterns of the world have been changed. This has given rise to a new discussion on 'what is' and 'what is not normal'? Foucault attempted to provide answers to these questions through the discursive formations of psychiatry, medicine and social work. The multidisciplinary work was related to managing people in the shape of groups by having power over their bodies. '*Bio-power'* attempts to give emphasis on life and health, rather than looking at from the threat of death angle. It explores the regulation of body, production--taken as notion of sexuality, regulation of habits and well-being. The power

of eugenics can be explored to improve human race with a non-destructive manner. For Foucault, the merger of social science, medical science can be explored from the '*Bio-politics'* and power angles. *"If genocide is indeed the dream of modern power, this is not because of the recent return to the ancient right to kill; it is because power is situated and exercised at the level of life, the species, the race, and the large-scale phenomena of the population"*(Foucault, 1984c). Although Foucault's work points out the hegemonic account by exploring the networks and alliance to some extent a more focused account of poststructuralist hegemony can be found in the work of Laclau and Mouffe (1985). Laclau and Mouffe (ibid) are considered as post-Marxist social theorists since they reject the idea of Marxist essentialism on similar grounds with Frankfort School of thought, but approached hegemony from poststructuralist perceptive. The essentialism in Marxist ideas believes that people—and phenomena as well—have a level of certainty—essence—in character that can be fixed and can't be changed. They believed that politics is about the articulation of meaning in the '*forms'*, which are partially fixed and these partial meaning creates hegemony. It is the same *form* that Latour (2007) describes as *vehicle of transportation* and Hernes (2008) describes as a process. The movements within processes are providing the circulation of power; whereas *form's* partial fixation is providing evidence of infrastructures and classifications (Star and Bowker, 2006).

> *Power like society is the final result of process and not a reservoir, a stock, or a capital that will automatically provide an explanation. Power and domination have to be produced, made up and composed. Asymmetries exist, yes but, where do they come from and what are they made out of?*(Latour, 2007:p. 64)

For Foucault, power also exists everywhere. The idea of social control using disciplinary power and formation of panoptic metaphor for observation provided the method for making observations (K. M. Mason. accessed 04/202009). Using Jeremy Bentham's concept of panoptic (Bozovic, 1995), Foucault attempts to explain the technologies, which provides diffusion of disciplinary power in a spatio-temporal context (Ball and Wilson, 2000).

For Foucault, it is power that constitutes knowledge. So, instead of thinking knowledge as power as perceived in modern times, the emphasis is on 'power is knowledge'. While staying in similar lines with Foucault's idea of power, and contrary to sovereign power, Laclau and Mouffe explored power in semiotics and texts. Keeping to a poststructuralist stance, they believed that there is no fixed, real dimension. There is only representation that attempts to fix meaning through temporary nodal points. These representations emerge in the form of agents, relations and particular practices—types of nodal points. "*Power is the apparent order of taken-for-granted categories of existence, as they are fixed and represented in a myriad discursive forms and practices"* (Clegg, 1994). Laclau believe that Marxist ideas should not be perceived as an extreme orthodox way or as an alternate economic/political model. Instead, society ought to be studied as a structure from different angles; therefore, a polysemic view should be obtained by ensembleing the phenomena in a discursive manner (Laclau, 1980). Through *polysemic* text and semiotics, hegemonic power can be identified. From a poststructuralist perspective, power exists in all objects of observation. Unlike sovereign power presented in modern research, poststructuralist account of power sees it as distributed into objects. Poststructuralist research demands the lens to operate from multiple angles as it give different perspectives and provide *heteroglossia* (Reed and Hughes, 1992). It demands an exploration of the discursive practices, micro-politics, disciplinary and

biological nature, semiotics, and texts as power emerges from such places. For Latour (2007), power is not only limited to humans as material means are required for organizational work. *"Left to its own devices, a power relationship that mobilizes nothing but social skills would be limited to very-short live, transient inter-action [..] When power is exerted for good it is because it is not made of social ties."(ibid:p. 66).* This gives us the account of a social where the processes are represented by the combination of human and material entities.

From Actor-Network Theory's (Law, 1986b:p. 264) perspective power is the effect, rather than the cause[15]. From the computerization project's `angle, the whole process of implementing a campus management system—CMS—then turns into an issue of power, where pre-*programmed* administrative rules are being shifted and *programmed* for computers as well as for people to obey.[16] The parts—processes—of campus management system suddenly become **"***accoutrements of power that define our diplomacy*" (Drew, 1995) "*and one of the manifold forms of domination that can be exercised within society*" (Foucault's Interview by Gordon, 1980:p 96)

The properties of a poststructuralist account of power are episodic and coercive in nature. "*A power which intervened in the life of the producer only in occasion; its sole function was to assure the periodical transfer of the product of labor- not the administration of labor itself"*(Bauman, 1982). While, structuralist type of powers contributed in streamlining the structure and functions for smooth operations and for the targeted goals, it also gave a rise to the evil nature of power. In such arena how agency is denied to some and given to others, how structures could be said to have determined some things and not others (Bowker and Star, 2000). The infrastructure within

[15] Power lies in the practice not in the beholder.
[16] Hence Continuous transformation of power as the data is being looked at from different angles and would become part of the translation itself. .

organizations is available through bureaucratic and business process management models. According to Star and Bowker (2006), models belong to standardization and classification which is required by the organizations to keep order and operationalize the routine work. However, due to their rigidness and routinization, these fixed models hinder innovations. Using their own powers within their fixed processes, they don't let new processes to become part of the organizations. In such models, the emphasis is given on how certain forms are developed, rather than looking at the truth and falsity of the representation of the forms (Hassard and Parker, 1993). The structure restricts the heteroglossia and imposes its isolated facts and figure to compose the formation. The structure of the process gets more importance, rather than the formations. The same type of power has led and to an extent justified even human genocides for the sake of being organization benefit—in a larger political contest (ibid). The extreme example from the other side—power in circulation of network—is where Al-Qaida's working through fluid network is giving nightmares to people. "*The BBC documentary series,* The Power of Nightmares*, for example advances the hypothesis that Al-Qaida is more like a fictitious monster myth that has spread unquestioned through politics, the security services and the international media, created by the Western politician to restore their power and authority in an age of political disillusionment"* (Hernes, 2008). Hernes (ibid) carefully laid out statement questions the assemblage created by the Western media and politicians. This assemblage may have missed some representations within heterogeneous interpretations[17], lacks the rhetorical and historical contents; or rather being looked at from a structural perspective where infra-structure is being damaged. The structures or deficient assemblages could misrepresent the process or the processes of formations. For the west, its enactment may be limited to nightmares; however, this

[17] This could be on partial perception could be from both sides-- i.e. Al-Qaida and western hemisphere.

mythical creature with its fragmented alliance is striking heavily in Pakistan and creating hindrances in development process and destroying the infrastructures.

Hernes(2008) gives an example of an email sent by the superior within the university to his/her subordinate. The email circulated as a *quasi-object* where it inscribed different meanings for different individuals. For the superior, it may be simply a reminder how things should be done. Whereas, the subordinate's interpretation could altogether differ from what the superior wanted to convey. The trajectory of meaning would require a set of membership to be mobilized for necessary processing activities. Such processing from the leaders requires the emergence of a *quasi-object* that demands to circulate the power through such *obligatory passages*. The inscribed meanings provide associated alliance between faculty, administrations and syndicate/boards. The material agency to circulate the power resides within the flow of processes but the inscribing provides associations. *"One could envisage various motivations for actors to become enrolled in networks. Being part of the bigger confer powers because it enables the actor to represent something bigger*" (Hernes, 2008:p.73). The connection to leadership is not isolated; rather it is engraved within the granted authority by the various agencies. The indisputability between the authorities—actors—provides a firmer account of the process. However, the surge in being part of something bigger may diverge towards a direction, where the new formation—through processing—does not match with the essence[18]of the institution. Therefore, leadership must explore the associations/connections carefully before initiating a process, as stabilization of any process is temporary. Gomart and Hennion (1999) use the word '*active passion'* to refer to a form of attachment that is entangled by a collective, by objects, techniques, constraints. It is the *"user's tentative encouragement of shifts between states of*

[18]Latour's perspective of university

being"(ibid:p.244) that provides such '*active passions'*. It is based on *'passings' "that involve uses of time and objects, relations to the group, indigenous theories of what happens, what works and what is at stake."(ibidp.232)*

The study of power from poststructuralist view reveals greater complexities and bring out the issues within the fixed structures that otherwise could be ignored. Power accounts from multiple perspective and carefully designed representation of reality within the organization from the poststructuralist lens may provide knowledge, which structuralist lens could miss out due to its rigid sovereign structure.

2.13 Resistance within Organizations

Resistance within organizations is often associated with change. Organizational change occurs when there is an element that is perceived within the existing system to be functionally redundant, obsolete, and underdeveloped. *"Fracture and vignette allow sorting and resorting (or remixing). They can help resist ordinality, a given hierarchy of things. Thus, they avoid teleology (looking at the end of the story), including reconstructions of the past that place contemporary values on top of those from some time ago"* (Star and Bowker, 2007:p. 279). Fractures are likely to be created due to the change process which brings in uncertainty. It is the time where norm and standards made from past practices and observations are questioned by ignoring their existing significance and applications. The implementation of the new element could be in shape of structure, system, policy, rules and regulations or be it a combination of these. The success of something new in the organization depends on how well it has been implemented and accepted. The element of change brings with it 'noise' that emerges due to uncertainty in the organization. The uncertain environment that emerges in the organization's culture is usually visible through the actions of the actors. These actions

related to resistance are often associated to fearfulness, loss of status, power, and lack of knowledge—build up the beliefs—(Law, 1986a) and incompatibility (French and Bell, 1999).

Remaining with a Foucauldian account of power[19], resistance cannot be considered as something 'out there': *"Attention needs to be paid to the framework within which conceptualization of resistance and power are formed—the 'power of the language of power'"* (Knights and Vurdubakis, 1994:p.169). The study done by Andersen (200314-15) on Foucault's Archaeology of Knowledge provides some insight on how discursive formations constitute strategy through the joint operation of discursive objects, subjects, concepts together[20]. In order to understand the strategy that in our case is resistance, one must traverse the remaining formations in a sequential order starting from the object that is power.

> *There are no relations of power without resistances: the latter are all the more real and effective because they are formed right at the point where relations of power are exercised; resistance to power does not have to come from somewhere else to be real, nor is it inexorably frustrated through being the compatriot of power; hence like power resistances are multiple and can be integrated into global strategies.*(Foucault, 1980:p. 142)

It is the association of knowledge with power that ultimately allows the strategies to observe whether resistance is as an outcome has emerged (Edwards and Nicoll, 2004:p. 162). Learning discourses can activate various embodied subjectivities *"the self-actualizing, self-directing subject of humanistic psychology or the adaptive, information-processing subject to cognitive psychology"*(Usher, 1993:p. 18) with the

[19] There is a big debate in what constitutes 'Foucauldian Perspective' (Burrell, 1988)
20Strategy lies on top of all these.

effect of discursive practice. These issues are mobilized when the workplace learning takes place through debate and practice (Edwards and Nicoll, 2004). Relevant to Foucault's stance, the study conducted by Bloomfield and Vurdubakis(1994) describes how IT consultants encountered sites of resistance. According to them, resistance was observed by assessing the attitude, skills of the people as the new technology was introduced. "*The constitution of resistance was based on their [IT professionals] intervention of purposes to transforming employee behaviour through programmes of technology assessment, training, awareness-raising and so on is rendered not only legitimate but also necessary by this exercise of power. In short, consultants readily constitute certain forms of conduct as 'resistance to technology' as this gives them some purchase on its reform by identifying a space in which expertise can be brought to bear in the exercise of power. Resistance consequently plays the role of continuously provoking extensions, revisions and refinements of the same practices which it confronts"* (Knights and Vurdubakis, 1994:p.180).

From a technological perspective obduracy or plasticity of objects emerges at the time of it is being established and this brings in the element of confrontation with or within users. This can also be seen as a *"function of the distribution of competences assumed when an object is conceived and designed"* (Akrich, 1997:p.207). The new object poses threats to the existing set of skills, practices and processes as its inculcation may alter or redesign the work environment. From Foucault's perspective, there is a less radical level of resistance as the social movement creates differences in the society. The fracturing effect within the society, where grouping and regrouping is done, is based on social satisfactions and individual unites[21](Foucault, 1984b:p.96). To control such situations, the hybrid mobilization of disciplinary and governmental power is required

[21] Idea similar to what ANT suggests for capturing uncertainty

which brings us back to the realm of networks of associations (Edwards and Nicoll, 2004:p.172).

Coinciding with Foucault, Latour (1986:p.264-269) also sees power and resistance in the within the network of alliances of actors. Rather than situating the power in mega structures, he places power within the actions of multitudes. For example, the president of a country or a company does not have *reserve* power—which was seen from Marx's perspective—rather, power emerges through the actions of various actors working for him. Building on Foucault's notion of panopticism, Latour (2007: p. 181) proposes another method of observance with multiple views of things known as '*oligopticon'*. '*Oligopticon'* are like command centres for war, which are much smaller than the war front but the whole war information from various angles are gathered and plan is executed from a small site. The visibility of such places is through the information processing emerging from diverse places. *"Such processes are put into operation from a host scattered centers of calculations, where ruptures are coordinated and toward which the subsequent information is directed" (Latour 1987 cited in Haggerty and Ericson, 2000).* Examples of such places could be multinational organization head offices, where information and commands flow takes place. For this project the university realm and Higher Education Commission of Pakistan are main sites. 'O*ligopticon'* provides us the account of emergence of actions, governance, and the management of processes. In order to access such accounts, the questions that needed to asked are "*In which building? In which bureau? Through which corridor is it accessible? Which colleagues has it been read to? How has it been compiled?*"(Latour, 7 March 2012:p. 183). Rather than exploring the effect of such artefacts, Latour (ibid) attempts to emphasize their usage and interaction within the network—social. As a result, resistance emerges at time when the actions are committed, as actors within the

network can modify, deflect or betray the orders, claims, artefacts, and goods. For example, the computer's induction within society can be seen as an action based from driving force of social advancement. Its inductions within the organizations in such a manner that the some groups with their interactions create the power to bringing the computerized elements within the organization, while some other interest groups[22] can stop or slow down by some other interest groups who do not want the computerization to happen (Latour, 1986). Movement in the shape of social with the mixture of human and non-human interaction provides a kind of social in which the actions drives the force and reactions that conflict the course of actions illuminates the element of resistance. The idea is quite similar to Foucault's identification of resistance but it departs from that account by focussing on the unfolding of reality by exploring the strategy through concept, subject, and back to object. For tracing resistance or any strategy, Foucault explores the '*priori'* constructs, whereas Latour (2007) leaves that on actor's actions considering *'situ'* to be more important. This enable studies to float on data, rather than drowning in it. The argument for this approach via Actor-Network Theory is given as follows:

> *To remain at this very intuitive level, AT [Action Network Theory] is simple material resistance argument.* S*trength does not come from concentration, purity and unity, but from dissemination, heterogeneity and the careful plaiting of weak ties. This feeling that resistance, obduracy and sturdiness is more easily achieved through netting, lacing, weaving, twisting, of ties that are weak by themselves, and that each tie, no matter how strong, is itself woven out of still weaker threads,*

[2222] According to Latour, a single person can also constitute a group.

permeates, for instance, Foucault's analysis of micro-powers as well as recent sociology of technology.(Latour, 1996a)

Reiterating the same thoughts, Sarkeret.al.'s (2006:p 52) study of process change failures *suggest "the notion of punctual-ization and betrayal further warns us that the set of stakeholders of an initiative is always in flux, as actor networks unite and disintegrate to serve the sponsored interests or compelling parallel interests"*

The study of resistance suggests that 'noise' in various forms of resistance provokes the eruption of emotions within individuals or groups working within the organizations. Grint et.al.(1995) suggests the inculcation of amnesia in the organization, in order to set up the new development of computerized processing. Considering emotions linked with amnesia—as a metaphor—they perceive that employees have to erase their past memories of the organization in two ways. One way is to forget the previous process and go with the new one whereas; the second one is to transfer their memory bank to computer. While the solution with such kind of loss of memory seems attractive to provide contemporary solution for work environment by introducing new processes. The loss of memory to computerized system however, raises doubts as whether forgetting past is that important and erasing human memory to computer might raise the issue of erasing the element of tacit knowledge available, which is equally important for the organization. Despite the problems with metaphor of creating amnesia for the organization, the inculcation of right kind of emotions could win grounds within organization.

Law (2012) argues that representing and accounting are two simultaneous modes that happen at the development of an information system. The representations—for this

study we assume it is the mode of resistance—of subject and object interchange their positions. He considers that representations generate *virtual objects* that can be considered as subjects to study. Mangers tend to avoid study of such *virtual objects* and blame technology instead. By making such consideration it gives them ease within the accounting mode to place blame, rather than exploring the *virtual object*. Lilley (2012) suggests that users' resistance to change—computerization—is largely represented around the notion of accountability. "*Accountability is about a distribution of the future. An allocation of credit and blame for making the future happen that is taking place in the here and now" (ibid:p.141).* Though a chimera, the possibility of reduction in the level of resistance lies in implosion of structure and explosion of seduction. *"Seduction withdraws something from the order of the visible, whereas production brings everything to view, be it object, number, or concept"(cited in Lilley, 2012:p.139; Baudrillard, 1990:p. 151).* Latour (2008a) also recommends *'passions'* to be incorporated within creating a *net-work.* The advantage in such kind of transformation is that it illuminates the '*hyperaesthesia'*, or '*hyper-aesthetics'*, that provide competency to perceive, combine and elaborate actions performed within organizing(Gomart and Hennion, 1999:p.238). However, the moral dilemma has to be understood from the objective use of such subject. The domain of accountability shifts from technical determinism to a social realm. The processes suddenly become enriched and complex. Responsibility shifts towards the agencies that can emulate seduction to create a conducive environment towards the change. *"Swidler* (1986:P. 274) *terms as strategies in action, which are culturally specific configurations of habits, styles, skills, and reasoned decisions emerging out of one's multiple identity locations, including gender, age, profession, etc*." This makes the task of seduction more difficult.

2.14 Conclusive Remarks

The concept and definitions provided in most of the textbooks of various disciplines always describe a fixed *context*. The purpose of these fixations is to provide an order. Law explains these orders in Serres world *"There are patches of order in a sea of disorder. The most interesting places lie on the boundaries between order and disorder. Or where different orders rub up against one another"(Law, 2009:p.144).* ANT is seen as an alternative, with its focus on reassembling entities and creating a localized assemblage. The notion of structure can return in the sociology of associations with a proviso that these structures are *shaky* or *leaky*. The limitation of traditional sociology was that it attempted a singular account of one fixed discipline attempted to isolate its own techniques that hindered the innovation and creativity. The difference between the two sides is between assessing *consumption* in the case of traditional sociology and *production* that is looked into by ANT (Grint and Woolgar, 1997:p. 65). ANT attempts to bring innovation within the studies by providing a mixture of techniques from multiple disciplines. Therefore, all techniques, whether technological or social have to be applied without any reference to its discipline. The mix of technique and its contextual outcome suits the current study endeavour, where the impact of computerization within organizations is being observed. The nature of the study demands an exploration of the domains of computer science, organizational and managerial perspectives. This allows for a more nuanced understanding of the human and non-human aspects of resistance which faced the computerization project. As an element of change the business processes could be explored from the angle of hybrid and quasi-object formations within the university business processes settling down as part of practices performed by various entities.

ANT attempts to provide a historical account based on the observation of objects and subjects that gain a certain value within the on-going research. The idea is based on the granting agency to the objects; whereas, the *context* based on sociology of social is fixed to provide and allocate the pre-generated properties that are being used. The *context* from sociology of association is based on multiple views; therefore, the understanding of the same *context* differs from which side it is being looked at. It is in this kind of frame of *context* and *contents* that study will continue.

The university to be considered as *'sui generis'* seems to be a misnomer as the literature review depicts that same organizational theories can also be applied on universities organizations. However, considering the nature of universities varied work that is linked from administrative to knowledge based acquisitions and deliveries demands diversity of views to be represented. Therefore, the university sector can be considered in terms of complex organizations that require systemic understanding in order to provide account of multiple elements within a university. For this research, the university will be considered as fluid in nature in order to ascertain the elements of these existing social technologies by using the literature review that provided abstraction in ordering, accountability for work and changed alignments.

Chapter 3 Research Framework

In your thirst for knowledge, be sure not to drown in all the information.

Anthony J. D'Angel(1993: p.4)(1993: p.4)

3.1 Preface

The literature review chapter has positioned the nature of study as an exploration of a fluid form of sociality within universities—where 'the social' is treated as an emergent outcome or organizing processes rather than a prior given. After critically examining the Actor Network related literature, ANT was utilized as a framework for research. The aim here is to utilize ANT in order to observe the set of accountable-ordering techniques that constitute computerized management solution software, and to analyse how fragmentary organizing processes accommodate to change. The research questions posed in the introduction chapter also demand an exploration of the human and non-human performances within the changed university realm. The project of computerization and its impact on university administration will therefore be explored with an aim to analyse the constitution of the social realm. The selection of ANT was done on the basis of its strength on capturing the human and non-human objects' in a plural manner within a socio-technical environment (ibid).

3.2 How to Deploy Actor Network Theory?

In what follows I will show how Latour's version of ANT is utilized in my study. I divide the discussion into two parts. In the first part, five types of controversies about the social world are described to explore uncertainties. With its divergent constructivist epistemological stance, ANT initiates the approach by examining the *five uncertainties*: the *nature of groups, nature of actions, the nature of objects, the nature of facts &*

concerns, and nature of risky—accounts—social science(Latour, 2007:p.22). In the second part, the three moves of *localizing the global, redistributing the local and connecting sites* attempt to follow the actors to observe how the controversies were resolved by building formats, standards and metrologies. This could be done by recognizing possible boundaries, categories and settlements. The last part observes how the assemblage has been accomplished and what sort of new things emerge from it (Latour, 2007:p. 227). The analytical stance of this thesis is derived from the following paragraph:

> *ANT is not the empty claim that objects do things 'instead' of human actors: it simply says that no science of the social can even begin if the question of who and what participates in the action is not first of all thoroughly explored, even though it might mean letting elements in which, for lack of a better term, we would call non-humans. This expression, like all the others chosen by ANT is meaningless in itself. It does not designate a domain of reality. It does not designate little goblins with red hats acting at atomic levels, only that the analyst should be prepared to look in order to account for the durability and extension of any interaction (Latour, 2007).*

The study of computerization in the pilot project conducted by Higher Education Commission of Pakistan—HEC—was initiated in 2009 by acquiring the access from the gatekeeper, the Executive Director of HEC. With his gracious permission, the HEC IT department, software company employees and two universities were accessed for conducting interviews, making observations and collecting documents. The pilot work was performed between December 2009 and January 2010. After discussing the initial data with supervisors, the complete data collection process was conducted from February till April 2010. The data collection procedure was based on interviews—32 in

total with semi-structured questions—attached as Appendix C. Out of thirty-two, thirty interviews were voice recorded, whilst the remaining two did not allow the recording due to apprehension that the material might be used in journalistic publications. The nature of questions was intentionally left open in order to facilitate a wide range of responses (Bryman and Bell, 2007). Personal views were not imposed and the responses were not considered in terms of '*facts'*, '*realities'* or '*truths'*(Silverman, 2006). The judgment between a real or false performance within the interview was only detected through exploring the connectivity and association with respect to other activities (Goffman, 1990). The purpose was to trace the trails that actors leave in their interviews. These trails guide the interviewer to look for signs and proceed further by asking questions or contemplate the signs for further exploration. The gatekeepers as *obligatory passages* in all the institutions were important people as they provided identification and access to the research subjects and objects. Following Goffman's (ibid) guidelines, hints within the interview were also accounted to set the direction of data collection as these hints were considered as the sign posts for further explorations. Beside interviews, observations were also made and noted into the ANT specified notebooks—Appendix D**.** As recommended by the supervisors, two days were spent in each university just to observe the working of actors, mainly in their Campus Management Departments. Some materiality effects were also noted through observations in the shape of documents, letters and observations. The institutions also provided documentation in the shape of project proposals, feasibility study reports, work reports, official correspondence, graphic analysis of software usage, software development and user manuals. The software company also had a database of e-mail correspondence which they agreed to provide access, but it was not given, despite of Higher Education Commission's approval and repeated requests from their project

manager and the author. Therefore, there email conversation remained concealed from the study conducted. In addition to other questions asked in the interview, storytelling was also incorporated by asking for the recollection of incidents of special significance related to computerization that might have happened before, during or after the computerization process. *"Is there any story that you can remember?"* The aim was to follow the signifiers between the actor's narrations. As Gabriel (2000:p. 137) states

> *[S]tories are not encountered in their natural state—that is, as part of the organizational talk—but are presented and performed for the benefit of the outsider. They are part of the dyadic research relationship rather than of organizational discourse proper*.

The storyteller has the ability to mould the story towards what needs to be presented from his/her angle. Due to such plasticity, stories should not be taken at the face value. The researcher must be clear of possible uses of the narratives and analyze them in the context of other data sources.

The storytelling provided a holographic representation of the past interactions. The storytellers had to echo waves and carve a narrative that had certain significance in their life. These *antenarratives* provided better understanding of the processes/forms that surrounded computerizations of university realm (Boje, 2011). Boje (ibid) gives emphasis on two meanings: supportive towards narrative and second taking the element of risk by attempting to add value through storytelling.

3.21 First Source of Uncertainty: The Nature of Groups

Latour (2007P. 27-37) argues that meaning of the term 'group' is so vague and unquantifiable that it can be made of a single member or includes providing infinite number of members within the group. Such vagueness can be considered as advantageous feature of ANT, where these groups could vary from the individual agent, organizations, races, states, persons, members, will power, libido, biographies and fields. Group formations can change as a function of the frame of reference that is being used to consider them. Account of groups produced by tracing their activities provides a greater insight within the established connections. Controversies between the groups should be mapped, instead of looking at the social aggregates of prebuilt structures and theories. Within the groups, spokespersons, shepherds, watchdog of group and documentation about the group must also be identified. It is important for ANT to account for a large retinue of group makers, group talkers and group holders. However, the thing to remember here is that group making process *is uncertain, fragile*, and *controversial* and based on ever *shifting ties*. Along with the group formations a list of anti-groups must also be prepared to map out the controversies between them and establish where the groups disconnect. The anti-groups are also groups but their anti-ness depends upon the controversies between them. Within the groups, ANT attempts to provide the voice of the actor/actant and suppresses the jargons and opinions of the researcher. As Latour (2007: p. 30) says that we should check, *"Is the text that comments on the various quotes and documents more, less or as interesting as the actors' own expressions and behaviours?"* This gives an opportunity to add non-human object within the ensuing research. For ANT, the making of groups is the job of actors not the social scientist. Since the actors are creating the groups and, in effect, performing sociology themselves, the researcher—social scientist—is merely providing

a trace of a set of associations of these groups. Contrary to the sociology, ANT demands the researchers to be part the research themselves as he/she is not viewing or performing the research from the outer sphere. Groups are not formed permanently, instead the group formation changes. These changes in groups leave behind the traces, which provide data for researchers. Unlike sociology, which conceives rule as the normal order of things and change or creation as exceptions, ANT treats rule as performance, explanation of troubling exceptions and stability over long term is acquired (ibid:p.35). Therefore, ANT attempts to explore performances, rather than looking at the ostensive aspects of groups. In the make or break of groups, it is important to see tools or means used for developing a new group[23] as a *mediator* and not considered as mere *intermediary*. The difference between them is that *intermediary* performs actions that are predictable; therefore, predictable result emerges from it. *"Intermediaries are described as the means of bringing together (and we would add keeping apart), defining and associating various heterogeneous entities; and constructing the form and the substance of relations set up between them"* (Bloomfield and Vurdubakis, 1997:p 642). While the *mediator's* performance is unpredictable in nature and it can affect the outcomes by having its own impact on the input it receives.

> *For ANT, there is no preferable type of social aggregates, there exists endless number of mediators, and when those are transformed into faithful intermediaries it is not the rule, but a rare exception that has to be accounted for by some extra work—usually by the mobilization of even more mediators! No two view points of the same object could be more different* (Latour, 2007: p. 40).

For example, a group of mangers deliberating on the product launch with varied opinions on how to launch can be considered as a *mediator* group. The product itself as

[23]A group can consist one or more entities.

an actor has also the ability to be the part of these *mediators*. The information provided to them cannot generate a predictable decision based on manger's multiple viewpoints only, since a lot depends on the product as well. Once the consensus has been reached and a decision has been taken on how to launch the product, it will change the same group's role to from *mediator* to *intermediary* as they would simply work towards launching the product in the method decided and documented that would ultimately work as a *black-box*.

The initial groups that were identified were the software company with its Enterprise Resource Planning solution—campus management—software, the HEC and the two universities where HEC's pilot project has to be conducted. These groups and formations changed from moment to moment and from one network to another. The processes happening at different times changed the dimensions of groups. The *intermediaries* were identified within the network. The flip-flop between *intermediary* and *mediator* was explored, but it was evident only on temporary basis and dependent on the momentary actions. The rules and orders only emerged within the study when performed by actor/s at various stages. The enacted processes constituted the form that ANT seeks to study. The historical perspective was studied in order to appreciate their current nature of enactment.

3.22 Second Source of Uncertainty: Action is Overtaken

After exploring groups and tracing their controversies, the next step is to explore the complexity of *acting* or taking *actions*. The *actor* never acts alone; there are always others who are *acting* together. It is the agency of others that contributes to the present action. *Actions* are usually decided by someone else and we simply follow it, whether we like it or not. *"Action is not done under the full control of consciousness; action*

should rather be felt as a node, a knot, and a conglomerate of many surprising sets of agencies that have to be slowly disentangled" (Latour, 2007: p. 46). To explore any action, these set of agencies have to be accounted. However, this can be a tedious process which demands disentanglement and identification of agencies that were the part of the action. The interpretation of action as per social science would be to relate the action to agency by grouping them into society, culture, structure and fields. On the contrary, ANT would like to see action as a *mediation* event and it should provide the *uncertainties* and *controversies* that relate to the action. For ANT, data resides in between the initiation of the idea of taking action and completion of action. In between, there is a complex set of data that needs to be retrieved from actors—since for ANT the analyst is also an actor—about the controversies of who, when, where and why action was taken? Actor-Network does not provide the source of an action. But instead, it provides a fluid sense of social where groups/entities divulge in action. This is where ANT intends to float on data, rather than back-tracking its roots. Latour (2007: p. 46) explains the actor's role as akin to that of a play seen where actor is not alone in the action. The whole setup is constituted by the lighting effects, stage design, and backstage crew, actors' interplay of semiotics and dialogue delivery as conceived by the writer. Such complex situations are hardly controllable and things are bound to go wrong during actions. Therefore, actions can be dis-local—throw things into confusion, can be considered as borrowed, influenced, dominated, betrayed, translated, distributed and influenced (Cooren, 2001). As an analyst/actor, the elements that need to be detected from the actions are related to *uncertainties*—within the action, hesitations, dislocations and puzzlements. The aim of accounting such elements from the '*action is overtaken'* is not to fix the conclusions drawn by the analyst/actor; instead, to keep it as a source data for the reader to relate it to their relevant field. There is certain openness

within the narratives for keeping the thought process open to various aspects. ANT insists on not blaming *actor*/s for their *action*/s, but instead to keep the *uncertainty* of action/s, in order to assemble the social at a later stage. In ANT, the right to using meta-language resides with the actor not with the analysts, which is in contrary to the case social of science, where analysts will change these phrases to decrease the complexity. For examples, a criminal claiming that it was a 'voice' that told him to do certain crime. In the case of social science the analyst may alter the criminal statement and provide a social or psychological reasoning for criminal saying these words. But in social of assembling, the words of criminal will not be altered in order to keep the data accurate for assemblage at a later stage. *"Explaining in 'instant sociology' has become a cinch much like 'instant psychoanalysis' "*(Latour, 2007: p. 50). From this it follows that it is important for the analyst to map out the controversies on the basis of meta-languages that is used by the actors. This is only possible if the nature of the agency is clearly figured out. ANT also demands an exploration of the figuration of actants because "*figuration endows them with a shape but not necessarily in the manner of a smooth portrait in drawing actors"* (*ibid*: p. 54). The concept of figuration in ANT deals with hypostasizing—i.e. coupling of multiple entities to provide identity—rather than individualizing to a single entity or structural elements. Considering that actors are given importance within the use of meta-language, their criticism on any type of agency also provides insight to other actor's behaviours. This is quite similar to the *formation* of groups that provide the account of anti-group *formations*. In addition the actors will also provide theories of action to explain how agencies effects were carried. The major distinction that an analyst has to make is whether the agency, after its existence figuration and opponents, is *acting* like an *intermediary* or as a *mediator.*

The flip-flop of *intermediaries* to *mediators* and the use of meta-language provided an account of power circulation. This was detected through the documentation, interviews and story-telling where controversies and uncertainties were sited. A combination of the material *semiotics* and *meta-language* used by actors provided the representation of fear that ultimately led to resistance-oriented actions. Their verbal communication, gestures and annoyed expressions pointed to the level of uncertainties they were going through. The meta-language of actors was also converted to an infra-language that ANT leaves at the discretion of researcher. It is the representation of the actors and agencies that enables the researcher to infer various areas of study.

3.23 Third Source of Uncertainty: Objects too Have Agency

Despite the emergence of social science as a discipline after industrialization, where objects started to take part in work or replace humans from their work, non-human objects have not been considered as actors in the traditional sociology (Latour, 2007). For example, objects like hammers and soap have unique characteristics. A hammer can be used to place a nail on a wall. The sociology of social science considers such associations as humans' intentional actions that act upon and cause the material to do something meaningful thus remaining as intermediary simply following instructions. For ANT, the non-human objects as actors themselves have an agentic nature that needs to be included while establishing the social realm. The hammer's availability does matter to place a nail on the wall. There is a certain action performed by the non-human object that can change the further course of actions or result in consequences. For ANT, the nature of material is not an important issue; rather what counts is its usage at time the action was executed. Therefore, adding non-humans to the actors' list will provide a different perspective by exploring data after performing the figuration of actors. *"The project of ANT is simply to extend the list and modify the shapes and figures of those*

assembled as participants and to design a way to make them act as a durable whole" (Latour, 2007: p. 72).

There are five major areas that can be explored within organizations. The first step would be to explore the innovations that happened within the organization. To start searching for innovations, the engineer's design departments, scientist laboratory, the trial or pilot projects must be explored. In the case of innovations, complex objects leave a trace in the shape of documents, sketches, regulations and plans. The object at the time of innovation becomes more apparent in any other case, due to its comparatively longer *mediator* state then in other cases in which non-human object would quickly convert itself as an *intermediary*. The second step is to explore and observe the things which are simpler and don't seem to have much importance, yet at some stage these objects had the *mediator* capabilities for short time and then converting themselves to *intermediaries*. For example the user manual is supposed to act as an *intermediary* to provide operational guidance, yet at times it turns into a *mediator* when the reader is unable to comprehend its presumable easy to operate and learn instructions. The third step for identifying the objects is to explore the occasions related to accidents, breakdowns, and strikes. It identifies non-human objects working as an *intermediary* in the normal stance would change themselves as a *mediator* for some time under special circumstances. For example, a computer system breakdown at the airport can disrupt and practically close down an airport until it is completely restored. Technological objects are known for their quick flip-flop changes from *intermediary* to *mediator* and back to *intermediary*. The fourth step is to bring out the archives, documents, memoirs, and historian accounts as objects that might have had a *mediator* role in past. The fifth and last step is to be creative and envisage the possible objects that could have contributed. All these steps can be taken to identify the non-

human objects for their agentic nature similar to humans. The action of these non-human objects are limited and changes from *mediatory* to *intermediary* more quickly than human objects (Latour, 2007: p. 78). Although ethnomethodology studies also explore the same entities, they give less emphasis to objects (McLean and Hassard, 2004:p. 509). By giving agency to non-human objects and adding them in observations, ANT attempts to take the power away from the social realm of sociology of social. The sociology of social gives power to researcher who disperses it into the objects. On the contrary, ANT attempts to grant power to actors by giving them a voice within the developed narrative:

> *When we define the quality control of ANT accounts, we have to be very scrupulous in checking whether power and domination are explained by the multiplicity of objects given a central role and transported by vehicles which should be empirically visible---- and we will not be content to have power and domination themselves be the mysterious container that holds inside of it that which makes the many participants in the action move.*(Latour, 2007: p. 83)

In ANT the account of non-human object's agency is considered to be short lived within their role of *mediators* to *intermediaries*. Therefore, it was difficult to capture such short-span agentic effects. The only way to see the agency was to keep the structure flat and have limited use of it as infra-structure. The depiction of power with its circulatory motion and residing in heterogeneous entities generated voices for weak and strong actors—considered in traditional sociology through hierarchical ordering—simultaneously. This brought the element of critique within the network framing as well. The software company was visited and employees were interviewed to observe the site of creation of software. The HEC and universities were also found to be places of

innovation where innovative ideas emerged and changes were made to localize the software. The accidents and breakdowns were found to be the major sources of *uncertainties*. The stories about such incidents were rich in data and demanded and extension or accommodate of the overflow of the other networks within the narrative. In this process the inclusion/exclusion of entities had to be carefully decided based on their connectivity.

3.24 Fourth Source of Uncertainty: Matters of Fact vs. Matters of Concern

To produce a *fact* for science is extremely important, as it serves the base of the conclusions drawn. While ANT believes that establishment of *facts* help build up ontological stances, it is important to challenge these ontological stances by exploring *matters of concern*. For ANT, *matters of concern* are taken as extremely uncertain, disputed, real, and objectives that are not typical in nature. This emphasises the body of politics that surrounds the organizing realm. The questions that have to be posed to accentuate *concerns* are related to multiplicity of solutions, trade-offs between the decisions, tensions between the performances, and the authority to decide (Mol, 1999:p.86). The agencies in *concerns* are considered as *'gatherings',* rather than perceiving as facts providing objects. For example, introducing a new medicine that cures migraine pains could be considered as a revelation for doctors treating the patients. However, the *matter of concern* would be at what cost the medicine is providing the cure. The side effects of the medicine, its availability and its price range will be the *matters of concern* that doctors have to consider before prescribing the medicine to their patients. For a researcher, knowing a fact is important, but to explore a *matter of concern* would provide rich data from different perspectives. Obtaining *the matters of concern* from multiple perspectives doesn't mean that facts are discarded altogether, rather it is a way of feeding controversies and explore the data from multiple

perspective that may lead to it provide new outcomes and better understanding of the established facts (Latour, 2007). The fact changes from time to time as scientists explore the *matters of concern* circulating around the facts. The number of planets that we learnt in our school time—since1943—as an established fact has now changed for—in 2006—us and the newer generation. The exploration of facts regarding Pluto from various angles about the mass, size, rotation, and gravitational force proved Pluto to not to be a planet. The multiple angles that emerge from *matters of concern* doesn't mean that it is the interpretive flexibility given to *matter of concern*. Rather, it is the plurality of ideas that goes through the observatories and ultimately unifies mutual consent to strengthen the established fact or to redefine the fact. For ANT it is important to explore the simple *intermediaries* and expose them as set of *mediators* that play a critical role towards a unified idea. The whole exercise is not to close down the research on the basis of a hegemonic version of fact, rather explore it from different perspectives and explore various agencies in order to ascertain some sort of authenticity. Stengers (2011:p. 372) defines this as '*Cosmopolitics*,' that **"***introduces what is neither an activity, nor a negotiation, nor a practice, but the mode in which the problematic copresence of practices may be actualized: the experience, always in the present, of the one into whom the other's dreams, hopes, and fears pass".*

ANT recommends four steps to perform such assessments. The first step demands the scientific fact to be taken back to its laboratory as the fabrication process provides considerable information about the matter of fact that has been established. The second step is to explore the real environment that a fact lives in. The everyday use of the fact will provide traces of association with social. The third step is to explore the fact in the large scale integration as the conglomerated formation brings out controversies, and provide traces of association. The fourth step demands an observation of the *reality vs.*

fiction that exists in the natural realm. Sometimes the decisions made are different from the reality or facts. Unification of *matters of concern* in such cases may point to a different perspective that those produced by *matters of fact*. Facts are reduced to a certain vision, whereas the unified concerns broadening the narrow vision could ultimately be transformed into *matters of facts*. When it comes to *matters of fact,* it is a question of the trials of forces that are undergone to 'harden up' a fact, whereas with *matters of concern* it is a question of the relationships which can be built between practices. For example, "*computers might offer an advertisement for the best example hype, but chips in computer science require vast institutions in order to live up to their reputation as 'formal machines'. Everywhere, the empirical multiplicity of former 'natural' agencies overflows the narrow boundary of matter of facts. There exists no direct relation between being legal and being indisputable*" (Latour, 2007:p. 111).

Engagement with heterogeneity within various entities in the research work provided the sense of body of politics. The Campus Management Solution—CMS—software was seen differently by the different stakeholders—i.e. HEC, Universities, Students and Software company. Their *concerns* regarding the implementation varied as some went with the flow while others attempted to move against the flow of implementation process. The compromises had to be made by some, while others gained from the change. The element of change, CMS itself, was changed due to the concerned parties reservations and actions. The difference of reality and fictions depends on which side you are on.

3.25 Fifth Source of Uncertainty: Writing Down Risky Accounts

"*If you don't want to take notes and to write them down well, don't try to get into Sociology*" (Latour, 2007: p. 135)

The basic idea behind writing down *risky accounts* in the shape of text is to keep track of research work and data while performing research. For ANT the empirical data collection is insufficient to create an assemblage. According to Geertz (1973:p. 23), *"social actions are comments on more than themselves; ...where an interpretation comes from does not determine where it can be impelled to go. Small facts speak to large issues… because they are made to."* Accounts of small observations may bring strength to the evidence—or clues—gathered or altogether give an insight where evidence as pointing to. In order to keep records and capture data, Latour (2007:p. 134) recommends use of four different type of notebooks. The first notebook is considered as a logbook in which appointments, reactions, encountering new state of affairs and surprises are documented. The second notebook provides a chronological and categorical order of the gathered information. The third type of notebook keeps record of the ideas, tropes and metaphors that come to researcher's mind or objects produced while capturing and observing the data. To keep an account of researcher's thinking while exploring the data is important as the researcher may forget such ideas at the writing the report stage. The fourth notebook should be kept to write the *effects* of the written text on actors. The idea is to trace changes that text made in actors' lives in the shape of deployment or unification of actions. For ANT the text could act and play a *mediator* role, rather than playing a mere *intermediary* role. The added value may change the research direction more:

> *The idea that reality exists in multiple related versions lend itself to the notions that one can choose freely between them. However, if one tries to locate the*

outside position from where one is supposed to evaluate and make such choices, one finds that such a place simply does not exist.(Gad and Jensen, 2010:p. 71)

For ANT, the text has some sort of level of abstractness as a portrait would have if you compare it with reality. The art of writing text is quite important for the sociologist as the representations of objects, their agentic nature and derivation of conclusion emerges from the text. The account of notebooks enables to deploy more objects--human and artefacts--with agencies and help find more *mediators* within the network: *It is the collective regime of activity that decides what is insignificant noise and what must be taken into account*" (Stengers, 1997:p.9). The whole process of writing ultimately will be used for making a final report. The researcher should be prepared to take a risk of writing the final report that is not limited to its posed question but making it intrinsically different (ibid:7). For a social scientist, *"De-scribing, inscribing, narrating and writing final reports are as unnatural, complex, and painstaking as dissecting fruit flies or sending a telescope into spac*e" (Latour, 2007: p. 136). ANT considers its articulation to be of no less than those of science. The process of developing a final report in ANT is as tedious as going through the scientific experiments and collecting observations.

As defined above, four different documents were generated that are attached as Annex. B. These observations provided greater insight into the formations. To some extent, these accounts also provided a method of triangulation for assessing interviewees' statement, besides adding value and creating diversity of thoughts. All the observations and interviews were shifted to NIVivo 7.0—CAQDAS—software—Please see Appendix E. Utilizing ANT's five steps uncertainties were identified and categorized. The cases option of the software enabled to explore the data from resistance and

transformations point of view. The graphic representation of groups and their interaction was also generated through NIVivo7.0 modelling tool.

3.26 How to Trace the Associations: Keep Social Flat

Moving on from the five steps of exploring uncertainties, ANT insists on treating the social as a flat domain while making the final moves towards finalizing the analysis. Within traditional sociology, the analyst constructs a model of the social environment using the three dimensions of context, structure and society. Context provides the pre-state, where an action has been taken place. The pre-state is looked at from just one angle through which action will emerge. Structure provides the setup in which the action has taken place. Finally, society provides the body of politics account of the social environment. By contrast, ANT constitutes account of the social using multiple dimensions. Context in this case is not singular and fixed, rather it is revealed through exploring multiple angles. The researcher has to view and provide accounts of these multiple angles (Latour, 2007). ANT also moves away from the traditional structural account common in sociology. For ANT, the artefacts within the structure are part of the actor-network; therefore, structure cannot be distinguished as a separate entity. Structures are then converted to infrastructure (Star and Bowker, 2006). Instead of exploring structures, ANT demands to explore the leads that actors' provide within the network. Traditional social scientists use the idea of society to build an account of any invisible or hidden aspects. On the contrary, ANT considers that the body of politics is not a separate phenomenon; rather it is part of actor's act. These accounts become part of the research when actors are accounted and their actions are considered.

3.27 First Move: Localizing the Global: Panopticon to Oligopticon, Panoramas

In the first step towards analysis, ANT builds up connections leading from one local interaction to other places, times, and agencies that made the local site to do something. The whole process follows the traces by translation. ANT gives the word translation a special meaning by stating that it is:

> *a relation that does not transport causality but induces two mediators into coexisting. If some causality appears to be transported in a predictable and routine way, then it's the proof that other mediators have been put in place to render such a displacement smooth and predictable* (Latour, 2007: p. 108).

The idea is to translate the transformation process within the network by identifying and including the *mediators* between the paths of the network. Translation refutes the fixations of society, social realm or social ties. Translation is only available between the mediators which provide traceable associations (ibid: p.108). While establishing the network paths through these traceable associations, the departure point of various network paths can be same, but their end point can't be same. It is not the similar as computer network where everything is connected to everything else. Each path we follow will have a different ending as depicted in figure 4.1.

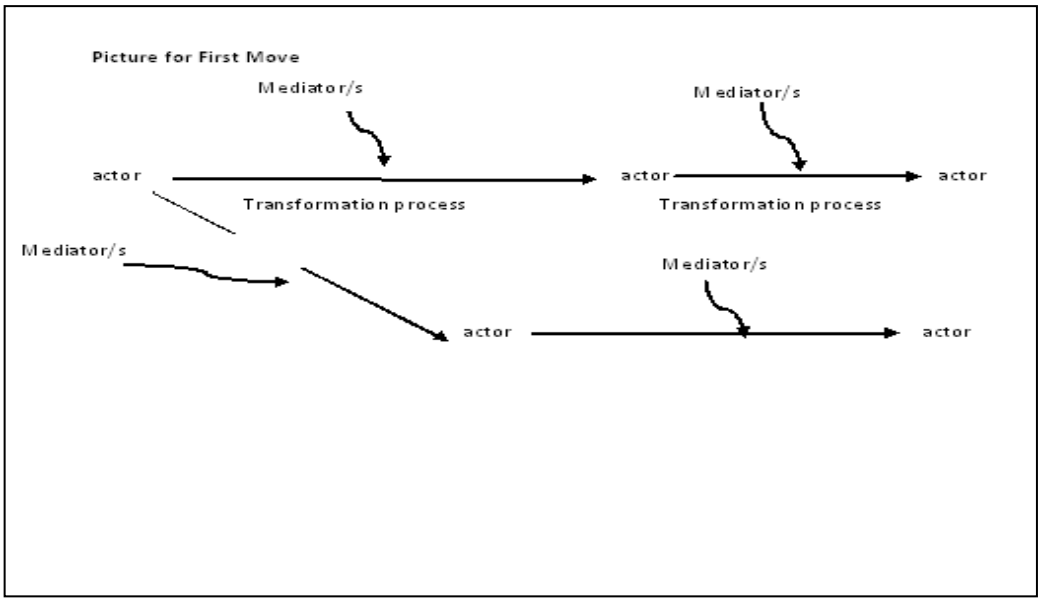


Figure 3.1 ANT Origination and Termination of Flow

(Latour, 1997)

The advantage of using this method is that while plotting the paths, the vehicles required to transport and generate transformation becomes quite evident. By contrast, with traditional sociology there is less evidence of what made the transformation and this is subsequently read as a 'hidden force' which contributes to society. Whilst traditional sociology develops the micro level of assessments and attempt to apply globally by providing their writings on family, institutions, nations-states, markets, health and deviances, ANT on the other hand excludes macro level accounts from its findings. It attempts to provide visibility to those elements that were non-visible in sociology. By performing such kind of work, it is approaching to global/macro aspects by locating their place in local research at a micro level. The creation of network is based on providing a meshed network in such a way that in order to check the global/macro applicability the local/micro level has to be visited and explored. This means that networks cut through each other to bring global elements to local and vice versa

The notion of 'panopticon' derives from the 19th century work of Jeremy Bentham (Bozovic, 1995). Foucault (1975) highlighted this concept for surveillance by providing insight on its effects on subjects. Surveillance techniques played their own role as an object and changed the behaviour of subjects under observation. Latour (2007: p. 181), proposes another method of observation - known as '*oligopticon'* – which involves multiple views of things. '*Oligopticons'* are like command centres for war, which are much smaller than the war front but information about the whole war taken from various angles is gathered and a plan is executed from a small sight. *"The different control mechanisms are inseparable variations, forming a system of variable geometry the language of which is numerical (which doesn't necessarily mean binary). Enclosures are moulds, distinct casting, but controls are modulations, like a self-deforming cast that will continuously change from one moment to the other, or like a sieve whose mesh will transmute from point to point….There is no need to fear or hope, but only to look for new weapons"(Deleuze, 1990:p. 4).* The command centres are developed through these kinds of complex technical meshes. Based on programmed controls the data travels from one point to another. Instead of hiding away from the technological advancement one must look towards the ways to cope with the possible effects. These technical artefacts provide visibility through the data/information flow that is emerging from diverse places. Another example of such place could be taken from a multinational organization office where information and commands flow takes place. The '*oligopticon'* provides us the account of emergence of wrong actions, governance, re-engineering and social capital. In order to access such accounts, the questions that needed to asked are *"In which building? In which bureau? Through which corridor is it accessible? Which colleagues has it been read to? How has it been*

compiled?" (Latour, 2007:p 183). Besides looking from a micro or meso level[24], ANT also explores '*panoramas'*, in order to attain the big picture. In relation to *oligopticons*, *panoramas* provide insight into what is projected to others. It may or may not be the truth that is shown as a '*panoramic'* view. *"Whereas oligoptica are constantly revealing the fragility of their connections and their lack of control on what is left in between their networks, panoramas gives the impression of complete control over what is being surveyed, even though they are partially blind and that nothing enters or leaves their walls except interested or baffled spectators"* (Ibid: p. 188). By developing the *oligoptic* and *panoramic* views, ANT creates a mesh of network that explores the big picture presented—by using the panoramic view—and compares it with the actual situation—that is available through *oligopticon*.

The actors' paths were followed starting from Higher Education Commission to other organizations, Campus Management Solution—CMS—connections with Software Company to HEC and Universities. The documentation sent by HEC to other organizations and their actions based on documents were observed. CMS was a part of the creation of *oligopticon* for the Higher Education Commission as well as for the university. Tangential effects of the *oligopticon* were observed in the existing social. The panoramas were mostly provided by the administrative officials who portrayed the reality partially.

3.28 Second Move: Redistributing the Local: Plug-ins, from actor to attachments

While the first move demanded bringing global into local and attempted to provide an analysis between the big picture—panorama—and actual situation, the second move attempts to redistribute the local (Latour, 2007:p. 191-218). In order to redistribute the local, the first area to observe is the interaction between the production site and local

[24]Loatour's latest claim is that ANT works at Meso level. (Latour, 7 March 2012)

sites of implementation. The researcher has to explore the variety of agencies—including non-human—that exist within the local context. By bringing in non-human agencies the researcher can observe multiple new connections that are available. The presence of the non-human objects that were hidden before but now they are visible through their mutual interaction is known as '*articulators'* and '*localizers'* (Latour, 2007:p. 195). These *articulators* and *localizers* have the ability to move from *intermediaries* to *mediators* and vice versa. For example while delivering a lecture in a lecture theatre, the setup of room with its teaching aids, infrastructure, noise level outside and inside can be the faithful *intermediaries* but any slight deviation of behaviour between these objects can play a role of a *mediator*. By observing such changes the researcher can identify a new set of associations. For ANT, face to face interactions with actors provide a variety of trails to be followed but lacks following five limitations that must be observed before bringing them in to analysis. First, the interactions are *isotopic* in the sense that acting is based on multiple actions, distant locations & materials, and emerging from remote invisible actors. The second aspect is that interactions are not *synchronic*. The whole interaction is weaved in a timeframe that is difficult to identify. For example the lecture happening in a room is based on the room construction that may be done many years before the lecture. Similarly the clothes and desks have emerged from a different timeframe. The lecturer's use of English as a language is dated way back hundreds of years when English emerged as a language. Serres interviewed by Latour (1995:p. 48-76) considers time in French word '*Le temps'* that has dual meaning of time and weather. According to his concept time is as complex as weather. Time as old and new comes together to present a complex form of existence. Both require the turbulence and chaos understanding of the past to understand the present. Third, interaction doesn't provide a *synoptic* account as there are many

hidden actors that needs to be identified. The wholeness of the action would depend upon many actions taken earlier; therefore, the interaction by itself is not enough to give a complete account (Latour, 2007). Fourth, the interactions cannot be *homogenous*, as the multiple agencies shift nature through time and therefore, cannot provide an account through a single interaction. For example, the passage from the architect's original design to the construction of room in which lecture is happening now has multiple agentic works that are not visible within the lecture itself. The fifth aspect is that interactions are not *isobaric* in nature. The nature of participants varies as some are eager to say things while others hardly talk. Some interactions are black-boxed in such a way that only technical people can understand the nature of interaction. The idea of formulating the five deficiencies is not to evade interaction itself; rather the aim should be to overcome interaction's deficiencies by deploying the five elements. *"The word 'interaction' was not badly chosen; only the number and type of 'actions' and the span of their 'inter' relations has been vastly underestimated. Stretch any given inter-action and, sure enough, it becomes an actor network"* (ibid: p. 202). The stretching of interaction means that there are gaps of information that exists after performing interactions. An example of such a gap could be the operation manual that readers often don't grasp. Such grasps are known as *"the gap of executions"* (Norama, 1988). These gaps have to be filled by using the semiotics i.e. exploring documentations, visiting the sites with a different perspective driven by the human and non-human interactions, voices tones, looking at the visual expressions and gestures. Latour (2007: p. 207) calls such inclusions to be '*plug-ins'* a term that is taken from the information technologies. The whole exercise of placing *plug-in* is to extend the number of attachments within the actor-network and observe *mediators* acting on other *mediators*. Identifying these Plug-

ins could enrich the analysis by identifying more actants thus adding new dimensions to the network formation.

The utterance and gestures recorded during data capturing provided the gist of the communication. The interviewer's tone when speaking, facial expressions, room setups observations enabled to understand the interactions in a better manner. The time variations and its effects on the existing network was evident through the understanding of events of past that were represented in the present actions. For example the building construction style, the security measures taken etc. The construction of *forms* was made more visible through the addition of *plug-ins.* This enabled the research endeavour to understand the process intricacies which simple interaction could have been missed.

3.29 Third Move: Connecting Sites: Mediators, Plasmas, the missing masses

The first move shifts the global to local and the second move links the sites direction of flow to some other site. The third move is dependent on the first two moves in a sense that the previous two have generated a new conduit in which entities are transported. Importance in this third step is given to *connections*, *vehicles*, and attachments rather than merely exploring the sites that have been transformed into Actor-Networks. The new channels/conduits provide more meaning and multiple angles from which the problems can be explored. By performing such type of tracing the aim is to explore micro aspects that are unidentifiable in traditional sociologists' approaches while exploring social, individual, cognitions, markets, empire, structure and face-to-face interaction. In this move there are three things that needed to be identified: types of connections that transport the agencies, mediators used to in the transportation of agencies and identification of plasma. In the first step of the move, the circulation between the sites provides the account of what ANT defines as '*forms*'. *"A form is simply something which allows something else to be transported from one site to*

another. Form then becomes one of the most important types of translations" (Latour, 2007:p. 223). Based on the set of tools available to the practitioner, the *form* enables the provision of information by deriving the structure and identifying its materiality. Once, the structure and materiality are framed then next phase is to assess whether there is some *quasi-standardization* that can be ascertained. The second step is based on the belief that actors are made to do things by others. By identifying these *mediators* perceived as attachments that are circulating within the network conduit have to be considered along with the subjects. While considering the subjects, objects around it must also be considered by exploring which one has more influence within the network—i.e. the subject or the object. "*Things, quasi-objects, and attachments are the real centre of the social world, not the agent, person, member, or participant—nor is it society or its avatars"* (Latour, 2007:p. 238). For ANT, society is constituted through the elements' connections not the way it is perceived as a whole made of elements within traditional sociology (Middleton and Brown, 2005). While there are some elements which are known, most of the elements that connect society are unknown. This unknown elements aspect which is treated as having an '*unformatted phenomena'* is defined by Latour (2007: p. 243-44) as '*plasma'*. In order to provide the account of such '*Plasma'* further interpretations are required. These interpretations are not limited to a human base only but are extended to the whole world's entities. *"It's not the purposeful humans, intentional persons, and individual souls are the only interpretive agents in a world of matters of facts devoid of any meaning by itself. What is meant by interpretations, flexibility and fluidity is simply way to register the vast outside to which every course of action has to appeal in order to be carried out. This is not true for just human actions, but for every activity"* (Latour, 2007:p. 245). In addition to going slow and following leads, there are many areas which may produce the effects on subjects but

which cannot be identified due to their large quantity and the unavailability of information. These *missing masses* have to be brought into an account of the research in such a manner that the researcher's personal opinions should not become part of the interpretation.

Society and some of the events that influenced the outcome of network were *plasmatic* for this research project and treated as *plasma overflowed* from other unreachable networks. This was based on influences that were brought in through the other network fragments and formations. The attempt to explore these networks was to bring in the missing masses within the research projects. These missing masses varied from human to non-human objects or the combination of both. The *process* or *forms* were identified through the representation of interactions, documentations, programs and observations. The *forms* transportation abilities were observed within the organizing and changing of actors. Another important element that was detected was the need for accountability and ordering which requires the form to change its formation. The *form* provided a connection to reach out to the actors within a network. *Form* also provided a cut through movement between the micro and macro actors quite similar to the telescopic zooming capabilities where macro actors were at times involved perform micro things.

3.3 Conclusive Remarks

Latour's assemblage consists of five main things: materialities, actants (human and non-human), heterogeneous agencies (conduits), different optics, different times and different places. Using Latour's version of ANT, fragmented actions will be explored where form—process—will be studied as a transporting vehicle to create connectivity between actors. A mixed and diverse arrangement of material was utilized for making associations. The ensemble consisted of discourses, institutions, architectural forms,

regulatory decisions, laws, programmable software and administrative measures. These were studied by utilizing ANT's framework. The literature review and study of the framework provided the account of ANT to be a construct of multi-authorship. The multiple authorship somehow exist within the framework either through their concepts that were incorporated within ANT or through the critical reviews which made ANT to readjust its stances since its inception. The journey of ANT itself is through various entities that enacted upon and produced a flexible and fluid framework.

ANT was applied in such manner that the uncertainties in the shape of group formations, actions, granting agency to objects, exploring facts with concerns and risky accounts emphasised the representation of resistance and new formations. The three moves of localizing the global, redistributing the local and finally connecting the site in conjunction with uncertainties provided an account of transformations and represented the impact of computerization. Strings of actions were observed where mediators were accounted to frame the *work-net*. Bringing duplicity of account various network formation was observed from multiple angles In line with these outcomes, the next three chapters of data analysis will use ANT to understand the concept of form, transformation and formations with the introduction of campus management solution software. Through ANT, the aim is to explore the changed performance of human and non-human objects and the kind of social that emerges through the impact of computerization process.

Chapter 4 Data Analysis Part-I

Introducing the Main Entities

4.1 Introduction

This chapter introduces the main actors that contributed toward the process of initiating computerization in the public universities of Pakistan. The formation of the network was located within the Higher Education Commission, two public universities, software company and infrastructure facilities provided by HEC to universities for computerization and communication. Within the network, these actors in the shape of organizations and materiality played a critical role in initiating and driving the project. The sites mentioned above were constructed in due course of time where humans and materiality provided the connectivity to bring the sites in its current state. From the point of view of Actor-Network Theory, this chapter deals with the construction of sites that will later be used to introduce the Campus Management Systems. However, the sites have their own historical background that has to be considered while exploring their current status and interactions. Latour (2007) suggest that in order to study a site, its historical development within the moving time must be considered. Latour (ibid) provides the example of classroom construction being not *synchronic* for the reason that its development was based on day to day moments of actions The classroom is a combination of room's material structure, the ensemble of chairs that were brought into the room—after manufacturing at some other site; the provision of black/white board, which was fabricated by the joining of various natural and synthetic materials; the provision of multimedia facilities and associated computer network connects to the outer realm of the lecture hall. Computer network and software provides the channel to connect to so many other physical and virtual artefacts that momentarily become part of

the lecture hall. The construction of a lecture hall site becomes complex due to its current location in historical context. In order to understand and appreciate the lecture hall dynamics one must revisit these historical developments to a possible level of depth. Quite similarly, to understand the computerization process or rather set of entangled processes that submerge within the ensuing study, there is a need to understand the entities' emergence from their historical perspective (Hernes, 2008).

This chapter introduces the sites where Campus Management System was built, enforced and ultimately implemented through the enactment of various human and non-human agencies. The computerization of public universities and especially the pilot project is not treated here as an isolated event that happened out of the blue. Rather, it is framed through various set of fragments of networks. The purpose here to *prolong* the greater network formation and *rely* the accounts further (Law and Hassard, 1999:p.223). As an introductory part of the analysis, this chapter will attempt to understand the dynamics of the various sites by probing into the major historical developments that happened in the course of time at varied spaces and which contributed towards implementation of Campus Management Systems. The chapter begins by examining the development process of Campus Management Systems software and then describes its educational history. The attempt here is to locate the major contributions of human and non-human entities that initiated the drive towards the introduction of the computerization project to public universities by selecting the PeopleSoft Campus Management Solution—CMS. The main projection of the chapter is contributed to the study of secondary and primary data combined. Perhaps, more reliance is on secondary data due to the observations of tectonic movements occurred mainly in the—distant—

past. Therefore, some parts of the analysis would remain *plasmatic*[25], in the sense that precise objectification of the events may not be possible, as contents were extracted mainly from secondary data including documentations, web sources, and previously written thesis. However, the attempt is made to introduce agencies of different entities involved in launching the project.

4.2 The Origin of CMS-Object's connectivity based on subjects

While exploring the association among various subjects, the aim is to detect the *obligatory passages* through which the actions have to go through from one node of the network to the other (Latour, 2007). These *obligatory passages* either have the nature of an *intermediary* which would pass on the actions without any alterations or of a *mediator* that would provide variation in the action's outcomes. The advantage of identifying the *mediator* can either make a difference in enhancing the planned project or it can simply change the course of planning all together. The CMS software also had such *intermediaries* and *mediators* that could affect the project. The work-net within the software had the capability to invoke such *interlocutors* when and where required. These *interlocutors* were the production of the past programming skills constituting the CMS software.

In the early days of computerization, computer systems took the *form* of large size mainframes with high costs which could only be afforded by large sized organizations. With the help of advanced level of research, the computer systems were able to penetrate the middle and small sized organizations, ultimately facilitating and providing computing facilities to humans at a personal level. Software development was

[25] Some parts of the contents may be unclear due to domination of secondary data sources that are mixed with primary data. Especially while providing the account of emergence of CMS software and History of Pakistani universities.

progressive within the moving times. It constitutes the software by virtually sitting upon each other in a layered *form* on the basis of advancements in programming techniques. These layers are now commonly known as generations of programming languages[26]. The application layer has the ability to provide meaningful dialogue between humans and computers, by storing and disbursing information. The auxiliary storages can be connected to processing units for providing need base projections of the data. The processing is entangled with many set of entities and *forms* communicating with each other (Hernes, 2008). The application layer as a buffer between the humans and other software layers works as an *intermediary* to perform the tasks demanded by the humans and instructed by the application software. The instruction or data that is given to them are simply transmitted on both sides i.e. is the information receiving side and the computing side. The lowest level of language is the binary language with its limited plural nature—it can only deal with 0 or 1—of binary numbers that enables multiplicity of tasks to be performed through the flow of current in various circuits. Despite, binary numbers' limited functionality and fixity to perform only on-off tasks built into the electronic circuits, it provide desired output by creating combinations of the 0 and 1's to make circuits enact for processing. The built-in simple mathematical formulas have limited capabilities for processing. However, the organizing of high level and middle level layers enables the lower level to perform the complex processing not know to Middle layer software[27]—High level programs that interact with the operating system—as a tool creates a bounded rationality for the lower language that is the binary side. It is quite similar to the work of data entry operator who only knows how to enter data and the rest of processing is left to others for creating in-*formation*. Due to the fixed nature of binary and *intermediary* software tools, it seems that only the application

[26] First Generation is binary, second is Assembly level, third is high level programming and 4th is Very high level programming.

[27] Middle layer software for e.g. operating systems, assembly language, compilers etc)

layer—as translator—changes its interaction with human actors, while, the other elements of software remains same. The application layers are known as very high level language as it gets quite closer to human speaking languages. Considering the fixed nature of binary and intermediary software, enactment of human applications brings the changes through differed status caused in input and outputs. The agency of human action—programmer and designers—makes the application layer change its interface with other humans. After the change in application layer, it is the uses of software that make the user utilize the new design and feature of the application layer. The *network* in this particular case is detected between the three main groups or group of actants[28] that are software developers, computers that work in binary manner with the help of *intermediary* software—like operating systems and assembly language—and the translator. The translator[29] software—very high level language—meets ANT criteria by becoming the *obligatory point of passage* in such manner that other elements of network must define and understand their roles, interests, words and actions through this object or subject (Callon, 1986). The only thing that application layer software lacks in becoming actant is the aspect of materiality, as it is virtual in nature. These layers are only distinguishable at the time they are in the *process* of writing programs. Once added to computer the physical distinction between these layers seizes to exist. If a piece of text can be considered as material then application layer software that was also written at some time can also be considered as text in the shape of written communication that orders computers to perform tasks (Grint and Woolgar, 1997:p. 70). The application level programming now with the help of network mediums have divided into client and server based software which further accentuate and define their

[28] word ANT uses for actors
[29] Used in literal meaning not in computer terminology.

agentic nature, where client software with the demand of the user, requests server software to provide the relevant portion of data/information.

This interaction gave rise to web-based development with webpage options executed by the user demands the relevant information from the particular site. Such advanced nexus of human, software and computer hardware are now visible in most of the organizational work sites. The complexity of human body of what Latour (2007: p.220) consider as admirable network within, is then extended by these computer networks that are driven through various software and hardware circuits. Campus Management System was also a combination of such network formation.

Universities and educational institutions are sites of interactions, where knowledge delivery and its advancements are attempted at parallel. The dual nature also requires good record keeping and maintaining data/information to provide historical *accountability* as well as perform planning for the future organizing (Suchman, 2009; Munro, 2012) . The advantage of using the information technologies lies in its objectification. *"The individual is constructed as a calculable self by techniques of recording, classifying, combining and computing data, especially accounting data" (Boland and Shultze, 2012:p. 63).*

To enhance the software user friendliness and ultimately earn more profits by creating generic software, companies started to develop off-the-shelf software. This enabled the users to spend less time on programming and focus more on data processing and information analysis. The success of word-processing, spread-sheets and databases for personal and official/business usage gave a rise to integrated software development for incorporating the generic business functions into one software package and naming it as an Enterprise Resource Programming (ERP) solution.

PeopleSoft, Inc. was founded by David Duffield and Ken Morris in 1987 in Walnut Creek California about 50 miles away from the Silicon Valley. The dominance of Silicon Valley in computer and software development was evident when Oracle—a Silicon Valley based company—purchased the PeopleSoft company and made it into a subsidiary in 2005(M. Kane. accessed 01/152012). The eighteen years' worth of work, fame, human resources with material value was thus absorbed into Oracle's existing structure. The hostile takeover was done after a long evaluation and negotiation process[30] and considering PeopleSoft's market value. In order to utilize the established market share value, Oracle decided to keep the PeopleSoft name and started providing off-the-shelf programmable software solution under this name. The software included Human Resource Management—HRM, Customer Relations Management—CRM, Manufacturing, Financial, Enterprise Performance Management, and Student Management tools. While these software developments were aimed at performing specific business related work based on their subjective areas, the transition was towards specific organizing needs. To accommodate such changes, software chunks out of the subject based software were redesigned for handling objects of particular organizations. Campus Management Solution—CMS—software was also one such Enterprise Resource Programming solution that included suite of software providing Admissions, Recruiting, Student Record and Student Financial Mart. The programming code is inscribed by programmer after determining the need of all domains of educational realm. The data as object goes through the processing subject to activations of the required set of inscription—programming code—when and where required (Latour, 1996b).

[30]http://www.zdnet.com/news/oracle-buys-peoplesoft-for-10-billion/140240

The following process flow illustrates the high-level Campus Solutions business processes that created the object of Campus Management Systems

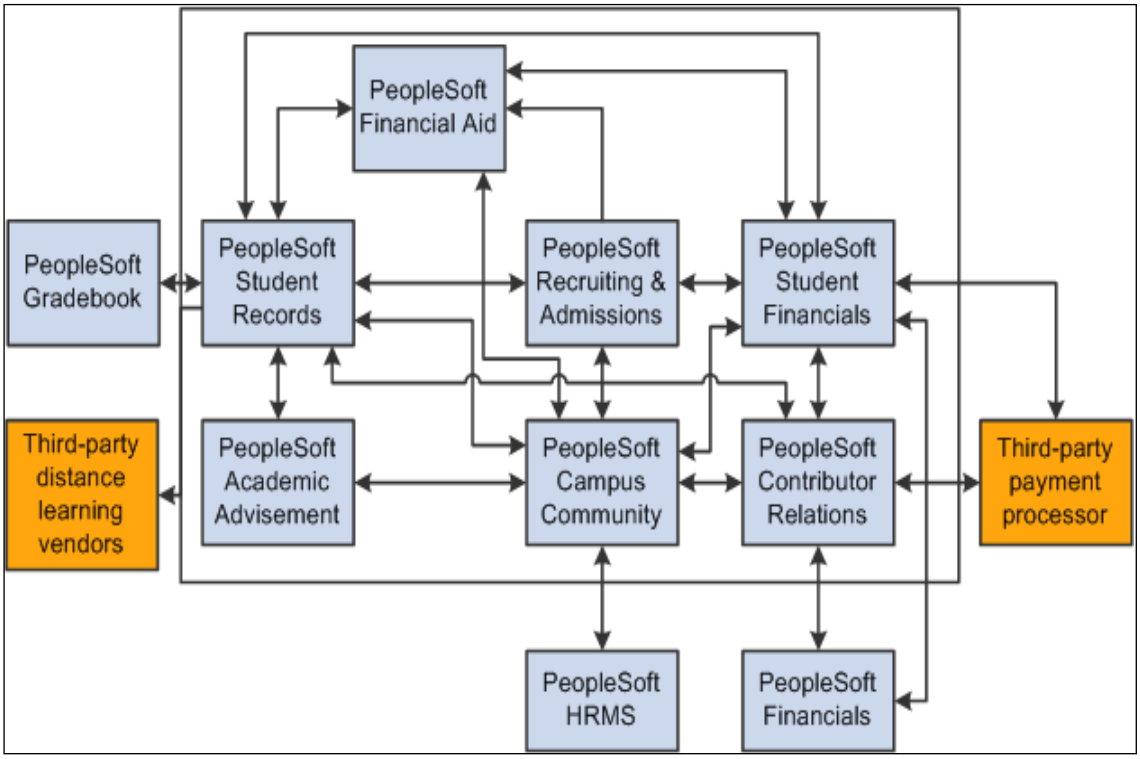


Figure 4.1Campus Solution Integration of Marts

(http://docs.oracle.com/cd/E17137_01/psft/acrobat/cs9lsfn-b0310.pdf)

The flow chart depicted a series of interactions occurring between these marts with an assumption that data flows between each other. At a more conceptual level, this flow and inputs are based on some actions that are associated with activities happening in the outer realm of computer. These time base triggers are activated and processed to provide the necessary information/data for other marts as well as for the administrative staff. The software marts have connectivity with each other as well as the flexibility to communicate to other external software components (depicted here as third party

vendor software). These marts were the software—virtual—sites where activities were recorded to exchange data/information relevant to knowledge based commodity exchange at some cost[31]. Marts were *not synchronic* in nature, as development work was done on the basis of historical evolvements (Latour, 2007). The combination of these Marts built at different times constituted the CMS software and their virtual existence was giving the source for *accountability* of the past and projection for future planning (Munro, 2012). Besides its own module oriented network of software, there was a provision to extend the software interaction with third party software integration. This tailored software is not the only one in the market; several other software companies have also floated software that could be integrated with CMS software, in addition to making Campus Management Systems of their own in the global academic market.

The development process for CMS marts was not done at one time as the layered code of CMS uses programming done in COBOL—Common Business Oriented Language—3rd Generation Language level to 4th Generation Level of language. The full blown software architecture invoked these pieces of codes as per the application's and user's demand. The scripts intensification was subject to the outcome of network of networks in due course of time. These programming codes were *"fragments of intelligence distributed through machines, fragments of machines dispersed through bodies, fragments of organizations morphed into software lines, fragments of codes sticking into institutions, fragments of subjects floating into virtual space"*(Latour, 1996c:p. 302). There were locations within the software modules where jobs could be automated and triggered for processing at a certain time. The web based layered software application can be integrated with other software packages to deliver email and other

[31] Mart as a sales room where some commodity is sold. There must be some cost associated to it

website integration tools. Then there were other virtual places within marts, where its own programming languages as People tools provide help in designing and changing applications. For example, SQR—Structured Query Reports, and SQL—Structured Query Language were available within the software to facilitate users/programmers. These facilitations were just like SAP—Systems Applications & Products—a famous Enterprise Resource Planning—ERP—Solution that had ABAP—Advanced Business Application Programming. PeopleSoft claim that good industry standards have been incorporated in its education sector's focused suit to cater to its peculiar requirements. If so-called industrial best practises have to be followed, there was no need to change the software existing design. But in exceptional cases, the software provided the link to third party software for making necessary alterations. As explained by the Software Company's employee. "*If you want to follow the best practices then there is this configuration that has to be executed. But if there is a weird and strange rule then you have to customize it and create your own code to implement it.*" It was a matter of convenience for the loyal software developing employee's view about CMS's standardized best practices. The software contained solutions that could be utilized without making any changes. Anything that needs to be waivered from the original software was considered below standard in terms of functioning of operational procedures that were part of the existing process. These best practices were acquired by the PeopleSoft through selling its products to many academic organizations, getting feedback and incorporating academia's demand based on their reactions, ultimately launching its new advanced versions in the market that consisted the revised built-in further improved industry standards. The graphic representations in Fig. 4.2 depicted the names of reputed universities as clients of PeopleSoft CMS Software. This image

portrayed reliability and an assurance of the good practices that were incorporated in the software[32].

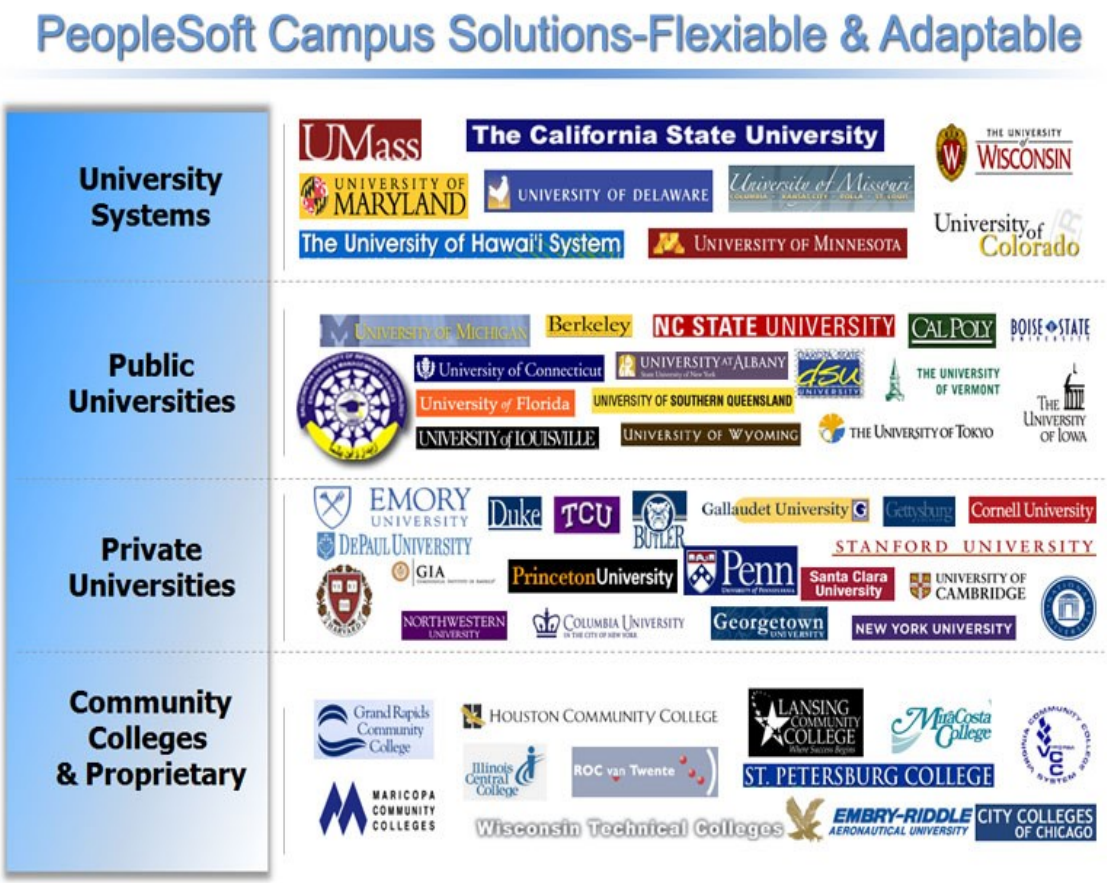


Figure 4.2 PeopleSoft CMS Membership

The software development processes where the transformation from subject based software to object based CMS was done in due course of time (Hernes, 2008). It is a continued process that involves the human computer interaction with its equivocal

[32] This Graphic banner has been taken from a another Pakistani University that has placed it in their Webpages to assure the viewers and critics that the software they are using is renowned and used by most of the American universities.

http://www.buitms.edu.pk/CMS/Default.aspx

agentic effects that they pose on each other. While humans through their new ideas and practices attempt to change the computational device, computers on the other hand attempt to transform the nature of work. The concept of Marts that has been introduced to computer software where actions take place within the computer systems is a mere attempt to locate the functionality in the computer and observe its processing at an abstract level. The famous names used for the publicity of the CMS software depicted not only usage and efficiency but also portrayed the capacity of software to localize itself within globalized educational sector.

4.3 Precursors of Pakistan's Public Universities

The attempt here is to identify the *mediators* and *intermediaries* within the historical context to find the course of actions that constructed the Pakistani public universities atmosphere. Actor Network Theory identifies *intermediaries* as buffers in between that would play role within the network but are unable to change the course of actions. These entities play a role in the routine state of affairs but their presence is required to keep the binding of the groups. On the contrary, the *mediators* have their own agency and capability to change the course of actions to divert the outcome (Latour, 2007). Besides identifying these *interlocutors*, the aim is to explore the changed group formations as well. These formations could be a small group within the organization or it could vary geographically dislocated. The current situation of the education system and implementation of CMS software—as discussed above--in Pakistan could only be appreciated if historical construction of various entities and sites be explored.

The higher educational system in the Indian subcontinent was influenced by the invaders of different eras starting from the Arabs, Persians (Moguls) and then the British Raj—rule—for one hundred years. Before leaving India in 1947, the British left

their imprint on the educational system. At the inception of Pakistan in 1947, the territorial divide between India and Pakistan provided for only one university to Pakistan i.e. the Punjab University. The Punjab University was created by the British rulers through the British Government Act. XIX of 1882. Realizing the dearth of higher educational institutions within the country, a second academe was started in the form of the University of Sindh established through a State Act No. XVII of 1947. Initially it acted only as an examining body; the teaching component was added later. From 1947 to early 1980's, higher education was limited to public universities only. In order to cater to public universities' growing funding needs, regulate employees' service structure and academic standards, University Grants Commission (UGC) was established in 1974. University Grants Commission being an ***intermediary*** between the government's bureaucracy and universities started to regulate the education policy made by the Ministry of Education of Pakistan. The government authorized the University Grants Commission to play a role in curriculum development and to provide academic guidance, as well as securing funds for universities. Though it kept the recurring funds flowing to these public universities, it could not make any formal contribution to improving academic standards and bringing the desired outcomes of higher education within these universities (Ali, 2005).

In 1982, the Government of Pakistan acknowledged the lack of higher education facilities and its limited resources to support the public universities' infrastructure. It allowed the private sector to initiate higher education business ventures and develop institutions on a self-financing basis. This action was taken on the basis of the rapidly growing population and inability of public universities to meet higher education needs. Thereby, the University Grants Commission's—UGC—working was increased with the mushroom growth of private institutions. The situation demanded UGC to keep close

observation of the academic standards of these new private sector institutions, in addition to monitor the existing public sector universities. Figure 4.3 depicts the growth of Pakistan universities over the years.

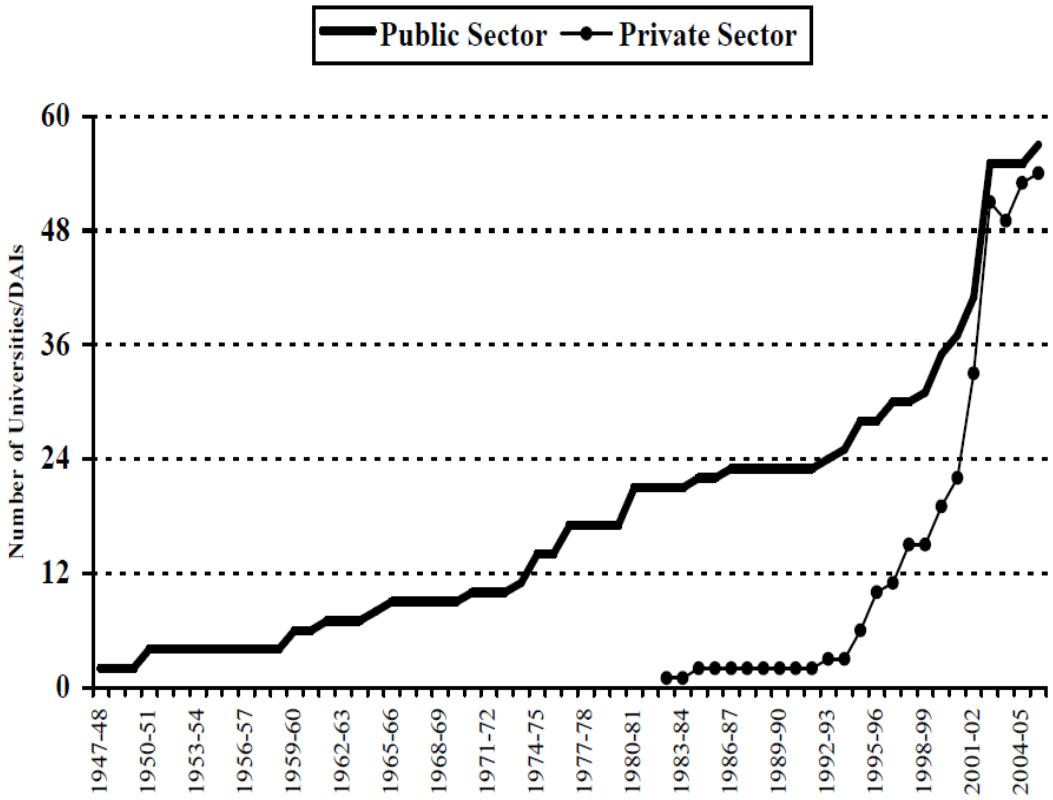


Figure 4.3 Growth of Pakistan Universities

Statistics Published by HEC

(http://www.hec.gov.pk/MediaPublication/Pages/AnnualReports.aspx)

Despite governmental support, the UGC was unable to provide the desired impact on the higher education quality and standards (Ali, 2005). Instead, its functions remained focused on providing recurring budgets to the public universities. Its performance matched with its nomenclature as it was acquiring the funds from ministry of education and distributing it among the public universities. Even the funds provided by the Government of Pakistan were insufficient, as a meagre amount that constituted less than 2% of country's GNP (Kronstadt, 2004) was allocated for education by the Government

of Pakistan. In such conditions, the UGC run by government bureaucrats could not contribute much to improve the existing state of the universities. Change in the higher educational structure ultimately came through the work of an independent informal think tank known as Boston Group, which consisted of Pakistani expatriate scholars, educationists, researchers and activists. The Boston Group identified and targeted the possible foreign sources through which the higher education of Pakistan could actually get some funding. In order to make their proposal viable, the Boston Group used the World Bank and United Nations Educational, Scientific and Cultural Organization—UNESCO—guidelines for the developing countries' higher educational improvements(Mansell and Wehn, 1998). After synchronizing their guidelines with the World Bank and UNESCO, a joint task force on education, comprised of the Boston group and the Ministry of Education, proposed recommendations for improvement of higher education. The joint task force proposed reorganising the University Grants Commission as the Higher Education Commission—HEC. This was accepted and implemented in 2002 by the Government of Pakistan through a presidential ordinance.

Among other vital propositions given in the reforms agenda was the statement that:

> *Reality must be understood, but never feared. While many of the changes needed might seem intuitively obvious to the outside observer, there are powerful vested interests that either benefits from the status quo or have grown too used to it. They are unlikely to let go without a fight. Such realistic need to be understood, but worked around. The reform process must be strategic in its focus – saving its fights for things that are likely to provide the highest immediate benefit or trigger enduring systemic change. (Boston, 2002) Extract from the Boston Group Report*

The statement portrayed the expected resistance that HEC might face while implementing the Boston Group's recommendations at the time of its emergence and implementing the agenda in terms of providing institutional, curricular and fiscal reforms. The fear was that brining changes through the agenda would create lots of uncertainties. Some elements within the existing system would resist for their continuity and diffusion of changes would regroup formations at various levels. The changes in authority will also divert the power circulation into new directions and dimensions. In the Pak-Millennium Conference (Government of Pakistan, 2002), the conference speakers highlighted the issues relevant to systems and gave birth to the idea of setting up Management Information Systems—MIS—within HEC as a means for universities to properly monitor their resources, academic quality and pursue the management of reforms. This idea provoked the HEC to set up MIS not only for themselves, but also for the universities. The HEC's own decision making heavily relied upon the input of the universities data/information. It was vital for HEC to have timely and correct information from the higher educational institutions and particularly the public universities, in order to allocate resources and devise plans for improving the academic quality. The idea was similar to the processes of database oriented surveillance inculcated within the developed countries systems using the micro level data to create micro level control (Poster, 1990) . HEC's nature of work demanded such kind of *Oligoptic* instrument to be installed within the public universities so that the sites of actions could be observed from their command centre (Latour, 2007). *"Such processes are put into operation from a host scattered centres of calculations, where ruptures are coordinated and toward which the subsequent information is directed"* (Latour 1987 cited in Haggerty and Ericson, 2000). For HEC, CMS system was seen as an

accoutrement of authority and circulation of power on public universities as well as alignment of their work (Munro, 2012; Drew, 1995).

The growth of population within the country demanded increased number of universities within Pakistan. The transformation of the existing status of universities, running under depleted academic and financial conditions, happened through the Boston Group and Education Ministry's joint report that attempted to define the changes by providing ideas of developed countries' initiatives to be implemented within Pakistan. The implementation of CMS was one of the initiatives that the HEC adopted and attempted to implement within public universities of Pakistan. The belief of introducing the change element was based on *"Organizations, in other words remain always immanent to the instrumentarium that bring them to existence" (Latour, 2008a).*

4.4 Overcoming the Impediments:-

From an Actor-Network Theory perspective, the aim here is to identify the '*obligatory passage points' o*f *processes* where the enrolling agency attempts to fix the problem (Hernes, 2008). While travelling through the *obligatory passages* there are '*articulators or localizers'* , called the '*Plug-ins'* by Latour (2007), that can have the ability to move from becoming '*intermediaries to mediators'* and vice versa. Within the source of *uncertainties* there are group *formations* and actions based on other actions—*Action is overtaken***.** Latour (2007) explains that the action is not isolated in nature. It is based on many other actions that occur through multiple set of agencies. In order to understand one action, multiple set of actions have to be disentangled slowly to observe the interactions that led to a particular action. The aim of the following passage of story is to illuminate such multiple situated actions that coincided with other actions and were taken to keep the project on course and in line with the laid down plans (Suchman,

2009). The heterogeneous nature of action is explored from multiple angles that connected to the educational realm of Pakistan for processing the computerization project. The HEC started working under the guidelines of its Presidential Ordinance and recommendations given by the Boston Group, duly vetted by the Task Force of Ministry of Education of Pakistan. The Ordinance gave HEC the authority to guide and instruct universities, while the Boston Group report provided the direction to streamline their required work. With the aim of improving the universities' systems, the first step was to develop and improve technological infrastructure facilities. HEC started projects around the setting up computer labs and local area networks, provision of video conferencing and establishing the Pakistan Education Research Network—PERN—for accessing worldwide digital libraries within the public universities of Pakistan. Since the seventy three public universities were spread all over Pakistan, this made a colossal task for HEC to extend the reach of the technology infrastructure in order to overcome geographical[33] barriers and other impediments.

In line with their strategic thinking for channelling funds in the right direction, improving academic conditions and providing technological infrastructure, HEC demanded considerable amounts of data from the public universities. Most of the public universities administrative work was based on manual file work or some word processing, which after printing became part of the old filing systems and minutes. Limited use of spread-sheets for data management or ad-hoc/legacy software systems were used within the public universities. Due to the limited technological advancement within the administrative work of the universities, HEC's officials faced difficulties to attain information from Pakistani universities. In particular, HEC's statistics

[33] Pakistan is divided into five provinces and approximately 9 Ethnic groups. The local languages even have their own localized versions with social behaviours that change with the difference of locations as well. Pakistan Ethnic Map is attached as Appendix G

department had to request repeatedly for obtaining the data from these universities. In contrary to HEC's claim of delayed processing and transmission of information from universities, the universities claimed that data is sent many times to HEC but they don't acknowledge and ask for the same information repeatedly. HEC conversely claimed that some of the universities could not even provide the exact numbers for their student enrolment, as their internal departments provided varied accounts. The overall outcome of these disagreements was that HEC could not perform its strategic planning unless the information was provided to them on time and with a substantial authenticity. HEC's *alignment* of work according to their plans was not matching with the *identity of work* with the *accounts* given by the universities' administrative staff. The CMS system was proposed to have universities' *accountability* by acquiring the relevant *in-formation*. It could only happen if the universities employees' works were aligned with their line of accounts and image of actual accounts is identified (Munro, 2012:p. 4). Assessing the difficulty to access the required information on time, despite providing the network and computer infrastructure to public universities—for the proposed fragment of network these entities can be seen as '*Plug-ins'*—the HEC official went into brainstorming mode to resolve the problem. Keeping in view of the Education Ministry's Tasks Force's recommendations, the Executive Director of Higher Education Commission—HEC—proposed the idea of developing generic campus management systems software for the public universities. This thought process was in-line with the previously mentioned Boston Group report, where the need for Management Information Systems was identified (Boston, 2002). The idea was duly supported by the Chairman of HEC, as the project was not only seen as a mere computerization for automation, but also to enhance the HEC's visionary objectives of improving productivity, performance, survivability and self-reliance within the public universities through taking strategic decisions

(Government of Pakistan, 2002). However, it was impossible to do so under the then current scenario of universities information provision. Therefore, the plan for computerization of universities administrative data was proposed and approved. Initially, HEC identified six prospective universities for its implementation and established a technical committee, which provided the recommendations for hardware and software setups. By enrolling the problems faced by the HEC in collection of data/information, they attempted to fix it through ***its** own granted agency*. This agency was based on the multiple actions happened in the past mentioned above. Through such agentic authority the HEC launched the public universities computerization project.

Based on its technical committees' recommendations, HEC requested 6.5 million rupees for each university from the Government of Pakistan. This amount covered purchasing costs of hardware and software deployment in each university. There were no objections to the hardware, but HEC had to work extensively to convince the Government to approve the funds for software allocation. In Pakistan, sixty rupees — approx. 0.50 pence—could purchase a Compact Disc containing hundreds of free pirated software[34]. Hence it seemed rather odd for some government officials that HEC should spend so much on software licences. The bureaucratic *form* of government, with their own assessment system, was hesitant to allocate funds for the project. There set of criteria required lots of changes to be made within the planned project, in order to *align* with government's pre-set standards for public projects (Boland and Shultze, 2012). Considering the Government i.e. Planning Commission of Pakistan would take long time for funds allocation, HEC decide to tactfully evade the bureaucratic formation of the government. Instead of conducting this project under the umbrella of Pakistan Social Development Program (PSDP)—which was a routine procedure for conducting any

[34] In a recent initiative by HEC to bring people towards licensed software, they have signed contract with Microsoft to provide software to students and faculty at a subsidised rate.

Governmental Project—HEC decided to change the proposal for CMS system implementation to Planning Commission by managing the project within the existing allocated budgets of the public universities (Suchman, 2009). The idea was to eliminate the government's planning commission that has become an '*obligatory passage'* for the funding approval. Iterative alterations in plans also change people and materiality required for the project over time and across space (ibid: p. 197). With the HEC's changed financial plan, the Planning Commission of Pakistan became mere '*intermediary'* for the Campus Management project, rather than becoming '*mediators'* who could altogether change the course of project or even not let it happen. By changing these nodal points within the '*fragmented network' between HEC* and Planning Commission, HEC succeeded to get re-appropriation of 6.5 million rupees allocated out of the universities' administrative expenditure in the given budget to the respective universities. This was seen as a matter of changing the account heads only. It was mutually decided that the universities would bear the expenditures of human resource, networking and infrastructure facilities from their existing budget. For HEC, convincing the universities for re-appropriation of funds was not easy, but it was negotiated through diplomatic communication. Along with HEC's authoritative standing on public universities, promises of continued support and visualising the future benefits were the key ingredients within the convincing process. These expenditures included development of server rooms, any additional computer networks—in adding up to existing network facilities that HEC had already provided, construction and allocation of office spaces costs. The pre-planned things have to be altered to the new changes for evasion of hurdles. Changes within the plan provided the account of moment to moment based situated actions (Suchman, 2009).

4.5 Enactment of the Computerization Project

From an ANT perspective, the unleashing of '*object's agency'* and its '*material effects'* are visible when the flow of network converges towards it (Latour, 2007). The pre-granted agency to such object does not simply let the other objects pass through it, as sometimes, the object's own agentic effect is also detected; as was the case in selection of Campus Management System Software. The selection of the software for implementation was based on the prior associations and pre-determined standards. Such vest criteria configures the strategy and guides the project's direction for what stays in and what is kept out.

After the final approval from the Government of Pakistan of re-appropriation of funds, the HEC initiated its search for hardware purchase and software development through an advertisement in the newspaper. A Request for Proposal—RFP—consisting of twenty eight pages of criteria and list of required details were issued to make sure vendors clearly understood the HEC's demand. The RFP demand list obtained the functional demands of the required software, its training and usability needs and the financial cost. The software company status was assessed through their financial turnovers, taxes paid in last five years and technical expertise details demanded within the RFP. The documents detailed demand was enough to make sure that newly registered companies without any prior experience and amateur software developers could not apply. Furthermore, the document also demanded provision of international collaboration details. The extensiveness of RFP affected the software companies in such a manner that only six of them were able to apply—based on the RFP's laid down strict criteria as depicted in Appendix F.

The technical and financial proposals were demanded separately. The technical report of the company was given 80% marks and only 20% weight was given to the financial quotation. The selection process was based on the committees consisting of computer specialists from HEC and from the faculties of various universities within Pakistan. The committee which purposed the technical requirements for the software also selected the hardware vendors based on their reputation and ability to provide services in multiple cities within Pakistan. The criteria set for hardware was equally applicable to software purchase, yet the choice for selection had further issues, such as whether to go for Enterprise Resource Planning—ERP—software available internationally or to utilize local software development companies and develop campus management system from scratch. HEC decided to go with the former choice, as local companies did not provide enough evidence of experience for development in campus management systems. HEC did not want to become a "guinea pig" and jeopardize the whole project. Based on the idea of localizing the global best practices, HEC wanted to use software that already incorporated best practices in the form of procedures and processes taken from earlier implementations within various universities globally (Latour, 2007). After evaluating multiple off-the-shelf ERP applications like Zanzibar, Banner, PeopleSoft's Campus Management Solution, Systems Application in Products (for Data processing also commonly known as SAP) and Microsoft Dynamics, HEC's Technical Committee selected Campus Management Solution of PeopleSoft owned by Oracle Corporation on the grounds of availability of Oracle's development teams through its local business partner Techlogix. While assessing the ERPs, Gartner's world-acclaimed technical report was used to assess the products. It provided negligible variances in the above mentioned ERP software products. This report was developed based on bench marks developed by the Gartner's group to assess the software working efficiency tested on

specific computer hardware platforms. Though this report had an effect on the selection process but the decisive factor for selection of Campus Management Solution of PeopleSoft as 'the software' was done mainly on the basis of availability of local expertise. The effect of the RFP was evident in the consolidated comparative statement issued by HEC—see figure 4.3—in which only six companies applied, out of which three were subsequently rejected on the grounds of non-provision of country wide support and local developed solution.

Higher Education Commission, Islamabad

Tender for Campus Management Solution

Consolidated Comparative Statement of Technical & Financial Evaluation of Bids

Tender advertisement date: 29-Oct-06

Technical Proposal Opening Date: 26-Dec-06

Financial Proposal Opening Date: 27-Feb-07

Sr. No.	Firm Name	Technical Score (A) (80%)	No. of Students	Database	Financial Bid Value (Rs.)	Financial Score (B) (20%)	Total Score (A+B)
1	Abacus Consulting	61.4	50,000	Oracle	234,721,440	17.13	78.53
2	Siemens	58.4	50,000	Oracle	279,331,709	14.39	72.79
3	Techlogix	70.2	50,000	Oracle	201,010,650	20	90.2
4	AOS	26.4	-	-	Not opened	-	26.4
5	Softronic	42.4	-	-	Not opened	-	42.4
6	Telconet	43.6	-	-	Not opened	-	43.6

Figure 4.4 HEC's Comparative Statement for Software Vendor Selection

(Data handed over by HEC)

The selection decision also took into account the presence of Oracle and its local offices situated within Pakistan. From the provision of the software expertise angle, the HEC wanted the *localization of global,* in order to convene the projects on local universities.

The aim was to get the global expertise through the local partners of the software company. This meant that connections and associations had to be developed for the emergence of new groups. The formations of new groups based on times and agencies would enact where *"a local site [university] is made to do something"* (Latour, 2007:p. 173).

4.6 Change of Plans to Reduce Uncertainty

The set course of actions change when there are '*uncertainties'* in starting something new, in shape of failures or rupturing the groups' cohesiveness are evident from the possible actions(Latour, 2007). The planned actions then have to be changed from its laid down course of action, in order to reduce or divert '*uncertainties'*. While diversion of actions is one way to reduce *uncertainty*, the other method described by ANT is to explore and compare the '*matter of facts'* presented to the '*matter of concerns'* where the difference is between observing fictions vs. realities. The HEC's changes in the plan depicted below and the way to convince the universities for implementing the project provide such evidence of reduction of *uncertainty* for multiple entities. The domain of *uncertainty* belongs to reservations and trepidations where entities transfer within various groups depending on the vulnerable situations. This seems to be the part of organizing and re-organizing effect within and across institutions.

The HEC's initial plan of conducting a pilot project with six universities was reduced to a two universities sub-pilot project upon the request of Techlogix (Suchman, 2009). Although the software company was selected after rigorous deliberations and based on their renowned technical expertise in software development, they were nomads in the development of educational sector and in particular Campus Management System. Though backed by the Oracle Corporation's vast experience, their local software

development expertise was mostly within other industrial domains. Their suggestion of a small-scale start to the pilot project was based on their inexperience in PeopleSoft Campus Management Solution development, and computerization in the educational sector. The plan was to start computerization process from two medium size universities and observe problems or hindrances in setting up the CMS, in order to learn and change the implementation process for other universities. In this way, the software company could evolve its own methodology for handling the educational sector. Despite their vast experience and pre-developed methodologies in other industrial computerization, they were *uncertain* about handling the pilot project at this level. The *fact* was that they had the programming capabilities, but they were *concerned* about entering into a new industrial sector. There was an apprehension that failing in the pilot project could actually jeopardize their continuation of work in the education industry. The solution to this cautious move was to reduce pilot project to a sub-pilot project of two universities. This meant reduction in the group size and numbers to accommodate the test and trial within the limited entities.

The selection of the first two universities to take part in computerization process was based on their performance around previous project completion and active interaction with HEC. Initially, the two selected universities were quite hesitant in implementing the computerization project in collaboration with HEC. From the universities' perspective, the project's benefits were unclear to them and the administration had apprehensions that failure of this project could reap bad repute to these universities. Furthermore, the collaborative nature of this project with HEC was unique in the sense that computerization of university in the global realm is usually universities' own prerogative and such projects are introduced by the universities themselves. Without any clear vision about the project's reaping benefits on organizing operations and any

further financial allocation, the universities were hesitant to take part into the pilot project. The project's funding was without any additional financial budget allocation for the project, as the 6.5 million rupees was to be deducted from the existing recurrent budget. Furthermore, they had to bear the human resource and any additional developmental cost from their own revenues. In order to convince the universities to participate, the Chairman and Executive Director of HEC conducted meetings with their Vice Chancellors and other top officials. The Director General of Information Technology (DGIT) of HEC had to personally visit these universities. He conducted meetings with their Vice Chancellors to provide details about the project and possible benefits. Selling the idea of the implementation of computerization within the university was a difficult task and this could only be done if realization of benefits for the administration was explained clearly so that the VCs along with their administration team could be brought on board for project implementation. The communicative actions had to be deployed by multiple entities to convince the universities' administration for implementation of CMS system (Ericksen, 1982: quoted in Suchman, 2009: p.85). To accentuate the value of the software, Techlogix was also involved to demonstrate the prototype to the university administration, so that they could have better understanding of the computerization process. Once the administration understands the software *operationalization* the *mobilization* would become easier (Callon, 1986). Among other authoritative effects from the HEC, the communication[35] and negotiation paved in the way for the campus management system implementation as the two targeted universities finally accepted the project.

The *'matter of facts'* visualized in the shape of software demos and presentations had to be calibrated to the Universities '*matter of concerns'* (Latour, 2007). The universities

[35] Treated as a medium.

had to be convinced to accept these so called *facts* presented for Campus Management System. The universities employees had to examine through their visualization, whether their '*matters of concerns'* were being addressed through this proposed change or not. Once realized the possible benefits they could reap from Campus Management System, the universities agreed to implement the new system. These changes in plans depict the element of possible *resistances* that Boston Group[36] mentioned at the inception of the HEC as well as the impediments towards the *localization of the global best practices* that were to be incorporated into the universities' systems through the CMS. Resistance hinders the *mobilization* process of the projects (Callon *et al.*, 1986). Overcoming such impediments depended upon the authoritative and negotiated communication channels between the pilot projects selected universities and HEC. These paved paths had a mix of entities that enabled the project's operationalization. The entangled processes had to be calibrated towards achievement of planning done by HEC (Suchman, 2009).

4.7 Provision of Authority's Surveillance Measures and Sounding the Bugle of Success

Being the initiator of the project, the HEC wanted to keep an eye on the endeavour. The measures they had taken are described in the following passage. *From ANT perspective, the type of surveillance seems to be 'Oligoptic' in nature. ''...I propose to use the word oligopticon as the generic term, reserving the expression of centres of calculation for the sites where literal and not simply metaphorical calculations are made possible by the mathematical or at least arithmetic format of the document being brought back and forth"* (Latour, 2007:p. 181). In comparison with the *panopticon*, the *oligopticon* attain the data/information from various sites, angles and sources and then compiles it to

[36](Boston, 2002)

observe the progress with a claim that observer is not effected through this process. For such view, there are multiple '*intermediaries'—articulators*—consisting of human and non-human objects that are required to reach out and capture the on-going actions. The word '*panorama'* is used by ANT as the projection to the outer world that could be true or it could be a depiction, in contrary to the actual situation (Latour, 2007:p. 187-190). HEC's commitment to the project and their stake in the project demanded them to provide a panoramic view of the project to others.

HEC did not induct any new people into their organization for the particular project in order to keep the handling costs at minimal. They reassigned a web developer as a project manager for the computerization project, who would work under the supervision and guidance of Director Information Technology—IT—and Director General—DG—IT. In order to observe and smoothly manage the computerization project in an '*oligoptic'* manner, a steering committee presided by HEC's Executive Director, and members consisting of DG IT HEC, project managers from all four organizations[37], and Vice Chancellors of both universities' was formed. The steering committee met every month to assess the progress of computerization and resolve issues relevant to problems they faced that occurred in their own domains. To gather these committee members once a month was a difficult task, due to their diverse institutional commitment and residing in four different cities geographically located far away from each other. To cope with the steering committee meeting challenges, the project manager of HEC found the use of video conferencing facility to be extremely useful, which HEC had already installed within these universities as a *plug-in* for communication (Latour, 2007). Due to the software company's multinational organization status, this kind of mode of communication was already in vogue with them. Hence, video conferencing

[37] Software Company, HEC and Two Universities.

became quite a frequent affair for communicating within these organizations, besides conducting the steering committee's meeting through video conferencing. Video conferencing as an *articulator* enabled the members to *localize* virtually and observe problems, when their institutional work commitments and travelling constraints restricted them from visiting the HEC's main office. Though a communication *intermediary* channel, the facility enabled the steering committee to connect with each other for formal and informal discussions and asses the project progress. The virtual presence augmented the physical embodiment for interaction and assessment of progress. In addition to the video conferencing link, the project managers were also using MSN Messenger to keep them informed of day to day work problems and progress. Such *Plug-inshybridized* the entities to *perform* despite of geographical and multi-natured work commitment impediments.

The sub-pilot project was started in 2006. In 2008, it was declared a success through a case study jointly published by the HEC and Oracle Incorporation, as a customer case study. Providing a *panoramic view*, the case study of sub-pilot project was declared as a successful 'pilot project'—instead of considering it a sub-pilot project—and induction of four more universities in the computerization process. In the case study attached as Appendix G, the computerization work on initial two universities was declared successful with drastic improvements in admissions, results and degree processing (Oracle Customer Case Study, 2008). The Executive Director's commented

"Everything is generated electronically and is available over the Web, which is a tremendous boon for the universities. The headaches of generating admissions lists and doing all administrative tasks manually are eliminated". Executive Director, Higher Education Commission (Oracle Customer Case Study, 2008)

This was the part of the joint panoramic view projected by Oracle and HEC depicting a great success of the O*ligopticon*—the CMS software. The transformation effects were presented in the shape of changed work formation where manual work was eliminated and computerized formations had reaped remarkable benefits. The *panoramic* nature of the claim within the quote and further study suggested these statements had been farfetched as the claim matched less with the research findings[38].

The inclusion of video teleconferencing facilities and MSN Messenger's usage within the network eliminated the possible geographical and work related hindrances. It depicts how pre-developed constructed *artefact/s* becomes a part of the network of surveillance to provide the contingency in the existing plan that was diverted due to the need of performing situated actions. The projection of sub-pilot as a success and calling it the pilot project in the HEC and Oracle's joint published Case Study(Oracle Customer Case Study, 2008) depicts how the *panoramic* view given to the outside and inside of network varies. The project's continuation depends on the image portrayed of the change within the two universities that were going through the experiential and experimental phases.

4.8 Visit to Site of Construction/Laboratory: The Software Company

Latour (2007) suggest visiting the site of fabrication to view how this object in pursuance was developed. The aim here was to observe the environmental factors in which the prefabricated software was moulded to the organizational needs. The passages below observes the knowledge base '*group formations'* and the '*materiality's effect'* of the conjoined human and non-human object in depicting certain images of the organization. The whole process was seeking improved *hybridization* of work. While drawing the Software Company's own image, the illustration conceived by the

[38] More available in the next chapter where resistance is projected within the project.

Techlogix for the sites of implementations, i.e. the two universities, is also explained in the following passage. Universities are usually considered as sites of educational excellence where technology transfer and its learning process should be much easier than in other industries. On the contrary, the software company provided a different picture of the working environment where they faced predicaments towards introducing the change agent.

This was a first project for Techlogix in the education sector and in implementing the PeopleSoft CMS. While Techlogix had their own methodologies available to work with other industries, it lacked experience in education sector. For the company, the sub-pilot project was not only important to retain the universities' computerization business, but also to learn and evolve their methodology for development, as future success in the education sector depended upon it. In order to overcome their technical weaknesses, Techlogix consulted Oracle Incorporation for its hands-on training on PeopleSoft CMS software to understand the programs development and deployment technicalities. Being a stakeholder in selling the Oracle Database Software and CMS licences to universities through HEC, Oracle's Pakistan office constantly monitored the software selection and implementation process by keeping in touch with HEC and Techlogix. Oracle's local office extended help to the software company by providing the software programmers' team with hands-on training for programming and implementing CMS. Furthermore, the licensing cost for their CMS software was subsidised for the educational industry, in order to compete with the local market software solution providers. These steps taken by Oracle Company influenced the project selection process. HEC perceived that with the Oracle Company's back end support Techlogix would be able to implement the project. The *global* would be *localized* in much better manner (Latour, 2007). HEC

considered the CMS system of PeopleSoft under Oracle and with Techlogix was the 'right' software for Pakistani universities.

Techlogix's main office was situated to the rear of United States Consulate. Due to the terrorist attack threats on the US Consulate, the street was heavily guarded and one could only reach the software office premises after getting through two security check-posts. The entrance to the road featured a huge gate with a cemented wall. This gave the image of crossing a border and entering into another territory or country. The sense of alienation for Techlogix was not only limited to the location of the premises of their head office, the software company was also registered in the United States with their branch office situated in Boston. At the initial stage, Techlogix had problems in acquiring the data from these two universities. One defence of the delay in the submission by these two universities based on preconceived notion was that "*this data will be transferred to USA and it will be used against Pakistan, so we will not provide you data*." Employees' cynical remarks accounted for the type for their apprehensions that "*Yankee's propaganda*" (Collinson, 1992) was being prevailed on them (Fleming and Spicer, 2003). These apprehensions were based on series of events occurred in the past. For the current study, it would be difficult to collect the *facts* to match with *concerns* posed by the university employees.

At the time of the execution of the project, Techlogix divided the data into master data and student data for CMS. The master data provided the details of educational programs, along with details of the infrastructure. The student record contained information from admissions, examinations and up to their graduation. Techlogix confronted a two-tiered governance structure for the project. Firstly, from HEC through the Steering Committee, project manager and Director General IT's interventions and

secondly, at the university level in dealing with the administrative heads of the university were the two group of channels from communication. In comparison to the Techlogix, interaction with HEC, the public universities being the actual sites of implementation demanded extensive dealing and communication. Initially, Techlogix created one team at their central office, which was responsible for the preliminary in-house training and initial development. Mostly, Techlogix contacted HEC when clarity of plan or help in accessing the universities related resources was required. Techlogix being new to the educational industry and implementing CMS for the first time, it was a process of simultaneous learning and implementation for them. Their head office collected the initial requirements and started the development. At the time of CMS software module delivery to the universities, the central team was split into three teams. One main team with Project Manager stayed at the main head office, while the other two teams were tasked to work within the respective universities for implementation of the software. The formations and fractures of such groups were based on the situated actions taken on the current state of affairs demand.

The software company found the university working environment to be very different from other industries in the sense that that public university had a bureaucratic *form* of working, where people when called for meeting came up with their own agendas, rather than providing relevant information to Techlogix. As explained by the employee of the software company

> *Emp: "In the first two universities, we went the traditional way you know, Requirement gathering, going and meeting chairpersons in their teaching departments, going and meeting with the admission committee person in their office. So, I mean that was a very expensive way of working in term of time. In*

one on one meetings you can't, for example if one department says that this is my policy on GPA (Grade point Average). Ok, you find that the attendance rule that he is telling is not in compliance with the university rules, so you need to go back to the person who has the university rule and you need to talk to them. They might have something to say OK then go back to the previous person to sort the problem out. It is very difficult to do that kind back and forth communication."

The university policies, rules and regulations varied from department to department and campus to campus. Identifying these variations and asking them to bring a common policy for programming into the system was a time consuming task, as agreement on policy and rules and regulations had to be done through specified committees, councils and boards. To resolve these problems, the software company's project managers often had to visit the Vice Chancellor—VC—for making a policy decision. The VC's had the legal authority to change and implement policies/rules and later on to get them approved through the relevant committees, boards or councils with retrospective effect. These congregations were presided over by VC himself; therefore, approval for such project and their execution depended at lot on what he thinks about it. Acting as an '*obligatory passage'* of communication for Techlogix, the VC used his administrative authority vested in him by the university's statutory bodies. Staying within the university charter, the VC could give instructions to the sign-off authorities consisting of Head of Teaching Departments, Controller of Examinations, Director Admissions, Principals of Colleges or Hostel Wardens etc.

The employees in public universities were hired on permanent basis and you would find people working at the same post and sitting at the same spot for that last twenty years or may be even more. Their skillset was not achieved in one frame of time—*not in*

synchronic manner—but it has now become a part of their daily routine work (Latour, 2007). Rather, it was achieved in the due course of times learning each technique at a time. The nature of work was intertwined with the old technology of using pen and paper work creating *inscriptions* on files and registers. For these employees, bringing in a computerized system to work was a challenge of leaving the familiar technology passed down to them either at the time of learning in schools or attaining from their seniors and embarking on to an unknown technical ground. Thus it made them hesitant to take even small steps like inserting the date into the new computerized system. They were even hesitant to use the simple-Techlogix thought it was simple—help menu commands. The cautious learning of new techniques that the university employees would perform at a later stage slowed down the learning process. The user manual is supposed to provide information, yet it is quite common that people do not understand the document completely. At many occasions, the employees misinterpreted the *prescribed acts* demanded in the user manual. As explained by one of the software company's employee:

> *Emp: "So we created a document, a guide which was telling for example, how this session's fee is to be computed and so on. The person later on calls us and ask us you have given this date in the document and I have to insert another date, how would I do that if the document was created six months back? As an example, the old date was given as a sample value. Now for this person, the confusion was that the date in the helping document does not match with the current date he wants to insert. So for him he could not follow the document because he has to give a different date."*

The user manual *prescribed* the operations thorough examples, yet the operative side could not comprehend such instructions. A very simple *content* of the instruction could not be comprehended within the university's *context* for learning the proposed *contents* within the system. The complexity of user manual for CMS presented itself as a piece of technology that was also needed to be learnt by the university employees (Grint and Woolgar, 1997:p. 70). User manual had to be designed in such a way that it suited the context of the employees' comprehension (Clegg, 1990).

For outsiders, the university's main source of information was their prospectus that had details of departments, acquaintances with employees, programs layout, admission process, general criteria, rules and regulations. For Techlogix and newly inducted CMS department universities employees, the prospectus became the preliminary source of socialization and information. For these personnel the reading of such material was important in the sense that they could use this preliminary information to explore the organization's intricacies in detail by asking some questions of the existing staff based on knowledge gained through the prospectus, as these processes were part of the universities routine work. The idea was to initiate communication on the grounds of some pre-existing knowledge, so that the university employee was not burdened with the long list of questions. For the interviewer, the pre-read prospectus information became an ice-breaker for the software employees as they could start the conversation from the *content* that they had attained from the prospectus. However, the material within the prospectus was meant for outsiders and could only be useful to an extent of understanding universities basic structures. The real processes that took place had to be learnt from the university employees by interviewing and reviewing the official documentations done by the staff members. Communication mediums required rhythmic patterns to be developed for mutual understanding (Suchman, 2009). The

newly inducted CMS staff also talked about some of the challenges faced in the acquiring the information for developing CMS:

> Emp: *"I got a major source of the information, which I thought was a big achievement. It was the prospectus, which I acquired. All the processes were written on it, so I took few things from it and kept asking the people. To know things one by one is very amusing. Otherwise, one feels bored like a burden on one's mind but gradually people got familiar with us and they started to cooperate. This is what happened at very initial stage and I was the guy who started interaction with the people.*

Any knowledge gained prior to the interviews and meetings was conceived as a communication ice breaker. The prospectus was perceived not merely as an object of information, rather its contents provided a source for developing communication and association. Another example of such interactions and problems explained by the employee:

> *Emp: "So after the UATs [User Acceptance Testing], the end users' trainings were held accordingly. Where.....like there was complete manual system there and the HR personnel sitting with us……now you see every university's case is different if there's a university in Islamabad or Karachi, you cannot compare it with us because the HR personnel sitting here, they came in nineteen nineties they only know how to do the entry in the register, if this is responsible for the entry for accounts, and that one is for the establishment, they won't touch each other's registers. They had a level of working of their own."*

Such localized issues were not the part of the written documents available to the information seeking employees. The detailed understanding of the working environment

required a combination of reading information and interviewing people to assess how work is actually being conducted.

The observance of various groups depicted that change initiatives in the shape of CMS implementation challenged the pre-constructed formations. It attempted to bring in new group formations for the situated localized needs. These group formations were in the shape of Techlogix that had to be conjoined with the Oracle Corporation for meeting the CMS systems' software developmental demand. This was required for Techlogix to gain expertise in the domain of newly embarked-on education sector and for Oracle to sell their licenced product. For university employees, hesitating the project initiation and coming-up with agendas based on their pre-conceived mind-set were the sources of *uncertainties*. The explorations of prospectus and user/operating manuals were only good, if the possible *semiotic* interaction was provided between the inter-action. Latour (2007) explains, there is a "*gap of execution*" between inter and action—inter-action. Reading such informative documents merely provides *inter* part. Though he rights this for conducting the research, but it is equivalently applicable to the isolated learning process as well. To complete the gap, the utilization of *semiotics* is needed in between to have a complete understanding of the inter-actions. The reading of prospectus and other relevant documentation depicted those gaps that were later filled through the observance of signs by meeting people and talking to them. The next chapter looks at such challenges and problems faced in CMS developing more closely.

4.9 Sites of Implementations

The two universities selected for the conducting the pilot of the pilot project were University of Engineering and Technology located at the Northern city of Peshawar and the other Dow University of Health Sciences located in the Southern city of Karachi. Figure 5.5 attempts to provide a rough account of the group formation and interaction that happened among the entities, groups and departments.

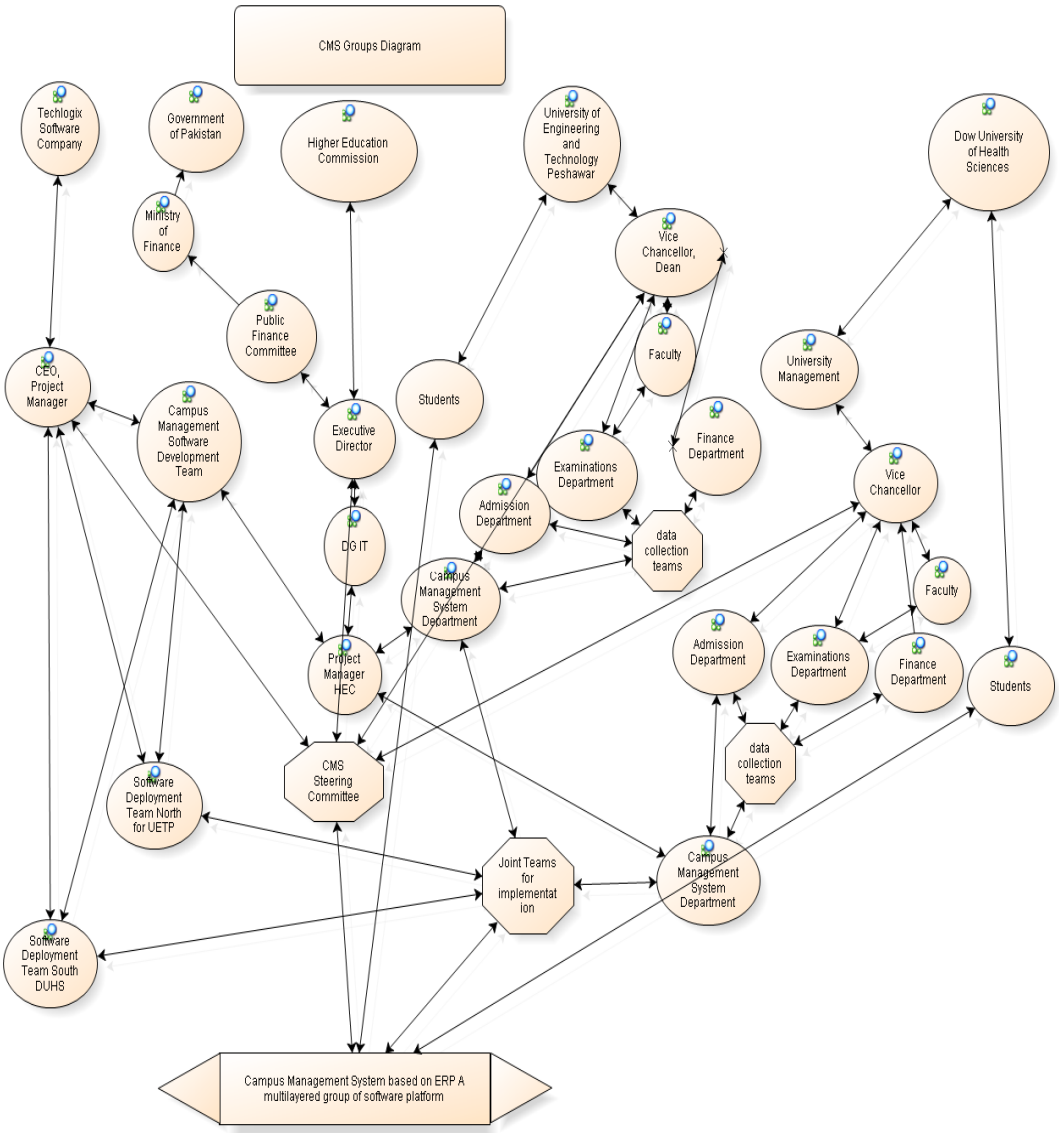


Figure 4.5 Connectivity Between Entities for CMS Implementation

The sites of implementation connections, associations and information flow for the pilot project under study are represented in this diagram. The formations for the project are depicted by the group activities that demanded the existing departments and other entities to interact, plan and take actions for CMS systems development. Though the software platform is depicted by just one graphic shape, in reality it require even more complex depiction than figure 5.5 to represent its actual execution, interaction and processing. The two-way arrows depict the associations for activating communication channels and execution of the project among multiple entities. The lines crossing through the shapes are portraying the demand of the development process to be of entities to join for achievement of plans. The associations through activities with the flow lines are introduced here for the sake of their developmental background. Detailed information about these sites will be available in the next two chapters which indulge and focus the *problem-tiazations* that ANT demands to explore with more fervour.

4.91 Case Study-1: University of Engineering and Technology Peshawar (UETP)

The Engineering and Technology College initially emerged in 1956 as an affiliated college to the main state university of the province. In 1980, the college was separated from the main university and declared as a degree awarding university. Initially, it had only one campus, but by the passage of time the Engineering University expanded its infrastructure facilities further to three northern cities, thus becoming a multi-campus university that offered following eleven departments.

- Department of Agricultural Engineering
- Department of Basic Sciences & Islamiyat
- Department of Computer Sciences & Information Technology
- Department of Computer System Engineering

- Department of Chemical Engineering
- Department of Civil Engineering
- Department of Electrical Engineering
- Department of Industrial Engineering
- Department of Mechanical Engineering
- Department of Mechatronics Engineering
- Department of Mining Engineering

The university was selected for the pilot project based on its past reputation of HEC related project completion as well as its technology based work. The HEC perceived that Engineering based university would be able to understand and adapt the CMS faster than other institutions. Its medium size among other public universities was also thought to be suitable for the software inculcation.

4.92 Case Study-2: Dow University of Health Sciences (DUHS)

The medical college was established at Karachi in December 1945 by the British Government of India. The foundation stone of the college was laid down by the second British Governor of the Province of Sindh, Sir Hugh Dow and the college was named after him as well. It remained working as a medical college until 2003, when its college status was extended to University of Health Sciences level again through the efforts of the provincial Governor of Sindh Dr. Ishrat-lu-Ebad Khan who was also a graduate of this college. The University status and its medical and health sciences domain granted through the government ordinance enabled it to engulf nine other medical and pharmacy colleges along with medical technology, health management and physiotherapy rehabilitation institutes located within the same city. In total, the university consisted

of 19 individual units in the shape of colleges, Institutes and departments that related to teaching besides the standard administration departments.

- Dow Medical College (DMC)
- Sindh Medical College (SMC)

  Dow International Medical College (DIMC)
- Ojha Institute of Chest Diseases (OICD)
- Institute of Basic Medical Sciences (IBMS)
- Dr. Ishrat-ul-ebad Khan Institute of Oral Health Sciences
- Dow College Of Pharmacy
- Institute of Medical Technology
- Institute of Physical Medicine And Rehabilitation
- Institute of Nursing
- Institute of Health Management
- National Institute of Diabetes And Endocrinology
- Sarwar Zuberi Liver Centre

  National Institute of Liver & GI Diseases
- Dow Diagnostic Research And Reference Laboratory
- Dow Radiology Department

  Dow University Artificial Limb Centre
- Vocational Training Centre
- Clinical Trials Unit(CTU)

This university was also seen as a suitable site from HEC's laid down criteria of mediums size, past project completion history and technology oriented work. Though

different from the Engineering University, the university had a special training department where administrative, faculty members and students were trained to use technology that ranged from basic training on office related use of computers to experimentations on medical simulators. The training process was an attempt to introduce technological contents to the existing practices. The CMS software introduction and usage could also be seen as a part of the technological drive the university had initiated earlier.

The selection of these two universities was done by HEC to conduct the sub-pilot project. It was based on their medium size institutional capacity, as the project initialized and controlled by HEC had to be started at a small to medium scale. From HEC's perspective, previous successful implementations of their provision of computers, installation of computer networks and digital library projects were the litmus tests that were performed on these two universities. Additionally, the selection of the two technology based—engineering and medical—universities was also an important factor. HEC perceived that these two universities with technological background would be able to appreciate the computerization project and absorb the change better than other universities. The two universities with their similarities also had some differences. The geographical locations of the two universities were different. The University of Engineering was located in the North Western Province, whereas, the University of Health Sciences was positioned in the south of Pakistan. The cultural environment in which the two universities were situated also provided varied accounts of materialities. University of Engineering was situated where the local language was preferred mode of speaking whereas; communication in University of Health Sciences was done mostly in the national language. The Engineering University employees preferred to wear shalwar-kamiz whereas; the University of Health sciences had more people wearing

trouser shirts. Since the engineering university's main campus was developed within the old University of Peshawar buildings, the premises had old style of architecture. The University of Health Sciences main campus buildings were situated in Karachi city centre adjacent to the Government Hospital provided more contemporary look of the premises. The structure of the building depicted a modern organizational working environment.

4.10 Concluding Remarks

The CMS software development existence and its marketability were based on its changed formations at different timeframes. The subjects of the various organizations were becoming a part of the object—CMS software. The connections among various entities—human and non-human—were developing the object to be suitable artefact for the educational sector deployment. On the other side, CMS had its own effect once introduced within organizations that constituted its market. Its positioning within the educational domain was not based on its marketing only, but a network of various elements and entities constituted its value. The aim here was to include the CMS technology with other existing technologies within the organization in such a way that its existence becomes obscure (Bijker and Law, 1992).

Pakistan's universities also have travelled through the time and space and reached a stage where new elements were being introduced in them to provide insight into the existing systems and bring changes by exploring the existing systems. The HEC's initial plan was based on the guidance given by consultants. CMS launch was not an out of the blue event; rather it should be seen as the effect of many other activities, documentations, associations and connections made in the previous times.

The chapter was not limited to introducing the main entities involved in the project initiation, but it also provided an account of the group formation and reformations,

deviation in plans at various levels, and most importantly introduced the possible set of '*interlocutors'* who could either effect the outcome or change altogether the course of actions. The organizations do not have their own movement; rather, it is the movement of these entities that provide forward movement (Latour, 2008a). The sites where the software was implemented have been introduced at a fairly minimal level as the following two chapters thoroughly explore these two universities' CMS implementation.

Chapter 5 Case Study 1

Analysis Part-II

"A Mixture is not easily analysed. Work, heat, light, a thousand pieces of information are necessary" (Serres, 2008)

Resistance towards Computerization in the Case Study of Northern University

5.1 Prelude for Next Two Chapters

Resistance within organizations is often associated with change. Change in organization occurs when there is an element that perceives the existing system to be functionally redundant, obsolete, and underdeveloped. While the implementation of the new element could be in shape of structure, system, policy, rules and regulations or be it a combination of these, the success of something new in the organization depends on how well it has been implemented and accepted. The element of change brings with it commotions that emerge due to uncertainty in the organization. The uncertain environment that emerges in the organization's culture is usually visible through the actions of the actors. In this chapter I propose to treat these actions are demonstrating resistance. Such resistance may take many *forms*, and may be associated with *processes* such as fearfulness, loss of status, power, lack of knowledge and incompatibility (French and Bell, 1999). The aim of this chapter and the next chapter is to analyse the *form* and *formation* of resistance and to observe the remedial measures taken to overcome resistance while implementing a computerized campus management system within Pakistan's public universities. Using Actor Network Theory, I will describe

resistance as it appears in both cases: two medium size universities, one based in the north east and the other based in south of Pakistan. The Oracle Corporation and Higher Education Commission published case study (Oracle Customer Case Study, 2008) jointly declared it to be a success without describing the impediments that *transformation process* had to go through. I would like to highlight the obstacles that the computerization process had to go through. Rather than looking at the final outcomes of the project, the case studies attempts to explore the early impacts of the computerization *process* to observe the *performance*. The existing chapter and the next chapter provide the account of computerization process in a network of networks formation.

Traditionally the social is seen as an external field of forces that constitutes the external environment in which an organization sits. However, from an Actor-Network perspective this is analytically a poor account of the relationships between networks. The '*social'* in Actor Network Theory is simply a way of referring to intersections in a complex mix of networks. Each network is constituted through many actions. Latour's (2007) idea of "*action is overtaken*" is based on the proliferation of these networks that explore connected processes. These varied actions are not always directed towards achieving the same goals or targets. With such understanding, the CMS inculcation is being explored in a fragmented manner where each fragment represents as if it is the *"part of the bygone structures and alludes to transformations*" (Latour, 1996b:p. 303).

5.2 Introduction

The University of Engineering and Technology Peshawar—UETP—started its computerization project in the year 2006. UETP's main campus was situated in the provincial capital Peshawar. Whereas, its' satellite campuses were scattered in three cities of the Province. Being adjacent to the Afghanistan, this province was considered to be part of the war zone with constant suicide bombing and terrorist group based attacks. In such conditions, the project of CMS was introduced by HEC to the university. At the time of initiating the project, the main campus administration communicated the university decision of computerization to bring the satellite campuses on-board. For this purpose, the Campus Directors along with their relevant staff was brought to the main campus so that Techlogix, the software company could obtain the preliminary data and information. The account to their initial interactions, shifting authorities and boundaries, behaviour to uncertainties and changing roles depicts the *formation* of resistance incorporated within the actions.

5.3 Language for Association and Effective Communication

To attain an insight to any event, ANT (Latour, 2007:p. 193) demands to explore the '*articulator'* that has a potential of either to support the process or to change a course of action. Among other non-material elements, common language and its utterance can play a critical role to provide traceability of prevailing group formations as well as their associations.

At the phase of requirement gathering for computerization project, the employees were called to the main campus, in order to provide their operational requirements for software. In some cases, signatory authorities could not satisfy the data acquisition needs of the software company. So, these unanswered questions were then referred to

the lower clerical staff that had in-depth knowledge about the existing system and its actual implementation. Initially, the lower staffs were quite hesitant to speak to the software company employees as they considered them to be 'outsiders'. One the team member of Software Company—Techlogix—happened to be from the same province and also knew the local language. In the first few meetings, he communicated with them in the national language and posed as if he did not know the local language. After observing university employees' attitudes and preference of speaking local language among themselves even when they were sitting with the Software Company systems analysis team, the software company employee unleashed his local language skills. In reaction to this changed *articulation* the university employees began to feel comfortable in front of him and started to share with him more rigorously then with other members of the software systems analysis team. Seeing this window of opportunity, the software company's team manager tasked his native speaking employee for conducting all the communication with university staff members for data/information collection. As most of the people in this province speak and feel comfortable communicating in their provincial language, the preliminary communication barrier was eliminated through the common language link. The communication channel started working with the technique of changed language *contents* hence making communicative actions in particular taking rhythmic pattern establishing understanding between the two sides (Suchman, 2009:p. 72). At times, the non-native language illiterate systems analysts team sitting in the room had no clue to the conversation that was happening between one of their team member and university employees. They could only guess from the non-verbal gestures what is going on. The language enabled this employee to associate with the university employees in such a manner that momentarily, he became the part of university employees group while getting isolated from his own team members. The harmonized

dialogue in the native language was important in the sense of attaining the information. The employees had their information needs to be retrieved from the newly developed information system. While the systems analysts needed the information from the university employees in order to change the existing form of the software and develop processes according to the university needs (Bloomfield and Vurdubakis, 1997). Once the communication link established, the 'outsider' of the software company suddenly was believed to be an 'insider', at least from the same culture, if not from the same organization. The guarded organizing secrets started to pour in when the Techlogix's employee was perceived as a *cabal* within the university employees group (Latour, 2007). Techlogix perceived this to be a breakthrough in terms of acquiring the data from the university. Upon breaking the language barrier, the university's personnel started to bring out relevant information about the implemented policies, rules and regulations, which software company perceived it as master data for the university's Campus Management Solution—CMS. As the university employees could now communicate with the software company on common language grounds, in addition to the master data they also brought their wish-lists for the new systems. This is where the *processes* within the existing system could be evaluated for changing or making them robust and dynamic (Suchman, 2009). As a part of provoking extensions, revisions and refinements, the employees thought this would be the right time to *mobilize* the issues for debate and practice prevailing within workplace (Knights and Vurdubakis, 1994; Edwards and Nicoll, 2004). While all of the wish-lists could not be integrated to the software program as it will then become a never ending story for the software company, some were incorporated and programmed into the system. The improved communication channel enabled Techlogix to somewhat enhance and situate their requirement gathering for the software development at an early stage.

The enhanced inputs and feedbacks seemed to be instigated by the *articulated* native language that developed an *association* among the university and Tehclogix employees. The university group was infiltrated by one member of the software company and that provided the software company convenience in accessing basic information/data about the university. This common link of language also encouraged the employees to seek applicability of the possible improvements that they had in mind. "*Electronic communication systems give voice, albeit a written and virtual one, to a multitude of organizational members un-tethered by traditional on boundaries of space and time" (Boland and Shultze, 2012p. 65).* Whilst it was made clear by the software company that not all of the wish lists could be integrated to the software program, some were incorporated and programmed into the CMS software. For CMS software these additions were attained through the chain of languages that permeates a range of '*articulators'* starting from local natural language to artificial computer languages.

The *group formations* within the network based on common languages between the computer, Techlogix and university employees provided *localization of global* good practices, yet on other hand local practices also sifted within the *global enactments* (Latour, 2007; Bloomfield and Vurdubakis, 1997). The common language *association* detected in the earlier passage and its reaped benefits toward data collection was only limited to till the time of interaction between the university employees and systems analysis teams preliminary information collection.

5.4 Network Movement: Value of Data/Information and its Shifting Control

As per ANT, the network movement could be explored by identifying the '*intermediaries'*—which could help in change process—and '*mediators'*—that could change the course of change process—in connection with the '*transport*

vehicles'(Latour, 2007). The '*transporting vehicles'* emerge in the shape of official documentations—electrical of printed formats. Plotting the paths of these *transporting vehicles* provides us the account of *performance* and *transformation*.

Based on the CMS software's knowledge and *in-formation* acquired through the preliminary systems analysis of the university, the software company subsequently created datasheets for acquiring the student data and asked the university employees to fill in these columns. These datasheets/*forms* were handed over to the newly hired campus management systems—CMS staff for acquiring the data from various departments within the university. The CMS department was created upon the recommendation of HEC's steering committee. The purpose was to hire dedicated IT skilled people for handling the computerization process. Acting as a communication bridge between the university employees and the software company, the newly inducted CMS employees attempted to acquire the data on the data-sheets. Upon demanding the data from various departments, the CMS staff of the university faced difficulties in data collection. The staff from other departments' lacked trust in the new CMS team on the grounds that the newly inducted team members could not be trusted. The element of trust within the existing employees was based on their daily interactions within the university premises. The *association* within the existing departments was much stronger then with the recently developed CMS department consisted of new set of employees. Furthermore, such new development had a consequence that existing employees own position as 'gatekeepers' to the data within their departments was compromised. For these workers, there was an association to the data held in their department, which underpinned their own role and authority within the organization (Latour, 2007). They perceived that this would be lost after transferring the data to the CMS staff. With the new software system installed, it was felt that CMS people would have access to all the

university data, resulting in the loss of control over data for other departments' employees, ultimately diminishes their authority. The evasive tactics included delay in providing filled datasheets, entering record without proper care or returning partially filled sheets to CMS employees. The *routine work* data was not passed on conveniently to the CMS employees. CMS software built upon relational database management system could not accept such partial data entry, as any missed piece of data could cause hindrance in establishing relation between the defined data access keys and data itself. Despite of this technicality for the CMS, the university employees feared that data capture by CMS employees will also result in taking over their control on data ultimately their positions and jobs.

The matter of low level of cooperation got so adverse that provision of uncompleted datasheets was raised at the highest level of HEC's supervised Steering Committee. As a member of the steering committee, the Vice Chancellor—VC—intervened and reiterated the importance of the filling out complete datasheets to the university employees through his head of departments. Furthermore, he conveyed the message through his Head of Departments that *'No one will lose their job with CMS department and software activation.*' The lack of completion of the student data 'starved' the CMS system of the crucial raw data needed to constitute it as a meaningful infrastructure. Without completion, the CMS system could not embed itself in university processes. The software company required the full completion of each individual datasheet. Any missing piece of data could show up in the relational database as an absence and thus could compromise the ability of the system to present itself as complete. Missing Data was important to build up the classifications already identified by the systems analysts to assemble and subsequently frame multiplicity of *contexts* for *information* dissemination (Bowker and Star, 2000). The material attainment for the software

company was generating a force exerted on the university employees to which they had to resist based on the possible foresighted consequences. By standing in between the data and the CMS software analysts could pose the intermittent effects towards computerization. These evasive moves could ultimately fail the project completely.

With respect to ANT, the university staff's role perceived as '*intermediary'* suddenly shifted towards a '*mediators'* who could affect the outcome of the project by providing incomplete student data. The completed data/*information* sheets were acquired for CMS through the intervention of the Vice Chancellor, as he became an '*obligatory passage'* after his directions to administrative staff of the relevant departments. The chain of command activation and assurance of retention within the organization by VC paved its way to access the missing pieces of data from the university departments. The lack of trust and fear of losing job & authority provided the slack times in the data collection processing. The communication channels' enforcement through the chain of command and assurance of continuation of jobs for university employees relinquished the suspected undercurrents of opposition. However, the new group *formations* had their own problems with the existing groups.

5.5 Leadership Activation

Campus Management Solution's—CMS—introduction to the university was based on the Higher Education of Pakistan's—HEC—initiative. Their selection of the university as the pilot project for CMS was done on its prior alliances in a number of development projects. Continuing the association with HEC, the Vice Chancellor—VC—also depicted his keen interest in the CMS project. For the VC, 'improvement' brought about by the system was a rather *'soft word'*; he wanted to radically change the *archaic*

system which he believed existed from *'Beerbul's*[39] *time'*. Old ideologies and practices were still part of the ongoing business processes. A change in data storage methods and processing had been required from many years. The idea of computerization was then to provide a monitoring system through the surveillance of staff, faculty and students to assure that declared *set of orders are aligned with the ongoing processes (Munro, 2012).* The contrast between the leadership comments on the determination of implementation and CMS software's actual slow inculcation suggested *'actions speak louder than the words'*. The commitment of leadership to change is more important than their planning to change the organization (Keen, 1997). The problem of performing active actions was that these actions were not based on isolated individualistic activities that VC could take-up himself (Latour, 2007). These actions were rather weaved and dependent on any other actions that were connected within network of networks. These multiplicities of actions varied in pulling towards desired results of or pushing towards slowing down or resisting[40]the computerization process. On VC's office table, a beautiful computer screen was lying as an artefact that depicted the computerization movement process within the university. Through this artefact, he could access the CMS data directly by going through the menus and performing queries. While the VC's leadership skill was geared towards steering this project, at the same time his work and time commitments in other areas restrained him from using the CMS software. His drive towards computerization process could not accentuate the elements of '*active passions'* (Gomart and Hennion, 1999). The *passing* of time and objects in relations with multi work-groups constrained on the grounds of what works and what is at stake. Despite his support for computerization, he couldn't use the system by himself.

[39] A famous Raja in Indian history stories, who provided a message "It is better to rejoice then to grief in misfortune" presumably used for explaining the existing employees working state.
[40] More evident in previous chapter.

5.6 Disassociations:-Compromising the Knowledgeable Strongholds due to Redefined Groups

From ANT's perspective (Latour, 2007:p. 33), the groups' spokespersons act frantically upon the *formations* and *redistributions* of groups as these changes pose an *uncertain* environment for the whole group. The *associations* and *disassociations* happen on regular basis and in this process it generates issues between group members ultimately oscillating new *formation* of groups. The confrontations between the processes were evident when the technical object was being conceived, designed and the competencies were redistributed between the users and CMS (Akrich, 1997). In term of control, the Examination Department was known for keeping information in a secret and secure manner and that was evident from the entrance gate of the Examination Department. There was only one physical access point, which was guarded through an iron gate that acted as a material object signifying the restricted access. Besides the Iron Gate, there was a security guard as *gatekeeper* standing to make sure that no one barge in the Iron Gate without prior permission. The entrance to the Examination Department was subject to the permission from inside. Upon arrival at the gate, the person has to first identify himself/herself and then explain to the guard the reason for visiting. The guard then went back to the Examination Department in order to gain permission from the Controller's office. But this security was not limited to humans. As human and material conjoined barrier made sure what goes in must stay in and what comes out, must come out with proper permission [41](Latour, 1992b)

Most often, the Controller of Examination acted as the key person who communicated with the outer world and then guided his staff accordingly, to perform their

[41] Based on Latour's (1992b)narration of hinge and door story

examinations related tasks. The whole idea of making a visible high security enclosure was to depict and symbolically enact a high level of sanctity in the examination record keeping. Mixing the symbolic representation with the materiality enhanced the image of a secure place (Latour, 1999). This image was further evident through the interaction of the CMS staff with Examination Department's staff while collecting relevant information.

> *Emp: we went to the examination section to get some data and told the employee, these are our people who will feed it. Because data was in black and white [paper form] and there was no data in the soft form we have to upload the data of the students in the system to bring it to a standard form. He [The Examination Department employee] put his hand on the files and said I will not give it to you. We told the Controller and controller said that you please sit, I go and ask him, why he is not giving it to you? He went to him and then the sounds of quarrelling we listened to…ha ha ha ha*
>
> *Int: okay!*
>
> *Emp: He [the person sitting inside] said I won't give the data and I will not in any case and this and that. So then eventually it happened that……..we then made our own people sit there and told him that your register will not go anywhere. We will be feeding sitting right over there. So this was very shocking for me….I mean that this tells how much conservative we are*

The Examination Department perceived their result register as the most important artefact of their department. Through the registers' scripts, the Examination Department employees were able to present themselves as the producers of a certain value that affected students, faculty and ultimately the whole university. The account of frantic

behaviour of the spokesperson given in the interview depicted the Examination Department's uncertain status due to fear of losing control on their most precious artefact. While on one side, they had the issue of maintaining their departmental integrity, on the other side; it was the fear that the only technical skill they maintained—that of maintaining the record—was being taking away from them. The objects preformed their relationships with actors and vested them with what could be called "moral" content (Akrich, 1997:p. 219).The compromise of sharing such important data was done on the grounds of keeping the registers at the same place and sharing data to the CMS staff for computerization, only if it was done in the perceived sacred premises of Examination Department. Their perception of *betrayal* with the existing *processes* and its *punctual-ization* enforcement suggests that the Examination Departments' employees as set of stakeholders within the university were staying in *flux* to guard the existing system (Sarker *et al.*, 2006).

The Examination Department realised the value of their data/*information* for the CMS process. They had in the past been charged with keeping it secure from any outer threats and resisted the idea of physically providing or removing their registers from the Examination Department. The idea was to guard their inner premises from outer threats. The examination employees believed that the visible premises of the Examination Department rendered it a secure place of their data processing and storage. Therefore, they resisted the physical dislocation of their records.

In terms of valuable data, the most important date required by the CMS software was the student records kept in the Examination department. CMS could only enact itself as coherent data infrastructure if the student records could be projected within the software system (Bowker and Star, 2000). The uncertain environment that emerged in the

organization was the hiring of new people for CMS department, who were now trying to control examination data. In other words, the CMS employees along with CMS software were shaking the *structure* of existing *infrastructure*. The old employees of Examination had the apprehensions that these CMS employees might take over their work in future, resulting for the exam employees to be jobless. In order to reduce such fear, the university administration communicated with all the old employees and assured them that nobody will lose their job due to the CMS implementation.

The Controller Examinations' team consisted of three data processing personnel and two supervisors—with Bachelor degrees—to oversee the work. Among these people, there was only one person who had a computer diploma course. The computer knowledge of the others was limited to word-processing and spread-sheets only. These people were already over-worked and under-paid.

The lack of computer knowledge made the Examination Department unaware that the physical demarcation of their boundary was breached virtually through computer network. Their lack of computer knowledge kept them entirely vulnerable to a possible attack on their data/information adulteration or leakage that was invisible to them. The computer that was kept in the physically locked premises that had the valuable and secret admission information was available through the existing network. The computer files on it were shared and available on the network. The lack of computer knowledge made the Examination Department unaware that the physical demarcation of their premises was breached virtually through computer network. As explained by an employee of the software company

> *Emp: Software Company's Employee: In the university our teams actually went on site. They had to actually go and see, what are their existing systems that they*

are working on transcript and grades information is being kept. So they said that it is very secret and we can't show you that and so on. At first we had a talk with them for a long time. Eventually with proper approvals and so on, they opened one room lock and then second room door was unlocked and you walk in to the room, the computer that had all the secret data was available on the network.

Int: Oh my God ok .

Emp: Ha Ha…

Int: Physically isolated but …

Emp: yes all in locks. it took them to open two or three locks to open to get to the system and system is available on the network .So our team really enjoyed that scenario.

The Examination Department's lack of computer technical knowledge was only visible to the team of software experts through their team of computer network experts. For them, the symbolic restriction was visible and effective enough to protect their exclusive boundaries. What they didn't realize was that these *symbolic boundaries* were visible enactments only at a *panoramic* level and the real security risks within the computer networks were hidden from them due to their limited knowledge and bounded rationality (Latour, 2007). The *ordered* periphery of examinations department could be trenched through the computer networking channel ultimately causing *disorder* within the misperceived *symbolic boundaries* (Law, 2009:p.144). The perception of the two groups i.e. the Examination Department and the software deployment teams had different views about the secure premises. The Examination Department team was trying to defend their fort on the grounds of their technological knowledge. Whereas, the software deployment team perceived that technology to be obsolete and with contained flaws that provided holes to access the data/information lying within the

Examination Department. The fights between these two groups hindered the processing of data collection and deployment of CMS software.

5.7 Issues Existing Prior to Computerization Becoming Part of the Network

Latour (2007:p.192) explains that acting is based on multiple actions, distant locations and emerging from invisible actors. Based on such multiplicity, the happening of various events in the past constructs the existing social realm. The Examination Department often had quarrels with other departments on the grounds of delayed results announcement, transcript delivery to students etc. Besides criticizing the manual heavy workload levied upon the fewer people for handling the examinations data processing, the Examination Department also complained about the low salary and a greater number of specific work problems in comparison with other faculty members and departments. As depicted by the interview of Director Examinations in this passage

> *Emp: There were often quarrels amongst our administration They [administration] say this has not been done, that has not been done. In writing that why they [students] come to me for the degrees? I asked them why are you sitting here, what is your problem? Administration says. So, it means that you cannot do his work whether you can't do it or you don't want to. What is the reason behind it you understand better? I told them [administration] to give me staff, because I don't have the manpower. So, this was between us and them the….*
>
> *Int: complaint?*
>
> *Emp: problem in between*

The quarrels between Examination Department and administration about salaries and manpower were issue lingering on prior to the CMS project was launched. Yet, these issues contributed to the *mobilization* of the element of resistance that were depicted in the work efficiency. Furthermore, it also permeated to the kind of justifications that were provided towards their defence in making slow progress. Such struggles between the Examination Department and the administration were evident from the VC's interview, where the Examination Department's resistance could be seen from kind of questions posed to the VC by the Exam Department about CMS.

> *VC: It's a mirror [the software] and its quick and its error free because in the past, like I said when all lists of the students' results used to come to the examination section, they used to have somebody working on them and it used to take weeks. I said [VC], why is it taking so long? He [Controller Examinations] says, we are typing it in but I [VC] said it was typed in, he [Controller Examinations] says that was in such and such form and our computer, our typewriter is this and that and resisted the computerization [of CMS]on grounds of reliability and security of data. Then I said [VC], what if you make a mistake? He [Controller Examinations] says No, we copy from them, I said yeah, but you've got fingers what if you spell the name wrong? What if you type the CGPA wrong? and that's what used to happen.*

The passage above provides us the account of existing *performance* from the Examination Department that was based on the prior sweltering issues. The assumption about working conditions from Examination Department sides was creating hindrance in making any rapid progress towards computerization. On the other hand, VC's conflicting perception of Examination Department doing redundant work with obsolete and incompatible technology was also evident. There was a simultaneous *representation*

and feature of *accountability* that had to be addressed in the CMS developing *process* (Law, 2012).

Aside from the manual heavy workload levied upon fewer people for handling the examinations data processing, the Examination Department also complained about the low salary and more work problem in comparison with other faculty members and departments. The background to the salary issue was that HEC improved the faculty salaries by advancing the designated scales, in order to improve the existing faculty salaries and made it competitive to the existing private sector salary scales. The step was taken to encourage educated people join the University in order to achieve teaching quality. While faculty member and VC's salaries' had been increased drastically within the public universities, the administrative staff remained on the old salary packages, which were insufficient to make both ends meet.

The quarrels between Examination Department and administration about the salaries and less manpower seemed to be prior issues that provided the *account* of existing situation within the administrative departments. The blame games on each other showed that these issues of the past had their impact on existing working conditions. The hostile conditions between the administrative departments were creating rigidity in the environment towards accepting each other as well as anew CMS software. These prior issues mutually contributed in *mobilization* of element of resistance that may be *represented* in the work efficiency and also permeated to the kind of justifications that were provided towards their defence. According to Akrich (1997:p. 208) "*…it may be that no actors will come forward to play the roles envisaged by the designer. Or users may define quite different roles of their own. If this happens, the objects remain a chimera, for it is in the confrontation between technical objects and their users that the latter are rendered real or unreal.*"

The next section explores how plans and strategies changed within the CMS implementation. In contrary to the previous situation where new group *formations* had quarrels, the next section attempts to explore how new groupings become the *agent of change.*

5.8 Diversions in Examination flow of information

From an ANT perspective, '*form'* is an entity that allows something to be transported from one site to another. The attempt here is to find such transporters that are making transformation happen despite the localized resistance discussed in the previous chapter. These *transporters* within the university may be found in the shape of humans, computerized systems, storage devices and documentations. Together they are the *possible vehicles of transportation* that serve as '*intermediaries'* and '*mediators'* that contribute towards the new formations by diverting the flow of channels through which the information travels (Latour, 2007).

Before CMS implementation, students' results used to travel from relevant marker—the course tutor—to head of department—HoD—and onwards to the Controller of Examinations office for compilation and calculating student's grades. With CMS software introduction, the authority for declaring results remained with Controller of Examination's office, but the flow of data—in the shape of students' results—was diverted to the CMS department to feed CMS Student Record Mart. It was not the computer system that was embedded into human organization; rather human organization was embedded into the computer system (Latour, 1996b). After HoD's approval, the CMS department's deployed person would than develop a worksheet using Excel medium for CMS software. Two copies of these Excel sheets were stored and burnt to Compact Disc—CD—duly signed by the Head of Department—for its authenticity—went to Examination Department where a hardcopy and softcopy was

routed through Dean's office to CMS Staff. CMS department uploaded the—CD—Excel sheets onto the CMS software. Due to this changed flow of information, the role of the Examination Department was then transformed from having the sole ability to process inputs, calculate and determine grade values and keeping the subsequent records into that of checking authority only. Introduction of CMS system had transformed the working in such way that issue of self-*accountability* (Munro, 2012)for the Examination Department, which was of greater concern, had been *realigned* to *vigilance* on other departments. This was due to the shift of possession of data to CMS department. The physical protection of data that Examination Department was *accountable* now became the concern of the CMS department. The work pressure on Examination Department employees was relinquished to some extent. The technological change in the shape of central database had affected the procedures and rule of business. The Examination Department's peculiar skill set of processing the result was now shifted to the computerized *form* rendering certain abstractness for their perceived '*identity of work'* (ibid). These employees had to perform audit through an external software auditor—made by the CMS Department—that checked the CMS department's data loading within the system.

The examination staff were now just making sure that the data entered in the systems was correct as per the CD record provided to them by the teaching departments. The data burnt on CD sent by the faculty department had the assurance of authenticity, which replaced the signed hardcopy of results sent previously. At the behest of the Examination department demand, the CMS department created a program that checked the grades assigned by the teachers provided on the CD with the grades entered in the CMS Student Record Mart to make sure that grades had been entered correctly in the CMS system. The software module—built by the CMS department to counter check the

data entry— was a further external program/auditor for the CMS software which provided Examination department with the ability to internally audit and assure *accountability*. Authenticity was delivered by comparing their CD data to CMS Software data where the source of data remained the same but differed in terms of medium of input. The ostensive purpose of providing such software was to check the CMS automated process by the Examination Department conveniently. While same Excel sheet was used to provide the two copies to two different departments, the one lodged with the Examination Department gains authority by virtue of its association with the Controller of Examinations office whilst the other copy entered into the CMS student record mart lacked such credibility. The Excel worksheet that provided *content* processing under the old systems was now the source of giving *context* for CMS data entry. This diffusion of technology was due to its prior *routine-ization* and convenience of use (Lilley, 2012). At first glance, this seemed rather redundant as data artefacts with same origin were being tested against each other, yet the difference between them was the association they had within the network. The environment between the two CD's data differed in terms of their '*intermediaries'* and the attempt of comparing from the Examination Department was to assure that these '*intermediaries'* did not turn into '*mediators'* to transform the original results. With the new changes, the pressure of work on the Examination Department in the past was now relinquished resulting in having better relations with administration and teaching departments, as they had fewer issues to fight on. With the help of CMS software, students were also able to collect transcripts with fewer time lags.

CMS software had reduced the '*mala fide'* intents of peoples for future, as now the triangular—faculty, examination and CMS department—interaction in the result processing would keep checks and balances on each other. The circulation of the exam

results would provide a vigilant and transparent system. The multiple flow of in-*formation* was changing the authoritative roles, hence effecting the power distribution (Law, 1986b:p. 264). The IT surveillance built-in tool of activities already incorporated into CMS software provided the computerized tracing of *associations* of changes (Latour, 2007).

The effect of the changed flow of information was more visible at the time of convocation where the governor of the province—also the Chancellor of the university—agreed to attend the ceremony leaving just one month for university to organize the event. Under the old system of processing results, printing transcripts, checking the final clearance from finance and library departments, writing invitation letters to students and getting registration done for convocation and rehearsals, it would have not been possible to do all the activities within the stipulated time of one month. Due to the quick access to the relevant data made possible by the CMS Software, the university was able to organise the event in this short timeframe. CMS capacities for querying and report writing became the sources of efficient work. It was based on the abstract design of query or report generator software that could provide output of multiple *in-formation* of students name lists, address and individualized letters.

The variety of shifted and new '*intermediaries'* discussed in the above passages as *transporters* gave new dimensions to the network. The flow of *in-formation* through the '*forms'* was diverted, with the transporters changing the sense of *accountability* within the examination system. The circulatory power through the change of authority enabled *surveillance* from multiple angles. The convocation preparation timeframe was reduced due to centralization and ability to process data in a fast manner.

5.9 Eruption of Uncertainties and Switch Over:-

ANT's first five steps demand to explore uncertainties. The passage below attempts to observe the *grouping* and *regrouping* of the entities based on the changing plans and strategies (Latour, 2007). The actors are considered intelligent and their actions based on perceived problems provide the possible solutions to the problems.

CMS project was initiated under the supervision of Director of Finance, who took part in allocating budget, hiring the IT team for CMS and setting up of the server room. After the initial setup was completed, the project was then shifted to the Dean of Engineering of the University. The Dean's approach was more of an academic administrator. For him, the identification of '*problematization'* related to CMS implementation was easy to comprehend being a part of academic community (Callon, 1986). Understanding that to initiate the project for admission processing and implement the software within department, he needed the alliance from securing the measure of '*interessement'*. The problem that he saw with CMS team faced was the element of mistrust from existing university employees. The existing employees posed questions regarding the university CMS team's method of working with the university's sensitive data. Looking at this non-cooperative situation created by the university staff members with CMS department, the Dean decided to bring the CMS development team to work under the Director of Admissions, who was also the Head of Department of Mechanical Engineering. The purpose was to curtail the rifts and make people feel that CMS department employees are part of the university. The '*enrolment'* of Director Admission with a dual hat of Head of Department was seen as an opportunity to siphon-off the element of mistrust and non-cooperative atmosphere within the university. The Director of Admissions was working in the organization for the last eighteen years. By

aiding his agency in multiple dimensions of departmental work, the CMS software could be '*mobilized'*. Director Admission interacted with university employees and the CMS team employees simultaneously to oversee and observe CMS development work. As a consequence to such action, there were two supervisory levels within the university that existed for monitoring at the affairs of the CMS team. One at the top level with the VC and Dean's involvement and the other at the Director of Admission's level through the handling day-to-day issues related to computerization. Director admission's eighteen years of affiliation, knowledge of departmental work and admission procedure enabled the CMS employees to resolve issue through him. Any problems faced by the CMS team which the Director Admissions was unable to solve were ultimately brought to the Dean. The Dean either with the help of Vice Chancellor or by himself becoming an *obligatory* communication channel between departments provided the solutions to the problems faced in computerization by the CMS staff. The Dean's efforts at making himself a communication bridge between the departments enabled the CMS employees to interact with the university employees. Therefore, the progress in obtaining data, and implementation of CMS was made possible. The Dean, by virtue of his post and his role of acting as Principal, made communication possible between university departments and the CMS department. The Dean's role in enhancing communication was further evident from this CMS employee's comments:

> *Emp: we have done this communication in the way that the Dean is basically more involved with faculty and with examination and admission*
>
> *Int: I think the Dean's role is like a principal here, as I understand*
>
> *Emp: It is of principal, because all the faculty is under him, so if he gets something done from the faculty, even if today, the faculty is accepting his orders. Today they accept something from him with an understanding that*

tomorrow he will have to accept something from the faculty. So, we have kept Dean as the routing instrument in between and that's how you have to flow information further. Now we involve him in all major decisions. He also sees to the teachers' point of view, where to facilitate them so we can get this kind of help form him also.

The introduction of such '*obligatory passages'*—Dean and Director Admissions—were not limited within the university, as such entities could be identified in other places as well. Based on mutual understanding and administration's communication, complex issues related to rules and regulations and its inculcation into software were negotiated by the '*obligatory passages'* through the communication channels that started within the university but ended up in Higher Education Commission—HEC—Project Steering Committee. For example, the PeopleSoft (CMS) software could not handle the repeat course average out grading systems without writing extra programming code. Under the old system, those students who repeated a subject due to failure or to improve their grade had their latter grade—A, B, C, D and F—numerical value averaged out with the previous grade achieved. Based on the built-in system facilities for calculating cumulative grade point average (CGPA), the CMS system could only take one grade's numerical value from the subject studied twice or more times. Hence, the CMS software could not cater to the existing practice of averaging out the courses CGPA values, by keeping the previous grade. Instead, the CMS software picked the highest grade to be counted in the CGPA and previous grade value was eliminated. The matter was raised in the HEC supervised Steering Committee by the software company. Agreeing with the CMS software's feature of adding just one highest grade's value in the CGPA, the project Steering Committee also approved the same method to handle course repeat

cases within the students' academic transcript. Initially, it was decided in the Steering Committee that if there was a major discrepancy between CMS People software's built-in rules and the regulations of the university, then the university rules would be changed to cater to the software. This decision was taken on the basis of the software's built-in 'good practices', so those should be utilized. The Steering Committee considered the CMS software's way of processing and its methods of generating official reports—such as transcripts—evolved after it's installations at many reputed universities worldwide. The 'good practices' were thus part of the CMS software. Furthermore, it was decided not modify the CMS software by adding additional complex coding, thus to keep it simpler for the software company to program and the university staff to handle. Irrespective of the Steering Committee's decision and in-house university debate, the Examination Department stood by its policy of averaging out the subject grade, since, they argued, that this represented the student's performance with regard to the academic progression, against which a student transcript ought to be properly understood. The *obligatory passage* for this particular issue seemed to be the Examination Department from ANT's perspective had the ability to convert an '*intermediary'* to a '*mediator'* that stood between the CMS software built in 'good practises' and the Steering Committees orders. For Examination Department's perspective, the word transcript meant to provide an account of grades and its numerical values on temporal basis. These classifications of students' grades were deeply embedded into the existing knowledge production and bureaucratic educational schemes (Bowker and Star, 2000:p. 11). The stance of Examination Department was on the academic technical grounds that ultimately changed the course of processing within the CMS software by altering the software and creating an additional software code to handle course repetitions and the CGPA calculations.

The same story narrated by the CMS staff depicted as if it was deliberate effort on the Examination Department to delay the CMS implementation and show-off their authority:

Int: In this, as you were working, if there was any critical issues, anything, anything challenging what you faced?

Emp: Challenging, yes, it was that the university [Examination Department] was not accepting D+ grade. That it not this way but the other way, we are not accepting it.

Int: D, D+?

Emp: Yes, it was some improvement issue.

Int: How was that?

Emp: It was that, that they counted it on both places, that if a student has secured the D grade previously, they counted it and when he improved it, they used to show it too [on the transcript] and used to count both of them

Int: Right, it might be an average

Emp: Yes, average. We said that, do not take the previously secured D and the improved grade should be taken according to the policy. So, this was the one.

Int: Right, you got this implemented because of the system?

Emp: Yes because of the system, of course, and the second is that…. (interrupted)

Int: So now it is done in the same fashion in the university?

Emp: Yes, the other was of F grade, they used to show that on the transcript that a student has earned this grade. We said that, it should not be shown (on the transcript) because he has not passed this F grade.

Int: Right, before this, these credits were shown earned?

Emp: Yes it was shown on the transcript. As he has not passed it but it showed it earned

Int: So what was the practice, did the student take it again?

Emp: Later, yes again as the Examination Department demanded it to be the same.

Int: So it was again on average

Emp: Yes all the same, the Examination Department insisted upon it. The system processing was delayed and the matter went to the Steering Committee [HEC] as well but they [Exam Department] had the old rule implemented.

The passage above represents the *mobilization* of actors in the shape of existing grading systems creating a vital set of alliance with the Examination Department employees. The Examination Department was a place where people with the predated knowledge based on set of examinations standards could provide valid arguments. Their level of expertise on rubrics was providing them latitude over the computer skilled CMS employees. The variance in technicalities between the two groups and its interplay provides an account of delayed implementation of CMS. It also *represented* (Law, 2012) the loyalty aspects of the Examination Department employees towards keeping the existing excellence of the system and incorporating it within the newly developed CMS software. The Department's *represented* their *accountability* issue by creating a *quasi-object* of grading scheme through which the students' were seen (Hernes, 2008; Middleton and Brown, 2005). Changing this *quasi-object* could change the narration of their academic achievements drastically by depicting different CGPA on the transcript. Regardless of a moral judgement, whether the course of actions taken by Examination Department was to delay the CMS implementation process, the issue depicted the

resistance based on academic technicalities. This was the fight among the two technicalities, one based on the *localized* rules—the Examination Department—and other being *the global* 'good practices' (Latour, 2007). The win in the case of *performance* was of the Examination Department based on *localized* rule with their technical understanding (Bloomfield and Vurdubakis, 1997).

The study of '*obligatory passages'* provide the account of multiple grouping and their interactions surrounding the particular issues. The conflicting actions and views of group spokespersons and diversified entities surrounding the '*obligatory passages'* illuminates the possible resistance that CMS software had to face while its incorporation within the university.

To accentuate it further, the next section attempts to explore the role of these *obligatory passages* in the shape of helpers or direction diverters.

5.10 Tangled Processes for Admissions

Within the networks the processes as set of tangled formations frame the Actor Network Theory (Hernes, 2008). Such was the case with the university admissions. The provincial government created an Examination Testing Agency—ETA—to conduct the entry test for admitting students to its public universities fairly on merit basis. However, ETA's remit was limited to provincial ordinance produced for its emergence, since no infrastructure was in place in which to embed such an institution independently. The Engineering University was delegated to act as the provincial ETA until such body is formed independently. The University received approx. nine thousand applications every year from within and outside the province for their quota places. A student could not apply to specialist place in a particular field of engineering, since admission of candidates to departments and campuses was done on the basis of a merit-list drawn

from the written examination conducted by the university admission staff on behalf of ETA—and high school final marks. Both grades had to be accounted for by giving them the specified percentage. This was a complex or rather *messy* matter, as there were eleven departments and four campuses where students had to be adjusted based on their merit position all over the provincial campuses (Law, 2004).

The admission department used to set up a temporary admissions office in the big university hall with the help of the finance and other teaching departments. The purpose of this exercise was to sell the admission forms, give receipt of an applicant fee along with the relevant documents at a single point. When the software company inquired about the admission procedure, the university officials proudly described this as "*the centralized admission process".* While this might have appeared to facilitate applicants or their relatives/helpers, it did not provide a central database for the university. After data being collected at the admission hall, the physical registers were taken to various offices and departments for their own *accountability* (Boland and Shultze, 2012). The centralized space—admission hall—with the purpose of *aligning the work* provided a skewed image of togetherness of different departments momentarily. But the timeframe tilted the centrality when the printed registries on which the data was entered travelled to their relevant departments, after the form selling and submission procedure for admissions was completed. CMS centralized database could transform this time based division, which created hindrances in searching the relevant data/info and performing future audits. CMS software had the ability to centralize the data and *aligned* the *localized* departmental information from the angle they would like to view. Besides the useful features of CMS software, its full utilization of Marts—the software modules within CMS—was still under consideration due to public and governmental pressures.

The CMS implementation network was *entangled* with the other networks of the university where public domain and the provincial government forced the admission department to check and recheck the complete admission process, before announcement of their final merit lists. For the last two years, CMS was going through the testing process as the admission department was hesitant to launch it without making sure that it works properly. The CMS software with its admission mart had the full capability to handle the admission procedures, but it was only executed on test and trial basis. A strict check was required to be enforced at each stage of admission process, since a single mistake could lead to embarrassment for the university administration and proved damaging to the reputation of the university. The semi-manual nature of work required more time and extra people to assist with preparing student admission list. On time and error free result announcement was a key element for the university's image building.

The admission department with the help of computer science department was able to develop a Macro in Excel sheet—programmable option to adapt Excel into customized work—that provided the selection of students department-wise according to the merit list. Each student was selected based on merit list with predetermined prioritized department list. The complete compilation of results required considerable iterative processing for each student. Considering that there were approximately nine thousand applicants every year, it would be difficult to handle such work manually, as was the case until 2001. With the introduction of the Computer Science department to the university and its contribution towards the Macro development, MS-Excel was introduced to the admission department. By gradually learning the Spread sheets features, MS-Excel was *routinized* into the department (Lilley, 2012). As a known technology, MS-Excel provided admissions employees to operate on a predefined macro programmed to work with their typed data. The outcome of this process was to

produce an authentic admission list, which could, after re-formatting, be uploaded to the CMS software. This process was known as '*smoothening the data'* amongst university employees. Since the CMS software was an Enterprise Resource Planning—ERP—solution, it provided the facility for uploading data through Excel Sheets. Although the Macro formula was tested and used by the admission department, the software company believed that the Macro's logical progression through iterative processing on finding students was also flawed and claimed that their CMS programmed module to create the merit-list corrected that error. Yet, the admission department denied this claim and insisted that the Macro in Excel worked fine without any errors. It seems that Excel as *routinzed* software was providing a dual role in the '*smoothening data'* for processing in Excel Macro and in CMS software. While Excel as an *accoutrement of power* (Drew, 1995) was helping the CMS software for data provision at the same time it was also competing against the CMS software—for assessment of developed formulas and the outcome of admission results. From the CMS employees' point of view, the software's ability to perform more tasks over the semi-manual system was being gradually recognized by the admission department employees. The CMS Employee handling the admission data claimed that this is the '*intelligent way to perform things'*. Yet, the '*less intelligent way*' in the *form* of Excel as a legacy system was still part of the existing network where CMS software was attempting to create its own space and alliance.

In parallel to manual form submission, the CMS online form submission system was introduced, using a unique identification key for each online application form submission. This identification key was used to retrieve the completed application form for further processing. Trust in the CMS could only be gained through time trial testing and confirmation that it was performing as good as the previous system, if not better. Although the online submission of forms was allowed, but the candidates' copied

academic records were to be submitted manually. The original degrees, certificates and transcripts—as the seals and signs of various academic institutions bears the authenticity of the document—were required to be physically presented at the time of submission of printed admission form and attested copies of academic record. The '*original papers'* with the institutions' stamps and seal had stronger *alliance* with authenticity in the manual submission then the scanned transcripts and degrees stored within the computerized system.

Despite the increased work burden produced due to two systems working for admissions data processing—by needing to assess the results from each side—the doubling up of work assured the authenticity of candidature. Two *transportation vehicles* in the shape of computerized and semi-manual admission forms were performing the tasks to assess and compete with each other. The not so trusted CMS system so far could have missed out the submission of forms as well as prerequisite documents and that would have created problems. As explained by Director Admissions:

> *Emp: for the first year we will say that if someone has applied online, that is acceptable. And the one has applied on paper, he is accepted too. We might have to work like this for one or two years until the people could know which one is easier so that they could start accessing for themselves gradually, that it would be easier to switch over to this[CMS].*
>
> *Int: right, right.*
>
> *Emp: because of that…….it becomes and a very sensitive issue a political problem. If a candidate fails and we tell him that you did not manage to apply online so you have failed, that's what we will not be able to afford. Because*

there is a lot of pressure on us that you are a public sector university and you are not taking care of the people and this and that. So that's why there we are a little slow over CMS implementation but it will definitely help out that…..the processing time of applications. The time of processing will be very much reduced for us because…aaa….the data will be already available.

The pressure of external networks that was built up by the *missing masses* (Latour, 1992b) within the CMS network in the shape other competing and time tested *forms of semi-manual transporting vehicles*, public and candidates for admissions was evident by exploring the network fusions with each other. The consideration of these *missing masses* (ibid) is perceived to be one of the possible reasons for slow and cautious role out of the project. The admission department had to be cautious in announcing the results. Firstly, they were *accountable* to the sensitive matter of declaring the admission results and secondly, the whole university's repute was at stake *(Boland and Shultze, 2012)*.

One major barrier to CMS software integration was that its Recruiting and Admission Mart was considered as not good enough to be taken '*as is'* into the existing admission system. It required a workaround to be done in form of the software company writing further programs to provide the complex admission criteria based on merit. This program was an external integration to the existing software. This kind of development was resisted by the HEC's project steering committee, as these external pieces of unique codes would not be supported by the software company in future. The externality in the shape of the programmed criteria for the CMS admission mart was actually an internality of the university's admission department that must be exercised to converge their performance in to the announced admission merit-list. The switch between the

content to becoming part of the *context* of the *malleable media* is where the transformations become more evident (Woolgar, 1991).

The above mentioned narrations are of set of networks that extended their *overflow* (Latour, 2007)through their intersections in the implementation of CMS system within the university. These networks varied from leadership commitment to other nature of work, provincial centralized admission system and the pressure of *missing masses*. All these seemed to be individual part of networks that could be explored on their own. Yet, their convergence and agentic factors are evident in contributing towards the slowing down the CMS implementation and the possible transformation that was desired by the university administration.

5.11 Switching of *Mediators* into *Intermediaries* through Mergers:-

The study of the CMS implementation within the university has provided us the account of importance of utterances within the intercommunication, shifting of controls due to data transfers, defence of knowledgeable strong holds, eruption of *uncertainties* and *reformations* of organization due to CMS implementation. The next section also attempts identify the rifts between two groups and how their *reformation* by merging them into one group resolves the conflicting issues. From ANT's perspective, it is the back and forth movement of the '*intermediaries'* into '*mediators'* that provides us the account of *uncertainties* and possible solutions to resolve them (Latour, 2007). '*Intermediaries'* simply help the *process* to go through, whereas, '*mediators'* either delay or may even change to course of the action. ANT encourages exploring the *mediators* that flip flop between the role of *intermediaries* and *mediators*.

Upon the initial CMS software configuration and development done in their head office, the software company moved there two members' to the university premises, in order to

oversee the implementation of the software and clear out the runtime glitches. For Techlogix—the Software Company, the university's own CMS Department employees were their natural allies, as both sides had the same aim to implement the software system within the university. At the time of implementation, there were two main issues, how to access the CMS software within the university departments through the existing networking system and the identification of a person responsible in each academic department who would be charged with understanding and operating the software.

The software usage within the campus became an issue when the departments could not access the software in their own offices. The network administration team was responsible for managing the university computer network and its linkage with other allied campuses. Along with other digital communication, the CMS software had to use the same existing medium for reaching out to other department and other campuses. The CMS employees claimed everything is fine from CMS server's end and the fault lies within the existing computer network. The network administration staff of the university held the CMS software to be faulty and claimed that the university CMS employees were unable to provide access to the software. For their part, the CMS staff blamed the physical network infrastructure, arguing that it was incapable of handling the web services messages. No prior notice of such deficiency was taken as Techlogix assumed that the network infrastructure provided by the HEC in the past was working well. The possible reason of such lack of discerns within the network system could be that it catered to computer labs and its usage was not at the optimum level. The problem occurred when the CMS software after connecting more computers and sites started to send its own data traffic on the existing network. With increased level of computer data signals on the computer network, the network started to clog and could not transmit the

CMS software data in a smooth manner. To resolve such problem the university had to move from its organizational mode to experimentation/intuitional mode, which required situated actions to be taken (Hernes, 2008). In order to resolve the access problem and end the blame game of the two computer teams, the university administration as an '*obligatory passage'* decided to combine the CMS and Network administration team. The network administrator of the CMS was also made responsible of the whole campus network. The authority existed within the network administration was now shifted to the CMS staff. With authority, along came the responsibility to manage the complete computer network system and that meant more work as well. The CMS staff were now approached by the university employees for handling other network and computer related problems. Being a part of the joint team they had no option but to facilitate the chores unrelated to CMS Software as well. Once the teams were merged into one information technology group, a major flaw was identified in the existing network cabling within the campus, along with some web server configuration problems. The onus of problem was levied on the old networking team. The old network now working under the CMS Network in-charge had no option to accept the network flaws to be occurring from their side. The blame game once between each other was now finished due to CMS department's dominance on the computer network staff. After exploring the possible sites where network signal clogging could happen, the problem was detected in cable length for the maximum distance that a digital signal could be sent was not observed at the time of cabling. Therefore, the web messages in the shape of digital signals were either delayed or not delivered to the destination computers lying in different departments. Based on the non-confirmation of the data signals received at the destination, the source computer kept on repeating and sending the same data signals again and again. This was causing the network to clog. Due to physical network's

layout problem the network servers were also causing problems. In addition to the network problem, at some places the digital data could not reach due to the incorrect web server configuration that blocked the massages from reaching some departments' computers. The joint IT group team became a *'mediator'* between two technological systems—CMS and Computer Network. The two technical systems required the efforts of both teams to work together to resolve the technical problems faced between them. Prior to joining, these two teams had quarrels among each other on technological grounds. Each team had their potential to detect the problems through their technical knowledge. However, they were only able to resolve the problem when the two technical expertise groups were joined together to cope with the blame game and rigidity among each other. The university administration had to curtail this fracturing effect (Foucault, 1984b:p.96). The resistance between the two groups was in a way linked to the resistance between two systems. The merger between the two groups was not limited to their physical abilities but it was also a merger of the two systems as well, as each side had its virtual extension *associated* with the computer systems they were held responsible. To control such situation, the *hybrid mobilization* of disciplinary as well as technical associations was required (Edwards and Nicoll, 2004:p.172). Once these two *hybrid groups* were merged, the problems between the two computer systems were also resolved. The joint team resolved the problem by placing the physical hardware, in the shape of signal repeaters at the appropriate distances and configuring the software of web domain services. Once the CMS access was enabled by the joint IT team, the software itself became an '*intermediary'* between the CMS and other departments. Since the computer systems' major glitches were removed and the user could simply access the software from their own departments through the computer terminals, the formation of CMS software was simply facilitating the access of data and

in-formation between the CMS departments and the other university departments. However, this did not mean that the problems of accessing CMS were resolved forever. The computer systems are prone to malfunctions and the moment the system stops functions it suddenly becomes a '*mediator'* that would change the course of actions of entities *associated* with it. A deviated set of plan might be required until the problem is resolved (Hernes, 2008). While the local technical problem was resolved within the main campus, the other cities campuses were still facing the slow speed access problem in their campuses. The problem with these campuses was related to internet connection speed, as some of the campuses are getting a meagre 1MB of bandwidth for the whole campus, making access to all internet resources extremely difficult to accomplish.

At the time of deployment of the CMS, the nature of the software demanded that data be entered from the relevant departments. The university administration decided to deputise at least one person within each university department as responsible for making timely entry of data into the system. In most of the departments, one CMS data entry staff was hired as a new employee. Typically this was someone relatively young, who had computer operating knowledge. While in some departments, an existing employee with computer knowledge was transferred to CMS wing. With this change they were now reporting to CMS Department but doing the data entry job in the departments they were working earlier. In addition to the emphasis on computer knowledge, the selection of these new personnel was based on age and that was a significant consideration for their employability. The idea was to hire young people who could stay with the University for a Sometime after learning the CMS software. By placing one of their own people within the department, CMS department assured the access to departmental data. These employees acting as '*dispatchers'* (Latour, 7 March 2012) in most cases were actually in the state of '*active passion' (Gomart and Hennion,*

1999:p. 232). With each '*passing'* (ibid) of data/information they would attempt to preserve the interests of CMS Software as well as CMS Department. The centralization of data by performing the routine data entry tasks by these *dispatchers* was not limited to data only as they had to keep an eye on the CMS department's vested interests as well.

ANT attempts to explore the course of actions taken within the *organizational* and *intuitive* modes, to overcome the *uncertainties* by exposing the '*obligatory passages'* within the network (Hernes, 2008). During this whole process of connecting the sites and entities provides their momentarily changed behaviours where either by supporting the course of action they enhance the movements within the networks towards perceived directions or altogether divert the course of actions. These diversions could delay the processing or create overheads for the organizations pre-set targets. It is the moments in between the flip flop of entities between the '*intermediary'* and '*mediator'* roles that provides the account of resistance committed by the entities.

Continuing with the story of implementation and pursuance of finding *mediators* next section explores the CMS systems own role and its agentic effect within the university after its deployment was partially complete.

5.12 Interlocutors: - CMS itself becoming Mediator

ANT demands to unleash the materiality and observe its possible influences within the network actors. Although the material impacts were also observed during the systems analysis and data capturing phases, but the accounts given below are based on the time and space where CMS software's implementation CMS itself as an '*interlocutor*[42]' started to influence the existing performances. Latour (1992b:p. 232) explains the

[42] Any entity that has a potential to become a mediator.

behaviour imposed by the non-human delegates as '*prescription'*. "*The prescription is the moral and ethical dimension of mechanism".*

Upon implementation of the software, the faculty raised concerns about the new routine activities that were demanded by the entering of the daily attendance record on the CMS system, which had replaced the system of maintaining attendance register files and calculating overall rates towards the end of semester. Some faculty members perceived that the daily attendance *form* provided to them for entering the data into the software was indicative of an element of mistrust expressed toward them. As explained by one of the Head of Department.

> *Int: As teachers were concerned, did they accept this, that the automation should be implemented at once.*
>
> *HoD: no obviously, nobody was using it even after implementation. They used to say that what is this? It seems that we are not trusted regarding attendance or what? Now, there were apprehensions of the teachers because everybody, every individual thinks different.*

The extract from the interview depicted the trepidation the started to erupt within the faculty members. It was a matter between the *prescribed* (Latour, 1992b:p. 232)system versus the *image of work* (Munro, 2012) perceived by the faculty members. For faculty, placing a daily entrance of attendance data into the system was mistrust on them as their authority of keeping the attendance sheet was taken away from them. In the beginning some faculty members avoided this interaction with CMS but the continuous administrative demand with the help of HoD and the software '*dispatcher's*[43]' consistent reminders left no choice for the faculty members but to provide the

[43] Latour (7 March 2012) uses this word for intermediaries.

attendance record on daily basis. The rule of sixty-percent compulsory attendance for students existed since the annual system was practiced. However, during the annual system and before the CMS implantation this rule could not be imposed within the faculty departments due to insufficient information or calculation. The departments were taking too much time to calculate the student's attendance percentage. After semester system and CMS implementation, the students were informed at the commencement of semester that sixty-percent compulsory attendance rule will be applied for allowing the student to sit for the final exam. Based on nature of semester system studies and good practices already exercised in the developed countries, Academic Council recommended strict implementation of attendance rule and gradually raised the scale of sixty- percent to eighty-percent minimum requirement for taking the semester's final examination. In the past, some teachers complained that students pressurize them to forge their low attendance so that they could attempt the examination. The enforcement of the rule through the software enabled the faculty to come out of the student pressure as they had now no control on the attendance and the system has taken over this authority from the faculty. Some faculty members even mentioned this unexpected benefit that the new attendance system had taken away the pressure from them. In case the students' now requested for relaxation in attendance, the teacher could blame the software for not allowing anything. The *identity of work* was now *aligning* with the *prescribed* rules and giving a new dimension to the moral and ethical standards by taking away the right from the faculty to change the attendance.

The Examination software Mart also placed added pressure on the faculty members to observe the deadline of results submission as the system could only *process* the results once all the results had been turned-in, only at that point being able to calculate the Grade Point Average—GPA—and Cumulative Grade point Average—CGPA. At

times, the software's constraint was compromised, as still, the cases of late result submission by the faculty did occur occasionally. But the faculty was warned by the HoD's to make sure that such delay should not happen again.

The CMS software with its capability to *process* the calculation of student attendance provides mix reactions from the faculty. While administration and some faculty members praised CMS software's *interlocutor's* capabilities to implement the attendance rule, others were hesitant to give away their authority to the CMS and ultimately giving a way to the administration to decide who will sit in the final examination. By holding the attendance sheets with them or delaying the submission of results, the faculty members were causing the CMS software not to functions at its demanded capacity. The administrative pressure by HoD's on the faculty members was an attempt to streamline the attendance and examinations' *processing*. The aim was to *routinize* some of the faculty members who still hesitated the new *formations* and make them *accountable (Munro, 2012)* to provide the attendance and exam results to meet the CMS time constrained data demands.

5.13 Effect of Plasma on Existing Social Formations

From ANT's perspective, *plasma* is the phenomena *"…. which is not yet formatted, not yet measured, not yet socialized, not yet engaged in metro-logical chains, not yet covered, surveyed, mobilized or subjectified. How big it is? Take a map of London and imagine that the social world visited so far occupies no more than the subway. The plasma would be the rest of London, all its buildings, inhabitants, climates, plants, cats, palaces, horse guards" (Latour, 2007:p. 244).* It is accounted through the interpretations. The interpretation not limited to humans should have flexibility and

fluidity to register the vast outside where every action and interaction has to appeal or repeal towards the course of change and organizing. Hence, *plasma* here would be treated as the *work-nets* of university built within the body of politics that are unapproachable in the current network formations, yet their effects were evident through interpretations of actors (ibid).

In contrast to admission department's constraints to go slow, in some areas the outside networks were actually driving forward the adoption of CMS. This was the case with identification cards—ID—generation for enhancement of security measures within the university. Due to prevailing Al-Qaida led terrorist attacks in the city and threats to the campus, the university was advised by the provincial government to close its working by 2PM, rather than running the teaching sessions until late evening. In order to restrict entry and conduct proper checks on people who came to university, the use of compulsory photo ID was made mandatory for all students. At the entrance gate of the Engineering University, there was a security guard with a big bamboo barrier stopping vehicles and maintaining ID checks. The check was more of a symbolic threat to intruders as most of the terrorist attacks happened in the past were committed by suicide bombers: a mere bamboo barrier or security guard with an old gun would not be able to prevent a dedicated attacker from entering the campus[44]. The purpose seemed to be limited to stopping strangers or visitors and interrogate them at the gate to identify the purpose of visit, rather than maintaining security from bomb threats. The reality seemed to be *sedimented* out of the security process (Karen, 1996). This kind of symbolic security was only possible, if all the employees and students had their photo IDs available to be shown at the entrance gate, in order to identify intruders or visitors. But

[44] The threat was not limited to internal as the Vice Chancellor of Islamia University—an adjacent campus to Engineering University—who was cousin of ruling party's leader was abducted while he was travelling to home in his official car. For last eight months, he is in custody of terrorists as his videos are released by them to show that he is still alive and struggling for his life.

producing ID cards for the whole campus in a short period of time was impossible, as the physical files had to be reviewed to gather the necessary data to make ID cards. CMS Student Record Mart was made to interact by designing the security card in the report writing facility of the software. The Record Mart provided the flexibility through the report-writer to design and print the IDs. The *technological* tool was fused within the security surveillance *context* to produce an identifiable artefact in the shape of ID cards in short time. The security department acquired the student data in the shape of lists of students to match with cards and within few days a checkpoint was established for students. No students were allowed to enter the university premises without their ID cards.

The main campus appeared to be a calm environment within the university but this calmness was surrounded by plenty of stormy activities happening within and around the university. One such unfortunate event was the murder of a hostel resident student who was beaten to death by an extremist group that apparently wanted to stop the student from listening to music in his room. After this incident, the campus suddenly became a site of intense political activity for few days, with different political groups striking and refusing to attend classes. Some physical clashes between rival groups also occurred on campus.

Culture as a resource can be mobilized as a source of assistance or resistance (Brown and Capdevila, 1999). The incident can be seen as '*plasmatic'* in the sense that such events occurred outside the CMS development network. However, this kind of digression within the existing environment poses a question to the *set of orders* that are applied to impose the *authority* on others by the student groups. The identification between the *order* and *disorder* provides the locations where processes have to be

realized (Law, 2009:p.144). The *overflows* of such networks provide enigmatic pressures on the prevailing processes of change. For this implementations process of network/s there is turbid visibility towards what is flowing into its own body of politics. However, this illuminates the kind of life threatening pressures that employees of the university could face while *aligning* themselves to the set of *accountabilities* and *associations* posed through the CMS software. More importantly, had the hostel module of CMS been fully implemented within the university premises and its satellite campuses, then this may have had some effect on administrators ability to anticipate such incidents. The *"capacity of the technology is equivalent to its political circumstances of production"* (Grint and Woolgar, 1997:p. 19). CMS system's hostel module was limited to allocation of rooms. According to Software Company's systems analyst, the administration was adamant about computerizing the hostel allocation system based on merit lists. They were not concerned with creating a database that could actually record the main activities happened within the hostel environment. For example, the visitor logbook, warden's comment on students' behaviour, hostel exigency and emergency reports, meal arrangements in cafeteria etc. were some of the things that could actually provide a source of information about students' living in the dormitories. As explained by the software development team member

> "*The university administration was interested in only ten percent of students' hostelization in terms of their stay that was assigning their room. The ninety-percent of their stay was less important, as administration had to face more pressure at the time of hostel room allocations*".

Since no data was available related to students' hostelization's activities, the research work could not analyse the effect of CMS software's hostel module on stopping such

unfortunate instances. Therefore, analysis remains *plasmatic* as the network of hostel module's performativity could not be fully identified.

In the first case, the *plasmatic* effect of the terrorist attacks made people realize the CMS implementation importance as it contributed towards quick processing and developed ID cards for the university. In the second case, the *plasmatic* effect of the student's pressure to obtain the hostel room provides a repealing account where CMS working was limited to creation of the hostel allocation list. The outer pressures restrained the working of fully developed hostel management system. Due to the incomplete implementation of the hostel management system, the extent to which the CMS could contribute towards the risk management remains unclear. Such kind of external agencies exert pressure that hinders in the implementation of CMS.

5.14 Articulation of Best Practices and its Localization

ANT demands localization of global to translate the transformation process within the networks by recognizing the *mediators* between the paths of the networks. *"This deployment might take the shape of a network on the condition that every transport be paid in transformations, that is , if we make sure to pave the whole way from one site to next not with intermediaries but with full blown mediators"*(Latour, 2007:p. 173). The departure point of the various paths could be same but their endpoints diverge from each other. The university realm had its own set of mediators that demanded the change element i.e. CMS to be moulded to its own requirement.

One of the major reasons for the introduction of CMS software as a part of the bigger network within the university was to cope with the relentless continuation of semester work that was required to *operational-ize* the semester system in its full *context* by conducting the twofold activities per year. Under the former system, the annual

examination provided ample time for departments to prepare and declare results, which acted as a precursor to the financial and other administrative work. All departments had ample time to process data and prepare for the next academic year. The version of semester-ization introduced within the university lacked many of the benefits found in other places that apply this system. Firstly, the flexibility of registering into courses that is a part of semester system was not given to students, which is usual feature of the American semester system of studies. The constraint on such flexibility was based on the fixed courses for engineering degree allocated to students. Secondly, the university admitted students from the high schools that were based on annual system. The university believed that the cream of students was available only once a year and good students were not available for the second semester intake. The consequence of that was that fall semester courses were not offered in springtime and vice versa. Students who could not clear their semester subjects had to wait for one year to take up some of the courses. In the North American system of studies, the failed student retakes the whole course again as no re-sit option is available in the case of British semester system. The university adopted neither the North American, nor British functionalities of subject repeating in their implementation of the semester system. The best practices inculcated in the CMS software were trimmed to their own needs. Consequently, the current system was causing some students to lose their academic years, as they had to wait for the next year registration and could not take advanced courses.

The question of standardization versus localization is at the heart of this analysis. CMS as foreign object for the university demanded—with its prebuilt software design the nature of—the existing social to perform tasks based on global standards. It was a struggle between the world *inscribed* by the CMS designers and world *described* by its university users (Akrich, 1997:p. 208-209). The CMS was on a continued due to the

displacements. However, the localized semester system resisted the full CMS software implementation, thereby demanding necessary changes for the system to run. The global best practice advocates were the conglomeration of Higher Education Commission and CMS system itself. Together they a formed a group to bring in the global practices. The HEC desired that a set of standardized practices should be inculcated through the CMS. The CMS with its built-in software architecture attempted to force the pre-set and preprogramed practices. The struggle for standardization between CMS—with HEC as a supporter—and university employees—with localized academic practice knowledge—seemed to provide an account where existing processes are prevailing and attempting to restructure the CMS globalized *formations*. The analysis depicts that while prevailing processes do not outright reject the new *form* rather attempts to sift into the change demanded in the new *formations*. The *set of orders* needs to be visited by the authorities and experts jointly to avoid any foreseeable problems (Law, 2009:p.144). The intersections of the two networks are dependent on selection of processes as any redirection shifts the paths and direction of flow. The *planning* was re-planned to accommodate the existing processes within the element of change that was CMS system (Suchman, 2009).

5.15 Meaningful Shifting Boundaries

The definition of groups in ANT is not limited to humans. A group could be a combination of artifacts and humans or even one entity alone could pose as a group. *"The word 'group' is so empty that it sets neither the size nor the content"* (Latour, 2007:p. 29). Groups change their boundaries through continued formatting and reformatting. Observing group leaders and their interactions provide the account of shift within groups' boundaries, as they become hyperactive at the time of groups' fractures

or emergences. While observing the change within the university groups, their shifting boundaries provided the account of new formations due to enactment of *mediators*. These shifts contribute towards the transformation process.

Initially, the Vice Chancellor—VC—decided that the CMS installation project would be launched under the responsibility of the Director of Finance. At its initial phase, the project required the allocation of funds from the university side, as HEC carved this project out of the prevailing budget of the university. The money allocated for university remained the same but some of its portion was diverted towards the CMS systems implementation. The VC's decision in this regard seemed to be a move to smoothen the fund allocation process, as at the initial stage, the finance department had to allocate the relevant funds. The ownership commitment from the finance department project would ease out the financial acquisition problems at the early stage where payments were required for software and infrastructure development.

At the stage of software implementation, the VC decided to shift the responsibility to a *hybrid* employee, the Dean of University (Latour, 2008b). This was the result of the realization that the operationalization involved dealing with more administrative issues with faculty and departments, rather than of the management of financial allocation. One more factor in this change of responsibility could also be contributed to the fact that Director of Finance retired and was rehired as Financial Advisor to the VC. The loss of interest from the then director finance and now financial advisor was evident at the time of his interview. Despite taking interview time from is secretary, he refused to be interviewed and with disgruntled voice: *"I don't have time for this and it is not my concern. You should ask the person who is in-charge of this project."* Upon reminding him that he was the one who started the project, Financial Advisor managed to say some

words about it, but the clear lack of interest was evident from his tone and gestures. The reaction and anxiety shown over the conversation depicted peeved interaction that may have ramified emotional attachment and losing the key authoritative role in the CMS project. While this change in responsibility in handing over the project from Financial Adviser to Dean seemed quite intelligible from VC's point of view, it created differences between the employees. The perceptions and loyalties for the old and new command were clearly divided. There was a question of full commitment towards the new group leadership (Latour, 1986). Moving control over the project from one domain to another divided the CMS employees' associations. For those who wanted to stay under Financial Advisor, the invisible boundaries of working under finance department had some monetary conveniences that vanished after crossing over and becoming Dean's team. These employees wanted the salaries to be enhanced on the grounds of competitive market-rates for their computerized technical skill set. For others, the switch over was a convenience of utilizing the Dean's '*academix'* capabilities (ibid). If the project had stayed within the finance department these monetary issues might have been more easily resolved. The change of command for some employees became a source of hindrance in communication, as some of them thought that they had better association with the old leadership.

The Financial Advisor was strict in terms of laid down rules and regulations that CMS staff adhered to. But he was willing to listen to the CMS department employees' job related problems. The employees thought that his continuation of command could have resolved their personal issues that were related to monetary and career benefits. The change in command also revised *set of orders* and changed some practices. The Director of Finance adhered strictly to the - for example, employees could not use mobile phone in their offices as it would interfere with computer server machines communication and

harm data storage. Punctual time keeping was another thing that was demanded within the CMS department. The groups' formations between the CMS employees were based on their vested interests, limitation of communication, authority and financial benefits. With employees benefits neglected, CMS implementation could hinder as the trained employees might leave for better prospects.

The formation and reformation of groups and boundaries could be detected at various stages of the computerization process, but the glaring examples of such shifts were evident in the above passage. Their shifts are on continual basis where the entities interact and reform the stances. Boundaries changes from moment to moment where interests and group work effects *territorialise* and *de-territorialise* for other moments (Hernes, 2008).

5.16 Summing up the Prevalent Network for Resistance

The continuous flow of *information* through the artefact of datasheets was part of the design and implementation phase of the CMS Software. A blockage to this flow emerged from the provision of incomplete *information* on the datasheets. This was part of the network where some actors' attempted to slow down the implementations, eventually to a level that it fails the CMS project. The solution to avoid such diligence was evident through the agency of steering committee that asserted the compliance through Vice Chancellor (VC) and HODs[45]. From Software Company's point of view, the VC and HODs were '*obligatory passages'* through which they could attain complete data/information about university to set up the CMS alignment. Drawing upon the '*energy'* of these '*obligatory passages'* in the shape of their focused attentions and actions could complete the data/information required by the software company. This

[45] (Latour, 1992b).

was done with the assumption that problem lies in humans only and ignoring the possible agencies of the non-human objects that existed with data sheets *forms* and possibly the CMS artefact[46]. Where there are '*action-programs'*, there are '*counter-programs'*. The employees' delaying tactics and provision of incomplete information were based on latent *representations*[47]—that account for fear of technology, job and losing authority, salary issues etc.—hidden inside these moves. However, moves and verbal comments provided evidence of fear of losing control and lead to a concern over their own future employability. The question of association and disassociation of *groups* was also evident, where newly inducted CMS staff was considered as an alien group to the existing organizational culture, therefore, faced a group(s) cohesive action in a way that *'we are part of the university, while you are not.'* This *represents* the issue between the groups. For example, the existing visible working boundaries of the Examination Department were challenged by the CMS demand for data/information for the computerization *process*. The [48]data/*information* kept in the perceived[49] safe haven of Examination office premises was shifted to CMS software to be used by CMS employees. The Examination employees perceived it as a risk that was interwoven by elements of loss of their technical supremacy resulting in job insecurity, control of *information*, threat to secrecy and ultimately placing the university reputation at stake through its possible leakage. These accumulated concerns and *uncertainties* brought out a strong reaction towards the CMS employees when they demanded the sacred registers filled with students' academic record. After realizing that the loss of possession of data/information was inevitable, the Examination Department gave in, but only on the condition that all data entry would be done within their secure premises. In doing so

[46] *"It is the complete chain that makes up the missing masses, no either of the extremities"*
[47] Based on Law (2012) "Theories of representations".

they were unaware of the fact of a pre-existing possible breach in their stronghold through computerized network access on the computer they used even before CMS was introduced. While the lack of awareness of technology provided them an illusory form of security, the awareness of the prior issues in the form of low salaries and less manpower to handle the enormous workload played a role in the *mobilization* of resistance towards CMS software implementation. The shifting of project control from Director of Finance to Dean and finally to Director of Admission, provides some evidence of administration's struggle to overcome the resistance that emerged in the shape of project glitches which erupted at various moments of CMS implementation and the evasive tactics taken to overcome the problems. The prevailing element of resistance continued even after the partial implementation of the CMS software. The faculty's hesitant behaviour in using the CMS software and provide data on regular basis points to their mistrust and concerns over loss of control of data.

The CMS project was launched within the university in 2006 and was made available to the administration in 2008. Besides the fact that the software handles all the information about the students, the students were not given access to their data until fall semester 2009. The idea behind not giving the access was to make the administrative staff well versed with the software technicalities, *information* flow and its dissemination *process* first, and then allows the students to access their information through the internet portal. The usage benchmark software created by the software company was based on the data taken in one of the well reputed private university, where the CMS software was installed by the software company at the same time this project was going on. The private university's usage data was taken as a benchmark to assess the public university's usage of the software. Besides the continued efforts of the university administration, HEC's steering committee and CMS staff, the software usage has only

risen to sixty-percent of the software module usage. This was only made possible when the software company provided their usage statistics on the university's CMS software utilization to the steering committee. At that time it was only touching forty-percent usage. After looking at that meagre percentage of usage, the Vice Chancellor engaged in continuous encouragement and enforcement for usage of this software, with a result that usage was increased to sixty-percent. The VC believed that very few stragglers were now left. People had started to accept the software as a useful tool. The software company considered this percentage usage to be very slow by comparing it to the computerization project in other industrial sectors. However, HEC and the university still considered it a success after taking account of the prevailing culture within the public universities of Pakistan.

Chapter 6 Case study 2

Analysis Part-III

"*There is nothing more difficult to carry out, nor more doubtful of success, nor more dangerous to handle, than to initiate a new order of things*"

Niccolo Machiavelli

Resistance towards Computerization in the Case Study of Southern University

6.1 Introduction

Dow University of Health Sciences was situated in Pakistan's southern city of Karachi. Karachi being the only operational sea port was a hub of overseas commercial activities. Due to diversity in its 'citizenship Karachi is known as a true cosmopolitan. Being the largest city of Pakistan it had liveliness which is now under severe threat of terrorist activities, extortionists, drugs and gang mafias. Dow University's campuses were scattered in within the city centre and suburbs. Most of its institutions were surrounding the Civil Hospital of Karachi that was also located in the city centre. The Campus Management Solution—CMS—software was introduced through the central head office and all other institutions were then connected through the computer network that Higher Education Commission—HEC—had provided previously.

6.2 Realizations through Agencies

According to Latour (2007:p. 229), the imposition of *quasi-standards*—as in this case was through the CMS software's built-in '*Best Practices*'[50]—can be achieved through the coordination among the agents. It is the agency that provides the enactments. Implementation of CMS also required such multiple actors and enactment for the project to be initiated within the university.

In the early stage of the CMS software project implementation, the HEC faced difficulties in convincing the university to embark on the project. The university officials had reservations about the success of the project. Its failure could bring a bad reputation to this newly established university. Furthermore, the university desired a complete campus management system, which would also cater to their financial, human resources management and other administrative needs. The CMS provided by the HEC was felt to be too student-centric and based around *information* which was only related to student data. This seemed to a partial solution for implementing the 'best practices'. After joint presentations from the HEC, Techlogix—the Software Company—and lots of in-house deliberations, the university administration decided to implement the project with a promise from HEC that the other administrative modules would be forthcoming and integrated into CMS at a future date. It took almost two months of convincing before the project to be initiated. However, the initiation of this project was not solely dependent on the HEC's demand and their seriousness in implementing the CMS, since the decision was actually taken after realization of possible benefits that will reap out of this project for the university. As the Vice Chancellor—VC—in his interview explained:

[50] Latour gives an example of Accounting codes and their narrations as a standard of best practices.

Int: HEC says that they were having some trouble in gathering the statistics from the different universities, so that's why they came up with the idea of placing the CMS?

VC: Exactly, they were right and it's not only when you talk about statistics, statistics in various ways and even when they used to write to us about. For example, the number of students, we had to go back to our registers and to our manual documents to send the details over. There was some problem. For example, few students who were failing, we were showing them in two classes. We were showing them in class say year three as well as in year four and there was a discrepancy. So, we were also not satisfied and then our people had to do a lot of work. So that was one reason, but we also were facing lot of difficulties. For example, for our student financials and so on and so forth, so yes this is the reason that we started off with.

The VC's comments about the university's administrative work related problems prior to CMS implementation resembled with HEC's identified problems within the existing *processes*. Yet, HEC claimed that it took them a long time to convince the VC and his team to initiate the CMS project. It was the combination of these communication channels that convinced the university's administration. HEC had to realize the university administration that CMS would provide the benefits to the university staff as well.

The value of information provision was not limited to its onward transfer to HEC. The statistical accounts could also prove useful for the university itself, in *performing* its administrative tasks efficiently. The *accountability* through the statistical data could eliminate the *uncertainties* and ambiguities that were prevailing in the existing

information. The *identity of work* could be *aligned* to the *line of work* (Munro, 2012). Considering the importance of making the project successful and to keep the newly built university's reputation intact, the VC himself took on the role of project management, instead of making someone else responsible for the project within the administrative staff. The CMS development team worked and reported directly to the VC. At the initial phase and later on shifting academic systems from annual to semester system, the VC even had to work on weekends, to an extent that he conducted few joint meetings at his private residence with the software development representatives, university administrative & academic staff and the CMS Project Management team. Such indulgent of leadership encouraged the project to move on further as its *active passing* through the leadership was driving other members to follow and become a part of something big (Latour, 2008a; Hernes, 2008; Gomart and Hennion, 1999).

HEC applied material and human agencies simultaneously to convince the University for launching the projects. Once the realization was achieved, the VC being the *gatekeeper* of the university had to show his personal interest in order to convince the administration to focus on the CMS implementation in a sincere manner.

The progress made by VC to implement the CMS was not enough as other regulatory issues had to be managed, in order to make CMS functionality more useful. The next section explores such changes where new *alliances* required the *realignment* of things.

6.3 Realignment of Alliances/Associations:-

As per ANT, the accounts of associations among human and material entities provide us the capability to trace the social. The eruption of '*uncertainties'* make the changes within the existing *alliances* by creating new *associations* and instigating

disassociations momentarily (Latour, 2007). It is within this frame of reference that the possible relations of subjects and objects that could be probed to recognize their *representations* towards resisting the change (Law, 2012).

Due to a change in the academic year, Techlogix had to revise the CMS master data, as the relationship among the datasets would have to be altered to suit the semester systems' data entry. This was done after six months of going into the project work, when the software company had already completed master data collection and structured the software to store the data on annual system basis for computerization. The semester system in comparison with annual system was a complete shift in academic environment as it affected the fee submission, registration teaching and assessment *processes*. The *entangled processes* required time to be *untangled*, comprehend the *connections* and *reconnect* them for changed scenarios/programs (Hernes, 2008). With this late decision, the software company had to make changes to the software that would attune it to the semester system. This meant that six months' worth of progress had to be revisited and changed to facilitate the semester system's complexities. The university perceived that the software company's experience and the software's built-in *best practices* would help them in learning the semester system (Latour, 2007:p. 229). Being new to the semester system, the university administrative staff had the perception about the CMS that the software—with its version 8 being implemented within the university—had gone through many reviews by PeopleSoft and Oracle after getting the feedbacks from the reputed international universities work on semester system using the software. The CMS software Marts through its points on interactions and demands—3C's Communication, Checklists and Comments prebuilt in CMS—would provide the knowledge to *operational-ize* the CMS system. The

university staffs being nomad to CMS software and semester system were looking towards the Techlogix employees to teach them both integrated systems simultaneously.

The initial changes were not limited to software development, as the University's CMS staff kept changing, due to the high demand for qualified IT professionals in the large cosmopolitan city. Quite often, the hired and trained staff left for better job prospects. After seeing the high attrition rate of computer professionals in the CMS department, the salary level was raised substantially according to prevailing market rates. The future job prospects for the employees were also improved in shape of medical facilities and the provision of other fringe benefits. Through this action, the university was able to retain its CMS staff for a longer period.

At the initial phase of data collection, the CMS employees faced problems in acquiring the data from other departments, despite the fact that the launch of the project was announced by the Registrar and conveyed to all departments through a circular. The CMS employees had to visit different institutes and departments after the classes were conducted. The staff and head of departments engaged in handling routine business could not provide the data during the morning time when student classes were conducted. Therefore, the CMS staff visited them mostly in the afternoon, out of their routine office hours when they had exhausted their energy in teaching and administrative work. At times, the CMS staff ended up in quarrels with some departments' officials and employees who were fatigued with their whole day's work. Besides the *representation* that *accounted* for fatigue, the CMS staffs were new to the organization and many department officials and staff did not recognize the CMS staff (Law, 2012). Therefore, the other university departments hesitated to provide their departmental data, which at times seemed to be an issue of trust if not a hidden fear of

losing the control of keeping it with them. Following story told by the CMS Department's employee as part of one interview depicted such views.

Emp: I went for data gathering. I used to go after almost 3 o'clock when the classes ended. First I had to go to the HODs to take permission. That sir this is what I want…..I first had to introduce myself. Although it was communicated from Registrar and the higher authorities but I don't know why they didn't have any information. The ones who knew me they accepted me happily. They ordered their people to take me to relevant offices and to let me collect whatever I wanted by myself from their record. There was a professor, which I didn't know, was a little crack (laughing) I should not say like that but

Int: It's okay

Emp: He was a little hot-tempered, but I didn't know. I knocked and entered in his office, and paid Salam [greetings]. He got up and he changed his tone suddenly and asked me where did I come from. I said that sir I am an employee of the university and showed him the map. I also had a map about what to do and where to go. I said 'sir this is the map', he asked 'which map? Of ABC [Name of another big university that was in another city] University?'. That behaviour of him was very frustrating. And because of the pressure of the workload, we were…..I mean…mental level…

Int: On limits

Emp: Yes, the limit used to be high always. And already I had faced a lot of issues, during data gathering, if you can imagine that the data gathering in the months of June and July[51]*. I tried to say that I……in response, he was not even listening to me. I said that sir this is the project, he responded "what project?" I*

[51] In June and July, It is extremely hot and humid in Karachi.

mean he was not listening to me. When he crossed his limits I only said that sir let me tell you about what is the CMS. He said that "you are nobody to tell me". I …… I mean when he misbehaved with me. Because when a person is not even listening to you…not even letting you to say anything about what you want to say. Then me too….I behaved a little harsh. I didn't know who this guy is. What is he and what his post is and I even didn't know…..that…..I went to his office…I thought he was a professor. So there was no peon at that time. So I stood up suddenly and pushed the chair aside….and from office….I mean I didn't misbehave with him then. I mean as I could show my anger…..I mean I just stood up and pushed the chair aside…and. In frustration I got out of the office. When you gather the data of the whole campus and face a hell of issues…and the person is not even ready to listen to you…there was no personal issue of mine. From university…I was an employee of the university and so was he and I was doing a job for the university. He didn't give me a chance to speak. I returned and complained to my director. I told him what happened and what I had done. He said that it was really very bad. Then the Registrar made a phone call from the upper floor. He asked 'where is Jawad? Send Jawad [fictitious name] to the upper floor to my office'. Registrar is 'Masha Allah' a good guy. He knew what these CMS people are doing and what is their job. I went to him and……if you are clear…..I had the satisfaction that I have done nothing wrong. I thought that I will tell him my story….and lets see what happens next so Registrar asked me about what happened. I told him the whole story about what had happened. Registrar said that okay, whatever happened, you please apologize to him, because after all he is our officer. So later….Registrar said to please go and say sorry to him, he is your senior and I said no matter what, I will go. Later

when I went to him, knocked, entered in the office and said 'Salam and sorry sir'. He said 'what sorry, you should learn some manners. you came here to teach me?' I said 'I don't know anything, I am here just to say sorry.' I left after saying this. So in the start…I mean we faced a lot of such issues

Int: You mean you faced to this much level

Emp: To this level……a lot…..in the start……..When you are doing something for not yourself…….both are working for the same institute….at least one should listen to the other, what he is doing or not. He didn't even know anything about CMS. It was in the initial phase, Data collection phase. Only some HOD's or some higher management knew about it who were relevant persons, the irrelevant people didn't know about that so people did this to me being a new person.

The CMS department employee's story provides us the representation of frustration and difficulties that were faced at the time of data collection. The illustration above points to the existing pressure of work, hot weather and perceived irrelevant task of giving away the data that contributed to such interactions. For CMS Employees it was 'the' for them while for the other employees the priority of giving away the important data was quite low within the daily routine work. Despite the claim made by the CMS employee of his minimal subverted action against the senior HoD's rude response, he was told to apologize by the Registrar.

The narrative of this incident provided an account of interplay of multiple *representations* (Law, 2012). It was evident that work pressure on both sides was quite extensive. The work fatigue was taking its toll in the way that after a whole day of extensive administration or teaching work on a hot day, the CMS staff would appear in the departments for data collection. This was the time when energy levels were usually

low and the employees were thinking about heading home. Being humans, the CMS employees also suffered from the same sort of afternoon work effect, in addition to the time pressures to finish the data/information collection process. The slow response on part of university employees to provide the relevant data to CMS employees was based on their *association* with data itself. The fear of loss of control on data forced them pick up such fights and take evasive actions. Irrespective of the Registrar's temporary alliance with CMS team—in the *form* of his letter instructing HOD's to cooperate with CMS team in data/information collection, the CMS employees faced harsh situations, as the university custodian's[52] *orders* to cooperate were not fully followed (2009:p. 149). From the administration and the faculty's perspective, they were busy in doing the 'real' academic work of teaching and assuring that education systems were functional. The CMS employees' visits were considered an intrusion in their daily tasks. By attending to and visibly adhering to the accepted rules of university working life and defying the *new orders* of Registrar, the university administration staffs were making choices to keep the existing system working on their terms. Their resistance was based on the *association* with the material rules and regulations and the data that they applied on. It was now going in the hands of CMS employees. This suggests that the choices of such type of interaction with CMS employees were not solely based on their loyalty towards existing system and full compliance of university working requirement. As Registrar's circular was also a *work order* given to them to which they were responsible to perform their share of task by providing the data to CMS employees. It seems that a stream of other hidden *representations*—in term of losing control and job insecurity etc—could have also triggered towards disobeying the Registrar's cooperation *order* with new CMS staff. On the other hand, the CMS staff were getting frustrated as they thought of

[52] By university Statues, Registrar is known to be custodian of university seal, therefore, authority as well.

themselves to be part of the same organization and working for the overall benefit of the institution. Furthermore, the non–cooperative attitude on the part of the faculty and the administration was making their life difficult as now along with work pressure they had to face psychological abuse from their co-workers. The standardized *ordering strategies* in the shape of enterprises and bureaucracies were easy to use as these modes were routinized in the system through education (Law, 2009:p. 149). Any change within work would illuminate problems in *ordering* by *representing* mutually inclusive set of notions and maintaining pre-set standards for keeping the existing system prevailing.

From resistance perspective, the *routine work* generates a level of *associations* among the entities are based on its understanding i.e. the *identity of work* (Munro, 2012). Any awareness about its possible alteration renders the entities to be *uncertain* on the basis of whether their existing status would change (Latour, 2007). The element of change may disrupt the existing routine work and could *disassociate* the existing entities. The proposed change here was also increasing the workload of the existing employees thus breaking their existing routine of work. The provision of data to CMS team meant there routine would be disrupted in the future as well when the CMS software would start functioning.

The mixture of human and non-human entities that were deploying there agencies provide an *account of grouping* based on technological knowledge and each with the help of their technical expertise attempting to resist the other group.

6.4 Cyborg Clashes:-Technology Resisting Technology:-

ANT accounts the uncertainties by exploring materiality. Materiality has to be unleashed within the executed actions that become part of the human entities (Latour,

2007). Simple objects utilized within the network based actions are to be observed for the innovations, mediations breakdowns and strikes to provide a holistic view.

The uneven shift from manual/legacy systems to CMS software system implementation was not restricted to the behaviour of staff from faculty departments. CMS deployment also encountered problems from the administrative departments as well. The university had their own computerized system available within the Examination and Finance Departments. Both Departments were working in isolation with the result that data transfer from one system to the other was a time consuming activity. The Examination Department was located in the third floor of the Administrative Building along with the Registrar's office. The access was blocked through an electronic gate. Next to the electronic gate was a window where a person was sitting controlling the access. Close circuit television—CCTV—cameras were installed beside the entrance door and inside the department premises, which provided the Controller of Examination with a complete view of the premises and the nature of work that was going on. The *panopticons* were collecting the *information* and sending it to the Controller Examination's office (K. M. Mason. accessed 04/202009). The Controller's small office was located at the back of the Examination Department. This resembled an observatory room from where physical movements and activities within the department could be observed. Overall, the Examination Block projected an image of well-guarded and secured-area. The technical objects were now embedded to the existing examination systems (Bowker and Star, 2000)

The Examination Department seemed to have a strong hold on their territory as well as on the data/*information* on which they worked. Despite the CMS software's comprehensive processing capabilities and producing the results on its own, the

department perceived it as front-end software. The Examination Department claimed that CMS could only capture the data from departments. Its processing had to be done by the Examination Department using their own prebuilt software. That information in the shape of result was then fed-back to the CMS software to declare it to students. CMS result processing capabilities were not utilized by the Examination Department. The administration's efforts toward full implementation of the software were ignored, as the Examination Department kept on using legacy software in shape of Excel Sheets and locally developed software for processing the results. CMS employees and their newly introduced software were unable to break the alliance of the Examination department with predated technology. In spite of having a semester system of studies, the final examination was centralized. The *routnization* of the semester system demanded the delegated authority of creating question papers to the teaching faculty (Lilley, 2012). However, this change was again denied by the Exam Department on the basis of their previous *alliance* with the available computerized question databank. The Examination Department generated the question papers using their computerized database of multiple choice questions—MCQs. The MCQ system was implemented in the annual system but its intelligibility was now rooted in the semester system. Even though a computer programmer sitting in the Examination Department along with other computer literate staff was available to the Examination Department, the Department was still working on their existing computerized MCQ based systems. The change was denied as the precious alliance provided them control on the system of examinations. The Examination Department considered the existing technology as entirely sufficient for the nature of its work, with the checking of the MCQ's done through Optical Character Recognition (OCR) software. The OCR answer sheets played a key role in their existing system, which provided the results in Microsoft Excel sheet format that

could be conveniently transferred to the MS-Excel based result sheets. The common practice was that besides the final examinations' score, the remaining percentages of semester score awarded by the teachers in the shape of midterms result—conducted as short essay questions, quizzes, assignments and practical exams—were also recorded on the Excel spreadsheets. In spite of CMS system's overall better operability and friendly menu driven data entry options, as a software for daily use, Microsoft Excel had taken a key role for data input and processing due to its convenient availability and common use among the employees. The Exam department were satisfied with the existing ad-hoc systems and did not bother to shift to CMS software completely. They were certainly not concerned about complete integration and were focused purely on efforts to conveniently upload their Excel sheets to the CMS.

The interlinked agencies of human and technology provide us two set of *group formations (Latour, 2007)*. One group was using the old techniques that have been *routine-ized* to a level where any changes in them would generate *uncertainties* within their existing integrated processing and feared to be damaging the examination system's *performance (Lilley, 2012)*. The other *group* with new technicalities of functioning was attempting to make changes based on its alliance with CMS software. The Examination Department wanted to keep the existing grouping intact. The CMS department wanted to breach this temporary boundary and were attempting to redefine their group through CMS software inculcation within the Examination Department[53] (Callon and Law,

[53] The *context* and *contents* switch with the change in time and space. There is "*entirely pragmatic, permeable and revisable boundary between context and content*" (Callon and Law, 1989b).

1989b). The struggle between these two groups provides us the account where possible *disassociations* are causing the element of fear of control and lack of new technological advancement causing hindrances in the progress of CMS implementation. More evidence is provided in the next part of the story.

6.5 Grouping Based on Technology

ANT demands that exploration of *uncertainties* should also capture the '*concerns'* of the groups. Groups' '*concerns'* compared with '*facts'* would bring out the controversies and issues within the large conglomerate (Latour, 2007).

Instead of implementing the CMS software in the Examination Department, the Controller of Examinations clearly demonstrated that his major concerns were with the *secrecy* and *transparency* of the departmental work. Although the two terms contradict each other in the sense that secrecy of examination data/*information* for confidentiality and possible chance of contamination, the true level of transparency could be compromised. Thinking secrecy and transparency as two extreme polls to maintain a compromise between one had to be made to commit to the other. The Examination Department due to its nature of work had certain 'sacredness' within the university. In order to maintain such kind of sanctity for Examination Department, Controller of Examinations—as in-charge of the Department—was shadowed by another person from academics sides. In such an environment where a deficit in trust existed, the dual nature of control and shadowed observation for the department created an element of not opening up or providing the information, which was not only evident from the personal meeting encounters but it was also visible from the CMS staff's interviews.

Emp: there [Examination Department] we keep facing the problems. In fact we wanted that…..the result notification should be generated through CMS. But, in the start…it happens that everything is done through a process. First you prepare class assignment and then you enter the marks and then you post it and after that the result notification was generated and at a time. Result notification, transcript and….the detailed result sheet in which student's remarks, grade points and GPA is calculated. The Controller Examination, he used to say that you always delay it. Till now they are there BDS and MBBS programs. I mean following their traditional procedure they prepared everything result on Excel and after issuing the notification, they provide us that Excel file for the purpose to generate the transcripts

Int: Right, so to the extent of examinations, they are running their system based on the Excel?

Emp: Yes sir. We are just given the data and we are only to update it

From the Examination Department's point of view, the results and the data had to be kept secret until its declaration. The use of CMS software to *process* the results would make their secrecy vulnerable. The CMS department was only trusted once the result was released by the Examination Department. The connectivity of two departments was hindered on the grounds of trust worthiness that was based on balancing the *secret* and *transparent* acts. From Examination Department's point of view, they were able to handle the student examination record processing utilizing the existing techniques and established software practices. In their perception, the existing material and humans' interaction was sufficient to build up a stronghold, in order to cater to their '*secrecy'* and '*transparency'* needs. They were *concerned* that the shift to CMS could make holes in the tightly knitted systems which demanded strict control and observance. For them,

the *process* of the introduction of CMS would bring in uncertainties, relax their existing iron-grip and break their monopoly on result processing, thus making the examination system vulnerable to unidentified intrusions. With such aims in mind, the Examination Department resisted the CMS implementation.

From the CMS department's point of view, the existing software—Excel—could also be uploaded automatically to their CMS system. Despite, this technological connectivity, the CMS had, they felt, a superior capability for handling massive data processing and its *transformation* into meaningful *information* for students and for all levels of managerial use. From their side, this change could only bring strength to the existing system. The point of conflict between the two departments was a matter of preference due to mistrust.

Besides the separation of examination system from CMS, the CMS staff faced continuous problems from the Examinations Department in the form of its slow provision of often incorrect output.

> *Emp: They complain that your system [CMS] is slow. We used to print out transcripts at once after mail merge but they will realize it later when they will get the consolidated data*
>
> *Int: so why do they blame? Is your system slow in printing out the transcripts or what?*
>
> *Emp: No, In fact we import data from Excel to CIE [component interface of enterprise file type]. In some programs the strength is very small*
>
> *Emp: 25, 30 students approx. When we talk about the MBBS, there are candidates about 850. When we import from Excel to CIE, as much students we have to import, as much processing, the system will do it quickly. Right now, I*

have asked the assigned operator of Examination Department to please make the assignments before the final examination so that when the time comes, you will only have to enter the marks and roll numbers and you could import them and you could be able to prepare the mark sheet after immediately running all processes. So, when you are uploading the marks, systematically it will take some time and then (interrupted)

Int: Does it take days to?

Emp: No, No, within an hour, for MBBS. It is done? It is done. But still they say it is slow They admit but…. a little they complain and……..when you came here last time. He said that I will complain to person who comes from the HEC [As I went to the university through HEC's permission]

Int: Okay, ha ha ha ha

Emp: and I said okay you can tell him

Int: Right

Emp: Mr. Adnan [fictitious name] was saying that you will ask me about my bad experience so I have the bad experiences daily (laughing))

Int: ha ha ha

Emp: ha ha ha

This conversation depicts the kind of blame games going on between the two departments. This '*cold war'* between the two departments surrounding the CMS software efficiency and its workability was indirectly targeting the CMS implementing *process*. Such *representations* were the part of the CMS implementation process (Law, 2012). From the Examination Department's point of view, the CMS was not yet ready to take on the colossal task of *processing* the results. The *tangled processes* had their own set of associations that could not be comprised with the newly introduced

processes (Hernes, 2008). The department pointed out any discrepancies that they found in the new systems reports. The threatened loss of the old system in the anticipated scenario where CMS effectively took over the Examination Department's data/information could result in their existing technical knowledge being rendered as obsolete. Such *active passions* with the old system could only be maintained if the CMS system was declared as inefficient and too slow for university usage (Gomart and Hennion, 1999:p.244). It seemed that problems were raised not only as a means of correcting the new software system, but instead, to downplay the value of the CMS software and its *associated* employee's efficiency. The CMS software and employees posed a job threat as well as loss of control on over examination data from Examination Department's employees' point of view thus created a rivalry among the two departments. The Examination employees were not giving any ground on the basis that the CMS system could have had some processing glitches that would require time and as yet unearned experience on the part of CMS staff to overcome. Therefore, CMS employees were targeted as constantly to blame for malfunctions and delays of their CMS software. The dual *processing* of examination results was continued and on-going for almost four years during the implementation period. The rigidness of the Examination Department around keeping the old system created a major hindrance for the full implementation of the CMS software.

The matter of *concerns* overwhelmed the *fact* that CMS could *process* the examination data comprehensively and keep it secure as well. The struggle between the two groups provided a teleological account where the continued action of the Examination department represented their fear of trust on CMS on the grounds of secrecy, transparency and efficiency. The *concerns* were clearly spelled by the actors or hidden within *goal directed activities* that may even *approach towards ethics*. Therefore,

teleology also becomes part of the group actions thus making it to be continuing with actions and not as *study of cause*[54]. Latour (1992b:p. 232) explains the behaviour imposed by the non-human delegates as '*prescription'*. "*The prescription is the moral and ethical dimension of mechanism".* These *matters of concerns* along with *active passions* of the Examination Department were creating hindrances towards full deployment of CMS Software. In order to CMS software to operate at its full capacity, it has to somehow redefine the Examination boundaries/strongholds and eliminate their fears towards the new system

6.6 Redefining Groups by Unleashing Materiality

According to ANT, the group *formations* and *reformations* leaves traces that could provide meaningful insight into the organizational work. The definition of a group member is not limited to humans only as materiality could also be a part of the group. Within the group, group-leaders/gatekeepers' actions have to be observed as they act frantically at the time of make or break of the group.

The Examination Department was not the only department that made secrecy and confidentiality their prime goals. Other departments also superseded the administration's instructions for implementing the CMS solution software. The Admissions Department *represented* same priorities that were depicted by the Examination Department (Law, 2012). The Director of Admissions was also shadowed by a senior faculty member—the wife of the existing Vice Chancellor—of the university. This senior faculty member dealt practically with all policy issues or admission problems that occurred within the Department. The dual command was not

[54] Dictionary defines teleology as study of causes, approach to ethics and goal directed activity. The term is used here not because of its imminent end meaning but more of a continued connectivity with actions in term approach to ethics and its goal direction.

the only means of observing and controlling the sensitive nature of the admission work, but it was also evident from physical setup of the admissions office. The Director of Admissions and shadow faculty member had adjacent table and chairs. In front of the entrance was a small glass window, which provided the medium for selling the prospectus or any initial conversation, which led to access in the hall for further communication. The admission office was set up in a big hall without any partitions, so everybody could see each other. The admission office staff had a row of tables with computers placed on top, where staff could perform their routine jobs. In the middle of the hall was a rectangle table, where ten to fifteen people could sit and perform group tasks related to scrutinizing the candidates' documents, *performing* random checks on the admission answer sheets and conducting other admissions related work.

Initially, the CMS staff working in the office and their servers were kept with the Information Technology—IT—Department. CMS team *performed* all preliminary development work from the IT offices. However, the newly inducted CMS staff faced problems in acquiring data from the admissions department as they were denied access to the admission data, which was *represented* as being of a highly confidential nature. After being made aware of the deadlock, the VC of the university decided to shift the CMS staff physically to the Admission Department hall, so that the trust deficit and team conflict between the two departments might be reduced. The CMS team was given a space in one far corner of the admission office, which physically created a clear division between the admissions and CMS employee groups. CMS workstations were clustered and set-up in a separate space from the admission employees. However, the physical presence of the CMS staff within the secure Admission Hall enabled the admission employees to start trusting the CMS staff as they slowly opened up their secured admission related information and started to provide the relevant admissions

data to the CMS staff. The apprehension of trust posed by the Admission Department employees was not the only issue as these employees saw a complete set of employees along with their computer hardware barging into their territory that was based on data/information bifurcation. The invasion by the CMS Department was done by taking away the Admission Department's data/*information* that was stored in their computers and physical files/folders. The loss of control on data/information with CMS department could also meant loss of job as well. The idea of shared space was much more than the mere CMS Department physically sitting with the Admission Department. It was based on the idea of creating an environment where the fuzzy territorial boundary between the two should change based on admission data and physical premises and *form* a new group (Latour, 2007). The element of trust built upon the materiality of admission hall was a preconceived notion as safe haven for the admission department where data/information was considered to be secure. CMS presence within the same room enabled the admission staff to start trusting the CMS staff as they could see their physical presence and feel as if they were one of them. The improved opportunities for interaction enhanced the communication channels between the teams and led to a change in the role of the Admissions Department from that of a *mediator* to that of an *intermediary* for CMS Software, as they started to share data with CMS staff (ibid). While the two departments were working in the same room, their physical distribution within the room in the shape of working clusters clearly depicted that they were separate groups and doing something different from each other. Though sitting in the same room the distant locations within the room provided an account of a disassociation that still existed blurrily. The relocation of CMS employees was a success with respect to their acquisition of admissions data for the new software, but it came at the cost of their quiet work environment that they needed to perform their programming and

reconfiguring tasks. The admission hall was always crowded with almost 15-20 people sitting in it at one time. The admission staff kept busy with university staff visitors and some external visitors who came to enquire about the admissions.

The act of VC—as the group leader—seemed to be making an effort to clear out the hurdles between the Admission Department and CMS Department. His act of joining the two groups under one roof and in the same hall depicts the kind of problems the two groups had in communicating with each other. The fear of an uncertain environment was *represented* in their non-cooperative actions. The blockage of flow of data/*information* started to reduce when both groups started to work under the stronghold of Admission Hall. For admission employees the CMS Department was now part of their team. By virtue of the CMS staff presence inside the admission premises—or rather posed by VC, the admission department started provided data/information to the CMS software through the CMS staff. Rather than considering *overflow* between the departmental *networks*, it was a systemic infusion of the two groups. The attempt was to create a "*…novel role systems and role culture may be constructed over the remnants of older understanding"* (Kaghan and Bowker, 2001).

6.7 Effect of Plasma on Existing Social Formations

For ANT, the society is constituted through the elements' connections, not the way perceived as a whole made of element by sociology of social. The interactions are constituted by known and unknown elements. Together these elements constitute society in which entities exist. The unknown elements create an '*unformatted phenomena'* and it's unclear state is defined by Latour (2007: p. 243-44) as '*Plasma'*. The university also existed within such realm where each entity existing within the university premises brings the influences of society and culture's known and unknown

elements. In order for entities to co-exist they must persist or resist within the *forms* that are part of the practices. The entities influences are based on *set of technologies* (Foucault, 1988:p.18) that interplays and create the university working environment.

Figure 6.1 University Entrance

The University's main gate as shown in figure 6.1 depicted a restricted entrance image due to its past political activists' stronghold on campus as well as the current wave of terrorist activities happening within the city. As explained by the Principal of the College.

"In past the college was practically run by the student unions and there were 'no-go areas' for the other party members. As an Alumni and an employee, I have experienced such things. But now the things are changing and there is more freedom to walk around and administration holds the control."

The shift from a student stronghold to administrative control provides a transformation that university had gone through. Though the previously created *set of orders* for *accountability* were same, the only visual change observed was the introduction of

surveillance through security guard, security cameras and databases operations and probably much more in-house efforts to make the change possible. A mix of human and nonhuman objects provided the surveillance tools to assure the *accountability* of people at the desired locations and provided the image of secured and safeguarded premises (Munro, 2012). Together, these entities formed a depiction of '*quasi-objects'* through which surveillants could observe the students and employees act as per the set of orders (Hernes, 2008; Middleton and Brown, 2005).

The '*freedom to walk around the premises'* described by the Principal was secured through these '*quasi-objects'* made human and nonhuman entities. On the contrary, the presence of the '*quasi-objects'* was also the signs of limiting the freedom of activity through known and unknown observers. The university's main campus was located within the city centre. This area remained under constant threats of terrorist activities and violence that was prevailing within Pakistan and especially more in the city of Karachi. In order to protect the university from possible threats, the entrance gate was secured with a walk-through metal detector machine, physical guards and security cameras to observe the entrance and the entrants—as show in fig. 6.1. Visitors were logged in a physical register and allowed access only after they submitted some form of identification card, which was returned to them at the time of exiting the premises. Aside from visitor's data, the employees and students entrance was authorized by the turnstile card scanner. In this way, the computerized system—of turnstile—logged in the entrance of its own employees and students, as they had to enter the premises by swiping their machine-readable security cards. All these electronic gadgets along with human guards created the security *quasi-object*, through which entrance was permitted a very high-tech secured environment. In addition to employees and students data collection, the surveillants presented an image of a secure place where intruder

identification could be performed to restrict the terrorist activities based on the face value of the place.

In contrast with the developed countries where universities have open access and freedom of walking into and around the campus, the DUHS campus depicted a very closed and restricted atmosphere. However, the students felt safe, as the outer uncertain *plasmatic* realm posed a security threat to their lives. As explained by the students

> *Int: These turnstiles installed on the starting….as you enter …… and show your card….. This much surveillance, is that good for security?*
>
> *Stu1: Well, you can see, yesterday how many bomb blasts were there in Lahore*
>
> *Int: Yes, yes, right.*
>
> *Stu 2: Well there is no such problem (interrupted)*
>
> *Stu1: Not much problem, easily….Everybody has their own card …. You are coming or going… even the college has to check your incoming and outgoing timings*
>
> *Int: Yes, hmmm, hmmm*
>
> *Stu 3: This is no problem*
>
> *Stu2: This is no problem at all*
>
> *Int: Right*
>
> *Stu1: That's one of the good things you know that has happened.*

The objects of surveillance were scrutinizing the entrance gate to restrict the entry as well as to keep record of people entering within the university premises. The current terrorist attacks and bomb blasts wave within the country was making the students to accept the high security presence within the university. They were willing to forgo the freedom at the cost of their life security. The outer *plasmatic* environment had deep

impacts on students. Foregoing their own freedom of activity within the campus for the sake of terrorist threats they accepted the emergence of *quasi-objects.*

Despite of such precautionary measures and changed social environment within the university premises, the CMS operationalization was hindered with the external shocking news from '*malleable media'* (Woolgar, 1991). The moment the News Channel on the television placed within the Admission Office telecasted the *breaking news* of bomb explosion in the city center, the employees stopped working. Their mind was now focused on only one question: '*how will I be able to go home?'* Though the explosion was outside the university premises, its effect on the performance of employees was clearly evident from the people's interactions inside the university. The *quasi-objects* effectiveness suddenly became irrelevant the moment the outer *plasmatic* event took place and telecasted. The political circumstances suddenly hindered the capacity of production (Grint and Woolgar, 1997). The employees started to leave the university premises earlier then the prescribed office hours, in order to get back to their homes. The employees knew from past experiences that the roads would soon be blocked and they would not be able to find transportation to get back home. The Heads of Departments did not oppose the early exits from the work place, as they also understood this exigency as well.

Although the sites, *quasi-objects* and incidents mentioned above were not part of the CMS software's original formation, yet they had effects on the CMS functioning within the university.

6.8 Meaningful Shifting Boundaries

Latour (2007: p. 211) attempts to explain the boundaries not to be drawn in a literal and strict manner as he quotes Hutchins (1995:p. 312) "*Internalization has long connoted something moving across some boundary. Both elements of this definition are misleading. What moves is not a thing, and the boundary across which movement takes place is a line that, if drawn too firmly, obscures our understanding of the nature of human cognition. Within this larger unit of analysis, what used to look like internalization now appears as a gradual propagation of organized functional properties across a set of malleable media."* The *malleable media* of surveillance in the shape of '*mediators'* provides the gaze by combining the '*panoptic'* and '*oligoptic'* views of the situated interactions where functionality becomes *accountable* to pre-set standards (Munro, 2012). The University was also making such attempt through the prescribed surveillance tools and techniques. Each *panopticon* was connected to others providing a formation of an *oligopticon* for the University to observe and make things accounted for (Latour, 2007).

The surveillance provided through the *quasi-objects*—the mixture of entities—gave an image of a secure environment for most of the students (Middleton and Brown, 2005). It facilitated a system for administration to monitor the students' activities within the campus; the same posed a threat to their free will actions and provided a check on social boundary crossings. The administration believed that the students were becoming more studious and the quality of education dissemination had increased through the *quasi-objects* of surveillance. For university administration's perspective, the idea of freedom was limited to the observance of rules. Any disobedience of rules meant crossing the interim boundaries of granted freedom, as was the story of one of the student.

According to the computerized attendance report[55] issued by the Campus Management System—CMS, one female student's attendances fell short to eighty percent level required to sit for the final examinations. Her father came to see the Principal and argued that this was impossible, as he, himself dropped his daughter at college every day. Upon checking video camera footage, turnstile in-out data and tallying it with CMS based class attendance sheet—the tools of surveillance available, the Principal found that the female student was indeed dropped-off at the university every day by her father. However, after her arrival on the premises and seeing-off her father, she then used to go out with her boyfriend for the whole day, instead of attending lectures and staying on the campus. The *seduction* of fellowship was more powerful than the *accountable set of orders* provided by the university and society (Lilley, 2012). The student's level of *accountability* was not limited to attending the lectures, but the society's norms were also required to be observed (Munro, 2012). Traditionally, Karachi was considerably more liberal than other parts of the country. Nevertheless, dating and going out with a boyfriend was looked down upon in the prevailing society. After the information was given to her father, the family decided to withdraw their daughter from studies.

The surveillance system based on video camera and turnstile time-log data provided a '*panoptic'* view of the humans entering the secured premises. The purpose was to observe the visitors, employees and students' movements within the campus. As a part of the *oligopticon*, the attendance role within CMS Marts provided a partial picture of student's presence in the campus. In the instance above, the two conjoined systems provided a complete account of human movements. The '*panoptic'* and '*oligoptic'* gaze simultaneously detected an element of defying the norms and rules practiced within university and outer social realm. This gaze was not possible or at least difficult to

[55] The big fiasco has been covered in the previous chapter

detect prior to the implementation of such technology. For enhanced processing of '*panoptic'* gaze, the data received at the entrance through the turnstile could be used to verify the attendance of employees and students as well, thus becoming a part of the '*oligoptic'* gaze for the organization's functional vigilance.

By connecting sites of '*panoptic'* to '*oligoptic'* views, the *accountability* of defined *set of orders* was tested. The breach in this culturally defined behaviour was on one side the freedom of action exercised by the student, yet it had dire consequences for the continuation of her studies in the shape of parental agency of protection. Latour (7 March 2012) explains that all *panoptic* views are connected to the *oligoptic* views. The incidence challenges Latour's claim of '*oligopticon'* not affecting the subject. In this case, the subject disregarded the surveillance of 'panoptic' media's *malleability*. Instead, she was made *accountable* through the '*oligoptic'* gaze by capturing the data from multiple angles. Ultimately, she was affected by the '*oligoptic'* view in the shape of forced withdrawal of studies. The *malleable media* projected a view through the *oligopticon,* suggests that *oligopticons* do affect the subjects but in a tangential mode.

6.9 CMS formation effect on University's flow of information

From ANT perspective, new formations occur with the help of changed '*form or processes'* (Hernes, 2008) through the *'vehicles of transport'* in the shape of humans, computerized systems, storage devices and documentations (Latour, 2007). The attempt here is to explore the *stacks of networks* where the existing *processes or forms* gets challenged either due to the exigencies of the object of change or identification of existing processes to be cumbersome and complicated. The attempt here is to highlight such *processes* within the existing system. Furthermore, how the CMS system—new—

introduction manages by changing the flow of the information. The flow of information was related to various entities connected within the university.

The grouping and regrouping of entities due to the introduction of CMS software pointed to some changed formations. The provisions under the old system could not be adapted to the new CMS system while handling student data. One such case was the generation of identity numbers for students. CMS was able to produce a unique identification number for students that could not have been done in the past. Prior to CMS software's introduction, each department would generate their own ID numbers for students at the start of the term. This would result in one student having multiple identification numbers, meaning that each student had to memorize many ID numbers for providing his/her recognition to different departments. For the administration, record keeping through multiple identity numbers made it extremely difficult to maintain unique data/information, especially for the examinations and finance departments, since they had their own ID systems. The problem with this system was that the identification of individual students as a single entity and the corresponding maintenance of his/her virtual status was cumbersome, due to multiplicity of references. With one ID number, the student's *virtual other* could be identified easily within the CMS systems and presented when and where required. The previous multi-ID system lacked to the creation of '*diachronic'* account of the student (Latour, 2007). In the past, the matter of duplication of names was resolved by finding and matching the father/guardian's name. The use of composite keys—student name + father name—to detect and identify the individual could also fail in rare cases where the fathers' name of two identically named students also happened to be similar as well.

The existing complex or rather chaotic system of student registration could not be continued with the introduction of CMS software. As a relational database, CMS Student Mart required a unique ID for each student to be maintained within the system. To resolve the on-going multiple identity problem, the CMS department decided to generate identity numbers of student on the basis of their admissions' merit positions. For the departments, different IDs were the issue of territorial recognition of students. Each department with its working domain wanted to record student activities and maintain their record separately. The flow of information was difficult due to such individualistic management. With CMS systems software introduction, the unique ID number for student could provide *transportation* of data within the CMS Marts and departments. The central data management enabled through CMS software removed this sub-territorial divide and resolved the identity crisis cases that happened in the past. The shifting of such boundaries had some consequences as well (Latour, 2007). In addition to forgoing control on student information, departments also lost the freedom of changing the lab and class schedules by themselves. The revised *form of* work provided the account of transformation but "*at the cost of losing some properties to gain others"* (Latour, 1999:p. 71). The circulation of data in changed form also provided the account of power diversions. Due to CMS systems constraints, the teaching departments had to ask the CMS staff members to change the schedule for them.

> *Emp: when we tried to place the record of the 3 or 4 year older students into CMS system, there we faced lot of issues. The way that the Admission Department has issued them a roll number in the first year, when they shifted to second year, the roll number was changed again. When they shifted to third year, it was changed again. In Clinical, it was changed again. The Anatomy*

Department had given them an identity of their own and that Forensic Department had given their own identity, so there were many issues

Int: Right, how did you resolve it?

Emp: after a lot of struggle.

Int: No, I mean what was the common key?

Emp: One of the common keys was the Father Name of the student and as we had the students' files here in the admissions department. From students' historical data that was being processed in the Admission Department or from the Finance, we tried it from everywhere. We finally decided to use the data of the admissions department. We could rely on that because they were finalized here. Then we assigned students our own identity, a CMS ID, according to their merit number. And the rest, it was the practice that…like in scheduling, this week there is a class of this group and in the next week in the same time the class of the next group was being held. So we told them that we cannot not impose a change in the system in real time, first we have to mange it, have to schedule a timetable. Later when its attendance register is generated and you can mark. When you want to change it, you can surely change it, but first you will inform, so that we can make changes to it. So now it has been uniformed, I mean it happens very few, there are some exceptional cases like there are offs. Everything is all right now

The CMS software converged the various forms of ID numbers to a unique ID number for each student. The system was working with multiple IDs was prone to the risk of misrepresentation and association. On the contrary, it relinquished the departmental

freedom and control on data/information as now any change in their pre-planned system had to be reported to the CMS department. CMS Marts on one side eliminated the possible hazards of redundancy through its relational database yet, it shifted the teaching departmental authority to CMS department's employees.

From the administration's perspective, CMS provided a means of observing changes in the routine of events. Any change of plans in lecture timings and cancellations had to be reported to CMS department to revise their pre-set system data demands e.g. student and teacher attendances, room allocations. Students who used report changes of personal information to the concerned departments now were redirected to the CMS department to make amendments. The check on accomplishment of pre-planned work and its alteration was now possible through the CMS software (Suchman, 2009). The shift of information to CMS department for a centralized control was also affecting interaction and mechanism of communication between the university employees and students. Furthermore, it also depicted the emerging trust on CMS employees and the software system.

The CMS software as a technological artifact played a role in foreground as people associated with the system either learned CMS's technicalities or interacted with CMS employees for overall systems operability. CMS software capabilities provided the connectivity through its background work/facilitation i.e. various built-in programming tools and languages. CMS software modules provided *comments, checklists and communication*—3Cs— facilitation that composed its *service indicators*. The *comments* generated from human interaction and computer automated error detection enabled to assess the tasks' implementations, for example streamlining of centralized data, enrolment of standard activities through the built in inscriptions. The *checklists* assured

the prerequisite tasks' timely implementation and activation of functionality of CMS modules ranging from student enrolment, attendance to award of grades. Through these two service indicators, CMS conversed with its own modules, administration and departments. However, *communication* part was not fully functional in its true letter and spirit because of the prior attendance row incidence[56]. It was the part where students attained information through CMS software's e-portal access, which CMS staff and administration considered as '*external communication'*.

The diversion of flows of information through CMS software created a transformed environment where administration had a centralized control and observance over students' academic activities. The centralization had its consequences on the existing *processes* where control of information was now shifted from teaching departments to CMS department. Any change in pre-planned activities could now be checked through the CMS service *indicators* and *checklists*. However, *communication* module, a vital part of the system was not activated to enhance the CMS connectivity. *"Organizations, in other words remain always immanent to the instrumentarium that bring them to existence (Latour, 2008a).* The flow of information was dependent on such instruments to be incorporated within the existing system.

6.10 Interlocutors: - CMS itself becoming a Mediator

Interlocutor is an entity or a group of entities that take up the role of a *mediator* who could change the course of actions within the network. In the continuation of exploring the multiple actions that generate a single action, ANT attempts to explore the agencies

[56] The attendance case where Principal was shot and attendance shortage was later waived for students to sit in the final examination. Detailed discussion done in the previous chapter.

that steer the direction the social is moving (Latour, 2007). While the in the previous narrations the CMS software implementation time was presented where most of the time other entities were acting between the CMS software deployment, the following narration presents CMS software itself acting as a *mediator* and changing the course of actions for the university and bringing out its own *prescriptions* more strongly (Latour, 1992b).

Besides the slow and incomplete progress of the CMS implementation within the University departments, the VC decided to provide CMS software access to newly inducted students. The student module could provide the students with information about their on-going semester attendance, payment of fees, and the grades achieved in the previous semester. The Controller of Examinations resisted the idea of providing the online transcript view facility as the new CMS software could not be trusted with student results. Hence, only attendance and fee structure *information* was placed on the web to be viewed from the student accounts.

The implementation of the CMS software enabled the university departments to implement and enforce the rules and regulations set by the Pakistan Medical and Dental Council—PMDC—and the university academic rules and regulations. These *prescribed rules* including the maximum limits allowed to attempt the final examinations and eighty-percent attendance imposed by PMDC became active upon becoming a part of the software commands. Programing in CMS was becoming an *accoutrement* for imposing the rules and regulations (Foucault's Interview by Gordon, 1980:p 96; Drew, 1995). *The* fragments of rules and regulations were *morphed into software lines for organizing the accountability* (Munro, 2012; Latour, 1996c:p. 302). For example, the numbers of attempts that a student could make to pass the final exam (in its each component i.e. written and practical) were restricted to 'three', under the PMDC rules.

With the use of the CMS software, the university administration employees were able to detect the number of attempts the student had already made and could stop the student from taking the final exam and re-registering for the courses again. Through the programmed rules and regulations within the CMS, students with exceptional cases could be detected and informed about their status. In the past there were delays in detecting such cases, which caused inadvertent regulatory mistakes for universities' implemented rule and regulations and in some cases even led to legal challenges. Similarly, the PMDC students' attendance rule demanded eighty-percent minimum compulsory attendances to be a prerequisite for attempting the final examination. This rule had existed for some time, but it had not been implemented in a strict manner as the attendance calculation and collection from the department was done manually and it proved to be a colossal manual task. Therefore, it had been difficult to identify students with less than eighty-percent attendance before the final examination was conducted. But with the introduction of CMS software, this rule suddenly became relevant as the departments were forced to enter the attendance of students on daily basis. The exact percentage could be presented and students with less than eighty-percent attendance within the semester could be stopped from attempting the final examination. The classrooms were equipped with card readers and students were supposed to swipe their cards at the time they enter the classrooms. Previously, attendance was taken manually in the classroom as well as electronically using the Radio Frequency ID cards that students placed in front of the card readers installed in all classrooms. Despite the students' attendance was taken manually as well as electronically, the enforcement of attendance rules was non-existent. The manual attendance was taken by the faculty member and was believed to provide a partial account of student attending the class. The problem of getting precise account even records when electronic RFID card reader

systems was introduced. A student using an electronic swipe-card could simply swipe some other student's card as well as their own, in order to falsely show that the other student had also attended the lecture session. . For the *programs,* there are always *counter-programs* to follow that accentuate the trade-offs between them (Latour, 1987a). The act of marking the multiple attendances by one person is commonly known as '*proxy'* attendance among the students. This agentic function where one acted as a substitute of another was not limited to attendance only. The '*proxy' with its* proximity could not provide the knowledge transfer to the rightful candidate. The student point of view was that *"attendance is less important than who is teaching and how knowledge is being delivered."* For Students, the pedagogy was the key to attend the lecture and lab sessions. The attendance for the sake of showing-up and depicting physical presence was less important than what and how it was being delivered.

The CMS software attendance mart was the third system that followed the manual and electronic RFID card reading system. The swipe card system developed as a part of the entrance turnstile login—and logout—security system was not integrated with CMS software yet. The software patch that would integrate the two systems was to be provided by the security company that installed the turnstiles at the entrance and swipe card system in classrooms. The patch would become key *intermediary* software that could ease out the data transfer between the two systems (Bloomfield and Vurdubakis, 1997). Due to this non availability of software, faculty member's class attendance record on daily basis provided the mechanism for implementing the rule of compulsory eighty-percent attendances through CMS software that became a critical issue for the university.

The Principal of the Medical College—who was also the Pro-Vice Chancellor of the University—enforced the attendance rule on the students once CMS provided the means

for gaining attendance information before the final examination. As the rule was being properly enforced for the first time, students with less than eighty-percent attendance tried to convince the Principal to relax attendance rules. The students who were affected also had access to the attendance module of CMS and they could see their exact percentage of attendance. Some students claimed that this figure was wrong, and blamed the CMS software. The struggle between the students and the Principal as to whether to implement the attendance rule was still on-going when the principal was wounded by a bullet while he was travelling to his home in the afternoon. The police report treated the drive-by shooting as a consequence of possible stray bullet that wounded the Principal. After recovering from the injury, the Principal resigned from his post and started working in the hospital as teaching faculty only. The picture portrayed by the police report and the action of resigning from the Principal and Pro-VC's post provided a contradictory picture. Police report depicted the incidence to be an unforeseen event. On the other hand, principal's resignation from his posts pointed to the university's inner pressures and attendance rule implementation to be the prevailing issues. The report from the police and the action taken by the Principal seems to be *plasmatic* in nature as exact phenomena could not be traced. The university atmosphere was under intense tension as the students were pressing for attendance rule waiver. Considering the calamity of the situation and to avoid another incidence, the VC himself looked into the student's problem. He was not sure if the software, human typing errors in CMS attendance modules or 'proxy' attendance using the swipe card system has contributed to create a critical problem for students and might have instigated the Principal's assassination attempt. The problem was that the attendance waiver could not be granted on the basis of giving-in on an unlawful activity committed outside the university premises. Basing the waiver of attendance policy on such criminal

act of assignation attempt could have future agentic consequences. Therefore, the waiver had to be based on something else. To ease out the situation the CMS software was blamed. Considering the possibilities of errors that creep in as the CMS was used for the first time, a onetime relaxation in the attendance requirement was granted to resolve the issue. In order to relinquish the student pressure from Principal's post, a committee consisting of faculty members was formed to look into the short attendance case. Student access to CMS through the web was shut down, as this was seen as a possible source—in the shape of transparent information—from where the problem emerged. The CMS software on one hand enabled the university to implement academic rules, but on the other hand, it brought a level of uncertainty for existing students with less than eighty-percent attendance as well as change in administration in the shape of Principal's resignation and creation of committee for the attendance cases.

The CMS implementation at the phase of data collection and software development was done much faster in comparison with its implementation phase. Despite the Vice Chancellor and his team's efforts, CMS software usage only rose to forty-percent, the resistance faced within the administrative departments along with attendance issue which resulted in Principal's resignation affected the level of effort and struggle that the administration was doing to implement the CMS Software in its totality and make them adopt 'go slow' policy on the implementation of the CMS project. The society being a '*bundle of composite entities endured in time and space'* (Latour, 2007:p 218) represented such kind of resistance that CMS software faced within the campus. The problem is that there is a limit to unbundle the entities, therefore, the outer event of assassination attempt remains *plasmic* but its *agentic* effect was observed within the organization.

6.11 Articulation of Best Practices and its Localization

ANT demands to build up the connections leading from one local interaction to other places, times, and agencies that make the network (Latour, 2007). The whole process follows the traces by translation. The process of translation demands to identify the *mediators* that have been placed in between to show the *transformation's* real agents. It is in this network where the global practices conglomerated within CMS software attempted to localize it. The university localization demands had to be met by the CMS software. The software ability to accommodate changes in its global standard formats had to be tested. The situated actions and interactions depicted the confrontation between the best global and existing localized practices.

The Examination Department's on-going resistance to the idea of implementing the CMS system was highlighted in the previous chapter. The CMS system could only cater for the existing semester system data. All previous data and information regarding the annual system was withheld from the CMS system and it was only accessible through the Examinations Department. The Examinations Department had its own software with built-in question banks that generated the final examinations. The integration of systems was impossible as the examination process demanded integrity and secrecy by reducing the entities that pass on the examination papers to the examination halls and vice versa sent the results back to the department. The Examination Department having *black-boxed* set of processes wanted to keep on using the trusted system (Latour, 1987a). From the Examination Department's perspective, CMS-Software connection to their examination system would make the Examination Department's secrecy vulnerable. Through CMS Software the connectivity with other systems and access to multiple people outside the domain of the Examination Department was possible.

However, the transcripts of students had to be changed as the introduction of semester system demanded to transform the existing transcripts. The CMS software processing had to be entangled with the transcripts' old *forms.* The annual system format provided a full year's academic achievement snapshot. That needs to be *transformed* to semester system where assessment on temporal basis had to be depicted. This variation was based on "*unique product of circumstances and unique producer of circumstances in turn"* (Hernes, 2008:p. xv). The Examination Department wanted to show course repeat attempts by students as well, which was not available under the best practices that were pre-loaded in CMS. The CMS software Marts with *articulated* built-in best practices could not support the desired structure of transcript's *localization* for the Examination Department, as the known best practice for other places was not suited for this university; some alterations in the CMS software were required. The local was encompassing the generalized global set of practices that were being implemented through the CMS (Bloomfield and Vurdubakis, 1997). Therefore, the CMS had to be programmed through its report-writer editor, where the standard output of transcripts could be formatted according to the Examination Department's requirements. These *mediators* in the shape of visual report writer software had to be placed with the existing software Marts to render the displacements in smooth and predictable manner. The Visual report writer could be seen as a *quasi-object* that as a medium granted temporary stability as well connection through which the modification of the software was possible (Middleton and Brown, 2005).

> *Int: Did you change anything when Techlogix [Software Company] brought the software to you, as you might have a different process going on in the system?*

Emp: First the system was based on annual intake. When we shifted to semester system we had the system changed for the semester system.

Int: Did the software change your business processes?

Emp: Yes similarly, we have our clinical postings and after every posting, they get their grades. Some percentage of this added to the final grade of the student, so they said we will place it in the database but how much of the percentage will be added to the final exam, that you have to do it yourself through a report. So we have created reports with our evaluation scheme formulas

Int: So it just then depends on you how you would manage the system

Emp: we are doing customization according to our own requirements.

The existing business processes *'forms'* had its unique demands that CMS software could not cater. The CMS department employees had to alter the software through its flexible report builder programs. The customization provides evidence where the global best practices had to be altered to cater to the existing system. For the CMS team the prebuilt best practices could not provide their designed requirements. To complete such task, the virtual software layers had to communicate the alterations within the CMS Software. The report writer fourth generation software layer as an '*interlocutor'* between humans and CMS system invoked the third generation software layer to reframe its instruction set for the revised formats. The report writer as a visual programming tool enabled redesigned output screens and printouts that were required in the process of transformation. The CMS university employees claimed that despite the requirement gathering by the software company many *processes* had to be programmed by them to meet their requirements. As mentioned by a CMS department employee.

Emp: During testing, we told about the issues to the software company employees, which we faced and many of them were also solved then and there. And a lot of them are pending yet.

Int: Which ones are pending?

Emp: Pending.....regarding finance guides.....user guides etc.……the setup guides are not provided.

The software company claimed that they have given ample help and training to the university CMS department employees. Yet the CMS department employees were adamant of partial provision of services and help by the software company.

Despite of global best practices pre-built into the CMS software, it had to be programmed for the local use of the university. The passage above shows that global plans have to be shifted to a local level (Suchman, 2009). The completed conformation of CMS Software implementation was confronted by the prevailing vested requirements. The infusion of localized requirements provides a mixed account of change within the existing system rather than a comprehensive one.

6.12 Summing up the Prevalent Network for Resistance

CMS faced intensive resistance at the time of its introduction. Its intensity was reduced through various agencies that enacted within the presentations and communication channels. Once the CMS deployment was agreed, the working alliance were tested and shifted to new dimensions. The new elements in the shape of semester system's incorporation delayed the project. In consequence to this delayed action, the whole

progress had to be revisited and made attuned to the newly introduced semester system. The major *group formations* emerged in the shape of CMS staff vs. the other faculty and administration. Despite the Registrar's letter to cooperate with CMS employees, they faced difficulties in obtaining and collecting data/*information* for the development *process* to such extent that quarrels and interpersonal disputes arose. The hidden elements such as work fatigue and loss of control of data/information played a part in resisting the full cooperation with CMS staff. These were part of the *representations* accounted within the actions and interactions. The element of techniques and its incorporation into technology also played a key role where the technical alliances of people with software provided group coercion against the other technical alliances—CMS employees vs. Examination Department. The sensitive nature of the Examination and Admission work was also a *representation* where trust was accounted in their nature of work. Being new, CMS employees were seen as not trustworthy for the confidential work done by both departments. The solution to this level of mistrust was found in physical placement of the CMS employees in the admission department. The idea was to naturalize their existence and to consider them as a part of the admission team. Once they were seen to be seated inside the admission department's secured premises, they were able to penetrate and gain some level of trust, as they were now being accepted as a part of the admission team. Students' resistance towards the CMS system was based on the implementation or rather activation of dormant rules. The turbulent incident involving the principal had an impact on the CMS process and made the administration 'go slow' on the implementation of CMS software.

Chapter 7 Discussion and Conclusion

"We have already become something. Questions of Truth and Freedom can arise for us in the transformation we undergo or project. In short we have a history. We [are] .... Related to a past that has helped define our identity and the future that puts it again in question"(Taylor, 1984:p.180)

7.1 Discussion

The continuity of CMS software implementation relies on its adaptability to incorporate the changes demanded by its users. Though the software is considered to be a package which delivers the pre-programmed enterprise resource, with each implementation it is improving and changing its own set of code for better facilitation. The programming codes produce material effects not only on the user but also for the software itself. With each its iteration—things added or deleted, CMS is able to set new features and provide incremental improvements for the educational system. Through the programmed code it extends the nexus of network. The intensification of script is based on morphing of organizational intricacies where the database is made active through the stimuli posed by the programmers and users. There seems to be a cycle between the processes and practices. The processes gain strength in due course of time and become part of practices. The observance of practices illuminates their operational capabilities for others. Through repetitive trials and adjustments practices reach for a kind of global applicability. CMS incorporated these so called best practices while it was implemented into various universities that demanded to process their administrative data. To subsist and remain useful within the educational realm, the flexibility of adapting and adjusting to new set of processes and practices at various level of programming within the existing system seems to be a mandatory feature for CMS.

The Higher Education Commission (HEC) attempted to implement the CMS software based on following the developed nations' universities where campus management systems were providing database oriented surveillances. The surveillance was for keeping order and accountability within the public universities. The idea was to develop an *Oligopticon* (Latour, 2007) where rules and regulations could be observed through the flow of the data/information towards the centre of the command centre of the HEC. Through the CMS, HEC wanted to localize the global best practices within the universities (ibid). For HEC, CMS was not only seen as a package to improve university's administrative work performance but it was also acting as an accoutrement of their authority (Drew, 1995) CMS as an instrument was placed within the public universities to extract data/information on time for HEC's future decision making. Moreover, the system was inculcated within the public universities to monitor the public universities academic progress. HEC could not conduct the project without the prior budgetary approval from the Ministry of Education. To evade the cumbersome and lengthy bureaucratic form of process for acquiring computerization project budget, HEC tactfully brought it under its own existing recurring budget. Without such cost effective action and tactful reallocation of existing budget, the project would have been impossible to initiate. Furthermore, the collaboration with Oracle and later with Microsoft enabled the HEC to provide licensed software at reduced rates for university administration, faculty and students use. This was envisaged as the first step towards making people use licensed software within Pakistan. The change of association and connectivity between the nodal points of the network framed an alternate position where governmental bureaucratic form was bypassed and reduced the project cost. At the same time awareness of using licensed software within the country was introduced intuitively. HEC was also able to convince the two medium size universities to take part in the sub-

pilot project, after opening up various communication mediums. These channels enabled the concerns that the university employees and administration had on implementing the CMS system to be addressed. The smart move on the part of the HEC was to present the CMS system through the selected software company—Techlogix. By making them an ally, HEC had the capacity to answer the queries about the systems functionality's concerns. The operationalization and mobilization of the project was made possible due to collected efforts within various organizational entities. The plans had to be re-planned to situate and calibrate towards making the project work (Suchman, 2009)Within the universities, CMS could not function effectively on its own as it required various fragments to be incorporated. These fragments of various technical artefacts had to be incorporated within the systems to make it work. The programing had to incorporate the university mechanism in such a way that its flow of work and information was compatible with most of the university functions (or provided further enhancement). CMS software required sets of *instrumentarium* to be incorporated within the universities to work effectively (Latour, 2007). The range of such technical artefacts was based on rules and regulations of conducting processes, development of computer network, provision of computer machines as servers for programmers and users. The CMS system had to be superimposed on top of the existing working environment as a part of the HEC's strategic move for Universities' improved operationally. The problem was that any form of superimposition confronted predictable elements of assistance and resistance. In order to enhance the former and overcome the lateral, the Steering Committee oversaw the activities on monthly basis. The Steering Committee members were simultaneously working for many and with multiple organizations, but with a purpose to organize the implementation of the computerization project. The Committee's flexible nature of meetings through video teleconferencing,

MSN and its ability to handle the project related problems and resolving them with universities' top-tier administrative staff worked as *plug-in* for assistance and attempted to remove the possible resistance elements. These hybridized *plug-ins* (ibid) enabled the project to progress despite of the geographical and multi-natured work commitment impediments of the committee members. *Plug*-ins enabled the problems to be discussed and actions to be taken towards computerization process.

From the software company's purview, the experience of working with public universities was a different experience than with other industrial private sectors. The software company found the public universities to be framed in bureaucratic forms where information collection and making any change within the existing system required extensive deliberations and delayed approval. Instead of providing feedback on the relevant issues, the university officials presented their own set of agendas. Despite the existence of written official written rules within the university, they found considerable variance in the application of rules among various departments. The signing-off authorities (i.e. the head of department) were often unable to describe the complete operational procedure within the departments. Clerical staff provided a greater insight into the routine operations that were conducted within the two universities. The structures and hierarchies were detected by following the network connections within the work formations. The benchmark software was made by utilizing Pakistan's private university's CMS software usage data. It depicted a very low percentage of usage within the two public universities computerized in the sub-pilot project even after the steering committee and top administration of the two universities came on-board for the project. After going through the problems faced in the sub-pilot project, Techlogix decided to start the other universities computerization with meeting the vice chancellor first. They made sure that VC was fully on-board with the CMS implementation.

Leadership had a key role in providing the agency for ensuring that the campus management was implemented. In order to improve the intensity of passion towards the computerization, they should also use the CMS software through their own computers rather than getting information on paper from the staff. Their acts should portray an *active passion* (Gomart and Hennion, 1999:p. 232)for the implementation project. By becoming part of work-net and leading by example might enhance the computerization project implementation process

After collecting the initial data/information from the universities, the ambiguities were resolved by calling all the relevant head of department to their Techlogix's head office, where they were kept for three days. Techlogix's project managers made sure that issues and conflicting rules were cleared then and there. The sub-pilot project was also a learning process for Techlogix, as they evolved their own methodology of working with the public university sector. The thick printed software use operational manual developed by Techlogix failed to make any impact as employees frequently queried even small steps with Techlogix. After the sub-pilot project, Techlogix introduced computer based training—CBT—software that interactively provided user guidance by showing the mouse clicks on relevant points, menu operations and scenario based selections within various sections of the software. The sub-pilot project enabled Techlogix to understand the universities realm in such a way that their skills and expertise in the educational sector was also increased. CBT was an advanced form of medium of communication that created a rhythmic pattern for the employees to understand the usability of the software. The gap of execution was reduced by the CBT coming in between inter and action. The *hybrid form* of training was becoming useful to improve upon the CMS functionality within the existing administrative work. Resistance is a compound of multiple actions that constitutes a complex mangle. Within

the mangle there are forces applied for appealing and repealing the change process. However, the resistance should not here be viewed from an entirely negative perspective. The concerns of the counter force should also be considered and addressed properly (Latour, 2007). Their concerns entered into the reality-constituting processes as they became sediment-ed within the build-up of facts *(Karen, 1996:p. 105)*. The grouping between the two forces could not be ignored as the change process depends upon the interplay between the two representations. The actors have to carefully examine the actions in order to observe the representations of resistance. Within the two universities the elements of resistance appeared from many different areas. The development of any new association means there is simultaneously some level of disassociation within the changed environment. The associations happen when multiple entities agree to coexist whereas; disassociation relies on alternate stances based on disagreements and counter actions. The stronger association takes more time in ruptures and reformations of groups. The strength lies within the connected nodes. The analysis chapters provided observations by exploring the uncertainties posed by various actors that constituted the networks. The representations towards resisting the change were presented within the networks through the back and forth of actants movement between the statuses of *intermediaries* to *mediators (Latour, 2007)*. The inherent notions related to uncertainties were, change within routine work, betrayal from existing processes by rendering to intrusions, fear of diminished authority, loosing knowledge and job, transfer of authority and data/information, sense of being observed, work related fatigues, accumulated historical *concerns* related to salary and manpower and compatibility of existing infrastructure. The routinization of work and entities has an inherent value for the progress of project and it can be considered as is a key element in paving paths of associations (Lilley, 2012).

Moving on further with the acclimatizing work routine, the next stage can be seen as active passions where entities seek work actively to keep the developed bond sustained. Any change within the routine work is considered to be disruption and poses possible threat to the existing passionate association. The CMS software as an agent of change was contesting such *active passions* within the existing groups. The groups' rigid attitudes to adapting the CMS were evident through their non-cooperative attitude towards the CMS employees and downplaying the functionality of the software. With time and practice, the processes became hybridized and entered into routines in such a way that their technical exigencies were routinized. Therefore, any change within the existing process creates an uncertain environment. This was the case within the two universities. Any change within the existing routine led to a readjustment of the existing techniques. Furthermore, the Examinations and Admissions Departments held the guarded secrets and confidential documents of the Universities. With the introduction of CMS software and new CMS Department, the secured areas of Admission and Examination Departments were intruded. They felt threatened in their two key concerns of security and transparency. The employees' perceptions about the new changes were based on their feeling of betrayal from the existing processes. As set of stakeholders within these universities they were stood their ground to guard existing processes and practices within the system. The employees had their own entrenched boundaries and presumed these to be secured within the prevailing system. Their perception of such a stronghold encouraged them to go slow with the change process. The idea of delaying provision of data\information was to slow down the change process to the extent that it ultimately failed. Their expertise was challenged by the CMS software implementation, especially in the case of Examination and Admission Departments. The employees' technical set of skills would become obsolete once the CMS computerized system took

over the two departments' data processing. This meant that their authority over the data/information was diverted towards the CMS department. Losing authority and expertise could mean potentially losing a job in the future. The employees' tactics in the shape of their actions depicted the ethical dilemma of whether such actions pointed to the extrinsic or intrinsic benefits. The extrinsic appeals to active passions of entities for the sake of the alliances; whereas, intrinsic attempts to work towards their own survival. The case studies also provided an account of the alliance of material elements with the human as groups playing for and against the implementation process. Another contribution towards resisting the full implementation was detected through the *plasmatic networks* existing outside the domain of the universities (Latour, 2007). The *missing masses* played roles within both universities to slow down the implementation of the CMS. The admission pressures in the case of north and Principal's drive-by shooting/assassination attempt were actually part of the other networks that could not be reached for this research work. However, there is a level of infusion from these *plasmatic* networks to the universities' network framed within this research work. Within the network there seems to be conduits where actions takes place and work flows. The elements of resistance mentioned above can be considered as sediments that slowed down the flow of work towards the CMS software system implementation.

It seemed that these counter actions—some obvious some hidden within inactions—towards CMS software implementation slowed down the process. The overcome such intrinsic and extrinsic actions as *counter programs* towards the CMS implementation *programs* were based on opening the communication channels, regrouping and re-placement of entities. In the case of the northern university, the software company's employee made a breakthrough by using the native language (Latour, 1987a). The diversion in articulation of the communication channel from national to local language

enabled Techlogix's employee to penetrate the university cabal and extract data\information in a swift manner. The same universities' group conflict and blame games between the CMS department and Computer Networks department were resolved by merging the two departments. The matter was resolved intuitively in such a way that the two sides could not blame each other after becoming one. The onus of blame was diverted towards themselves, in case the group complained about each other. The actual problem detected by the joint group was also related to the blockage within computer network communication channels by locating the fault within physical network cables—conduits—and webserver communication configuration. Similarly the case study of the south also depicted similar evidence when the whole CMS office was shifted into the Admission Office due to non-cooperation and communication between the groups. By displacing the CMS department and placing them among the admission office, an association was enabled that allowed a certain level of trust to be developed. The action was like placing an *enzyme on the sediments* that hindered the flow of data/information. The VC's action as an enzyme reduced the sediments that existed in between the conduits of associations developed for the flow of data/information. It is evident from the above discussion that enabling the communication channels to work in *rhythmic patterns* (Suchman, 2009:p. 72) where two sides/groups can understand open the possible blockages created through the *sediments of resistance* can enhance the implementation process. The advantage is such communication is that it creates connectivity between the newly introduced element and the existing element which creates a certain level of association that can later form a new group. Through associations, polemics have to be developed to encourage the computerization process in order to attain a forceful movement. While some would follow, others might have to be pushed (nudged) for the movement towards the changed direction. Sediments can

also be removed based on the supportive enzymes in the shape of actions that help remove such deposits rather than performing full surgeries right from the beginning to which recovery might become a factor.

From the above discussion it is evident that resistance against the change emerges as *sediments* within the *multifaceted* network that attempt to block the flow of work towards implementing the change. The sediments appear either within the network or they sift within the conduits through other networks. These sediments reduce the flow of work towards the changes as *counter programs*. 'Forms'—processes—as transporters have to go through the conduits where the *sediments* attempt to stop them. During the processing, multiple communication channels have to be activated to identify the *sediments* and take possible steps to remove them. To remove such hindrances, the flow of work has to be constantly observed and formations of sediments need to be identified and addressed before they slow down the flow of work and ultimately stops the change process. But more important is the identification of these sediments within their own conduits before they merge within each other and create a force greater than the force that is attempting to organize the change. Within the transformation there are multiple set of processes–forms—that work as transport vehicles that attempt to provide changed formations within the working environment. In order to observe these changed formations, the fragments of networks (Latour, 1996b:p. 303)were explored with an attempt to untangle the processes (Hernes, 2008) and observe the nature of changes with the two universities. Although the resistance within the two universities was accentuated in the analysis, it was very much a part of the business processes being conducted within the university. The sediments played their part in making the transformation slow. The CMS network was entangled with other networks inside and beyond the universities. These networks had their effects *infused*

within the CMS implementation process. The word *infused* seems to be a better option while explain the networks linking, rather than what Latour calls it 'overflows'. It attempts to provide a simmering account of other networks prescribed by the *missing masses* (Latour, 2007). The prominent issues faced within the *infused network*s for the CMS implementation process were related to the *ordering* and *accountability* techniques that attempted to *align the identity of work*. The difference between the *alignments* is what organizing demands and the *identity of work* is actually perceived through the ordering mechanism (Munro, 2012). Through CMS software system, the attempt was made to localize the global good practices of universities.

In the case of the University in north, the public and provincial pressures on the Admissions Department made the implementation to go slow and introduce the software at a very slow pace. The routinized software in the shape of Excel worksheets could be seen as a tool of authority that circulated power within the surroundings through the developed procedures and formulas. The malleable media had an impression on its users and any change within the existing software demanded time and space to overcome the pervious media's imprints. The Examination Department saw a drastic change in their working as the CMS Department took over the responsibility for data entry from them. Due to this changed flow of information, the role of the Examination Department was then transformed from having the sole ability to process inputs, calculate and determine grade values. By changing the alignment of work, the accountability issue diverted towards the CMS Department. The Examination Department's transformation of work was evident from the level of CMS implementation where the software still had to establish its work space. Some of the global best practices were localized by changing the CMS. The element of change was being changed to suit the localized applications. For example, the semester systems unique features were not catered within the CMS

best practiced inculcated software. The changes were made to accommodate the unique processes conducted by the university. While some new formations were evident, others had a turbulent picture either due to *plasmatic* effects or simply because the CMS was partially implemented and was still under the banner of '*Work Under Progress'* and planned for the future without giving any deadlines. The shifting of authorities while the project was being implemented also affected the progress in the shape of grouping and regrouping. The frequent shift between the temporary boundaries also developed concerns where sediments within the flow of work hindered the progress.

In the case of the university located in south, the centralization of data was done but with a limited utilization. The merger between the Admission Department and CMS department ordered by the VC provided the CMS software with the relevant data that was required for processing. The major transformations within this university were related to providing students with unique identification number—ID—numbers and maintaining the attendance record. In past, almost every department allotted a new ID at the time student enrolled in their department. The result was one student had multiple ID's which made the record processing extremely cumbersome. The constraints of the relational database of CMS software demanded that each student have one unique ID number. The system constraint enabled the university to revise their *form* of identification to a globally acceptable format. Similarly, the service indicator of the CMS software detected errors within the system as well as provided a checklist of prerequisite tasks completion. However, the communication feature which dealt with providing students information was blocked due to a prior attendance policy-related issue that had an effect on the Principal's lifestyle as well as student's attendance policy. The attendance module along with other set of technologies provided a surveillance tool for the university. The set of these technologies created *panoptic* and

oligoptic (Latour, 2007) views to form a *quasi-object* (Middleton and Brown, 2005) of surveillance for employees and students. The formation of such quasi-objects is only possible if the intensity of hybridization is enhanced. This means that the set of techniques available to humans and non-humans must be enjoined to produce the enhanced effects. The incident mentioned earlier regarding the female student who had to drop her course of studies as the quasi-object represented her image contra to the prevailing set of *parental orders*. The *oligopticon* connected with *panopticons* had a tangential effect on the subjects under surveillance. Rife of ordering (Law, 2009:p. 149) and accountability was what constituted the organizing work between various entities. The conglomeration of employees and students were made accountable through the quasi-objects of surveillance. The administration used the quasi-object accounted for the predefined set of orders that prevailed within the university. Probity for the subjects lied in staying within the formulated orders. In contrary to the university in the North, this University's Examination Department had greater control on their premises through their own legacy software. Therefore, they did not allow the CMS to perform the result processing. Instead they only provide the compiled result to the CMS software for its announcement and printing. Despite its complete capabilities to handle the examination results, the CMS was deliberately limited in its ability to declare results. The intensity of CMS implemented within this university was less than University in North.

Techniques and plans constitute actions that lead towards developing the *form* (processes) which ultimately settles down as practices**.** This study suggests that business process management is based on entangled set of processes. It demands alternative and intuitive thinking within the leadership, ordering and accountability of existing work practices. Any intuitive idea among these overlapping domains can change business processes. Leadership needs to lead by example in such a way that alternates within the

existing set of order could be explored from time to time. The sediments within the conduits of work-flow have to be properly addressed for possible elimination or reduction. The nature of accountability to probe for sorted alignment of work in administration's perspective and the real image of identity of employees working are required to be harmonized. The intensity of the *hybrid-ization* of work needs to be enhanced systemically in order to produce multiple set of quasi-objects through which the set of operations for organizing function can be observed. The element of change needs to become part of the existing system in hybridized form where its processes become part of the routine use of the working environment. The university as an organization could be seen from the little things that emerge through organizing. Latour (2008) in his inaugural papers in MAD (Materiality, Agency, Development) conference explains:

To use again in Whitehead's terms: "what lasts (the essence of the school) is generated by what does not last (the constant work of taking it up again)" The essence can also be called as DNA of the university that has to be read and understood. The selection of "which part has to be encoded and which part has to leave depends on the actors"

7.2 Conclusion

Using Actor Network as a framework, this thesis has attempted to provide the account of transformation process within the two universities. The entangled processes ranged from leadership role, admission procedures exigencies, diversions in flow of information, *panopticons* connection with *oligopticons*, role of *malleable media* and its programming *accoutrement* towards *set of orders, overflows o*f other networks, issues of *accountability* through *set of orders*, shift of temporary boundaries to *localization* of *global* standards. The process of computerization within the two public universities was

found to be slower in comparison with its implementation in private universities and other industries within Pakistan.

In the case study of North, the leadership role was important to introduce the CMS as an element of change within the organization. There was a realization of existing system to be obsolete and introduction of the new system was pursued to some extent. But more importantly, *active passion* had to be activated within the leadership as well as employees. The admission procedure of the university was entangled with multiple processes connected with other network emerging from society and culture. CMS software's partial deployment and long time for testing was due to the strength and influences of the *missing masses* that were not considered at the time of its implementation. The University's body of politics had connections to the other networks' outer *plasma* that was sifting into the university's *work-net*. The introduction of semester system brought new dynamics within the existing system. Due to this change, the *set of orders* incorporated within the CMS software had to be revised for realignment of work. The existing planning had to re-planned for the situating the global into localized standards. The Examination Department's authority and control was diverted due to CMS dual flow of information. Their laborious nature of work was changed to surveillant oriented. The CMS was able to create a triangle of faculty, CMS department and examinations department to enhance and keep *accountability* on the examination system. The change process also affected the existing boundaries in order to accommodate the new *set of orders*. During the change in processing, the grouping and regrouping provided the account of the shifts of alliances and associations. The change of authorities also provided traces of *accouterments* of power shifts. The CMS system enabled the improved processing speed through which the convocation and the security check was conducted within less time.

In the second case study, the CMS software's partial implementation was explored where its communication channels inoperability was detected due previous incidence of attendance enforcement. CMS's association with the surveillance had been identified where it worked with its set of allies to provide the student's attendance record. The set of allies *formed* a *qausi-object* for surveillance through which administration posed its *set of orders* to provide *accountability*. A tangential effect of the quasi-object was detected as the data seen through *oligoptic* view was available for multiple interpretations. The sense of *accountability* towards academic deliverance was found to be contradictory where administration perception of class/lab attendance was different from the students. Such heteroglossia provided the difference between the *alignment of work* and the *real image of identity accounts*. The Examination Department's association with the existing system was much stronger for the CMS software to connect to them. The issue of secrecy and security represented the strength with the existing alliance. CMS being new to the university required more time to gain such representation. However, CMS software adaptability to the existing formation was making it slowly acquire its stature where its usage was giving confidence to the users to start utilizing the software.

The software was indulged into various entangled processes in both universities. It seemed that its formation had not yet acquired the status of a *black-box.* Universities were still struggling in further CMS implementation. The sites of implementation had multiplicity of constraints and willingness to change and this was driving the computerization process in a slow manner. The implementation depended on the prevailing technical knowledge and willing to change. The coercive forces from organization's outer and inner realm played a dual role of restricting and encouraging the change of system. The *performativity* was framed through multiplicity of materiality

and humans. Its heterogeneous nature has provided a network where frame of reference changes the previous assemblages or in some cases even it fails the previous findings depending on which angle it has been framed or reframed (Latour, 2007).

The study attempted to bring out the performance effect of computerization on human and non-humans. The three analysis chapters provided the narrative of the pilot project of computerization of public universities within Pakistan. Universities should not be considered as '*sui-genres'* such that any organizational concept or theory can be applied to them in the way they is applied to other forms of organizations. From the analysis chapters, it was evident that the computerization processes affected the humans and non-humans in a mutual manner. In most of the thesis the word entity was used to refer to both sides.

The element of change for these entities was computerization through a foreign entity known as CMS software system. The invasion of a new system was perceived similar to a foreigner is approached by the locals in a cautious manner. The difference of the new entity was compared through their representations of their different style of work. The problems occurred between the existing and the new when the perceptions of localized entities clashed with the new entities. In order to accept each other, compromises in switching technicalities, processes and practices were made from both sides. There were some entities that went with the flow of change and helped to inculcate changes within the organising processes, whereas others resisted the changes due to their perceptions or compatibility issues. The changed flow in data/information also affected the sources that authorise circulation of power. Flow diversions in data/information and work enabled entities to authorize and play a role within organizing in a different manner. This raised the level of uncertainties among the working environment. Within

the fragments of network, the flow of power shifted between human and non-human entities based on the *programs* and *counter programs* set within the nature and society. Neither nature nor society is symmetrical (Latour, 1992a). Therefore, the combination of both demands analyst to explore abstract ideas and find some temporary common grounds where co-existence is possible.

The utilization of ANT framework of study enabled the analysis of a vast array of issues and entities that were related to the computerization process within and outside of organization. Due to the hazy nature, plasma effects could be explained in detail, however, their effect certainly enriched the understanding of happening of particular situations. Within the network, the point of view from multiple perspectives enabled the actors to provide their concerns and become part of the research. This could be seen as an augmentation of critical elements formed within the network that ANT is often accused of lacking (Doolin and Lowe, 2002).Though structure and hierarchies were invisible within the network formations, following the work-net enabled the inclusion of the voices of lower cadre workers and material effects that might have been missed out when using other methodologies. The multiple perspectives permitted an element of critique around emerging issues and concerns. The claim by its authors of ANT not being a theory (Latour, 2007) provided the flexibility of bringing in multiple prevailing issues within the computerization process. The nature of the framework provided an account of human and non-human actors from the perspective of viewing the structures as infrastructures that play their roles within the network. The network flow provides actors' account of social and work while ignoring the aspect of hierarchal framing of structural setup. The gap within such kind of study could be explained as if buying a car based on its running performance evaluation rather than purchasing it solely on its shape or on its structural qualifications. Forgoing such structural aspects may be

considered as ANT's venial sin that could be seen as a trade-off towards its adaptability and heterogenetic capabilities. The performance of such kind of research that keeps a flat surface and gives voices to the *missing masses* within the social framework emphasizes more on innovativeness and delegative democracy rather than focusing on structural boundaries that hinders both aspects. Thinking beyond the structures could provide us a view that has been ignored in the past.

However, the heterogenic account is limited to the production of *striated* descriptive knowledge by the researcher. The *repertoires* within the descriptions represent bidirectional flow either in assisting or resisting mode without challenging narratives of actants. Instead of exploring uncertainties in the two modes, the purpose of study could be diverted towards the on-going transformative process in which each action has to be reviewed for its justifiable reason. This is where Callon's work on ANT where *problemitization* has to be viewed from the aspect of *intressment*—both physical and nature—and *mobilization*. On the contrary, the five uncertainties emphasized by Latour probe more towards the problems. The narratives constituted through actions suggest that anticipation of the consequences of decision taken by actants were limited to actant's account or available within the collected data. This restricted the aspects of exploring the *otherness* that might have existed within the same domains (Lee and Brown, 1994). While floating on data, a certain level of enigma sufficed throughout the storytelling where desire to probe was hindered through the shear nature of ANT's version used within the study. The actors driven story reduces the margin of analysis to be performed by the researcher. The outreach towards the outcome was only available through the channels that could be traversed through the help of actor's described act. Significant amount of cognitive resources may be deployed within the narratives. The options and solution to the problems posed could not be conceived especially in terms

of behavioural and interactive perspectives. The inclusion *of overflows* does attempt to include the *missing masses* but accesses to such entities are limited through the narrator (Callon *et al.*, 2011). Therefore, use of the word *infusion* instead of *overflow* is suggested as one of the outcome of this study. The approach to such distant actants could rely on the carefully recognized *hybridized* formations.

It seemed that the impact of computerization within these universities was a slow process. As per the Software Companies findings, the changes were sifting into the existing formations in much slower pace compared to other industrial sectors. The project was initiated in 2006 and until 2009 the computerization process was in its implementation stage. During the processes of adapting the change the element of changed also gets changed. CMS software's every journey in an organization not only makes changes within the organization but it also provides changes in its software code that enables to improve upon the existing version.

From HEC's point of view the CMS software was introduced as an agent of change to improve the university's administrative functioning. Bureaucratic forms of working can be partially blamed towards the Desk-Killing of the work required CMS implementation. *"Appealing to a reserve of energy, be it 'capital' or 'power', to explain the obedient behaviour of the multitudes, is thus meaningless, This reservoir is full only as long as others dutifully fill it. It is empty when you need it, that is when the others are no longer filling it"* (Latour, 1986:p. 276)There were other organizational, cultural and societal concerns that were needed to be mobilized towards the successful implantation of CMS project. For both sides it was a question of existence and co-existence. However, it seems that existing configuration of technology was in the processes of reconfiguration or rather trans-configuration to accommodate the new technologies for

transformation to happen. I leave the last word to one of the participants, which seems like a fitting conclusion:

> *Emp: The IT team at their end, they thought ok it will happen. So that took some time to settle down. If you look into the change management part, both of these universities went partially live in last year (2008). UETP [North] has really improved and gone up to 60 -70 % of their systems usage. DOW University [South] is still under 50. They are still under 50 because you see the change management really requires you to have a plan up to grass root level, how the system will penetrate? So that is if something is not properly planned, if you haven't communicated them upfront, OK what are the goals that you need to achieve, cut off your old systems and switch to the new one totally. So in this case, people are confused they do half of the work on the old system and remaining half on the new. Some do all in new and some say ok we can't close the old system somebody has to tell them that stop the old system. You know if that somebody doesn't know that they have to tell people to stop working on the old system so cut-offs were not clearly defined as well. Since they had no definition of cut-offs so it is going on like this for quite some time.*

Appendix A Semi-Structured Interview Question

Possible Interview Questions

Organization: Higher Education Commission of Pakistan

1. How was the automation project conceived?
2. What was your role in computerization?
3. How were task teams and groups created?
4. How did the task-teams work?
5. What were the selection criteria for selecting the software package?
6. How did the HEC's IT team contribute in the project?
7. Did you perceive any hindrances or hurdles in launching the computerization project?
8. What sort of actions did you take to make sure that the project went well?
9. Did you write any letters emails? If yes, what was the response from the other side?
10. What was your main concern about the computerization project?
11. What changes do you see in the organization?
12. To whom do you think I should talk to find out more about this issue?
13. Can you recall any special incident or event, related to computerization, that might have happened before, during or after the automation process? Is there any story that you can remember?

Types of Question:

- Introducing: Please tell me about the ….
- Follow up questions….., Could you say more, what do you mean?
- Probing questions…….
- Specifying the questions: What do you do then….?
- Direct questions: Do you find easy ….?
- Indirect questions: What do you think the computerization has achieved?
- Interpreting questions……So what you mean…

Possible Interview Questions

Organization: Techlogix (Software Company)

1. Please tell me how your company got involved in the computerization process?
2. What team was formed to pursue the project?
3. What sort of paperwork was completed before quoting?
4. How was the presentation of the project handled?
5. How did you form the team for implementing the project?
6. What was the university's attitude towards the implementation?
7. What problems did you face while doing the pilot project?
8. What was HEC's attitude for the project?
9. What was the campus's reaction to computerization?
10. How many changes were required in the software to implement in each university?
11. What changes do you see in the organization after computerization?
12. Was this project different from other computerization projects?
13. Can you identify challenges faced by your organization in automation?
14. To whom do you think I should talk to find out more about this issue?
15. Can you recall any special incidence or event, related to computerization, that might have happened before, during or after the automation process? Is there any story that you can remember?

Types of Questions:

- Introducing: Please tell me about the ….
- Follow up questions….., Could you say more, what do you mean?
- Probing questions…….
- Specifying the questions: What do you do then….?
- Direct questions: Do you find easy ….?
- Indirect questions: What do you think the automation has achieved?
- Interpreting questions……So what you mean…

Possible Interview Questions

Organization: DOW University of Health Sciences/University of Engineering and Technology Peshawar

1. Please tell me about the automation project.
2. How was the work done before automation?
3. Did you create any new groups or task team to work with computerization?
4. Did your university demand any changes in the design of the software?
5. How has the computerization changed the work environment?
6. How has the nature of work changed for the organization?
7. Can you identify challenges faced in automation by your organization?
8. To whom do you think I should talk to find out more about this issue?
9. What was the impact on the university community after computerization?
10. What larger changes do you see in the organization?
11. Can you recall any special incidence, related to computerization, that might have happened before, during or after the computerization process? Is there any story that you can remember?

Types of Questions:

- Introducing: Please tell me about the ….
- Follow up questions….., Could you say more, what do you mean?
- Probing questions…….

- Specifying the questions: What do you do then….?
- Direct questions: Do you find easy ….?
- Indirect questions: What do you think the automation has achieved?
- Interpreting questions……So what you mean…

Appendix B **Notebooks and Memoirs**

(Each page here represents a separate document)

Face Sheet

(Logbook work for ANT)

Time of interview:

Date of interview:

Location details:

Organization of interviewee:

Time current post held:

Interviewee's name:

Age:

Gender:

Work experience:

Time working in current organization:

Number of years involved in current group:

Notes Sheet: (Part of Logbook for ANT)

How did the interview go?

Where did the interview take place?

Any feelings about the interview, any surprises, or reactions observed

The setting of the interview (busy/ quiet/ many/few people in vicinity, new/old building, etc.)

Chronological Order of Information after Transcribing

(Later to be added to NVivo)

Date:

Time of interview:

Interviewee name:

Post held:

Organization's name:

Transcribed information (interview) goes here

Notebook

Record Keeping of My Own Thought Process

Organization:

Theme:

Idea:

Trope (Figure of speech):

Metaphors:

General Comments:

Account of Text Effects on People

Organization:

Name:

Designation:

Text reference:

Action taken by the individual based on the text direction:

Appendix C Consent of Interview and Utilization of Information

I understand that this interview is a part of research work conducted for a PhD by Mr. Faisal Aftab, student of University of Leicester. The interview contents will be kept anonymous and used for analysis done within his PhD research work only. The interview transcript will be given back to me for approval of contents.

I hereby give my approval for the interview contents to be used in the interviewer's PhD research thesis.

Signatures:

Name:

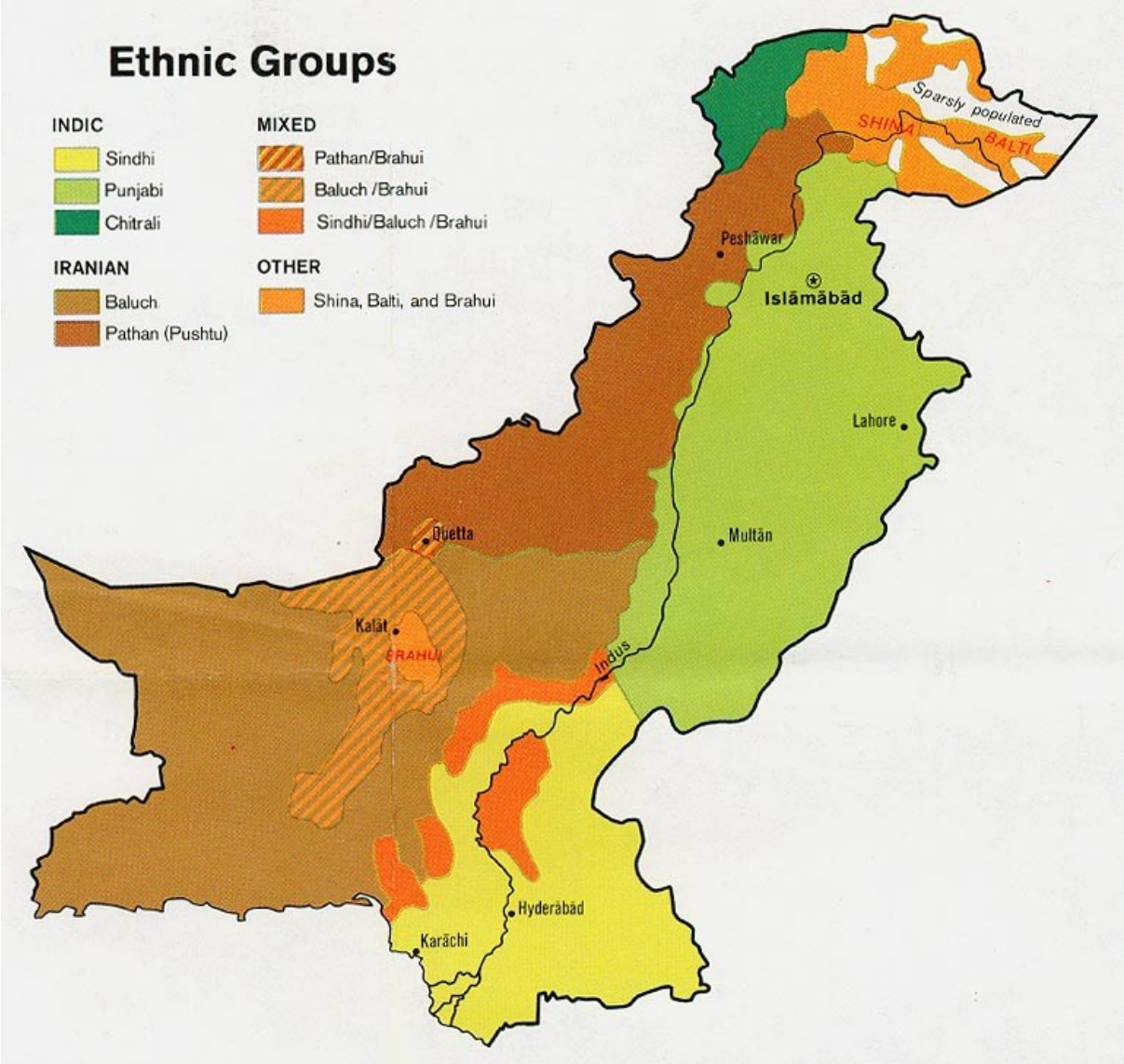
Organization:

Appendix D ANT Deployment: Terminology

Terms and Phases	What to look for
First Source of uncertainty : nature of groups	Vague, based on power formation of groups changing. In the make or break group watch the tools. Look at the performances: Intermediaries and mediators.. Shifting of mediators to intermediaries.
Second Source of Uncertainty: Action is Overtaken	Take Action as a node. Never taken alone. Explore the taking action and completion of action as there are complex set of data available. Look at the materiality of things. Actions are borrowed, influenced dominated, betrayed, translated and influenced. ANT demands not to blame actor/s for their actions and drawn conclusion by the analyst/actor; instead, he should keep it as a source data. Check how agency acts instead of choosing a particular composite agency.
Third source of uncertainty Objects too Have Agency	Nature of materiality is not important issue rather it is the action executed and performance that counts. Not to bring object equal to humans but the aim is to provide a holistic view. In order to do that explore 1) innovations,2) mediators capabilities,3) occasions related to accidents, breakdowns and strikes, 4) bring out the archives, documents, memoirs and historian accounts 5) be creative and envisage the possible objects that could have contributed.
Fourth Source of Uncertainty; Matter of facts Vs. Matter of Concern	Explore data from multiple perceptive. For ANT it is important to explore the simple intermediaries and expose various agencies in order to ascertain some sort of authenticity. 1) Scientific fact to be taken back to its laboratory as the fabrication process provides much more information about the matter of fact established. 2) Explore the real environment that a fact lives. The every day use of the fact will provide traces of association with social. 3) Explore the fact in the large scale integration as the conglomerated formation brings out controversies. 4) Observe the reality vs. fiction that exists in the natural realm.
Fifth Source of Uncertainty	1) Logbook in which appointments, reactions, encountering new state of affairs and surprises are documented 2) Notebook as logbook provides chronological and categorical order of the gathered information. 3) Tropes and Metaphors
First Move: Panopticon to Oligopticon	Oligopticon and Panoramas

Terms and Phases	What to look for
Second move: Redistributing the Local	Articulators and localizers:-intermediaries to shift mediators and back and forth . face to face lacks following five things 1) isotopic: acting is based on multiple actions, distant locations and materials and emerging from remote invisible actors 2) Interactions is not synchronic classroom interaction things of different time working together 3: Interaction doesn't provide synoptic account as there are many hidden actors that needs to be identified. 4) Interaction cannot be homogenous as the multiple agencies shifting nature through time and space cannot provide account in single interaction 5) Interactions are not isobaric in nature. The nature of participants varies as some are eager to say things while other hardly speaks. Operational manual ; besides its generic nature of better understanding the user grasps it difficulties "known as the gap of execution"
Third Move	Dependent on first two moves; first shifts global to local, second move links the sites directions of flow to some other site distributed in time and space. Once a new conduit is created in which entities are transported. Looking from connections forms and formations. explore the unformatted phenomena : as Plasma

Appendix E Pakistan Ethnic Groups



http://www.lib.utexas.edu/maps/middle_east_and_asia/pakistan_ethnic_1973.jpg

http://www.lib.utexas.edu/maps/middle_east_and_asia/pakistan_ethnic_1973.jpg

Appendix F HEC CMS Technical & Financial Evaluations Criteria

Parameters of Technical & Financial Evaluation for Campus Management Solution

Tender Date: Oct 29, 2006
Date of Opening (Technical bid): Dec 26, 2006 Time: 03:00 PM

Mandatory Requirements		
Sr. No.	**Attributes**	**Requirements**
1	Off-the shelf solution of International Repute	Literature/ brochure / catalogue of Product, user manual and technical documents
2	Details of litigation/sub-judice cases (if any)	Certificate/ Letter
3	Income tax (NTN), Sales Tax Registration Certificate	Provide certificates
4	Web enabled application	Compulsory
5	CMM or equivalent system	CMM compliance product up to 3 levels
6	Provision of on line bugs tracking / reporting system	Compulsory
7	Search record Functionality	Provide efficient Search functionality in all modules
8	Reports	Capability to generate multiple reports as per requirement of different modules
9	Self Service Components	Extensive self-service centres for all audiences, including Student, Instructor, Advisor and Administrative Staff
10	Upgrades	Provide software enhancements, updates & patches in the package. (with no hidden charges)

Technical Bid: 80%
Financial Bid: 20 %

Sections	Score	Score Obtained
A. Business Profile	15	
B. Experience	15	
C. Product details	35	
D. Composition of team assigned	30	
E. Training	05	
Total	**100**	

1- Technical Bid Score: Marks obtained by Firm / 100 * 60 = _____

2- Financial Bid Score: M/B * W = _____
M → Minimum Bid
B → The bid
W → Weight (20)

3- Live Demonstration score (of CMS): 15 = _____
4- QA from Technical Committee Members: 5=_____

Total Score = Technical Bid Score + Financial Bid Score + Live demonstration score + QA

Note: HEC reserve the right to reject the proposal if any of the above mentioned requirements are not fulfilled.

1

Technical Evaluation Performa

A – Business Profile				
Sr. No.	**Attributes**	**Max Score**	**Score Distribution**	**Requirements**
1	Authorized Product dealer/ Partner	4	4	Organization directly participated
			3	Authorized Dealer/ partner
2	Financial Strength	4	4	More than or equal to 150 Million turnover with software services revenue at least 75%
			3	100 – 149 Million turnover with software services revenue at least 75%
			2	50 – 99 Million turnover with software services revenue at least 75%
3	Company established (No. of years)	3	3	5 or more years
			2	3 – 4 years
4	Location of Offices	4	4	Office in Islamabad, Lahore, Karachi, Peshawar, Quetta
			3	Office in Islamabad, Lahore, Karachi
			2	Office in Islamabad only
	Total	**15**		

B – Experience				
5	Successful implementations in other organizations (for **Local organization** - project of similar level and scope like ERP)	5	5	Government Sector
			3	Private sector organization
6	Successful implementations of Product (for **International organization**)	5	5	Implementation in Higher education Institutes in South Asia
			3	Implementation in Higher education Institutes in Asia
			2	Implementation in Higher Education Institutes in North America / Europe
7	Number of reference able Implementations (Off the shelf product)	5	5	10 or more Implementations in the region (Asia Pacific)
			3	7-9 Implementations in the region
			2	4-6 Implementations in the region
	Total	**15**		

C – Product details				
8	Compliance of Product with Functional Requirements of RFP	5	5	100% compliance (all modules) (Provide details)
			4	90% compliance. (Provide details)
			3	80% compliance. (Provide details)
9	Integration & Inter-operatability with other products	5	5	Maximum flexibility to integrate with new modules and products (80 – 90 %). Provide details
			3	50-70 % flexibility. Provide details
10	Presentation & user friendliness of product (provide screen shots of product)	3	3	Good (presentation and screen shots)
			1	Average (presentation and screen shots)
11	Configuration/customization level (for local partners)	5	5	No locally developed module
			4	Out of the box with customizations
			3	Integration with 3rd party tools
			2	One locally developed module added

			1	More than one locally developed module added
12	Warrantee period and conditions (if any for implemented solution)	4	4	Free for two year
			2	Free for one year
13	Maintenance & Operational Support	5	5	Maintenance and operational support for one year after complete implementation
			3	Maintenance and operational support for six months after complete implementation
14	Maximum time required for complete implementation from the date of award of contract	5	5	9 – 12 months
			4	12 – 15 months
			3	More than 15 months
15	Compatibility with legacy system DB	3	3	For having this feature
	Total	**35**		

D – Composition of Team assigned to implement CMS				
16	Location (of Team)	5	5	Team in Islamabad, Karachi, Lahore, Peshawar, Quetta
			3	Team in Islamabad, Lahore, Karachi
			2	Islamabad based team only
17	Project Manager (PM) experience of CMS implementation (CMS for international organization) (similar level product implementation for local organization)	5	5	2 or more implementations
			3	1 implementation
18	Project Management Team	5	5	Dedicated Project Management Teams defined (at least for two implementations to go parallel)
			3	Dedicated Project Management Team (for one at a time implementation)
19	Project Technical Lead (at least 2 resources)	5	5	5 or more years of Technical Solution Delivery Experience
			3	Over 4 years of Technical Solution Delivery Experience
			2	Over 3 years of Technical Solution Delivery Experience
20	Project Technical Team	5	5	Dedicated Teams
			3	Shared Teams
21	Current assignments in hand of Team	5	5	No assignment in hand
			3	One assignment in hand
			1	More than one assignment
	Total	**30**		

E – Training				
20	Location (of facilities & Technical Team for training available)	5	5	Facilities & Staff available in Islamabad, Karachi, Lahore, Peshawar, Quetta
			3	Facilities & Staff available in Islamabad, Lahore, Karachi
			2	Facilities & Staff available in Islamabad only
			1	Facilities through other organization / institute
	Total	**5**		

Appendix G Oracle & HEC joint Published Case Study

Oracle Customer Case Study

Higher Education Commission Automates Student Administration at Pakistan Universities

Higher Education Commission
Islamabad, Pakistan
www.hec.gov.pk

Industry:
Education & Research

Employees:
700

Oracle Products & Services:

PeopleSoft Enterprise Campus Solutions
- Student Administration
- Academic Advisement
- Campus Community
- Financial Aid
- Recruiting and Admissions
- Student Records
- Campus Self Service
- Gradebook
- Contributor Relations

Oracle Database
Oracle Real Application Clusters

Oracle Partner:
Techlogix
www.techlogix.com

"Everything is generated electronically and is available over the Web, which is a tremendous boon for the universities. The headaches of generating admissions lists and doing all administrative tasks manually are eliminated." – Dr Sohail Naqvi, Executive Director, Higher Education Commission

The Higher Education Commission (HEC) was established by the Government of Pakistan in 2002. Since then, the HEC has undertaken a five-year reform process to turn Pakistan's universities into world-class centers of education and research and development. Today, the HEC is investing in the development of 124 private and public institutions across Pakistan.

A key part of this reform process was the deployment of computers and high-speed networks across all these universities. However, despite the introduction of new technology, managing student information was a manual and time-consuming process. Everything related to student administration, including enrolments, fee records, and exam results, was handled by different departments at each university.

"Student recruitment and administration and the distribution of information took far too long," said HEC executive director Dr Sohail Naqvi. "Every item was standalone. One university office would handle admissions, one would handle student fees, and another would compile students' results.

"Everything was done on paper or using Microsoft Excel spreadsheets. There was no common platform between the universities and it was quite chaotic as department staff had to check and re-check information," said Dr Naqvi.

In early 2007, the University of Engineering & Technology in Peshawar and the Dow University of Health Sciences in Karachi were selected to participate in a pilot project to automate their student administration and management processes.

After a rigorous selection process, the HEC turned to Oracle's PeopleSoft Enterprise Campus Solutions to automate the student

Published September 2008

ORACLE

Key Benefits:

- Improved efficiency by automating student administration process with Web-based system
- Enabled students to apply for admission and financial aid, view exam results, course and grade history, evaluate transfer credit, and pay fees online
- Enabled staff to track fee payments, create class assignments, calculate grades, and assess student progress online
- Provided platform to speed up the distribution of general information to students
- Enabled students to receive their degrees within a week, rather than wait up to 12 months

administration process and provide real-time information to students and faculty staff at the two universities.

The universities deployed the PeopleSoft Enterprise Student Administration, PeopleSoft Enterprise Campus Self Service, PeopleSoft Enterprise Gradebook, and PeopleSoft Enterprise Contributor Relations modules. The system runs on Oracle Database 10*g* and Oracle Real Application Clusters.

Student Administration Information Delivered Fast

Using the Web-based PeopleSoft Enterprise Student Administration system, thousands of students and staff at the two universities can access administration records, financials, class timetables, and exam results in seconds.

Students use the PeopleSoft Enterprise Campus Self Service module to apply for admission, change enrolments, request transcripts, view course and grade history, and evaluate transfer credit.

"University staff can also easily track students who have paid their fees and those who have not," said Dr Naqvi.

"Professors, academic advisors, and administration staff spend much less time on administrative tasks. For example, it previously took six to 12 months for some students to receive their university degrees. This process now takes no more than one week."

Faculty staff also uses the PeopleSoft Gradebook module to create class assignments, calculate grades, and assess student progress, eliminating the manual process of recording results on paper.

Improved Efficiency with Electronic Records

Both universities now have clear, documented student administration processes that are generated electronically. This improves overall administration efficiency and brings an "automation" culture to the universities, said Dr Naqvi.

"Students, for example, need to attend a certain percentage of their classes. These numbers can't be changed once they are fed into the system, which brings a lot of transparency into the student administration process.

"Everything is generated electronically and is available over the Web, which is a tremendous boon for the universities. The headaches of generating admissions lists and doing all administrative tasks manually are eliminated," he said.

Distributing information to students throughout the campuses is also made easier. "The universities have thousands of letters and other documentation to send out to students each semester. Templates are available online that speed up this process," said Dr Naqvi.

The Future

A further four universities are currently implementing the PeopleSoft solution. The Balochistan University of IT & Management Sciences in Quetta, Punjab University in Lahore, Quiad-e-Azam University in Islamabad, and Islamia University in Bhawalpur are expected to go live by July 2009.

There are also plans to extend the PeopleSoft system beyond student administration. "There are many large educational institutions throughout Pakistan—the largest has 30,000 students—that need help automating their financial management and human resources functions," said Dr Naqvi.

"We will be looking at some additional projects in the future."

Why Oracle?

In 2006, HEC formed an expert group to map out the problem and design the requirements. The group built a specification document and went to tender. HEC created a performance matrix and evaluated proposals from Oracle, SAP, and a number of solutions developed by local organizations.

"We were impressed by the functionality of Oracle's PeopleSoft Campus Solutions," said Dr Naqvi.

HEC selected Oracle Partner Techlogix to deploy the solution. "There were many university processes that had to be modified and Techlogix provided the expertise that we needed. The project simply would not have succeeded without Techlogix's assistance."

Implementation Process

Techlogix kicked off the project in mid-2007. The company trained IT staff and administrators from both universities on how to feed student records from current and previous semesters into the system. Data was verified, checked, and double-checked before it went live.

The implementation went live at both universities in July 2008.

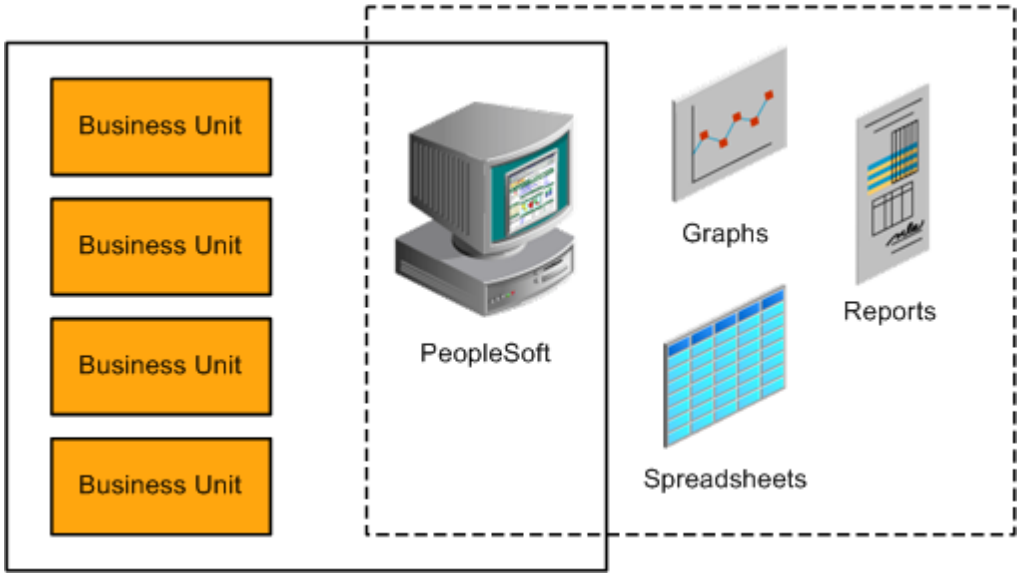
Advice from Higher Education Commission

- Ensure that all relevant staff across the university are committed to the project.
- Use a local partner with a strong technical competence.

The Higher Education Commission (HEC) was established by the Pakistani Government in 2002. Today, the HEC is investing in the development of 124 private and public institutions across Pakistan.

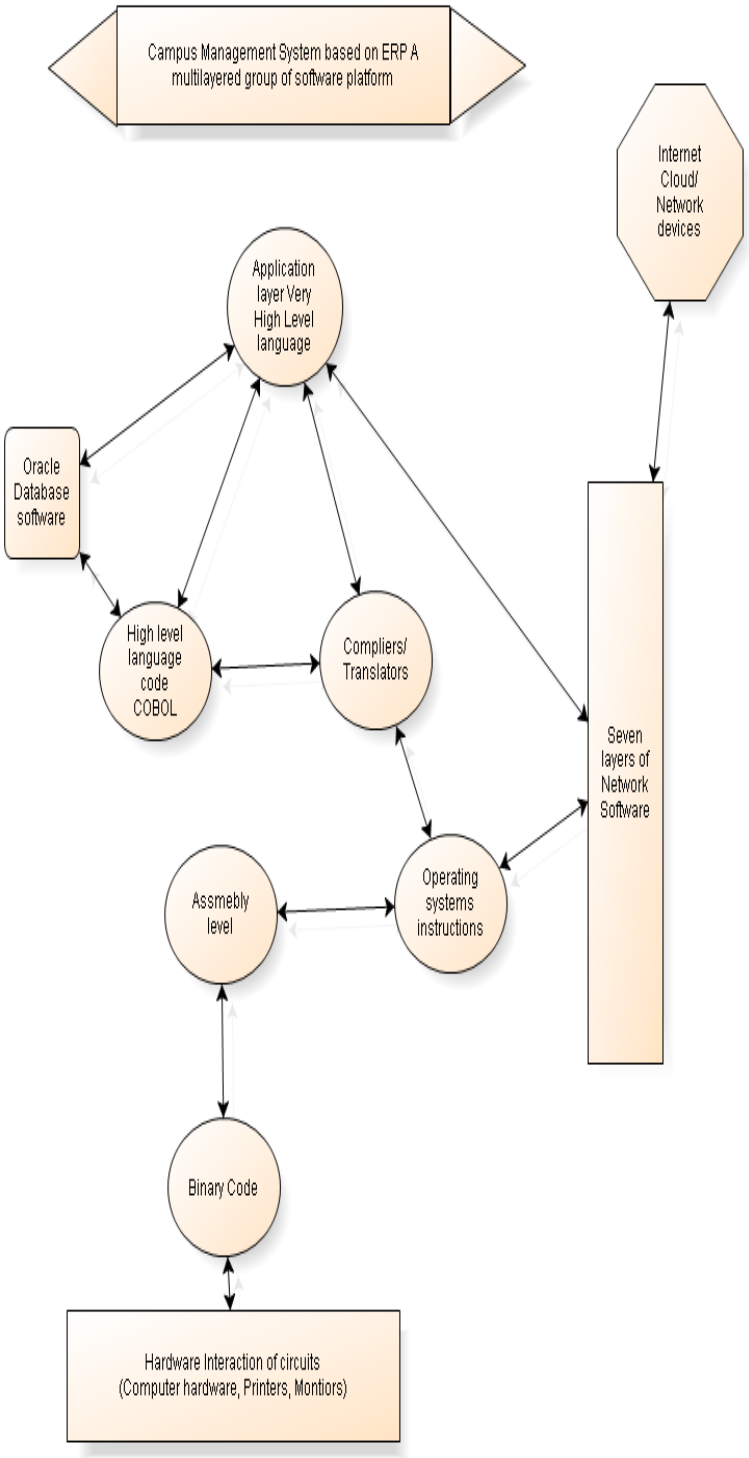
Appendix H CMS simple solution to complex problem

Benefits of centralized data



http://docs.oracle.com/cd/E17137_01/psft/acrobat/cs9lsfn-b0310.pdf

Appendix I CMS Software Intercation



Appendix J CMS Modules Details

Campus Management Solution is the most responsive and comprehensive student administration system which covers all the phases of student life cycle at the university; right from his admission till he graduates and becomes an alumnus. Following are the modules available in CMS:

- **Recruitment & Admission:** This module is capable to automate the admission process of university, it will generate merit lists according to the admission criteria and score of the admission test results. The system will make offering process automatic on the merit basis.
- **Student Financials:** Student Financial module will keep record of each student's financials comprising his fees, scholarships and waivers. Any student can get his status regarding credit or debit. This will enable finance department to easily find out the statistics relating to student finance.
- **Student Records:** The Student Records application is a set of business processes which can maintain Course Catalog, maintain Schedule of Classes, define Repeat Checking Rules, Maintain Course Requisites, Process appointments, permissions, term activations, withdrawals and other term related activities.

- **Academic Advisement:** Academic Advisement is the application within Campus Solutions that is used for degree audit i.e. to track the requirements that a student must satisfy in order to graduate.
- **Campus community:** It is the foundation of PeopleSoft Campus Solutions package It provides the 3C's concept i.e. Communications, Checklists and Comments. It also enables to maintain People and Organizations data. It helps in Event tracking On and Off Campus events.
- **Grade Book:**Gradebook helps to monitor class assignments and grades as well as facilitates communication between instructors and students.
- Hostel Management System :
    1. Hostel Management System (HMS) enables students to apply for hostel rooms and place requests/complaints.
    2. It enables the administration to allot rooms to faculty and students, to do mess billing directly to student accounts maintained with the accounts department, to manage the store inventory, to place notices online for the hostel residents, to mark attendance of both the hostel residents and their visitors.
    3. It also provides reports like list of students who applied for hostel admission, snapshot of current hostel rooms allocation, inventory transaction history, and attendance report.
- **Campus Self Service:**
    - **Student Self-Service:**
        - Access a secure 360-degree view of their relationship with the institution on a single web page.

- View class and exam schedules, check enrolment appointments, and enrol or change enrolment in classes.
- Request transcripts, view course and grade history, and evaluate transfer credit.
- Manage their student accounts for charges, payments, financial aid, and admission deposit activity.
- Make online credit card and eCheck payments.

- **Faculty Self-Service:**
  - See a complete calendar of their classes.
  - View a list of students who are enrolled or wait-listed for a class, plus those who dropped.
  - Send email to one student, a select group, or all students in a class—with just one click.
  - Access class information, such as start and end date, days and times, and location.
  - Enter midterm and final grades for each student.
  - Write notes to be displayed on a student's transcript.

Enterprise Portal: It is a world class portal solution with many robust content and collaborative features.

Contributor Relations: Contributor Relations gives the ability to manage relationship alumni and other donors.

CollegeNet Scheduling System: It is world class scheduling system used across the globe. It provides detailed views of facilities and keeps track of any conflicts that might arise.

http://www.buitms.edu.pk/CMS/Default.aspx

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