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Chapter 7

Actor–Network Theory: A Bureaucratic View of Public Service Innovation

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ABSTRACT

Public sector institutions continue to significantly invest in Information and Communication Technology (ICT) as a solution for many of their service provision challenges, for example, greater efficiency and quality of services. However, what has come to light is that there is a lack of research on understanding the contributory value or “success” of technological innovations. This chapter introduces a socio-technical view of public service innovation. The aim of this research is to extend on the notion of bureaucracy, which is traditionally focused on the politics of office environments. This socio-technical view extends this traditional view to include the politics of service networks, particularly within IT-enabled public service innovation. The chapter focuses on how service innovation is exploited to align specific interests through the process of translation and shifts the focus from value co-creation to value co-enactment. In essence, this chapter explains how public service technological innovations act as an agent of bureaucracy that alters the relational dynamics of power, risk, responsibility, and accountability. For demonstrative purposes, this chapter describes a case study that examines IT-enabled service innovation with an academic service environment.

1. INTRODUCTION

Service comprise of socio-technical (human and technological) factors which exchange various resources and competencies. Service network environments remain one of the most significant, yet ‘invisible’ infrastructures within the modern business era (Carroll et al., 2010). Service networks become increasingly

complex when technology is implemented to execute specific service processes. This ultimately adds to the complexity of a service environment, making it one of the most difficult environments to examine and manage. In addition, although the emerging paradigm of ‘Service Science’ calls for more theoretical focus on understanding complex service systems, few efforts have surfaced which ap-

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ply a new theoretical lens on understanding the underlying trajectories of socio-technical dynamics within a service system (Spohrer et al. 2007). Often, researchers are tasked with defending a particular theory to focus their research, but as Walsham (1997; p. 478) suggests:

There is not, and never will be, a best theory. Theory is our chronologically inadequate attempt to come to terms with the infinite complexity of the real world. Our quest should be for improved theory, not best theory, and for theory that is relevant to the issues of our time.

While it may seem contradictory after reading Walsham's quote, this chapter sets out to advance theoretical developments to extend our understanding of the traditional view of bureaucracy to include the politics of service networks, particularly within IT-enabled public service innovation. To achieve this, the chapter proposes the need to examine the socio-technical impact of technology on public service network dynamics. This empirical research explores an academic service network, with particular attention paid towards a critical end-to-end exam grading process. A single case study (Yin, 2009) is employed to examine the introduction of a Web-based system on a traditionally bureaucratic public service system and its transformation from a paper-based system to an automated system. The research adopts actor-network theory (ANT) as a research lens. ANT offers a rich vocabulary to describe the interplay of socio-technical dynamics which influence the service system reconfiguration. Thus, this chapter also offers a discussion on how ANT may be employed to examine the complexity of service systems and service innovation and builds on the efforts of Carroll et al. (2012). More specifically, this chapter examines the 'translation' process of IT-enabled public

service network innovation. In essence, it explains how public service technological innovations commands control over public sector behaviour and therefore acts as an agent of bureaucracy which alters the relational dynamics of power, risk, responsibility, and accountability. The descriptions resulting from ANT assists us to uncover the difficulties of service innovation diffusion by various actors and structural forces. This highlights the importance of 'translation' in service provision. This chapter argues that the concept of service co-enactment replaces co-creation within public sector networks since interaction is inscribed and governed through service regulation.

2. SOCIETY AND TECHNOLOGY

There have been numerous conceptualisations of the relationship which exists between technology and society and many studies highlight the important factor in which information technology (IT) plays to enable and increase the transformations of organisations (Orlikowski, 1991; Demirkan et al. 2008). However, it is difficult for Service Science practitioners to accept a presumptuous attitude towards the promise of technology, and suggest that these assumptions regarding the affordance of technology are becoming a cliché (for example, Demirkan et al. 2008).

In the past, there have been two differing schools of thought on the relationship of IT and social factors. One school of thought focused on technological determinism (Winner, 1977), which suggests that technology follows its own logic and patterns of usage. Alternatively, there was considerable support for constructionism which suggests that society develops the technology and society determines technology's role (Woolgar, 1991). These schools of thought were much debated

throughout literature over in the 1970's and 1980's. But, in recent years, researchers began to examine the role in which both arguments played simultaneously to advance our understanding of the embedded relationship of IT and the organisation. Continued interest focused towards the question of how IT and the organisational roles interplay and how they come into 'being', suggesting the need to pay more attention to the characteristics and properties which support their co-existence (Kling, 1991; Orlikowski, 1992). Nowadays, we acknowledge that there is a mid-point between the two schools of thought which offers us a 'truer' picture of technologies ability to 'enable' and 'restrict' transformations. There have been increasing efforts to propose suitable models to explain the socio-technical factors of organisations. One approach in particular which is gaining more research ground across diverse research fields is ANT, which offers a radical vocabulary to examine the socio-technical building blocks on the nature of service networks.

A service system comprises of socio-technical systems which stabilise a service network through the exchange of resources and competencies which generate value (Carroll, 2012). The transformation of system thinking began during the 1960's and people began to view the organisation as an 'open system' made up of socio-technical factors. Within this school of thought, Emery and Trist (1960) examine how a system maintains quasi-stationary equilibrium despite changes in the environment. A socio-technical view of organisations incorporates the need to examine the hybrid nature of social (i.e. people) and the technical (i.e. things) in order to understand how actions are executed and the factors which influence the actions' outcomes (Carroll, 2012). Although technical factors are often concerned with machinery, it also includes methods and procedures to explore

how work is organised as a process. Nowadays, technology (i.e. service systems) plays a critical role in supporting critical organisational functions which highlight the importance of understanding how socio-technical systems impact of service relational structures. Thus, ANT is a fitting research approach to gain insight of socio-technical systems particularly in the field of Service Science.

2.1 The Emergence of Service Science

In response to the growing importance placed on understanding service complexities (technical, social, economic, etc.) the field of 'Service Science' has emerged to guide the effective design, implementation, and management of service systems. However, although Service Science calls for more theoretical focus on understanding complex service systems, few efforts have surfaced which apply a new theoretical lens on understanding the underlying trajectories of socio-technical dynamics within a service system. This chapter argues that ANT provides a suitable theoretical lens to examine and explain the underlying trajectories of socio-technical dynamics within a service system.

The design, management and delivery of complex service systems suggest that we need to develop a scientific understanding regarding the configuration of resources to deliver service excellence. In order to extend our understanding on service delivery, there is a need to establish alternative methods to examine service formation and the value propositions which connects them. Within the service-dominant environment (Normann, 2001; Vargo and Lusch, 2008), organisations are faced with increasing challenges to develop their capabilities in complex service models (Vargo et al. 2008). The emergence of Service Science as a discipline in recent

years confirms the fundamental change which continues to alter the nature and application of technology within business environments. Service Science is an attempt to understand the complex nature of service systems and acts as an interdisciplinary umbrella which incorporates widely diverse disciplines to construct, manage, analyse and evolve service systems (Spohrer et al, 2007). This suggests that we need a more systematic, analytical, and overarching approach (Carroll, 2012) to examine service co-production operations to generate knowledge regarding the overlap between the social, business, and technology factors within a service environment (i.e. bridging service management and service computing). As services become more “open”, collaborative, flexible, agile, and adaptive, there are greater pressures on business to reconfigure and meet change through strategic realignments (Carroll et al., 2010; Carroll 2012). In doing so, managers should develop an understanding as to how this impacts the ‘value’ of the service system. A service system comprises of a provider(s) and a client(s) who collaborate to deliver (i.e. co-create) and benefit from a service (Vargo et al. 2008). A service system may be defined as (IfM and IBM, 2007; p. 5):

...a dynamic value co-creating configuration or resources, including people, technology, organisations and shared information (language, laws, measures and methods), all connected internally and externally by value propositions, with the aim to consistently and profitably meet the customer's needs better than competing alternatives.

The environment in which the configuration of resources is achieved is described as a service network. A service network comprises of clear linkages which define the service structure and interactions in which it co-ordinates its tasks to achieve a certain

business objective. Since it accounts for the collective effort of all service interactions to generate and realise value, co-creation is an important concept within a service network. This suggests that ANT can assist Service Science researchers in their quest to understand the complexity of service systems.

3. INTRODUCING ‘PUBLIC’ SERVICE SCIENCE

As discussed earlier in this chapter, the concept of a service had received much interest over the last decade, in particular the applications of technology to extend services. As the business environment continues to shift from a goods-dominant environment towards a service-dominant one (Normann, 2001), service networks play a central role towards supporting and delivering services across the global economy (Fitzsimmons and Fitzsimmons, 2004). However, although, practitioners continue to make substantial investments on services and supporting service infrastructure, one of the main problems is that little is known about the socio-technical infrastructure to deliver a service and understand the factors which influence service ‘value’.

Service science introduces a new paradigm shift to deal with new service realities. A paradigm shift may be described as “a broad model, a framework, a way of thinking, or a scheme for understanding reality” (Tapscott and Caston, 1993; p. xii). The influence of Internet technologies and other Web services has altered our understanding of the modern service environment. For example, in business, the marketplace has become a volatile and ‘flattened’ (Friedman, 2006) global stage. In addition, business is considered to be a ‘networked effort’ rather than an individualistic effort (Carr, 2003; Carr, 2004), while customers co-create value within a business (Normann,

2001), and technology continues to be the dominant force in the service sector. Thus, Service Science acts as an interdisciplinary umbrella which incorporates widely diverse disciplines to construct, manage, analyse and evolve service systems. This suggests that we need a more systematic approach (Spohrer et al. 2007; Spohrer and Maglio 2008) to examine service co-production operations to generate new knowledge regarding the overlap between business and technology (i.e. service management and service computing).

The delivery of services is facilitated through a service system which is supported by technological innovations and organisational networks, connected through value propositions and information exchanges. In today's service-dominant business environment (Normann, 2001; Spohrer et al., 2007), harnessing innovative applications of technology is considered one of the critical factors towards organisational sustainability (for example, Weill et al., 2002) and achieving greater efficiencies. Consequently, the application of technology to support services has altered our traditional understanding of the 'organisation', making it more difficult to conceptualise the paradigm of services. Understanding the socio-technical factors is critical for several phases of service network development, including; conceptualisation, design, delivering, monitoring, optimisation, planning, and analysis. What has come to light is that there is a lack of theoretical developments on what these intertwining dynamics are and how they are influenced by technology. This is particularly true within public sector service when one considers the influence of bureaucracy in service change and actor-network reconfiguration, hence the need to shed more light on Public Service Science.

3.1 Need for Public Service Science

Public services typically refer to direct or indirect services which are provided to citizens by a government through the provision of finance to support fundamental services. Examples of public services include health, education, transport, infrastructure, and security and defence. Public services tend to be heavily regulated to define service composition and orchestration. However, it becomes evident that although much research focuses on public administration, few efforts exist on exploring how public administration bodies incorporate the concept of 'service networks' and there is a lack of understanding regarding the socio-technical implications of process patterns on administrative tasks (O'Toole, 1997a; O'Toole, 1997b; O'Toole, 1997c; Bannister, 2001; Berry et al. 2004; Rethemeyer, 2005).

Over the last decade, there has been a dramatic shift in the delivery of public services which are often characterised by political agendas, legislation-driven rather than market-driven goals, and deficiencies in financial and human resources (Rusaw 2007; Feller and Finnegan, 2008). Digitising public services appears to be an emerging focus in public services to improve efficiency through the affordance of IT (Pedersen et al. 2006), which often impacts service management issues (Jansen, 2005). Feller and Finnegan (2008) discuss how early adopters of technology in the public sector such as across Scandinavian countries, the UK, and Canada are considered to avail of a more developed technical infrastructure to deliver of e-services. However, Feller and Finnegan (2008) caution that placing substantial efforts on IT issues often allows organisation issues to become increasingly neglected and therefore a certain balance is required

to address both technical and organisation factors. This places greater emphasises on the need to examine socio-technical factors within the public service.

3.2 Traditional View of Public Services

Public services play a critical role in the ‘public good’ and economic development. The provision of public services is considered to be a universal guarantee within governmental developments to support human rights, for example, health care and education. Many of these service efforts may be difficult to supply through individual efforts (for example, rail transport) and may be difficult to determine quality metrics (for example, health care). Thus, it is inevitable that bureaucracy plays a central role on public services. This is also evident from Weber’s classical description of bureaucracy which may be characterised as (Weber, 1919):

- A dictation of labour based on functional specialisation;
- A hierarchy of authority;
- A system of rules which limit discretion;
- Impersonality;
- A career structure based on technical competence;
- Written records of activities.

Bureaucracies exists across many organisational structures and cultures although there have been efforts in the past to minimise or remove bureaucratic procedures, for example, business process re-engineering. Such organisational change initiatives are significant catalysts for change, although it suggests that there is a clash with the nature of bureaucracy and innovative technological culture. Rethemeyer (2009) provides a discussion on the challenges which exist in public services.

He examines how Terry Moe once described the politics–administration dichotomy as the “dichotomy that won’t die” (1994, p. 17). This dichotomy is also embedded within the modern public service sector. However, Thompson and Alvesson (2005) argue that that due to the changing nature of the business and social environment, the bureaucratic model is obsolete. Thompson and Alvesson (2005) list two main assumptions throughout bureaucracy literature. Firstly, although bureaucracy is the dominant organising logic of modernity, “it produces degrees of inefficiency, dehumanisation, and ritualism” (p. 90). Secondly, although bureaucracy may be the desired functionality within a particular environment, it does not fit all environments, particularly where there is a high degree of unpredictability, instability, innovation, and adaptiveness.

The role of IT within the public sector continues to come under scrutiny. McIvor et al. (2002) suggest that there is a lack of transparency in public sector service although technologies may provide greater insight on service behaviour (for example, Internet technologies). There are many factors which contribute to the lack of transparency within public services. Throughout the 1980’s there was considerable promise of IT to deliver more cost effective public services although McIvor et al., (2002) explain that there were many limitations to realising IT effectiveness since IT developments affected the “*public purse*”. Other problems surrounded the confusion of IT potential and the lack of know-how at management level, lack of IT strategy developments, poor project management, lack of training and staffing, and difficulties arising from inter-departmental politics. Willcocks (1994) explains that as a result of these significant hurdles, many public services began to outsource IT consultants at an extremely high cost although they rarely

benefited from their skills. Considering the cost and often publicity of technological efforts, IT implementation was often prioritised although there was a sense of low confidence attached to public sector IT implementation. McIvor et al., (2002) explains that one of the most significant problems facing organisations is their lack of ability to align organisational structures and peoples' roles with technological innovation and is often hindered by the authority figures. As a result, this began to separate policy from administration which effects how information was sanctioned through bureaucratic structures and lacking in strategy which slowly became embedded in the public service culture. Bichard (2000) suggests that public service culture focuses on risk aversion, whereby bureaucratic structures control service operations rather than developing structures to 'connect' information silos through the service. McIvor et al., (2002) suggests that there is a need for cultural change and viewing technology as a tool to share information to enhance public service performance and remove the perception of "*power perceived to accompany the possession of information and where managers often act as controlling pretty tyrants, jealously guarding their own patch of turf*" (p. 175). This is not often the case within the private sector. For example, Bannister (2001) examines how IT-orientated change in public administration has lagged behind that in the private sector. He discusses how the conservative and bureaucratic nature of public administration often prevents change. However, nowadays, particularly within the service sector, there are growing pressures to secure increased 'value' from technological investments which is ripe with challenges in the past. Many of the challenges experienced include cultural, structural, resource, technical, or isolated developments which do not interrelate (Bannister, 2001). One way to overcome some of these factors, as suggested

by Lynn (2005) is to 'divorce' politics from management within the public sector. In order to do so, this chapter proposes the need to bring the public sector into the Service Science focus to examine the trajectories of public service networks. Therefore, it is important to examine these boundaries and explore how technologies support relational structures and 'meaning' through a socio-technical lens such as that provided by ANT.

4. ACTOR-NETWORK THEORY: AN OVERVIEW

To put it very simply: A good ANT account is a narrative or a description or a proposition where all the actors do something and don't just sit there. – Latour, (2005, p. 128)

ANT continues to make a significant contribution to science and technology studies. ANT is often described as a systematic approach to explore the infrastructure which supports the 'scientific and technological achievements' within a network making it a more profound approach to researching and understanding service networks (Carroll et al. 2012; Carroll, 2012). ANT suggests that the world is made up of intertwining networks which are comprised of many complex interactions (locally and globally) which constantly reconfigure itself on a regular basis. This systematic approach focuses on the infrastructure which supports socio-technical developments and their interactions. ANT also provides us with a lens to examine the links between the so-called social and the technical and suggests that actors can be enrolled to stabilise the network. Steps may involve identifying stakeholders and their interactions; the development of an actor-network model; the identification of irreversible technologies, enablers and inhibitors of specific processes and activities which are

socially embedded in a service network. ANT breaks away from the social science school of thought as it does not fix itself upon any set theory per se, but rather enjoys the radical uncertainty of human behaviour in which actions are not predetermined. ANT provides an approach to understand how both social action shapes technology and how technological innovations shape social action. Thus, ANT acts as a toolkit to explore how human and non-human actors interact with one another to make sense of their world (Latour, 2005). Law (2007; p.2) provides an account of ANT and explains that:

Theories usually try to explain why something happens, but Actor-Network Theory is descriptive rather than foundational in explanatory terms, which means that it is a disappointment for those seeking strong accounts. Instead it tells stories about 'how' relations assemble or don't. As a form, one of several, of material semiotics, it is better understood as a toolkit for telling interesting stories about, and interfering in, those relations. More profoundly, it is a sensibility to the messy practices of relationality and materiality of the world. Along with this sensibility comes a wariness of the large-scale claims common in social theory: these usually seem too simple.

This supports what the author refers to as Walsham's (1997) argument at the beginning of the chapter that '*our quest should be to improve theory*'. ANT provides a vocabulary to examine how powerful networks emerge and pays particular attention to assemblage and the influence of objects and people. Therefore, it establishes networks and determines particular actions or behaviour. Although there are many aspects to ANT, the process of 'translation' is fruitful in examining the implementation of service innovation to describe how technology impacts on service

network dynamics and impacts the structure of a service network. To appreciate the value of ANT, it is also important to understand the background of ANT.

4.1 Actor-Network Theory: A Brief Background

The fundamental aim of ANT is to explore how networks are built or assembled and maintained to achieve a specific objective. Identities (networks and actants) are established by their represented or delegated interactions which acknowledge the importance of the inseparable socio-technical factors (Carroll et al. 2012). ANT rejects "any sundering of human and non-human, social and technical elements" (Hassard et al., 1999) since ANT adopts socio-technical symmetry to explore actants' (human and non-human) participation within heterogonous network assemblages through negotiation and translation.

ANT provides the ability to uncover the chain of actions or influences from various actors which are carried out to deliver a specific action and outcome. Therefore, it breaks away from the social science school of thought since it does not fixate upon any set theory per se, but rather enjoys the uncertainty of human behaviour in which actions are not predetermined. Latour (2005) explains that the ANT approach rejects a social dimension, social order, a social force, frame of reference, actors are not embedded in a social context, and suggest that actors know what they are doing and are connected to many other elements. In this alternative view, 'social' is not some glue that could fix everything: it is what is glued together by many other types of connectors (Latour, 2005; p. 5) and the specific associations provided which are of importance. This draws the author's attention towards the linkage, relations, assemblages, or interactions of service networks. During

the interactions, one of the key factors which emerge from the negotiations is the concept of translation (Callon, 1986a). Translation is a complex view of interactions which suggest that actors:

- Assemble similar definitions and meanings;
- Define network representatives;
- Encourage one another towards the pursuit of self-interest and collective objectives.

After negotiation with certain states of power relations, actants eventually conceive what they want and what they can achieve. Actants have the ability to (re)construct a network which their interactions to stabilise the system. Of course, the reverse is also true, i.e. the lack of interactions can destabilise the network until it eventually dissolves. In addition, ANT identifies objects as boundary objects which foster interconnections (Star and Griesemer, 1989). They describe boundary objects as being adaptable to different viewpoints and robust enough to maintain identity across them and identify four types of boundary objects (Star and Griesemer, 1989):

- Repositories;
- Ideal types;
- Coincident boundaries;
- Standardised forms.

These boundary objects relate to how information may be interpreted by different communities but with enough fixed content to maintain its reliability. They also discuss how problems from conflicting views are often managed from a variety of ways including (list extracted from Star and Griesemer, 1989; p. 404):

- Via a 'lowest common denominator' which satisfies the minimal demands of

each world by capturing properties that fall within the minimum acceptable range of all concerned worlds;

- Via the use of versatile, plastic, reconfigurable (programmable) objects that each world can mould to its purposes locally;
- Via storing a complex of objects from which things necessary for each world can be physically extracted and configured for local purposes, as from a library;
- Each participating world can abstract or simplify the object to suit its demands; that is, 'extraneous' properties can be deleted or ignored;
- Work in the worlds can proceed in parallel except for limited exchanges of standardised sorts; or
- Work can be staged so that stages are relatively autonomous.

The list above places emphasis on actant configuration and their properties which may be interpreted to facilitate the exchange of resources and competencies across a service network. In addition, this list acts as a platform upon which we can develop a socio-technical view of a service network. Berg and Timmermans (2000) explain that ANT does not assume that order can hold totalitarian control but rather, order is a co-produced achievement. This is an interesting concept which links ANT to Service Science logic while both schools of thought are focused on examining the intertwining nature of co-creation and co-production interactions which will be outlined in the case study. One of the main differences between actors and actants is that actors have the ability to circulate actants within a system. Latour (2005) denies that sociology can never attain an objective viewpoint and look beyond its participants (i.e. a meta-language). Actants influence one another. Law (2008) refutes that technology is transferable since

it does not originate from a fixed point and instead suggests that technology is passed and changed to a point that it becomes 'less and less recognisable'. Within a network, actors tend to present one another with a version of their necessities, and from that other actors understand the strategies they attribute to each other (Latour, 2005; p.163). This often allows them to create their own society, sociology, language, and meta-language. ANT suggests that there is no single theory of action (Walsham, 1997; Latour, 2005), i.e. it denies a fixed frame of reference as indicated from a relativistic sociology (which examines deviant phenomena through a fixed theory), and instead embrace a fluctuating reference approach (*follow the actors*). Due to the complex and intertwining nature of actants within service networks, ANT presents a significant contribution towards Service Science research undertakings. It has significant potential to provide a contribution towards the emerging paradigm of Service Science, for example service formation, service evolution and service innovation. Thus, one can examine the formation of service systems through a radical and rich vocabulary offer through ANT.

4.2 Actor-Network Theory: Key Concepts and Vocabulary

While exploring the underlying mechanics of a service network, ANT presents us with a 'vocabulary' to examine and discuss, for example, how the introduction of an IT system impacts the structure of a service network. Latour, Callon and Law are among the most cited scholars whom introduce a vocabulary which is used to distinguish between objects and subjects and explore particular network phenomena, i.e. the objective and the subjective. Many ANT studies examine 'success' and 'failure' and examine the concept of 'power' which established actor-networks and impos-

ing 'order' on actants to meet specific interests (for example, Berg and Timmermans, 2000). Additional studies began to examine multiplicity and difference of multiple 'orders' (Gad & Jensen, 2010) which act almost automatically and simultaneously. ANT suggests that 'reality' is dependent, contextual, and emergent and refutes the notion that there may be a 'fixed point' of analysis (Carroll, 2012). Rather than suggest that factors such as culture or globalisation impact a certain phenomena, ANT suggests that these factors need explanation and sets out to describe how environments (i.e. networks) come into being. These studies adopt ANT to incorporate a different language and viewpoint to describe the network's operations. This is also suggested by Latour (1992), as he explains that ANT overcomes the need to discuss knowledge and objects using a one dimensional language and instead adopts a dualism as a second dimensional approach. He suggests that, "instead of being opposite causes of our knowledge, the two poles are a single consequence of a common practice that is now the single focus of our analysis" (p. 281). There are a number of key concepts which one has to become familiar with while adopting ANT (see Table 1).

Although Table 1 lists the key vocabulary used throughout ANT studies, Hassard et al. (1999; p. 392) explain that the success of ANT is with the "*habit of failing to forge its own internal and external boundaries*", which presents us with a large degree of exploration freedom. Law (1999) suggests that ANT has become a strategy which has an "*obligatory passage point....with a more or less fixed location*" (p. 2). Latour (2005) provides what he describes as the 'intellectual architecture' in his account of the social explanations of social phenomenon. He explains that the word 'social' cannot be conceptualised as a 'kind of material or domain' which can be discussed using a 'social explanation' (p. 1). ANT is

Table 1. ANT main concepts (Carroll et al., 2012)

Concept	Explanation
Actant	“Any element which bends space around itself, makes other elements dependent upon itself and translates their will into the language of its own” (Callon and Latour, 1981; p. 286).
Actor-network	A heterogeneous network of aligned interests formed through translation of interests (Walsham and Sahay, 1999).
Assemblages	Built out of social ties rather than physical and explores what is the social made of, e.g., how we act, or who else is acting.
Associations	Non-social ties which can be used to trace associations and does not designate a thing among other things.
Black box	A snapshot of the network which illustrates its irreversible properties.
Translation	The creation process of an actor-network through four main phases (Callon, 1986a): 1. Problematisation, 2. Interessement, 3. Enrolment, 4. Mobilisation.
Problematisation	Defines identities and interests of other actors which align with its own interests (i.e. <i>obligatory passage point</i>).
Obligatory Passage Point	A situation that has to occur in order for all the actors to satisfy the interests (Callon, 1986a).
Interessement	Convince other actors to agree on and accept the definition of the focal actor (Callon, 1986a).
Enrolment	An actor accepts the interests defined by the focal actor and sets out to achieve them through actant allies which align with the actor-network (Callon, 1986a).
Mobilisation	Ensuring actors represent actors interests (Callon, 1986a).
Inscription	Creating technical objects which ensure an actor’s interests are protected, e.g. a particular piece of software or regulations to meet organisational objectives (Latour, 1992).
Performativity	“Entities achieve their form as a consequence of the relations in which they are located...they are <i>performed</i> in, by and through those relations” (Law, 1999).
Irreversibility	The point to which it is impossible to return to a point where alternative opportunities may exist (Walsham and Sahay, 1999).
Immutable mobile	Strong properties within a network which establishes its irreversibility, e.g. software standards (Walsham, 1997)
Speaker/delegate/representative	An actor that speaks on behalf of (or stands in for) other actors (Callon, 1986a; Sarker et al., 2006).
Betrayal	A situation where actors do not abide by the agreements arising from the enrolment of their representatives (Callon, 1986a; Sarker et al., 2006).

often referred to as the sociology of translation (Callon, 1986a) which suggests that one must identify the meaning of ‘assemblages’ through ANT (Latour, 2005). ANT examines the “*motivations and actions of groups of actors who form elements, linked by associations, of heterogeneous networks of aligned interests*” (Walsham, 1997; p. 468).

There are some subtle differences between the social science literature and ANT. For ex-

ample, an actor may be considered as anything which comprises of a process or a number of processes to execute a certain task, i.e., a person, group, department, organisation, or an information system. In ANT literature an actant (human and non-human) is more than what social science would describe as an actor, since an actant is often ‘enrolled’ in a certain position to strengthen it. For example, software (actant) executes code (action) to perform an

action to meet a business objective (the network) or, an elevator (the actant) strengthens the accessibility (the action) of the floors (the network) within a building. In addition, ANT promotes that humans are not the only beings of agency, and that we should consider machines, animals, and as demonstrated in other studies, matter (Latour, 1998) and thus can be considered an actant “*if it performs, or might perform [agency]*” (Callon and Law, 1995; p. 491). Actants may be considered as human and non-human stakeholders whom are focused on interests that influence technological applications (Monteiro and Hanseth, 1996; Walsham, 1997; Hanseth et al., 2004; Sarker et al., 2006; Carroll, 2012). In the pursuit of specific interests, networks are formed and aligned through technological innovations. As actors continue to translate (align interests) and enrol additional actors, the network becomes increasingly more stable. Succeeding in alignment is particularly important. This is achieved through inscriptions. Inscriptions are common procedures such as managerial practice, employee contracts, standards, regulations or software requirements documentation (i.e., indicates how the network should operate). Latour (2005), discusses the notion of the neologism “valorimeter” which refers to a measurement of a network’s ability to meet actor’s requirements are being addressed, and is of particular interest from an IS requirements perspective. Inscriptions also support the translation process through the design of the network and determine who will participate, how they will participate, and the impact on their roles. For example, once business processes have been established and automated, the software which supports business processes adopts the inscription role which often becomes fixed and irreversible, i.e. making it impossible to start the process again or explore alternative opportunities. The

actors which participate in the network and operate the technology form the actor-network which creates an embedded black-box model of the system of what appears to be the optimum system operations.

4.2.1 Materiality, Inscription and Translation

ANT suggests that objects have agency to establish relations and translate interests. For example, Latour (1992) discusses how a hydraulic door system is considered more reliable than a human operator or, how a car seatbelt imposes morality on humans. Although it is often considered controversial, ANT practitioners insist that researchers must refuse to distinguish between human and non-human as prior categories and is considered one of the main contributions to this research approach. Callon and Muniesa’s (2005) provide an interesting account of materiality and they caution that we should not confuse materiality with physicality. Instead, we should examine how properties are supported through specific process.

The concepts of inscription (Akrich 1992; Akrich and Latour 1992) and translation (Callon 1991; Latour 1987) are of particular relevance within Service Science (Carroll et al. 2012; Carroll, 2012). Translation treats actants within an actor-network as a heterogeneous unit of analysis with particular on network formation. Translation examines the various meanings which actors provide about a specific phenomenon which actors discuss the intersement process of various interests. The ultimate aim of the intersement is to enrol actors to support a set of defined interests and stabilise a network. Translation suggests that the nature of power plays a significant role in actor-network formation. For example, Callon (1986a; p. 223) explains that:

To translate is to displace... to express in one's own language what others say and want, why they act in the way they do and how they associate with each other: it is to establish oneself as a spokesman.

Translation is a very complex task which undergoes four main phases (Callon, 1986a):

1. **Problematisation:** Defines the problem or opportunity with which an actor proposes a solution. Defining the proposed solution acts as the obligatory passage point;
2. **Interessement:** Attracts other actors in the proposed solution to favour a new opportunity which confirms the problematisation phase.
3. **Enrolment:** Is a negotiation process to exhibits how the interessement meets the actors' interests and needs and persuades them to accept the new actor-network.
4. **Mobilisation:** Is an important process which ensures that actors represent other actors' interests.

Another key concept in ANT is inscription. Inscription refers to what may be described as the patterns of use but is relatively flexible in the nature of use, for example, computer applications. In order to stabilise a network and establish social order, actors engage in continuous negotiation to align particular interests (interpretation, representation, or self-interests) to mobilise support as part of the translation process. Inscription translates specific interests within technical objects, for example, text, software, user requirements, or regulations, which typically impacts on actors' roles. This process varies substantially as there are many factors which impact on its success, for example:

1. What is the desired outcome from the inscription?
2. What medium is utilised for the inscription process?
3. Which actors inscribe the particular interests?
4. How strong are the inscriptions (what level of resistance could oppose the inscriptions)?

Consequently, the design of the translation process is realised to align with users needs to provide a particular solution. The solution is then translated to complete a task, while actions are translated to specific outcomes. Inscriptions are typically provided with more concrete content to record actors' interests within a material which vary in their flexibility, for example, policy and regulations. Therefore, the strength of the inscription may be determined by the possibility of irreversibility. Translation and inscription play a fundamental role in the formation approach of an actor-network. In addition to understanding the theory of ANT, one can also adopt ANT as an approach to examine service systems.

5. ACTOR-NETWORK THEORY: THE APPROACH

Technology is impacted and consequently shaped by a number of factors including, for example, social interests, existing networks or network formation, power structures within a network, influence structures, political nature of the network, and attitudes (Carroll, 2012). In order to understand how social actions shapes technology and technological innovations shape social action there are a number of phases one can adopt as a roadmap which is significant to the research method-

ology. The phases listed in Table 2 (adapted from McBride, 2000) outlines the research methodology which may be adopted by the Actor-Network theorist to apply in Service Science research.

According to Latour (1993), ANT's theoretical ability rests in its refusal to reduce network explanations to natural, social, or discursive categorisations although identifying the importance of each one (p. 91). In addition, to support this logic, Law (1990; p. 113) suggests that "the stability and form of artifacts should be seen as a function of the interaction of heterogeneous elements as these are shaped and assimilated into a network". The phases listed in Table 2 provide a roadmap on how to employ ANT to explore the nature of a service network. This is important as Latour (2005) denies that sociology can ever attain an objective viewpoint and look beyond its participants (i.e. to develop a meta-language). In addition, Mitchell (2002) suggests that with the continuous pursuit social abstraction, there is a growing division of our social world "into image and object, representation and reality" (p 93).

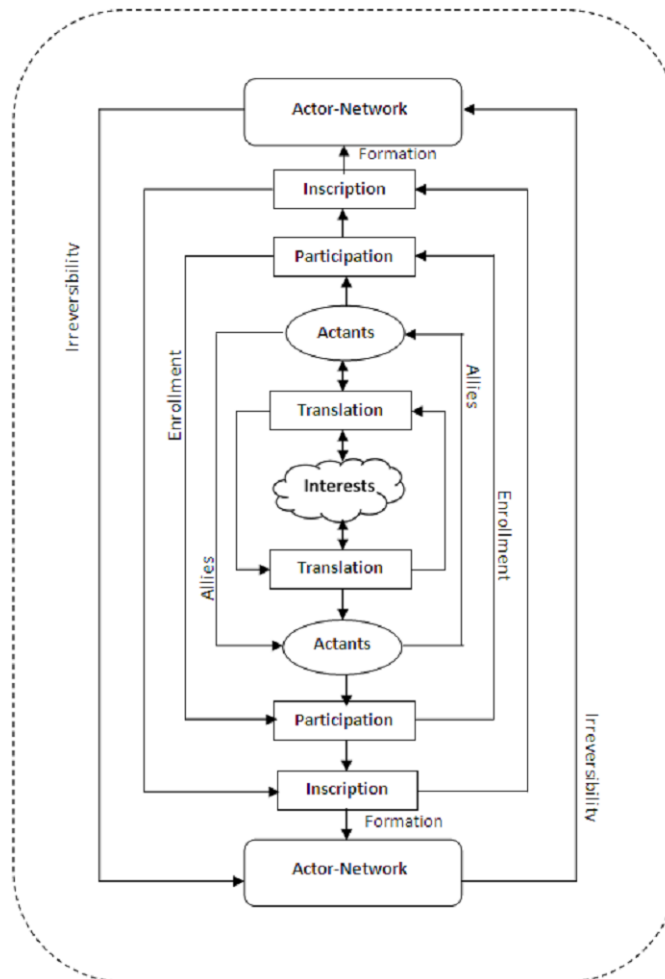
Social abstraction also takes into account the performance of the actor-network. For example, Knox et al. (2007) discuss performances of 'calculability' (or the 'effects' of calculability) which accounts for social practices in terms of the abstract workings of a 'locationless logic'. In addition, Knox et al. (2007) draws on Callon and Law (2005; p. 25) to suggests that 'calculation' is, "*a process in which entities are, so to speak, released from local entanglements and detached from specific contexts so that they can be 'reworked, displayed, related, manipulated, transformed and summed up in a single space'*". But the question remains: how is this accomplished?

From the extensive literature review on ANT, Figure 1 depicts the authors conceptualisation of how an actor-network is formed and stabilised, starting with the centre of the diagram which motivates network formation through 'interests'. Figure 1 provides an overview of ANT and illustrates what one can conceptualise how the main concepts operate and intertwine with one another. Networks are created through aligned interests into which actants enrol. When they enrol, they accept

Table 2. Phases of adopting the ANT approach (adopted from McBride, 2000)

Phase	Description
Identify the stakeholders	Comprise of human or non-human actors which influence or becomes influenced by other actor's policies and practices.
Investigate the stakeholders	Understanding the character of the stakeholders through, surveys, or interviews with network representatives, accessing documentation, understanding their attitudes, interactions, interests, etc.
Identify stakeholder interactions	Tracing interactions between stakeholders to explore the level of influence between stakeholders (e.g. trust and control).
Construct an actor-network model	Construct an actor-network model to determine for example, the networks complexity, cohesion, strength, and influence.
Examine irreversibility	Determine to what degree it is difficult to make a change, e.g. through understanding the culture and the nature of acceptance in the network.
Source of inhibitors and enablers	Determine who enables and inhibits actions to shape technology and the network under investigation, e.g. technology, attitudes, resistance, or network infrastructure.
Tracing actions	Identify what activities led to the alignment of the actor-network, for example, training.
Reporting on the actor-network	Report on the overall nature of the network and explain how social actions shapes technology and technological innovations shape social action within the network.

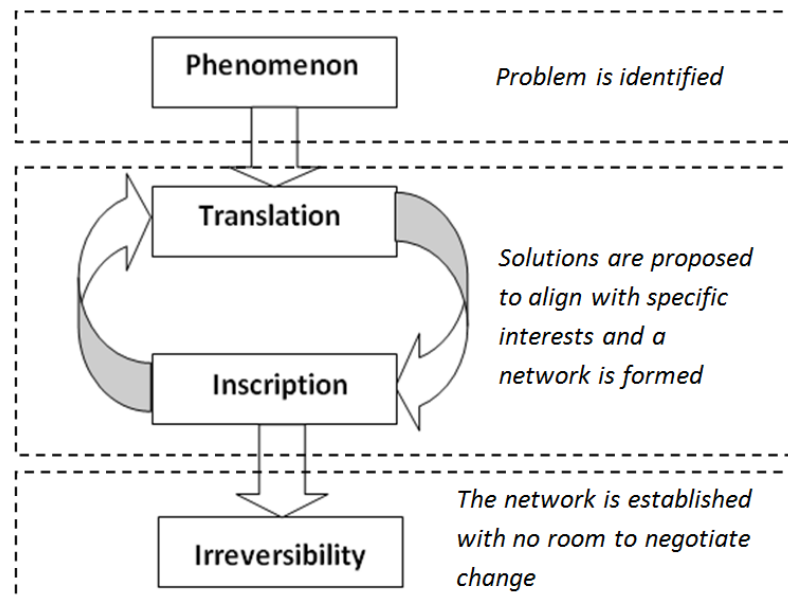
Figure 1. ANT overview



allies' interests through a process of translation which effectively states their agreement with their participation and efforts to stabilise the network. Thus, an agreement is established on what the network represents, how it shall operate, and the rolls various actants will adopt to stabilise the network. These processes form the network into what becomes known as the actor-network. The actor-network becomes irreversible and cannot explore alternative opportunities at this point (i.e. the actor-network becomes a black box). The process of translation and inscription are illustrated as follows (Figure 2).

Figure 2 depicts the relationship between translation and inscription to address a phenomenon (the formation of an actor-network) through various interests and to establish an irreversible network. Traditionally, organisations would implement technology to mediate complex or laborious tasks. This would essentially disentangle knowledge from one actant (e.g. a department) and transfer the knowledge and repackage it in various other locations for other people to benefit from the records. Therefore, one should consider how technology often 'replaces' methods of process execution and relocates knowledge

Figure 2. Process of translation and inscription



which alters the socio-technical world through a representative view. Adopting this approach places emphasis on ‘how’ actants form service networks which directs attention towards the application of ANT.

5.1 Overlap between ANT and Diffusion of Innovation

Carroll (2012) identifies a significant overlap between the ANT concepts listed above and the theoretical works provided on ‘Diffusion of Innovation’ (Rogers, 1962; Rogers and Shoemaker, 1971; Rogers, 1976; Rogers, 2010). The theoretical developments on the diffusion of innovation examine the characteristics of an innovation and its context that correlate with its diffusion (Rogers, 1962). The process examines how innovation is communicated among various interested parties through various channels within a social system. The success of an innovation is largely dependent on decisions made within the social system as they adopt five steps:

1. **Knowledge:** Exposure to an innovation but lacks information about the innovation and seeks to learn more.
2. **Persuasion:** Interested in the innovation and is keen to learn more detail about the innovation.
3. **Decision:** Weights up the advantages and disadvantages of innovation and makes a decision whether to adopt the innovations.
4. **Implementation:** Employs and examines the usefulness of innovations.
5. **Confirmation:** Finalise decision to continue using the innovation.

Individuals have different levels of enthusiasm towards the adoption of innovations and often the amount of time required depends on certain characteristics of the person or social system. These are innovators, early adopters, early majority, late majority, or laggards. Although this theory provides a useful insight of the implementation of innovation, it fails to address the socio-technical factors which

this study sets out to examine. To investigate this, the author has explored the relationship between service IT-enabled innovation and Rogers (1962) diffusion of innovation. The findings present a significant overlap between the diffusion of innovation and ANT (Table 3).

Table 3 highlights that public service IT-enabled innovation presents a significant overlap between the concept of diffusion of innovation and actor-network translation. The promise of innovation is only realised if management adopt a successful intersement process to convince other actors to learn and agree on a specific innovative solution to support public service operations. Thus, it is important to gain an understanding the problematic relationship in IS and organisational development (van den Hooff and Winter, 2011). This is critical when, for example, it is applied within the public sector considering the unsatisfactory application and culture of IS in public administration and the effect of the diffusion of innovation. Latour (2005) discusses the “*division of labour*” which suggests that one can only create sub-projects after a project succeeds which is often determined by whether it is of a continuous compromise nature. Interestingly, Latour (2005, p.126) suggest that the more a technological project advances, the more likely the impact

of technology diminishes in relative terms. ANT prescribes two main methodological approaches:

1. Follow the actor (i.e. using interviews and ethnographic research);
2. Examine inscriptions (i.e. text sources which are also central to credibility, e.g. the strategy of enrolling others).

Although traditional research approaches have guided researchers to gain insights on various demographics of the social world, there appears to be a void in our ability to truly understand how technology continues to shape our world. Latour’s expression, “*follow the actors*”, suggests that we can examine what actors do, why they do it, and their interests or beliefs in doing so through their interactions which support their existence. The focus of the theory is to trace and explain where stabilising networks are the result of aligned interests, or in some cases, fail to establish themselves (Walsham, 1997). This, it is suggested, provides us with insight as to what shapes network infrastructures which is significant when applied to the public sector (Ali and Green, 2007; Feller and Finnegan, 2008; Cordella and Iannaccin, 2010; Davis, 2010). Within an IS perspective, there are several

Table 3. Overlap between the diffusion of innovation and ANT

Diffusion of Innovation	ANT	Description
Knowledge	Problematisation	Identifies how innovation will support interests and align others interests.
Persuasion	Interessement	Convince other actors to learn and agree on a specific innovation to support operations.
Decision	Enrolment	Weights up the advantages and disadvantages of innovation and decides to adopt the defined interests represented via the innovation.
Implementation	Inscription	Creating technical objects such a piece of software to demonstrate the usefulness of the innovation.
Confirmation	Irreversibility	Making a final decision to implement or continue using an innovation to a point to which it is impossible to return to another point where alternative opportunities may exist.

key studies which develop ANT concepts, in particular the IS-related studies.

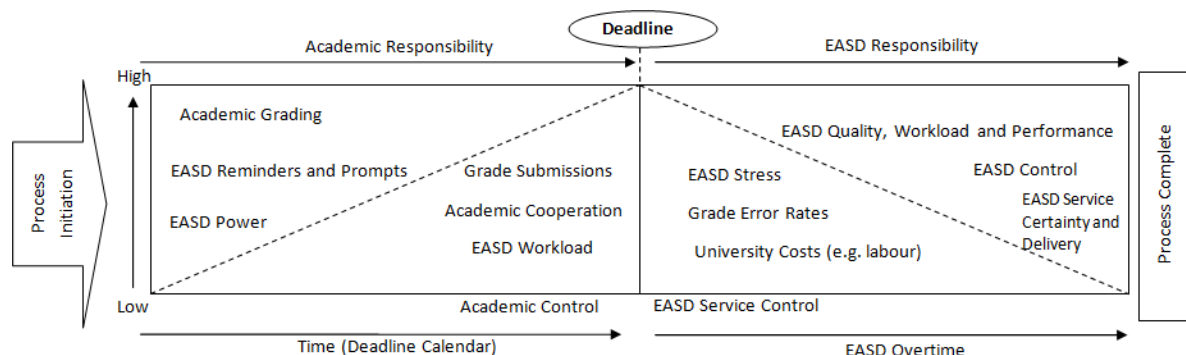
6. CASE STUDY

The author examined the introduction of a web-based grading system which replaced a paper-based process within a university service environment. The exam administration service department (EASD) initiated the need for change in order to improve operational efficiency. Central to this research study was the need to develop an understanding of the changeover process and its impact on the service network dynamics. This was important as Latour (2005), suggests that one must ask how the 'system' has complied through various associations. The purpose of this case study was therefore to explore the socio-technical dynamics of the translation process during the implementing of IT innovation within a public service network. Thus, through the implementation and evolution of the service network, the author could examine the shift in norms of a bureaucratic nature. In doing so, the author had to embrace the unexpected conduits of information which appear on the discovery for the truth, which often raised more questions as to the motivations of public service innovation. The evidence suggests

that there were some considerable tensions between actors interests within the service network. Some of the initial findings indicate that academics' had no insights as to the impact of this on EASD operations which is illustrated in Figure 3.

As Figure 3 illustrates, there are many factors which influence service actor behaviour which impacts on service delivery quality and efficiencies. For example, the concept of 'responsibility' appears to be a transferred property from academics' to EASD and vice-versa as EASD prompt academics and academics' submit grading sheets for the grading deadline. The conceptual design supports the author's enquiry and provides a model for some level of structure or consistency in answering the research questions and reach new conclusions. However, it is worth noting that a certain level of flexibility is necessary in order for the research to comply with the underlying anthropological/ethnographic strategy or philosophy which this research supports. Therefore the conceptual design plays a central role in framing the research since theory building relies on the general construct of concepts which emerge from the findings. Miles and Huberman (1984) discuss how they identify terms and store them in labelled bins which come from theory, experience and the objectives of the study. The bins contain many discrete

Figure 3. Issues with the manual paper-based grading process



events or behaviours although one may not fully understand at the initial stage how they relate to one another. Organising the bins in a specific layout supported my quest to develop a conceptual framework to clarify their interrelationships. The conceptual framework (Figure 4) explains, either graphically or in narrative forms, the main dimensions which are studied, i.e., the key factors or variables, and the presumed relations among them (Miles and Huberman, 1984). The conceptual model acted as the initial framework which “...explains, either graphically or in narrative form, the main things to be studied—the key factors, construct or variables, and the presumed relationships among them” (Miles and Huberman, 1994; p. 19).

Figure 4 depicts the initial framework which supported framing this research study. The framework above illustrates and specifies which concepts were identified in the initial literature review are used to examine service networks and supported the decisions of the initial inductive process. For example, the model considers:

- A service network is comprised of both social and technical factors;
 - ANT is an appropriate research lens to explore the socio-technical nature of service network.

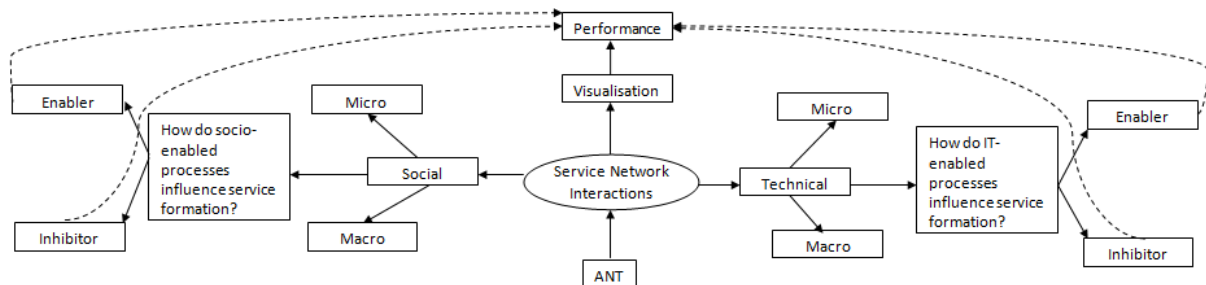
- Both the service micro and macro environments should be compared for their socio-technical components and irregularities;
 - The questions highlight the need to examine ‘how’ social-enabled and technical-enabled factors influence the service network.
 - The model also suggests the need to explore ‘why’ the enablers and inhibitors of socio-technical entities influence a service network.
 - It is also important to examine how relational structures influence service dynamics.

The framework assumes some relationship as indicated by the arrows which are illustrated for logical reasons, for example, how the social and technical factors influence the service network interactions. These topics are discussed in the following sections.

6.1 From Service Co-Creation to Co-Enactment

The case study revealed much insight on the translation process which was motivated by the need to control service interactions and behaviour to meet specific interests. The concept of inscription came in many forms, for example, job descriptions, grading sheets,

Figure 4. Conceptual model of the research



software, and policy and regulation. Thus, it became clear the notion of 'creation' was not as obvious within the public sector, but rather behaviour in a forced action which suggested that actions were enacted to comply with service regulations. The literature suggests that services are co-created which implies a sense of voluntary enrolment in a service network. This is applicable within the private sector since there is a reward to 'co-create'. However, within the public sector, services are stabilised through actions governed by regulations. This suggests that enrolment is not voluntary per se, but rather, actions are mandatory to comply with service governance to stabilise service networks.

The inscription of an online grading system was mobilised to an external actor-network (i.e. outsourced). In doing so, it also served specific self-interests and acted as a representative to understand the university service logic. This led to the formation of some tensions within the university actor-network and was viewed as a sense of betrayal of the problematisation phase which highlighted key requirements and concerns through a pilot test. Betrayal in this context refers to a situation where actors do not abide by the agreements arising from the enrolment of their representatives (Callon, 1986; Sarker et al., 2006). This sense of betrayal was protected through inscriptions of service regulations. In addition, additional senior actors were enrolled to support the fast implementation of the IS which was mobilised through email inscriptions highlighting the need to reassemble a technological-enabled actor-network.

The introduction of the Web-based system was not a single cohesive movement, i.e. it did not have a simple start nor a simple finish. The requirement for inscribing the need for change and discussion of the problematisation dates back for 30 years which was reported

by several actors, yet it was not considered important to entertain this notion. The motivation for change highlights other 'interests'. Thus, the evolution of a service network stems from the evolution of interests which generates the need for innovation and innovative associations and assemblages. For example, when one considers the core ideals of service science, it is not necessarily a historical process but rather an evolving process that shaped the emergence and translation of service values, norms, culture which (re)framed an information system reputation through a hybrid of socio-technical evolutionary developments. Thus, service is an evolving entity. For example, although ANT provided the research lens to examine service networks, the notion of service evolution challenges the concept of actor-network irreversibility. Therefore, the author would argue that in order to have a state of irreversibility, one must conclude that a service network is viewed as a fixed state, i.e. a static service but rather an entity which reacts and is influenced by the relational structure which stabilises and alters its defining structure, behaviour, and composition. As this research demonstrates and will tie back to the literature, in order for a service network to function and stabilise, it must remain dynamic through continuous interaction (i.e. associations and assemblages'). This suggests that service actions are complex and evolve with service eco-system factors and demands. In this regard, the research delves into what has 'shaped' the collective concept of the 'service' actor-network and the 'acceptable' actions which deliver the 'modern' service. Thus, a service reacts to many uncertainties which allows action or regulations to be reversed and supports the evolution of policy formation to reduce service uncertainties. This enables us to explore specific actions and examine what was involved in service provi-

sion. The findings also explore how service norms are shaped to support the academic service network considering the challenges they continue to face.

What is of considerable interest throughout the findings lies within the translation process which reconfigures an actor-network and how the service ‘architects’ enrol all participants. Technological innovation in this context altered a service network and highlighted some concerns regarding ‘backward innovation’ – depending upon whose interests were best served. The reach or accessibility of virtual methods to port service information may be embraced as an innovative asset, or rejected as an intrusive extension of working practices outside of the working day. For example, email implies that actors are accessible anywhere, at any-time through PC, laptop, or increasingly through mobile phones. Understanding this view, allows us to see services from a new perspective as the notion of service has no clear boundaries. While developing theoretical insights on service networks, the also examined concepts such as bureaucracy, politics, power, influence, and methods of control which is formed into a theory of *servicracy* (i.e. the bureaucracy of IT-enabled service networks).

Insights on human experiences provided true ‘explanations’ on what constitutes as a service and the actions which deliver a service. Service behaviour may be viewed as the socio-technical interaction of actants within a service environment often dictated by decision makers who act as actor-network representatives. In this sense, it is the actual interaction (social, technical, or socio-technical) which generated the network linkage that we refer to as ‘service’. Therefore, it is more natural to view a service as being connected to the social and technical world, rather than separate autonomous entity which the traditional view of services once adopted. The research argues that the 21st century service network

supports self-interest, self-referencing, self-aware, self-validating, socially embedded model of service autonomy, whose interactions or associations recognises not only service strengths and opportunities, but also its limitations, weaknesses, and even threats. The findings support the notion that public service networks are protected by the inscription of self-made service policy and regulation by which quality acts as the ‘trust’ obligatory passage point which actors must comply with. The findings suggest that one must pay particular attention towards the ‘collective’ ability to shape a service network. It is through the reflection of the findings, that we can understand how actors generate certain behaviour to facilitate service requirements or how behaviour becomes controlled. To elaborate, actors must therefore have direct relations with their actions rather than be captive of them, which suggest relationships have both a direct and in-direct impact on service environments (Brynjolfsson, 1993). In this regard, there is an obvious need for greater process ownership, rather than offloading process which fosters a defensive service environment (Normann, 2001). Considering the nature of IT-enabled service structures, accountability or responsibility appears to have become ‘liquidised’ and in some cases ‘unbundled’ within a virtual environment. It is worth noting that the literature suggests that the bureaucratic model is the best approach to get work complete since “it deals with size, complexity, and the need for accountability” (Thompson and Alvesson, 2005; p. 91). Within the bureaucratic nature of the academic service network, it introduces the notion of virtual bureaucracy which will be discussed further in this chapter (summarised in Table 4).

Table 4 summarises some of the initial findings which steered the research theoretical developments towards the emergence of virtual bureaucracy. While software plays

Table 4. Summary of the emergence of virtual bureaucracy

	Main Theme
1	Need for a socio-technical view of public service networks and IT-enabled innovation
2	Shift from value co-creation to value co-enactment
3	Need to visualise service relational structures
4	Unpredictable nature of public service innovation
5	The role of 'language' in service network evolution
6	Need to explain the material-semiotice relationality of service networks
7	Refocus attention on the need to examine service foundations

an increasingly critical supportive role on service provisions, the concept of service co-creation or co-production appears to be less evident in the implementation of IS in the public service network. For example, co-creation appears to become evident after the Web-based implementation phase and only adopts a role which participates in predefined actions, i.e. less evident in decision-making tasks and policy formation. This creates tensions in various interest groups, arguably reflecting a failure by senior actors to balance the imperatives of service science and the ideals of service management and computing. Tensions also arise from the emphatic capacity of the groups most affected by the service network change. Service management evolves from their transition from obligatory passage points through enrolled agreement of IS short-to-medium term strategy and departmental interests. However, the links or associations which lead into interpersonal, departmental decisions on a micro and macro scale are considerably complex. To protect these decisions, management consume quiet a lot of time shaping regulations through the inscription process and entering discussion to complete the translation process while consequently shaping 'acceptable' service behaviour.

Although much focus nowadays is placed upon innovation and how this alludes to

'progress', the author would argue that fostering collaborative service capacity is just as important to achieving a service environment. It would provide an individualistic sense of participation, worth, ownership, whose requirements must be discussed, debated, and decided upon while removing the unhealthy sense of service disparagement through the inscription of software and authoritarian language. Adding software to the socio-technical layers of *servicracy* increases the complexity of service while removing social factors in the strive towards the more 'modern' technical factors. Actors should be mindful as to "what is progress" (Postman, 1992) which raises substantial ethical and managerial questions which an actor network must be more willing to examine and debate before entering the process of translation. The idea that progress should be theoretically designed to increase human happiness (or self-interests) but appears to be turned into the assumption that pursuing progress is the same as improving actor-network welfare. This research demonstrates how this is not the case and examines the implications of this and the so-called 'general good'. This supports the concept of bureaucracy and its tendency to put the rationality of rules above the rationality of ends, therefore restricting behaviour and remaining open to self-promoting opportunities. Adopting such a view only adds to the increasingly

fragmented efforts of public service networks making it extremely difficult to integrate a united service network infrastructure. In addition, this introduces the concept of ‘missed opportunity’ in public service innovation.

7. CONCLUSION AND FUTURE RESEARCH

Service comprise of socio-technical (human and technological) factors which exchange various resources and competencies. Service networks are used to transfer resources and competencies, yet they remain an underexplored and ‘invisible’ infrastructure. Service networks become increasingly complex when technology is implemented to execute specific service processes. This ultimately adds to the complexity of a service environment, making it one of the most difficult environments to examine and manage. In addition, although the emerging paradigm of ‘Service Science’ calls for more theoretical focus on understanding complex service systems, few efforts have surfaced which apply a new theoretical lens on understanding the underlying trajectories of socio-technical dynamics within a service system. Despite the burgeoning number of studies of public service sector information systems, none of these research efforts focus on the dynamic relationship between technology and the impact of the assemblage-like configuration of service relational structures. This empirical research explores an academic service network, with particular attention paid towards a critical end-to-end exam grading process. The author employs a single embedded case study to examine the impact of a Web-based system on a traditionally bureaucratic public service system and its transformation from a paper-based system to an automated system. The research adopts ANT as a research lens which offers a rich vocabulary

to describe the interplay of socio-technical dynamics which influence the service system reconfiguration with particular attention paid towards the shift from service co-creation to service co-enactment.

Public sector institutions continue to significantly invest in ICT as a solution towards many of their service provision challenges, for example, greater efficiency and quality of services. However, what has come to light is that there is a lack of research on understanding the contributory value or ‘success’ of technological innovations. This chapter introduces a socio-technical view of public service innovation. The aim of this research is to extend on the notion of bureaucracy which is traditional focused on the politics of office environments. This socio-technical view extends this traditional view to include the politics of service networks, particularly within IT-enables public service innovation. The chapter focuses on how service innovation is exploited to align specific interests through the process of translation and shifts the focus from value co-creation to value co-enactment. In essence, this chapter explains how public service technological innovations act as an agent of bureaucracy which alters the relational dynamics of power, risk, responsibility, and accountability. For demonstrative purposes, this chapter describes a case study which examines IT-enabled service innovation with an academic service environment. While developing theoretical insights on service networks, the author also examined concepts such as bureaucracy, politics, power, influence, and methods of control which is formed into a theory of *servicracy* (i.e. the bureaucracy of IT-enabled service networks). *Servicracy* stems from the merging of ‘service’ and ‘-cracy’ the Greek for rule or political power. *Servicracy* develops our understanding of bureaucracy with service network theoretical developments and examines the implementa-

tion process of technology in a public service network which is a significant contribution to service science. As part of the future research work, the theory of servicracy will be tested across a number of research fields to test its validity. [Note: While this chapter provides a brief overview of the case study, a more detailed account of this research is available from the Carroll (2012) resource].

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KEY TERMS AND DEFINITIONS

Actor-Network Theory: Provides an approach to understand how both social action shapes technology and how technological innovations shape social action. ANT acts as a toolkit to explore how human and non-human actors interact with one another to make sense of their world.

Conceptual Model: Explains (graphically or in narrative form) the main focus of study, i.e. the key factors, construct or variables, and the presumed relationships among them.

Service Science: Acts as an interdisciplinary umbrella which incorporates widely diverse disciplines to construct, manage, analyse and evolve service systems. The explosive growth in Service Science is motivated by the need to develop more systematic, analytical, and overarching approaches to understanding the complexity of services.

Service System: comprises of socio-technical systems which stabilise a service network through the exchange of resources and competencies which generate value.

Service: Comprise of socio-technical (human and technological) factors which exchange various resources and competencies.

Servicracy: Extends the notion of bureaucracy of IT-enabled service networks and develops our understanding of how bureaucracy shapes service networks during the implementation process of technology in a public service network.