Introduction

ANT is a theory that explains social translations. In principle ANT, though proposed almost 40 years ago, was ahead of its time. It was and still do enable meticulous and sometimes verbose descriptive analysis of the translation that results in material. Furthermore it explains why previous and, in recent times, current socio-technical systems exist. It was and still, by no means, a perfect theory. However, it does account for explaining the role of ‘the social’ in the creation of technical artifacts (Hanseth and Monteiro 1998). The descriptive nature of the theory allows social theorists to leave no stone unturned and even to unturn back then stones that should have been left unturned in the description of translations. That is understandable because ANT is anti-epistemological. However, ANT was and is still is a lens in which one

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could use to interpret our world. This made the theory to gain traction in the 1990s, when researchers who were not Science and Technology Studies scholars realized the usefulness of the theory for the description of translation in their discipline. As a result ANT has been used to analyze systems in the natural sciences (see examples Newton 2002; Balzacq and Cavelty 2016), social sciences (see examples Fine 2006; Callon 1999), humanities (see examples Luo 2020; Piper-Wright 2020), and the medical sciences (see examples Altabaibeh et al. 2020; Cresswell et al. 2010). It is true that due to the unorthodox nature of ANT, researchers sometimes take due liberties in extending their perception and representation of the core principles of the theory in their analytical endeavours. However, if one views the theory from either a non-sociological or socio-anthropological point of view, that was not necessarily a bad thing. That is because those researchers realize that, within their field of expertise, the ANT made sense in the way and manner presented by them. Nevertheless, despite such deviations such researchers do not take liberties with the core concepts of the theory. The core concepts of the theory abide, whiles their applicability varies. Nevertheless, the eclectisism of the theory has led to its sustenance over the years. What also makes ANT dynamic is its applicability in explorations, diagnostics, investigations, and for interrogations. These properties have enabled researchers to utilize the theory in the study of innovations (see examples Akrich et al. 2002; Harty 2008), system examples (see Tatnall 2005; Callon 1987) and society (see examples Latour 2011).

Almost 40 years after its conceptualization, our contemporary world has provided an environment for the theory to be probed and further utilized. It is time to test the theoretical concepts and ideas on the sociology of translation presented more than 40 years ago. It is time to highlight various contemporary areas where the theory can be utilized and to consider if either certain theoretical propositions hold today or they have to evolved. This is important because we live at a time on earth where ANT seems to present the best pathway towards understanding contemporary innovations, organizational changes, societal changes, and the cultural changes. Furthermore, our society is evolving at a rapid pace and it is technology driven. There is an observable correlation between technological advancement and the advancement of
the society. Hence as technology evolves, so does the society. Evidence of our technology-driven society is evident in different echo systems. These ecosystems could be organizations, business models, e-commerce, e-governance, e-health, etc. These ecosystem, among others, are all interconnected in different punctualized networks or clusters with members from different parts of the world. Hence as technology evolves these echo systems evolve as well. Often times they do not evolve without challenges. In other cases, they evolve into challenges. One way of solving these challenges is by investigating the weak links within the actor network and trying to find ways on how to solve the problem. This implies that the person in charge has an overview of the actor network. Furthermore, these punctualized networks are very complex systems (see example Sage et al. 2020). The complex systems consist of the core and the periphery (edges). Example of systems at the edges are social media systems, etc. Nevertheless currently, very few literary works analyze the complexity of these systems. For example, the socio-technical analysis of these contemporary socio-technical systems governed by new digital technologies like Block chain, AI, etc., are rare.

Hence, our contemporary age opens up an opportunity for the investigation of our world using ANT. It opens up the possibility to analyze translations, understand the character of actants today, examine the challenges with the theory if any, and if necessary propose ways we can understand our world today using ANT. This book is designed to kick start this process of probing, analyzing, and highlighting new ways of approaching the theory in different fields. This chapter has four sections. This section is followed by a brief expose on the relevance of ANT today. The section is followed by a summary of chapters presented in this book. It then ends with a conclusion.

The Relevance of Ant Today

The Actor Network Theory is an unorthodox theory. Nevertheless, it is a theory that is still relevant today. This is more so because the present innovations in society consist of elements that can be explained by the ANT. The nature of the current network of interactions is consistent with
the theory and the translation process still holds not just for artifacts but also for Black boxes. In this section, the discussion is on to the consistency of the theory to contemporary times and the need to rethink actant agency allocations. The consistency is discussed under three headings, the nature of the network, network transformation, and agency.

**Nature of the Network**

The first applicable tenet is fact that actor networks consist of human and non-human actants (Law 1999). This still holds in contemporary times. It is more evident today that it was when Bruno Latour and Michel Callon (1981) proposed the theory. Nevertheless, the common actors in our contemporary world are human and non-human actors. Some of the contemporary actors include human and different non-human actors such as technology, ideas, concepts, semiotics, and a whole range of actors. In principle this one of the doctrines of the ANT that is timeless and used in a great deal of non-Science and Technology Studies (STS) ANT research as mentioned earlier.

ANT also posits that the human actant, material, semiotics, artifacts, and other actants interacting in the actor network as a whole (Latour 1993, 1999). A contemporary example is Facebook as a platform, not the company this time. Facebook is represented by its brand logo (semiotic) and by its name. When anyone sees that brand logo or hears the name, Facebook the first thing that comes to mind is the service. The platform is accessed via technological artifacts, such as mobile and desktop devices. The materiality of these artifacts makes is attractive for humans to use the service. In these devices, there are different semiotics familiar to the users that enable human interaction. These are some of the different actant interactions in the actor network of Facebook. These interactions occur as a whole. However, the Facebook Brand Logo or the name represents them.

Another tenet of the actor network, which has contemporary implications, is on the nature of the actor network. The ontology of the Actor Network is different from the ontology of other networks. As the name implies, actor network is about the interaction between actants
The actants are not nodes in the network; rather the actants produce action toward one another in their interactions within the network (ibid.). That is also visible in contemporary times. If one considers a laptop as an actor network. When the keyboard is activated, any command typed using the keyboard is displayed on the screen. If the screen goes blank, there is no actor network because no action is produced. The same thing does with the switch and the light bulb. Hence, the network is not about the nodes but the actions produced by the actant in the network.

Other tenets of the ANT that is applicable in contemporary times is that of Punctualization (Crawford 2004; Williams 2015). Although actor networks are heterogenous and unstable, from time to time, there are observable moments where different black boxed actor networks become interlinked to create larger actor networks. The punctualization of actor networks is very visible today. The driver for this process in most cases is technology. A contemporary example is e-government. In the western hemisphere, the government of some countries in the 2000s established black boxes of sectoral e-government service delivery systems. However, in the last decade these systems have been consolidated (Williams 2020). Hence, citizens and businesses who intend to conduct any transaction with government agencies does so via one portal (ibid.). Aside e-government systems other examples of punctualization is evident in business ecosystems using Cloud computing and Blockchain. However, in contemporary times, punctualized networks are very volatile and susceptible to change.

Network Transformation

Actor Network transformations are often interpreted using a process called translation. Translation is the basis of the study of the ANT (initially called Sociology of translation) (see Callon 1986). In simplistic terms, translation in ANT provides a third person’s perspective to the development of an innovation. In the often interpreted or re-interpreted version of events, the chronology describes the emergence of the innovation from its transformation as an idea to its materialization. This
explanation might be oversimplistic. Anyway, the developers of the theory have gone at length to describe the translation process of different systems. In their description, a focal actant conceives an idea and draws a plan for how the idea will be fulfilled and the actants that will be involved. The focal actor then coopts these actants to support in the development of the idea. The translation process is complete when the emerging actant embodies the pattern of use. The emerging actant, be it a network or an individual actant represents what it will be used for. This representation is the inscription of the actant (Callon 1991).

In contemporary times, there is a great deal of translation taking place. This is backed by the fact that there are more inscribed actants today than any time in history. Aside technology artifacts, there are millions of other inscribed artifacts emerging from myriads of actor networks. But as mentioned in the introduction of this chapter, ICT has enabled translations that has resulted in an interconnected world—a globalized world. A world that is technology driven, a world where different actor networks have punctualized be it briefly to define our age. One could say that we live in an age where successful innovations has to facilitate competitive advantages as well as networking possibilities. The networking possibilities aid the strength to lift the weak. It also enables the leveraging of competences to develop innovative solutions. This is why technologies that enable punctualization of actor networks such as Microsoft Azure, Google cloud, etc., are at the forefront of their business. They enable bigger corporations to collaborate with SMEs in different parts of the world to solve problems. They enable a company to take advantage of access to market, access to workforce, and access to friendly markets by decentralizing their workforce to different geographical locations. However, these workforces use these collaborative platforms, sync to their organizational platform to work together. An inscription of a new world and a new way of life. Hence, many contemporary issues can be analyzed and translated using the Actor Network theory.
Agency

In the earlier part of this section, mention was made of the classes of actants identified in ANT. ANT grants actants the status of equality. This is because ANT does not ascribe agency based on the nature of the actant. Agency is assigned based on the action the actant produces in the network (Latour, The power of association 1986). When ANT was conceived, certain non-human actors were unable to act independently. However, in the contemporary world, the adoption of ICT has changed that. Hence, today, you do not need to monitor your lawn’s water sprinkler. You just program it and leave the rest to the sprinkler. You do not have to bother about conserving energy at home. You only have to hook up the electrical wiring in your home to a smart home device and the rest is taken care of by the smart home device. Therefore, certain non-human actors now possess programmed intentionality.

However, in between the 1950s and 1960s (CHM 2019), AI and robotics were conceptualized. Today they are a reality and in our homes. They operate independently of humans. The same is the case for smart factories. Nevertheless, in the future these non-human actants will become very independent from human us. They will possess intentionality. This implies that although ANT is still relevant today, it might be necessary to classify further non-human actants.

Granting intentionality to human actants and other actants that possess such attributes does not diminish the role of non-human actants in an actor network. Yes, it might reduce their status in the actor network thereby creating actant inequality. On the other hand no. For example, the law is a non-human actant; it constrains, restricts, and even induces punishment. It is human revere and fears the law. Is the law by any means inferior to men? By all means no. However, that does not imply that humans and the law are equal. Hence granting actants the properties that rightly describe them is essential to ANT of the future. We should observe translations as they are and not the way we think they should be. Hence, ascribing agency to man and any other non-human actant not based on their action alone but also their intentionality should be considered in contemporary ANT.
In summary to this section, a summary of the chapters in this book is presented.

Introduction to the Book

The book is not developed exclusively for researchers, and academics. It is also developed for policymakers, entrepreneurs, engineers, web developers, innovators, and head of organization anyone who wants to understand how to explain the world around him or her. The writing style in the book is academic, but the authors have provided simplified explanations of concepts to enable an average reader comprehend the discussions. This enables persons who are new to ANT to also understand the theory and utilize it.

Although ANT is an STS theory, its use in this book transcends STS. In this book, it is applied in the field of banking and finance, architecture, risk management, information technology, policy studies, education, health, organizational studies, media entrepreneurship, and the social sciences. Different issues with respect to the ANT in these fields are presented. Hence, any reader from any field of study will derive value from the book. All papers in this book were peer-reviewed.

The book has 14 chapters. A summary of their contents are as follows.

This chapter is the introduction to the book. It highlights why research in ANT is valuable today.

Chapter 2 discuss risk management in complex systems using ANT through the perspective of language. The author focuses on the communicative side of dealing with extraordinary situations in diversified systemic entities. The chapter first analyzes the characteristics of complex systems from the communication perspective to highlight the inherent challenges encountered by those taking part in any form of interaction. The author then utilizes ANT to discuss risk management and its communicative aspect. The discussion in this chapter is supported on case studies that highlight practical approaches to managing risk in complex systems.

Chapter 3 is a very interesting chapter analyzing the actor network in an Architectural setting. The chapter highlights the role of a building as a
mediator in an architectural actor network. It issues a call for the change in practice where architectural design is human centric. The chapter argues that the relationship between an architect and a design is always dynamic and complex and cannot be simply reduced to human mastery over built form. Hence, the author argues that architects should not only impose their ideas on a building, rather they should pay attention to feedback non-actants as well.

Chapter 4 interrogates the validity of the four moments of translation in ICT driven actor networks. The highlights that actor network are evolving from human controlled or driven actor networks into technology-driven actor networks. This evolution implies that the social translation processes will evolve at some point. The evolution will not have an impact on ANT, but it might have an impact on the four moments of translations and how the decision to consider power relationships in actor networks.

Chapter 5 introduces media entrepreneurs as agents of change. It highlights the increasing pervasiveness of technology on the supply and demand side of the media market as mediators of the change. However, the media entrepreneur realizes this opportunity and implements it. The chapter argues that the explanation of the actions of these change agents can be best explained using ANT. In this chapter the author, provides a compelling argument to their position toward researchers of media entrepreneurship.

Chapter 6 interrogates the reason for the failure in the mobilization process in the adoption of e-learning in Ghana. The chapter identifies the current adoption process in the light of the COVID-19 pandemic as chaotic. Using the four moments of translation, the authors analyze the translation process to identify what went wrong along the way.

Chapter 7 utilizes ANT to evaluate the translation process in the development of the Social media Data protection policies in Iran. The author pays great deal of attention to debate as a mediator in the translation process. The four moments of translation by Michel Callon is used to evaluate the translation process. The chapter indicates that instances where there was a break down in debate, it was difficult for actants to be mobilized in the Social Media Data Protection Policy network.
Chapter 8 provides an analysis of leadership in multicultural teams through the perspective of Actor Network Theory. The author presents the technological and organizational dynamics that sustain multicultural teams. These dynamics consist of human and non-human actants. The chapter argues that a successful management of a multicultural team hinges in the ability to manage human and non-human actants to enable them work together as a whole.

Chapter 9 argues for the use of ANT as an adoption theory. The online banking system is used as a case study and described as an actor network. The actor network is described as consisting of the demand and the supply side of the Banking System. Based on this description, the chapter argues that by investigating the translation process, factors that enable and inhibit the adoption of online banking can be revealed.

Chapter 10 uses ANT as a tool to analyze why occupational violence occurs in health care settings. The chapter argues that the reason for occupational violence in healthcare settings is not human centric. Rather non-human actors contribute to the problem as well. The chapter provides recommendation on how to tackle occupational violence from a holistic perspective.

Chapter 11 highlight the relevant for using ANT in the analysis of network organization. The authors argue that as organizations become interconnected, ANT becomes more relevant in analyzing these organizations. Despite their optimism, the authors feel that ANT has to be streamlined in the management and business discipline, hence they have proposed a conceptual framework to aid this process.

Chapter 12 analyzes the notion of equality of actors in actor networks. The argument is that even within actants of the same kind inequality exist in the way they produce action. The argument is supported by an empirical analysis of actant interaction on Twitter.

Chapter 13 presents the influence of technology in the broadcast industry. It further highlights what should be the basis for translation of technological innovation in the broadcast industry. The authors identify that the disruptive nature of technology to the broadcast industry makes it difficult to understand which technology to use. They have developed a matrix that could be used to preplan the translation process for innovation. IRIB is their case.
Chapter 14 provides a state of the art on the actor network in the banking system. The authors do not discuss ANT; rather they provide an overview of a contemporary network and possibilities for interactive online banking. This chapter is included in this book to inspire ANT research in this area.

As evident in the overview of each chapter, except for the last two, different authors have analyzed ANT as it pertains to their field and area of expertise. The analysis covers complex networks, heterogeneous networks, networks at the edges, and core networks. The analysis has been predictive, interrogative, and prescriptive. They have also covered contemporary issues in different sectors. In the course of the analysis, the chapters have not deviated from the sociological foundations of the ANT. Rather they have maintained the core of the theory in their analysis.

Conclusion

As implied in earlier in the introductory part of this chapter, we live in a technology-driven world. This has enabled heightened interaction between human and non-human actants. Furthermore, these actants act as a whole. Hence, we are living in a world made up of interlinking but complex actor networks. This book draws our attention to this fact and calls for more ANT related research into the various actor network. This will enable us understand our world, inspire great innovations, inspire team building, inspire team management as well as diagnose challenges in order to be able to solve them.

References

Akrich, M., Callon, M., & Latour, B. (2002). The key to success in innovation part1: The art of interessement. *International Journal of Innovation Management, 6*(2), 187–206.
Altabaibeh, A., Cadwell, K. A., & Volante, M. A. (2020). Tracing healthcare organisation integration in the UK using actor–network theory. *Journal of Health Organization and Management*, *34*(2), 192–206.

Balzacq, T., & Cavelty, M. D. (2016). A theory of actor-network for cyber security. *European Journal of International Security*, *1*(2), 176–198.

Callon, M. (1986). Some elements of a sociology of translation: Domestication of the scallops and the fishermen of St Brieuc Bay. In L. John (Ed.), *Power, action and belief: A new sociology of Knowledge* (pp. 196–223). London: Routledge & Kegan Paul.

Callon, M. (1987). Society in the making: The study of technology as a tool for sociological analysis. In W. Bijker, T. Hughes, & T. Pinch (Eds.), *The social construction of technological systems*. Cambridge: MIT Press.

Callon, M. (1991). Techno-economic networks and irreversibility. In J. Law (Ed.), *A sociology of monsters: Essays on power technology and domination*. London: Routledge & Kegan Paul.

Callon, M. (1999). Actor-network theory—The market test. *The Sociology Review*, *47*(S1), 182–195.

Callon, M., & Latour, B. (1981). Unscrewing the big Leviathan: How actors macrostructure reality and how sociologists help them to do so. In K. D. Knorr- Cetina & A. V. Cicourel (Eds.), *Advances in social theory and methodology: Toward an integration of micro- and macro-sociologies*. Boston: Routledge & Kegan Paul.

CHM. (2019). *Computer History Museum*. https://www.computerhistory.org/timeline/1951/.

Crawford, C. (2004). Actor network theory. In G. Ritzer (Ed.), *Encyclopedia of social theory*. Thousand Oaks: Sage.

Cresswell, K. M., Worth, A., & Sheikh, A. (2010). Actor-network theory and its role in understanding the implementation of information technology developments in healthcare. *BMC Med Inform Decis Mak*, *10*(67), 1–11.

Fine, B. (2006). From actor-network theory to political economy. *Capitalism Nature Socialism*, *16*(4), 91–108.

Hanseth, O., & Monteiro, E. (1998). *Understanding information infrastructure*. Oslo: University of Oslo. http://heim.ifi.uio.no/~oleha/Publications/bok.html.

Harty, C. (2008). Implementing innovation in construction: Contexts, relative boundedness and actor-network theory. *Construction Management and Economics*, *26*(10), 1029–1041.

Latour, B. (1986). The power of association. In J. Law (Ed.), *Power, action and belief* (pp. 264–280). London: Routledge & Kegan Paul.
Latour, B. (1993). *We have never been modern*. Cambridge: Harvard University Press.

Latour, B. (1999). *Pandora’s hope: Essays on the reality of science studies*. Cambridge: Harvard University Press.

Latour, B. (2011). Network theory | Networks, societies, spheres: Reflections of an actor-network theorist. *International Journal of Communications*, 5(2011), 796–810.

Law, J. (1999). After ANT: Complexity, naming and topology. In J. Hassard & J. Law (Eds.), *Actor-network theory and after*. Oxford: Blackwell.

Luo, W. (2020). *Translation as actor-networking: Actor, agencies, and networks in the making of Arthur Waley’s English translations of the Chinese ‘Journey to the West’*. London: Routledge.

Newton, T. J. (2002). Creating the new ecological order? Elias and actor-network theory. *The Academy of Management Review*, 27(4), 523–540.

Piper-Wright, T. (2020). Between presence and program: The photographic error as counterculture. In R. Earnshaw, S. Liggett, P. Excell, & D. Thal mann (Eds.), *Technology, design and the arts—Challenges and opportunities*. Cham: Springer.

Sage, D, Vitry, C., & Dainty, A. (2020). Exploring the organizational proliferation of new technologies: An affective actor-network theory. *Organization Studies*, 41(3), 345–363.

Tatnall, A. (2005). Actor network theory in information systems research. In M. Khosrow-Pour (Ed.), *Encyclopedia of information science and technology* (1st ed., pp. 42–46). Hershey, PA: IGI.

Williams, I. (2015). *Analysis of public private interplay frameworks in the development of rural telecommunications infrastructure: A multiple-case study*. Aalborg: Aalborg University Press.

Williams, I. (2020). E-government, yesterday, today and in the future. In A. Sieben (Ed.), *E-government: Perspectives, challenges and opportunities*. Hauppauge: Nova Publishers.