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A Theoretical Lens to Examine the Structural Impact of Adopting Web 2.0

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Abstract
With the widespread integration of Web 2.0 technologies across society and business there is an increasing need to understand their underlying impact. Yet, very little research has been done on such technologies, so much so, that a definition still eludes the academic community. Nonetheless, their impacts cannot be ignored. For instance, from a societal perspective, the proliferation of social networks and attitude towards openness highlights the transformation from hierarchical type social structures to more non-hierarchical (horizontal) systems. However, rigorous analysis of the structural impacts of the technologies in an organisational context is more difficult due to the lack of theoretical frameworks. Moreover, there has been a call for researchers to build their own theoretical frameworks for further understanding in the domain. As a result, this paper aims to add to the body of knowledge by (i) further defining Web 2.0, (ii) reviewing past literature on organisational structure and technology, and (iii) developing a theoretical lens by rediscovering past socio-technical theories.

1. Introduction

It is hard to ignore the impact that social networks are having on how the masses are structuring their personal communities. Yet, very little research has been done on how these technologies are impacting on organisations. This paper highlights the need and also develops a new theoretical lens to study the structural impact of adopting intra-organisational Web 2.0 technologies, such as those supplied by SocialText.com. However, to do so, the paper first attempts to further classify the types of technologies that are labelled with the homogenous Web 2.0 tag. Furthermore, embracing the arguments of Whetten (1989) regarding the factors that should be considered in developing a conceptual argument, this paper addresses the So What?, Who Cares?, and Whats New?, factors specifically, as follows:

- **So What?:** Setting out a theoretical lens for analysing the impact of intra-organisational Web 2.0 technologies on organisational structure, will provide researchers and practitioners with a framework to benchmark the implementation of these technologies.
- **Who Cares?:** With the adoption of Web 2.0 becoming more widespread the need for such a lens is particularly important for decision makers who need to understand the impact of such technologies on their organisation.
- **Whats New?:** The novelty of this approach is twofold: firstly, in the type of technology that is the focus of the paper, and secondly, the choice of socio-technical theories, which highlights an alternative theoretical perspective.

While there is an abundance of social theories that can offer insight and explanation into such a focus on the impact of technology on organisational structure, we argue that these theories in isolation do not go far enough. Therefore, following an overview of two such socio-technical theories (Adaptive Structuration Theory and Information Processing Theory) we present a combinational theory which we refer to as the *IPAS* theoretical lens (Information Processing and Adaptive Structuration). We argue that the uniqueness of this theoretical lens centres on the fact that it can be used as a lens to set out a benchmark for future research into analysing intra-organisational Web 2.0 technologies and their impact on organisational structure. The core strength of the *IPAS* lens is its focus on *duality* (organisation and technology structures) and the *impacts* on information exchange. Therefore, this paper aims to create a platform for future research in the area.

2. Web 2.0

Since it has been coined in 2005, the term Web 2.0 has been the source of hype, disagreement and confusion within the web community. Indeed, Facebook.com (a social networking site), which has been regarded as a key exemplar of the Web 2.0 era had an estimated valuation of $100million after 12 months of operation, rising to a valuation of $15 billion after three years (Eisenmann and Feinstein, 2008). As a result of such speculation the term Web 2.0 quickly became linked synonymously to the term “social networking”. Furthermore, this resulted in the simplification of Web 2.0 as a platform for

connecting people, whereas, Web 1.0 was characterised as connecting computers. However, commenting on such a comparison, Tim Berners-Lee discounted Web 2.0 as a "*piece of jargon*", highlighting that the web was always about connecting people. Yet, he did admit that the technology needed to make the web interactive had not been developed previously, creating an asynchronous interaction model in the form of read-only web pages (Berners-Lee, 2006). As a result, it has only been in recent times that people could effectively mass collaborate on the web. In addition, adding to the confusion, Tim O'Reilly vaguely defined Web 2.0 as "*not something new, but rather a fuller realization of the true potential of the web platform*". Nonetheless, he did outline seven key principles that helped define Web 2.0 entities (O'Reilly, 2005). Highlighted in Table 1, these seven principles identify common trends that are exploited by Web 2.0 organisations.

1	**Web as a platform** – due to increased technological capability and convergence the web has become developed enough to be a platform just like windows was for the pc.
2	**Harnessing collective intelligence** – the ability to leverage the increased collaboration/participation and network effects on the web will provide organisations the foundation for competitive advantage.
3	**Data is the next "Intel Inside"** – the ability to own certain classes of data (location, identity, calendaring of public events, product identifiers) is now realistically attainable. This will further fuel the improvement and creation of services/products
4	**End of the software release cycle** – software business models veer more toward a Software-as-a-Service software model rather than a product focused model. This impacts many of the industry incumbents as they become slower to react to market forces.
5	**Lightweight programming models** – the provision of simplified frameworks/programming models, users have the ability to get more involved in the development process.
6	**Software above the level of a single device** – with the advent of ubiquitous computing and increased bandwidth the move to facilitate all devices as well as exploiting their unique attributes becomes more imperative.
7	**Rich user experiences** – end user experiences on the web become much more interactive and responsive.

Table 1: Principles of Web 2.0 (O'Reilly, 2005)

Since 2005 there have been further efforts to determine the underlying drivers of Web 2.0. Specifically, Tapscott and Williams (2007) describe Web 2.0 as a business revolution that is primarily driven by: (i) increased technological capacity, and (ii) the coming of age of a new demographic. Ultimately, they state that these two drivers come together to form a new dynamic implemented through a platform of participation. One of the underlying indicators of increased technological capacity is the transformation of the web from a read-only to read-write format. The effective use of technologies such as XML led to the separation of form and content and as a result simplified the process of web publishing to the extent that it could be done by all types of users, not just the technically savvy users. Furthermore, the process was enhanced so that individual users could publish to the web in real-time. The effect of this can be clearly seen in the proliferation of blogging applications that quickly became main-stream within the web community, such as: www.blogger.com, www.wordpress.org, and www.moveabletype.org. In addition, the maturity of open source technology and the recent advent of cloud computing has increased the technological capability of all organisations willing to develop new products/services. In particular, start-ups and SME's no longer need to raise huge amounts of capital to purchase development licences and expensive technical infrastructures. With regard to cloud computing, start-ups have the freedom to lease this technical infrastructure based on their unique requirements. This not only cuts their initial capital outlay but with an almost unlimited supply of computing capacity from the cloud, they have very little scalability issues to contend with.

From the perspective of new users, Tapscott and Williams (2007), stated that there is a new generation that "*has grown up online, and they are bringing a new ethic of openness, participation, and interactivity to workplaces, communities and markets*". Attracting a lot of focus, this generation is known by many labels, including: Net Gens, Generation Y, Millennials, and Echo Boomers. More importantly this generation is driving a culture of peer production, collaboration, sharing, customer innovation, and social and business integration. The impact of this generation as consumers, community members, entrepreneurs and business leaders cannot be understated. Already HR departments are planning on how to best attract, motivate and train future employees from this generation. This in-turn will lead to the adoption of technologies within organisational boundaries that

this generation find most effective in completing both operational and strategic tasks, such as communication and organisational learning.

2.1 Web 2.0 as a Platform of Participation

Combining the work of Tapscott and Williams with that of O'Reilly's seven principles, Figure 1 depicts a more holistic definition of Web 2.0. The result of which is a platform of participation. Such platforms are beginning to appear in aspects of both social and business engagement. As already stated, Facebook is a strong example of a Web 2.0 entity. Moreover it can be viewed as a platform of participation from a social aspect, where people get to interact around social objects such as: photos, videos and articles. In addition, highlighting the different forms of social platforms Fraser and Soumitra (2008) have identified five broad categories, which include: egocentric, community-based, opportunistic, passion-centric and media-sharing platforms. Each of these has specific characteristics but each tie back to the underlying social need of people.

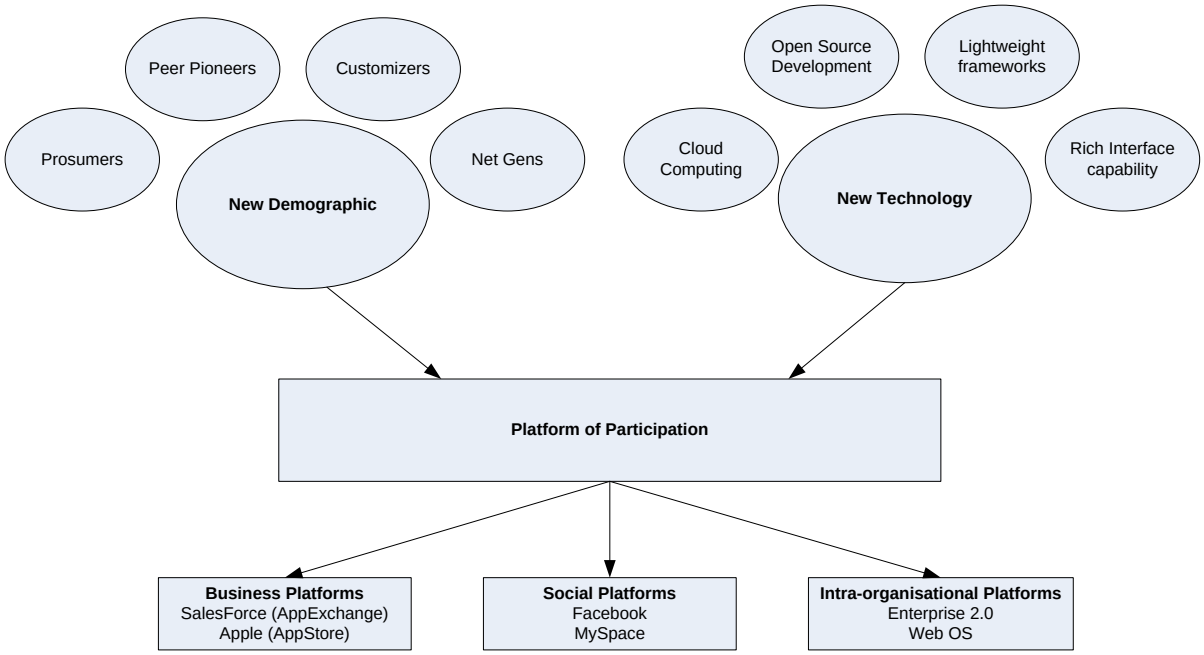


Figure 1: Web 2.0 as a Platform of Participation

From a business perspective, organisations such as SalesForce.com, Apple and Google have developed their own platforms of participation. Also labelled "*markets 2.0*", business platforms of participation enable customers to disintermediate market gatekeepers and transact directly with suppliers or become actual producers while at the same time consuming the same products (Fraser and Soumitra, 2008). For instance, SalesForce.com developed a platform that allowed their customers build individual products to suit their own needs. Furthermore, they created an exchange that allowed those customers to sell their individual products to other users of SalesForce applications. This created a community effect within the organisations in which benefit was created for both the customer and SalesForce.com. The benefit to the customers was that they were able to enhance the applications to specific business needs as well as profit from any revenue generated from the sales of such enhancements. The benefit for SalesForce.com was that they were able to turn their customers into a 'community of mass customizers' as well as reducing the requirement of having to predict customer trends.

Finally, organisations are also adopting platforms of participation to increase productivity and collaboration within their internal structures. Labelled as "*Enterprise 2.0*", the integration of wikis, blogs, tagging and collaboration tools has become a common trend across organisations (Stenmark, 2008). A recent study has shown that even though there are a number of barriers to Web 2.0 adoption, organisations are committed to capturing the collaborative benefits of the technologies (c.f. Bughin and Manyika, 2008). One of the pioneering firms in the area is SocialText.com and highlights the ability of Web 2.0 tools in aiding an organisation to increase teamwork, insight and responsiveness. In addition, there has been a notable increase in the use of Web 2.0 platforms for

specific aspects of organisational activities. For instance, "*eLearning 2.0"* highlights the use of platforms of participation in the HR/training function. Human resources can utilise these platforms to leverage and disperse the tacit knowledge held by individuals as well as better manage the talent in an organisation. Lastly, organisations are moving more towards utilising participation platforms as an operating system. Applications such as gmail and googledocs allow employees to share and collaborate more effectively on day-to-day tasks.

3. Structural Impact and Technology

Having categorised Web 2.0 into three technological classifications (as represented in Figure 1) we now focus our attention on Intra-organisational platforms (technologies that aid collaboration and communication) and the organisational structure impact of these technologies. The study of the organisational structure has long been an area of interest to scholars across all business and management related disciplines. In particular, the impact of Information Technology (IT) on organisational structure has long been an area with numerous contributors (Robey, 1981). The driving motivation for this combination of interest lies in the simple observation that information is a source of power (Pfeffer, 1978; Attewell and Rule, 1984). Heretofore, the ability of new technologies to alter the quality and availability of information facilitates shifts of power and ultimately organisational structures (Attewell and Rule, 1984).

Mirroring the economic organisational view of firm structure (hierarchical and market/network) (Williamson, 1979), the historical perspective on the structural impacts of IT involved the dichotomous classification of centralisation and decentralisation (Bloomfield and Coombs, 1992), where centralisation denoted an increased shift of power to top level executives with the predominance of top-down communication (Attewell and Rule, 1984). Moreover, IT was seen as a tool for management to further increase their decision making capability within the workplace (Bloomfield and Coombs, 1992). In contrast, decentralisation viewed IT as a means to increasing the access to information and maximising the efficiency of communication creating an organisational democracy where "power is not the money in the hands of few, but information in the hands of many" (Naisbitt, 1982; Attewell and Rule, 1984). This idea was first developed in the 1960's when Peter Drucker (1966), predicted that modern organisations would predominately comprise of knowledge workers with no need for middle management layers. Crystallising his vision in *"The Coming of the New Organisation"*(1988), Drucker stated that organisations would much more resemble structural forms found in hospital operating theatres or symphony orchestras. Furthermore, the reason given for this predicted structural shift from traditional hierarchical forms was the increasing prevalence of IT. Through the use of IT, organisations could remove whole layers of middle management that merely acted as information relays. Indeed, it is this elimination of certain layers of management (usually middle management) that has been defined as 'flattening' the organisation, where the functions and authority of these layers are reassigned 'downward' to the bottom or the organisation (e.g. the workers themselves) or 'upward' toward senior management (Fukuyama and Shulsky, 1999). Not only does flattening remove layers of management but it also speeds up the 'pattern of information exchange' (DeCanio and Watkins, 1998) between information acquirer and end-user, and increases the accuracy of the information, with fewer opportunities for distortion existing (Fukuyama and Shulsky, 1999). Moreover, front line workers are enabled to collect, analyse and utilise information, empowering them to act as executives over their areas of responsibility, therefore, dictating the structure of the organisation (Drucker, 1988).

Interestingly, Druckers vision of a flatter organisation indicated a move towards employee empowerment and decentralisation. However, the reduction of middle management layers has also been viewed as indication of centralisation and increased executive power (Attewell and Rule, 1984). Furthermore, while layers of management are removed, the organisation still retains a hierarchical structure and in some instances this can create a series of new problems for an organisation, for example: (i) increasing span of control for senior managers and decreasing ability of senior managers to supervise subordinates, or (ii) loss of the 'middle perspective' and reflection on standard operations (Fukuyama and Shulsky, 1999). What is certain is that organisations have indeed become flatter (Rajan and Wulf, 2006); yet, understanding whether this indicates decentralisation/centralisation or hierarchies/networks is still unclear as the implementation of IT supports a wide variety of lateral and vertical organisational structures (Robey, 1981). Indeed, DeCanio and Watkins (1998, p.290) posed the question of "whether the necessity of structure implies the necessity of hierarchy" and suggested that viewing the firm as an information-processing network yields sufficiently rich implications. In fact, as identified by Zammuto *et al.* (2007) many structural forms outside of centratisation/decentralisation

have been described by researchers, namely: adhocracy (Mintzberg, 1983), heterarchy (Hedlund, 1986), boundaryless (Devanna and Tichy, 1990), hypertext (Nonaka and Takeuchi, 1995), and edge-of-chaos (Brown and Eisenhardt, 1998). Furthermore, one of the key issues with examining the impact of IT on organisations is that the "IT artefact" continues to be under theorised (Orlikowski and Iacono, 2001). However, in attempting to theorise new and advanced technologies one encounters the problem of 'decomposition' as the artefact can be broken into functions which can be further broken into sub-functions and so on (Desanctis and Poole, 1994). This in turn leads to the dilemma where similar technologies have been found to lead to different structural outcomes (Barley, 1986). To combat this dilemma researchers have been urged to develop their own theoretical lens that studies the dynamics of technologies over a substantial period of time (Orlikowski and Iacono, 2001).

Mutch (2002) when addressing the criticisms of the 'relatively underdeveloped nature' (p.478) of theoretical approaches in the IS domain, suggested that the "sense of technology as infinitely malleable leads to a failure to recognize the specificities of particular applications and the constraints that they might impose" (p.478).Furthermore, as a starting point in developing a theoretical lens for understanding the technological impact on organisational structure, Zammuto *et al.* (2007) argue for reigniting the combined social and technological perspective that was popular in the 1950's. Their point being "IT has become inextricably intertwined with social relations to weave the fabric of organization" (Zammuto *et al.*, 2007). As a result, embracing the call of Zammuto *et al.* (2007) and following a preliminary survey of organisational structure literature, we specifically focus on socio-technical theories.

3.1 Adaptive Structuration and Information Processing

There is a plethora of social theories of the firm existing in mainstream Information Systems (IS) literature at present. For the most part these social theories take a variety of perspectives in an effort to explain the behaviour of a firm; for example, from a pure economic perspective to that of stakeholders' interest(s) in the firm. In particular some of these theories attempt to address the issue of the impact of ICT on organisational structure and vice versa. Furthermore, in fulfilling this objective, Structuration Theory as been recently viewed as one of the most influential of these theories (Jones and Karsten, 2008)

Originating from the domain of sociology, structuration began as a general theory of social organisation through the seminal works of Anthony Giddens (Giddens, 1976). One of the key conceptualisations made in the theory was the duality of structure, which indicated that social phenomena are not the result of either structure or agency, but of both. Furthermore, social structures are not independent of agency, nor is agency independent of structure as people leverage social structures in their actions while these actions simultaneously produce social structures (Jones and Karsten, 2008). Viewed as a hybrid theoretical approach between decision making (technological focus) and institutional theory (social focus), structuration theory enabled IS researchers to tackle the dilemma why the same technologies often led to different structural outcomes (Barley, 1986; Desanctis and Poole, 1994). Further developing the duality aspect of the theory within the IS domain DeSanctis and Poole (1994) applied structuration theory to examine technology impacts from two perspectives: (i) the types of structures that are provided by advanced technologies, and (ii) the structures that actually emerge from human action as people interact with these technologies. Labelling it as Adaptive Structuration Theory, they suggested that it would provide a picture of the dynamic process of how people incorporated advanced technologies into their organisation (Desanctis and Poole, 1994). The structures that are provided by advanced technologies can be described by the structural features and spirit of the technology. Structural features are specific types of rules, resources or capabilities offered by the system. The spirit of the technology is then the way a technology is presented to an organisation or the general intent underlying the structural features (Desanctis and Poole, 1994). These two conceptual components have been noted as indispensable for any programme of research on the effects of an IT artefact, but have been neglected due to concerns that they are inconsistent with the original structuration theory (Markus and Silver, 2008). These two concepts have been examined by Markus and Silver (2008) and redefined as: technical objects, functional affordances and symbolic expressions. Markus and Silver (2008, p.620) explain that *"the technical objects concept pertains to the IT artefacts themselves; the functional affordances and symbolic expressions concepts refer to relations between technical objects and users"*. Moreover, as Web 2.0 is relatively new, there is no feature list to compare to or "meaningful set of dimensions" to use like there was for GDSS. Furthermore, given that intra-organisational platforms primarily enable

collaboration and communication it is proposed that these features should be described through an information processing perspective.

The information-processing view of the firm, suggests that many firms literally do nothing but manipulate data and in light of this a firm can be modelled 'simply' as a network of information processing agents/actors (c.f. DeCanio and Watkins, 1998). This information model of the firm suggests that the organisation can be defined by the 'pattern of information exchange' (DeCanio and Watkins, 1998) amongst the agents/actors; the actions of the firm and the patterns of communication are a function of both the network structure (which is itself influenced by the organisational structure) and the information-processing capabilities of the agents/actors (which are limited by their own human computational capacity, the information-processing capabilities and actual data/information available to them) (c.f. DeCanio and Watkins, 1998). DeCanio and Watkins (1998, p.290) suggest that the flattening of organisations may be the 'unintended consequences' of the impact of IT and its ability to improve the information-processing capability of agents/actors. However, IT, by its design, has great potential to speed up information flow (one of the primary advantages of 'flattening'), ensuring that information gets to the right people at the right time in the right format (Fukuyama and Shulsky, 1999). However, Fukuyama and Shulsky (1999) continue that IT as a means of communication can be counterproductive, leading to what is referred to as 'information overload' (flooding channels with information). Therefore, there seems to be a dichotomous relationship between the information processes inherent in both the organisation and the technology itself.

5. Summary: The IPAS Theoretical Lens

In addressing the limitations of adaptive structuration theory and illustrating the strengths of the information processing perspective to address these limitations (as presented in the previous section), we argue that a theoretical perspective focusing on a combination of these two socio-technical theories is needed. The combination of these theories forms the basis for our IPAS theoretical lens, as presented in Figure 2.

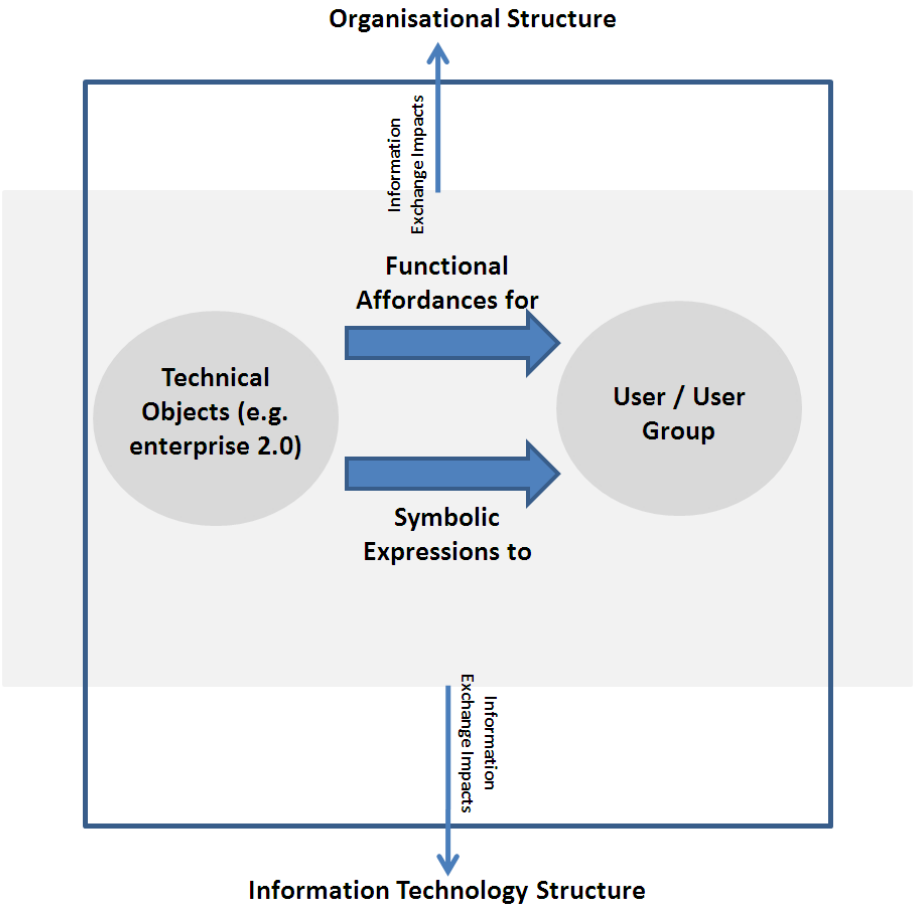


Figure 2: Information Processing and Adaptive Structuration (IPAS) Theoretical Lens

The uniqueness of the IPAS theoretical lens centres on the fact that it can be used to set out a benchmark for future research into analysing intra-organisational Web 2.0 technologies and their impact on organisational structure. The core strength of the *IPAS* lens is its focus on *duality* (organisation and technology structures) and the *impacts* on information exchange. Figure 1 suggests that the Information Processing perspective is embedded within the Adaptive Structuration perspective, which focuses on the *duality* of organisation and technology structure. However, the distinction in our proposed *IPAS* lens is that the information exchange, specifically focusing on the patterns of information exchange, is the key unit of analysis. Therefore, when undertaking research to study the structural impact of adopting business platforms of participation, we argue that the first step is to examine the impact that the IT artefact has had on the organisational structure (e.g. has it led to changes in the patterns of information exchange). Once this has been established, an examination of the new information processing structures existing in both the organisation and the technology can be undertaken.

Moreover, while evidence exists to support the claim that IT can flatten organisational structures, there has been a failure to address the existence of organisational flattening and the democratisation of information. Therefore, a further distinctive characteristic of the proposed *IPAS* theoretical lens is that it facilitates viewing the organisation as an information-processing network which will provide rich insights, to progress our current understanding, around the issues associated with the dichotomy of democratisation of information and organisational flattening. For the purposes of such research we define the democratisation of information as *"an improvement in information flow amongst all intra-organisational actors with equal open visibility of all intra-organisational information to all actors"*. In this definition we use the term actors to mean 'human' actors (c.f. Mutch, 2002) only. Furthermore, the IPAS theoretical lens can be used to answer the following two research questions: [1] *Does democratisation of information occur in organisations that have adopted intra-organisational Web 2.0 technologies?* and [2] *Does organisational flattening occur in organisations that have adopted intra-organisational Web 2.0 technologies?* We argue that these are difficult questions with somewhat uncertain answers but our proposed hybrid IPAS theoretical lens brings us closer to being able to focus our research efforts to answer such questions.

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