World Academy of Science, Engineering and Technology
International Journal of Industrial and Systems Engineering
Vol:11, No:7, 2017

eTransformation Framework for the Cognitive Systems

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***Abstract*—**Digital systems are in the Cognitive wave of the eTransformations and are now extensively aimed at meeting the individuals' demands, both those of customers requiring services and those of service providers. It is also apparent that successful future systems will not just simply open doors to the traditional owners/users to offer and receive services such as Uber, for example, does today, but will in the future require more customized and cognitively enabled infrastructures that will be responsive to the system user's needs. To be able to identify what is required for such systems this research reviews the historical and the current effects of the eTransformation process by studying: 1. eTransitions of company websites and mobile applications, 2. Emergence of new shared economy business models such as Uber, and 3. New requirements for demand driven, cognitive systems capable of learning and just-in-time decision-making. Based on the analysis, this study proposes a Cognitive eTransformation Framework capable of guiding implementations of new responsive and user aware systems.

***Keywords*—**System implementations, AI supported systems, cognitive systems, eTransformation.

I. Introduction

FOR over three decades now technology has been playing a pivotal role in the ways we undertake work, interact and share information. In the early days, technology assisted the introductions of the productivity tools such as the tools used to type and format documents. These system developments were closely followed by the implementations of the spreadsheet tools and the uses of personal computers to speed the office productivity.

The second wave of the computing implementations introduced file sharing capabilities followed by the third wave and the World Wide Web connectivity, which has in a relatively short period of time, made a considerable impact on individuals, communities, businesses and industries. The emergence of the World Wide Web and developments of internal company systems have led to the fourth wave of the eTransformation and the concepts of convergence [16]. Convergence has enabled system integrations and has united and streamlined many of the companies' internal and external systems. The most noted business changes of the fourth wave of the eTransformation were the establishments of the first fully online businesses such as Amazon, and later, an online business that implemented a full re-design of the supply chain that for the first time allowed customers to purchase customized computers directly from the manufacturer i.e. Dell Computers.

In more recent years, what could be identified as the fifth wave of the business eTransformation is the emergence of online eTransformed systems that are integrating the powers of social media technologies [6] and location trackers. Such systems have now enabled new business models to emerge and shared economies [2] to be established. The fifth wave also introduced new business players to the markets, such as the companies like Uber [13].

The phenomenon guiding the new technology implementations to enhance and support business processes has for a while now in the literature been referred to as eTransformation [9]. This research therefore aims to study and review the trends of the eTransformation paradigm and its impacts on business environments, business changes and the implementations of novel and innovative business models. This research also takes into consideration that in more recent times, eTransformation principles have impacted not only the technical and business system components but also social human interactions.

To fully understand the paradigms of eTransformation, this research study investigates historical eTransformation data, the current effects of the eTransformation and the future of the system eTransformation developments. To conduct a detailed investigation, transformation is first reviewed historically. Following this, current scenarios are analysed and new cognitive scenarios are introduced. Next, the data are aggregated and the decision-making processes are depicted highlighting the importance of the group's and individual's needs, with close attention to the business requiems and the alertness to the environmental stimuli. Based on the data collected, this research proposes a framework that will help guide the eTransformation of the sixth, Cognitive wave of the eTransformation.

II. eTransformation Review

Early company investments into technology implementations where often seen as the purely additions to known well-established business operations; however, in more recent times, such operations are creating new business models, introducing new policies and laws, and are for the first time giving powers to individuals to sell, trade, offer and bid for services. To review and study the impacts of the eTransformation over time, each of the specific stages of the eTransformation was assessed utilising the web development eTransformation Dimensions methodology [11] and the Context [10] Specific eTransformation framework [9].

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A. Static Websites

The first opportunities that organisations had to display their data on the World Wide Web platforms was via brochure-like informative sites. Such sites in their infancy were based on the hyperlinks and textual information. The next stages of the developments were defined by the more enhanced designs and the utilisations of some basic site formatting principles, colour and the use of images.

To review how sites looked at the time, researchers used a Wayback Machine [15] site. To give an example, many websites of Australian companies in the early 2000s on their websites included information as: the main physical location address, phone numbers and some basic information about the business themselves. Websites for many companies at the time were an addition to the Yellow Pages directory, billboards and pamphlet notifications.

The information presented on the static sites is asynchronous. It provides information to the customers, but it does not allow customers' to establish a direct electronic contact. The only way of communication for the customers is to either call the company or send the company a traditional mail.

In terms of the technology, implementation of the static sites requires technology infrastructure to be developed, protocols and basic servers to be established, domain names purchased and a team that is able to create the site and maintain it.

When assessing the static site development stage via the eTransformational Contextual framework [10], it can be seen that at the time, company sites were usually alternative sources of advertising and status symbol that acknowledged the company's willingness and readiness to move into the electronic world.

The reviews utilising the eTransformation Dimensions [9] indicate that based on the companies' Strategies, the implementation of the static sites in the late '90s and early 2000's primarily was just a symbol of the online presence.

Structures of the companies [9] at the time where not impacted by the online presence as such sites had no input to business operations and run on completely separate systems.

Tasks and Processes [9] were not in any way impacted, nor changed by the introductions of the static sites; rather, they were just promoted on the sites "as is" in the shape of the services and/or products that companies offered. Furthermore, the tasks and processes of the company at the time did not guide the site implementations but were rather treated independently.

Companies' Tools and Systems [9] were predominately focused either on the productivity tools and/or the website development and its infrastructure. Therefore, company's strengths in terms of the technologies implemented were often closely aligned to companies' abilities to design and develop a basic site in-house, run, update, and maintain and host them. However, even though at the outset of the Static Sites it was important for the companies to have the technical expertise and the technology in-house, such knowledge and skills at the time were still not seen as business critical to the company's existence, but rather an addition and a status differentiation. The static site eTransformation stage was often seen as the electronic transition form of the hard copy flyer, a brochure and even in some instances Yellow Pages directory-like entries to the online presence.

B. Interactive Websites

The next stage of the eTransformation developments was characterised with Interactive sites [9]. Wayback machine reviews [15] indicate that many Australian-based companies implemented Interactive sites in the period of 2002 – 2004 and gave their customers opportunities to contact them, ask questions, search for answers, engage in discussions and have opportunities to email them, often via web forms.

Interactive sites were the first sites that gave consumers the power to directly speak to and communicate with companies without having to call them. At the time, many communications were still relatively asynchronous. Customers were able to search via the site maps, access discussion boards and were also able to receive information from the companies via emails and discussion posts.

A review via the eTransformation Context Framework [10] indicates that the Context of the businesses and their operations was at the time still not directly aligned and linked to the businesses type and the industry sector, and therefore, was neither aligned to the core business knowledge. Many companies at this time, regardless of their operations, were implementing similar infrastructures. The assessment of the companies' technologies at the time of the second wave eTransformation and the implementations of interactive sites, indicates that resources to implement interactive site systems were quite similar to those of the static sites; however, they required read/write access to databases, web forms and data storages. In these instances, web forms were implemented which allowed for the data to be recorded and stored, retrieved and acted upon by the organisations. Such implementations for the first time provided companies with opportunities for direct customer feedback and suggestions.

Based on the eTransformation dimensions [9] reviews of companies' Strategy at the time of the interactive sites, was focusing on providing support and information about the products and services companies offered at the time. This was the first attempt to provide customers with the abilities for electronic interactions and feedback. Furthermore, at this stage of the technology implementations and developments, companies were also focusing on gaining a wider reach and enabling their customers to learn more about the products and services they offered without having to call or visit the company directly.

Structure, based on the eTransformation Dimensions study [9] was for the first time seen as one of the driving components that allowed the company to explain decision-making processes as well as elaborate upon the departments, their roles and responsibilities. This was particularly noticed with the sales and the marketing departments, which at the time, were aiming to send messages directly to customers and provide them with more information about products and

services with the aim to attract a larger customer base. During this time, the eTransformation Dimension of Structure [9] started to have an impact on companies' site developments. Such influences also became more visible on the assessments of the eTransformation Dimension of Tasks and Processes. This was predominantly seen to be having an impact on how particular activities are being addressed, and how for example, feedback and questions were answered and directed to specific company representatives, so that adequate feedback can be given to customers.

The eTransformation Dimension of Tools and Systems [9] in early 2000s, still for many companies, was not fully integrated with the business operation of the company. Some internal communications were shared via intranet sites that slowly started to be developed by companies; however, in many instances, public sites were still not interlinked to any of the existing company systems and operations. Such a trend was noticed when studying historical websites of Australian companies. Many company business processes and operations at this stage were still not integrated to the internal company systems and the company websites.

C. eCommerce Websites and Convergence

eCommerce websites were seen as a major turning point, where the website integrations of the external company pages and the internal company systems started to become a necessity.

Initially, it was the catalogues that started to emerge, which was followed with the implementations of the selection and enquiry tools, and later on, the payment tools. From 2004 onwards, a number of Australian-based companies started to allow bookings via both traditional and electronic (web-based) mediums. Furthermore, this was also the time when many companies commenced to introduce electronic credit card payment systems. Furthermore, the integration of payments and bookings required changes to internal business operations and had started to disturb once seamless business operations.

Based on the eTransformation Contextual Framework [10] analysis, companies at this stage were identifying that context was one of the very important parameters to successful business transformation. Furthermore, companies started to realise that industry knowledge and domain knowledge were essential [10] for effective function implementations. For example, it was seen to be important to have the understanding of the payment parameters and payment methods, as well as the external factors that may have played a role in online transactions. Therefore, the company context at the time was based on key industry data that allowed for services to be aligned to the requirements, and consequently, issue a predictable payment fare before the service was to be undertaken.

Based on the eTransformation Dimension [10] of the company Strategy, the aim for companies at the time was to sell goods and/or provide services. Furthermore, the companies' Strategy was to address seamless data transfers and offer quick response times. At this stage more companies had the resources and skills to follow field innovators such as Amazon, who started operating as an eCommerce site almost a decade prior to many other companies. The ability for other more traditional companies at the time to follow and adopt and integrate a new vision and different business models was still seen as a novelty and an unconventional way to operate a business.

Based on the eTransformation Dimensions Strategy [10] of the third wave, eTransformation developments required company goals and visions to be clearly established, so that companies could effectively start to shape the company's decisions about its existence and operations. In turn, the decisions made within the Strategy dimension had direct impacts to business organisational Structures and business operations.

Structure was at this time of the eTransformation developments identified as the core building block that by many companies was seen as the main Dimension requiring changes. The reasons for this was that business processes often required decision-makers also to change, and in many cases, be substituted by the functions and rules of digital environments. Therefore, for the online sales systems to be fully functional and integrated, certain decisions needed to be coded and implemented into the systems directly. For this to be achieved, the Dimension of Strategy and Structure required change. Furthermore, Tasks and Processes also required re-developments [10]; however, when studying the Dimension of Tasks and Processes eTransformation, it was noted that even though this was one of the integral Dimensions that required change, many businesses still struggled to identify how it should be changed mainly because of the fear of losing the current know-how and profits. Companies that invested into and implemented technologies but were not careful when assessing and analysing the impacts of those technologies on their systems were often impacted by the "dot com crash" effect [7]. Consequently, this experience taught organisations and many companies that when eTransforming, careful assessment of the business operations is absolutely essential, so that the technology can be appropriately selected and later implemented based on the companies visions, structures and business requirements; the dimension of the eTransformation Tools and Systems, at this stage of the development, started to play a key driving role of the companies' success. Furthermore, for many companies, eTransforming this was the time when Information Technology departments started to form and expand; and as a result, many companies were determined to build and host their web services in-house, which for some, caused a return on investment loss. Soon after, new developments that occurred a few years earlier started to be utilised and implemented by the eTransforming companies. The new eTransformation avenues that were emerging were the website templates and stand-alone open source shopping carts that allowed many, particularly small and medium-size businesses, to achieve a goal of offering and marketing their products online.

Soon after, another new business model was established that allowed online markets and brokers to be established such as Expedia, and Booking.com, with the aim to provide

customers with seamless travel services and the experiences. This was also the time when many companies were trying to integrate parts of the public components of their sites promoting sales and marketing with the internal processes of product databases, sales and customer data sets to establish Convergence.

D.Mobile and Social Media Enhanced Systems

Today, customers and businesses alike do not purely rely on websites, but also on mobile applications and social media to purchase products and meet their goals and requirements. Both websites and mobile-based applications these days allow for the seamless integrations with maps and GPS (Graphical Positioning Systems) aiming to ensure customers have a more satisfying experience. GPS systems for example allow users to identify locations of properties, track vehicles, study traffic flow, determine distances and prioritise traffic signals.

When analysing taxi company websites today, it can also be seen that their websites and mobile applications are closely aligned. Both websites and applications allow users to provide detailed information and receive services swiftly.

Such a system integrates company systems and allows for seamless customer experiences. In particular, this can be seen from the iTunes Apple phone applications reviews that many Australian-based taxi companies allow users to register and rate the drivers (i.e. 13CABS). This furthermore allows customers to develop trust, which in turn assists in shaping the customers' positive experience.

- Social Media Enhanced Systems

Detailed research of the existing eTransformation system implementations indicate that surrounding technologies such as those of social media like Facebook and Twitter have given rise to the importance of the individual. Such systems are often seen as novel and innovative. They can be compared to Amazon of late '90s that started as a fully online enabled business, which the technology of that time allowed for. However, even though the technology was already available in the '90s, many other companies were still not able to realise the full potential of the technologies of the time.

By reviewing the current integrated similar services and by taking into the account the importance of the social interactions of new services, implementing novel business models, and even requiring changes within the markets and implementations of the new trade laws and taxes, started to emerge. Uber today for example, has managed not just to give individuals power to express their opinions and post request but has also given the power to the individuals to run their businesses in the new wave of the shared style economy. Such economy allows those owning a particular service or goods, in Uber's case, a vehicle to offer a service for a fee. Such implementation is possible, as the technology that share economy services require is now freely available. Furthermore, social media has allowed for feedback, questions and reviews to be posted and for the individuals to interact with one another within electronic settings. Therefore, Uber has implemented a new business model that based on the technology that exists today is possible and easily implementable. Its existence in the context in which it operates was not fully approved in the early days (due to the novel legal regulation requirements); however, clear guidelines were present and its implementation was closely aligned to the industry context as well as the specific knowledge of the domain. Organisational contexts, for example, were defined by people owning vehicles, people requiring transport, the location of each system user and the surroundings. Infrastructure for such a system was defined as being the roads, the road and traffic rules and the system operating rules that bound all participants into system user profiles. Therefore, based on the context, the infrastructure, the process and the user requirements, the system scope was fully defined. However, in the early days of Uber, operational and legal guidelines were still non-existent. This in turn identified that new eTransformation systems did not just purely require the understanding of the organisation's operations, technology and its surrounding context, but also a deep understanding of the legal regulations and governing policies. This allowed for the shared economy implementations and the new digital infrastructures to be revolutionised. Uber's implementation and legalization has created the acceptance of new business structures, novel business models and the introduction of changes to legal regulations and standards. These new systems are now truly synchronous. Communication here is driven two ways – from the company towards the consumers and from the consumers to the company. The shared economy business models cannot exist without the instantaneous feedback and just-in-time exchanges.

System integrations with GPS give users the ability to track and identify the locations of vehicles and call vehicles nearby for pick up, as in Uber's case, or to find suitable accommodation, as in the case of Airbnb. Once a member of the system (i.e. Uber), the social interactions of users and their past experiences are utilised to make decisions about which drivers to select and which cars to pick. Furthermore, drivers have similar opportunities. They are also able to see past reviews about the customers. What is unique in such a system is that both the users and providers of the systems are easily tracked and are identifiable by the systems.

When conducting the assessment based on the eTransformation Context, it can be seen that at this stage of the eTransformation development, the company context needs to be well planned and integrated into all business operations. Both the business and customer context [10] are essential. The customer and the service provider are in fact the system users whose roles are specifically defined. Both system users work on meeting needs based on the location, environment and specific scenarios.

The Context of the system users is defined by the situation and the circumstances. For the customer it may be occasions, the location where they are going and the time they need to reach the location. For providers, it may be the route they should take to be able to meet the customer demands.

Both customers and service providers use GPS location

services for predictability, reviews, just-in-time data from the news and social media as well as profiling data based on the customers' circles of friends and past history data that may be taken for decision-making purposes. Some similar applications, for example, may also offer system users the ability to sign in using their Facebook profiles, which may allow for more detailed profiling, understanding and identifications.

Based on the eTransformation principles, technology in a shared economy is well integrated; for example, there is a clearly defined process infrastructure, social media, feedback and communications, as well as the location services, purchase facilities and back bone technology required, to run the services.

The eTransformation Dimension of Strategy is highly blended into the contextual and environmental requirements. The strategy allows for system users to search for and provide services. For example, the Uber user may in one instance be a driver, while in the other, may be a customer searching for the service.

The strategy of the shared economy system addressees the goals of each user (individual) and therefore gives power to each, both the consumer and the service provider. Such a structure is clearly defined, yet is flexible and easily adaptable. The structure in this instance can be seen as the shell system that allows providers and users to register, list the services they offer and search for services they require. Based on the implementations and user privileges, the system is able to adapt to changed circumstances.

The eTransformation Tasks and Processes are often aligned in shared economy to the industry sector via the service providers. Uber vehicles are, for example, not owned by Uber, but by the car owners who are providing the services. Common process operations that are required to support the business operations such as the ability to log in, create records, list services, provide payments and monitor transactions, are offered by the company providing the platform [13] for the exchanges. For the company, however, those providing the services and those offering services are both seen as the customers.

In terms of the eTransformation Dimensions when reviewing companies Tools and Systems, it can be identified that often such services may not directly be provided nor be owned by those providing such services. This also helps identify that Cloud-based solutions and software or service-based solutions are some of the driving factors of the new changes and implementations of the new systems. To identify to which extent these new systems are meeting the needs of humans and how well they are integrating technology and social requirements, data gathered is further analysed by applying the Socio Technical Theory perspective and Maslow's Hierarchy of Needs [14] to the new and emerging business processes.

III. Socio Technical Perspectives and Maslow's Hierarchy of Needs Guiding the eTransformation

Socio Technical Theory coined in 1977 [3] identifies close interdependencies between social and technical systems. This theory also identifies that technology needs to be closely embedded with the business processes and the activities that need to be seamlessly integrated into the business operations. For years however this was not achieved. Early developments of web-based systems were predominately focused on specific tasks. It was only once eCommerce sites came into existence that system integrations started to be seen as the main building blocks of the business presence that have provided the power, policy and the strategy to the socio-technical unity governing it.

Assessments of the gathered eTransformation data and their reviews were closely aligned to the earlier coined theory of Social Needs by Abraham Maslow, 1943 [14], which states that humans require first to meet their physiological needs, followed by the needs of safety, love and belonging and esteem. Maslow sees self-actualization to be the final need humans can reach to be fully satisfied and feel worthy.

To align the theory to the principles of business eTransformation stages (Fig. 1), the initial stage that humans need to reach are the "physiological needs" which symbolize the requirements for shelter and food that are essential for existence. When such needs are translated to electronic environments, they can be seen and interpreted as the basic information without which companies cannot exist. For example, these are the first static sites that identify where the company is located, what it does, how to contact it and what the company's main operations are. When aligning this to socio-technical theory, it is important to take into the account that technology in this instance is just the medium being utilized to show that the organization has the basic online presence and exists as a player in the electronic world.

The next stage is "Safety", ensuring in Maslow's theory that humans have family, job security and that all their primary needs are met [14].

In the electronic environment, this showcases companies' existence in the marketplace and the belonging to the industry sector. Furthermore, Safety is also defined by the ability of companies to promote the goods/services they offer and allow customers to contact the organization and receive additional information and feedback.

Safety standards are also closely aligned to the system of security measures. People's activities depend upon a series of tasks, policies, standards and regulations that are assumed by the organizations. To have a full and seamless integrations structure, the decision-making processes within the organization need to be reviewed to ensure the technology is well implemented.

"Love and Belonging" indicate a sense of community, people who have similar interests and family groups or just simply people who are striving to meet common goals and exchange services.

In online environments, these are the people who may be searching for particular services/goods. For example, these may be people who would like to find transportation from one location to the other or to book their travel via marketplace sites such as Expedia, where they can have a belonging and

receive a service. Such belonging however needs to be closely aligned to policies, regulations and strict guiding principles so that customers of the online market can safely utilize a varied source of systems and functionalities. This indicates that the structure of the operations and process need to change, so that the required operations can seamlessly be completed.

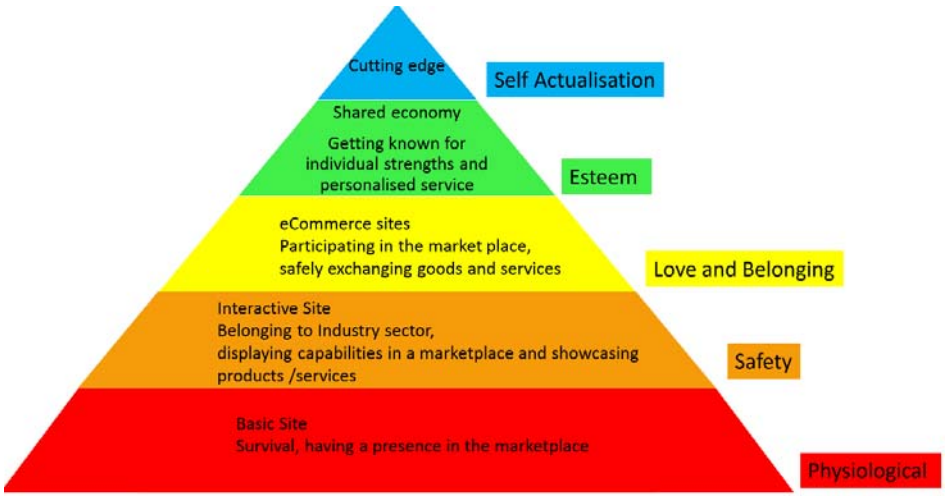

Fig. 1 Maslow's theory adapted to eTransformation

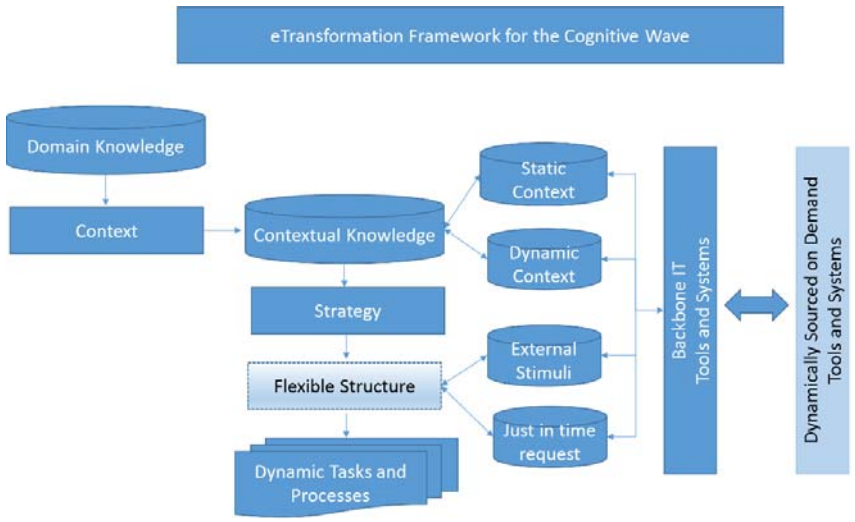

Fig. 2 eTransformation framework for the cognitive wave

As humans start to master particular skills and learn, they start to gain "Esteem" and they start to feel more confident. By doing this they engage with others, provide their feedback and reviews, which allows groups and the communities to grow and expand.

In the electronic sense, this has caused the emergence of not only the eCommerce-based businesses where payments are transferred, but also the emergence of the implementations of social media powered sites and social economies. Social economies now give the ability to system users to share their knowledge and their skills about the services they can offer to others. This is seen in the current taxi-based mobile applications, where users are able to provide ratings and track their taxis. To be able to do this, it is important that social and structural characteristics be taken into the account; they define the context in which the operations happen and identify the knowledge required, as well as the outcomes that are to be produced. Therefore, it is essential to align supporting activities such as the ability to implement payment systems, or implement security, or integrate Google Map APIs to identify car and drivers' locations that give users the ability to demonstrate and show their position within the market place.

Esteem is further developed with the emergence of shared economies, where companies are coined with the aim to achieve higher goals and allow the resources of the specific skill and/or tool to be utilized in the best possible capacity. They also allow for new teams to be organized, such as teams of drivers as in Uber and accommodation providers as in Airbnb, and skilled personnel such as in Airtasker [1]. Shared economy companies also allow people who would like extra work to put their resources to a good use and allows the individuals to further grow.

The achievements gained by participating in the shared economy are increasing participants' self-belief and pride, allowing them to feel worthwhile and be satisfied with their achievements. Electronic systems are now allowing system users to provide their inputs in the form of questions, answers, reviews, ratings and blogs. Furthermore, these days' users are also given the power to directly review the providers of services, instantaneously delivering feedback input to current business operations, quality of service and customer and provider satisfaction. Such systems are also allowing other users to make decisions based on the continuous transformation feedback loops [10] that feed decision making and system improvements. The feedback loops also provide positive ratings to system users, and consequently, those who are providing the quality services or are just acting as the effective system participants, are helping system users gain feedback. It is expected that positive feedback would in such instances positively correlate with Maslow's "esteem" level of needs.

Based on the current eTransformation developments, however, the final stage of Maslow's needs has not fully been reached. "Self-actualization" ensures that individuals have the full perception of reality, are able to act in a natural way, are socially compassionate and are fully reliant on their own experiences and actions [5]. For this to be established, eTransformation systems need to be able to reach and achieve higher cognitive capabilities. To do so, a detailed review has been undertaken of new predictions and guidelines that specify and propose new changes. As per Stone et al. [12], new systems will require the ability to make sense and understand the environments in which they are operating, they will also need to be socially intelligent which will allow them to reach a higher senses of being, and showcase their ability to achieve and meet goals. New systems will also need to be able to make decisions in multicultural environments and be able to quickly adapt to new scenarios. New implemented systems will also be expected to compute large sums of data that they receive just-in-time, and will need to have the capacities to interact with other virtual and physical objects. Consequently, the new sixth wave of the eTransformation will enable the emergence of intelligent cognitive systems that will be able to reflect on the stimuli they receive from the environment, will be able to assess the circumstances that surround them just-in-time, and will be able to gather the requirements of systems users, both those receiving and those providing the service, instantaneously.

IV. eTransformation Framework for the Cognitive Wave

Based on detailed eTransformation reviews that assess technological, social and human needs, it can be seen that future system implementations will be strongly guided by the eTransformation paradigm that will require an understanding of the human, social and technical stimuli, as they are all required when meeting the higher human needs and allowing individuals to reach "self-actualization".

The reviews undertaken by the researchers' at Stanford identify that in 2030 artificial intelligence driven systems will begin to dominate [12]. One of the identified areas of change and improvement is the transport industry, and is predicted that it will be guided and supported through sensor signals and the data generated via cognitive and intelligent systems.

Research also identifies that Uber has recently acquired Uber Artificial Intelligence (AI) Labs, [8] which Uber expects will allow for more intelligent decision-making in the autonomous transport to be achieved.

The 2030 research [12] states that new systems will also need to be able to provide personalized services, and will in turn, allow for the Maslow's "self actualization" to be established.

New Cognitive systems (framework depicted in Fig. 2), will be based on machine learning principles that will enable systems to behave depending on the current context. Such systems will also be adaptive and responsive to the just-in-time environmental needs and will deliver personalized services that will benefit individuals based on their specific domain, contextual, and time and space defined needs, demands or requirements.

Based on the eTransformation Dimensions, new Cognitive systems will require Strategy [10] that will be attentive to human like stimuli. This also means that Strategy will not be a constant, but will rather have the power to change and adapt based on the context, domain and just-in-time stimuli received.

The Strategy will therefore, be based on the cognitive analysis of the current situations and the needs and the requirements of the system members. Strategy will also take into the account goals and objectives for each particular group/individual or stimuli for any given time and place. For example, there may be a varied form of taxi/Uber transport requirement. The Cognitive, Artificially Intelligent system [12] will be more human-like and will take into account a large array of possible scenarios.

First of all, it will identify Domain knowledge [10] such as the actual requirement to take customers from one location to another. Based on pre-defined characteristics, artificially intelligent systems will be able to adapt and through series of neural network searches, identify if a service is to be provided to a company, group or an individual. Once this is identified based on past scenarios and machine learning paradigms, the system will be expected to learn and adjust. Following this, the eTransformation Context [10] of the actual journey will be taken into the account. For example, it will often be expected that the user is known to the system and therefore registered with the service. As such, the user would have created a profile within the system; consequently, the system would know the user and would be able to adjust to current and past behaviours. If unknown circumstances or unique occurrences are identified via the systems' cognition and sense-making paradigms, the system would ask questions, seek clarification, and accordingly modify and adapt. To depict this in an example, if the goal is to transport a user to a specific location, there would be a specific paradigm that the cognitively enhanced eTransformation system would follow. The Strategy

element would have a component that addresses the system backbone that would be stable and would address the main service delivery requirements. The system would also have the component of Strategy that would be adaptable and flexible and would be able to react to the received stimuli. The Strategy component would be flexible; in transport for example, it would depend upon the time of day, if it is a weekend or a holiday and/or if it is a group or an individual trip.

The Structure of the system would also need to be flexible. Technology will allow for the data to be imputed, gathered and processed based on demands. The integral structure of the system, similar to the one of Uber, could be relatively simple; however, in addition would require component-based development that would allow for the external and the other situational stimuli to be computed, assessed and responded to.

Tasks and Processes of the Cognitive system would be closely defined and would represent the components of the complex living self-organizing systems. Some processes, for example, would require simple processing and calculations such as the transport from A to B. For this to happen, the system would need to accept the registered users, who would be able to start operations. The car would need to be able to understand and interpret the GPS signals and safely drive from A to B.

Therefore, for such functions to be implemented, the system would require:

- User registration;
- User authority to power the car;
- Car to:
  - Drive/Stop/Turn,
  - Avoid dangers and obstacles,
  - Follow signals and road rules,
  - Interpret the GPS signal ,
  - Read the map,
  - Process directions, and
  - Arrive to a destination.

In addition to the ability to move the autonomous car to reach "self actualized" and cognitive interpretations, the system may need to be capable of processing more intelligent higher-level stimuli. For example, the car will behave based on the data that is stored in its users' profile and based on the pattern recognition and the machine learning would perform tasks. Therefore, if a system user, in this case the car owner or the customer, each morning was to watch BBC news while travelling to work, based on the repetitive nature, after a certain number of occurrences of the event, the car would automatically start to alert the car owner/customer of new videos to watch on the way to work. Furthermore, if there is breaking news of an event that has just happened and such video is available for viewing, instantly the car system could then be set up immediately to alert the owner/customer, regardless of the type of journey the customer is undertaking. In this instance, the car's system may take a more human like organic approach. Alerts, like the one described, could be coded as components that could be attached or detached as needed from basic driving model system functions.

In addition to the functions described above, the following functions could be added to the Cognitive system:

- If it is a working day, play BBC news on the way to work; and,
- If there is breaking news, regardless of the time, prompt to play BBC news.

Such systems would also allow for the just-in-time decision-making based on the customer/user requirements. The requirements could range from those set in the customer's profile, to those identified by the artificial intelligence. For example, a user/customer of the car may change their route mid-journey to pickup up a friend, or to avoid a danger on the street, or take a different route, because the customer or the owner is on a holiday and going to the mountains rather than work, and is consequently, not following the profile rules. Such systems should also be able to behave based on the just-in-time customer requests and accommodate such requirements as best as possible. Therefore, systems would need to be able to adjust in time. If there is a danger on the street, based on the received stimuli, the system should automatically drive to avoid the danger. Also, it should be possible for the customer/owner to override the pre-set requirements at any time. For example, there may be a change based on the previously arranged circumstances. Consequently, the system should be able to take into account the new stimuli and act accordingly. Hence, the input would require:

- Set holiday mode;
- Divert from the usual route (add location);
- Next, go to the "mountains"; and
- Play children's favourite movies.

It can be seen that the implementation of an Artificial Intelligent Cognitive system requires a detailed focus on each of the given process characteristic. Furthermore, such a system would need to be flexible and responsive. Based on the given examples, such a system would also have close interactivity with Cloud resources and other available customer's subscriptions – such as, for example, Netflix to play videos.

The customer or the car owners are the central actor in this example and their needs and requirements need to be met at a given time and place. Furthermore, the car, while in possession of the user should allow the customer to have an enjoyable and pleasant journey. Therefore, the car should also allow a user to call up the external online systems, of which they have access or privileges to. As an example, a customer may want the car to park in their company car park, for which they have electronic access privileges. This means that by calling the required online service, the car owner/customer should be able to enter the credentials and allow the car to park in their designated spot, while in their service. Therefore, the system would allow:

- Call web service – park at office car park;
- Prompt for credentials;
- Allow the car to park for a set time.

Furthermore, this identifies that for cognitive, artificially intelligent systems to be fully embedded and integrated into eTransformed system environments, it will be essential to

embed machine learning, computational processing and sense making so that system users/owners can have seamless interactions. For example, once these principles are implemented to self-driving cars, such eTransformed systems will be intelligent and capable of responding to intelligent scenarios:

- Meet me at 10 p.m. at the World Square pick up zone near the crossing of Liverpool and Pitt Street in Sydney, Australia.
- On the way, pick Jodie from tennis (i.e. contact known to the car contact book and tennis as one of the favourite locations).
- Drive us Home (Home entered as a favourite location). While driving play Hip-hop music.

The Cognitive, adaptable and sense-making enabled system would also need to be attentive to current news, and react so that it avoids accidents, road diversions or natural disaster. Consequently, the car's system should be able to receive and process stimuli from the outside world such as the radio, Twitter, BBC or similar news channels. The car should also be able to react to input from area councils and city zones about road upgrades and diversions. Therefore, if a diversion is in place:

- Car senses the requirement to divert;
- Car alerts the user/owner and identifies another more suitable route.

The eTransformation Framework for the Cognitive eTransformation wave and artificially intelligent system developments would need to take into account that each system is to be implemented with the need to address the context, the requirements of the field and the industry. For transport, this is the ability to use a mode of transport, provide movement from A to B via the set roads infrastructure, follow the set traffic rules, laws and regulations and ensure the safe transportation of the car owner/customer.

Initially, for such a system to be developed, known or Static context would need to be determined. Such characteristics would take into the account the country in which the car is being driven, if the car was crossing borders and changing driving sides, and following the set road rules and regulations. The Dynamic context for traffic would define the changing environments. Traffic is organic, it is constantly moving and the situation on the road is often changing rapidly. Road conditions are often dependent on the time of day, on events on the streets along the route taken, on the safety standards of the cars and roads, as well as the external conditions, events, weather, diversions, and upgrades.

For the auto drivable car to act in a user/owner desired way, it needs to be able to learn based on past experiences, based on the current circumstances and on just-in-time received inputs.

To operate and move from one location to the other, it relies on the set of technologies that can be pre-set; however, to be able to act based on changed scenarios, such as those received from external environments such as a road diversion due to an accident, the self-drivable car first needs to be able to collate data, process it, make a cognitive decision and ensure the decision it makes is safe and can deliver a desired outcome for the recipient – owner/car user. This means that the structure of the designed system is partially set at the implementation, these are the set driving functions, map data, avoidance of dangers, road rules and regulations, and extra add on functionality components that can be added as plug and play modules. Therefore, the overarching strategy is to set the remaining components to allow for flexibility and the implementation of the plug and play modules that can also collate, store and compute external stimuli. This also implies that certain processes will be set based on demands and requirements; however, for the car's system to be able to interpret outside stimuli, it will need to allow for the flexible component built system modules to be implemented. The plug and play modules would allow for the exceptional circumstances components to overwrite the usual route, for example, or to alert about dangers or to display the requirements for car repairs, or in an exceptional circumstance, drive the car directly to the service repair centre. In turn, this would also mean that the networked economy [4] concept would expand to allow services to be shared, and software and data to be sourced via Cloud infrastructure, pay per service software solutions to be integrated and big data analytics relevant to road scenarios, weather, traffic congestion and car status sourced on the go. Such a platform would also allow retail stores to plug-in their promotional materials, and as customers drive pass sensors or stores for the advertised products and services, data based on the preferences or previous purchases of customers can be displayed on screens in the cars. Such system designs would also allow for holistic integrations, for seamless data transfers and the abilities to provide seamless uninterrupted services to the customers across the transport sector. Once fully artificially intelligent systems are implemented, technology will be in the background.

Technology, in that instance, just purely becomes a platform that will allow for exchanges to happen, for sensor data to collect the stimuli, for computational and sense-making frameworks to make just-in-time decisions and to allow for cognitive human-like interpretations and just-in-time decisions.

V. Conclusion and Further Studies

In conclusion, it can be seen that the development of cognitive artificially intelligent systems requires not just simply the understanding of eTransformation Dimensions and the contextual environment, but also the understanding of specific individual requirements, needs and circumstances. Some can be defined as static contextual characteristics that identify the current business/activity location and operations. Dynamic contextual requirements take into account all possible changing characters that are not just simply specific to the organization and industry sector, but are in fact crucial to the individual. They identify particular characteristics that define the situation. Therefore, in the smart car example, these characteristics will, on the one hand, take the static context as the requirement of transport, road rules, the number of people requiring transport and the locations customers/owners would

like to reach.

The dynamic context in this instance will take into the account the roads conditions, the infrastructure, the weather, how busy the roads may be during a specific time of day, and how costly and time consuming it may be to transport the individuals or groups.

The new model which requires the system to behave as a living organism and reflect the contextual data received, therefore, requires a flexible structure. Its main building blocks and technology may provide a backbone that can support the operations, as with Uber for example. The services provided and received will depend upon individual characteristics and the environmental scenario. The characteristics of each trip and the environmental scenario, would in the transport sector, be defined in a user profile and the environmental characteristics profile that would record scenarios common for that day and time as well as the current road circumstances and just-in-time weather. For the customers or owners, for example, a morning ride to work could be based on pre-set requests that would allow the customer to see the news, review the presentations, take calls, and reply to emails. On the other hand, the same system which each working day gives access to the working data of the owner/customer may need to be receptive to context changes and just-in-time requests. For example, an owner/customer may be on a holiday, and thus, may instead require a casual ride with family to the mountains. In both instances, the basic processes of transportation and the rules will be the same; however, the nature in which personal experiences will be delivered will differ. It is important also to note that new systems will also be sourcing data from external data sources such as social media and will not be only relying on pre-set system data, but also current just-in-time events. It is expected that future studies will start to focus on systems cognitive abilities and the implementations which is expected, would allow for human-like just-in-time decision-making processes to occur with the aim to deliver timely requirements and services to customers/owners.

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