Transforming Enterprise Computing Platform: Analysis and Transformation Framework

Settapong Malisuwan, Dithdanai Milindavanij, and Noppadol Tiamnara

Abstract—**Rapid advances in cloud, mobile, social media and big data technologies are changing the ways that people work, and disrupting every industry. The inter-dependencies between mobile computing, social media, cloud computing, and big data technologies is called 'The Third Computing Platform'. Industry cloud platforms have already emerged in a wide variety of industries, including telecommunications, finance, retail, healthcare, logistic and manufacturing. The emergence of the Third Platform across different industries can create new types of digital disruption and transformation. Therefore, today, competitive advantages are being built by integrating cloud, mobile, social and big data technologies. To response to these dynamics, enterprises and organizations in both private and public sectors are undertaking digital transformation initiatives to sustain and gain more their competitive advantages. The objectives of this paper are to study the next-generation computing platform (The Third Platform) and propose a transformation framework to help an enterprise to implement the successful transformation. To achieve the objectives of the research, this paper uses both primary and secondary qualitative data to create the enterprise transformation framework.**

Index Terms—**Transformation, computing, platform, enterprise, framework.**

I. INTRODUCTION

The change in consumer behaviors toward the era of smart communication devices domination: with the stream of penetrating information everywhere and every time, new created contents including photography, posting, online transaction processing under the social context where the management strategy is implemented at low costs through the cloud computing technology, affects the entrepreneurs and business operators who rely on the information technology (IT) to modify their investment structures which will further influence the models of business transactions. The First Platform investing concept is the investment made either in mainframe computers or mini computer technology which has around a million consumers worldwide [1]. Most of them are the business transaction processing at the organizational level. The investment in each organization must be individual and unrelated to each other because it did not have such efficient computer networking technology like in the present day. This caused recurring investments in the installation of mainframe or mini computers to process data in each enterprise or organization since they cannot be shared among each other, affecting the business cost to be high while the

market is still limited in size.

The growth in computer networking technology first began with the emergence of local area network technology (LAN) which supports connection of computer components and gives rise to the concept of designing distributed computer architecture. Here, the concept of client and server helps lower investment values of the organization because there is no need for dumping money to build mainframe and mini computers. Later, when the world-class networking technology like the Internet accompanied by HTTP and World Wide Web technologies had grown, the web 1.0 technology offering users with experiences to access websites, even if it is mostly simplex, then arose. Here, most of the contents were created by the website owners, partly business organizations. However, in the marketing and economical aspects, it was considered the way to increase the number of service users from the first platform era. This era is, therefore, defined as The Second Platform where the service users were made up from the combination of both business persons and general consumers for over a hundred million worldwide in number, whereas the types of commodities were increase to be more than ten thousand. The Second Platform covered a period of about 25 years since the LAN technology had been first introduced [1], [2].

As the technology has been developed, both in terms of communication networks and high rates of speed, the success in building cloud computing services using the virtual machine technology and the way that we try to overcome natural limits give rise to the mobile 3G and 4G networks that support the needs for transferring data at a very high speed [3]. This includes the LAN technology under the name of Wi-Fi which has now become advanced and reached the IEEE 802.11ac standards. It supports high speed data communications at the level of Gbps during the same time interval when the communicative innovation like smartphones and tablet PCs is invented under the concept which causes the standard operating systems and results in storefront applications. This promotes the existing of the world of communication through several million applications with the aim to stimulate consumers worldwide using the innovative social networking and leads to the full-form Third Platform era as a consequence. It can be said that the year 2014 is the early phase of the Third Platform era. The grower the big data technology, the fuller and deeper consumer behavior analysis will be. This promotes and develops several types of technology and economic, social, and cultural growth enhancing the growth in the Third Platform era. The Third Platform is the next-generation compute platform characterized by a proliferation of always-connected smart mobile devices, coupled with the widespread usage of social networking, and layered over a

cloud-based server infrastructure.

To achieve the objectives of this research, this paper is organized as follows. Section II explains the research methodology. The Third Computing Platform is described in Section III. Transforming to the Third Computing Platform and digital transformation framework are presented in Section IV. The conclusion is provided in the last section.

II. RESEARCH METHODOLOGY

The objectives of this research are to propose the Enterprise Transformation Framework and provide recommendations to develop an enterprise model of the Third Computing Platform. It is intended as a qualitative research based on in-depth interviews and supported by inputs of secondary data called from academic papers, business and best-practices reports made by respectable reference sources. Its primary data will come from in-depth interviews of distinguished experts in related fields under the following research framework as illustrated by Fig. 1.
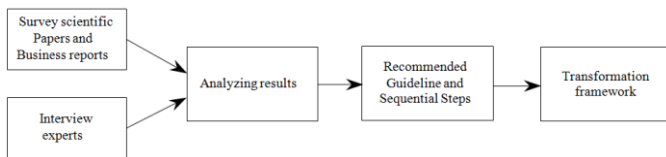

Fig. 1. Research framework.

We classified subject matter experts into 4 categories depending on their area of expertise in ICTs, Economics, Strategic Management, and Marketing. The total number of subject matter experts or respondents is 12 with 3 from each key focus area.

Inputs from the in-depth interviews will be processed and analyzed together with secondary data which will be summarized into a preliminary draft conclusion to be forwarded to the 12 experts for further comments with an intention of streamlining them into a shared common direction. The version assessed and scrutinized by the 12 experts will then be adopted as a basis for formulating a transformation framework with a guideline for implementing key points to ensure efficient and successful transformation for the enterprise.

III. THE THIRD COMPUTING PLATFORM: REVIEW AND ANALYSIS

Regarding the Third Platform, it is a new concept which realizes the change in technology and consumer behaviors by connecting the application of 4 types of technology which has grown along with the world of applications comprising [1]:

• Cloud Computing Technology has now been laid at the heart of the operators providing application services in order to use of Cloud technology to lower costs of business execution instead of making investments to build new computer servers for service provision as it used to be. Cloud services are not only a transformative solution that helps organizations to achieve strategic goals. It can also be essential to the actual execution of transformation. Based on a research in [4], there are different monetization models to command ownership of customers as following:

1) Device lock-in model: Apple's iCloud drives high margin device sales by providing seam less multi device synchronization.

2) Advertising model: Google leverages its large cloud user base to drive advertising revenues by offering low cost or free cloud services.

3) Content sales model: Amazon drives content sales with cloud based platforms that push digital content directly to users that have heavily subsidized devices.

4) OS lock-in model: Microsoft leverages its Sky Drive cloud services to let users synchronize their content, thus increasing customer reliance on Windows' platform and suite of applications.

• Mobile Communication Technology has grown and expanded due to the promotion of the efficiency in supporting high speed data communication via mobile networks i.e. 3G and 4G. This results in further steps toward mobile phone products in the forms of smartphones and tablet PCs, including the products concerning wearable devices which are getting more efficient. The grower the user base of mobile communication services, the lower the economic cost of device producers will be. This results in the continuous development in terms of networking technology, communication devices, and peripherals.

• Social networking technology, also known as the Social Network Services which rapidly grow, is various in terms of service providers and covers the worldwide population. Nowadays, the connection among worldwide consumers through social network services is mostly made via mobile communication devices. Social network services have tacitly become the channel of proving marketing strategies, information, education, social and cultural related issues for worldwide population. Also, they are considered the most powerful communicating, persuading, publicizing, agitating channels, etc. ever. Some examples can be seen through utilization of several applications, i.e. Facebook, Twitter, Line, WeChat, Instagram, etc. which exist in the current world.

• Big Data technology is an interesting trend and is promoted to be applied to its fullest capacity by the company providing mobile phone services, the company producing and selling fast moving consumer goods (FMCG), and the advertising company. It was invented due to the fact that the living of people on the basis of communication technology advancement relies on data storage and management. These can be done using cloud computing networks along with the data already exists in mobile networks, with the push made by the popular current and the growth in social network services, including business and other transactions. This affects the global computer networks to store larger data of people which tends to be unorganized and does not bridge or link together. If all of the data can be interwoven and combined from several sources, e.g. mobile phone networks, application service providers, cloud computing service providers, and other information sources together as well as can set up conditions and analyze the data of such consumers, it will further encourage the synthesis to endlessly create new models of business transactions. The Big Data technology is, therefore, compared as the most important factor resulting in desired business outcomes both at present and in the future.

Since the matter of the Third Platform and other platforms in the previous eras are not related to technology, instead it is considered a business framework additional concerning investment trends to achieve effectiveness in terms of business and other transactions, i.e. educational, medical, military, and other non-profit sectors. The transition of the world toward the Third Platform era is, therefore, the phenomenon where changes can be clearly observed or have any impacts on consumers. Conversely, the consumers themselves are the factor influencing several sectors to realize the operation efficiency and consider adjusting their information ecosystems, partly for managing the costs of execution to be in line with the advancement of 3 main technologies in the Third Platform era: development in networks and mobile communication devices, higher efficiency and lower prices for using cloud computing services, and the growing number of consumers in the world of social networks. Regarding the Big Data, it will possibly increase its importance when it grows in the future. This aims to enable the internal execution of organizations or agencies to better access consumers or target groups with more economical cost management according to technology trends

When considering the assessment report of the investing trend for the information ecosystem regarding the technologies related to the Second Platform and the Third Platform during 2013-2020 of several organizations and agencies worldwide compiled by IDC Research Co. Ltd., it is found that in 2013, organizations and agencies worldwide still spent the information budget on investing in the Second Platform related technologies: 74 percent in LAN and server technologies and 26 percent in cloud, applications, and social network related activities which belong to the Third Platform trend [1]. By 2020, the investment ration of various organizations will increase to 40 percent. This points out that from now on, various organizations and agencies will more realize in slowing down the investments concerning hardware or enlargement of information network architecture size, but will convert investment into expenses made through providers of cloud network services and give more importance to provision of services in the form of application programs on communication devices: smartphones and tablet PCs.
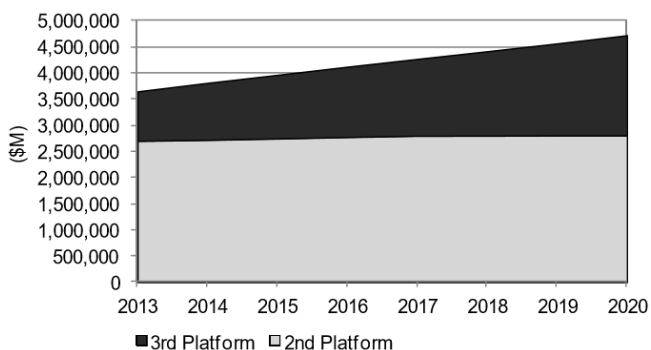

Fig. 2. Estimating trends for information investment compared with the trends for the Second Platform and the Third Platform.
Source: IDC, 2013 [1].

The trend of accepting information budget spending on the Third Platform related technologies can be seen from the growth in the expenditure budgets shown in Fig. 2 [1]. Here,

it is estimated that the expenditure budget for the Third Platform of several organizations and agencies worldwide will have grown around 10.6 percent during the interval between 2014 to 2020, whereas the expenditure budget for the Second Platform, during the same time interval, has grown by only 0.5 percent or 20 percent lower than the expenditure budget spent on supporting the Third Platform. Therefore, it can be estimated that by 2020, the investment in the Third Platform of various firms, agencies, and organizations will grow by 95 percent compared to other investments conforming to the growth in the behavior of consumers using continuously greater numbers of smart devices worldwide, including the expansion of 3G and 4G mobile phone networks. The development in the WiFi communication that supports higher rates of speed and installation of more hotspots in several areas worldwide has several consequences on the consumer base which is characterized by the social networking culture and plenty of transactions and daily activities via applications.

Among the 4 key factors giving rise to the Third Platform business plan, the cloud computing affecting the circulation of sustenance and expansion of marketplace and application store businesses which have grown up to this time is considered the first priority. The cloud computing service models that cloud computing operators provide for general business operators are various. However, the model that currently gains global popularity is PaaS or Platform-as-a-service where cloud service providers will serve themselves as the storage site for data and the mechanism of services in the Third Platform world [5]. They will also serve themselves as the hub that secures cooperation for marketplace services for several applications and for a large number of application developers worldwide. As there are such a lot of databases of cloud service utilization, it will generally lower the cost of cloud computing service provision, based on the economic principle. This can be seen from the announcement of price reduction in terms of rent for places and data processing in the cloud network of Amazon Web Services (AWS) at the beginning of the year. This is, therefore, the factor attracting several forms of business operators to take interest in slowing down investments according to the trend in the Second Platform and increasing expenses on using cloud computing services

This research has a belief that other than mass cloud computing services provided by large firms like Amazon, Microsoft, IBM, Google, and salesforce.com, in the near future, there will be a lot of small firms arising to provide cloud computing services in the model specifically designed to satisfy the needs of firms, organizations, or other agencies-so as to be used as the place for developing service provision for only business groups. The reason behind such change is due to the fact that even though the model of cloud computing services provided by large firms is able to increase the business odds in terms of prices and to satisfy the needs of people worldwide, the methods of service provision are still of the same standard. If it is used in improving the special service which specifically meets the utilization needs of some organizations, it will not be fairy flexible. This becomes the business chance of small operators to be able to offer the cloud computing service where data processing proficiency and capabilities are emphasized to meet the needs of specific

groups, for example, the cloud services for SMEs, industrial affairs, etc.

Not only is the Third Platform related to the operators providing mobile phone services, but it is also related to the concept which influences firms, organizations, and various agencies. The wide open of the online business which using applications as the main channel is now getting growing in terms of users' data bases and diversity of products along with the expansion of society. The social network is open for every kind of business to utilize such technologies in providing itself a business chance. Eventually, such a large quantity of "data" arising from providing and using different kinds of services will become the valuable resource of business. Before this stage, both several profit and non-profit organizations have to cooperate to impose policies as well as methods of data management using the Big Data technology at its fullest capacity. In the future, the new form of business value like Mobile Advertising of which the business growth trend has now not been observed clearly may become one of the channels for operating new business generating tremendous values.

IV. TRANSFORMATION FRAMEWORK AND RECOMMENDATIONS

The result of the research conducted in accordance with the methodology detailed in Section II shows that almost all experts agreed to adopt the principles dealing with enterprise transformation referred in [6]. The areas of focus for the digital transformation are concluded in Table I [6]. Furthermore, the process of the 10-step implementation from [7] will be applied in the proposed framework. Accordingly, the research results will help us propose a transformation framework as illustrated in Fig. 7.

TABLE I: AREAS OF FOCUS FOR DIGITAL TRANSFORMATION

Digital transformation : areas of focus	
Customer	Customer insight
	Omni-channel
	Digital marketing
Product	Connected products
	Pay per use
	Predictive usage
Processes & Systems	Customer-centric & standard platforms
	Agile approaches to work
	Anytime anywhere, any device
Organization	Dynamic partner ecosystems
	Digital skills & virtual workforce
	Digital collaboration & innovation

In this paper, we adopt the theory of enterprise transformation from the research in [8]. The transformation in [8] is addressed as following:

"Transformation is driven by value deficiencies and involves examining and changing work processes. This examination involves consideration of how changes are likely to affect future states of the enterprise. Potential impacts on enterprise states are assessed in terms of value consequences. Projected consequences can, and should, influence how investments of attention and resources are allocated. The problem solving and decision making abilities of management, as well as the social context, influence how and how well all of this happens." The transformation

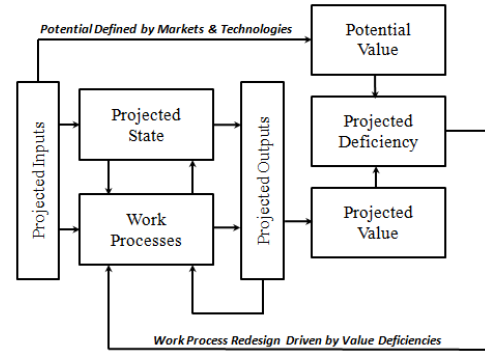framework from [8] can be demonstrated in Fig. 3.

Fig. 3. The transformation framework defined by [14].

After collecting and analyzing data from the interviews to create a transformation framework based on [6], [8], the proposed framework can be demonstrated in Fig. 4.
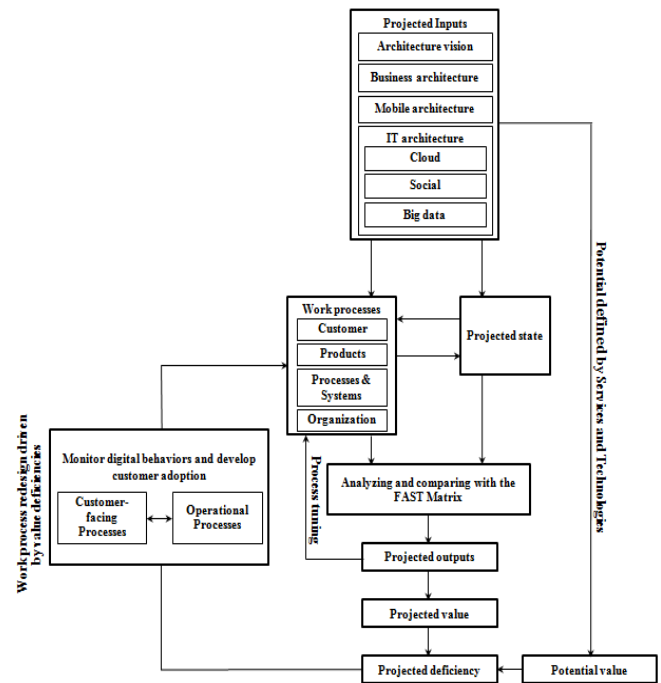

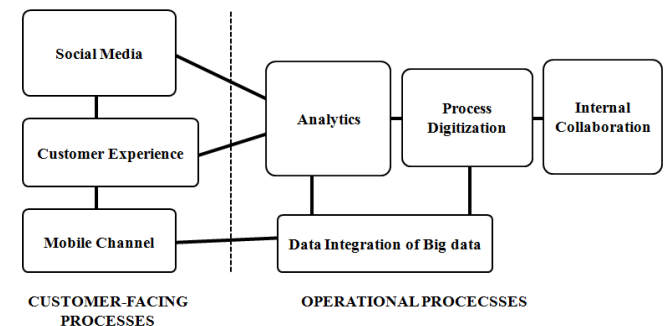Fig. 4. The proposed transformation framework.

Fig. 5. Linkages between customer-facing processes and operational processes.

The proposed framework composes of 4 key technologies of the Third Computing Platform that enable enterprises to align their digital transformation efforts. A clear vision helps to frame in people's understanding a picture of how the

company will transform in the future. One of the major components to drive the transformation is 'Monitor digital behaviors and develop customer adoption' which the mechanism of the component can be found in [9]. This component deals with the integration and interaction between operational processes and customer-facing processes. Table II and Table III show details of each component of the customer-facing processes and the operational processes. We can see that 4 key technologies of the Third Computing Platform are applied into the processes as shown in Fig. 5.

TABLE II: CUSTOMER-FACING PROCESSES

Customer-Facing Processes	
Social media	Monitor reputation
	Promote products and services
	Sell products and services
	Provide customer service
	Build customer communities
Customer Experience	Ensure cross-channels consistency
	Personalize the customer experience
	Offer self- service
Mobile Channel	Promote products and services
	Sell products and services
	Provide customer service

TABLE III: OPERATIONAL PROCESSES

Operational Processes	
Analytic	Target marketing more effectively
	Personalize marketing communications
	Optimize pricing
	Better quality sales prospects
Process Digitization	Automating processes
	Monitoring operations in real-time
	Adaptability to external changes
Internal Collaboration	Active knowledge sharing
	Use of internal social networks and video conferencing
	Working anywhere, anytime, any device
Data Integration	Customer Data
	Other data (finance, supply-chain, operations)

The most fundamental transformation is a digital platform of integrated data and processes. The difficulty of operating without a platform becomes greater as enterprises engage in multi-channel operations and different technologies. Many organizations cannot link customers' activity to their activity on the social network or mobile. Unified data and process is one reason that the Third Computing Platform enterprises are able to gain advantage through analytics and personalization much more readily than traditional organizations [10].

The role of communication is very important in effecting change and reducing organizational resistance in the transformation process. People can be an obstacle to successful transformation than any complicated technology. Successful transformation needs efficient communication to mobilize their workforce. Digital technology provides a wealth of opportunity to those willing to change their businesses to take advantage of it. Today's competition of all industries is dictating efficient integration of enterprises which can only be achieved through digital processes with

collaborative technologies in the Third Computing Platform.

V. CONCLUDING REMARK

The economy in the digital era is on the developing stage, both in terms of interwoven technologies and activities that promote new business models especially the data analytic science which is abundant in the cloud computing system, including the everyday data generated by consumers, will promote the construction and synthesis of patterns and mechanism of business operation via digital media which have never existed previously. This is beneficial in terms of developing business and facilitating the living of people with access to communication devices and systems. However, it also impacts the living of people in terms of violating or offending private rights concerning reporting unsatisfied news to consumers. Therefore, it is necessary that various enterprises both nationally and internationally try to understand changes and progress, both in terms of technologies and business transaction, so that the balance of technology utilization can arise.

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Settapong Malisuwan was born on March 24, 1966 in Bangkok, Thailand. He was awarded full scholarship from Thai government for Ph.D. in electrical engineering (telecommunications), specializing in mobile communication systems from Florida Atlantic University (State University System of Florida), Boca Raton in 2000. He received his MSc in electrical engineering in mobile communications system from

George Washington University in 1996 and was awarded First Class Honors, Gold Medal Award and Outstanding Cadet Award by the university. He also achieved MSc in electrical engineering in telecommunication engineering from Georgia Institute of Technology in 1992. Furthermore, he achieved military education from Special Warfare Center, Thailand, specializing in Ranger and Airborne Courses in 1989 and 1988 respectively. He is currently the Vice Chairman and Board Commissioner of National Broadcasting and Telecommunications Regulator in Bangkok, Thailand. He was awarded The "Science Towards the Excellence in 2013" by The Senate Standing Committee on Science, Technology, Communications and Telecommunications. His research interests are in electromagnetics, efficient spectrum management and Telecommunications policy and management.

Dithdanai Milindavanij was born in Bangkok, Thailand on February 15, 1981. He received his master of political science degree in political management from Ramkhamhaeng University in 2006. He has been working in National Broadcasting and Telecommunications, Bangkok, Thailand office since 2011 and has been working as an Assistant to Vice Chairman in National Broadcasting and Telecommunications since May 2015. His research interests are in technology management and spectrum management.

Noppadol Tiamnara was born on November 12, 1968 in Pah Na Korn Sri Ayuttaya, Thailand. He received his BSc degree in electrical engineering from Saint John's University, Thailand, 2002. He received his MSc in Technology Management from Thammasart University, Thailand, 2012. Since 2006, he has been working in National Broadcasting and Telecommunications Commission as Assistant to Secretary of Vice Chairman of National Broadcasting and Telecommunication Commission (NBTC). His research interests include LTE design, wireless systems, microstrip antenna and applied electromagnetic.