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ANALYSIS OF TRANSFORMATION AND USABILITY OF IT INFRASTRUCTURE IN MARKETING MANAGEMENT

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Abstract

In the present scenario, it is needed to bridge the infrastructure gap and the investments that are somehow not sustainable. Also it is required to be focused on vicious cycle of low investment and low growth. There is a persistence of infrastructure deficits despite an enormous available pool of global savings. With the historic structural transformation, the developing countries may become the major drivers of global savings, investment, and growth, and with it driving the largest wave of urbanization in world history. Creativity and problem-solving are neither individual endeavours, nor being occurred in isolation. The design thinking approach is based on developing a thorough understanding of what the user goals are from multiple viewpoints, i.e. emotional, psychological and behavioural. Through an iterative process of observation, ideation, rapid prototyping and testing, design thinking can help craft an experience that is meaningful to the person engaged with it, one that seamlessly meshes the physical and digital interactions of people, processes and things. In early days, companies may have approached the creation of a new product or service by defining a set of requirements. Today, many now seek to first understand the actual human needs behind the product or service, to develop an overall experience. Performing certain activities in isolation for example, observation, ideation, prototyping and testing may miss the critical point of design thinking, which is both a journey and a mindset. In this paper, it is intended to focus on role of IoT(Internet of Things)in transformation in marketing management.

Keywords : IoT, Prototyping, Sustainability, Data management, Digital technology, Real time , Virtualization

Introduction

It has been observed that the ideas of accelerating sustainable development and eradicating poverty and that of climate change are practically intertwined. Growth strategies that fail to tackle poverty and/or climate change will prove to be unsustainable, and vice versa. A common denominator to the success of both agendas is infrastructure development. Infrastructure is an essential component of growth, development, poverty reduction, and environmental sustainability. A major expansion of investment in modern, clean, and efficient infrastructure will be essential to attaining the growth and sustainable development objectives that the world is setting for itself. Over the coming 15 years, the world may need to invest huge investments in sustainable infrastructure assets, more than twice the current stock of global public capital. While the customer experience may drive competition, technology is being applied across a range of internal processes including back-end efficiency, risk management, data analysis, and compliance. This contributes to the need for the board to take a broader view in order to understand where investment is going and how it is contributing to broader business objectives. With the Internet of Things (IoT), increasingly sophisticated and real-time analytics and other emerging digital technologies, companies can virtually observe the consumer, uncover unmet needs and incorporate those insights as part of their experience, further blurring the borders between the physical and digital worlds. The IoT will be an increasingly powerful aid to organizations looking to design a better experience. Devices and objects instrumented to collect and share intelligence on product usage and user behaviour, both online and offline, will yield a treasure trove of real-time insights that can help organizations anticipate customer needs, inform continuous product improvement and serve up contextually relevant content and experiences.

Testing and validating concepts or prototypes doesn't always have to be approached as formal usability tests, in which end-users are brought into a lab and asked to go through a series of tasks – that they fail or complete – as others take notes behind a two-way mirror. With design thinking, testing and validation are often more informal and participatory.

To generate these additional revenues, companies will introduce new industrial products with digital features and augment their existing portfolio. Digital services based on data analytics, or even complete digital solutions serving a customer ecosystem, will drive breakthrough revenue growth. The biggest challenge of industrial leaders isn't technology - it is the people. While digital technologies are rapidly becoming a commodity, success largely depends on an organisation's Digital IQ1, especially how well its

digital leaders like the CEO, CTO, or CIO define, lead, and communicate the transformation. It's also dependent upon the digital qualifications of the employees who need to roll out digital processes and services. Radical
disruption isn't always comfortable for the people who make it happen, so change management will also be critical. And with data analytics becoming a core capability for every industrial company, enhancing skills and organisational structures will be critical.
With so much change in store, there's one area that companies can't afford to ignore: digital trust. Digital ecosystems can only function efficiently if all parties involved can trust in the security of their data and communication, as well as the protection of their intellectual property. Protecting your company and ensuring digital trust requires significant investment and clear guidelines for data integrity and security.

Review of Literature

J. W. Ross et al.[1] in their work have discussed about Enterprise Architecture Management which has been established as a governance instrument to consistently align both business and IT with strategy and goals, and to ensure adaptability, consistency, compliance, and efficiency.

C. Bass et al.[2] in their work have focused on IoT (The Internet of Things) that enables a large number of physical devices to connect each other to perform wireless data communication and interaction using the Internet as a global communication environment. Information and data are central components of our everyday activities. Social networks, smart portable devices, and intelligent cars, represent a few instances of a pervasive, information-driven vision of current enterprise systems with IoT and service-oriented enterprise architectures.

Gubbi et al.[3] in their study have focused on Service-oriented systems , which may be instrument to close the business - IT gap by delivering appropriate business functionality efficiently and integrating new service types coming from the Internet of Things and from cloud services environments.

P. Weill et al.[4] in their work have discussed about the current digital strategies along with The Internet of Things (IoT) as well as disruptive business operating models, and holistic governance models for business and IT , associated with current fast changing markets. With the huge diversity of Internet of Things technologies and products organizations have to leverage and extend previous enterprise architecture efforts to enable business value by integrating the Internet of Things into their classic business and computational environments.

R. Schmidt et al. [5] in their work have focused on sensors, actuators, devices as well as humans and software agents interact and communicate data to implement specific tasks or more sophisticated business or technical processes. The Internet of Things maps and integrates real world objects into the virtual world, and extends the interaction with mobility systems, collaboration support systems, and systems and services for big data and cloud environments. Furthermore, the Internet of Things fundamentally influences the Industry 4.0 and adaptable digital enterprise architectures. Therefore, smart products as well as their production is supported by the Internet of Things and can help enterprises to flexibly create customer-oriented products.

WSO2et al.[6] in their work have discussed that IoT(The Internet of Thing architecture) has to support a set of generic as well as some specific requirements. Generic requirements result from the inherent connection of a magnitude of devices via the Internet, often having to cross firewalls and other obstacles. Having to consider so many and a dynamic growing number of device architectures for scalability may be needed.

A. Zimmermann et al.[7] in their work have analyzed and transformed the architectural resources with concept maps and extract their coarse-grained aspects by delimiting architecture viewpoints, architecture models, their elements, and illustrating these models by typical examples. Architecture viewpoints are representing and grouping conceptual business and technology functions regardless of their implementation resources like people, processes, information, systems, or technologies. They extend the information by additional aspects like quality criteria, service levels, KPI, costs, risks and compliance criteria.

Valasek C, Miller C et al.[8] in their work have focused on potential threat to physical safety which is integration of advanced sensing and controls within automobiles. They have demonstrated this type of attack through the on-board diagnostic port inside the vehicle. Their report illustrated the ability to command advanced vehicle control systems such as electronic steering, acceleration, and braking through this access method.

As discussed in Cox Communications et al.[9], the prospect of physical access brings us to the connected home. Many home security systems allow the homeowner to control access to their residence through a smartphone application. Some systems provide the ability to not only alarm the home but control other physical aspects such as entry door locks, garage doors, lighting, and water.

James R et al.[10] in their work have focused about application of IoT in automotive industry. In addition to features such as entertainment and navigation, the automotive industry may integrate a vast array of sensors into new automobiles. These sensors may provide advanced diagnostic information as well as features such as collision avoidance and traffic management sensors.

IoT architecture

It can be represented by four building blocks:

1. **Things:** These are defined as uniquely identifiable nodes, primarily sensors that communicate without human interaction using different connectivity methods.
2. **Gateways:** These act as intermediaries between things and the cloud to provide the needed connectivity, security, and manageability.
3. **Network infrastructure:** This is comprised of routers, aggregators, gateways, repeaters and other devices that control and secure data flow.
4. **Cloud infrastructure:** Cloud infrastructure contains large pools of virtualized servers and storage that are networked together with computing and analytical capabilities.

Existing security technologies will play a role in mitigating IoT risks but they are not enough. The goal is to get data securely to the right place, at the right time, in the right format. It's easier said than done for many reasons, and here is a list of some of the challenges:

- Many IoT Systems are poorly designed and implemented, using diverse protocols and technologies that create complex and sometimes conflicting configurations.
- Limited guidance for life cycle maintenance and management of IoT devices
- IoT privacy concerns are complex and not always readily evident.
- There is a lack of standards for authentication and authorization of IoT edge devices.
- Security standards, for platform configurations, involving virtualized IoT platforms supporting multi-tenancy is immature.
- The uses for Internet of Things technology are expanding and changing.

The current IoT system rely on centralized, communication models. All devices are identified, authenticated and connected through cloud servers and connections between devices usually go through the internet. However, the decentralized approach to IoT networking may be able to solve many of the issues. Adopting a standardized peer-to-peer communication model to process the hundreds of billions of transactions between devices may significantly reduce the costs associated with installing and maintaining large centralized data centres. It may distribute computation and storage needs across the billions of devices that form IoT networks and prevent failure in any single node in a network from bringing the entire network to a halting collapse. So establishing peer-to-peer communications may present its own set of challenges, chief among them the issue of security. It is understood that IoT security is much more than just about protecting sensitive data.

Performance with business model and smart products

It is seen that some business models may be the management tools to facilitate creating, enlarging and retaining business value. In the present scenario, tremendous interest in smart and connected business models is seen, particularly in IoT business models. There may be many issues associated with the business models. Connecting different devices and developing standards or maintaining information security may be some of the challenges of smart and connected business models. The main activities in this case may be associated with customer development, product development, implementation/service, marketing/sales, platform development, software development, partner management, logistics. Key resources are physical resources, intellectual property, employee capabilities, financial resources, software, and relations. Customer relationship components may be personal assistance, dedicated assistance, self-service, automated service, communities, and co-creation. Channels are sales-force, web sales, own stores, partner stores, and wholesaler. Customer segments may be mass market, segmented, diversified and multi-sided platforms. Cost structures may be associated with product development cost, IT cost, personnel cost, hardware/production cost, logistics cost, marketing, and sales cost. The primary goal of smart and connected product applications may be to enhance the efficiency of transactions which may be improved by making the transaction faster, simple as well as evaluating its dependability.

Technologies associated with IoT layers

The IoT is primarily associated with a set of technologies, systems, and design principles with the emerging wave of Internet-connected things based on the physical environment.The IoT architecture consists of three main layers which can be called as physical, connectivity and digital layers.

Physical layer

At the physical layer, sensors and micro-controllers work together to provide one of the most important aspects of the Internet of Things (IoT): Detecting changes in an object or the environment, allowing for capture of relevant data for real-time or post-processing. Sensors are used for detection of physical changes including temperature, light, pressure, sound, and motion. They are also used for detection of the logical relationship of one object to another(s) and the environment including the presence/absence of an electronically traceable entity, location or activity. Actuators are other critical devices at the physical layer which are used to effect a change in the environment such as the temperature controller of an air conditioner.

Connectivity layer

The connectivity layer is responsible for connecting to other smart things, network devices, and servers. Its features are also used for transmitting and processing sensor data. IoT devices connect and communicate using various technical communication models and technologies such as IP networks, 3G/4G, Bluetooth, Z-Wave, WiFi ZigBee, RFID or NFC.

Digital layer

Digital layer stores, analyzes and processes huge amounts of data that comes from the connectivity layer. It can manage and provide a diverse set of services to the lower layers. It employs many technologies such as databases, cloud computing, and big data processing modules. It is also responsible for delivering application specific services to the user. It defines various applications in which the IoT can be deployed.

Solution based on IoT complexity

(i). Adopting flexibility with IoT in industrialization
Developing and deploying the systems that will make up the industrial internet of things represent a massive investment not just in the present but also for decades to come. To meet the needs of today and tomorrow, the only available way of approach is not by anticipating the future but by deploying a network of systems flexible enough to evolve and adapt. This requires a platform-based approach; a single hardware architecture that is deployed across many applications, flexible enough to remove a substantial amount of the hardware complexity and makes each new problem primarily a software challenge. The platforms that are chosen by the system designers need to be based on an IT-friendly OS so they can be securely provisioned and configured to properly authenticate and authorize users to maintain system integrity and maximize system availability.

(ii). Managing time and cost with IoT by implementing platform-based approach

Cost and time to market are the driving factors when choosing test equipment in the consumer internet of things. A small group of companies, especially those that test memory and microcontrollers, are satisfied with fixed-functionality or what we call the "big iron" testers. But as companies innovate and rapidly evolve the functionality of their devices, they realize that they need a smarter automated test equipment platform that can productively scale with that innovation. With a platform-based approach, engineers can now scale up the capability of a tester by adding modules when necessary, which eliminates the high cost of retooling the hardware or rewriting the lowest levels of software.

(iii).The use of internet with greater capacity

The mobile Internet has always promised a continued innovation and inspired researchers all over the world to think beyond faster data and greater capacity. These new networks, referred to as fifth generation or 5G, will transform our way of living and unleash enormous economic potential. However researchers need to take a platform-based approach to design and rapidly prototype their concepts faster in order to expedite the time to market and deployment.

(iv).Advancement of IoTthrough integrated hardware and software

Makers all over the world are inspiring each other to create smart gadgets, robotic gizmos, autonomous drones and wearable devices. These innovations are no longer monopolized by huge multinational, multimillion dollar companies. Instead, makers work in home garages and collaborative workspaces with their peers to get this going. What is better than that is the fact that they openly share their inventions and ideas online to inspire new innovations from other makers. The extreme evolution of wireless connectivity and cloud computing is helping these group of makers to be more involved and be aligned with the internet of things. An interconnected world adds functionality and greater insight into an unlimited number of existing and new devices, all hooked up to the internet. An integrated hardware and software platform will enable the maker movement to advance the IoT much like the open platform for mobile app creation has developed a new economy around smartphones.

Discussion and future direction

The integration of a huge amount of dynamically growing Internet of Things objects may be a considerable challenge for the scalability, extension and dynamically evolution of working models. Presently the progress is going on the idea of integrating small working model descriptions for each relevant IoT object . These description usually consist of partial IoT-Data (Instances), partial IoT-Models, and partial IoT-Metamodels.

Conclusion

The Internet of Things holds a great deal of promise for improving the lifestyles. Knowledge gained may be allowed to realize efficiencies in nearly every aspect of human life. However, rapid adoption of Internet of Things technologies may lead to long-term problems given the current state of the industry. Unless standards, interoperability, and developer/user education and practices improve there may be significant negative consequences. In addition, there must be equality between consumer grade and commercial grade product offerings with regard to security. The number of devices deployed may be expected to support the IoT to visualizes the requirement for adequate security and privacy. It may be support for exponential growth in the attack surface of the internet. Since the IoT may connect the virtual world with the physical world, security concerns turn into safety concerns. Privacy in the internet of things is just as important and depends on adequate security measures to be in place. The implications of the Internet of Things may in reality be the trading of functionality and efficiency for the personal privacy in the present society.

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