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# "Consumerization of IT" - Challenges for IS Education

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## Abstract

The quiet revolution of consumer IT reached a climax recently, with the widespread adoption of smart consumer devices and their rapid penetration into enterprise IT applications. This significant change of attitude, as well as the reliance on information technology has been referred to as "Consumerization of Information Technology" (CoIT). CoIT has emerged with a global driving force that has been and will continue to reshape IT practices. This paper examines some of the IT challenges associated with CoIT, and relates them to Information Systems (IS) educational challenges.

**Keywords:** Consumerization, Net Generation, IS education

## 1. INTRODUCTION

The recent introduction of the iPhone and iPad has intensified the rapid shifting of global technological development emphasis towards a new ecosystem surrounding smartphones and tablets, creating new waves of technological and social changes collectively known as the "Consumerization of Information Technology" (CoIT). CoIT represents a disruptive change that has forced all organizations to reevaluate their relationships with stakeholders, especially the consumers and end users. CoIT has challenged the relative value of traditional enterprise Information System (IS), and by extension, the relative value of traditional IS educational programs that have been designed for the enterprise Information Systems. This paper examines some of the organizational challenges emerging from CoIT, and evaluates similar and related challenges in the IS Educational process. While it would be beyond the scope of this paper to precisely distinguish the two terms Information Systems (IS), and Information Technology (IT), it might be helpful to think of IS as the collection of software and captured data, residing on main-stream computer systems such as mainframe and PC, while IT would include IS and all consumer and office

electronics and Internet based computational systems that exhibit the capabilities of traditional computers.

## 2. CONSUMERIZATION OF IT (CoIT)

CoIT first gained popularity in 2001, while the iPhone and iPad made "consumerized IT" the new normal (Clevenger, 2012). Although a concise, common definition of CoIT is being refined, CoIT represents a fundamental change in user expectation for technology, the selective usage of available technology, and radical changes in IT decision making, funding, and usage patterns. (Crawford, 2012; Microsoft, 2011; Dasher, 2012)

CoIT refers to the expectation for easy-to-use and attractive interfaces with intuitive functionality at low price, or even zero cost (Golden, 2011). From the user's perspective, ease-of-use equates to near-frictionless availability of tools and solutions, and the ability to use these tools with a transparent setup process, without assistance or intervention from IT support (Reinhard, 2012). From an inter-organization perspective, there must be well-documented, convenient interfaces that do not require the support of a joint engineering project

team (Golden, 2011). A recent survey of over 3000 information workers and business executives in nine countries suggested that user owned devices represent up to 40.7% of the devices used for work purposes, hence there exists a need for application interfaces to work seamlessly with user owned devices (Gens, et.al., 2011).

Two fundamental driving forces behind CoIT have been the users, and changes in the technology solutions (Crawford, 2012). Users can be roughly divided into three subgroups: the senior executives, the Net Generation, and the rapidly growing number of users with access to a mobile device (Gainham, 2012). New technologies including smartphones, tablets, cloud services, mobile solutions and apps have been rapidly replacing the traditional roles of PC and software.

The senior executives are influential in moving organization toward embracing and supporting CoIT. The recent wave of new consumer IT devices offer numerous attractive features for the executives, who can easily afford the new IT as a personal device, or lead adoption of the new devices by the organization. Increasing array of lightweight devices with features such as instant-on, long battery life, mobile connectivity, touch interfaces, and vibrant displays storm the IT world creating a disruptive force that promise to change IT practices for years to come.

The Net Generation generally refers to children born after 1986. The Net Generation has yet to unleash its full influence in changing the perceived value of organizational IT. As active consumers of the new IT, they constantly impose pressure to upgrade IT services. As the new workforce, and having a high level of IT awareness, they are influential in transforming the IT process with preference for the usage of personal devices they have been familiar with in their consumer life (Crawford, 2012; Gainham, 2012 ;Gens, et.al., 2011). They are IT savvy, and incline to question the relevancy of existing IT practices, pushing for changes in IS designs. The Net Generation potentially presents the greatest challenge for IS education (Law, 2011).

The last group of users includes workers that own mobile devices and consumers that embrace mobile devices as the preferred platforms for communication and information consumption. Many workers push the

acceptance of "Bring Your Own Device" (BYOD), and other new technological solutions such as cloud services. A recent study showed that 70% of employees reported accessing corporate information from employee-owned device compared to a 40% estimate by IT departments (Gruman, 2012). Collectively, these users generate numerous issues in terms of IT funding, data security, compliance, IT support and IS usage. As users make independent IT purchase decisions, less funding flows through the IT department, which also must shoulders the additional workload of supporting IT unfamiliar to the IT staff. When the IT department fails to provide adequate support services, the ending result could be an erosion of usage of the enterprise IS through decentralized information management practices. Copies of data begin to flow through non-enterprise information infrastructures, creating redundancy, and effectively eliminating the value contribution of enterprise IT investment.

### **3. CoIT AND CHANGES IN TECHNOLOGY SOLUTIONS**

There have been major technological breakthroughs in the past decade, especially in innovative consumer IT that provide attractive substitutes for mainstream computational features. Some of the recent developments have created speculation that the personal computer could be phased out within years. Some of the more significant technology shifts include (Hinchcliffe, 2011):

1. From Graphic User Interface (GUI) to touch User Interface (UI) & mobile platforms.
2. From data center to cloud services.
3. From PC to devices running Browser & Apps.
4. From email & web contents to social media.
5. From enterprise centric development to consumer centric development.
6. From databases & business intelligence (BI) to Big Data.
7. From enterprise IT infrastructure to personal IT infrastructure.
8. From centrally pushed IT applications to decentralized IT needs, pulling IT solutions.

Each of these areas of change has generated and will continue to generate significant research interests. The momentum of change has been speeding up in the last 12 months, especially in the first five areas. The next section of this paper examines some indicators of change, and

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draws attention to associated IS educational challenges.

#### **4. CoIT TECHNOLOGY SHIFT AND IS EDUCATIONAL CHALLENGES**

The migration away from GUI to touch UI & mobile platforms effectively tore down the last barrier to a digital society. According to recent Pew surveys, 88% of American adults age 18+ owned at least one mobile device, with 46% of adults owning a smartphone, and 63% going online wirelessly with one of those devices (Web, 2012). Now users can perform intensive computational tasks at various time and location, with minimal training and effort. The attractive touch UI made campus IT seem antiquated. The restrictive IT facilities on campuses suddenly became a burden to a new style of learning. The artificial schedules of class meeting and contact hours also became less meaningful with the capability for virtual meeting, online media and real time interaction. The "instruction" of a class could commence with "instructional activities" up to six months prior to the first class meeting, when students started to "interact" with the instructor concerning class activities, learning resources, data storage and supporting IT. When students gradually turned to a continuous learning process, aided by IT supported virtual learning, it became more difficult to plan, justify and support campus-based IT facilities, which were designed for event-based learning. Thus, innovative instructional design and delivery approach is an emerging challenge for IS education to capture the interest of a new generation of students.

Cloud services have been filling the void of restrictive institutional data center. The surge in data flow also tested the service capacity of data center, forcing users to turn to free or low cost cloud services for more predictable access. Some examples include websites, course materials download, and electronic forums. As students expected 24/7 access, easy authentication process, and smooth user interface experience, it became difficult to rely solely on institutional data center for instructional support. Thus, migration of learning resources to public cloud services is a worthy option to capture the passion of students towards IS education.

For many years, the focus of IS education has been in helping students to learn application tools, application development tools, and

eventually acquire the skills to create custom application software. The emergence of Apps raises many challenging questions - "Why should a student learn spreadsheet when there are Apps for the common tasks?", "Why should someone learn HTML script coding when one can create a working website through a point and click Web Builder?", "Why does one need a PC when all the needed tasks can be accomplished through a browser on a mobile device?". The challenge remains to convince students that they have been given a relevant and valuable educational experience. Thus, a new direction could be in the decoupling of the mastering of IT tools from the assembly of the IT tool box, preparing students for rapid changing work environment. A key challenge would be in finding ways to release the creative energy of students, and to explore the potential of powerful IT tools that are yet to be adopted into the academic toolbox.

A surprising trend has been the increasing time people spend in social media. In the process, users neglected the communication channels of email and websites. Thus there is a need to reassess the roles of email and website as effective communication platforms. At the same time, it would be fruitful to explore the potential of social media for instructional support, for team projects, and for research on emerging IT needs and interests. As a result, there will be a need to redefining learning and learning outcomes, to develop new assessment tools for shared learning environment, and to reconsider the roles of information channels in the educational process. For example, the relative roles of textbook, ebook, website, eforum, and social media.

While enterprises have been shifting their IT resources to consumer centric development, there is a need for rapid retooling to include this development in IS education. Many students now have access to affordable, sophisticated personal IT infrastructure, unmatched by the IT infrastructure provided by educational institutions. Moreover, existing relational database systems can no longer handle the massive data stream in a scalable and cost effective manner. A major challenge would be to take students from classroom cases with limited data, to gain experience working with massive data volume. The slowdown in enterprise centric development also indicates a need to adjust the forecast for demand for IT talent in enterprise system related activities.

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## **5 NET GENERATION AND IS EDUCATIONAL CHALLENGES**

The reality of CoIT raises an extremely important question: "Will there be sustainable demand for the current IS educational products?" For many years, IS programs have housed the best collection of IS learning resources for students. CoIT reflects a change in attitude toward IT, especially among the Net Generation. By 2012, The Net Generation accounted for a majority of the students on university campuses. (Internet Generation, 2012) As avid users of computer and Internet, the Net Generation demonstrates much less tolerant of boredom than previous generations. They learned just in time, loved experimentation, with preference for web-based tools and services. They were less inclined to follow a curriculum, neither would they equate hard work with learning (Smith, 1999; Hay, L.E. 2000).

The Net Generation grew up through the development of CoIT. They are more likely to own the latest generation of consumer IT than previous generations. They surf the Internet for information rather than reading textbooks, they turned to Google and Wikipedia for references rather than visiting a library. They are skilled in locating tools and web services for task completion. Many of them enjoy access to better technology and better IT infrastructure than those provided by academic institutions. They do not hesitate to request special accommodation to meet their diversified interests. As a highly mobile generation, they demand the availability of technology at their choice of time, location and communication channel.

At the same time, it has been challenging to motivate the Net Generation into deep learning, particularly when they have been pampered with the convenience and ease-of-use of CoIT. The ease of finding information, the availability of quick tools, and even the flood of opinions from social media, represent factors that tend to weaken the problem solving skills of the Net Generation. This could be particularly challenging when trying to train future IS designers, who must be objective and analytical.

The Net Generation is known to be curious, independent, contrarian, intelligent, adaptable, confident, and focused (The Net Generation, 2000). Often this translates to failure to follow

detailed instructions. The Net Generation is inclined to have problems follow a training schedule - some desire to focus and work ahead of schedule; others sidetrack to related topics, and some dwell on excessive details of a topic while neglecting the schedule and requirements. This often creates unplanned challenges in "controlled learning environment", where each student has been expected to completed prescribed works, on rigid schedule, around the use of standardized, institutional provided IT and IT infrastructure.

## **6. RETHINKING THE INTERPRETATION OF IS 2010 CORE COURSES AND CoIT**

There have been drastic shifts in global acceptance of CoIT in the last two years since the announcement of the IS 2010 curriculum recommendation (IS010, 2010). CoIT presents new challenges that merit consideration in IS curriculum revision efforts, as follows:

1. Foundations of Information Systems  
CoIT accounted for 40% of enterprise IT usage and over 50% of US adult IT usage. A recent straw poll of students in an Introduction to Computer general education course showed that nearly 50% of the enrolled students own a MacbookPro. Other students captured pages of book with smartphones, and routinely swapped assignments through cloud services. However, these are not the typical IT practices covered in textbooks and core topics, nor do students indicate much interest in the traditional topics such as Windows system, and data storage technology. The pressing questions of relevancy, popularity, platform support, continuity, and IT ecosystem seem to command increasing importance in defining the desirable fundamental understanding of information systems. As IS education expands its scope from enterprise IS development to web applications and CoIT, it is important to include fundamental topics relevant to students pursuing different career paths.

2. Data and Information Management  
Search engines are rapidly displacing database systems as the tool of choice in locating information, especially for the Net Generation. Although data processing activities and database systems are still the backbone for data management, customized user interfaces, smart sensors, semantic engines, and contents management systems have increasingly roles in the utilization of enterprise data. There are also

needs to address data and information distribution issues, especially related to CoIT.

### 3. Enterprise Architecture

The spreading of data as a result of CoIT creates potential needs for a new design of Information Architecture, where both internally and externally sourced information must be blended to support enterprise mission. Mobile devices are becoming important tools for data collection and information dissemination, with a desirable shift in enterprise IT supports.

### 4. IT Infrastructure

The increasing role of cloud services suggests needed attention to outsourced services management, and roles of individual consumer IT infrastructure. New skills must be developed to develop, manage and evaluate outsourced services. Special attention would be required on compliance issues, data usage, data security issues and IT infrastructure interfaces. This is especially important towards supporting data sharing in the emergent multiplatform technological environment, especially the rapidly developing mobile platforms.

### 5. IS Project Management

CoIT enhances virtual interaction, making it desirable to address virtual project management and increasing consumer roles and participation in projects. The roles of social media are casting new meaning to project development, especially when users are given active roles in projects.

### 6. System Analysis and Design

CoIT points to the need for smart interface designs for enterprise systems. Web and browser based software development drives innovation and reshapes enterprise IS designs. Low cost and high speed hardware shifts attention to rapid development, with increasing emphasis on user experience.

### 7. IS Strategy, Management and Acquisition

Considering CoIT, increasing attention would be required for agile IS services, strategic IT alliances, shared IT resources and universal connectivity. As consumer spending becomes a major economic driver, Enterprise IS strategy development must also take into consideration information consumption pattern of end users, their preferences for IT platform, and the raising trend of bring their consumer life into work life.

## 7. CONCLUSIONS

Although CoIT seems to be remotely related to the enterprise IS at this stage, business executives and IT industries have taken this development seriously. Recent developments have already placed major IT vendors at the brink of fighting for survival, while others have abruptly modified IT strategies and core IT technology around the CoIT developments.

It is important for IS educators to participate in this evolving change and help define enterprise boundaries for CoIT, and prepare future IS leaders. The challenges will be great, confronting unfamiliar CoIT innovations, new tools, and new IT platforms. There is a need to recast the image and role of IS program, rethink the mission of IS curriculum, reposition the importance of innovation, rediscover the market needs, readjust to a new generation of learners, reassess desirable learning outcomes, redesign the IS learning experience, realign instructional resources, and retool to assess and evaluate student accomplishments, while building on the broadened student IT experience and interests beyond the business function.

The Net Generation has been raised through the evolution of CoIT, and to them, IT is fun and easy to learn and use. They have many available options for their computational tasks. How would IS education deepen their experience in the utilization and control of information technology? Furthermore, how would IS education develop them to add value to enterprise IS application needs?

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