

Article

The Evolving Role of IT Departments in Digital Transformation

Che-Chuan Hsu ^{1,2,*} , Rua-Huan Tsaih ² and David C. Yen ³

¹ Department of Information Management, Lee-Ming Institute of Technology, Taipei 24305, Taiwan

² Department of Management Information Systems, National Chengchi University, Taipei 11605, Taiwan; tsaih@mis.nccu.edu.tw

³ Department of Management Information Systems, School of Economic and Business, State University of New York College at Oneonta, Oneonta, NY 13820, USA; David.Yen@oneonta.edu

* Correspondence: chuan1020@gmail.com; Tel.: +886-2-2909-7811 (ext. 3104)

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Abstract: In the digital era, organizations are increasingly tasked with creating and utilizing new content, applications, and/or services through the use of advanced information and communication technologies (ICT) to sustain a competitive advantage. Indeed, sustainability is now an embedded and overarching feature of organizations' strategic planning. Research has shown that information technology (IT) departments are vital to organizations' digital transformation. However, the role of IT departments in non-ICT-oriented organizations undergoing digital transformation has yet to be explored. Our study reveals that although the IT departments of non-ICT-oriented organizations play an important and proactive role in the early stages of organizational transformation and a dominant role in developing ICT capabilities, they will be unable to assume a leadership role within the organizations after transformation is complete.

Keywords: IT departments; digital transformation; non-ICT-oriented organization; dynamic capabilities

1. Introduction

In the digital era, organizations are increasingly tasked with creating and utilizing new content and/or services through the use of advanced information and communication technologies (ICT) to gain a competitive advantage in sustainable development [1–4]. They compete not only in generating new products and/or services and knowledge, but also in effecting positive social and environmental change [5]. This is true of both ICT-oriented organizations (i.e., the “tech sector”) and non-ICT-oriented organizations (such as government sector institutions). Table 1 provides some examples of ICT- and non-ICT-oriented organizations. Both use sustainability strategies that not only minimize their environmental impact, but also increase their business opportunities, business competitiveness, and business benefits [6,7]. In particular, non-ICT-oriented organizations should look at the “big picture” of their rapidly changing external environments (EEs) and draft policies accordingly [8]. To keep pace with competitors in the digital era, these organizations must embrace opportunities and overcome various challenges to meet the accelerating demands of their changing EEs [9]. For instance, Barnes & Noble have developed the Nook, a suite of e-book readers based on the Android platform to compete with Amazon's Kindle and other tablets. Similarly, Starwood Hotels has developed a keyless entry system, allowing guests to use their smartphones to unlock hotel doors with ease. The British Museum has launched its own television channel, which displays video clips on exhibitions and collections, offering interesting behind-the-scenes experiences of the museum [10].

Table 1. Examples of information and communication technologies (ICT)-oriented and non-ICT-oriented organizations.

Category Industry	ICT-Oriented Organizations	Non-ICT-Oriented Organizations
Bookstores	Amazon	Barnes & Noble
Hotels	Airbnb	Starwood Hotels & Resorts
Museums	Big Ten Experience	British Museum

Sustainability is now an embedded and overarching feature of organizations' strategic planning [11]. Both ICT-oriented and non-ICT-oriented organizations recognize the potentially significant role of ICT in enabling and supporting sustainability practices [7]. In terms of education, for example, ICT can overcome some of the major handicaps of conventional education. However, researchers also stress that ICT should enhance or supplement traditional education, not replace it. Therefore, ICT applications are often seen as playing a vital role in improving efficiency across the sustainability spectrum and helping to deliver sustainable growth [12]. Specifically, such applications are collectively responsible for ensuring that non-ICT-oriented organizations contribute to sustainable development [13]. For instance, according to the International Council of Museums (2011), "sustainability is the dynamic process of museums, based on the recognition and preservation of tangible and intangible heritage with the museums responding to the needs of the community. To be sustainable, museums, through their mission, must be an active and attractive part of the community by adding value to the heritage and social memory." Consequently, a museum's implementation of organizational strategies enhances its own sustainability [14]. Over the years, ICT has provided organizations with the capabilities required to increase their profitability, efficiency, productivity, knowledge, and competitive advantage [15,16]. Therefore, ICT has become a major supporter of business innovation and wealth generation and an important tool enabling organizations to develop sustainability capabilities [7].

From the perspective of the knowledge economy, museums are all non-ICT-oriented organizations but differ a great deal in terms of funding, size, type, and collections [11]. Museums play a significant role in collecting, recording, safeguarding, and exhibiting relics and/or heritage in various forms [17]. Recently, awareness of the role of culture in sustainable development has increased [4,8,18]. For instance, the National Palace Museum (NPM) in Taiwan, one of the top museums worldwide, has begun to conduct projects to develop various kinds of IT-generated content (which refers to physical entities that take a digital form and/or are created through digital practices [16]) and ICT-enabled services in the last few decades [19]. (Innovative services are often developed through the integration of creativity, ICT, and profitable business models. These services are ICT-enabled because they are online, real-time, interactive, and provided through ICT applications [10,16,20–23].) To revitalize the value of its cultural relics, the NPM has undertaken a sustainability strategy related to the development of ICT applications, such as three-dimensional animations, websites, interactive exhibitions, and mobile applications (apps) [16]. Figure 1 shows how the NPM has sought to digitize its archive of historical treasures since joining the Taiwan e-Learning and Digital Archives Program in 2002. Its goal is to transform precious artifact data into creative IT-generated content and/or innovative ICT-enabled services for museum customers in general and the young generation of customers in particular [10,16,20,22–24]. Building on these successes, the NPM is planning new means of effectively and sustainably reviving China's cultural and historical artifacts and improving public understanding of these objects. In terms of strategic implementation, creative IT-generated content and new media exhibitions can be treated as reusable resources. This concept can also be applied to innovative ICT-enabled services. On the next level, forms of IT-generated content and new media exhibitions can be reorganized to give larger-scale content and exhibitions. They persist as building blocks for expansion, whether for the promotion of education or for cultural and creative development. Knowledge of cultural relics is either simple or complex, and can be combined with

creative IT-generated content, innovative ICT-enabled services, and new media exhibitions. Knowledge of cultural relics can thus also be regarded as a building block for expansion.

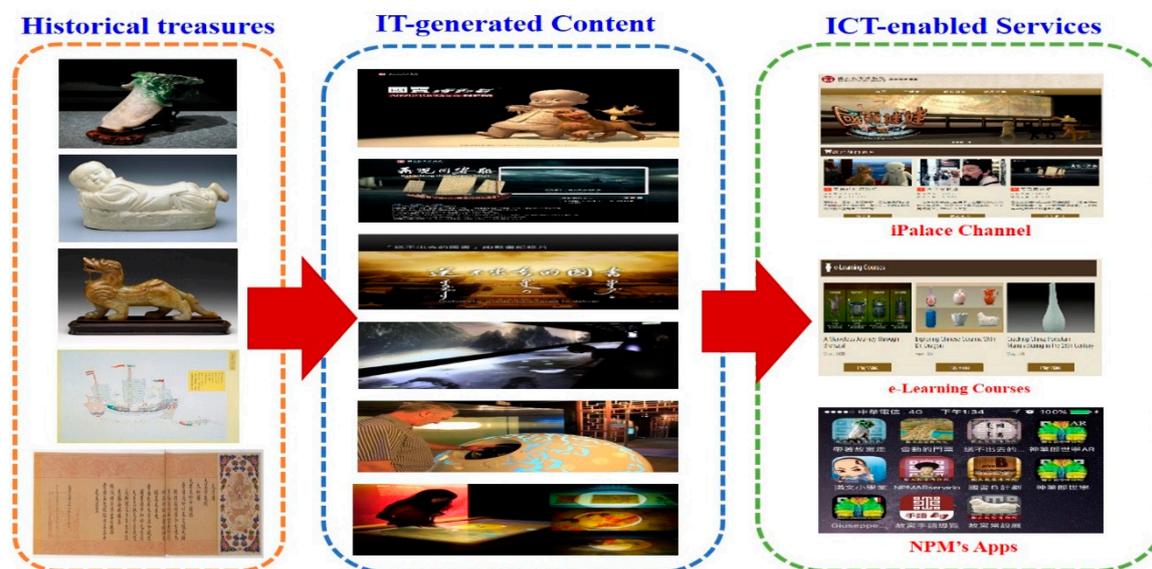


Figure 1. Developing historical treasures as information technology (IT)-generated content and ICT-enabled services at the National Palace Museum (NPM).

As previously discussed, each of the above is an example of how non-ICT-oriented organizations can develop and evolve their dynamic capabilities (DCs) to help guide their decisions and actions in their rapidly changing complex environments and sustain a competitive advantage [3,4,25]. However, a key question concerning their vision, culture, organizational structure, and model of sustainable development has yet to be answered: What role can and should IT departments play in non-ICT-oriented organizations undergoing digital transformation?

To keep pace with fierce competition for sustainability in the digital era, non-ICT-oriented organizations are seeking to develop their own ability to produce creative IT-generated content and/or innovative ICT-enabled services [10,16,21,22]. To this end, IT departments in non-ICT-oriented organizations need to change their supporting role to a proactive or even dominant role. Traditionally, IT departments have tended to wall themselves off as merely technical centers supporting the needs of other business functions or units [26]. In the digital era, however, IT being relegated to a mere supporting role can hamper non-ICT-oriented organizations' critical efforts to develop digital content and/or services.

One of the most common challenges/problems encountered is that IT departments do not speak the same conceptual language as other business units [27–29]. IT departments often struggle to transform themselves from technically oriented to customer oriented. However, changing environmental challenges such as digitalization reveal the value of IT departments as strategic business partners in general management and other critical areas, rather than as merely supporting services [30]. Although Drnevich and Croson [31] claim that the reordering of roles and responsibilities in IT departments in the digital era reflects a new paradigm for non-ICT-oriented organizations, scant research has focused on the changing role of IT departments in these organizations—from their traditional role as supporting units to a much more proactive and even dominant role as providers of creative IT-generated content and/or innovative ICT-enabled services.

The transformation of IT departments should be considered part of a broader process of organizational transformation. This involves organization-wide strategizing that may far exceed functional thinking or the functional perspective. Strategic organizational transformation holistically addresses the opportunities and risks posed by advanced IT to the organization, and can have major structural effects on the whole business [6,32–34]. The transformation process is complex, chaotic,

and dynamic, and may thus fashion a new form of cross-functional department [35,36]. Therefore, organizations' DCs play a crucial role in organizational transformation [37].

DCs are the higher-level competencies that determine an organization's capability to integrate, build and reconfigure internal and external resources to address rapidly changing EEs and sustain a competitive advantage [38–40]. Augier and Teece [41] and Teece [42] state that DCs can be disaggregated into the following three capacities: (1) sensing and shaping opportunities and threats; (2) seizing opportunities; and (3) maintaining competitiveness through enhancing, combining, protecting, and, when necessary, transforming the organization's intangible and tangible assets. In summary, DCs enable organizations to sense changes in their EEs and to seize the resulting opportunities to support organizational transformation. DCs are built on the microfoundations of the sensing–seizing–transforming process. Although they are difficult to imitate and sometimes are deeply embedded in the organization, these foundations can be a source of sustainable competitive advantage if organizations can find diverse ways of developing them and drawing on various kinds of accumulated knowledge exercised through separate but reinforcing internal activities.

As per the earlier discussion, this study fills theoretical and practical gaps in existing research by exploring the evolving role of IT departments in non-ICT-oriented organizations. We first describe the microfoundations of the sensing–seizing–transformation process and then derive these foundations deductively, using theories of and research on best practice, and inductively, based on the NPM case. As a result, the research has three objectives: (1) to identify the sensing–seizing–transforming process in non-ICT-oriented organizations, (2) to explore the microfoundations of this process, and (3) to determine what role IT departments should play in non-ICT-oriented organizations undergoing digital transformation. This study also provides managerial insights for non-ICT-oriented organizations and offers some suggestions for future research to be conducted in this field.

2. Literature Review

“IT” traditionally denotes computer-based technologies for processing information and includes items such as the EE, infrastructure, relevant equipment and other peripherals and accessories, factory and office automation technologies, software and hardware developments, and relevant applications and services [43,44]. To keep pace with aggressive competition in the digital era, ICT plays an irreplaceable role in producing creative IT-generated content and/or innovative ICT-enabled services and knowledge, and sustainable development relies largely on ICT to facilitate or even enable them to affect positive social and environmental change [5,15,16,21,23,45–47]. Both ICT- and non-ICT-oriented organizations are recognizing the potentially significant role of ICT in enabling and supporting sustainability practices [7,48,49]. Sustainability is now an embedded and overarching feature of organizations' strategic planning [11,44,50]. Therefore, ICT has become a major supporter of business innovation and wealth generation, and has helped organizations to develop sustainability capabilities [29,48,49,51].

Nevertheless, an organization's capability to adopt/implement up-to-date ICT may depend on its structure, leading to the implementation of varying operational frameworks and procedural reforms [4,50,52]. Prior studies have indicated that the success of an organization is determined by its ability to identify, cope with, and even utilize the crises and/or opportunities arising from ICT advancements [9,53,54]. Consequently, ICT has a significant influence on organizations, as a key dimension of external environmental changes [43,46,55,56]. One of the functions deployed to meet organizational challenges is environmental scanning (ES). ES involves collecting information on the EE [52,57]. An organization may have many departments performing ES-related tasks, such as searching for important information; effectively recognizing, understanding, and sorting this information; and presenting the results to management to serve as a foundation for organizational transformation [58]. Searching activities are relevant to an organization's “sensing” of rapid changes in the EE [42]. This is followed by continuous rounds of organizational restructuring and transformation, and can involve many changing elements, whose “chemical reactions” test the organization's ability

to respond to changes in its EE [46]. As a large percentage of an organization's new products and service applications are developed to meet the various challenges generated by/from its EE, searching and exploring activities should not be limited and localized. They must embrace all potential collaborators—customers, partners, complementary organizations—that engage actively in innovation [42]. An organization's capabilities must therefore remain dynamic enough to achieve the best strategic “fit” [38].

Superior organizational capabilities result not only from experience and the accumulation of learning processes and opportunities, but also from superior management and social capital, which in turn is derived from the sensing, seizing, and transforming activities central to the microfoundations of DCs [15,16,59–61]. These capabilities are underpinned by the organizational and managerial competencies required to sense the EE, seize opportunities as they become available, and transform in line with changes [62]. DCs, then, reflect an organization's ability to innovate and to adapt to and create change that is favorable to customers [63,64]. A number of scholars have made significant contributions to this conceptual research [39–42,59–62,65–74]. For instance, Eisenhardt and Martin [65] identify cross-functional research and development (R&D) teams, new product development routines, quality control routines, technology transfer and/or knowledge transfer routines, and certain performance measurement systems as important elements of DCs. Zollo and Winter [74] argue that DCs are structured and persistent in a given organization, whereas Rindova and Taylor [67] identify DCs as emergent and evolving.

Augier and Teece [41] propose a sensing–seizing–transforming concept that underpins the microfoundations of DCs. For instance, if an organization has a good early warning system (i.e., it can quickly “sense” developments in the business environment), it will have more time to respond to both positive and negative shocks [69]. Generally, sensing capabilities reflect an organization's cognitive skills, which can yield numerous benefits. Similarly, an organization that is able to rapidly seize opportunities and transform itself in response to these opportunities will be more resilient when dealing with sudden shocks that require rapid alignment or immediate expansion. To this end, the most desirable approach is to embed scanning and interpretive processes throughout the organization and provide feedback channels to ensure that top management remains well informed [62].

Teece [42] demonstrates that the microfoundations for DCs comprise routine changes (e.g., product development along a known trajectory) and analytical methodologies (e.g., investment choices). These can be disaggregated into three clusters of activities and adjustments: (1) identification and assessment of an opportunity (sensing), (2) mobilization of resources to capitalize on the opportunity (seizing), and (3) continued renewal (transforming). Sensing, seizing and transforming are essential to enable an organization to sustain itself in the long term by responding to changes arising continuously from customers, organizational policies, computing technologies, and the EE [64,75]. These changes enable organizations to evolve and coevolve with their EE, and as such, are critical to organizational transformation [38].

As noted above, the sensing–seizing–transforming process involves more than merely revitalizing traditional strategic management capstones [69]. It also integrates an organization's internal and external activities while embracing the fundamental importance of creating, transferring and protecting intangible assets, including knowledge and capabilities such as decision-making skills, leadership, branding, knowledge management, technological know-how, relationships, and new ways of organizing. Based on the above discussion, the concepts proposed in this paper focus on the changing role of IT departments in non-ICT-oriented organizations within the sensing–seizing–transforming framework.

3. Methodology and the NPM

This paper uses the NPM as a case study to explore the evolving role of IT departments in non-ICT-oriented organizations. Qualitative research methods facilitate a detailed examination of what happens naturally in knowledge-centered organizations, while providing access to context and

seeking a better understanding of social reality [76]. Although some studies address organizations' sustainability practices, few discuss the use of ICT applications in strategic management by exploring the evolving role of IT departments in non-ICT-oriented organizations. In addition, very limited research has offered a detailed description of the potential role played by IT departments in such organizations undergoing digital transformation, and the selected case organization offers novel insights that enable us to conduct a preliminary investigation into a set of sustainability practices and the evolving role of IT departments in non-ICT-oriented organizations. We collected data on the organizational transformation reflected in the museum's IT-generated content and ICT-enabled services. Documents were reviewed, examined and categorized. In addition, interviews were conducted with two categories of interviewees: NPM professionals from various departments and external experts (policy-makers, academics, and former NPM staff). The interviews ranged from 1 to 2 h each, and a digital voice recorder was used (with interviewees' consent). Each interview was transcribed in Mandarin to reduce the potential for confusion or misunderstanding. Only essential parts of the interviews were quoted and translated into English by a certified Chinese–English translator. The NPM is one of the top museums worldwide, and is at the forefront of creative IT-generated content and innovative ICT-enabled service development, expanding the traditional museum space online to meet today's challenges. The case study should thus be beneficial to other non-ICT-oriented organizations.

The NPM has played a leading role in incorporating ICT into the development of cultural sustainability practices since 1998 [77]. It is one of the ministries and councils of/under the Executive Yuan, which is overseen by the Office of the President (as shown in Figure 2). In line with government policy, the NPM has completed a number of projects related to its shift toward IT-generated content and services, as shown in Figure 3. These programs have yielded an abundance of innovative digital content. The museum's archive is no longer limited to historical relics; it now includes relevant metadata and IT-generated content, such as digital images, interactive media, animations, and augmented reality.

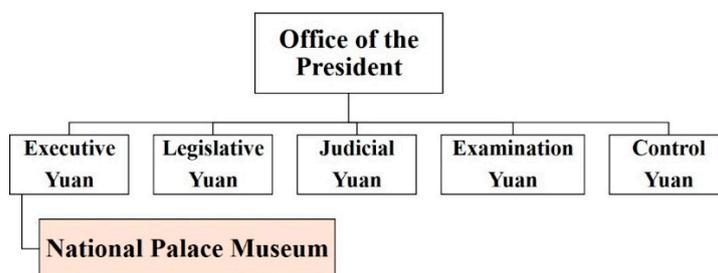


Figure 2. Position of NPM within the structure of the central government of the Republic of China.

Overall, the NPM's digitization efforts can be divided into three conceptual levels [47,77]. The most fundamental level is the Digital Archives Program, under which numerous relics are digitized and archived. The next level is the Digital Museum Program, under which the digital materials created in the Digital Archives Program are combined with marketing materials to complement the museum's exhibits in practice. This enriches the NPM's displays and appearance and helps to capture international attention. Interactive technologies such as digital media, animation and films help visitors to better understand the essence of historical relics. The final level consists of a Digital Learning Program component and a Knowledge Economy component. The objective of this level is to use the abundant resources obtained in the two previous levels to develop online learning platforms to study cultural relics, such as the NPM's e-learning platform. The goal of the Digital Learning Program is to strengthen the museum's educational curricula through the power of technology, raise awareness of the beauty of cultural relics, and increase the public's cultural literacy. The objectives of the Knowledge Economy component are to preserve the informational value of cultural relics, to offer digitized documents to private organizations via licensing mechanisms for value-added applications, and to create new products with digital content. At the organizational level, the NPM recognizes that

these digital programs and projects are critical due to the interdisciplinary nature of integrating IT, processes, and client demands in response to the changing EE.

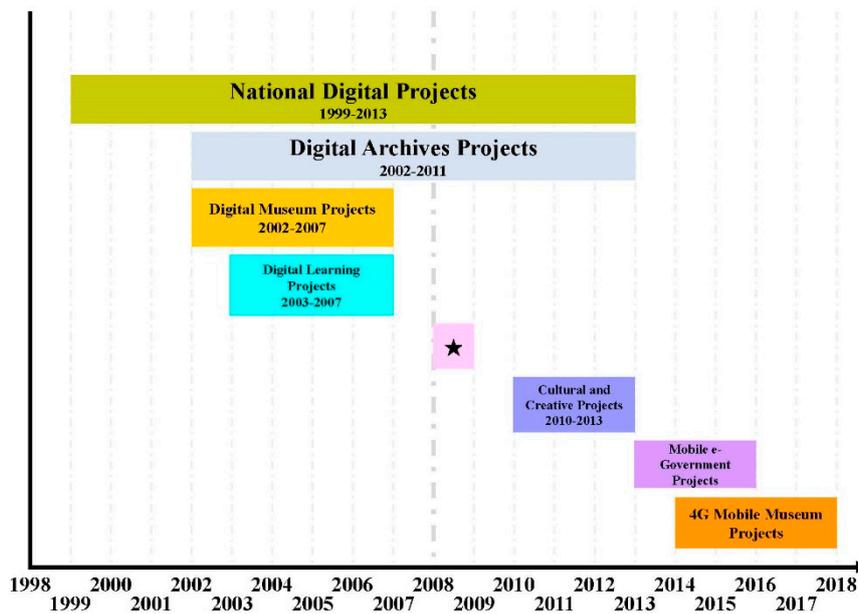


Figure 3. Timeline of projects conducted by the NPM.

Digitization has enabled the NPM to add new value to historical artifacts through IT-generated content and ICT-enabled services. For instance, “Old Is New,” an advertising campaign launched by the NPM in 2006, was based on Tingjian Huang’s “A Letter on Floral Fragrances” and the “Adventures in the NPM” animation series. As Figure 4 shows, the NPM has developed a number of similar ICT-enabled services made available via websites, social media, the iPalace Channel, mobile apps, and IT-generated content [24,78].



Figure 4. ICT-enabled services developed by the NPM.

4. Discussion and Analysis

This paper builds on Augier and Teece's [41] analysis of DCs to illustrate the microfoundations of the sensing–seizing–transforming process in a non-ICT-oriented organization. These microfoundations reflect not only the strategic choices made by the NPM during its digitization projects, but also the rapid and uncertain changes in the EE that precipitated these choices (as shown in Figure 5). Each microfoundation can be a source of sustainable advantage if developed through difficult-to-imitate skills that are deeply embedded within the organization, as is the case for the NPM. Such skills are honed by drawing on cumulative knowledge exercised through separating but reinforcing internal activities.

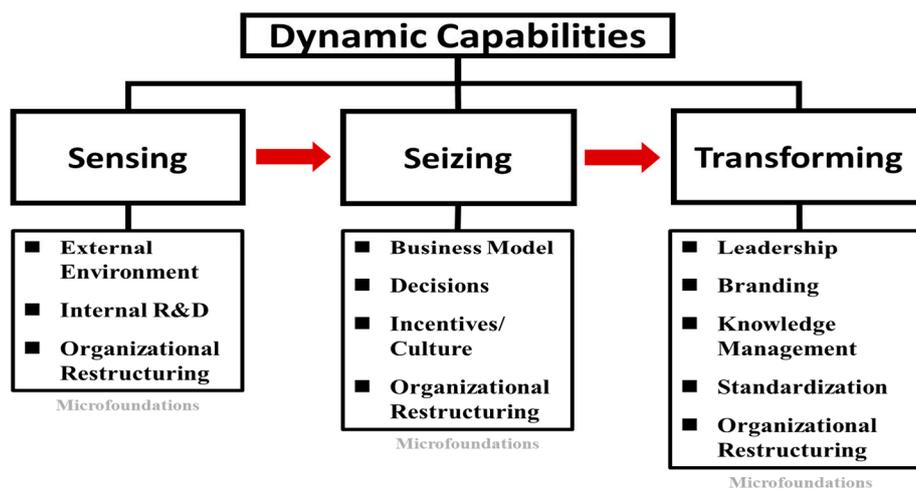


Figure 5. Microfoundations of the sensing–seizing–transforming process (adapted from Augier and Teece [41]).

4.1. Sensing

EE. Organizations must have the capacity to respond to their rapidly changing EEs. The leader of a museum, for example, must look at the “big picture” of the museum’s environment and draft policies with sustainable development in mind [8]. The NPM realized that digital convergence can bring about a high degree of integration in terms of content, devices and creativity. The organization thus decided to use new media technology to develop novel service models and thereby changed the public’s expectations and behavior. Zhou Wei-Qiang, section chief of the Department of Rare Books and Historical Documents, explained this objective as follows:

“The NPM hoped to create and develop its products and services. Its best approach was to become an observer in the IT industry, understand up-to-date IT and apply it creatively to exhibits, and actively seek partners to produce new IT-generated content and/or ICT-enabled services.”

The NPM thus uses up-to-date IT to attract younger visitors and provides approachable interactive displays (e.g., New Media Arts) and educational services (e.g., the iPAlace Channel). The government has also urged the NPM to shift its image away from that of a repository for tradition, cultural meaning, and aesthetics toward that of a trove of modern cultural commodities.

IT has become integral to the government’s efforts to integrate historical Chinese culture and art with modern life. The directorship of the NPM, unlike that of other museums, is a political role equivalent to that of a minister; the director is nominated and appointed by the president and the premier, as shown in Figure 2. This may help to explain why the NPM has some of the most fully integrated IT resources in the world. The museum has implemented more IT projects than many other museums worldwide, such as the British Museum and the Louvre. For instance, the NPM launched its National Digital Projects as early as 1998, under the direction of the Executive Yuan, as shown

in Figure 3. Each of the National Digital Projects used state-of-the-art IT, contributing to the NPM's leading role in developing digital archives in the 21st century.

Internal R&D. In response to advances in IT and Internet applications and to meet the diverse needs of the public, the NPM has developed new content and services. In the words of former NPM director Shih Shou-Chien, "museums [that] adopt up-to-date IT can provide better services." The NPM's early applications of IT (before 2001) were actually intended to aid internal administrative management, not to provide information to the public. However, after significant rounds of digitization, the NPM began to expand its IT implementation to new contexts and use its IT resources to develop new information systems and multimedia applications to provide a wider array of ICT-enabled services. IT-informed leadership must be flexible and continuously learn and drive digital strategy-making through relevant managerial practices, creative and innovative capabilities, and the agile use of IT knowledge. The museum's IT department also used state-of-the-art IT and Internet applications to enhance its internal R&D capabilities. In sum, internal R&D provided the NPM—and especially its IT and related departments—with more room and potential to innovate content and provide new service offerings, creating an outstanding opportunity to transform itself organizationally.

Organizational restructuring. Taiwan's Council for Cultural Affairs of the Executive Yuan has stated that the creative industries must make important contributions to generating employment and economic value. The Executive Yuan developed a "Plan to Develop the Creative Industry" as one of 10 major subprojects of the "Challenge 2008 National Development Plan." The former was confirmed by the Executive Yuan on 7 March 2008, and its implementation by the NPM began the following week. Former NPM director Chou Kung-shin observed that due to overlaps in the organization's administrative levels at this time, the museum's affairs were not efficiently allocated and handled. In other words, the museum's departmental system/structure failed to match its professional needs and keep pace with its development. Therefore, an Organization Revision Committee was established to restructure the organization in line with the "Basic Code Governing Central Administrative Agencies Organizations." Twelve departmental units remained the same, but 8 departments, 4 offices, and 38 sections were reorganized into 9 departments, 3 offices, and 40 sections. Notably, the exhibition design section was merged with the computer center to form the Department of Education Promotion.

4.2. Seizing

Business model. A business model covers the entire process of value creation by providing customers with the products and/or services they require [44]. In the past, museums were perceived primarily as academic institutions with no commercial future; few regarded them as venues for recreation. Organizations undergoing digital transformation adopt state-of-the-art IT, such as social media, mobile access, analytics, and embedded sensing devices, to improve their business, enhance customers' experience, streamline their operations, and/or create new business models [68]. Former NPM director Lin Mun-Lee described this process as follows:

"Museum digitization has had a widespread influence on commerce and industry and has promoted the concept of 'museums without walls.' Its far-reaching influence helps museums to derive more diverse business models."

The NPM began licensing vendors to use its trademark and digital images. The vendors then produced spinoff creative goods and sold them around the world. Lin James Quo-Ping, former chief curator of the Department of Education, Exhibition, and Information Services, explained this system as follows:

"The NPM authorizes manufacturers to reproduce the museum's digitized images, and manufacturers then arrange exhibition tours, create installation art, and charge fees for public viewing. This is a new business model. As a result, the achievements of the NPM in digitization are extended from collections, exhibitions, and education all the way to products."

For instance, the NPM collaborated with *National Geographic* in 2007 to film the documentary *Inside: The Emperor's Treasure*. This cross-industry alliance allowed *National Geographic* to create a high-quality program and the NPM to promote and market its brand, increasing its recognition. The NPM established authorization mechanisms in 2006 and 2007, providing a legal basis for its subsequent commercial activities. These administrative regulations have enabled the museum to take a great leap forward in commercial terms.

Decisions. Given the rapid changes in IT and organizations' EEs, decisions made as part of the seizing process are crucial to organizational transformation. IT leaders should have the information literacy required to promote new IT-generated content and related services. This may be associated with their background. In the past, government programs and projects may have been assigned to the NPM in accordance with e-government policies. Later projects required more granular leadership. Kuo Chen-Wo, section chief in the Department of Education, Exhibition, and Information Services, who is well versed in information management, is able to sense changes in IT and the EE and seize opportunities accordingly. He described his leadership experience as follows:

"To organize new media arts exhibitions, our department now applies for funds from government departments, such as the National Science Council or the Council for Cultural Affairs. In the past, the director did not have to seek government funding; section chiefs in any of the departments could apply for and execute projects. Of course, they also needed the support of previous directors for this process to go smoothly."

This was a major issue for the NPM, because decisions were formerly made not by the director but by section chiefs; the director was only required to approve or reject such decisions later. Therefore, decisions made during the seizing process can be regarded as one of the microfoundations for DCs in the process of organizational transformation.

Incentive/culture. The influence of digitization on the NPM was affected by the attitudes of its employees. NPM employees are subject to expectations from the public. Public opinion can influence an organization's internal culture, leading to changes not only in its exterior hardware, but also in its internal motivation. Former director Lin Mun-Lee described the importance of positive changes from the inside out as follows:

"True organizational transformation starts from the inside. Internal transmutation methods can motivate employees. During this process, I frequently discussed matters with [employees] and interacted with them to enable them to tell me what they needed. I was very willing to coordinate with my employees to help them do their work."

For instance, the NPM held Gallery Talks, a forum in which the public could interact with curators. Most of the museum's curators are researchers. When they learned that they had to take turns speaking with museum visitors who had signed up in advance for the talks, some asked why they had to do the work of tour guides. Initially, therefore, innovative forms of public engagement encountered internal opposition. However, the momentum later became positive. The Gallery Talks established a platform for communication between curators and visitors, giving curators the opportunity to temporarily escape their identity as researchers and listen to what visitors had to say, and thereby, to plan and arrange exhibitions from the perspective of visitors rather than of relics. Despite their initial objections, the researchers ultimately came to understand the strategic value of their roles as curators through direct contact with visitors. Some even asked their colleagues to observe the audience's reactions during the talks so as to avoid lengthy explanations that would disengage them from the visitors' input. As NPM employees began participating in and understanding the digitization process, the organization was able to seize a crucial opportunity for transformation, providing another microfoundation for the NPM's DCs.

Organizational restructuring. As well as strengthening its collection, conservation, research, exhibition, and education functions, the NPM adapted to emerging digital trends and incorporated

new management and marketing/promotion ideas into its operations. By changing and restructuring its organization and administration, the NPM transformed itself into a place that the public was eager to visit. In 2012, the Executive Yuan began an organizational restructuring process to reduce the number of cabinet-level agencies from 37 to 29, leaving 14 ministries, 8 councils, 3 independent commissions, and 4 other agencies, including the NPM. In response to this adjustment, the NPM implemented its own organizational restructuring to make its operations smoother and more efficient. For instance, the functions of the Department of Exhibition Services and the Department of Education Promotion had previously shown considerable overlap. The NPM thus combined the two to form a new Department of Education and Exhibition Information Services, divided into six sections corresponding to three major functions—education and awareness programs, exhibition services, and IT.

4.3. Transforming

Leadership. Leadership is “the soul of museum operations.” Leaders are tasked with directing organizational operations and development [9]. In 2006, deputy director Lin Mun-Lee took over leadership, becoming the first female director in the NPM’s 80-year history. She explained her leadership philosophy as follows:

“All forms of organizational transformation or change meet resistance or carry baggage, particularly in old public departments such as the NPM. However, I am optimistic about change because difficulties can be overcome. The method I adopted [at the NPM] was internal transmutation, to reduce the resistance I might encounter. I remained professional and neutral, which helped to resolve difficulties.”

A number of NPM section chiefs and individuals in other executive positions reported that former director Lin Mun-Lee conducted herself as a leader and was able to seize opportunities to present and promote the museum to the public. She tended to play the role of mediator, seeking a balance between two approaches in the form of feasible self-implemented alternatives or outsourcing additional experts to handle such matters to capitalize on the potential advantages of the NPM’s relics.

Like the former director, Feng Ming-Chu was promoted from the role of relics expert to that of deputy director and then director. She requested that the team responsible for curating new media arts exhibitions listen to the NPM’s relics experts. Although the resulting meetings focused on exhibition content, the experts provided the curatorial team with additional inspiration. Former directors Lin Mun-Lee and Feng Ming-Chu each assumed the role of organizational leader, rather than the traditional managerial role, while still serving as deputy director. Being the leader of a traditional organization is very different from being an expert in historical art or artifacts. Thus, leadership was a crucial microfoundation for the organizational transformation of the NPM.

Branding. Branding is an image-building activity associated with marketing but is also linked with an organization’s prestige and reputation. In the past, the NPM conveyed the impression of authority and mystery, presenting its relics as symbols of the government’s power. Now, the NPM seeks to become more than just a museum; its goal is to become a brand belonging to everyday aesthetics. Former director Chou Kung-Shin recommended that the NPM pursue branding and brand authorization as a new line of business. The NPM’s commercial operating strategies have two crucial qualities. The first is differentiation, which involves creating its own brand within the industry. The second is creative design, to attract customers’ attention and meet their needs. Entering into branding activities was thus another microfoundation for DCs in the NPM’s transformation process. For instance, the “Old Is New” project launched by former director Lin Mun-Lee in 2006 and 2007 was closer to a marketing and branding campaign than a traditional curation activity. This project helped the NPM to establish its brand in its areas of expertise. This was a new type of branding; in particular, the NPM opted to showcase its IT as part of its brand, rather than relying on relics alone. The efforts and changes made by the museum have received high praise in the professional domain; however, considerable room remains for improvement in the public domain.

Knowledge management. From the perspective of knowledge management, the NPM’s community of practice (COP) is not solely based on internal communication within the organization, but also emphasizes its shifting boundaries and cross-organizational information exchange. The IT department at the NPM developed a microfoundation for DCs that underpinned and enabled the museum’s orchestration of content and services. The work of the IT department helps the organization to integrate internal and external knowledge sharing and dissemination. For instance, to envisage new IT-generated content and services, the NPM has adopted a cross-industry alliance strategy to form a dedicated team of project managers, relics experts, and external IT partners (as shown in Table 2). This team is now referred to as a “community of apprentices and masters” (CoA&M) rather than a COP, as each member may act variously as an apprentice or a master (see Figure 6) [16]. As the members of the CoA&M have various professional affiliations and belong to both internal and external organizations, challenges relating to goal congruence, information sharing, capability building, and resource commitment inevitably occur. The CoA&M’s practices allow relics experts and IT professionals to work together to enhance their respective understanding and thus acquire and develop the knowledge (both tacit and explicit) required to create new content (see Figure 7). Therefore, the CoA&M has developed an effective way of guiding collaboration between (internal) relics experts and (external) IT professionals to ensure the production of knowledge-based, IT-generated content and services.

Table 2. Examples of the NPM’s IT-generated content and corresponding external IT partners.

Year	IT-Generated Content	External IT Partners
2005	Peach Blossoms and Two Swallows	Techart Group Co. Bright Ideas Design Co. Acer Group
2006	A Letter on Floral Fragrances	Aegus Co.
2007	Adventures in the NPM	Digimax, Inc.
2010	2011 National Treasure Exhibition	Blue Phoenix New Media Arts ASUS Design
2011	Landscape Reunited—Huang Gongwang’s Dwelling in the Fuchun Mountains	Blue Phoenix New Media Arts Delta Group
2012	Google Art Project	Google
2013	Rebuilding the Tongan Ships	Bronze Visual Art
2014	Diplomatic Credentials Failed to Deliver	Shengjie Digital Science Technologies Company Limited

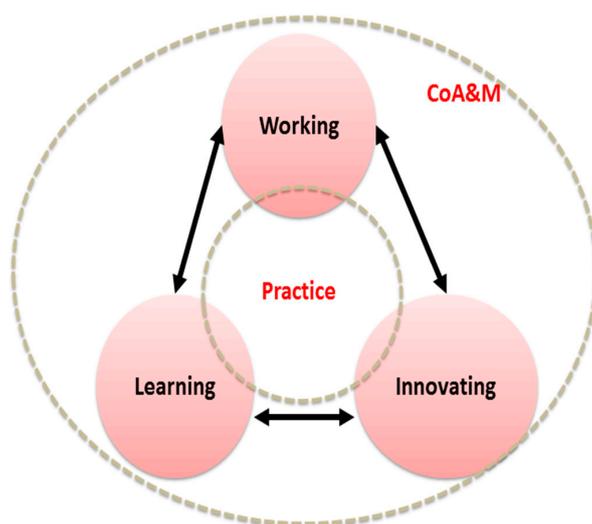


Figure 6. To enhance creativity and generate a distinct conceptual shift, the working, learning and innovation processes must be interrelated, compatible and complementary. (Source: Tsaih et al. [16].)

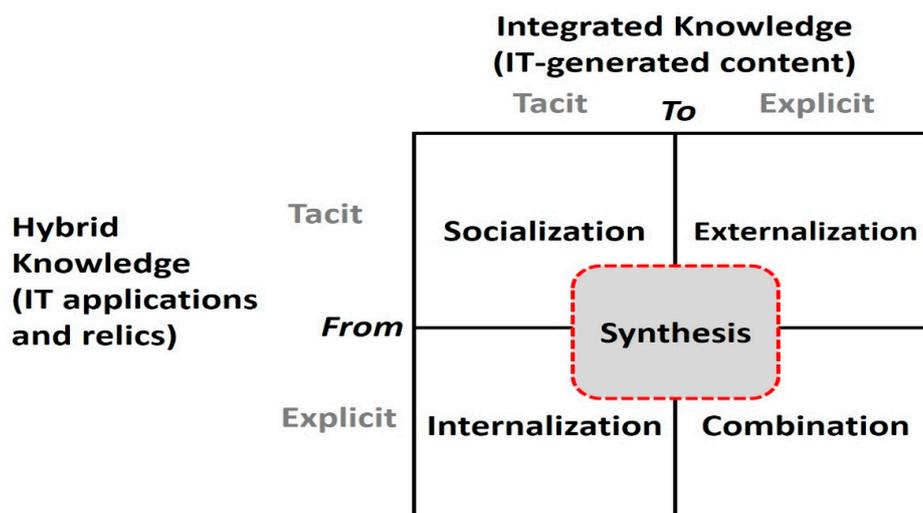


Figure 7. Modes of knowledge creation for IT-generated content are similar to those specified in the socialization, externalization, combination, and internalization (SECI) model. However, a “synthesis” mechanism is embedded in each SECI mode. (Source: Tsaih et al. [16].)

Standardization. Standardization is an important microfoundation for DCs in the organizational transformation process. With the growth of digital archive technology, the NPM converted its accumulated IT-generated content into digital exhibits to realize its goal of becoming a “museum without walls.” For instance, Kuo Chen-Wo, section chief of the Department of Education, Exhibition, and Information, requested that the IT department propose additional methods of adopting IT applications after the three relics departments had produced their results. With the experience gained during each project, the IT department was able to establish a standard operating procedure (SOP) for new media art exhibitions. This included such activities as preparing the exhibition, promoting education, organizing the exhibition, proposing an opening press conference, suggesting an exhibition period, and dismantling the exhibition. All of the NPM’s digital works are of a certain quality. Based on years of curating experience, the curators established a comprehensive SOP encompassing careful plans and arrangements for all tasks before, during and after every exhibition.

Organizational restructuring. Former director Feng Ming-Chu described this process as follows:

“Digital archives are a growing trend. We believe that our overall digitization achievements have proved advantageous to our organization. Our achievements have contributed to education promotion, academic research, and even commercial design.”

Former Department of Painting and Calligraphy section chief Liu Fang-Ru offered the following remarks:

“As relics researchers, we were initially full of doubt and apprehension about the Digital Archive Program because all of the members of our team were experts in art history, and none of us had a background in IT.”

Joint discussions and brainstorming sessions are needed to ensure that IT-generated content and services meet nuanced curatorial requirements and preserve academic integrity. If relics experts merely contribute knowledge to, rather than participate in, the development of IT-generated content and services, they will gain only a limited sense of how to use IT to produce new content. This problem was noted by Kuo Chen-Wo, section chief of the Department of Education, Exhibition, and Information:

“When the three relics departments are discussing the theme of a relics exhibition, the Department of Education, Exhibition, and Information does not participate in the discussion. We join in and provide support for IT applications after the three relics departments have produced their results.”

Relics experts are not empowered to actually create relevant content or services by themselves. Therefore, the NPM needs to determine how to preserve creative IT-generated content and generate innovative services. IT professionals face a similar problem: If they merely contribute their expertise to IT applications without acquiring knowledge, they will be unable to create relevant content or services by themselves in the future.

5. Summary and Managerial Implications

Digital transformation is difficult for non-ICT-oriented organizations which lack awareness of advancements in ICT. They have no ideas for developing innovative ICT applications and no experience of obtaining the competitive advantage of sustainability from ICT applications. This study provides clear evidence that the sensing–seizing–transforming process provides critical assistance for organizations in developing DCs for new IT-generated content and/or services and gaining the competitive advantage of sustainability.

This study shows that no matter how a non-ICT-oriented organization like the NPM transforms itself in pursuit of sustainable development, it cannot become an ICT-oriented organization. The NPM has recognized that ICT applications are necessary for sustainability, and has thus enhanced the position of its IT department within the organizational hierarchy; however, although the NPM has some awareness of the role of ICT applications in securing sustainability, its IT department continues to make a limited contribution. Consequently, although the NPM's IT department played an important and proactive role at the beginning of the organizational transformation process, and even takes a dominant role in developing ICT capabilities, it will be unable to assume a leadership role within the organization after transformation is complete.

The findings of this study have a number of managerial implications. First, according to the discussion in the subsection on internal R&D in Section 4.1, the (sensing) capability of non-ICT-oriented organizations in terms of internal R&D in the IT department can be used to “observe” state-of-the-art IT and to initiate innovative ICT-related projects down the road. This will provide organizations with opportunities to more radically transform themselves. Second, according to the discussion in the subsection on decisions in Section 4.2, the crucial decision-making (seizing) capability of non-ICT-oriented organizations can be enhanced by building IT literacy to ensure that the organizations' leaders are ready for implementation/adoption [8]. Third, according to the discussion in the subsection on standardization in Section 4.3, the (transforming) capability of standardization can establish mechanisms for speeding up the development of IT-generated content and/or ICT-enabled services. Fourth, as shown in the aforementioned statements, the IT department of a non-ICT-oriented organization cannot lead the whole organization during this transformation process. In the NPM, for example, the (sensing and seizing) capabilities associated with organizational restructuring and the (transforming) capabilities associated with leadership and branding are nonsignificant due to aspects of the organization's EE (such as government policies that require close adherence to administrative guidelines) and its non-ICT-oriented vision, culture, and organizational structure.

This study is also significant for its use of the DC framework to deal with the issue of the implementation/adoption of management information systems. This study fills theoretical and practical gaps in existing research by exploring the evolving role of IT departments in non-ICT-oriented organizations. This study also suggests that non-ICT-oriented organizations can develop the DCs required to perform organizational transformation through the aforementioned sensing–seizing–transforming process. Additionally, this study shows that rather than focusing on each department's specialty, organizations should appropriately allocate resources to build the DCs needed to generate creative IT-generated content and innovative ICT-enabled services.

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