

Combining the Features of ICT and Citizen Relationship Management to Enhance the Governmental Administration: An I-Kenting System as a Practice

Yu-Tso Chen, Chuang-Chiao Huang, and Hsin-Yu Yu

Abstract—In recent years, citizen relationship management (CRM) has been a considerable concept beneficial to enhance the relationship of citizen and government. The CRM supported systems may contribute to improve existed governmental services. However, how to efficiently and effectively realize the CRM applications is a practical issue worthy of investigation. Fortunately, the ICT capable of intelligent computation plays a potential role of meeting the requirements of designing CRM services. This paper proposes a scheme of combining the features of ICT and CRM to enhance the governmental administration. Meanwhile, in order to evaluate the feasibility of the proposed method, a real prototype, I-Kenting, aiming at improving the CRM service for the Kenting National Park is demonstrated as a practice. The contribution of the proposed I-Kenting system is to realize a potential improvement of ICT-based CRM system. In addition, the proposed scheme addresses a considerable research direction of inviting ICT technologies to improve CRM performance.

Index Terms—Citizen relationship management, ICT, living lab.

I. INTRODUCTION

Citizen relationship management (CRM) is a mainstream which is theoretically perceived as a tool to enhance the relationship of citizen and government and may help the governmental service become more efficiently. For example, the Miami311 served by the city of Miami USA is a well-known system implemented on the basis of the concept of CRM. The Miami311 offers information and service in the area of Miami city. Through operating the provided functions, the Miami311 system can assist citizen solve a great amounts of daily events.

The new version of Miami311 is to invite citizens to perform governmental applications based on information and communication technologies (ICT). The purpose of promoting ICT-enabled CRM service is to advance the interactions between the government and people, so that to collaboratively achieve better service for people. Miami311 is a considerable practice of ICT-enabled CRM. The Miami311 can help the citizen ask question that close to their life like the time of throw the garbage or the site of travel. The Miami311 not only offers information about Miami city, also assist citizen solve the event which is not urgent like the surface gathered water or illegal parking.

Manuscript received January 31, 2017; revised May 1, 2017.

The authors are with the Department of Information Management, National United University, Miaoli, 36003 Taiwan (e-mail: yutso.chen@nuu.edu.tw, a596466@gmail.com, smile60250@gmail.com)

In Taiwan, the CRM service is not well-deployed. An interesting example is the CRM service in the Kenting National Park (KNP). The KNP Headquarter also has lots of governmental matters to be handled. The Kenting National Park located on the southern tip of Taiwan is the most popular national park in Taiwan. With its warm climate, pleasant scenery, and easy access, it attracts millions of foreign and Taiwanese tourists every year. The surface area of KNP is 33,289.59(Ha). In theory, such large range of area needs to be administrated by sufficient park staff; however, in practice, there are currently only 103 employees arranged for all the works in this national park. On average, each employee has to manage an area about 323.2(Ha). The difficult of management actually brings out various problems. For example, the hunting activity in KNP is not allowed. Sometimes, the residents living in the area of KNP will find some illegal hunting event, but they do not have an efficient enough way to report such event with complete information. That is, even the manager of KNP wants to find the criminal out, there will be less evidence to help proving the illegal event. In brief, because of the lack of efficient handling method, it is hard to prevent such illegal events immediately.

Fortunately, Taiwan has a good development on ICT which will benefit to build systematic CRM service like the Miami311. According to the statistics of networked readiness index (NRI) of World Economic Forum [1] for the past two decades, the Taiwanese is highly familiar in surfing on the internet, using the instant messaging applications and the like.

Based on the above, this paper proposes a scheme of combining the features of ICT and CRM to enhance the governmental administration. In order to evaluate the feasibility of the proposed method, a real prototype aiming at improving the CRM service for the KNP, named intelligent Kenting (shortly I-Kenting), is demonstrated as a practice.

II. LITERATURE REVIEW

A. Citizen Relationship Management

ICT with its advantage of networked features is able to hold the promise of enhancing integrated citizen-centric services. However, few governments to date have implemented such CRM information system required to fulfill that promise. Chen [2] presented an investigation aiming at the organizational determinants of the level of integration and the use of a citizen service information system. It draws from the literatures on diffusion and adoption of innovation, technology acceptance and use, information systems

implementation, and information technology and public administration. The primary sources of data are from International City/County Management Association data on citizen service systems and electronic government surveys. Ordered logit is the primary data analysis technique used. The findings of the study suggest the importance of getting citizen feedback in the move toward a more integrated citizen service information system. Strong organizational commitment to citizen services further plays a significant role in the more sophisticated use of such a system. Besides, Wheeler et al. [3] showed a CRM-like system. When public works employees fix a pothole, they can use the system on their government-issued iPhone or iPad to inform their supervisor that the work was completed. The above are some existed examples of CRM system.

B. Living Lab

In the past decade, human-centered methodologies such as Living Lab (LL) have been widely applied for governments and companies to innovate their administrative initiatives and business models. The original concept of Living Lab was proposed by Prof. William Mitchell who's with MIT MediaLab, it emphasizes the experimental daily-living associated technology-aided applications to be put to the proof through institute's lab trial. Nevertheless, the conception of the "new" Living Lab is characterized as stressing the support of open innovation activities for business modeling and virtual enterprising, especially on the basis of ICT to achieve smarter living services. The increasing number of people and organizations behind LL methodology are entirely convinced that the LL approaches empowering users in open cross-border collaboration will become a very strong element in a new innovation system. In brief, the LL methodology can engage and empower large groups of people in open real-world experimentally driven innovation processes; therefore it is respected to broaden innovations especially on ICT-supported services.

In practice, LL is an engineering approach not just a testbed simulator. LL-led innovations in conjunction with ICT can be co-created, tested, and evaluated in open, collaborative, multi-contextual, and real-world settings [4]. In other words, LL methodology not only focuses on involving users in the innovation process, it also strives to facilitate the interactions among other relevant stakeholders. That is, a LL system can be seen a multidisciplinary and ecosystem-alike environment.

In terms of LL process, Chen [5] presents a novel Smart Living Industry Promotion (SLIP) framework capable of improving industrial benefits of from designing smart living trail systems to commercializing smart living services. Besides, Bergvall-Kåreborn [6] proposed a Living Lab based process, called FormIT, which integrates the activities with users to achieve user co-creation. The FormIT contains five stages including planning, concept, design, evaluation, and commercialization. Moreover, Chen and Chou [7] design an Experience Feedback oriented Service Engineering Process (EFoSEP) composed of 14 stepwise modules in 5 phases. Their EFoSEP provides a systematic scheme particularly beneficial to user experience feedback in Living Labs systems.

In summary, a well-developed CSM should cover the

related principles, concepts, know-hows, as well as ICT-innovated ideas. Meanwhile, because the operation of CSM relates to different stakeholders, the process-model approach has to take account of stakeholders' needs. The mentioned LL approaches are valuable for designing a systematic process with collaborated parties involved.

III. THE SYSTEM DEVELOPMENT METHOD

The I-Kenting is designed by using the SDLC framework with inviting the works on the basis of Living Lab approach. The process of designing and developing the I-Kenting is introduced as the steps shown in Figure 1.

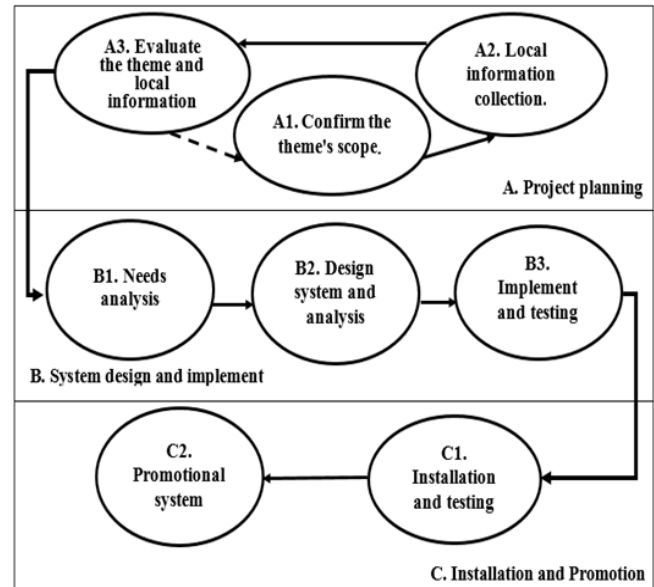


Fig. 1. The process of the system development method.

In the phase A (Project planning), the objective of the stepwise works is mainly to confirm the initiatives of plan.

A1: To confirm the content and category of topic.

A2: To apply the survey method to take a field trip and to collect necessary information.

A3: To perform an observational survey. Such survey is a method that is helpful for check what environment is suitable for the category of topic. The works will back to the step A1 if the expected objective is not accepted.

In the phase B (System design and implementation), the purpose of the stepwise works is to analyze the needs, to design the specifications, and to implement a system.

B1: To adopt use case diagram (UCD) and event table to analyze the needs of the planning system.

B2: To design the specifications by using class diagram, activity diagram, sequence diagram and database normalization.

B3: To implement the planning system according to the confirmed specifications. The related testing works are also required in this step.

In the phase C (Installation and promotion), the target of the stepwise works is to realistically install the system and to carry on the necessary promotion activities.

C1: To install the prototyping system into a real area, and to test and check it for user experience feedback.

C2: To set the appropriate activities profitable to widely

promote the ready system.

IV. SYSTEM DEMONSTRATION

Three functional features of the I-Kenting system are demonstrated in this section.

A. Share of Notification Information by Citizens

This functional feature is demonstrated as Fig. 2.



Fig. 2. The conceptual operation of sharing notification information by citizens.

B. Manage and Distribute the Notification Information.

This functional feature is demonstrated as Fig. 3.

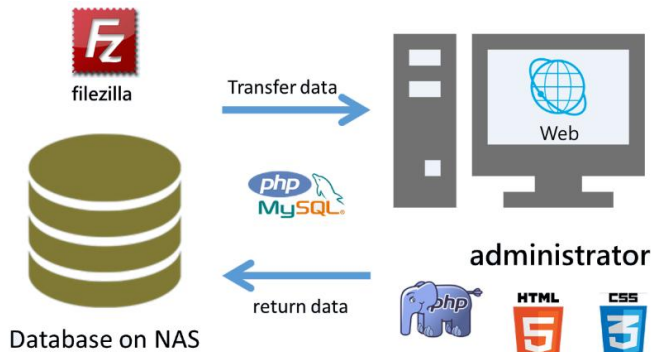


Fig. 3. The conceptual operation of managing and distributing notification information.

C. Immediate Broadcasting for the Emergency Notification Information

This functional feature is demonstrated as Fig. 4.

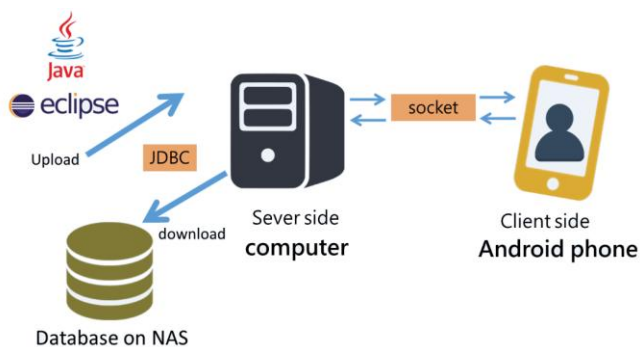


Fig. 4. The conceptual operation of broadcasting the emergency notification information.

D. System Demonstration

The citizens who want to report event to KNP headquarter should follow the steps as shown in Fig. 5 to 7 respectively.



Fig. 5. To launch the app.



Fig. 6. To compose a message to be sent out.



Fig. 7. To take pictures if necessary.

The administrator can get the information relate to the event by accessing the website of I-Kenting. The steps of administration operations are displayed as Fig. 8 to 10.



Fig. 8. To login the administration subsystem of I-Kenting.

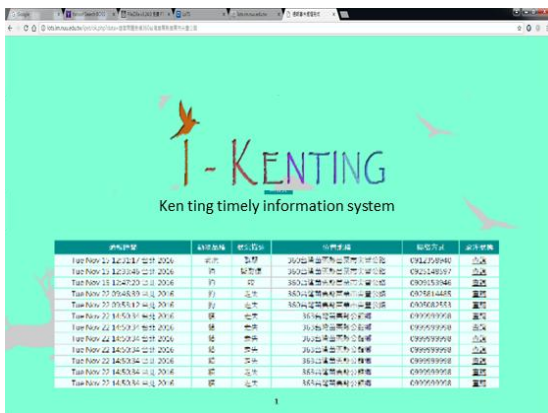


Fig. 9. To access the reported messages from citizens.



Fig. 10. To check the detailed information for further dealing process.

The process of data transmission is composed of the following steps as depicted in Figure 11.

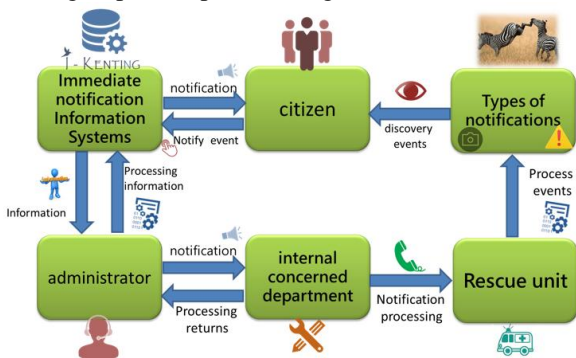


Fig. 11 The dataflow of I-Kenting operations.

V. DISCUSSION

I-Kenting can be seen as a kind of reporting system differentiated with traditional telephone reporting system. Table I shows a comparison list on the viewpoints of reporting way, reporting content, and position.

A. Reporting Way

I-Kenting's reporting way is easier and clearly than telephone reporting. With Internet, even if the administrators did not see the message right away, they could still get the information later. If the reporting way is telephone, you will miss the reporting when you miss it.

B. Reporting Content

The reporting content with dictate may let administrator feel confusing about how the event severity. With the I-Kenting system, the content of reporting can be clearly with graph and message.

C. Position

The position of telephone reporting system can only be known by dictate, but I-Kenting system can confirm the position easily and clearly. With the position function of smart phone, the site of event can be reporting precisely.

TABLE I: THE COMPARE OF TELEPHONE REPORTING SYSTEM AND

	I-KENTING	
Analysis Item	Telephone reporting system	«I-Kenting »
Reporting way	telephone	internet
Reporting content	dictate	message and graph
Position	dictate	position by smart phone

D. Virtual Decision Making

In the future, the headquarters of Kenting National Park can use the date of I-Kenting to do virtual decision making. For example, the headquarters can analysis where is the place that the deer usually been attack by hound or which area usually occur illegal fishing.

VI. CONCLUSION

The CRM is a set of open services for advancing the relationship between the government and citizens. This paper proposes a scheme of combining the features of ICT and CRM to enhance the governmental administration. In order to evaluate the feasibility of the proposed method, a real prototype aiming at improving the CRM service for the Kenting National Park is demonstrated as a practice.

The contribution of the proposed I-Kenting system is to realize a potential improvement of ICT-based CRM system. The proposed prototype addresses a considerable research direction of inviting ICT technologies to improve CRM performance. However, there are some considerable issues that might merit future researches.

- 1) To install some real testbeds on selected KNP areas to realistically evaluate the performance of the presented I-Kenting.
- 2) How to design and implement a practical business and operation model for the KNP headquarter to broadly invite citizens and visitors to use the I-Kenting services,

so that achieve the expected results of designing such CRM-oriented system.

- 3) How to get user experience feedback is an important issue worthy of further investigations.

ACKNOWLEDGMENT

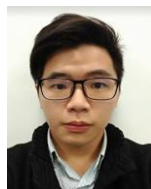
The authors thank Meng-Feng Huang, Yu-Chen Peng, and Wen-Yen Wen, for their comments, suggestions and system implementation assistance for this work.

REFERENCES

- [1] World Economic Forum. (2016). The Networked Readiness Index. [Online]. Available: http://www3.weforum.org/docs/GITR2016/WEF_GITR_Chapter1.1_2016.PDF
- [2] Y. C. Chen, "Citizen-centric e-government services: Understanding integrated citizen service information systems," *Social Science Computer Review*, vol. 28, no. 4, pp. 427-442, 2010
- [3] C. Wheeler, J. Baumann, and E. Writers. Small town, big dreams. [Online]. Available: <https://www.esri.rw/~media/Files/Pdfs/news/arcuser/0115/small-town-big-dreams.pdf>
- [4] R. Santoro and M. Conte, "Living labs in open innovation functional regions," in *Proc. the 15th International Conference on Concurrent Enterprising*, 2009.
- [5] Y. T. Chen, "Sketch industry promotion framework for smart living services by leveraging living lab harmonization cube," *International Journal of Electronic Business Management*, vol. 10, no. 2, pp. 153-165, 2012.
- [6] B. Bergvall-Kårebom, M. Hoist, and A. Ståhlbröst, "Concept design with a living lab approach," in *Proc. the 42nd Hawaii International Conference on System Sciences*, pp. 1-10, 2009.
- [7] Y. T. Chen and W. H. Chou, "Improve the success of service by adopting a novel experience feedback oriented service engineering process," in *Proc. the 2011 IEEE International Conference on Computers, Communications, Control and Automation*, 2011.



Yu-Tso Chen received his Ph.D. degree from Institute of Information Management, National Chiao-Tung University, Taiwan, in 2004 and his M.S. degree from Department of Information Management, National Yunlin University of Science and Technology, Taiwan in 1998. He was a researcher of Industrial Technology Research Institute, Taiwan from 2004 to 2009. He is now an assistant professor in the Department of Information Management, National United University in Taiwan. His research interests include information system analysis & design and project management, internet of things (IoT), information security, ICT-enabled service innovation, as well as Industrial Technology Foresight and Strategy Management.



Chuang-Chiao Huang received his B.S. degree from the Department of Healthcare Information and Management, Ming Chuan University, Taiwan in 2016. He is now a graduate student of the Department of Information Management, National United University, Taiwan. His research interests include Internet of Things (IoT) and Information Security.



Hsin-Yu Yu is an undergraduate student of the Department of Information Management, National United University, Taiwan. Her research interests include System analysis and Data mining.