COLLABORATIVE DESIGN OF CIVIC TECHNOLOGIES:

USING DESIGN THINKING PROTOCOL FOR PUBLIC SERVICE INNOVATION

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Introduction

1.1 The Open Collaboration in Government

Open Government: Civic Tech on Government Transparency and Citizen Participation was one of the panel sessions in the 21st World Congress on Information Technology (WCIT 2017) held in Taipei, Taiwan last September 10-13, 2017. Panel discussants included representatives from g0v.tw, Open Culture Foundation, mySociety, Etalab, French Prime Minister's task force for Open Data, Open Gov and Data-driven transformation, France, Open Data Lab Jakarta, Indonesia, and Code for America. The detailed discussions on varied aspects of civic technologies were conducted in the parallel event, Civic Tech Fest. Civic Tech Fest (civictechfest.org) is Asia's first ever civic technology festival and conference, featuring a series of forums, workshops, round tables, conferences and hackathons related to open data and open government. Civic Technologies advocates from all over the world provided in-depth analysis regarding online participation tools, digital democracy tools, as well as their influence and popularity. The discussions acted as important reference points for future development of the field (civictechfest.org).

1.2 Philippines, the Open Government Early Adopter

The Philippines is one of the eight founding states of the Open Government Partnership. The Philippine government launched in January 2014 its online open data portal (data.gov.ph) with the declaration that *'Public participation and collaboration will be key to the success of any open data initiative. An open policy of encouraging citizens and businesses to engage in this manner multiplies possibilities and opens up a world of innovation' (data.gov.ph, 2014).* With this premise, the the Philippine government encourages the public to develop and upload mobile applications that uses government data.

Government data sets made available vary from Local Government, Economy, Environment, Geospatial, Public Finance, Agriculture, Transport and Communication, Population, Employment, Social Welfare, Health, Education, Politics, Law and Justice, Infrastructure, Cultural, and Energy. Out of these voluminous data, only nine (9) civic applications related to this open data initiative have been developed. Two (2) are budget appropriations related: Budget Barger and Budget Booth; six (6) on transportation: Rklamo, transit.com.ph, Sakay.ph, Manila Train Guide, Trip Barker, and Taksilog; and one (1) on education: checkmyschool (data.gov.ph). Recently, these apps were removed from the pages of data.gov.ph.

1.3 The Need for Co-design of Public Service Innovation in Cities

Designing civic applications for cities is only logical for according to UN predictions, over 67% of the population will be concentrated in the cities by the year 2050. Cities play a leading role in the global economy, and this trend over time will only increase (PwC Russia, 2016). A City is a repository of voluminous data and a city's data is one of its most valuable assets. Adler (2017) expounds that urban data is the bedrock of the performance management programs that allow cities to ensure continuous improvement. Reliable data can facilitate interagency collaboration, improve partnerships with the private sector, and expand public engagement. Innovative uses of data allow cities to enforce regulation and improve social services. And, increasingly, open data is serving as the foundation for good government activism, allowing journalists and civic hackers to highlight government inefficiencies or even spot corruption (Adler, 2017).

Co-designing civic applications should facilitate the usability of public data accumulated by local governments from their citizens. Current technology allows rapid collaborative work between government, citizens and information technology practitioners. In many cities, municipal authorities have adopted mobile city applications to improve the lives of their citizens. Foremost is Civic Hall (civichall.org) which is a collaborative community center that advances the use of technology for the public good. It is Built on the idea that together – technologists, government

officials, community organizers, researchers, makers, social entrepreneurs, change-makers, hackers, academics, journalists, artists– we can organize to solve civic problems to scale. Civic Hall is a community of action-oriented, cross-sector professionals located in the heart of Manhattan, New York City, where we aim to better the world through civic tech. Among the city applications are Spain's smartappcity (see smartappcity.com), Singapore's eCitizen (see ecitizen.gov.sg/), Sydney City apps (see cityofsydney.nsw.gov.au/subscribe/city-apps), and City of Boston apps (see boston.gov/departments/innovation-and-technology/apps).

1.4 Statement of the Problem, Research Goals and Objectives

The main question that this paper would like to address is:

By applying design thinking stages in developing a civic technology for transactional public services, can a deliberate collaboration among government, citizens, and ICT practitioners lead to innovation and usability?

Review of Literature

2.1 Public Administration and the Imperative of Design

Ocampo (2013) noted that before 1945, Herbert A. Simon stressed that the study of Public Administration had emphasized "the art of getting things done." Due to the shift in the economy from production to service, Simon turned his attention to decision-making - the subtitle of his book Administrative Behavior: A Study of Decision-Making Processes in Administrative Organization (1947, 1957, 1976, 1997). Later, Simon urged another shift, this time to design, in the Sciences of the

Artificial (1969, 1981, 1996). Ocampo (2013) further quotes Simon (1996) that “Everyone designs ” (Ocampo 2013).

2.2 Discourse on Design Thinking

The discourse of design thinking originated in architecture, design and art, and later was also applied in the field of management (Johansson, & Woodilla, 2009). In the academic field the term has been known for thirty years and initially it was associated with the way designers think (Johansson, & Woodilla, 2009). The term was first used in 1987 by Rowe when he published a book titled Design Thinking (Rowe, 1987), although Simon analyzed the nature of design already eighteen years before the term “design thinking” had been introduced (Simon, 1969), making design thinking an actualization of the intellectual abstraction of theories of Public Administration as Design.

Table 1: A Summary of the Discourse on Design Thinking

Discourse	Main Emphasis	Literature Source(s)	Theoretical/Conceptual/Empirical Gaps
Nature of Design	Simon (1969) as founder of artificial intelligence for distinguishing between activities that create something new and activities that deal with existing reality Design thinking term was first used by Rowe (1987).	Simon (1969), Rowe (1987), Johansson, & Woodilla (2009)	Designing civic technologies can be empirical proof that will confirm and validate design thinking
Role of Reflection	Reflection was interpreted as the core of design work and as a part of practice	Schön (1983), Luka (2014)	Knowledge and ideas is often confined within the minds of stakeholders. A design experiment may provide

			empirical data on how reflection is actualized in design work
Problem Solving Activity	The design process is divided into two distinct phases: problem definition and problem solution	Buchanan (1992), Luka (2014)	Observation of a deliberate social interaction protocol may test problem definition and problem solving skills of individuals. The process needs to be hands-on where participants are not just told things or are asked on how they perceive things, but are allowed to discover, define and offer solutions to problems.
Practice-based activity and a way of making sense of things	Design thinking applies abduction which results in a value	Dorst (2011), Luka (2014)	There is a need to encapsulate the practice of making sense of things.
Creation of meaning rather than artifact	Meaning is the core of the design process and artifact becomes a medium for communicating these meanings	Krippendorff (2006), Johansson, & Woodilla (2009), Luka (2014)	Current technology is a great enabler and design thinking methodology can be a great guide. Civic technologies are human artifacts which are mediums of communication between government and citizens.
Three attributes: abductive, inclusive and	Design thinking reaches well beyond deductive and inductive reasoning to build up a mountain of possible answers	Oster (2008), Luka (2014)	A design thinking experiment may extract patterns of activities where one can draw inferences

problem-based			in order to facilitate duplication of best practices

2.3 Collaborative Governance in Design Thinking

Collaboration is an integral part of design thinking which is both a process and a mindset. Collaboration is the second attribute or characteristic that scholars (Baeck, & Gremett, 2012) identified: 1) ambiguity; 2) *collaboration;* 3) constructiveness; 4) curiosity; 5) empathy; 6) holism; 7) iteration; 8) non-judgmental way; 9) openness. It is therefore logical to look into the concept of collaborative governance in design thinking.

2.4 Manifesting Collaborative Design of Public Services in a Civic Application Project

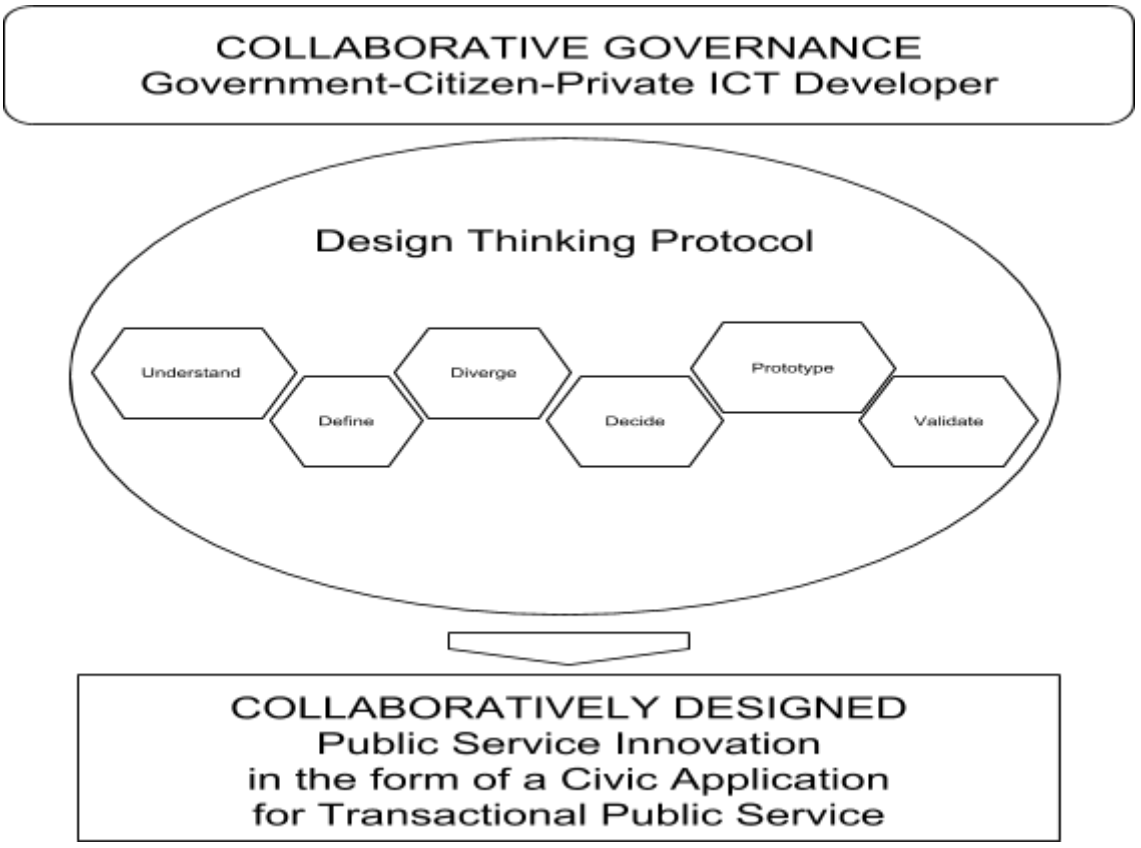
Applying design methods to public services can help to develop a better understanding of user needs and how services can be created to match them. The part of design, which is prototyping offer government quick and agile ways to test new solutions while containing risk. Prototyping can play an essential role in developing more innovative public services, providing government and citizens with a preview of how an innovation in public service will work.

Conceptual Framework

For Herbert Simon (1969) , everyone designs who devises courses of action aimed at changing existing situations into preferred ones. This means that government, citizens and ICT practitioners, regardless of position, social class, demographics or even gender are bound to be engaged whenever there is government-citizen interaction and government. Design may come in the form of public policies, rules and regulations, citizen surveys and consultations. Since everyone designs, each designer applies practical knowledge to solve problems and is decision oriented Coleman (1972). Ultimately, according to E. Alexander (1982), Design is intended “to conceive and prepare a description of proposed system, artefact or aggregation of artefacts. An articulation of this artefact or aggregation of artefacts can come in the form of digital public services and civic applications.

In figure 1, an overview of the constructs and proposition are being presented. For the proposition, the expected nature of the relationship between the constructs is indicated.

Figure 1. Conceptual Framework



Proposition - Deliberate collaboration between government, citizens and ICT practitioners through a design thinking protocol leads to knowledge sharing, idea generation, divergent thinking, and innovation in transactional public services.

Methodology

3.1 Design Thinking Experiment

This is an experiment where design thinking stages or protocol will be observed as it incorporates citizen, government and private ICT developers deliberately collaborating and participating in a co-creation and design of a civic application. This study will specifically use the agile design sprint methodology developed by Jake Knapp, John Zeratsky and Braden Kowitz from Google Ventures. SPRINT is a unique five-day process for solving tough problems through prototyping and testing ideas with customers. SPRINT has been applied in Chrome, Google Search, Gmail and other projects (Knapp et. al., 2016).

The experiment will begin by providing a public service design challenge for an Iloilo City (Philippines) mobile app to a control group and treatment group who are to develop ideas to solve the challenge in six separate phases within 3 days at the same venue, but in separate rooms.

The challenge will be to design an intuitive Iloilo City application for local citizens and visitors and the deliverable at the end of the experiment will be a polished mock design of the civic application. The design challenge was: How might we design a city mobile app that gathers requests, alerts, tickets, inspection information from and for citizens on LGU transactional services?

Table 2. Division of the Conduct of the Experiment

	Design Thinking (Treatment Group)	Hackathon (Control Group)
Day 1	Understand, Define and Diverge	Breakout sessions and Consultations
Day 2	Decide and Prototype	Actual hacking/developing
Day 3	Prototype and Validate	Presentation

3.2 Using Interaction Dynamics Notation to Document Team Collaboration

Team Collaboration captures how well teams are working using design thinking. For this measure this study turns to the Interaction Dynamics Notation tool created by Neeraj Sonalkar and Ade Mabogunje (2012). If we video record their work space over the duration of design activity and replay it, we would see team members moving around, interacting with each other and with a number of different objects and tools. Through these interactions, information and ideas circulate among the people on the team, concepts are generated, prototypes are created and tested, and products are specified (Sonalkar and Mabogunje, 2012).

3.3 Collaborator Journey Map

A collaborator journey map will be a idea generation of the process that a collaborator goes through in order to accomplish the design goal, a civic application. The map is condensed into a idea generation used to communicate insights that will inform design processes. Collaborator Journey mapping creates a holistic view of

collaboration experience, and can engage otherwise disinterested stakeholders from across groups and spur collaborative conversation and change.

3.4 Usability Metrics and Interview

The usability metrics will be gathered from at least five (5) LGU and five (5) citizen volunteers that can be accomodated in a day to test the prototype developed by the collaborators: Successful Task Completion, Critical Errors, Non-Critical Errors, Error-Free Rate, Time On Task, Subjective Measures, Likes, Dislikes and Recommendations.

Results and Findings

4.1 Collaborator Journey Map

Table 3 reflects the profile of the participants who volunteered to undergo the co-creation workshops.

Table 3. Participant profile

	Treatment Group	Control Group
Age	22 to 72 years old	20-52 years old
Gender	5 male, 1 female	4 male, 2 female
Iloilo City Affiliation	Residing and/or Working	Residing and/or Working
Educational Attainment	4 college, 2 post graduate	2 undergraduate, 2 college, 2 post-graduate
Co-creation Experience	4 with experience	1 with experience
Public Service Experience	5 with experience	3 with experience

The conduct of the Design sprint (Treatment Group) and Hackathon (Control Group) was recorded and the interactions between the participants were transcribed and coded. Tables 4 to 13 reflects the Interaction Dynamics and Patterns between the Citizen 1 (C1), Citizen 2 (C2), Government 1 (G1), Government 2 (G2), IT Practitioner 1 (IT1) and IT Practitioner 2 (IT2) during the understanding, Define, Diverge and Decide Phases.

Table 4. Collaborator Journey Map. Interaction Dynamics Notation for Treatment Group, Understanding Phase

IDN	C1	C2	G1	G2	IT1	IT2	Total
Move	48	23	26	28	14	27	166
Yes, and	20	10	16	9	3	9	67
Hesitation	15	3	4	5	4	10	41
Support for move	8	6	5	1	8	6	34
Question	12	4	1			16	33
Deflection	2	1		1		1	5
Deviation	2			2			4
Overcoming	2				1	1	4
Block			3				3
Humor	1	1					2
Interruption	2						2
Grand Total	**112**	**48**	**55**	**34**	**30**	**70**	**361**

Table 5. Collaborator Journey Map. Patterns for Treatment Group, Understanding Phase

Pattern	C1	C2	G1	G2	IT1	IT2	Total
Idea Generation	8	4	4	7	4	5	32
Sustained ideas expression	7	3	2	6	6	7	31
Divergent Thinking	12	5	1	2		10	30
Knowledge Sharing	3	4	13	3		3	26
Blocking			3				3
Grand Total	**30**	**16**	**23**	**14**	**10**	**25**	**123**

Understanding phase reflected strong exchange of ideas, support for these ideas, divergent thinking as well as knowledge sharing.

Table 6. Collaborator Journey Map. Interaction Dynamics Notation for Treatment Group, Define Phase

IDN	C1	C2	G1	G2	IT1	IT2	Total
Yes and	61	43	39	11	22	58	234
Move	56	21	46	12	6	22	163
Question	26	8	2		3	29	68
Support for move	19	5	6	5	4	17	56
Deviation	7	15	13	1	2	3	41
Hesitation	6	2	2		1	4	15
Deflection		3		1		7	11
lock	1	2			3	2	8
Overcoming		4	1		1	1	7
Interruption	2		1	1		2	6
Humor	2			2		1	5
Support for block				1	1	1	3
Grand Total	**180**	**103**	**110**	**34**	**43**	**147**	**617**

Table 7. Collaborator Journey Map. Pattern for Treatment Group, Define Phase

Pattern	C1	C2	G1	G2	IT1	IT2	Total
Divergent thinking	18	10	2	1	2	18	51
Knowledge sharing	9	5	26	6	1	1	48
Idea generation	14	7	3		5	8	37
Sustained idea expression	7	6	3	1	4	9	30
Sustained disagreement	1	2	1	1		2	7
Blocking	1	2			1	1	5
Grand Total	**50**	**32**	**35**	**9**	**13**	**39**	**178**

Divergent thinking and knowledge sharing on the define phase is reflective of the different point of views of citizens, government and by the IT practitioners.

Table 8. Collaborator Journey Map. Interaction Dynamics Notation for Treatment Group, Diverge Phase

IDN	C1	C2	G1	G2	IT1	IT2	Total
Move	26	52	24	25	24	35	186
Yes and	2	1				4	7
Grand Total	**28**	**53**	**24**	**25**	**24**	**39**	**193**

Table 9. Collaborator Journey Map. Pattern for Treatment Group, Diverge Phase

Pattern	C1	C2	G1	G2	IT1	IT2	Total
Idea generation	2	2		4			8
Sustained idea expression	2	1				4	7
Grand Total	**4**	**3**	**0**	**4**	**0**	**4**	**15**

Diverge phase is concentrated with idea generation and sustained idea expression.

Table 10. Collaborator Journey Map. Interaction Dynamics Notation for Treatment Group, Decide Phase

IDN	C1	C2	G1	G2	IT1	IT2	Total
Move	93	47	31	30	38	25	264
Yes and	13	7	10	6	14	8	58
Question	14	12	3	2	11	11	53
Deviation	4		3	4	6	5	22
Hesitation	7	2	1	1	1	4	16
Support for block	6		1	4			11
Support for move	2				1	4	7
Deflection		1	1	1		1	4
Humor		3					3
Block	1			1		1	3
Interruption					1		1
Grand Total	**140**	**72**	**50**	**49**	**72**	**59**	**442**

Table 11. Collaborator Journey Map. Pattern for Treatment Group, Decide Phase

COUNT	*Decide*						
Pattern	C1	C2	G1	G2	IT1	IT2	Total
Sustained idea expression	13	1	4	3	5	3	29
Divergent thinking	4	6	3	1	7	8	29
Knowledge sharing	2	4	6	5	1		18
Idea generation				1	2	2	5
Sustained disagreement				1			1
Blocking						1	1
Grand Total	**19**	**11**	**13**	**11**	**15**	**14**	**83**

Decision on the final features of the Iloilo City app for prototyping is evidenced by sustained idea expression with divergent thinking on implementation concern areas.

Table 12. Collaborator Journey Map. Interaction Dynamics Notation for Control Group, Consultation Phase

IDN	C1	C2	G1	G2	IT1	IT2	Total
Move	62	20	115	37	35	14	283
Yes, and	39	17	93	48	39	32	268
Question	25	14	10	5	27	12	93
Support for Move	6	4	8	7	6	4	35
Hesitation	6	2	8	1	2	3	22
Deviation	6	1	6	2	4	1	20
Overcoming		5	3	3		4	15
Deflection	1		4	5	2	1	13
Block	1	2	2	1	1	1	8
Interruption	1	1	2	1	1		6
Humor			1		1		2
Grand Total	**147**	**66**	**252**	**110**	**118**	**72**	**765**

Table 13. Collaborator Journey Map. Pattern for Control Group, Consultation Phase

Pattern	C1	C2	G1	G2	IT1	IT2	Total
Sustained idea expression	19	4	24	6	12	9	74
Idea generation	16	10	15	12	13	7	73
Knowledge sharing	7	3	22	3	4	4	43
Divergent thinking	10	9	7	4	8	1	39
Sustained disagreement	1		3	2			6
Blocking	1	1			1	1	4
Grand Total	**54**	**27**	**72**	**27**	**38**	**22**	**240**

The control group only had the consultation phase. Thus, idea generation and sustained idea generation was high to achieve their desired features for their Iloilo City app.

Participant takeaways from the design sprint and the hackathon were mainly that (1) the fact that it is possible to create an application with so little time yet having satisfactory results that may be utilized by the city government of iloilo in the near future, and (2) Proper team collaboration and communication lead to effective software development and to communicate despite the fact that you disagree with the other creators.

4.2 Usability

Twelve (12) users were introduced to the two Iloilo City Apps that were developed by the control and treatment group. Six (6) were Iloilo City Hall employees while six (6) were invited private citizens. Four (4) were female while eight (8) were male, all of them were either residing or working in Iloilo City.

The average time to Successful Task Completion of the Iloilo City apps were eleven (11) minutes with no Critical Errors, Non-Critical Errors or 100% Error-Free Rate. The users generally recognized the Iloilo City app as very important and that the City app would be a great improvement and very useful to the transactional services of the local government unit. Ten (10) of the users strongly agreed that the city app would promote competitiveness and growth in Iloilo City in the long run. Suggestions for improvement were for a tutorial for new users and coordination with other agencies.

Conclusions and Recommendation

5.1 Conclusion

The rapid experiments, ad hoc iterations and what-if scenarios that the private sector commonly use to innovate are a far cry from the voluminous economic data gathered and analyzed by public administrators. To introduce these innovation practices, there is a need to respect the unique bureaucratic constraints that government personnel face in exploring, understanding, accepting and implementing new innovation practices.

Design sprint or a hackathon practitioners often encourage divergent thinking and extensive ideation in order to maximize the exploration and exchange of new ideas. A typical 2-day all-nighter hackathon or a 5-day design sprint may hinder government participation. On the other hand, a 3-day design laboratory setting, with enough writing area and writing tool can foster free and frank discussion. With the City government conference room setting, ideas from citizens and ICT practitioners are presented in ways that do not duly criticize the host local government unit. New ideas for public services and interactions associated with the local government unit were thoroughly discussed to ensure that they are realistic, doable, provides access and reduces conflict.

With the goal creating simple ways of aggregating information from the public, who submit alerts and request via mobile phones, the participant were able to build platforms that allow people to connect to their local government.

5.2 Recommendation

Actual development of the prototype will require another form of collaboration between the local government unit, citizens and IT practitioners. Champions for collaborative governance must be identified to encourage participation and institutional support from the local government unit. Public service innovation and usability can then be further measures to ensure sustainability and success.

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