End-to-End User Participation in Information Systems Development: A Case Study Based on a Control Perspective

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END-TO-END USER PARTICIPATION IN INFORMATION SYSTEMS DEVELOPMENT: A CASE STUDY BASED ON A CONTROL PERSPECTIVE

Participation entre utilisateurs finaux au développement d’un système d’information : une étude de cas selon une perspective de contrôle

Completed Research Paper

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Abstract

Despite its well recognized importance, user participation in information systems development (ISD) is often limited, passive, symbolic, or marginal in practice. Users are thought to be in a weak position to influence the process and outcome of ISD. As an exploratory case study, this research reports on a refreshing user participation experience to examine what kinds of user behavior can exert strong control over ISD and how. In developing a core business system for a large commercial bank, a group of business experts collocated with the developers as part of the development team. Results show that strong control by users was achieved through their end-to-end participation, which was instrumental for ISD success in terms of high quality and smooth rollout. In particular, users’ influence was strengthened over time through their participation by doing in completing some of the key tasks usually done by the IS staff. This research contributes toward a new theory on user participation from a control perspective.

Keywords: Information systems development, end-to-end user participation, user control, information systems success

Résumé

Alors que les utilisateurs sont souvent perçus comme étant en position de faiblesse pour influencer le développement des systèmes d’information, cette étude de cas exploratoire rapporte une expérience enrichissante de participation d’utilisateurs, qui montre qu’un fort contrôle par les utilisateurs a été obtenu via la participation entre eux et la participation active à la réalisation de certaines des tâches clés habituellement dévolues aux équipes SI. Cette recherche alimente une nouvelle théorie sur la participation des utilisateurs selon une perspective de contrôle.

Abstract in Native language

尽管人们一直认为用户参与在信息系统实施中非常重要，但实践中，大多数用户是处于被动、象征性和边缘的从属地位，对系统实施过程和结果的影响非常有限。然而，本探索性案例揭示的用户参与方式令人耳目一新，它表明用户可以通过一系列的参与行为实现对系统实施的强控制。在中国农业银行的一个核心业务系统开发中，用户代表完全脱离原来的工作岗位被选调至项目组，作为项目成员和技术人员合作完成系统开发。随着用户亲自担任本应是由技术人员承担的众多关键工作，用户对系统开发过程和结果的控制逐步得到加强，最终保障了系统的高质量及其在全行范围内的顺利推广。本研究从控制的视角来拓展了用户参与理论。
**Introduction**

The important role of user participation in information systems development (ISD) is widely recognized almost like a tenet (e.g., Ives and Olson 1984; Cavaye 1995b; Hwang and Thorn 1999). Proponents for user participation strongly believe that it is a major contributor to successful IS implementation. However, despite the pervasiveness of this belief, researchers have repeatedly noted the lack of consistent empirical results in this area (Ives and Olson 1984; Cavaye 1995b; Markus and Mao 2004). To date, there is limited evidence that the use of ISD methodologies involved more than passive user participation. In fact, users often had little influence over the course of a development project (Gasson 1999; Mouakket et al. 1994; Urquhart 2001). Moreover, the goal of achieving more than a token user involvement remains elusive (Spinuzzi 2003).

Meanwhile, with the growing strategic importance of IS in organizations, the role of business units in ISD becomes increasingly significant (Rowlands 2007). As a result, it may not be sufficient for today’s ISD to limit user participation to requirements, acceptance test, and signing-off on key deliverables. Research has started to emerge on how business functions should participate more effectively in ISD and adjust their role in the changing context (e.g., Gallivan and Keil 2003; Rowlands 2007; McGrath and Papazafeiropoulou 2007). There is a clear change in the distribution of power over ISD in organizations. The traditional developer “power over users” (Markus and Bjorn-Andersen 1987) may have been weakened, as users seem to have more sources for power to influence ISD.

Drawing upon organizational theories, Kirsch (1996) identified several modes of control for the ISD context, along with their antecedent conditions. This research builds upon the work by Kirsch (1996, 1997). It specifically examines what kinds of user behavior can exert strong control over ISD, and how they influence ISD process and outcome.

As an exploratory case study, this research reports on a user participation practice, which is considered highly effective and illustrative. It describes business experts “participating by doing” in the entire process of ISD, which yielded “strong control” over the ISD process. In a nutshell, 31 business experts were drafted to the development team, away from their original posts, to work with the developers side-by-side in completing the massive development and rollout in a large bank. They took charge from the outset in the requirements stage, and also played a leading role in a significant portion of the development work. In the process of “doing,” users’ influence was strengthened to afford strong control, which led to high quality and smooth rollout.

Based on the control perspective, a preliminary theory of user participation is proposed. It suggests that “participation by doing” can strengthen, and in some cases create, the antecedent conditions for the application of a combination of control mechanisms for users to exert influence over the process and outcome of ISD, for ensuring systems quality and ultimately user acceptance. From the control perspective, different styles of user participation vary on the range of user behaviors, and their effects on the antecedent conditions of control, application of various control mechanisms, and ultimately system quality and adoption.

The remainder of this paper is organized as follows. The next section reviews relevant literature with a focus on deficiencies of conventional user participation and control theories. Then, the research method section describes the selection of the research site, data collection, and analysis procedures. Subsequently, results of data analysis are presented. Next, this paper reaches several conclusions, and compares them with relevant theories and prior literature, toward developing a new theory on user participation from the control perspective. Lastly, this paper concludes with a brief discussion.

**Literature Review**

**Deficiencies in Conventional User Participation**

User participation refers to the participative behavior of end-users of information systems or their representatives in a series of activities in an ISD process (e.g., Olson and Ives 1980; Franz and Robey 1986). User participation is commonly considered one of the critical success factors for ISD. One explanation holds that participation improves system quality by getting system requirements right. The second argues that participation works by creating the psychological experience of buy-in among participants. Unfortunately, mixed results were found in prior studies on the effectiveness and outcome of user participation (e.g., Ives and Olson 1984; Cavaye 1995b; Markus and Mao...
Part of the reason could be that benefits of user participation are moderated by various contingency factors (McKeen et al., 1994), the presence of conflicts between users and IS staff (Robey and Farrow 1982; Robey et al. 1989), and more importantly users’ disadvantageous position in ISD, which weakens the effect of user participation.

Most research on user participation implicitly assumes that when users participate in systems development, user–developer communication also occurs, which ensures that the resulting system will be designed to meet users’ needs and will be accepted by them. However, this should not be taken for granted, as the user–developer communication process is often ineffective (Gallivan and Keil 2003). Moreover, despite a strong emphasis on user participation and the value placed on “joint development,” IS methodologies’ prescriptions for the distribution of tasks and accountability between users and IS staff remain ambivalent (Beath and Orlikowski, 1994). Consequently, users can hardly be expected to be true co-agents with IS staff, and the interdependence between users and IS staff is often rendered as a relationship of dominance or dependence. Beath and Orlikowski (1994) further argued that “the very notion of ‘user involvement’ portrays IS as naturally in charge and having the authority to decree the participation of users in the development of their own work support systems” (p.373).

Several user participation methods have been discussed in the literature, featuring various levels of structuredness and user influence, such as the participative design (Mumford 1981; Carmel et al 1993), joint application design (Andrews, 1991; Carmel et al, 1993; Davidson, 1999), and user-centered design (Vredenburg et al., 2001; Mao et al. 2005). However, regardless of what specific techniques are adopted in these methods, it is IS staff who lead users’ participation. In other words, there is no fundamental change in users’ passive, marginal, and symbolic role in ISD. As a result, the effect of user participation is discounted to a large extent (Davidson, 1999).

Moreover, it is often thought that user participation is limited to requirements and design stages, and more important in these two stages than in others. Some even believe that after meaningful participation in the stage of analysis or design activities, further material participation in other stages may not be necessary to promote user satisfaction with the process (Wu and Marakas, 2006). However, an overlooked issue is that even if accurate requirements are captured from user participation, there exists no effective mechanism to ensure that the requirements are reflected in the final systems delivered (Markus and Mao, 2004). Therefore, it is of great significance to identify effective means to strengthen users’ influence in ISD, and to transform the passive, marginal, and symbolic role into a proactive, central, and substantial one.

Lastly, since not all end-users can or should participate, the link tends to be weak between the participation and adoption by a small number of user representatives and acceptance by a large amount of non-participating users (Markus and Mao, 2004). In sum, the deficiencies create a series of challenges for traditional theories and methods of user participation.

Control in Information Systems Development

Research on control in ISD originates in control theories in organizational studies. Control in a behavioral sense refers to attempts to ensure that individuals act according to an agreed-upon strategy to achieve desired objectives for an organizational project (Jaworski 1988; Merchant 1988). Drawing upon organizational theories, Kirsch (1996) identified four modes of control for the ISD context, namely behavior control, outcome control, clan control, and self-control (see Table 1). In extending prior research into the ISD management context, Kirsch (1996) emphasized “controller’s knowledge of the transformation process,” which refers to the controller’s knowledge about ISD. Her work suggests that the type of control is dependent on the controllers’ knowledge of the ISD, behavior observability, and outcome measurability.

According to Kirsch, formal control mechanisms are usually pre-defined by ISD methodology. In particular, behavior control relies upon specified rules and procedures to be followed for desired outcomes. It could be a detailed systems development methodology, which articulates precise steps for successfully developing a system. Behavior control is recommended when appropriate behaviors are known and controllees’ behaviors are observable. In the context of ISD, outcome control would imply setting precise target task completion dates and interim milestones. It is deemed suitable when outcomes are measurable. With regard to informal control mechanisms, clan control may be adopted when neither desired behaviors are well articulated nor outcomes are measurable. In contrast to clan control, self-control stems from individual objectives, personal standards, and intrinsic motivation. Organizational and individual antecedents of self-control include task complexity, ambiguity in performance evaluation, lack of rules and procedures, and the desire to exercise self-control.
Moreover, Kirsch (1997) also inducted from a multiple case study how IS staff and the user groups could exercise formal control over behavior and outcome, and informal control such as clan and self-control over ISD processes. For examples, formal control mechanisms include walk-throughs, ISD technical documentation, progress report, project plan, and system testing (Kirsch, 1997), as shown in Table 1. In this research, we draw mostly from Kirsch’s seminal work on control in ISD (1996, 1997), as a lens for analyzing the data.

Table 1. Control Modes, Antecedent Condition and Control Mechanisms (adopted from Kirsch, 1996, 1997)

<table>
<thead>
<tr>
<th>Control Mode</th>
<th>Key Characteristics</th>
<th>Antecedent Condition</th>
<th>Examples of Control Mechanisms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Behavior control</td>
<td>Controller monitors and evaluates controller’s behaviors, basing rewards on whether he followed the correct behaviors</td>
<td>knowledge of appropriate behaviors, behavior observability</td>
<td>project plan, ISD technical documentation, rules &amp; procedures, meetings</td>
</tr>
<tr>
<td>Outcome control</td>
<td>Controller evaluates whether outcomes were met, regardless of the process or behaviors followed</td>
<td>outcome measurability</td>
<td>project plan (defined target implementation, defined project milestones), system testing</td>
</tr>
<tr>
<td>Clan control</td>
<td>Clan identifies and reinforces acceptable behaviors, shared experiences, values, and beliefs among the clan members</td>
<td>appropriate behaviors unknown, outcomes not measurable</td>
<td>culture &amp; norms of organization and IS, peer pressure</td>
</tr>
<tr>
<td>Self-control</td>
<td>Controllee sets own task goals and procedures, intrinsically motivated, self monitoring and self evaluation.</td>
<td>complex or non-routine task, outcomes evaluation ambiguity</td>
<td>organizational role; self-management</td>
</tr>
</tbody>
</table>

Research Method

Case Context

The Agricultural Bank of China (“The Bank” thereafter) is one of the four largest state-owned commercial banks in China, with 37 provincial level branches, over 4,000 subsidiaries, and about 40,000 branch offices. In early 2003, the Bank decided to adopt a centralized accounting system with increased reach of control in pursuit of total cost management and other strategic objectives of financial management. It was a response to radical environmental changes including the opening-up of the financial industry to foreign competition as a result of China’s accession to WTO, regulatory reform, and the Bank’s ownership restructure. Consequently, the Bank decided to base its new strategic plan on innovation in financial management propelled by information technologies.

In was against such backdrop that the Financial Management Information System (FMIS) project was initiated. It would be a platform for management accounting, and its users would include finance and accounting employees at all levels within the Bank. It would also be instrumental for implementing several major reforms in the Bank. The objective of the project was to upgrade the level of financial management, and move to an integrated and centralized environment for accounting recognition and measurement, and financial management, while achieving seamless integration between financial accounting and managerial accounting. As a result, the FMIS project was highly ambitious, complex, and uncertain with regard to its end product.

The FMIS project was officially kicked off in March 2003. After two and a half years of system development and one and a half years of rollout nation-wide, the Bank completed the first phase of FMIS successfully in June 2007, finishing half a year ahead of schedule. The smooth rollout and user acceptance was a pleasant surprise to everyone including the top management.

Rationale for Site Selection

According to Miles and Huberman (1994), it is appropriate to use qualitative methods when the research emphasis is on deep understanding, local contextualization, causal inference, and revealing the perspectives of the people under
study. With an aim of generating a descriptive and explanatory account of “how” and “why,” we chose the case study method (Yin 2003; Benbasat et al. 1987). The case method is consistent with our central research question concerning what kinds of user behavior can exert strong control over ISD, and how. Furthermore, the choice of sample for a case study is crucial because it influences the results (Miles and Huberman 1994). The ISD case was chosen because it demonstrates a refreshing user participation practice, which proved to be effective and successful. It turns out to be quite insightful an in-depth examination of the entire process of user participation, various kinds of user behavior and how they lead to strong user control and system success at the end.

For example, rather unique were the role played by business experts in the project and the team composition. The FMIS project team initially consisted of just 14 members for feasibility and requirements analysis, gradually grew as the project progressed, and reached over 100 people at the peak time. However, 13 of the first 14 members were business experts, as user representatives, summoned from subsidiary branches due to the headquarters’ lack of manpower. The lone IS representative was from the Software Development Center of the Bank. The business experts held a variety of key positions in financial management in various levels of subsidiaries and branches of the Bank, with over 10 years of business experience on average. They were carefully chosen because most of them were “guys known to everybody in the bank for having an answer to any financial problems in a given area.” The 13 business experts completely left behind their normal post throughout the project duration, working on the project full time as full members of the development team. In the later stages of the project, when FMIS was about to be subjected to various tests, 18 additional business experts were drafted to the team with the same kind of arrangement. The 31 domain experts formed the business group of the project team, which was in parallel with the technical group, and participated by doing.

**Data Collection**

The two authors participated in face-to-face interviews with key members of the project team, which occurred over a period of about six months in the later stages of the project. There were 17 informants including the project manager, the leader of the business group, eight members of the business group, six members of the technical groups (sub-group leaders), and the leader of the testing group. They fully represented the development team, and covered all key perspectives. During the data collection period, the research team made multiple visits to the development team’s offices. The in-depth interviews typically lasted over an hour with each informant.

The interviews were audio recorded, and the researchers also took a large volume of notes. Supplementary documents were requested and given to verify and triangulate our findings, including the project feasibility report, project plan, weekly progress reports, and project summary reports. After data processing and initial analysis, follow-up visits to key informants were arranged to confirm the completeness and accuracy of key processes and preliminary conclusions.

**Data Analysis**

The data analysis overlapped with data collection, as common in qualitative research (Miles and Huberman, 1994; Strauss and Corbin, 1998; Yin, 2003). The recorded interviews were transcribed to facilitate analysis. After thinking about the data of transcription and case note, strategies were generated for collecting new, often better, data. At the end, in total over 400 pages of transcribed interview data were produced. In the process of data analysis, the authors also had numerous contacts with the project manager via email and online chat for clarifications and supplementary information, and got detailed answers.

In line with grounded theory research (cf. Strauss and Corbin 1998; Miles and Huberman 1994), our content analysis proceeded through the following three steps. In the first step, we identified major stages of the ISD life cycle and identified the main tasks and performers in each stage. Then, in the second step, we classified specific user behaviors in each ISD stage as the first order coding, and created a comprehensive list. Lastly, specific user behaviors were aggregated into more general classes in the second order coding, and then matched to control mechanisms and antecedent conditions; their impact on system success was also identified and measured as system quality and adoption.

The second author transcribed all interview records. Both authors reviewed the case materials, and discussed the data analysis approach and coding scheme first. Then, the two authors selected portions of the transcribed data for pilot analysis. We discussed and critiqued each other’s interpretations of data. Based on a common understanding,
the two authors then divided the coding task, with the second author coding the data while the first author acted as an auditor (cf. Lincoln and Guha 1985). The auditing task mainly involved verifying both the process (i.e., the steps followed by the coder) and the results of coding.

**Results**

**Characteristics of the FIMS Development Process**

The FMIS project followed essentially the traditional ISD life cycle model. However, iterations were performed within several of these stages, such as requirements modeling, design and implementation, and testing. The most distinct feature of FMIS was that the great majority of ISD work traditionally led by IS people was driven by the business experts, as shown in Figure 1, which was in sharp contrast with the conventional practice.

![Diagram: Major Development Stages and User Activities](image)

**Figure 1. Major Development Stages and User Activities**
User Behaviors in ISD Stages

Systems Planning and Requirements Modeling

Soon after the FIMS project was given the go-ahead, the 13 business experts reported to work. However, “no one knew what the business model looked like.” As a result, the first task was planning and scoping. The business experts were divided into two teams. Five of them who had experience participating in large scale ISD projects in the Bank visited several multinational banks’ regional headquarters in China to learn about their model of financial management. The rest started research on business requirements in related business units within the Bank, trying to understand their needs and expectations. Then, the two teams got together to share information, and created a requirements specification on FMIS, which was subsequently approved by the Bank headquarters.

In the requirements specification, FMIS initially consisted of five modules (subsystems). Subsequently, the 13 business experts were divided into five subgroups. At this point, each group was assigned one IS member, whose mandate was clear, “first, to learn business knowledge, and second, to advise them on the modeling from the perspective of technical feasibility.” In contrast with the conventional practice, the business experts prepared the requirements document. Business experts in each subgroup wrote down the corresponding business model based on the top level requirements specification. In the process, they made multiple visits to relevant business units in the Bank, used telephone and the Internet to query their former colleagues in their previous work unit. When need arose, they also communicated with provincial branches.

It took nearly five months to develop the initial business model for FMIS. Afterwards, each subgroup started the review, evaluation and refinement for the model, which took the following three steps. First, feedback from the technical representatives who participated in the modeling task to date was sought. Business experts explained the business logic to the IS staff, and sought advice on the technical feasibility. IS representatives provided suggestions for optimizing the scoping of the subsystems.

Second, feedback from provincial branches was sought. The headquarters of the Bank organized two requirements review meetings participated by senior users, and middle or senior managers, of major provincial branches. Through the meetings, the business model was reviewed, modified, and enhanced. As a result of these two rounds of review, the business model was expanded to consist of nine modules.

Lastly, the business model had to be reviewed and endorsed by the top management of the Bank, in order to be adopted later in the entire Bank. Having gone through the three rounds of review, the business model was further enhanced and finalized. A list of user behaviors in the early stages is shown in Table 2.

| Table 2. User Behaviors in Systems Planning and Requirements Modeling |
|---|---|
| Behaviors | Representative Quotations |
| Learning the best-practice in industry | “Senior managers from the HQs along with selected several representatives from our business group paid visits to HQs of multinational banks in China, such as the Deutsche Bank-China and Standard & Chartered, to see how they were doing, and to learn the advanced practice of multinationals.”

“In the system, there was a transaction side, such as the deposit management function, for which system requirements could be derived accordingly, because of bank regulations and industry standards. On the other hand, there was also a managerial side, which took some trials-and-errors, e.g., managerial accounting. We did a comprehensive research, and read numerous reference books, and recent Master’s and Ph.D theses, which were rather theoretical.” |
| Research within the Bank (Requirements of the HQ and branches) | “We inquired with the HQs, and listened to HQ leaders’ considerations on reforming the future financial management, with regard to the objective and strategy.”

“When I came across a problem, I’d pick up the phone or get on the Internet to communicate with my former colleagues or boss of my previous job, to discuss with them how to solve the problem.... This type of communication was frequent, as I
wanted to listen to their opinions to prevent future resistance by the user.”

<table>
<thead>
<tr>
<th>Discussion within the team</th>
<th>“During the requirements analysis period of time, meetings were held everyday. Starting from an outline, issues were discussed at the meeting during the day; more materials were prepared in the evening for the discussion on the next day. This process lasted for two months; everyday was like this.”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Confirmation with IS staff</td>
<td>“Since the business model was rather future-oriented, possibly beyond the reach of our technical capabilities, the requirements model must be reviewed by the IS staff first and foremost.”</td>
</tr>
<tr>
<td>with non-participating users</td>
<td>“After all, the 13 of us came from a small portion of the branches, leaving many more branches without representatives. It is only fair to consider their needs, otherwise if they feel their interests were not taken care of, there could be fierce resistance.”</td>
</tr>
<tr>
<td></td>
<td>“During the two large scale review meetings on the business requirements model participated by several senior managers form each branch, ...the exchanged was quite heated. Many conflicts were exposed, which caused tough debates. The resisters expressed out their views, but we adopted the majority views and suggestions at the end.”</td>
</tr>
<tr>
<td>with senior management of the HQs</td>
<td>“Senior management did not participate in our project directly. Therefore, we must brief them. It must be determined by the management, whether this project was feasible and adoptable throughout the bank. With the management’s determination, it would be rather straightforward to implement in a top-down manner.”</td>
</tr>
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</table>

**Systems Design and implementation**

The leading force for this stage was the technical group, to create the technical models, user interface prototype, and coding. Since the great majority of the IS staff had difficulty understanding the requirements model prepared in business language, the business experts trained the IS staff before they engaged in systems design. However, not only did the business group provide assistance to the IS staff in determining design parameters for the technical model, but they also performed several tasks unusual for their role. Even in this stage, the controller and supervisor role played by the business experts is quite obvious.

After training IS staff, the business experts helped with the design of user interface prototypes. They used Excel to draw sketches of their preferred and imagined dialog diagrams of the user interface. This was done after receiving basic training, based on the requirements specification documents prepared by themselves. Next, the IS staff developed web prototypes with HTML corresponding to the user drawn interface prototype, which was then reviewed by the business experts, and again revised by the IS staff for further review in an iterative process.

Subsequently, the business experts specified components of the user interface, along with the types and lengths of data. The IS staff prepared a uniform data sheet for this purpose, and explained about the required contents and their use first. “Our system must reflect not only the current practice but also the future, dozen years later, whatever the business evolution will be. For example, the current length of data fields is determined by the current users, but the future users might need the preserved length. Other than us (business experts), no one else have any clue.”

It was with all sorts of assistance from business experts as described above that the IS staff completed the initial version of systems design specifications. Afterward, business experts reviewed system design specs, and provided frequently feedback and directions for the IS group.

It is worth noting the interaction described below between the business and technical groups, which shows that both groups influenced the design by drawing upon their respective strengths: As the IS staff became familiar with the business model, they discovered the scoping between different subsystems was not optimal, and could be enhanced for higher efficiency. “Take the project management subsystem for example, which was the last one to be separated out as an independent module. Had it not been taken out as an independent subsystem, this function would have been spread out in many subsystems such as fixed assets management, expenses, and budget subsystems, which...
would result in low efficiency and wasted resources. Separated out as independent, it had higher efficiency, easier to manage.” After intensive discussion between the business and IS groups, FMIS was broke down into 13 subsystems in the final design specs.

In the coding stage, the business experts had a relatively lighter workload but several critical tasks nevertheless. For example, they considered themselves playing a supervisory role to oversee the materialization of the business model. “During the coding stage, they (IS staff) sometimes told us certain things were difficult to implement due to technical limitations, and requested for modification to the initial requirements. Sometimes, we’d agree; sometimes we’d insist.”

Furthermore, the business experts spent time on redesigning the financial management processes and compiling operational guidelines to match FMIS. “FMIS institutionalizes a whole set of new financial management system, which calls for reform in the financial management throughout the Bank. To ensure smooth operation of FMIS, the new managerial process must be designed and enforced so that by the time FMIS is rolled out, it will not conflict with the operations in practice. Once people have become used to the new financial rules in their work, they’d find FMIS helpful.” Table 3 summarizes results of analysis for the design and coding stages.

<table>
<thead>
<tr>
<th>Behaviors</th>
<th>Representative Quotations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Training IS staff</td>
<td>“Although several core IS members participated in the requirements modeling, the business model was not easy to understand for the great majority of the technical people. Therefore, we provided business training for them before they started out their design work.”</td>
</tr>
<tr>
<td>Learning to use design tools</td>
<td>“The IS staff taught us Visio for three days. Most of us did well, but later we felt it was better to use Excel, which was more familiar. The IT guys then trained us on how to use Excel to sketch dialog interfaces.”</td>
</tr>
<tr>
<td></td>
<td>“Having got training from the IS staff on UML, we could roughly understand their UML design. Nevertheless, they’d provide textual explanations for complicated design, thus there was no major hurdles in our communication.”</td>
</tr>
<tr>
<td>Drawing Prototypes</td>
<td>“Using Excel, we sketched out the interfaces in our mind, according to our needs. Key components on each interface (web page) were filled out. There was a prototype document, entirely made by us [users]. Of course, the IS staff gave us guidance, e.g., what could be realized through the transition between interfaces, and what couldn’t. They’d tell us all of these, and we put them in drawings.”</td>
</tr>
<tr>
<td>Review interface prototypes</td>
<td>“The IS staff began to design the web page prototype with HTML, based on the prototype drawn by us…. We’d browse through each page, examining which key elements to show on a given page, which ones are visible, and which ones are not, making adjustment cell by cell.”</td>
</tr>
<tr>
<td>Compiling data tables</td>
<td>“It was us, business experts, who decided on how many key elements are on a given page; so were how to control the elements, and the lengths and precision. The IS staff prepared a standard form only for us to fill.”</td>
</tr>
<tr>
<td>Reviewing technical model</td>
<td>“We held daily review meetings for the system specs (technical). The leader of each subgroup of domain experts would review and comment on the product design specs for the group, then the subgroup leaders would come together along with the leader of the entire business group to review the specs produced by each subgroup. Problems were solved on the same day.”</td>
</tr>
<tr>
<td>Resolving arguments with IS staff</td>
<td>“We argued bitterly [with the IS staff] but in most cases our view persisted. At times they felt modifications would be optimal and reducing redundancy; such suggestions would be adopted, after all their logical thinking and abstraction capabilities are stronger than ours.”</td>
</tr>
<tr>
<td>Supervising IS staff</td>
<td>“If they [the IS staff] encountered insurmountable hurdles in realizing the business logic, they wanted modification [to requirements]. If they did, they had to consult with us and get us to agree upon the modification.”</td>
</tr>
</tbody>
</table>
Testing and Piloting

As soon as a subsystem’s coding was completed, it was put into testing. Mindful of the overwhelming complexity involved in the functionality of FMIS, the headquarters of the Bank and the project team considered only business veterans were qualified to make judgment calls on the correctness of the system functions. As a result, the second batch of 18 business experts was drafted from provincial branches, who would be the future key users of FMIS, to join the project team to perform testing. Another objective for having them was that “we’d be the first users to experience the system, to verify the business model put forward by the first batch of business experts and the system.”

Upon arriving at the FMIS development site, the second batch of business experts was trained by the first batch on the business logic of the system. Subsequently, the latecomers were asked to reproduce the flowchart of each subsystem based on their own understanding, which showed each person’s degree of understanding and strengths. This became partly the basis for assigning the second group to different testing groups, while consideration was also given to their previous jobs. As a result, the business testers were divided into four groups.

Next, the testers were given technical training on testing. Having gone through the necessary training, the second batch of business experts started to prepare test cases. In fact, some high level test cases were already completed by the first batch of business experts, and these were refined and expanded. With the newly acquired testing skills and refined test cases, the second batch of business experts started the testing job. Except for unit tests being completed by the IS developers, the rest of the tests were conducted by the second batch.

Once FMIS had gone through testing in the development and testing environment, pilot test in the field started for the ultimate evaluation. After the user acceptance test, the entire project team moved to one of the Bank’s regional branches, which had one of the largest business volumes and the widest range of diverse transaction types, to conduct a pilot project. The pilot project was considered extension to the test, and it put FMIS in use in a real environment to face the ultimate test and verification.

“The pilot project must be a success. We could not afford a failure. A failure would create doubt in the mind of the top management in headquarters, and feed excuse to local branches for resistance. We need a success to kick off the rollout, and set a benchmark for other local branches. … The technical group was responsible for setting up the system, and the rest is up to us. … We devoted ourselves to work completely, … gave it all we had, to ensure the pilot’s success,” a business expert reflected.

In parallel with the pilot project, the business experts were also busy with preparing for the follow-up training and rollout work, and compiling the training manual and operation manual for the system. “It is highly advantageous for us to prepare [the training materials], because we know the business logic in the system by heart and understand the characteristics of the system thoroughly. Besides, we know how to describe the management philosophy in the system and operational routines in an easy to understand manner. Bringing it closer to the business, and making the system easier to learn and adopt.” Table 4 shows the coding results.
<table>
<thead>
<tr>
<th>Behaviors</th>
<th>Representative Quotations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Studying the business model (2nd batch of users only)</strong></td>
<td>“Although we were good in business, the system had many new things and we needed to understand the whole business model, which was a must. Therefore, our first task after arrival was receiving training given by the first batch of business experts on the business model.”</td>
</tr>
<tr>
<td><strong>Learning testing techniques</strong></td>
<td>“An IT person, who was specialized in testing, was responsible for training us on testing, including basic ideas and principals of testing, the use of bug management tools, our internal procedures, and how to prepare test cases…”</td>
</tr>
<tr>
<td><strong>Preparing test cases</strong></td>
<td>“We began to write up test cases. In fact, the first batch of business experts had already prepared the basic test cases. After all, they were the ones who were most familiar with the business logic embedded in the system. All we needed to do was to add more details to the cases.”</td>
</tr>
<tr>
<td><strong>Review test cases (1st batch of users only)</strong></td>
<td>“The quality of the test cases [prepared by the 2nd batch of users] would be reviewed by the 1st batch, who did the requirements. We, the IS staff, are not familiar with financial transactions, but still need the requirements people to do the gate-keeping, to avoid worries.”</td>
</tr>
<tr>
<td><strong>Performing tests (interface test, functional test, and integration test) (2nd batch of users)</strong></td>
<td>“Since they (the 1st batch of users) provided the business model, they might not see problems if the test were done by them, too. It is natural to feel one’s own product is problem-free. However, it is a completely new thing for us [2nd batch users], and easier to see defects.” “The test was divided into several stages. One of them was to test the components of interface … followed by functional test. They’d submit bug reports on anything short of satisfaction. While developing new functions, we removed the bugs.”</td>
</tr>
<tr>
<td><strong>Influencing the mode of collaboration with IS staff</strong></td>
<td>“In most cases, we took the initiative to approach the developers. For example, once a bug was found or a process was not smooth, we went to find them. Alternatively, for the processes that were hard to test with cases but susceptible to us, we asked the developers to explain to us their logic of coding. Then, we’d know what defects were likely, e.g., missing necessary verifications.”</td>
</tr>
<tr>
<td><strong>Resolving differences between the two batches of users, and those with the IS staff</strong></td>
<td>“Sometimes, we felt certain design irrational, or inconsistent with our work. We’d approach the IS staff or the 1st batch of users, and problems ensued. We’d get into heated debate, and no one backed off. At the end, it would be up to the leader of the IS group and the one of the business group to negotiate and make a decision. We confronted each other in discussions, but worked closely in a friendly collaboration.”</td>
</tr>
<tr>
<td><strong>Taking charge in piloting</strong></td>
<td>“Our business staff all went out for it. During the pilot, we were engaged in the frontline, taught the users hand by hand. Whenever inquiries arose, we responded quickly to resolve the problems so that no one had any doubt about the system. For small adjustment that we felt reasonable, of course, we’d accept.”</td>
</tr>
<tr>
<td><strong>Compiling the training manual, &amp; operation manual</strong></td>
<td>“As we approached the end of successful piloting, we started thinking about rollout. The first step would be training, which meant compiling training materials as the first step. The business users were divided, the 1st batch was familiar with the philosophy of the system, they were responsible for compiling training materials on the business principles of the system; the 2nd batch was familiar with operation, thus we took responsibilities for preparing training materials on operation. One of the key materials for operational training was the manual, and of course it would be necessary for future system operation.”</td>
</tr>
</tbody>
</table>
Training and Rollout

The training was conducted in two phases. The first one was to train to trainer. Each provincial branch selected about eight future trainers, and they were brought to the headquarters for a month long “training the trainer” program. The first batch of business experts was mainly responsible for training on the built-in management philosophy. The second batch did the operational training. After the training, the trainers went back to their provincial branches, and started local training. Meanwhile, the business group set up remote support via online instant messenger tools to answer queries, “answers to query were archived, and compiled in a manual distributed to each provincial branch. It became a must-have ‘help manual’ for those involved in later rollout.”

After the two rounds of training, the management philosophy and mechanisms built-in FMIS were effectively propagated throughout the Bank. In retrospect, “the most challenging part of the rollout was dealing with the leadership in the provincial branches. Without their support, it would be very tough to adopt. Therefore, our business group prepared a comprehensive promotion brochure for senior management in the headquarters before the release of FMIS. It highlighted key areas for reform to go along with FMIS, and outcome of the reform. Then, the headquarters took charge of the selling and promotion work to the leaders of provincial branches. Once the branch leadership bought in, the rollout was not far from success.” As can be seen, the business group in the project team played a highly significant and unique role in planning and executing the rollout.

Nation-wide rollout was divided into two batches. “It would have a lot of advantages if we go back to our own branch to help the rollout. Therefore, the first batch of branches to adopt FMIS was the home of FMIS participating users. With the success of the first batch, other branches would gain confidence and pressure in the sense that if it was successful elsewhere, why can’t it be here?” Since there were far more branches in the second batch, the business group do not have enough manpower to support them. Therefore, some of the earlier adopter branches were asked to support late adopters on a one-on-one basis.

Because of the training planned by and delivered by the business experts on the project team, who understood the practice and the system well, the rollout work was extremely smooth, finishing six months ahead of schedule. One of the branch leaders commented, “rolling out a system in the past used to take massive effort, mobilization by the leaders, taking a long time, and yet ending up with dismay results. It is surprising this time around it took few people to complete the rollout work in a short time.” Coding results are summarized in Table 5 for the final stages.

<table>
<thead>
<tr>
<th>Behaviors</th>
<th>Representative Quotations</th>
</tr>
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<tbody>
<tr>
<td>Training the trainers</td>
<td>“The first batch of business experts conducted the requirements modeling, familiar with the mode of financial management, so they are mainly responsible for training on the built-in management philosophy. We, the second batch, did the operational training because we conducted the tests and became familiar with the system details.”</td>
</tr>
<tr>
<td>Re-learning the entire business model and operation</td>
<td>“Regardless of training on business logic or system operation, all of our business group participated, just like the trainers. This is because, both requirements and testing work, testing in particular, were done in small groups. One became familiar with his own module, but was vague on other ones and lacked an overview. Having gone through the training, each of us reached a higher level of understanding. This was very important for us to facilitate rollout in the branches. By that time, knowing only your own module would not be acceptable.”</td>
</tr>
<tr>
<td>Supporting the local trainers’ work in their branches</td>
<td>“Once the trainers went back to their own branch, they started to take charge of training. … We created a liaison mechanism, an ITS [instant messenger] system in essence. Whenever problems arose, the screenshot could be sent to us via the ITS. …In the end, we compiled all of the problems together, and made a FAQ manual to distribute. If one got a problem, consult the manual first.”</td>
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</tbody>
</table>
Securing the support of local management for system rollout

“Our business group prepared a comprehensive promotion brochure for senior management in the headquarters before the release of FMIS. It highlighted key areas for reform to go along with FMIS, and outcome of the reform.”

Taking charge for the rollout

“Nation-wide rollout was divided into two batches. First, the business group went back to their own branch to help out the rollout. Following their success at home, they were assigned to the second batch of branches to run the rollout.”

Providing continuous support

“With the completion of the rollout, the business staff was gradually released from the project team. However, a liaison mechanism remained operating. Although they were scattered all over the country, they were still able to provide trouble-shooting clues whenever problems arose.”

An Analysis on the Essence of User Participation: A Control Perspective

Our results of the first order coding so far have illustrated a wide range of users’ participative behaviors in the entire ISD cycle (as shown in Tables 2 to 5). They are further aggregated into nine more general categories of participative behaviors, and mapped onto theoretical constructs of control theories in Table 6. It appears that some of these nine categories affected antecedent conditions of control, whereas others directly impacted on one or more modes of control. Furthermore, the influence of user participation on system quality and adoption (by non-participating users) is shown in Table 6. This analysis leads to a new understanding of user participation from the control perspective, towards a new theory of user participation.

What Are the Impact of Users Participation on Antecedent Conditions of Control?

Both organization theories and research on control in ISD (e.g., Kirsch, 1996, 1997, 2002) hold the same view that the adoption of a particular control mode is determined by three antecedent conditions, the controller’s knowledge of the transformation process (ISD knowledge in this context), behavior observability and outcome measurability. Among the three, the controller’s knowledge of the transformation process plays a critical role in determining the mode of control (Kirsch, 1996). Moreover, through a multiple case study, Kirsch (1997) reported that users could exert important control in ISD as “liaisons,” but they were not able to exercise strong control through multiple modes because of their innate lack of ISD knowledge, especially behavior control and outcome control (Kirsch, 2002).

However, this research finds that users’ extensive participating behaviors can change the antecedent conditions, which enabled strong control. Table 6 shows that in fact several broad categories of user behavior have such an effect. For example, “learning technical knowledge” allowed the users to gain familiarity with ISD principles, processes, activities, and tools, which resulted in enhanced “behavior observability” of the IS staff. Similarly, hands-on participation or participation by completing key tasks had the same effect. Through participation by doing, users gained “specialized technical training,” opportunity for “daily communication with and learning from the IS staff,” and “self-taught technical knowledge.” As a result, users’ “knowledge about ISD” snowballed.

In the same vein, our data reveal that user participation in various stages of ISD provided opportunities for enhancing users’ understanding of the requirements model, which was refined iteratively and continuously. In other words, the “outcome measurability” kept improving through this process. As a matter of fact, prior to the project, the business experts lacked a comprehensive understanding of the business logic involved in FMIS, as they were merely familiar with knowledge related to their own position. It was only through external, internal, and within the business group learning that the users developed a clearer and clearer vision of the project outcome.

It is clear that the antecedent conditions for control were not present at the beginning of the project. In fact, the business experts knew little about ISD prior to their role in the FMIS project. “We were more or less involved in some systems development projects in our bank in the past. However, it was mostly describing our requirements to the IS staff, and testing the system for acceptance, which basically involved no technical knowledge.” However, given the high uncertainty and complexity arising from the nature of FMIS, “it would be a mission impossible to
Table 6. User Behaviors and Their Impact on Control

<table>
<thead>
<tr>
<th>User Behaviors</th>
<th>Impact on antecedents</th>
<th>Outcome control</th>
<th>Behavior control</th>
<th>Clan control</th>
<th>Self control</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning technical knowledge</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>Learning business knowledge</td>
<td></td>
<td></td>
<td></td>
<td>√</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Understanding the needs of non-participating users</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>Hands-on participation in development</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>Review the work of developers</td>
<td>√</td>
<td>√</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Training IS staff on business knowledge</td>
<td>√</td>
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<tr>
<td>Influencing the mode of collaboration with IS staff</td>
<td>√</td>
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<tr>
<td>Shaping the behaviors of future users</td>
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<tr>
<td>Influencing rollout &amp; adoption</td>
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</tbody>
</table>

Note: 1= knowledge about ISD; 2= behavior observability; 3= outcome measurability
leave this task to the IS staff.” To some extent, the earlier overwhelming presence of the business experts on the project team helped set the tone for their leading position throughout the project lifecycle. Much of the later work had to be done by the users, too, and in many cases “it would be more advantageous to have the users do it” as indicated by the project manager.

What Are the Means for User Control?

In conventional practice, user participation tends to be largely limited to providing requirements. It would depend on the IS staff whether such requirements are fully embedded in the final system. However, in this case, since the business experts worked on the project full time, empowered truly as co-agent from the beginning, users felt responsible for the outcome of the project. They considered themselves “entrusted by the management, given an honor and more importantly responsibility, to complete this task successfully.” Therefore, they went far beyond merely providing requirements, but also worked hard to ensure the requirements were faithfully implemented. In other words, the users’ primary responsibility became to ensure quality, via strong control over the process and outcome of ISD.

As can be seen from Table 6, the most important means was outcome control over the developers, to ensure quality. Users’ control was not limited to evaluating whether the “defined target and project milestones” for the IS staff were met. “Participating by doing” afforded the most direct control to ensure that the systems followed the business need. Table 6 also shows that the secondary means was behavior control. However, instead of prescribing “development methodology, rules and procedures” as in the conventional sense, behavior control was archived via full-time and full membership in the project team, “working and living together with the IS staff” in collocation. There was a great deal of “face-to-face communication” and “direct observation and monitoring of IS staff’s work.”

Results in Table 6 also suggest that in our case there was rather limited use of clan control and self-control over the developers. These results are inconsistent with Kirsch’s finding (2002), which suggests that because of the lack of ISD knowledge users tend to rely upon clan control and self-control. In this case, with more direct behavior and outcome control afforded by extensive participation, clan control and self-control became less important, despite the fact that users were engaged in team-building. “We’d insist on our views in discussion of business logic, but we respect the IS staff, and maintain a good relationship.”

Furthermore, since ISD success is ultimately determined by the adoption by the large number of non-participating users, participating users need to worry about this issue, which is largely overlooked in prior literature (Markus and Mao, 2004). Indeed, out data show that the business experts spent a great deal of effort to ensure the acceptance of non-participating users. Their leading role in the rollout was highly effective for securing adoption by non-participating users. As shown in Table 6, clan control and self-control became the primary means, e.g., confirmation with the non-participating users on requirements and all other effort during the pilot stage, which were aimed for creating these users’ sense of involvement and acceptance in line with typical clan control. The preparation of managerial processes and procedures, operation manual, and training the trainers could be considered examples of self-control, to ensure the smooth operation of the systems. Therefore, we conclude that users as controllers face two categories of controlees, the IS staff to ensure quality, and the non-participating users for acceptance.

Discussion

This research demonstrates a refreshing user participation experience, which can be characterized as “participation by doing” in essence. As a result, users achieved strong control over ISD, which is not considered possible with the conventional user participation. By strong control, we mean the effective application of a combination of multiple control modes, including behavior and outcome in particular. The effectiveness of this style of participation is manifested in the smooth rollout of the system and satisfaction of the project objectives including reforming the financial management system. A general implication of this study is that, in light of the changing ISD environment, which becomes increasingly strategic, global, and complex (e.g., Gallivan and Keil 2003; Rowlands 2007; McGrath and Papazafeiropoulou 2007), traditional user participation becomes inadequate. The intensive and extensive participation by users illustrated in this case is expected to stimulate further research in the new ISD environment, and in particular the development of a new theory of user participation from the control perspective.

Previously, in both literature and practice, users were considered incapable of undertaking key tasks in ISD due to their lack of ISD knowledge. Methods have been proposed for users to monitor ISD, but there is a lack of effective
means for users to exert strong control. This case study confirms that users do not possess the capacity to exert strong control at the beginning of the project, however, through participation by doing users can gradually accumulate and consolidate their control. As illustrated in the case, with the right setup to ensure user power, a variety of actions can be taken by the users on the development team. Users become not only the sources of requirements but also the co-owner and implementer of some key tasks. In other words, the users are not merely suggestion-givers or onlookers, but doers with motivation and pressure. It is such hands-on participation that allows users to be closely engaged with the developers and the ISD process from end-to-end, from the requirements modeling to rollout execution.

**Implications for Research – Toward a New Theory of User Participation**

This research has several important theoretical contributions. It proposes a control perspective to user participation literature and approaches, by extending Kirsch’s work (1996, 1997, 2002) toward a new theory of user participation. It helps explain how users can strengthen their influence from the perspective of control. We argue that “participation by doing” can strengthen, and in some cases create, the antecedent conditions for the application of a combination of control mechanisms. In essence, the close engagement with the IS group and ISD process allows business experts to gain not only familiarity with SD processes, methodologies, and technologies, but also measurability of outcome and behavior observability of IS staff. In other words, “participation by doing” creates the antecedent conditions for business users to either exercise a particular mode of control that was otherwise impossible, or exert a mode of control more effectively, e.g., through instant feedback and close supervision on the IS staff and their work.

Furthermore, we argue that variance in user participation practice can be characterized in terms the degrees of control exerted by users over the ISD process and outcome. Our analysis shows that the control perspective can be gainfully applied to explaining the effectiveness of user participation, through their impact on the antecedent conditions of control, application of control, and system quality and adoption. Therefore, the lack of consistent findings in prior literature on the effectiveness of user participation may be attributed to the weak controls yielded from various participation approaches. Based on the analysis of the highly successful case of user participation, we argue that effective user participation can be achieved via strong control over the ISD process and outcome. Conversely, if the users exert little influence over the ISD process and outcome, their participation is unlikely to lead to expected benefits.

Another key contribution of this work is that we illustrate an approach to strong control by users, on how users can influence not only the quality but also the acceptance of an information system by the great majority of non-participating users. This area on the rollout planning and execution by users is generally overlooked in most of the extant literature. The systematic analysis of the characteristics of the case is instrumental to developing a theory of user participation and an approach for high impact on both system quality and acceptance by non-participating users.

**Implications for Practice**

The findings of this study are also of interest to practitioners. In particular, despite the widely recognized importance of user participation, the practice has often been reduced to rhetoric and lip-services, which result in disappointing outcomes. There is a lack of methodological guidance on how to ensure effective participation by users beyond general principles and philosophical thinking. The nine generic categories of participative behavior identified from this study might become helpful reference for user participation in highly complex and uncertain ISD project. Moreover, this case analysis illustrates some key control mechanisms for users, which could be helpful and educational to practitioners.

Furthermore, there is a common concern that user participation might result in project delay, conflicts, additional costs, and confusion, which ends up with little positive effect. This case analysis shows that, at least under certain institutional and project conditions, user participation can be highly effective. Furthermore, this case illustrates how users can gain power and influence, and how to exercise influence to result in high system quality and acceptance.
Limitations and Directions for Future Research

This is a single case analysis inevitably associated with the issue of whether the findings are generalizable. Moreover, the context of this case study in a unique cultural setting with its current state of IS maturity and management practice might further limit the applicability of the findings. Therefore, additional studies need to be conducted in other cultural contexts.

Furthermore, although user participation illustrated in the case is highly effective, this particular style is not without its limitations. For example, the weak presence of IS staff in the early stages had resulted some less than optimal design choices in the scoping of various subsystems and initial inappropriate selection of development platforms, which had to be corrected later. Moreover, the cost for having a large team of business experts on the development team could be high. In this case of internal development, partly due to the strong support from top management, cost control was not a priority and the user time was largely unaccounted for. This may not be the case for most conventional projects.

Nevertheless, through this case study, we identify a number of promising directions for future research. First, it might be beneficial to study more thoroughly the enabling conditions for user power, e.g., in terms of organizational setup and project nature that facilitate end-to-end user participation. Second, it will be interesting to study what kind of project may benefit the most from such a style of user participation, i.e., to examine the applicability of the current findings. Lastly, it is important to conduct explanatory studies based on multiple cases or large samples to confirm the relationship between user control and ISD outcome, and to develop and verify the theory of user participation from the control perspective.

Acknowledgements

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