

2009

# Toward the concept of pockets of creativity in business processes

Guy G. Gable

*Queensland University of Technology, g.gable@qut.edu.au*

Arun Rai

*Georgia State University, arun.rai@ceprn.org*

Follow this and additional works at: <http://aisel.aisnet.org/ecis2009>

---

## Recommended Citation

Gable, Guy G. and Rai, Arun, "Toward the concept of pockets of creativity in business processes" (2009). *ECIS 2009 Proceedings*. 162.  
<http://aisel.aisnet.org/ecis2009/162>

This material is brought to you by the European Conference on Information Systems (ECIS) at AIS Electronic Library (AISeL). It has been accepted for inclusion in ECIS 2009 Proceedings by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact [elibrary@aisnet.org](mailto:elibrary@aisnet.org).

# RECONCEPTUALISING THE INFORMATION SYSTEM AS A SERVICE (RESEARCH IN PROGRESS)

Gable, Guy, Queensland University of Technology, Brisbane, Australia [g.gable@qut.edu.au](mailto:g.gable@qut.edu.au)

Rai, Arun, Georgia State University, Atlanta, USA Arun Rai [arun.rai@ceprin.org](mailto:arun.rai@ceprin.org)

## Abstract

*The study will cross-fertilise Information Systems (IS) and Services Marketing ideas through reconceptualising the information system as a service (ISaaS). The study addresses known limitations of arguably the two most significant dependent variables in these disciplines - Information System Success or IS-Impact, and Service Quality. Planned efforts to synthesise analogous conceptions across these disciplines, are expected to force a deeper theoretical understanding of the broad notions of success, quality, value and satisfaction and their interrelations. The aims of this research are to: (1) yield a conceptually superior and more extensively validated IS success measurement model, and (2) develop and operationalise a more rigorously validated Service Quality measurement model, while extending the 'service' notion to 'operational computer-based information systems in organisations'. In the development of the new models the study will address contemporary validation issues.*

*Keywords: ISaaS, IS as a Service, IS-Impact, IS success, Information system success, Service quality, IS service quality, Formative construct validation.*

# 1 INTRODUCTION

The study aims to make parallel contributions to the two fields of Information Systems and Services Marketing. The study proceeds from a central interest in the importance of evaluating information systems (IS) in organisations, and adopts the IS-Impact model of (Gable et al. 2008) as the primary commencing theory-base. Akin to analytic theory<sup>1</sup> (Gregor, 2006), IS-Impact is conceptualised as a formative, multidimensional index, wherein the dimensions have a causal relationship with the overarching measure – IS-Impact.

IS have evolved to be intertwined with organisational processes, users increasingly interacting with the IS to co-produce the service and the IS accommodating heterogeneity in process and information needs (Rai, Lang, & Welker, 2002). Yet, research to date measuring IS success (including IS-Impact) has, typically, implicitly regarded the IS as a ‘product’, thereby possibly underestimating its service value to stakeholders. In parallel with continuing validation and generalisation of the ‘IS-Impact’ model (Gable et al., 2008), there is value in reconceptualising the IS ‘as a service’ (ISaaS<sup>2</sup>) and ultimately triangulating measures of ‘ISaaS’ with IS-Impact. Important research questions are: ‘Does conceptualising the IS as a service yield a more complete and accurate estimate of its impact?’ and ‘Is the Service Quality of the IS already accounted for wholly or partially by existing IS-Impact dimensions and measures?’

From an Information Systems perspective, main intended outcomes are to: (1) explore implications for evaluating IS from conceptualising the IS as a service; (2) bring conceptual clarity to the Information Systems discipline regarding the alternative notion of Service Quality as a ‘dimension’ of Information Systems Success (SvQD) as suggested by DeLone and McLean (2003); and (3) further validate the IS-Impact model of Gable et al. (2008). From a Services Marketing perspective, main intended outcomes of the study are to: (1) develop, and operationalise a more rigorously, empirically validated Service Quality measurement model; and (2) extend the ‘service’ notion to ‘operational information systems in organisations’ (IS).

## 1.1 Significance for practitioners

The Information and Communications Technology (ICT) market in Australia alone is worth \$38B, 3rd largest in Asia-Pacific (10th in the world). This spend is by both private and public sector, and by both large and small organisations (SME spend in Australia in 2003 was \$12B). Complex and expensive IT innovations (e.g. Enterprise Systems) are transforming organisations and industries, but not always for the better. Yet, IT investments are seldom systematically evaluated post-implementation, and where assessed, the process and measures are typically idiosyncratic and lacking credibility. Reliable, valid and comparable indicators of the impact of IS are required for organisations to know how their IT investment is performing, to maximise benefits, and to better plan future IT investments.

## 1.2 Significance for research

The study addresses known limitations of what may be the two most important dependent variables in

---

<sup>1</sup> The first of Gregor’s (2006) five types of theory in IS, analytic theories, “analyse ‘what is’ as opposed to explaining causality or attempting predictive generalizations ... they describe or classify specific dimensions or characteristics of individuals, groups, situations or events by summarizing the commonalities found in discrete observations” (2006, p.612).

<sup>2</sup> The concept of IS-as-a-service (ISaaS), coined here for the first time, should not to be confused with the notion of ‘Software as a Service’ (SaaS), which refers to a means of software deployment whereby payment is typically on a usage basis. Neither should ISaaS be confused with the ‘Service Quality of the IS function’ (sometimes ambiguously referred to as ‘IS Service Quality’), most notably introduced in 2003 by DeLone & McLean (2003) to their IS success model.

Information Systems and Services Marketing research, namely Information System Success or IS-Impact, and Service Quality. The study is novel in aiming to cross-fertilise learnings of these two disciplines; efforts to harmonise conceptions of IS-Impact and Service Quality being expected to force a deeper understanding of the broad notions of success, quality and satisfaction and their interrelations.

## 2 LITERATURE REVIEW

### 2.1 IS success measurement

While the assessment of IS Success is consistently reported by organizational executives throughout the world as a key issue (e.g., Irani and Love, 2000, Thatcher and Oliver, 2001), there is little consensus among practitioners or researchers on how best to measure the impact of IS in organizations. (Sabherwal et al. 2006:1849) observe, “Despite considerable empirical research, results on the relationships among constructs related to information systems (IS) success, as well as the determinants of IS Success, are often inconsistent.”

The (DeLone and McLean, 1992) IS Success model is most widely cited, and includes six constructs: System Quality, Information Quality, Satisfaction, Use, Individual Impact, and Organisational Impact. Nonetheless, a range of concerns have been suggested with past attempts to validate that model, including: poor measurement (e.g., incomplete or inappropriate measures) (DeLone and McLean, 1992, DeLone and McLean, 2002, DeLone and McLean, 2003, Gable, 1996, Melone, 1990), lack of theoretical grounding and, hence; lack of agreement on appropriate measures (Bonner, 1995, Myers et al., 1998); myopic focus on financial performance indicators (Ballantine et al., 1996, Kaplan and Norton, 1996); weaknesses in survey instruments employed (e.g., constructs lacking in validity); or inappropriate data collection approach (e.g., asking the wrong people, unrepresentative sample) (Seddon et al., 1999). Moreover, the lack of consensus on such a central dependent variable, compromises the comparability of study results and hinders the cumulative research tradition.

Gable et al. (2008) introduce the IS-Impact model (see also Gable et al. 2003, Sedera & Gable 2004), which, based in DeLone and McLean’s work, overcomes many concerns with past IS Success models (see Figure 1). In attention to proliferation of overlapping measures, (Gable et al. 2008) comprehensively evaluated existing items, resolving redundancy and identifying new measures for contemporary IS. Their model reconciles persistent confusion regarding the role of the DeLone and McLean constructs as measures versus explanandum, conceptually demonstrating their value as both. Their analysis represents the first test of the sufficiency and necessity (or not) of the six DeLone and McLean constructs; they ultimately evidence the sufficiency and necessity of the four IS-Impact dimensions. They argue the redundancy of Use, and consistent with contemporary views in Information Systems<sup>3</sup> and other disciplines<sup>4</sup>, they present a strong rationale for conceiving Satisfaction as a consequence of success (and antecedent) rather than a dimension (Figure 1).

---

<sup>3</sup> User satisfaction has been possibly the most extensively employed single measure for IS evaluation [DeLone and McLean, 1992, Doll and Torkzadeh, 1988, Etezadi-Amoli and Farhoomand, 1991, Gatian, 1994, Igbaria and Tan, 1997, Lucas, 1975]. Several widely cited studies developed standard instruments that measure satisfaction [Bailey and Pearson, 1983, Baroudi and Orlikowski, 1988, Doll and Torkzadeh, 1988]. Early satisfaction constructs in IS success evaluation (e.g., user information satisfaction—Bailey and Pearson 1983) have been found to mix measures of multiple success constructs (e.g. quality and impact) rather than measuring a distinct satisfaction construct [Gable 1996]. Rai et al (2002), state that user satisfaction has been measured indirectly through Information-Quality, System-Quality and other variables in prior studies. Additionally, [Sedera and Tan, 2005] demonstrated – through content analysis of 192 satisfaction-related items from 16 Satisfaction instruments – that 98% (189) of the measures readily map into existing measures pertaining to: System-Quality, Information-Quality, Individual-Impact and Organizational-Impact; with only 2% of the items (3 items) appearing to measure Satisfaction explicitly.

<sup>4</sup> The conception of Satisfaction as immediate consequence of IS-Impact too has support in the Marketing discipline. Services marketing researchers e.g. [Brady et al 2005; Anderson and Sullivan 1993; Spreng and MacKoy 1996] employ a nomological

Gable et al. (2008) define the IS-impact of an Information System (IS) as “a measure at a point in time, of the stream of net benefits from the IS, to date and anticipated, as perceived by all key-user-groups”. The four-dimensional IS-Impact measurement model consists of two halves; the “impact” half includes Organizational-Impact and Individual-Impact dimensions; the quality half includes System-Quality and Information-Quality dimensions. The IS-Impact model, by design, is intended to be robust, simple and generalizable, to yield results that are comparable across time, stakeholders, different systems and system contexts. The model and measurement approach employ perceptual measures and offer an instrument that is relevant to all key stakeholder groups, thereby enabling the combination or comparison of stakeholder perceptions. Such a validated and widely accepted IS-Impact measurement model has both academic and practical value.

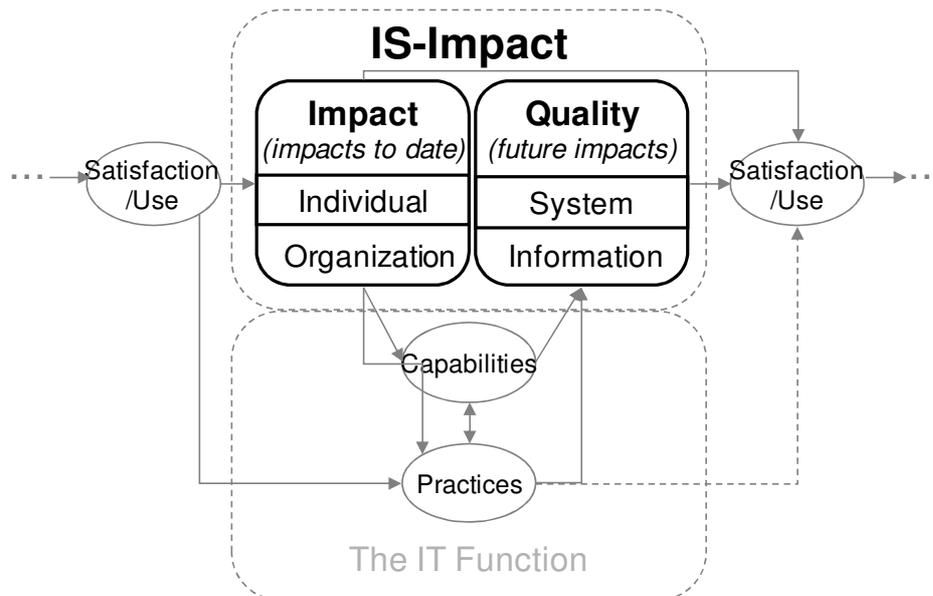


Figure 1 – The IS-Impact Model as mapped into IS-Net<sup>5</sup> (from (Gable et al. 2008:395))

## 2.2 Service quality measurement

Practitioners and academics have sought since the 1980s to better understand the quality of services (Brogowicz, Delene and Lyth 1990). The measurement of Service Quality has been of central interest to the Services Marketing discipline for several decades. Online services today are pervasive and service quality is recognised as a key contributor to national economies and an increasingly important competitive differentiator.

SERVQUAL (Parasuraman, Berry & Zeithaml 1988) a multi-item scale that decomposes the notion of service quality into five constructs: tangibles, reliability, responsiveness, assurance and empathy, has been the most widely employed and cited measurement model. (Parasuraman, Berry and Zeithaml 1988) define ‘service quality’ broadly as “a global overarching judgment or attitude relating to the overall excellence or superiority of a service;” nonetheless, the term has many interpretations. Though there has been considerable progress on how to measure service quality perceptions, little consensus has been achieved on what should be measured. There is agreement that service quality is multi-dimensional, but little agreement as to the nature or content of these dimensions (Brady and Cronin 2001). In example, within the banking sector, there exist multiple service quality models, each

net that positions Satisfaction as immediate consequence of Service Quality; Satisfaction being antecedent of Behavioural Intention.

<sup>5</sup> The IS-Impact model is shown here as mapped into the (Benbasat and Zmud (2003) nomological net IS-Net. (Gable et al. 2008) reconcile DeLone and McLean, IS-Net and IS-Impact.

consisting of varying numbers and nature/content of dimensions. More recent work by Brady and Cronin (2001) has provided a new and integrated conceptualisation of service quality. Brady and Cronin argue convincingly that customers form service quality perceptions on the basis of their evaluations of three primary dimensions: outcome quality, interaction quality, and environmental quality; these three primary dimensions are composed of multiple sub-dimensions.

In the 1990s, in recognition of the expanding service role of the IS function, Information Systems researchers such as Pitt et al. (1995) proposed that SERVQUAL be adapted to provide information about user satisfaction with the IS function. Despite some criticism (e.g. van Dyke, Prybutok, & Kappelman, 1999) the IS-adapted SERVQUAL has been praised for its practical relevance (Jiang, Klein, & Carr, 2002) and continues to be used to evaluate technical support service interactions (e.g. Carr (2002)). More recently IS researchers have also adapted SERVQUAL for use in the evaluation of electronic service environments such as e-commerce web sites (e.g. van Iwaarden, van der Wiele, Ball, & Millen, 2003) and Internet banking sites (e.g. Jayawardhena, 2004).

Conceiving a product as a set of service characteristics is not entirely new. It was first suggested by Lancaster (1966) four decades ago, and several researchers have since applied Lancaster's ideas. Saviotti and Metcalf (1984) used the idea of a product as a set of service characteristics to develop a framework for the evaluation of technological phenomena such as cars, and Gallouj and Weinstein (1997) used it to interpret innovation processes.

### **2.3 Contemporary Construct Validation**

Construct validation issues and concerns have generally been under-addressed in many fields of research endeavour, with the Information Systems and Marketing disciplines responding relatively recently. Burton-Jones and Straub (2006) focus on the importance of operationalisation in light of the specific research context, theory and hypotheses, highlighting concerns with over-reliance and inappropriate reliance on 'omnibus' constructs.

Recent work by Jarvis et al. (2003) and Petter et al. (2007) suggests extensive misspecification and validation of constructs as 'reflective' that are on closer scrutiny in fact 'formative'. Reflective constructs have observed measures that are affected by an underlying latent, unobservable construct (MacCallum & Browne 1993), while formative constructs are a composite of multiple measures. A change in the reflective construct affects the underlying measures, while changes in the formative measures cause changes in the underlying formative construct. Because measurement error impacts the structural model, misspecification of constructs as formative or reflective increases the potential for both type I and type II errors. Though not explicitly acknowledged nor addressed in the Services Marketing literature, the SERVQUAL and B&C models are 'formative' (as is IS-Impact). Thus, while the B&C Model (Brady & Cronin 2001) represents the most rigorously validated existing Service Quality measurement model, validation of the B&C model has to date not accounted for its formative nature.

Petter et al. (2007) have cast doubt on the validity of many mainstream constructs employed in IS research over the past 3 decades. They critique the almost universal conceptualisation and validation of these constructs as reflective. They are politic in not citing specific infractions but, rather, they list a range of studies and example constructs that have been 'properly' specified as reflective or formative. It is noteworthy that no examples of the proper specification of either the Individual-Impact or Organisational-Impact dimensions are cited (recognising that their list is not intended to be comprehensive). Cited examples of the proper specification of other of the DeLone and McLean dimensions are few, particularly in light of their extensive employment in IS research (e.g. only 1 example each of System-Quality and Information-Quality, both from the same study (Wixom & Todd 2005)). The IS-Impact model (Gable et al. 2008), however, is formative and is validated as such.

Each of IS-Impact, SERVQUAL and B&C and whatever 'new' model that derives from the Identification-Phase, employs survey instruments and multi-item scales that aim to measure real world

phenomena or latent constructs. Allport and Kerler (2003, p.356) suggest that ‘measurement is perhaps the most difficult aspect of behavioural research’. Validation of such latent constructs typically employs the so-called classical test theory (CTT), however, other approaches are gaining traction. In example, Item Response Theory (IRT) Rasch (1993) employs statistical models to achieve the ‘objective’ measurement of latent traits. And though relatively few papers in leading IS journals report the use of the Rasch IRT model [exceptions include Dekleva and Drehmer (1997) and Alvarez et al. (2007)], several recent marketing papers have suggested advantages of this approach (e.g. Salzberger and Sinkovics 2006).

### 3 THE CONCEPTUAL STUDY MODEL

The initial study model, developed in the first phase of the study, is depicted in Figure 2. This conceptual model incorporates three sub-models, and evaluates the relative power of IS-Impact, IS-Impact+ (IS-Impact plus SvQD) and ISaaS to predict Satisfaction.

The 1<sup>st</sup> sub-model: IS-Impact (as reproduced top Figure 2), with a strong basis in work by DeLone and McLean (1992, 2003), includes 4 dimensions in two halves, representing ‘*the stream of net benefits from an Information System to date and anticipated as perceived by all key-user-groups*’ (Gable et al. 2008). The ‘impact’ half measures benefits to date, or Individual-Impact and Organizational-Impact. The ‘quality’ half, uses System-Quality and Information-Quality as proxy measures of probable future impacts.

The 2<sup>nd</sup> sub-model: IS-Impact+, is a variant on IS-Impact which includes SvQD as a 5<sup>th</sup> dimension. There is potential for confusion here between our broader notion of ISaaS and the DeLone and McLean (2003) notion of Service Quality as a ‘dimension’ of Information System Success (SvQD). DeLone and McLean (1992), the most widely cited IS success model, extended their model in 2003 by including Service Quality (SvQD) as additional to their original dimensions of system success. Citing Pitt et al. (1995) they emphasise the dual role of contemporary organisations as both information provider (producing an information product) and service provider (providing support for end user developers) and argued for the inclusion of ‘service quality of the IS function’ as a dimension when evaluating IS success. Various researchers have employed ‘service quality of the IS function’ as a dimension in evaluating system success (Pitt et al. 1995; Jiang et al. 2002; Lurn & Lin 2003; DeLone & McLean 2004). (Watson, Pitt and Kavan 1998) argue the need to identify actions at the strategic, tactical and operational levels that will yield maximum improvement in IS service quality.

The 3<sup>rd</sup> sub-model: ISaaS, derives from more recent work by Brady and Cronin (2001). Consistent with ideas espoused by (Dabholkar et al. 1996, 2000), it represents service quality perceptions as multilevel and multidimensional, the rationale being that customers tend to cognitively decompose service quality dimensions into various sub-dimensions (Carman 1990), and a hierarchical structure accounts for the complexity of human perceptions (Dabholkar et al. 1996). Brady and Cronin (2001) bring substantial clarity and harmony to the measurement of service quality, their model in some sense subsuming SERVQUAL. Their third order model (ISaaS in Figure 2) relates service quality perceptions to the three dimensions – Interaction quality, Environment quality, and Outcome quality; each of which has three sub-dimensions that define the basis of service quality perceptions. They further suggest that for each of these sub-dimensions to contribute to improved service quality perceptions, the quality must be perceived to be reliable, responsive and empathetic.

The study aims to exploit perceived potential from cross-fertilisation of ideas between the IS and Marketing fields, the hierarchical structures of the IS-Impact and B&C models being analogous in several ways. In example, (Gronroos 1982), as cited in (Brady & Cronin 2001, p.35), suggests two main service quality dimensions where ‘Functional quality represents how the service is delivered; that is, it defines customers’ perceptions of the interactions that take place during service delivery. Technical quality reflects the outcome of the service act, or what the customer receives in the service

encounter.’ With the ‘operational’ IS (the focus of IS-Impact – and the unit-of-analysis in this study), where the system itself is conceived as a stream of services or a systematised (automated) service, the system (and its quality) are the ‘functional’ and its impacts are the ‘technical’ (or outputs). Note that the key distinction made in the IS-Impact model, between its Quality and Impact halves, is also similar to Alter’s distinction (in Seddon et al. 1999) between ‘internal performance’ and ‘external performance’ which respectively refer to ‘how well the system operates internally’ versus ‘how well the system achieves its purpose’ (1999, p.48).

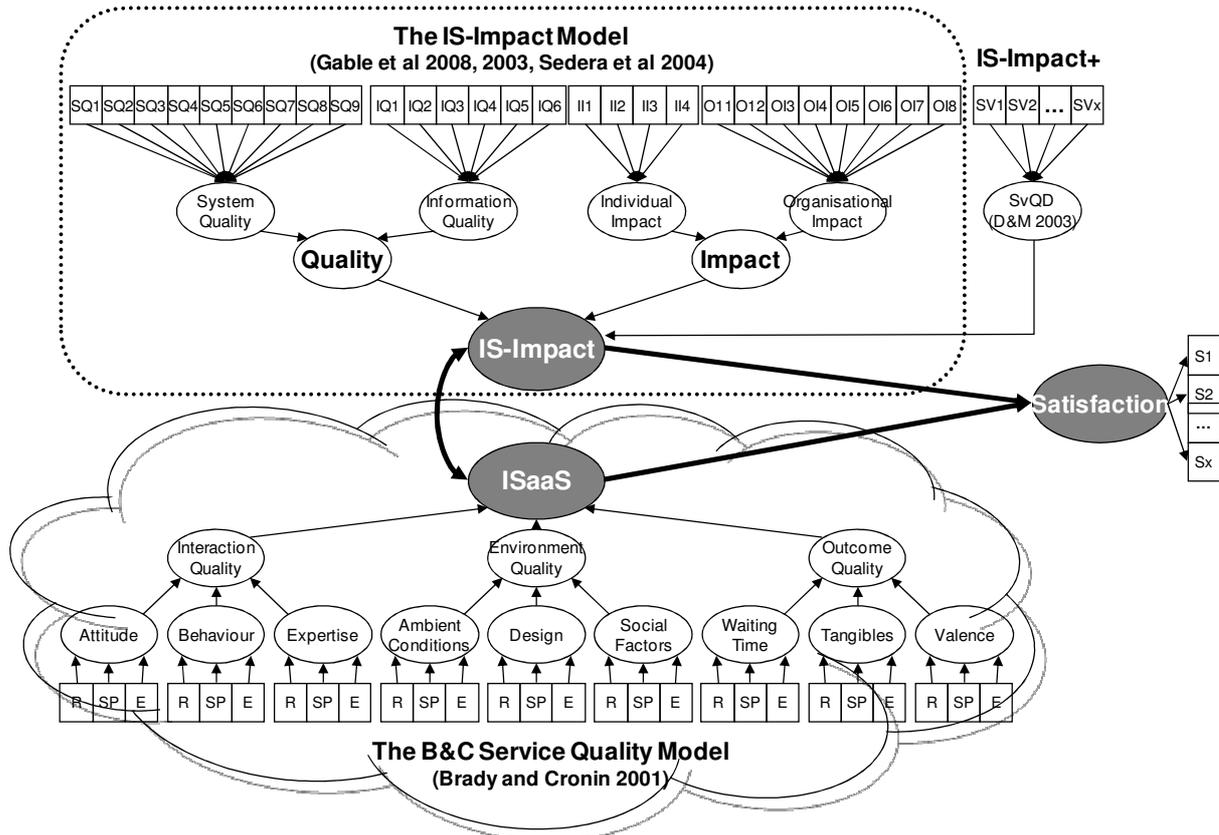


Figure 2 – The Conceptual Study Model

Details of the ISaaS sub-model in Figure 2, tentatively (thus the cloud) reflect the B&C model. The B&C model may ultimately be supplanted by a partially or substantively different model deriving from the exploratory Identification-Phase of the proposed study (see Figure 3). In the simplest scenario, the B&C model is adapted to the purpose of ISaaS. This may involve some variation of its dimensions or sub-dimensions (potentially the only variation being with the adaptation of its items). In example, an open issue is whether all nine B&C dimensions are relevant when conceptualising the IS as a service. Dependent on the operational definition of the IS, the B&C ‘Environment’ dimension – a) may not vary with different IS (‘I use different systems, but all from the same PC and desk’); b) may be optional (‘with my WiFi laptop I work from wherever I am’); or c) may more appropriately refer to the web environment (the look-and-feel of the virtual environment). In a more extreme scenario, inductive attention to quality-citations gathered in the exploratory Identification-Phase may suggest a radically different ISaaS model structure from that of the B&C model.

Finally, note that in the study model, the Satisfaction construct is: a) the immediate consequence of each of IS-Impact, IS-Impact+ and ISaaS; b) the only reflective construct in the study model (all others expected to be formative), this being a requirement for full identification of the formative IS-Impact, IS-Impact+ and ISaaS models (see Jarvis et al. 2003; Petter et al. 2007); and c) to be operationalised in full light of the model and study intent, as per Burton-Jones and Straub (2006).

## 4 APPROACH AND METHODOLOGY

### 4.1 The Study Design

To operationalise and validate the ISaaS model, the study employs a longitudinal, multi-method research design, extending the research cycle proposed by MacKenzie and House (1979) and McGrath (1979) for developing and validating a measurement model. The research design (Figure 3) entails two main phases and three surveys: (1) an exploratory-phase, to develop the hypothesised measurement model, and (2) a confirmatory-phase, to test the hypothesised measurement model against new data gathered. The exploratory phase adheres with the two-step approach of Burton-Jones and Straub (2006) for operationalising constructs and identifying measures, the related aim being to adequately account for the context of contemporary IS, and to ensure model completeness and an appropriate and complete choice of measures and dimensions.

The exploratory phase consists of two surveys, an identification-survey followed by a specification-survey. The identification-survey, akin to the 'function' phase of the Burton-Jones et al. (2006) approach, is intended to identify the salient dimensions and measures of the study ISaaS conceptual model (bottom sub-model in Figure 2); these dimensions and measures will later become the basis of an a-priori model to be operationalised in the specification-survey.

The study model will be tested empirically, primarily employing 1-7 point Likert survey data gathered longitudinally in relation to Enterprise Systems – Financials (the financial module of large enterprise Systems packaged software suites. E.g. SAP, ORACLE, Peoplesoft, ...). The study will be restricted to Financials, they being 'relatively' simple and homogenous (across organisations); and, as intra-organisational systems, only internal stakeholders need be canvassed. In order to gain a holistic view, all key-user-groups (Gable et al. 2008) will be surveyed, namely, Strategic, Management, Operational and Technical. Target sources of data include organisations with which the team has a track-record; e.g. Queensland Government agencies (mainly SAP Financials) and Universities (various).

In response to concerns expressed by Salzberger and Sinkovics (2004) and others, with classical test theory (CTT), an extension of the proposed study will entail the operationalisation and validation of all study constructs, employing both CTT and Item Response Theory (IRT) approaches, and corresponding comparison and triangulation of results.

The Identification-survey aims to generate a comprehensive inventory of 'qualities' of services experienced. Respondents are prompted to describe (both closed and open questions), and anchor their responses in, the target Financial system. Part B of the instrument seeks brief, qualitative, textual statements on perceived 'qualities' of that system as a service. These statements are decomposed into their component quality-citations (content analysis), then mapped into candidate frameworks (target: minimum inter-coder reliability of 80%). To the extent that any one of the frameworks (e.g. SERVQUAL, IS-Impact, B&C ...) is fully instantiated and fully accommodates the quality-citations, it may be considered complete (manifests content validity) and appropriate. Should none of the candidate frameworks adequately accommodate the quality-citations, a bottom-up and more grounded approach will be attempted, seeking to identify salient dimensions and sub-dimensions from the data. The main outcome of this stage is the ISaaS a-priori model.

The Specification-survey (the 2nd survey) aims to further specify and test the a-priori ISaaS model employing data gathered (primarily 7-point Likert scales) with an instrument that operationalises the dimensions, sub-dimensions and measures deriving from the identification-survey (possibly a variant of the B&C model; possibly something quite different). In order to establish internal validity for a formative index, we follow guidelines by Bagozzi (1994), Diamantopoulos and Winklhofer (2001) and Spector (1992). We also follow Jarvis et al.'s (2003) procedures for achieving identification of formative indicators, aiming for construct identification through both measurement (employing reflective criterion measures) and structural relations (the path with Satisfaction).

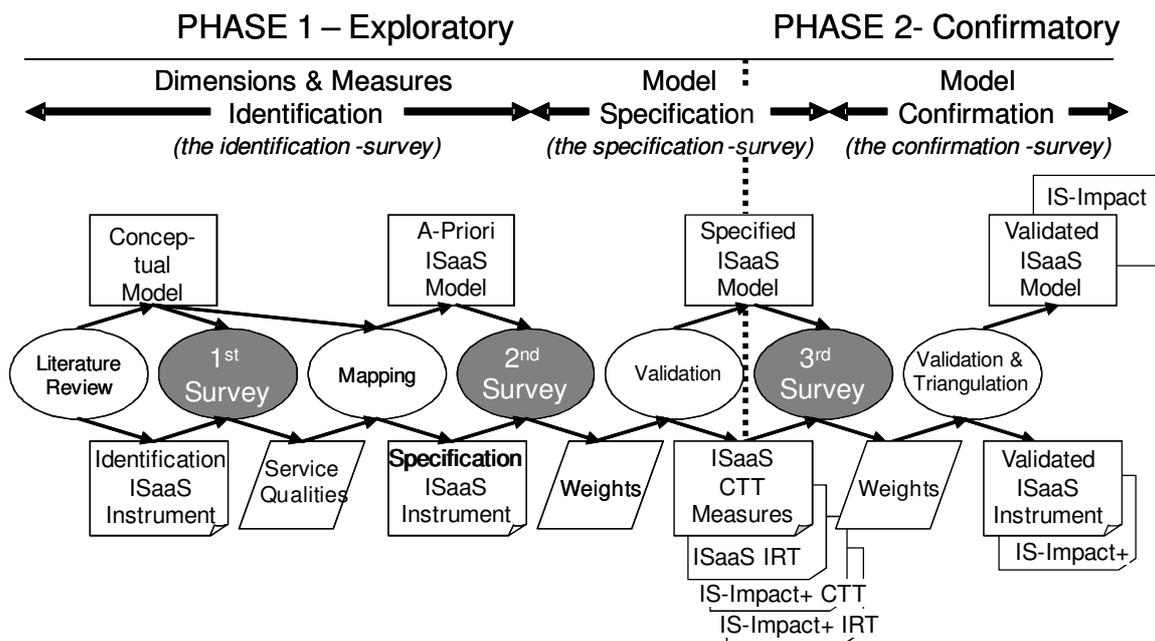


Figure 3 – Study Research Design

The Confirmation-survey aims to further validate the study model and instrument deriving from the exploratory-phase, and to further illustrate the mutual exclusivity and additivity of the measures and dimensions in the Model using confirmatory data analysis techniques and new data. In this phase of the study, we have the further objective of parallel testing of CTT and IRT data measurement approaches. Thus, four main bodies of data are required: (1) ISaaS CTT data, (2) ISaaS IRT data, (3) IS-Impact+ (subsumes IS-Impact) CTT data, and (4) IS-Impact+ IRT data. The effort and complexity of operationalisation is not underestimated. And though the team has comparatively advantageous access to large organisations for evidence, careful consideration in detailed design of data collection will need to address potential respondent fatigue and CMV (e.g. through random sub-sampling, longitudinal sampling). To complete the research cycle proposed by Mackenzie et al. (1979), construct validation tests similar to the Specification-Survey are conducted on the Confirmation-Survey data.

## 5 PROGRESS TO DATE AND NEXT STEPS

A literature survey has been completed, examining relevant issues relating to IS Success and to Service Quality measurement in the Services Marketing discipline. An evaluation has been made of current challenges in relation to construct measurement and validation in research. This has incorporated a literature review supported by a conceptual analysis. A basis for synthesising concepts from IS Impact measurement and from contemporary Service Quality measurement has been established. An initial conceptual Service Quality model has been developed as the basis for creating the a-priori model to be tested and refined into a validated ISaaS model.

The study has been proposed to the Australian Research Council, and acknowledges the generous support of that effort from a panel of two experts who offer alternative perspectives on the study design and developments. (1) *Professor Teck Hua Ho, William Halford Jr. Family Professor of Marketing, Berkeley*, brings a strong quantitative marketing perspective and a track record of research into consumer satisfaction (e.g. Ho 2006). (2) *Associate Professor Judy Drennan, Faculty of Business, Queensland University of Technology*, has specialist expertise in Services Marketing and Service Quality measurement (e.g. Drennan et al. 2003). The authors are optimistic the study will continue with ARC support. The study is regardless in 2009 proceeding with the Identification-survey.

## References

- Adam, F. and Fitzgerald, B. (2000). The status of the information systems field: historical perspective and practical orientation. *Information Research*, 5 (4).
- Allport, C.D. and Kerler, W.A. (2003). A research note regarding the development of the consensus on appropriation scale. *Information Systems Research*, 14(4), 356-359.
- Alvarez, P., Lopez-Rodriguez, F., Canito, J.L., Moral, F.J. and Camacho, A. (2007). Development of a Measure Model for Optimal Planning of Maintenance and Improvement of Roads. *Computers & Industrial Engineering*, 52(3), 327-335.
- Anderson, E. W. and M. W. Sullivan (1993) "The Antecedents and Consequences of Customer Satisfaction for Firms " *Marketing Science* (12) 2, pp. 125-143.
- Australian Bureau of Statistics (2007). *1301.0 - Year Book Australia*, 2007.
- Bagozzi, R.P. (1980). *Causal Models in Marketing*. John Wiley & Sons, New York.
- Bailey, J. E. and S. W. Pearson (1983) "Development Of A Tool For Measuring And Analyzing Computer User Satisfaction," *Management Science* (29) 5, pp. 530-545.
- Ballantine, J., M. Bonner, M. Levy, A. Martin et al. (1996) "The 3-D Model Of Information Systems Success: The Search For The Dependent Variable Continues," *Information Resources Management Journal* (9) 4, pp. 5-14.
- Baroudi, J. J. and W. J. Orlikowski (1988) "A Short-Form Measure Of User Information Satisfaction: A Psychometric Evaluation And Notes On Use," *Journal of Management Information Systems* (4) 4, pp. 44-59.
- Benbasat, I. and R. W. Zmud (2003) "The Identity Crisis Within The IS Discipline: Defining And Communicating The Discipline's Core Properties," *MIS Quarterly* (27) 2, pp. 183-194.
- Bonner, M. (1995) "Delone And Mclean's Model For Judging Information Systems Success - A Retrospective Application In Manufacturing." *Proceedings of the European Conference on IT Investment Evaluation*, Henley Management College, UK, 1995, pp. 218-227.
- Brady, M.K. and Cronin, J.J. (2001). Some new thoughts on conceptualizing perceived service quality: a hierarchical approach. *Journal of Marketing*, 65(3), 34-49.
- Brady, M. K., G. A. Knight, J. J. J. Cronin, G. T. M. Hult et al. (2005) "Removing the contextual lens: A multinational, multi-setting comparison of service evaluation models " *Journal of Retailing* (81) 3, pp. 215-230.
- Brogowicz, A. A., L. M. Delene and D. M. Lyth. 1990. A Synthesised Service Quality Model with Managerial Implications. *International Journal of Service Industry Management*, 1 (1): 27-45.
- Burton-Jones, A. and Straub, D.W. (2006). Reconceptualizing system usage: an approach and empirical test, *Information Systems Research*, 17(3), 228-246.
- Carman, J.M. (1990). Consumer perceptions of service quality: an assessment of the SERVQUAL dimensions. *Journal of Retailing*, 66(1), 33-55.
- Carr, C. L. (2002). A psychometric evaluation of the expectations, perceptions, and difference-scores generated by the IS-adapted SERVQUAL instrument. *Decision Sciences*, 33(2), 281-296.
- Dabholkar, P.A., Thorpe, D.I. and Rentz, J.O. (1996). A measure of service quality for retail stores: Scale development and validation. *Journal of the Academy of Marketing Science*, 24(1), 3-16.
- Dabholkar, P.A., Shepherd, C.D. and Thorpe, D.I. (2000). A comprehensive framework for service quality: an investigation of critical conceptual and measurement issues through a longitudinal study. *Journal of Retailing*, 76(2), 139-173.
- Dekleva, S. and Drehmer, D. (1997). Measuring Software Engineering Evolution: A Rasch Calibration. *Information Systems Research*, 8(1), 95-102.
- DeLone, W.H. and McLean, E.R. (1992). Information systems success: the quest for the dependent variable. *Information Systems Research*, 3,(1), 60-95.
- DeLone, W.H. and McLean, E.R. (2002). Information systems success revisited. *Proceedings of the 35th Hawaii International Conference on System Sciences (HICSS 2002)*, Big Island, Hawaii, 238-249.
- DeLone, W.H. and McLean, E.R (2003). The DeLone and McLean model of information systems success: a ten-year update. *Journal of Management Information Systems*, 19(4), 9-30.

- DeLone, W.H. and McLean, E.R (2004). Measuring e-commerce success: applying the DeLone & McLean information systems success model. *International Journal of Electronic Commerce*, 9(1), 31-47.
- Diamantopoulos, A. and Winklhofer, H.M. (2001). Index Construction with Formative Indicators: An Alternative to Scale Development. *Journal of Marketing Research*, 38, 269-277.
- Doll, W. J. and G. Torkzadeh (1988) "The Measurement Of End-User Computing Satisfaction," *MIS Quarterly* (12) 2, pp. 259-274.
- Drennan, J., & McColl-Kennedy, J. R. (2003). The relationship between Internet use and perceived performance in retail and professional service firms. *The Journal of Services Marketing*, 17(2/3), 295-311.
- Etezadi-Amoli, J. and A. F. Farhoomand (1991) "On End User Computing Satisfaction," *MIS Quarterly* (15) 1, pp. 1-4.
- Gable, G.G. (1996). A Multidimensional Model of Client Success When Engaging External Consultants. *Management Science*, 42(8), 1175-1198.
- Gable, G.G. (2006). The Information Systems Discipline in Australian Universities: A Contextual Framework. *Australasian Journal of Information Systems*, Special Issue The Information Systems Discipline in Australian Universities, 14(1), 103-122.
- Gable, G.G. (2007). The Information Systems Academic Discipline in Pacific Asia 2006: A Contextual Analysis. *Communications of the AIS*, Special Issue The Information Systems Academic Discipline in Pacific Asia, 21, 1-22.
- Gable, G.G., Sedera, D. and Chan, T. (2003). Enterprise systems success: a measurement model. *Proceedings of the Twenty-Fourth International Conference on Information Systems*, Seattle, USA, Dec. 14-17.
- Gable, G.G., Sedera, D. and Chan, T. (2008). Re-conceptualizing information system success: the IS-impact measurement model. *Journal of the Association for Information Systems*, 9(7), 377-408.
- Gallouj, F., & Weinstein, O. (1997). Innovation in services. *Research Policy*, 26(4-5), 537-556.
- Gatian, A. W. (1994) "Is User Satisfaction A Valid Measure Of System Effectiveness," *Information and Management*, (26) 3, pp. 119-131.
- Gregor, S. (2006) "The nature of theory in information systems," *MIS Quarterly* (30) 3, pp. 611-642.
- Grönroos, C. (2000) *Service Management and Marketing. A Customer Relationship Management Approach*. Chichester: John Wiley
- Ho, T-H, Park, Y-H. and Zhou, Y-P. (2006). Incorporating satisfaction into customer value analysis: Optimal investment in life-time value. *Marketing Science*, 25(3), 260-277.
- Igbaria, M. and M. Tan (1997) "The Consequences Of Information Technology Acceptance On Subsequent Individual Performance," *Information and Management*, (32) 3, pp. 113-121.
- Irani, Z. and P. E. D. Love (2000) "The Propagation of Technology Management Taxonomies for Evaluating Investments in Information Systems," *Journal of Management Information Systems* (17) 3, pp. 161-177.
- Jarvis, C.B., MacKenzie, S.B. and Podsakoff, P.M. (2003). A critical review of construct indicators and measurement model misspecification in marketing and consumer research. *Journal of Consumer Research*, 30(2), 199-218.
- Jayawardhena, C. (2004). Measurement of Service Quality in Internet Banking: The Development of an Instrument. *Journal of Marketing Management*, 20(1/2), 185-207.
- Jiang, J.J., Klein, G. and Carr, C.L. (2002). Measuring information system service quality: SERVQUAL from the other side. *MIS Quarterly*, 26(2), 145-166.
- Kaplan, R. S. and D. P. Norton (1996) *The Balanced Scorecard: Translating Strategy Into Action*. Boston, Mass: Harvard Business School Press.
- Lancaster, K. J. (1966). A New Approach to Consumer Theory. *Journal of Political Economy*, 74(2), 132-157.
- Luarn, P. and Lin, H.-H. (2003). A customer loyalty model for e-service context. *Journal of Electronic Commerce Research*, 4(4), 156-167.
- Lucas, H. C. (1975) "Performance And The Use Of An Information Systems," *Management Science* (21) 8, pp. 908-919.

- MacCallum, R.C. and Browne, M.W. (1993). The use of causal indicators in covariance structure models: some practical issues. *Psychological Bulletin*, 114(3), 533-541.
- Mackenzie, K.D. and House, R. (1979). Paradigm development in the social sciences. in Mowday, R.T. and Steers, R.M. (Eds), *Research in Organizations: Issues and Controversies*. Goodyear Publishing, Santa Monica, 22-38.
- Martin, G. (1979). What is the value of investment in Information Systems?, *MIS Quarterly*, 3(3), 5-34.
- McGrath, J.E. (1979). Toward a 'theory of method' for research on organizations. in Mowday, R.T. and Steers, R.M. (Eds), *Research in Organizations: Issues and Controversies*. Goodyear Publishing, Santa Monica, 4-21.
- Melone, N. P. (1990) "A Theoretical Assessment Of The User-Satisfaction Construct," *Management Science* (36) 1, pp. 76-91.
- Myers, B. L., L. A. Kappelman, and V. R. Prybutok (1998) "A Comprehensive Model For Assessing The Quality And Productivity Of The Information Systems Function: Toward A Theory For Information Systems Assessment," in E. J. Garrity and G. L. Sanders (Eds.) *Information Systems Success Measurement*, Hershey: Idea Group, pp. 94-121.
- Parasuraman, A., Berry, L.L. and Zeithaml, V.A. (1988). SERVQUAL: a multiple-item scale for measuring consumer perceptions of service quality. *Journal of Retailing*, 64(1), 12-40.
- Petter, S., Straub, D. and Rai, A. (2007). Specifying formative constructs in information systems research. *MIS Quarterly*, 31(4), 623- 656.
- Pitt, L.F., Watson, R.T. and Kavan, C.B. (1995). Service quality: a measure of information systems effectiveness, *MIS Quarterly*, 19(2), 173-187.
- Rai, A., Lang, S. S., & Welker, R. B. (2002). Assessing the validity of IS success models: An empirical test and theoretical analysis. *Information Systems Research*, 13(1), 50-69.
- Rasch, G. (1993). *Probabilistic Models for Some Intelligence and Attainment Tests*. MESA Press, Chicago.
- Sabherwal, R., A. Jeyaraj, and C. Chowa (2006) "Information System Success: Individual and Organizational Determinants," *Management Science* (52) 12, pp. 1849-1864.
- Salzberger, T. and Sinkovics, R.R. (2006). Reconsidering the problem of data equivalence in international marketing research. *International Marketing Review*, 23(4), 390-417.
- Saviotti, P. P., & Metcalfe, J. S. (1984). A theoretical approach to the construction of technological output indicators. *Research Policy*, 13(3), 141-151.
- Seddon, P.B., Staples, S., Patnayakuni, R. and Bowtell, M. (1999). Dimensions of information systems success. *Communications of the AIS*, 2(20).
- Sedera, D. and Gable, G. (2004). A factor and structural equation analysis of the enterprise systems success measurement model. *Proceedings of the Twenty-Fifth International Conference on Information Systems*, Washington, D.C., December 12-15.
- Sedera, D. and F. Tan. (2005) "User Satisfaction: a dimension of Enterprise System Success." Ninth Pacific Asia Conference on Information Systems (PACIS 2005), Thailand, 2005.
- Spreng, R. A. and R. D. Mackoy (1996) "An Empirical Examination of a Model of Perceived Service Quality and Satisfaction," *Journal of Retailing* (72) 2, pp. 201-214.
- van Dyke, T. P., Prybutok, V. R., & Kappelman, L. A. (1999). Cautions on the use of the SERVQUAL measure to assess the quality of information systems services. *Decision Sciences*, 30(3), 877-891.
- van Iwaarden, J., van der Wiele, T., Ball, L., & Millen, R. (2003). Applying SERVQUAL to WEB sites: an exploratory study. *The International Journal of Quality & Reliability Management*, 20(8/9), 919-935.
- Watson, R. T., L. F. Pitt and C. B. Kavan. 1998. Measuring Information Systems Service Quality: Lessons From Two Longitudinal Case Studies. *MIS Quarterly*, 22 (1): 61-79.
- Wixom, B.H. and Todd, P.A. (2005). A theoretical integration of user satisfaction and technology acceptance. *Information Systems Research*, 16(1), 85-102.