Innovation and Standardization in the Information Systems Field

Report on Workshop 2

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Abstract: This report presents the findings of a workshop which was held as part of the IFIP Working Group 8.1 working conference held at the University of Leiden, The Netherlands, 20-22 September 1999

1 INTRODUCTION

Participants:

Chair:	T. William Olle,	T. William Olle Associates, Surrey, UK (email Bill_Olle @ Compuserve.com)
Members:	Deborah Bunker,	University of N.S.W., Sydney, Australia
	Hungjung Lee,	National Computerization Agency, Korea
	John Lindsay,	Kingston University, UK
	Kalle Lyytinen,	University of Jyväskylä, Finland
	Zheying Zhang,	University of Jyväskylä, Finland
	Per Zaring,	Borås University, Sweden

Title:

The original title of the workshop ("*Innovation and Standardization in the Information Systems Field*") was accepted by the opening meeting of the workshop.

The original version of this chapter was revised: The copyright line was incorrect. This has been corrected. The Erratum to this chapter is available at DOI: 10.1007/978-0-387-35500-9_30

E. D. Falkenberg et al. (eds.), *Information System Concepts: An Integrated Discipline Emerging*

2 KEY QUESTIONS

The five key questions as formulated in the Call for Participation were reviewed carefully. After some discussion, it was agreed to a revised formulation of the first four questions. It was noted that the first two questions were concerned with standardization. The third question was concerned with the FRISCO report and standardization. The fourth and fifth key questions as formulated addressed innovation in the information systems. It was agreed that the fourth question should be revised and the fifth question merged into the fourth question.

As a result of this, the participants are on the following formulation of the key questions:

1. In what way does standardization impact innovation?
2. What are the benefits and risks of standardization in the information systems field?
3. Should FRISCO serve as a basis for a standard set of information systems concepts?
4. Is there a need for the following:
   a. new kinds of information system;
   b. new approaches to understanding, designing and building IS;
   c. new user interfaces to IS?

3. INITIAL THOUGHTS ON KEY QUESTIONS

3.1 Impact of standardization on innovation

It was noted that standardization may either be pre-emptive or post hoc. In the former case, the standard tries to pre-empt the market and create a way of doing things before any approach emerges as accepted. In the post hoc case, the standardization work is based on accepted practice and may have to choose among several approaches. There can be major problems with both pre-emptive and post hoc standardization.

A second dimension to standardization is that its scope of applicability may be any of the following:

a. organization (with a division or a company);
b. sectoral (manufacturing, geomatics, health);
c. national or supra-national (France, Canada, European Community, North American Trade Federation);

d. international;
e. cross sectoral.

A third dimension to standardization is the following:

a. related to potential commercial products
b. profession standards relating to the competence of persons
c. ethical relating to the behaviour of persons
d. education and qualifications relating to the training required by persons.

A final dimension to the standardization concept is that some standards are developed and approved by the official international body ISO (International Standards Organisation) which is a federation of more than 100 national standards bodies. In the field of information systems, most standards are international rather than national. Such standards are referred to as "de jure" standards, in other words having some legal standing. However, there is usually no legal enforcement of information technology standards in most countries. Legal enforcement of safety standards which are designed to protect lives is very common.

It is noted that there are frequent problems with "de jure" standardization work. With the current rapidly increasing rate of technological development, procedures adopted by ISO have had to be revised in a number of ways. For example, ISO now recognizes the concept of "publicly available specifications" which may be submitted to a fast track approval procedure.

In addition, there have been various consortia established (frequently supplier dominated) to develop specifications ostensibly more rapidly that has proved possible within ISO. Their developments means that there is a clear requirement to disseminate research results more quickly.

Standardization can also be regarded as a "way of viewing the world" so that the imposition of standards may also be a way of imposing a particular "world view" on ways of doing business. For example, the Internet is dependent on technology and infrastructure standards that enable businesses to globalise. It is noted that some countries and some individuals that do not have access to the Internet. This could mean that they unable to participate in the global marketplace and hence their ability to innovate is constrained.

There are many organizations interested in standardization apart from the aforementioned official international and national bodies. Examples of such are the following:

a. equipment suppliers (including software suppliers)
b. major users of products based on the standards
c. academics who have to be aware of important standards when teaching
d. consortia of suppliers and users usually formed to develop pre-emptive standards which they hope will become de facto and then de jure standards

It was noted that, in the information systems field, equipment suppliers are frequently the most heavily involved .

The reason for broadening the question from "in which way does standardization inhibit or stimulate innovation" to the wording used in this report was because it was felt that there were potential impacts other than "stimulate" and "inhibit". Examples of such possible impact were given as "help developing countries" and "improve the quality of life threatening systems" such as air traffic control and data protection.

3.2 Benefits and risks of standardization

One of the earliest benefits of standardization to be recognized was that referred to as "portability". In the early days a computer programme developed for one model of computer would not run on another model - even if that model was from same manufacturer. This lead to the standardization of the early programming languages such as Fortran and Cobol.

Another advantage to be recognized early was that of making it easier for educators to train student in skills which could have a wider degree of applicability.

It was also noted that standardization is in itself a kind of technology convergence in a specific technical area; standardization can enable technology convergence between separate technical areas.

One of the most important potential benefits of standardization was felt to be in enabling the inter-operability of information systems constructed on heterogeneous platforms. This should have the effect of reducing the risk in new investment, and hopefully reducing the price.

An important beneficial role of some of the more fundamental standards is that they can be enabling. Examples of such standards are character sets, measurement systems and coding systems. Such standards will become even more important in the future due to inter-operability and e-commerce requirements.

On the other hand, two noteworthy risks of standardization to businesses are as follows. The time to bring new applications and architectures to market is effectively shortened as these are now easily copied and emulated by competitors. For example, e-commerce publishing activities are easily copied, plagiarised and inappropriately linked

The security of systems is difficult and expensive to ensure, due to common operating platforms and the integration of value chain activities across these platforms.

3.3 FRISCO report as a basis for standard set of information system concepts

A number of questions arise when considering this question the first of which is "how can the some of the concepts spelled out and defined in the report be related to those already in use?" Another question is "is it too late for the carefully defined FRISCO concepts to have an impact on the broad practitioner world of information systems.

Given the importance of teaching in the information systems field, how would teaching FRISCO concepts contribute to a student's understanding of the skills needed to work in the information systems field?

The FRISCO report is essentially an attempt to derive a standard framework which can be used as a basis for understanding and communicating information systems concepts. This is a positive but also problematic activity as it helps to establish a "world view" which is invaluable in building and teaching information systems. It may also form a barrier, however, or inhibit the systems building activities of those countries and individuals that understand information systems in a slightly or totally different way.

The standardization of concepts such as those in the FRISCO report does not make sense. It is possible to standardize notions and procedures but in a democratic society it is not possible to standardize the way people think. The impact of the FRISCO report should be in the shaping of textbooks and associated teaching.

3.4 Need for news kinds of information systems approaches

3.4.1 New kinds of information system

There have been considerable advances in recent years in the kinds of information which can be handled by information systems. From the early days of structured data and formatted text, it is now possible to handle graphics, audio and video. Since it is now technically possible to digitize odours (and presumably tastes), it should also be soon possible to recreate the original form from the digitized form. This could be useful in distributing samples of perfumes and other fragrances as well as foodstuffs.

E-commerce technological developments and the associated use of standards (e.g. TCP/IP) have together seen inter-organisational systems become much more important (Extranets). Utilisation of information technology (IT) to integrate and automate value chain activities has meant that multi-business systems platform integration needs to be addressed for e-commerce to work effectively.

Furthermore, it is clear that new kinds of information system will surely be needed to ensure that public transport functions more safely and more effectively. The information systems used to support and drive e-commerce must be seen to reduce the risk of error.

3.4.2 New approaches to designing information systems

There appear to be almost as many ways of designing information systems as there are people trying to do it. Whether any given approach can be designated as "new" at any time is open to question – although an approach may be "new" to the person using it. Because it is so easy to develop an approach to information systems design, everyone does it. Some years ago, the use of CASE tools was widely advocated, only to fall into some disrepute because the results achieved did not match those suggested as possible in the marketing hype. The skill needed to design information systems does not scale easily. It may seem easy enough to develop smaller systems. The skills level required to design more complex systems does not increase linearly and this problem cannot be solved by using more people.

The trend, understandably enough, has been towards more multi-option, shrink wrapped (or pre-packaged) systems. This means that the user environment has the responsibility for deciding which options it wants at the time the system is installed and not at the time it is designed. Certain options required by the environment may not be provided in the shrink-wrapped package and these omissions can be serious.

Another aspect of this sub-question is the increasing need for the information systems to be able to inter-operate. This is particularly important in the business to business scenario of electronic commerce.

With the rise in importance of inter-organisational systems, there does not seem to have been a corresponding rise in inter-organisational systems building approaches and methods. There have been some frameworks developed for identifying opportunities for E-commerce within a business but serious systems building methods have been somewhat neglected. Work is required in this area.

It should also be clear from experience during the past three or four decades that an information system which is designed and built to meet a set of business requirements at a given point in time will invariably have to be modified at a later point in time. If the need (in general terms) to meet evolving requirements is recognized initially, then the modification can usually be effected more speedily and at lower cost. The concepts of "design for change" and "living systems" are clearly relevant here.

3.4.3 Need for new kinds of user interface to information systems

The world of "point and click" has been here for some time and can be clearly identified as a de facto standard for a user interface. The associated use of pull down menus (which is certain circumstances may be customized by the user) is an important element in the world of point and click.

Other user interfaces of importance include the QWERTY keyboard and voice recognition.

The QWERTY keyboard is clearly very basic to the extent that "point and click" is really a supplement to the keyboard in most situations. There are several standards for keyboard layouts, the multiplicity being governed by the many alphabets in world wide use.

Use of voice recognition is growing in acceptance as the technology improves and it is difficult to speculate on whether it will ever replace rather than merely supplement the duo of mouse and keyboard.

In short it does not seem as if there is a need for new kinds of user interface to information systems at least in the sense discussed above.

However, in another sense, the question merits further consideration. There are two broad classes of interaction between persons and information systems. There are firstly the prescribed types of interaction (including retrieval of information from the system and changing the information content of the information system).

Secondly, there are the types of interaction, which cannot be prescribed by an information systems designer. One example of such an interaction is an ad hoc query, which hopefully can be formulated by a user using some kind of query language.

On the subject of user interface, there is considerable room for improvement in the matter of structuring user levels so that the lowest level of user (in terms of complexity of requirements) is not confronted with options which he does not understand, does not wish to use, and probably should not try to use anyway.

Over the years, there has been a lot of research on "user satisfaction". The type of appropriate systems interface developed has been one of the subsets of this research (e.g. Human Computer Interaction). Just as e-commerce has affected the importance of inter-organisational systems development, it has also affected the importance of the customer as the system user. The customer is set to become a new class of system user as the Internet and web–based system design and creation become more commonplace. It seems that more activity and research needs to be focussed on the customer/user.

4. WHY THIS REPORT IS NOT A MANIFESTO

There was some feeling expressed in the workshop that a manifesto is needed on the subject of responsibility for information systems. The argument for this is that information systems professionals in general and those participating in IFIP working groups in particular need to comment publicly on the economy and effectiveness of the processes of standardization and innovation.

The was a feeling expressed that the process is sometimes a conspiracy to defraud, sometimes a series of design errors and sometimes a political process where different parties acting in different ways can make a difference. The well known situation relating to OSI, X500 and TCP/IP is felt to be an example of this.

This leads to the proposal that this report should constitute a manifesto indicating the responsibilities for IFIP Working Group 8.1.

Although the issue being raised is clearly of paramount importance, it is also clear that this report does not constitute such a manifesto. It is not clear that the questions posed to the workshop at its inception were of a nature to steer its deliberations in that direction.