Information System Concepts in Practice

Report on Workshop 3

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Key words: Information systems (IS), Concepts, Modelling, Practice, Information systems engineering (ISE), FRISCO

Abstract:

The main question addressed is how information system concepts influence the practice of designing and implementing information systems. We argue that this happens only indirectly, through methods and education. Vice-versa, the practitioner's information system concepts are limited to those encountered in practical experience, in particular via commercial tools and methods, and frameworks such as UML. This situation often leads to unwitting adoption of concepts that are not necessarily optimal for the task. In this connection, the FRISCO Report only plays a moderate role, primarily in academic circles, but not in any practice dominated environment. Information system glossaries that provide coherent explanations may be very important for new developments in the coming years, given the fast developments of the field and the large number of new staff that will not have a formal education in the discipline. In response to this, the Internet may be a suitable medium for the academic world to get stakeholders involved and committed.

1 INTRODUCTION

The original title of the workshop ("*How do our concepts shape our practice and vice-versa?*") was considered a good starting point but also somewhat restrictive. As to the second half of the implied question, one observes that practitioners ¹ mostly make implicit use of the concepts that underlie the information system design and construction tools that are

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](https://doi.org/10.1007/978-0-387-35500-9_30)

E. D. Falkenberg et al. (eds.), *Information System Concepts: An Integrated Discipline Emerging*
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available to them. Conscious and explicit use of concepts mainly appears to result from earlier education and training. Thus, the members of the workshop felt that their task should cover the entire range of concepts appropriate to the field. In particular, the question was posed to which extent the FRISCO framework and other research in information system concepts might provide a beneficial influence on the various sectors of what is called 'practice'.

2 NEW TRENDS (requiring attention):

The growth and increasing variety of systems, changes in the practice of use, and emerging research developments will cause the research into information system concepts (ISCO) to look to new principles and hence concepts. The traditional way to look at information systems as a system for an organisation that should support business processes is long gone. New developments in Information Systems Engineering (ISE) should be reflected in research into information system concepts if that research aims at being relevant for practitioners.

The following trends in ISE are considered to be important (the possible and probable consequences for research into ISCO is being marked by a ➡):

- The future will show a predominance of **multi-media** systems over purely **administrative** systems.
➡ This shift involves different processes and requires a *changed emphasis* on various possible *conceptual structures*.
- The emergence of **very large size distributed systems** that may require an approach in terms of 'packages' or components.
➡ When dealing with prefabricated components instead of constructing those oneself, *new methods and tools* will be required.
- **E-commerce** and **Internet** are there to stay and seem to have their own concepts. ➡ This development not only changes the practical use of systems, but also triggers *new areas of research into concepts (conversations, agents, etc.)*.
- **Workflow** especially in an **inter-organisational** context will pose new challenges.
➡ This changing context demands *inter-organisational involvement*, which, in turn, means that increased *conceptual clarity* will be needed.
- **Business needs and requirements** are gradually becoming more important than programmers' needs (because of increasing sophistication of users and their systems).
➡ This change in emphasis gives rise to an associated *shift of support needs*.

Finally, one encounters clear *standardisation* challenges, such as UML, etc., that need to be addressed (addressed by Workshop 3, “Innovation and Standardization in the Information Systems field”, elsewhere in these Proceedings).

3 THE FRISCO REPORT: analysis of its applicability

The FRISCO Report offers a ‘line of reasoning’ intended to improve the dialogue between IS users and IS specialists. In practice, attention may well centre on its ‘glossary’ of IS terms. This may result in a neglect of its fundamental basis (a coherent set of assumptions, from which a reasoned list of definitions follow, and which imply a set of guidelines for analysing the conceptual structures). This would be regrettable and should be overcome by suitable educational effort.

However, the open explanatory style of the “overview” chapter has led to some doubts regarding the consistency of the list, in that a certain definitional circularity is perceived. Thus, a revision of the report that clarifies such problems would be of great value.

The main message of the FRISCO Report is considered to be of great value, by both information system researchers and practitioners. For instance, it was remarked that the FRISCO line of reasoning and definitions imply (even if not explicitly expressed) ways of thinking about: ER, forms, flow of signals, codes and so on. This may in turn lead to clearer specifications and designs. Furthermore, opportunities may exist for comparing different models or even (in the future) translating them via meta-modelling. Unfortunately, such options have not yet been proven in practice.

The general conclusion, however, is that the FRISCO Report should be revised, such that the coherence of assumptions and the consequent views on meta-modelling and the significant concepts stand out more clearly for and that the credibility is enhanced with practitioners.

4 WHAT THE PRACTITIONERS’ WORLD EXPECTS

The requirements of ‘practitioners’ naturally depend on their positions and tasks: senior executives, middle management, operational and clerical staff take very different perspectives regarding ‘information systems’ and its use. Similarly, there is a wide range of responsibilities among IS specialists,

who may be designers and builders of information systems, and hence concentrate on other aspects than the 'users', but who will tend to be more practical in outlook than IS researchers. Thus, the expectations of the user and specialist categories (as opposed to the researchers) include answers to the following questions and wishes:

- How one gets from the real world to models that represent the appropriate information systems, is a question that is important for the designer of Information Systems. Moreover, a specific desire is often to change existing business practice by using new information systems that change sub-optimal processes (in a favourable direction). Information systems in the broader sense thus also include procedures, organisational structures etc.; these should be further elaborated to make FRISCO operational.
- Modelling of IS should be supported by implementation tools: thus, the design and implementation roles are to be rolled into one integral activity. Methods to obtain requirements from users and put them in models and verify user wishes, while simultaneously (or at least in one single sweep) arriving at the corresponding computer system are now expected from IS tools and methods developers. For using Information System Concepts by practitioners easy accessibility and making concepts fit for use is highly important. Credibility however comes first.
- Information systems concepts often merely derive from tools and languages that practitioners use – hence, one would wish to be provided with a (reasonably) all-embracing framework. Clear problems at the moment are how to find the borders around IS. Elaborated semantics of models should lead to comparison of different models to bring one model in the form of another model (automatically).

Given these expectations from the practitioners' world, we might try to sketch the relationship between the world of the practitioners and the research and IS-method developers. This is illustrated somehow in Figure 1. The figure summarises the relationship of the worlds of practitioners and researchers, as linked by their varied concepts. Practitioners predominantly base their views on 'common sense' and the nature of the tools available to them.

Researchers, on the other hand, are expected to come up with 'uncommon sense' (i.e. innovative ideas). So far, research has been primarily theoretical (i.e. based on the researchers' perception of the practitioners' environment)

and was aiming in particular at researcher themselves (this is indicated with the “thick arrow”). More empirical research into explicit and implicit usage of concepts ought to be conducted. The combined results of ‘theoretical’ and ‘empirical’ research might well lead to improved methods. The influence on method developers, therefore, could be significant, on practitioners somewhat less, on IS users only indirect.

Figure 1. The current and future links between theory and practice

The dotted arrows denote the new (or so far insufficiently stressed) interactions that could be beneficial for both the IS research and the practitioners world:

- mutual consideration of theory and practice;
- empirical research into the practical significance and applicability of concepts;
- evaluation of new development methods in the light of the above.

It is important that such new approaches – including an update and/or extension of the FRISCO Report – be conducted in an effective manner, that tries to keep up with the pace of developments and that includes beforehand mechanisms to involve practitioners. A possible approach to do so is included in the following section.

5 A ROADMAP FOR ACTION

The tacit assumption is that IS research and in particular research associated with concepts (“ISCO”) will yield interesting results, that might be useful in practice. The question is under what conditions and with what ambition one may come to sensible research lines (that can be taken up in the context of e.g. a follow up on FRISCO). The following recommendations and ideas express the conclusions of the workshop:

- It is essential to *inform stakeholders* about ISCO results. This should be pursued indirectly through [continuous] education and by dissemination in the form of papers in scientific and applied journals. Examples of journals that might be interested in the FRISCO Report and its extensions are the MIS Quarterly and the Journal of Information Systems. Additionally, 1-day training courses, a book for educational situations, an IFIP or more specific “FRISCO” web site should be aimed for in addition to the more traditional means of delivering research results.
- An *extension of the glossary* like the one of FRISCO is not only useful, but also necessary. Several new concepts need to be put in perspective. The list of topics to be addressed was given above. Furthermore the (perceived) significance FRISCO should be extended beyond its present glossary. It should be enhanced with *educational information*, the personal views (chapter 7) might be brought forward so as not to be buried under the precise but boring detail of the earlier chapters, and concepts in the ‘social’ step of the semiotic ladder – such as norm, rule, responsibility – should be emphasised. Moreover the credibility and consistency of the report should be carefully reviewed.
- Important is the question how to define feasible *empirical research programmes*. This research should aim at investigating how IS concepts used by practitioners in, discussions, designs, programs, implementation tools, and how they may contribute to some benefit.
- IS *method developers* will give ISCO research more attention when the clear added value is shown. This could be done by showing how e.g. UML can be described in terms of information system concepts **and how FRISCO relates to other IS concept framework studies**, such as those conducted by Bubenko, Loucopoulos and others.

- As indicated at the beginning of this report, practitioners benefit from concept frameworks mainly indirectly; hence the need is to **address** the next generation of “developers”, i.e. **students**, as well as the responsible **knowledge managers** within the ICT industry.

All in all, the main conclusion from the above is that Information Systems Concepts research needs a clear redirection and refocusing of the work which has been dominant in this area. It also means that research lines need to be developed that are being performed by practitioners and researchers together. Furthermore, it is clear that less traditional means of disseminating research results is necessary, in order to benefit optimally from the necessary changes in this field.

6 PARTICIPANTS

The workshop was attended by a diverse group of representatives from the academic world and industry. Some of the participants are professionally involved in both worlds. The participants were: Alistair Barros (Australia), Vincent Bataille (France), Xavier Castellani (France), Samuel Chong (United Kingdom), Pim Hengeveld (Netherlands), Sue Holwell (United Kingdom), Jens Kaasbøll (Norway), John Krogstie (Norway), Kecheng Liu (United Kingdom), Paul Mallens (Netherlands), Arne Sølvsberg (Norway), Ronald Stamper (NL and UK), Alex Verrijn-Stuart (Netherlands) and others.

The workshop was chaired by prof. dr W. Hengeveld from Delft University of Technology with the assistance of prof. dr A.A. Verrijn Stuart of Leiden University. This report is their sole responsibility.

References:

A Framework of Information System Concepts: The FRISCO report, E.D. Falkenberg et al., eds, © IFIP 1998; ISBN 3-901882-01-4 (Web edition: <ftp://ftp.leidenuniv.nl/pub/rul/full.full ftp>)

The Unified Modeling Language User Guide (The Addison-Wesley Object Technology Series) by Grady Booch, Ivar Jacobson, James Rumbaugh, Addison-Wesley Pub Co; ISBN: 0201571684

Uml Distilled : Applying the Standard Object Modeling Language (Addison-Wesley Object Technology Series) by Martin Fowler, Kendall Scott (Contributor), Ivar Jacobson, Addison-Wesley Pub Co; ISBN: 0201325632

UML in Action, Comm. ACM **42** (October 1999, Number 10), Grady Booch, guest ed. (articles by Cris Kobryn, Grant Larsen, Bran Selic, Alex E.Bell/Ryan W. Schmidt, Jim Conallen), pp 26-71.

Further information on *UML*, in general, see: <http://www.omg.org>

The reference to proposals to profile *UML* with enterprise models is:

http://www.omg.org/techprocess/meetings/schedule/UML_Profile_for_EDOC_RFP.html

This relates to the point that conceptual models are now being used as executable artifacts. The proposals define enterprise sub-models as well as their automatic, non-normative mappings through distributed middleware technologies (in this case Corba).

Various frameworks:

- P. Loucopoulos, P. McBrien, F. Schumaker, Theodoulidis, V. Kopanas and B. Wangler, *Integrating database technology, rule based and reasoning for effective information systems*, Journal of Information Systems **1** (Feb 1991) 129-152.
- D.E. Avison and A.T. Wood-Harper, *Information Systems Development Research: An Exploration of Ideas in Practice*, The Computer Journal **34** (2) 98-112, April 1991.
- A.T. Bertziss and J.A. Bubenko, *A software process model for business reengineering*, Proceedings of the IFIP WG8.1 Working Conference Information Systems Development for Decentralized Organizations (ISDO95), Trondheim, Norway, August 1995, pp 184—200, Chapman & Hall, 1995.

‘Practitioners’: persons involved in design, implementation and/or use of information systems, as opposed to researchers (academic) whose primary interests are foundations, formalisms, languages, tools and the applicability thereof; method and tool designers often straddle the divide.