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Early Theorising of Information Systems and their Larger Contexts. Personal Experiences and Reflections

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Early Theorising of Information Systems and their Larger Contexts

Personal experiences and reflections

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Abstract. This paper is a piece of first-person auto-ethnographic writing that gives an overview of the author's research career in the field of information systems covering the fifty-year time period from the middle of the 1960s to the middle of the 2010s with an emphasis on the early part of the time period. The story is about searching for larger contexts and/or bottlenecks when developing information systems and information systems development methods. The work described has included fieldwork (action research and field tests), headwork (connections to the literature) and textwork (writing books and articles).

1   Introduction

I have written this Researcher Career Retrospective (RCR) as a response to the call for papers to a special issue on Scandinavian Researcher Career Retrospectives in the *Scandinavian Journal of Information Systems*. This paper is a piece of first-person auto-ethnographic writing giving an overview of my research career covering the fifty-year time period from the mid-1960s to the mid-2010s with an emphasis on the early part of the time period. It uses publications (primarily books) as points of reference, many of which are written by me or by fellow researchers. The story is about searching for larger contexts and/or bottlenecks when developing information systems and information systems development methods. The work described has included three types of work (van Maanen 2011; Lanamäki 2015): fieldwork (action research (Baskerville 1999)) and field tests (van Horn 1973), headwork (connections to the literature), and textwork (writing books and articles). This paper is a major extension and revision of an article I published a decade ago (Lundeberg 2006).

2   Researcher career retrospectives: a moving target

The RCR genre is still rather young and hence subject to further development. The call for RCR-papers refers to Lanamäki (2015), who proposes that RCR writing should follow five core principles (artefacts):

1. Career as the unit of analysis

2. First-person auto-ethnographic writing

3. Publications as points of reference

4. Selective plot for relevance and interestingness

5. Dual-mission of the particular and the general

In writing an RCR, you can either focus on research processes or research results (publications) or both. Given the third core principle above with publications as points of reference, I have chosen an emphasis on research results.

Focusing on the RCR genre, Lanamäki's five principles can be considered 'good artefacts'. Important as these principles may be given the relative youth of the RCR genre, I expect more developments of RCRs in the future. This could take place in interdependent action at various scholarly events, meetings and conferences. In this paper, I will attempt to follow these core principles above.

3   Early Events

3.1   Early events from a Scandinavian perspective

The start of a new discipline. From a Scandinavian perspective, the academic field of information systems is about fifty years old. Important events that marked the start of the new discipline were the appointment of a professor in the field, the definition of the concept of information systems and the creation of an academic department in information systems.

My own academic career has also taken place during the past fifty years. My first academic position started on July 1, 1966 as teaching assistant in the department of Information Processing, especially Administrative Data Processing, a joint department at the University of Stockholm and the Royal Institute of Technology. In this paper, I begin with a story from my early academic work and on some experiences based on this work. The story is about searching for larger contexts and/or bottlenecks when developing information systems and information systems development methods in the early days of the discipline. Many of my experiences from work in the early days of the field are still relevant when developing methods today.

The pioneer: Börje Langefors. Börje Langefors is the man behind the Scandinavian field of information systems. No one has had a greater impact on information systems research and

practice in Scandinavia than Börje Langefors. Much of his work has been devoted to developing a general information systems theory defining the discipline independent of a changing technology. His seminal book, *Theoretical Analysis of Information Systems* (Langefors 1966), known by many students as THAIS, provided the theoretical foundation of the discipline. His influence has not been limited to Scandinavia. He was very active internationally, including being an organiser and the first chair of Technical Committee 8 (Information Systems) of the International Federation for Information Processing.

Many of the existing information system theories have their roots in research that Börje Langefors initiated in the sixties. He understood the important role that theories and methods play in building information systems to meet the needs of business operations and users. He believed that information technology systems involve human, organisational and technical phenomena. His vision was that information systems must be built on a deep understanding of the special character of each of these areas and their interactions.

In his inaugural address as a professor, Börje Langefors presented four method areas in information systems development:

- Object system analysis and design

- Information analysis

- Data system architecture and construction

- Realisation, implementation and operation

The first two areas are infological and the last two are datalogical. The object system is the utilising system (usually some part of a business firm) to be served and supported by an information system. Together, these four method areas were foundational in our approach to information systems development.

The birth of the concept of information systems. The concept of information systems was introduced by Börje Langefors for the first time at the third International Conference on Information Processing and Computer Science in New York in 1965. As chairman of the scientific program committee, he proposed that one of the five major subject areas of the congress should be information systems. This was a new concept at that time. He used the term information system to refer to a system of information. Börje Langefors pioneered the infological approach, building on his distinction between information and data. The approach distinguishes infological and datalogical work areas. The infological problem is how to define information to be provided by the system to satisfy user needs. The datalogical problem is how to organise the set of data and the hardware to implement the information system. For a contemporary treatment of semiotics, the theory of signs and symbols, see (Mingers and Willcocks 2014).

The start of a new department in Stockholm, Sweden. In the middle of 1966, I met Börje Langefors the first time. He was then acting professor at the Department of Information Processing with a focus in Administrative Data Processing. I met Börje through my employment interview. The interview was rather quick. As was often the case with Börje, much of our talk was about some of the recent ideas that Börje had on his mind.

Teaching. When I started to work at the department in the fall of 1966, we were initially five persons engaged in the teaching of the new academic curriculum: Börje Langefors as professor, Janis Bubenko as senior lecturer and Rune Engman, Olle Källhammar and myself as teaching assistants. It was a very interesting experience to participate in the establishment of new academic courses in an entirely new subject area. Under Börje's and Janis' guidance, I read the course books about a week before the students. From a pedagogical point of view, this was certainly not a preferred situation. From my point of view, it was a very exciting learning and teaching experience in a dynamic environment. Later on, the department in Stockholm promoted similar departments in Sweden, such as in Lund and Gothenburg.

Research. After the initial teaching-intensive years at the department, the focus turned more and more to research. Two of the research groups that started their work in 1969 were CADIS (Computer Aided Design of Information Systems) and ISAC (Information Systems for Administrative Control).

The CADIS research group was led by Janis Bubenko, and I led the ISAC research group. Together, these two groups covered Langefors' infological and datalogical work areas mentioned above. The acronym ISAC was later changed to be an abbreviation of 'information systems work and analysis of changes'. The idea behind this modification was to achieve better harmony between the perception of the acronym and our actual research.

In the ISAC group, we performed action research and field tests toward a new approach to information systems development. Our work began with information analysis, and gradually grew to include further areas. This growth was largely influenced by Langefors' infological approach, including the four method areas presented above, as well as by practical application in different business firms and other organisations.

In this article, I will now proceed with a popular and selective description through the publication history of the ISAC research group and its continuation in the Institute for Business Process Development (Institute V).

3.2   Early events from an international perspective

From an international perspective, the field of information systems is more than five decades old. The International Federation for Information Processing was formed in 1960 (Davis 2003), and the first formal MIS academic degree programs in the US (M.S. and Ph.D.) started in 1968 (Davis 2003). Blumenthal's early book *Management Information Systems* was published in 1969.

4   Career Part I: A search for larger contexts (1966-1980)

The story about the search for larger contexts and/or bottlenecks when developing methods starts with some background experience that I had before joining the Department of Information Processing with a focus on Administrative Data Processing.

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4.1   Information systems design.

My first job in the mid-1960s was about designing, building and implementing a simple information system. I produced drawings of an information system (Figure 1), which I then built to be operated and used on the existing computer. The information system was implemented and worked relatively well from a technical point of view. However, an obstacle emerged: I was not sure whether the information system I built met the information needs of the users or not. A challenge was to build an information system that was satisfactory from an infological as well as a datalogical point of view.

Information
Systems ⟶ Designs of
Design   Information
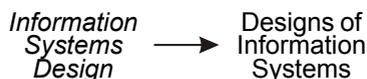   Systems

Figure 1. Information Systems Design produces designs of information systems.

At this point in time, I started to work at the Department of Information Processing with a focus on Administrative Data Processing.

4.2   Reflections on information systems design

There was nothing inherently wrong with the first information system I built. The question was just whether it complied with the context, which I knew very little about at the time. Although this part of the story now dates fifty years back, it is still relevant in today's business firms.

Many businesses complain that they have great people doing fantastic work, but the pieces do not always fit together in a larger context. It is such a waste not being able to use all the good work people are doing.

The solution was to cater to the larger context. I thought that finding the information needs behind the information system would solve my problems.

4.3   Information analysis

I felt I had to do something about meeting the information needs of the users. I therefore involved myself in the area information analysis under the guidance of Börje Langefors. The purpose of information analysis was to study the larger context of information systems; in this case, we focussed on the information needs of the users of the information systems (Figure 2). Under my leadership in the research group ISAC, we developed and published a methodology for information analysis, which was applied and used in numerous cases in various Scandinavian businesses. The methodology was published 1974 in the book *Systemering—Informationsanalys* written by me and Erling S. Andersen.
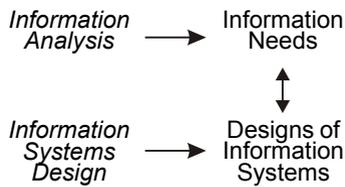
Figure 2. Information systems fulfil information needs

People were enthusiastic about information analysis. The purpose of information analysis was to arrive at good specifications for building information systems. However, it was astonishing that all these eager people were not especially interested in good specifications; they were excited about something else. They reported that this was the first time they were able to see their own work in a larger context, because an obstacle had been removed. This had a significant impact on their understanding of their activities in the business and how these activities were related to other activities. In short, the challenge was that they wanted to know more about the larger context of the information; in this case, about the procedures of the business operations.

From the 1970s to the 1980s, I was a member of the Working Group WG8.1 of the International Federation for Information Processing (IFIP). In May 1982, IFIP WG8.1 organised the first CRIS (Comparative Review of Information Systems) conference (Olle et al. 1982). The designers of different information system design methodologies were invited to submit papers with solutions to a jointly defined problem: defining an information system for the organisation of an IFIP working conference. At the time, this seemed like an excellent idea. Having an example to compare different solutions with made the discussions more concrete. However, it turned out that the differences between the various methodologies were much more significant than expected (Olle et al. 1983). The ISAC approach to specification of information systems and its application was one of the presented methodologies (Lundeberg 1982).

4.4 Reflections on information analysis

In analysing the effects of information analysis, we were surprised to learn that all those different actors and stakeholders had very different perspectives. This may seem difficult to understand from today's perspective (Lindgren 2013). As an information system designer, I was interested in good specifications. The users of the information systems wanted to know more about the larger context of the information; in this case, about the activities of the business operations.

Different persons have different perspectives. This is a general reflection that still holds today. What is self-evident for me is not self-evident for you. Different actors focus on different of the typical levels in business shown in Figure 3 and Figure 4.

The solution was once again to cater to the larger context. We now thought that describing the activities of the business operations to find out where information was needed before the detailed information needs were analysed would remedy the situation.

4.5   Activity studies

Again, we—the members of the research group ISAC—felt we had to do something about the challenge we had discovered. We wanted to meet the need to show the relationships between information needs and business procedures. We split what we earlier called information analysis in two areas: activity studies and information analysis. This idea was nothing new in the sense that it coincided with Langefors' first method area mentioned above. The objective of activity studies was to describe the procedures of the business operations to find out where information was needed before the detailed information needs were analysed (Figure 3). Hans-Erik Nissen and Erling S. Andersen described this method area in 1978 in their book *Systemering—Verksamhetsbeskrivning*. ISAC's work on activity studies can be seen as a forerunner to what would later be categorised as business process management (Davenport 1993).
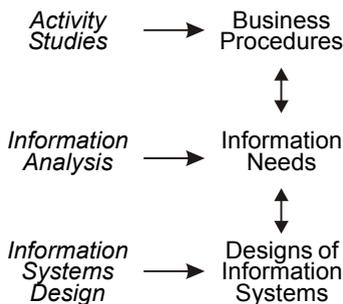

Figure 3. Business procedures have information needs

Equipped with a methodology for the areas of activity studies and information analysis, we carried out eight larger application projects together with major businesses[1] in the Stockholm area. Two people from the research group participated in each application together with people from the firm. On average, the applications took about a year and a half in calendar time. A new obstacle appeared: the results from these eight projects were used only in about half of the cases. This was very frustrating. Here we were, having spent a year and a half of our lives developing information systems of good quality, and they were not even being used!

4.6   Reflections on activity studies

This is not an unusual situation. If you ask a marketing specialist about what you should do to take your business forward, (s)he will probably suggest some marketing measures. If you ask somebody from financial control, (s)he will most likely suggest financially oriented measures, and so forth. We see what we are trained to see. We suggest measures that we know how to implement.

The challenge in the story was to try and avoid taking things for granted and to make sure that all relevant alternatives were addressed.

Obviously, we felt the challenge to find out why the information systems were not being used. Our analysis showed that we had taken parts of the larger context for granted without challenging it. For instance, we had presupposed that information systems were to be developed, without inquiring what the larger context was, and without addressing the need for change. At this point in time, we extended Börje Langefors method areas above with an additional method area.

4.7   Change studies

Our strategy for doing something about taking parts of the larger context for granted was to add yet another area, which we called change studies. The purpose of change studies was to check what the need for changes was in a larger context before deciding about developing information systems or working with other measures (Figure 4). We developed, tested and published a methodology called the *ISAC Approach to Information Systems Development* along these lines. The ISAC Approach was published in 1981 in the book *Information Systems Development—A Systematic Approach* written by me, Göran Goldkuhl and Anders G. Nilsson. A shorter version was published in two articles by Lundeberg et. al. (1979a and 1979b).
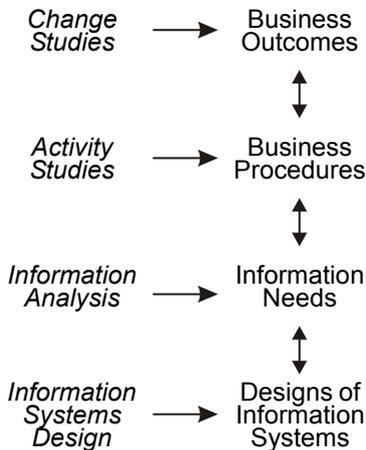
Change Studies ⟶ Business Outcomes

↕

Activity Studies ⟶ Business Procedures

↕

Information Analysis ⟶ Information Needs

↕

Information Systems Design ⟶ Designs of Information Systems

Figure 4. Business procedures contribute to achieving business outcomes

4.8   Reflections on change studies.

Find the persons behind the intended results. This lesson from change studies is one of the most important lessons from the story. In processes in business firms, task and relationship are an inseparable whole. Again and again, we find cases where nobody stands behind a particular

solution, which then falls flat to the ground. It is amazing and frustrating that so much money goes down the drain because people behind the intentions are missing.

4.9   Summary of and Reflections on Career Part I

The emphasis of the first part of my career coincided with the main four years of work in the research group ISAC from 1971 to 1974 (Lundeberg 1974; Lundeberg 1976). Roughly speaking, these four years have meant two years of methods development (action research) in limited early projects (1971—1972) and two years of methods application (field tests) in a number of pilot projects (1973—1974).

   The rest of the 1970s were mainly used for further pilot projects and documentation of the results. My participation in the work was as leader of the research group, which included active participation in the methods development and project leadership in some of the pilot projects. The contribution to knowledge is a methodology for information systems development. Gregor (2006) distinguishes between five types of theory. The ISAC methodology corresponds to the fifth of these: theory for design and action. Associated research has been referred to as design science (Hevner et. al. 2004).

   During the later part of the 1970s and the beginning of the 1980s, my international contacts increased in regard to personal contacts as well as international publications. I already mentioned IFIP's working group WG.1, which was very active. Additionally, the Scandinavian collaboration was strong, including contacts with others including Erling S. Andersen, Rolf Høyer and Åge Sørsveen in Norway, Niels Bjørn-Andersen in Denmark and Pentti Kerola in Finland. Pentti and I were among the organisers of the first two IRIS (Information Systems Research in Scandinavia) conferences. As far as translated books are concerned, Lundeberg and Andersen's 1974 book was published simultaneously in Swedish and Norwegian. The 1981 book by Lundeberg et al. was published in three languages: Swedish, English and Dutch. Pilot projects according to the ISAC approach were carried out in Denmark; e.g.; SAS Cargo; The Netherlands; e.g.; Delta Lloyd; and Norway; e.g.; Den Norske Veritas.

5   Career part II: The start of a new research institute, Institute V (1981-1985)

In 1981, I initiated the founding of a new independent research institute: The Institute for Business Process Development, or Institute V for short (V stands for Verksamhetsutveckling, the Swedish word for business process development). Institute V is a research foundation working in the areas of business transformation and business performance improvement. I left the University of Stockholm and became the leader of Institute V. The idea of founding the institute was built on the earlier positive cooperation between business firms and researchers that had taken place in the research group ISAC during the 1970s. The research group ISAC cooperated during its existence with a group of approximately twelve Swedish business firms and government authorities. Many of these became founding members[2] when the Institute started its work.

A leading idea at the start of Institute V was the transition from information systems development to business process development. This idea was manifested in the name of the institute. We had the idea that there would be a change in emphasis from an information systems orientation to a business process focus. The relationship between information systems and business processes would still be vital. At the time, the Swedish word 'Verksamhetsutveckling' was a new concept. Today, this word is widely used.

The activities at Institute V fell into three different categories:

1. Development of theories and methods

2. Action research and field tests

3. Transfer of knowledge

Together, these three types formed the way research was performed at Institute V. The intention was that an approximately equal amount of resources should be spent on each of these types.

The purpose of Institute V is to develop, use and disseminate knowledge about how individuals in businesses can use information, information systems and information technology to achieve sustainable business results. In this way, Institute V wants to contribute to the advancement of businesses in Sweden, as well as internationally.

One of the first projects of the new institute in 1981 was to interview the founding members about their perceived needs for further research. Two areas that came as a result of this were methods for high-level organisational analysis and methods for selection and adaptation of standard application packages (Anveskog et al. 1983; Anveskog et al. 1984). The work with high-level organisational analysis was an attempt to explore yet another context, this time above the change study results. The work with high-level organisational analysis was documented in internal papers. The idea behind using standard application packages was to remove bottlenecks like time and money by exploring the information system buy option.

A large part of my time during the second part of my career was devoted to transferring knowledge in different ways to different audiences. Together with the Institute for Individual and Organisational Learning in Oslo, Norway, we developed a role-play named KALO, concerning management of information systems departments.

5.1   Experiences and reflections regarding career part II

Our experience of working with the three parts as a whole was that they contributed to each other to a large degree. The first part (development of theories and methods) could benefit from our practical experiences in the second part (action research and field tests), as well as from the experiences in the third part (transfer of knowledge). As a whole, the three parts became our way of conducting research. This meant that we learned a lot from the practical applications we worked with and from the courses we gave.

The step from information systems development to management of information systems departments was yet another search for a larger context. The application of information system development methods was no longer a concern only for the individual designer, but concerned the whole department (Lundeberg and Sørsveen 1978).

6 Career part III: Moving Institute V to the Stockholm School of Economics (1986 onwards)

In 1986, I was invited to take the vacant chair in information management at the Stockholm School of Economics (SSE) and start working as full professor. In addition to filling the vacancy, SSE also wanted to promote teaching and research activities in the information systems field. It was agreed that Institute V should move to SSE to get a headstart in this field.

Teaching. When I started to work at SSE in the fall of 1986, I soon realised the similarity with the situation at the University of Stockholm twenty years earlier. I recruited a couple of teaching assistants with some information systems background and gave them internal courses the week before they were to teach the bachelor students. History had repeated itself. Again this was not ideal, but it was a way to get started.

Teaching at SSE took place on different levels: Bachelor, Master, MBA and EMBA. EMBA courses were especially influenced by findings from Institute V. The KALO role-play is an example of such influence.

Research. After the initial teaching-intensive years, the focus turned to research. The initial research in information systems at SSE (Lundeberg and Sundgren 1996) was built on ideas from Institute V.

My search for larger contexts continued. The book *Handling Change Processes* (Lundeberg 1993) presents an approach to handling change processes in connection with information systems and business reshaping. Another example of published research results is *Improving Business Performance: A First Introduction* (Lundeberg 2011), which builds on the idea that it is more resource-effective to focus on general, fundamental processes rather than to try to find cook-book recipes for every possible situation the future might hold.

7 Reflections on career part III and the story as a whole: What is it really about?

The story above is a story about the search for larger contexts and/or bottlenecks. In a sense, the same interest appears in the beginning of the story as in the end, independent of the context or the bottleneck. The question is: how can we move businesses forward by implementing various information systems solutions? If we apply the search for larger contexts to the information systems field, we have a set of levels from information system designs to information needs to business procedures to business outcomes. In summary, the ISAC story takes us from the field of information systems to the field of business process development.

The story can also be seen as a transition from technology (in this case information technology) to people. The paradox is that in an area like information technology, people turn out to be one of the big bottle-necks. Task and relationship are an inseparable whole.

In summary, the story and lessons learned are about larger contexts and bottlenecks:

- Combining infological and datalogical aspects
- Including the larger context of information
- Avoiding taking things for granted
- Finding the people behind intended results
- There are always options
- Investigating the IS buy and making options

These lessons learned are generalised, and therefore somewhat tricky or captious, but are still relevant for different audiences, for scholars as well for practitioners.

8 Reflections on researcher career retrospectives including family resemblances of the genre and career conclusion

Lanamäki (2015) discusses, among other topics, IS history, and tributes as family resemblances of the RCR genre. He also states that he could accept RCR as an IS history subgenre. If I look back at the RCR that I have just written, it is obvious that IS history and RCRs are very closely related to each other. Whether RCR should be a subgenre of IS history or not is a matter of personal taste.

Tributes. When it comes to tributes, I would like to distinguish between separate articles and collections of articles (often called 'festschrifts' or 'celebration publications'). During my career, I have received two festschrifts: one at the age of sixty (Sundgren et al. 2003), and one when I retired (Mårtensson and Mähring 2010). The character of the separate articles in both of these festschrift varies. Some articles start from some of my theoretical models and reflect about models in general or the own use of the theoretical models, develop them further or adapt them to specific contexts. Other chapters/articles are personal reflections about the information systems field in theory and practice. Tributes can thus be of quite different character.

Both of these festschrifts from some of my close colleagues and former doctoral students were a great honour and joy for me to receive.

I expect that we will see more RCRs in the future. This paper can be used as one exemplar. What are my experiences and reflections at the end of this attempt?

My own purpose when I wrote the first version of this paper was to give an overview of the major research topics that I have been involved in during my research career, especially in the beginning. It turned out that some readers were not especially interested in such an overview, but were interested in something else. They were interested in what the work with different research topics means to the field and other researchers. To me, this was a déjà vu experience. I compared it with the reactions some users had to information analysis. The users wanted more knowledge about the larger context, which is also what the readers wanted in the above situation. A clear instance of the difficulty of practicing what you preach!

Conclusion: From the field of information systems to the field of verksamhetsutveckling. I have earlier touched upon the fact that the Swedish word verksamhetsutveckling (English: business process development) was formed when Institute V was founded in 1981. Today this word is commonly used in Sweden. An alternative storyline for this paper could have been: from information systems to verksamhetsutveckling, suggesting that verksamhetsutveckling could be a new name for our field. This would imply the confluence of information systems, organisations and individuals. Many scholars use similar three worlds partitionings, for instance: material, social and personal worlds (Mingers and Willcocks 2014), technology, organisations and people (Hevner et. al. 2004) and artefacts, performatives and ostensives (Pentland and Feldman 2008). These are just three examples; there are many more. In addition to such examples, the scholars using three worlds partitioning often refer to each other.

One objection against the new name 'verksamhetsutveckling' for our field is that such a field would be very broad with all the consequences of what that entails. It is then interesting to note that the global tendency of creating larger departments focusses on growth, where IS departments are merged with management (Bjørn-Andersen and Clemmensen 2017). This tendency could support the broadening of the field and make such a change more realistic. The need for a new field would in such a scenario be supported by both research and teaching trends.

Notes

1. Atlas Copco (Order processing system), IBM's factory in Järfälla (Part of a production information system), The Material Administration of the Swedish Armed Forces (From mission to maintenance plans), The Municipality of Jönköping (Information systems for municipal activities planning), Scandinavian Airline Systems (Information systems for processing of time tables), The Swedish Army Staff (Systems for management of unit production), The Swedish Ministry of Defense (System for computer aided program budgeting), Swedish State Power Board (Parts of maintenance systems)
2. Among the seventeen founding members were: ASEA, Arla, SAS, SEB, SPP, Ericsson and Volvo. Some of these organizations have since changed names and/or organisational affiliation, a reflection of the fact that it has now been more than three decades since Institute V was founded.

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