Enterprise Wide Development
A survey of critical factors for co-ordinated development in complex organizations: What development managers consider

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Abstract

This paper describes critical factors for co-ordinated enterprise and IS/IT development and change in complex organizations in Sweden. These factors represent an answer on the crucial question: Why is co-ordinated development of enterprise and IS/IT difficult today? The survey is based upon in-depth interviews and concentrated workshops which present a current and qualitative view upon this area. 20 persons representing different development management roles from 6 large organizations with complex operations have participated. Responses relate to two main questions, which concern the problem generating factors and to what degree these are critical. The factors have been categorised into nine subject areas and certain factor groups within each area. A vast number of statements are included in the material.

In workshops, with invited experienced development managers, the responses were prioritised individually with regard to critical factors for co-ordinated enterprise and IS/IT development.

The result is a set of critical factors reflecting priorities of development managers in Sweden today, which can guide us in further research in management of co-ordinated enterprise and IS/IT development.

1. Introduction and objective

Large and complex organizations are increasingly dependent on IT, which is integrated in business processes to sustain competitiveness in current markets and also in migration into new markets and/or branch structures.

During the 1990's IT use has broadened and integration into human activities and business processes has increased in almost every area of society. Integration of IT has gone so far that the core of many business processes exists mostly in IS rather than in human activities. Today, in order to change, organizations have to manage social change and technical change in phase. Yet, difficulties in managing social and technical change are commonly seen in terms of failing projects and wasted investments. There is a need for theories and models, which better support continuous development of enterprise and IT systems in large organizations [1].

Especially large organizations constitute a complex environment for people and systems. Their enterprise demands large efforts to achieve change and involve situations where cause is hard to distinguish from effect. To co-ordinate development of both enterprise and IS/IT there are a number of critical factors that needs to be managed. But which are these factors, then?

There are suggestions on issues to manage in order to be successful with IS development in large organizations; A sequence of SIM Delphi studies during the last 15 years shows the changing interest of IT managers over time [2, 3]. For example, an area of increasing interest is the migration into new application areas based on Internet, like E-commerce. The SIM Delphi survey has been repeated on other continents and the results show that the key issues and their ranking also vary depending upon location [4]. However, the fact that an issue is interesting does not imply that it is difficult to manage. A survey with set questions has advantages for continuity but a drawback regarding catching top-of-mind concerns and in-depth discussions.

Literature offers a vast set of solutions to IS development and use in organizations, such as: strategic IS/IT-planning, architectural frameworks, standard systems, and enterprise wide infrastructure and project management. Some studies take a project perspective [5], [6, 7], [8]. Another area of great concern for studies relates to the difficulty of measuring the value of Information Systems [9]. Other studies have investigated failures within Information Systems [10], [11]. There are extensive course books with an aim to enhance knowledge in the field [12], [13]. There are also
classifications of existing studies [14]. If all these solutions exist, how come it’s still so troublesome? Are the offered solutions not used? IT management, and theories in the field, lack unifying concepts and frameworks still leaving the field incomprehensible to researchers and practitioners [15].

Our interest is the co-ordination of enterprise and IS development, throughout large and complex organizations rather than in specific application areas or single projects. Consequently, we set out to clarify the specific critical factors in some Swedish organizations. Overall, there is an interest for the question: Why is co-ordinated enterprise and IS/IT development difficult today?

An important group that confronts the context are practitioners and we have given them some questions - Let's see what they consider…

2. Method of the survey

The survey was made through a combination of interviews and workshops with change managers from large Swedish organizations with complex operations. Delineation of scope and forming the questionnaire was made in workshops with support from senior researchers. The interviews were performed mostly at the interviewee’s office by one or both researchers. The interview statements were compiled into lists of factors, problems and problem driving issues, as a basis for ranking and group-discussions in workshops.

2.1. Choice of approach

There are alternative approaches to address the issue at hand. The main advantage of the case studies and the context specific environments is the access to in-depth knowledge and understanding, something that is crucial when studying complex situations [16]. The main difficulty with a quantitative approach in a complex context would have been to formulate, gather and analyse data unless the research issue is well defined and understood among all respondents. Instead, such understanding is possible to achieve with a qualitative approach with in-depth interviews and workshops.

Repeating a previous study in a new setting would have had the advantage of reusing validated instruments and may have contributed to that research. For example, repeating the SIM Delphi study within Swedish organizations would be such an option. However, our main question concern about critical factors, which are difficult to handle rather than key issues of interest and furthermore we focus on the context of complex organizations.

By taking an inductive approach the possibility of discovering different phenomenas remains without being restrained to singular verification. A pure deductive standpoint would restrain the research to a fixed hypothesis [17].

In the interviews our approach is to be open-minded. It is essential to get a picture of what issues development managers in different organizations see as critical instead of analysing their reaction to a normative or prescriptive model. This is reflected in that the questions in the interviews are open and intended to let the interviewees form their answers in their own words and from their own thoughts.

Semi-standardized interviews, i.e. a number of presented questions, which can be adjusted and followed by individual questions, provide flexibility without losing the possibility to analyze similarities and differences [18].

The compilation of answers into groups is based on issues contained in the answers themselves, not on any pre-defined taxonomy. Workshops with participants were used for further validation and participants could influence factors listed in interviews.

This way we believe that the resulting list of areas and factors is a fairly good aggregation of the issues, which development managers are concerned with in large and complex Swedish organizations of today.

2.2. Framing the scope

To frame an original scope, construct interview questionnaire and select analysis/evaluation methods three preparatory workshops were performed with two senior researchers. This resulted in basic assumptions, definitions, main issues, organization scope, managerial roles and also ideas regarding subject areas for the research. We got some basic assumptions on the development situation today:

• more and more change requirements come from external stakeholders and affect the development work in a way uncontrollable to development management
• change requirements have dead-lines, best-before dates, for changes to be fully implemented and co-ordinated in enterprise and IS/IT, thus increasing the need for co-ordination of enterprise and IS/IT development/change
• there are managerial rather than technical issues hindering efficient co-ordination of enterprise and IS/IT development today
Enterprise in this context is not merely restricted to the corporate world but shall emphasize the organizational environment and operational settings. It exists also for public organizations, e.g. military units and the essence rests in ways of working, activities and “day to day business” (in Swedish the word “verksamhet” explains the meaning).

Complex in this context means entities that are constituted from a large number of elements with a large number of depending aspects. Complexity is increased from increase in dimensions such as diversity/heterogeneity of elements with dependencies, dynamic behavior and speed/phase of development and change. The main issues for this research are:

- To get a picture of what managers considered difficult and description of causes, situations and issues for co-ordinated enterprise and IS/IT development.
- To what degree are these concerns considered as critical factors by a group of experienced development managers.

The selection of organizations intended to cover a wide range of areas in society from public sector as well as from private to get a broad picture rather than a narrow one:

- Public: defense authority and a service administrating authority
- Private: manufacturing, system provider, transport and industry

Each of these organizations is considered large and complex in the sense that it dispersed geographically, has a large number of employees, a high knowledge content, advanced products and/or processes, and extensive IS/IT use in a variety of applications.

The following management levels and managerial roles were defined to support the survey:

- Enterprise role, a manager that has a role in the enterprise perspective, e.g. CEO, head of division or manager, change projects manager.
- IS/IT role, a manager that has a role in the IS/IT perspective, e.g. CIO, IT manager or IS/IT project manager.

- Overall management, that is the level that has to direct the organization as a whole, co-ordinate internal aspects to meet external aspects e.g. expectations, competition and development.
- Executing management, that is the level responsible for executing development activities and co-ordinating development and change work associated with the activity.

The division into enterprise and IS/IT perspective is intentional to reflect that this split of responsibility is often applied in large organizations. The survey is focused on development managers, thus, development workers and enterprise people at large have not been included. These groups may of course have other views on what makes co-ordinated enterprise and development difficult. Therefore, when interpreting the result from this survey, one must bear in mind this delineation. It is a survey of what development managers consider.

2.3. Interviews and workshops

The selection of interviewees was based on the four categories described in the previous section. The choice of candidates was made in collaboration with a senior representative from each organization, relying on their knowledge of personnel within the organization.

The interviews were conducted at the interviewee's location, normally in their office premises. The interviewees' could chose the time and date to their convenience and the atmosphere was relaxed. The interviews were documented with a tape recorder and notes. Over 200 critical factors were registered in a database, both short ones like “Long lead times” and sentences like: “We dont have a process for co-ordinated evolutionary enterprise and information systems development”.

The workshops were arranged by the researchers through an invitation procedure. Workshops were held at two different locations to enable as many participants as possible from the invited group. Each workshop started with a brief introduction to the problem domain and was followed by an individual critical factor ranking of statements before an open discussion finalized the workshop days. The results were all the time collected and registered in a database by the researchers.

3. Survey results

This part will first give a brief description of the participants, present the structure of interview statements in subject areas of the critical factors and finally present some ranking results together with their implications.

3.1. Participants

The following six organizations participated in the interviews and were all invited to the workshops.

Public sector:
Riksförsäkringsverket – www.rfv.se
Försvarsstaben – www.mil.se
The interviewees were asked to point out their main role according to the table 1 to confirm the correctness of the selection. There is an under-representation from Development management in IS/IT. Selecting one respondent per role and organization would have given the theoretical number of 24 respondents. However we did not get qualified persons in every category from all the organizations.

### Table 1. Representation of participants

<table>
<thead>
<tr>
<th></th>
<th>Enterprise</th>
<th>IS/IT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall management</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Executing management</td>
<td>5</td>
<td>3</td>
</tr>
</tbody>
</table>

The workshop had two purposes: to prioritize the individual and aggregated results from the interviews and to analyse and discuss critical factors. The workshop participants were invited from the same organizations that took part in interviews. The workshop was set up at two occasions in order to get as many participants as possible. Since the prioritization of the critical factors was performed individually we believe that this split does not affect the result in any critical way. Altogether also 20 valid priority lists were collected.

Workshop participants represent all categories of management.

### 3.2. Structuring of statements

The statements from interviews constitute a rich and vast material. However, it would not be suitable for consideration and evaluation with the limited time of a one-day workshop. Therefore, in order to produce a comprehensible material, the statements from two core questions were selected and structured into 10 subject areas. The two questions were:

- What do you consider to be the biggest difficulties/problems in co-ordinated enterprise and IS/IT development in your organization?
- What critical factors are generating problems in co-ordinated enterprise and IS/IT development?

Subject areas (see figure 1) were induced by the researchers from the statements themselves and not based on any predefined theoretical taxonomy. The reason for this is to minimize possible bias introduced by the underlying scope and perspective of a given taxonomy. The negative aspect of this may be that those encountering the material are led into thoughts around subject areas that they would not have if they see the material without being structured into subject areas. However, the participants perceived the subject areas as general and natural and no workshop participant reacted upon the issue.

In sorting the statements a notion of subject was used as a guideline, i.e.: “What is the subject that is addressed in this statement?” rather than “What is the issue that is addressed in this statement?” Of course, also this kind of vague guideline is open to bias from the researcher but we still believe that it gives us an opportunity to find other issues than those that have been found by following a defined structure. We also have the possibility to compare the subjects found with other taxonomies and thereby enrich them.

It is essential to note that statements may differ slightly in perceived meaning between Swedish and English. All interviews and rankings were made in Swedish. Also, the statistics shall be regarded as an indication of the statement and subject importance rather than strict statistical conclusions.

### 3.3. Subject Areas, statements and factors

As stated, the structuring of statements into subject areas was made to illustrate and make the vast interview material comprehensible in a short time. The Subject Areas are out-lined in figure 1. The areas cover universal subjects, such as Knowledge / Competence and Environment, but also more specific subjects like Enterprise design. Some areas were given primary headings in order to represent factors indicated by similar statements. An example would be Process, which contains primary headings for Long lead-times and Co-ordinated development. Similar factors may occur within...
different areas and it is equally essential to be aware of that there is a variation in number of factors per area. Nevertheless, that should not influence the analysis.

3.3.1. Environment covers aspects external to the organization such as technology change at large. These may range from major political shifts/events, the European Union and the internal market to globalisation and merger trends. An interesting note, which may well be subject to further research, is that these large and complex organizations have expressed a focus upon internal issues rather than external. An example of a statement comes from a CFO explaining the introduction of a common currency in Europe as: “It is critical to solve ‘the Euro issue’ both in terms of system and organization.”

3.3.2. Stakeholders cover external actors with an interest in, and/or means available to affect the development and change process of an organization. Such actors may be customers, suppliers, government, authorities etc. A specific statement illustrates the context for the stakeholder subject area: “Markets, geographically spread, have different stakeholders which are difficult to handle.”

3.3.3. Enterprise personnel regard aspects concerning the status, availability, influence etc of personnel in the organization. The factors relate to the availability of enterprise personnel with statements such as: “Everyone cant be part of process design”, “Enterprise personnel have such a workload that they can't be part of the development” etc.

3.3.4 IS/IT personnel cover issues concerning the status, availability, influence etc of IT personnel developing IS/IT systems for the organization. It relates to factors like availability of IS/IT personnel with issues such as: lack of time, difficult to keep competent personnel etc. Among the statements is a remark from a system development manager: “The number of consultants within projects, which later disappear together with all their knowledge”.

3.3.5. Knowledge/competence relate to aspects of knowledge, competence, language, behavioural patterns (cultural or role related). The expressed views include a factor of Attitudes and statements such as “Patience and understanding in order to establish a new way of working, including the infrastructure”. Factors relate to “Lack of knowledge for the operations among IT-personnel”, “Get the holistic view and roles among people”, “Lack of knowledge” and “Language and interpretation differences between actors”.

3.3.6. Process (development) cover aspects concerning the development process such as lead-time, smoothness etc. Statements address the process of phasing out old systems, “The organizational boxes are designed first, before IS/IT possibilities are investigated” and “Complexity! Large enterprise, which involve lots of people e.g. 100 project leaders with their own priorities”. Other statements were gathered under the factors for: “Long lead-time” and “Co-ordinated development.”

3.3.7. Enterprise design regard issues of the design of an organization/enterprise, both in its current form and future form. The factor “Co-ordinated enterprise design” was significant and include statements on geographical differences and the legal factors. An example of a statement from a project manager: “Our legal set-up is a hinder to let the system deliver desired project result.”

3.3.8 IS/IT design cover aspects of the design of IT-systems both legacy and future systems. The statements range from e.g. “User approval”, “Security solutions which restrain external co-operation and shared networks/ IT systems” and “Timing aspects, when is it profitable to let in new technology” to factors like “Complexity and Inflexibility in legacy systems” and “Co-ordination of development”.

3.3.9 Task/purpose/business/objectives relate to aspects of purpose, objectives and business of the enterprise. A statement expresses the difficulty to capitalise upon enterprise changes, to really realise the expected effects; “To actually achieve effects in terms of enterprise changes”. During one of the workshops a quote may further explain the situation: “Due to unclear alignment we have many tasks that are blurry. In calculations there are often a unhealthy re-use of potential benefits, e.g. if all potential head-count reductions were actually given a red cap, we would find that there are now a lot of persons with several red caps and also a whole bunch of ones which do not have any person at all to wear it.”

3.3.10 Management/management instruments cover aspects concerning management, such as organizing processes, decision making and resources as well as management instruments such as planning, control and follow-up instruments. Factors include the balance between Central-Local, Unclear responsibilities, Time span, Co-ordinated development, Comprehensibility and Top-management interest and commitment, e.g. “Lack of follow-up”.
4. Critical factor priorities

We believe that it is possible to draw some conclusions from the distribution of statements as they were gathered and discussed in subject areas. The number of statements reflects the concern of the interviewees. A subject area with a high number of statements is an area of large concern and contains critical factors.

We can present some tables with results based upon the rankings made in the workshops. Therefore, we can also illustrate some conclusions concerning the critical factors for co-ordinated enterprise and IS/IT development. Table 2 gives an overall view with comments below. Column 1 shows the number of statement rows from the individual interviews and column 2 the more comprehensible structure with primary headings used in the workshops together with subject areas. Column 3 presents the total number of ranks received in the workshops and column 4 represents the total number of high ranks (5-point rankings on a scale from 1-5 and 5 equals very important) received.

The first column with all the statements gives an indication of Concern, column five can represent Importance and column six Relevance of the critical factors discussed.

<table>
<thead>
<tr>
<th>Subject Area</th>
<th>Col 1 No of statement rows</th>
<th>Col 2 No of prim headings</th>
<th>Col 3 No of ranks received</th>
<th>Col 4 No of high ranks (5) received</th>
<th>Col 5 High ranks (5) for prim headings (in %)</th>
<th>Col 6 No of ranks per prim heading</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environment</td>
<td>2</td>
<td>2</td>
<td>36</td>
<td>2</td>
<td>6%</td>
<td>18,0</td>
</tr>
<tr>
<td>Stakeholders</td>
<td>8</td>
<td>8</td>
<td>137</td>
<td>19</td>
<td>14%</td>
<td>17,1</td>
</tr>
<tr>
<td>Enterpr. Pers</td>
<td>20</td>
<td>12</td>
<td>213</td>
<td>36</td>
<td>21%</td>
<td>17,8</td>
</tr>
<tr>
<td>IS/IT Pers</td>
<td>8</td>
<td>5</td>
<td>86</td>
<td>15</td>
<td>17%</td>
<td>17,2</td>
</tr>
<tr>
<td>Knowl/Compet</td>
<td>37</td>
<td>15</td>
<td>260</td>
<td>49</td>
<td>27%</td>
<td>17,3</td>
</tr>
<tr>
<td>Process (dev)</td>
<td>34</td>
<td>15</td>
<td>257</td>
<td>52</td>
<td>22%</td>
<td>17,1</td>
</tr>
<tr>
<td>Enterpr. Design</td>
<td>6</td>
<td>2</td>
<td>35</td>
<td>9</td>
<td>26%</td>
<td>17,5</td>
</tr>
<tr>
<td>IS/IT Design</td>
<td>28</td>
<td>12</td>
<td>211</td>
<td>51</td>
<td>27%</td>
<td>17,6</td>
</tr>
<tr>
<td>Task/Busin...</td>
<td>1</td>
<td>1</td>
<td>14</td>
<td>6</td>
<td>43%</td>
<td>14,0</td>
</tr>
<tr>
<td>Mgmt/Instrum</td>
<td>64</td>
<td>30</td>
<td>486</td>
<td>112</td>
<td>30%</td>
<td>16,2</td>
</tr>
</tbody>
</table>

In the statement list for critical factor rankings, some were grouped into a primary heading. Due to the grouping of certain statements into primary headings the respondents had the option to only rank the primary heading and leave the single statements in the group unranked. They also had the option to rank both the factor row and statements of their choice within the group. In the overall ranking of subjects (column 5 in table 2) the statistics is based on values from primary ranking rows only. If all rankings are included the result is slightly different (i.e. column 4 divided by column 3).

The number of rankings per primary heading tell us whether workshop participants paid attention to the statement or not which can be interpreted as a measure of relevance. The number of high ranks divided by the number of rankings tell us whether workshop participants consider it a critical factor or not, which can be interpreted as a measure of importance.

The allocation of statements into subject area (made by the researcher) directly impacts the aggregated priorities for the individual subject. Thus, it is also important to look at the individual statements when interpreting this material. There is also a possibility that subject areas with few statements get more attention from respondents since it is easier to overview and decide on a few statements.

‘Management/management instruments’ (64) is the area that clearly has most statements and it also has one of the highest high-rank figures. The number of rankings per row is a little bit lower than other areas but the difference is small. The high number of statements and the high importance indicate that both the interviewees and the workshop participants consider this to be the area with most difficulties/problem generators today and also very important for co-ordinated development. The interpretation is that Management is indeed a subject of large interest for further research, at the same time being aware of the fact that the respondents here represent management themselves.

Management/management instruments (64), Knowledge/competence (37), Process (development) (34), IS/IT design (28) are all of large concern and relatively high importance (No of high rankings). The three highest ranked are all people oriented subjects. Management is pursued by people and addresses people. Knowledge, competence and culture are all attributes of people and groups of people. The development process is performed by people, managed by people within the knowledge and cultural frames of these people. There
are, of course, interrelations between these three subjects that are not further investigated in this paper.

The obvious interpretation is that the main bulk of difficulties and problem generators are contained within these four subjects and their interrelations not excluding though that there may be significant single factors within other subject areas too.

These subjects are all mainly internal to an enterprise, which is quite interesting from a research point of view. Does this represent a delineation of development manager’s interest and scope within large organizations? Or is it a reflection of a reality where most difficulties in co-ordinated enterprise and IS/IT development actually are internal affairs? Further research may give an answer.

Environment and Stakeholders both contain few statements and are considered of minor importance, although relevance appears to be average. The interpretation is that development managers are not very concerned about difficulties and problem generators in these areas and do not consider them critical to manage.

Task/purpose/business/objective, seems to be of minor concern, just one statement. However, it has the highest score on importance of all. Since there are so few statements it is difficult to draw other conclusions than that this single factor is important. We have decided not to draw any conclusions on the subject at this stage.

We find it very interesting that internal subjects are ranked high from all aspects, whereas externally oriented/ dependent subjects are ranked very low. In the debate and also in American and international surveys [2, 3] [19], a number of external issues are ranked high regarding interest, relevance and degree of critical success factors. Such factors are outsourcing, responsiveness to market changes, competiveness etc. One interpretation is that all these factors are handled excellently by large Swedish organizations and that that is the reason they are not considered to be a problem. Another interpretation is that external factors are not visible once you are inside a large organization! This would then contradict the presence of current topics in debate such as the networking enterprise, interorganizational processes and value adding chains. A third interpretation is that there is a bias towards ‘internal’ people in the respondent group but that would only affect the critical factor ranking, not the number of statements since they were received in the interviews.

It is also worthwhile to present the outcome of individual statements as they also represent a part of how to handle critical factors. In this way it is also possible to see if the overall ranking is consistent with the single states or if there are high-ranked statements within low-ranked subject areas. Table 3 presents the Top-12 statements according to average ranking score.

### Table 3. Top statements by average ranking

<table>
<thead>
<tr>
<th>Statement</th>
<th>Subject Area</th>
<th>Aver ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. We don't have a process for co-ordinated evolutionary enterprise and information systems development</td>
<td>Mgmt/Instr</td>
<td>4,5</td>
</tr>
<tr>
<td>2. Unclear relationships for management and responsibilities</td>
<td>Mgmt/Instr</td>
<td>4,4</td>
</tr>
<tr>
<td>3. Long lead time</td>
<td>Proc (dev)</td>
<td>4,2</td>
</tr>
<tr>
<td>4. Management of development</td>
<td>Mgmt/Instr</td>
<td>4,2</td>
</tr>
<tr>
<td>5. Holistic understanding, own role and that of others</td>
<td>Knowledge/Competence</td>
<td>4,2</td>
</tr>
<tr>
<td>6. Comprehensibility (Swe: Överblickbarhet)</td>
<td>Mgmt/Instr</td>
<td>4,2</td>
</tr>
<tr>
<td>7. Commitment of overall management</td>
<td>Mgmt/Instr</td>
<td>4,1</td>
</tr>
<tr>
<td>8. Security and secrecy</td>
<td>IS/IT design</td>
<td>4,1</td>
</tr>
<tr>
<td>9. Difficulties with holism (Swe: Svårt att se helhet)</td>
<td>Enterp personnel</td>
<td>4,1</td>
</tr>
<tr>
<td>10. Complexity! Large enterprise with many involved e.g. 100 project leaders with their own priorities</td>
<td>Proc (dev)</td>
<td>4,0</td>
</tr>
<tr>
<td>11. Security aspects</td>
<td>Stakeholders</td>
<td>4,0</td>
</tr>
<tr>
<td>12. To actually achieve effects in terms of enterprise change</td>
<td>Task/business</td>
<td>4,0</td>
</tr>
</tbody>
</table>

From the table we can see that all statements except three, at the lower end, represent the top subject areas. Also, the top subject area Management/management instruments is represented in five rows of twelve.

The interpretation is that the average ranking score of individual statements, at large, confirms the overall indications from table 2 of subject area concern and importance of critical factors. Table 4 below presents Top-12 of individual statements according to number of highest rankings (5).

### Table 4. Top statements by No. of high-ranks

<table>
<thead>
<tr>
<th>Statement</th>
<th>Subject Area</th>
<th>Number of high-ranks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Unclear relationships for management and responsibilities</td>
<td>Mgmt/Instr</td>
<td>11</td>
</tr>
<tr>
<td>2. We don't have a process for co-ordinated evolutionary enterprise and information systems development</td>
<td>Mgmt/Instr</td>
<td>11</td>
</tr>
<tr>
<td>3. Commitment of overall management</td>
<td>Mgmt/Instr</td>
<td>10</td>
</tr>
<tr>
<td>4. Complexity and inflexibility in legacy systems</td>
<td>IS/IT design</td>
<td>9</td>
</tr>
<tr>
<td>5. Comprehensibility (Swe: Överblickbarhet)</td>
<td>Mgmt/Instr</td>
<td>8</td>
</tr>
<tr>
<td>6. Long lead time</td>
<td>Proc (dev)</td>
<td>8</td>
</tr>
<tr>
<td>7. Guarding special preserves (Swe: Inpinkade revir)</td>
<td>Enterp personnel</td>
<td>8</td>
</tr>
<tr>
<td>8. Security and secrecy</td>
<td>IS/IT design</td>
<td>8</td>
</tr>
<tr>
<td>9. Security solutions which</td>
<td>IS/IT design</td>
<td>8</td>
</tr>
</tbody>
</table>
The table contains those statements that got the highest critical factor priority (five on a scale to five), by seven respondents or more. The number of high-rankings also confirms the top positions of the four subjects in top in the overall ranking (table 2). Only one statement (7) is from another subject area. The subject Management/management instruments is represented in six of the Top-12, confirming its top ranking.

The interpretation is that there are very few statements from other areas than the top four that actually have been ranked high by many respondents, which confirms the positions of the overall top subjects.

This can not be interpreted so that all other statements are unimportant or could not be a critical factor in a specific organization or situation. Nevertheless, it is an indication of where this group of development managers thinks that the most important difficulties and problem generators are.

### 5. Concluding remarks

This may be a step in the search of "Why is co-ordinated enterprise and IS/IT development difficult today?". Together with the sub-sets of questions regarding difficulties/problems and “What critical factors are generating problems in co-ordinated enterprise and IS/IT development?”

We have found that the subjects of Management/management instruments, Knowledge/competence, Process (development), IS/IT design are all of large concern and high importance to the responding development managers. This confirms our assumption that managerial issues rather than technical are the most important difficulties in co-ordinated enterprise and IS/IT development.

The need may also increase as the need for cross-functional processes increase and the dependence of IS/IT support is intensified [20].

However, we have found that subjects with external orientation, such as Environment, Stakeholders, Task/purpose/business/objective have received little attention and low ranking with regard to being a critical factor. This indicates that our basic assumption that requirements from external stakeholders being a problematic change drivers ought to be questioned. In fact this ratings indicate that external factors play a minor role in development work in complex organisations. Nevertheless, we once again admit the ambiguity regarding Task/purpose/business/objective which call for further investigation and no strong conclusions at this point.

An initial assumption on externally set dead-lines for co-ordinated changes in enterprise and IS/IT-systems has not been confirmed although long lead-times in development work is a problematic issue.

Will this survey result help us investigate relevance of existing management theories and concepts? The list of subject areas, statements and critical factors is a result in itself. Considering size and delineation of the sample it seems a good idea to further define subjects and factors and to compare them to other taxonomies. We believe though that this set of subjects and the rankings are a valid basis for further research into an empirical and methodological foundation for co-ordinated enterprise and IS/IT development. There are research that suggests the opposite; That the solution is less co-ordination, that by introducing slack and allowing organizational drift the organization would prosper [21]. However, the reality is rather that different organizations need different solutions, at different times and the need for management, competence and process development are building blocks that matters for managers in complex organizations.

Consequently the results of this paper reflect the current mindset of development managers, i.e. what is important to them today. Therefore, there is a need also to address the issue of future difficulties and needs.

### 6. Further research

The above concluding remarks motivate our future research activities within the DELTA project at University of Gothenburg.

Firstly: The domination of internal subjects and the very low rating of subjects with external orientation is puzzling. It would be interesting to investigate if this conclusion is valid for complex organizations in general, and in that case the reasons for it.

Secondly: To investigate relations between the different subject areas and the potential impacts they have on each other. Furthermore, to emphasize the management actions that are put in place to deal with the existing challenges.
7. References


