

# The Swedish National Audit Office

## 1: The armed forces' development of information systems

(Försvarets utveckling av informationssystem)

### Report No. 1997:49 (5.1)

RRV Publication Service, Telefax no 46-8-6904100, E-mail: publikationsservice@rrv.se

*We assess the general approach within the Armed forces to the development of information systems. We also scrutinise four specific projects, PLS, ORION, ATLE-IS and LIM, and make a risk analysis of the project SIRIUS.*

The armed forces are at present undergoing a process in which information technology is being increasingly integrated into defence operations and into future wartime operations. Today new demands and somewhat changed demands are being made on the organisation and expertise required to manage the development of information systems in the armed forces.

The Swedish National Audit Office (RRV) has studied armed forces' management in respect of the development of systems for information processing. One observation made in this regard is that the expertise required to develop computer support for information management in the armed forces has hitherto, to a relatively large extent, been limited to a small number of experts working in, for example, supporting agencies such as FörsvarsData (Defence Data), the Defence Materiel Administration etc. These agencies in turn have engaged their own experts who have functioned as sub-consultants in matters concerning systems development. In projects where supporting agencies have contributed both EDP skills and subject area expertise, decision-making and controls in respect of systems development have in practice passed over from the armed forces, i.e. the client and owner of the systems, to the experts who have developed and supplied the systems. This phenomenon in itself is not unique for the armed forces.

When local users protested against centrally developed systems which were not adapted to operational needs, systems development was transferred, in the mid 1980s, to the local level. However, experience gained from this move also acted as a deterrent. The local users also became dependent on experts who had no responsibility for operations. The projects took too much time. They became complex. Efforts were not made to get systems accepted by other users with the result that it was difficult to spread systems. The lack of co-ordination and central control also contributed to a situation which created scope for parallel developments, duplication of effort, a tendency for personnel to look after their own interests only, and unnecessary costs. It took a long time to achieve results. The costs, which are difficult to calculate after the event, were higher than expected.

Experience of both these development philosophies should be taken into consideration when responsibilities and duties in respect of systems development are decided on in the new defence organisation.

The RRV has also established that several studies and development projects have overlapped each other. The armed forces have not hitherto had an overall specification or description of the systems that are in operation or of ongoing projects.

A further observation is that it is not possible to follow-up the total cost of development studies and development projects since no cost estimates have been made and there is no cost accounting for follow-up purposes. There is thus no possibility to weigh up the need of investments in EDP against other types of investments. There is also consequently no possibility to weigh up the advantages and disadvantages of proposals for EDP investments in the normal budget and planning process. The directive of the Supreme Commander that proper documentation shall exist before decisions are made has thus not been met.

Most of the shortcomings in the armed forces' management of systems development are known within the armed forces. Some of the shortcomings can be explained by weaknesses in the management of individual projects. However the number of parallel developments and

# The Swedish National Audit Office

## 1: The armed forces' development of information systems

overlapping projects which have occurred over a ten-year period demonstrates, in the opinion of the RRV, fundamental defects in the armed forces' management of systems development. The RRV study shows that the armed forces' management of systems development has been expensive and time-consuming and as a consequence the receipt of revenues has been delayed or, in some cases, no revenues have been received at all.

In the opinion of the RRV the reasons for this state of affairs can be found in the main in:

- Shortcomings in expertise in the specialist areas of information technology and accounting which, among other things, affect the ability to place appropriate orders for and to follow-up systems studies and systems development projects. The possibility of building up necessary specialist skills, experience and continuity is limited by the military promotion system which is based on mobility and broad experience.
- A lack of clarity in the allocation of duties and responsibilities for operations, finance and development projects.
- Weak financial management and controls and follow-up with an unclear linkage between responsibility for operations, finance and the development of IT support.
- A lack of co-ordination between the different services of the armed forces and the supporting agencies and between the services of the armed forces themselves in matters relating to studies and development of IT-based systems for information management.
- Weaknesses in the project management and project work of the Supreme Commander and the armed forces, partly due to a lack of clarity in project organisation and in the allocation of assignments and resources, and also as a consequence of the fact that the military promotion system creates problems in ensuring continuity in project manning.

The RRV study shows that the armed forces have taken measures to improve their management of the development of IT-based information systems. However, the RRV is of the opinion that further measures are needed to attain effective management of systems development. The size of the armed forces and its delegated decision structure give rise, in the opinion of the RRV, to demands on the Supreme Commander, when giving detailed shape to the new organisation and duties, to create clear guidelines and a clearer allocation of financial responsibility, linked to responsibility for operations and their development. The new organisation provides good possibilities for this type of linkage between operational responsibility and financial responsibility. On the other hand the linkage between responsibility for IT development and the operational and financial responsibility still seems unclear.

The RRV proposes among other things that:

- The Supreme Commander takes measures to secure expertise in the armed forces' management of the development of IT based information systems, both in operational and financial terms. The solution to this problem should be designed in such a way that requirements of specialist knowledge, experience and continuity are met.
- The Supreme Commander takes measures that have the aim of clarifying how the responsibility for IT development is combined with the responsibility for operations (production and programs) and their finance. The measures taken should include a clear specification of the responsibility for newly established functions in the new Armed Forces organisation.
- The Supreme Commander should take measures to improve the financial management of IT projects. This should include improvements to the accounting of results to enable a follow-up to be made of how resources - including personnel - have been used.

# The Swedish National Audit Office

## 1: The armed forces' development of information systems

- The Supreme Commander should use the possibility to call in external expertise to examine the quality of the material used for decision-making purposes for investments in EDP systems. This can take the form, for example, of review panels.
  - Available standard programs should be considered to a greater extent than hitherto as should the possibilities to procure, in open competition, certain types of IT expertise, the production of tailor-made systems, and the accessories and services which are needed to enable the IT support to provide the desired effects. When selecting suppliers, great importance should be attached to the long-term perspective and to stability.
  - In addition to his comments on this report the Supreme Commander should prepare a plan of action which clearly states the measures he intends to take to remedy the problems and shortcomings pointed out by the RRV.
-

# The Swedish National Audit Office

## 2: PLS and FMV – a study of an administrative support system

(PLS och FMV: en granskning av ett administrativt stödsystem)

### Report No. 1997:49 (5.2)

PLS (production management system) is the administrative support system of the Swedish Defence Materiel Administration (FMV). PLS is constructed from three different computer systems which shall work together to support FMV's fee-financed operations.

The development of PLS was started in the autumn of 1992 and has since then been a process which has required a great deal of work both on the part of systems development personnel and personnel at FMV. PLS is a large and extensive system which shall handle an annual turnover of SEK 18 billion and be used by some 2,500 members of staff at FMV.

Development work for major administrative computer systems is often beset by problems. It is therefore important that experience gained from the development of PLS is utilised in order to reduce and prevent problems in similar projects in the future. This has been the overriding goal of the study made by the Swedish National Audit Office (RRV) of the development and functionality of PLS.

The RRV study has had three purposes. The first has been to make an assessment of PLS in respect of goals, project work and development costs. In this respect the RRV has established that the PLS project lacked clearly defined goals. The FMV management has therefore had limited possibilities of following up and exercising control of the project. The vague wording of the goals can be partly explained by the fact that the FMV did not possess sufficient knowledge of what its new working methods would involve in practical terms.

The PLS project consists of three sub-projects which are developing systems for the management and control of assignments, procurements and finance. The project was obliged to work under severe pressure of time and was therefore not able to deliver fully satisfactory products to FMV on time. This is connected with the fact that the time plan for the transition to assignment-based management and a new organisation governed systems development.

The FMV let each sub-project work with tools and methods adapted to the systems development methods of each supplier. The three sub-systems in PLS therefore have different development environments, databases and operating environments. This has the effect that the system as a whole is difficult to learn and use. At the very beginning of the PLS project a number of risk analyses were made which indicated serious risks in the project work. However, project management chose to continue the development work without making any major changes to the organisation of the three subprojects.

PLS was not fully developed when it went into operation. The FMV was therefore obliged to devote a considerable amount of time and resources in order to be able use the system. Despite considerable efforts PLS did not function satisfactorily.

According to FMV the development costs of PLS amount to approximately SEK 142 million (current prices). This amount does not include costs of infrastructure, personal computers, training and extra work for the staff. The costs of infrastructure, necessary for the system, amount to approximately SEK 300 million. The project's original budget amounted to SEK 69 million. Shortcomings in project management, a lack of clarity in the client and recipient roles, as well as a new development and operating environment led to cost increases. It is however difficult to make an assessment of the development costs since PLS was not developed on the basis of clear goals.

The second purpose of the RRV study has been to assess the functionality of PLS in respect of reliability and user-friendliness. A combination of the fact that PLS has been affected by system breakdowns with losses of data and that the system is difficult to learn and use has had the effect that FMV personnel choose to use parallel support systems, for example Excel. PLS is not therefore always receiving the information necessary to enable it to support operations fully.

# The Swedish National Audit Office

## 2: PLS and FMV – a study of an administrative support system

The third purpose of the RRV study has been to assess the appropriateness of PLS in relation to FMV's working methods. The aim of PLS was to create an administrative support system for FMV's fee-financed and assignment-based operations. One precondition for the basic ideas behind FMV's working methods to obtain support is that PLS functions properly. However, problems associated with the development and functionality of PLS have had the result that PLS lacks is not fully appropriate. For example certain invoice routines do not function satisfactorily.

The FMV's new working methods are based in the main on the needs of management to manage and control operations. The model for FMV's working methods gives relatively little support and guidance for planning, management and follow-up of projects in anything else than financial terms. The introduction of a financial model for FMV's work has not led to any great changes in production.

The problems with PLS are not the only reasons why FMV is not using the new working method fully. Uncertainty in respect of the new working methods has led to staff at FMV choosing alternative solutions for running operations.

In summary the RRV can state that a combination of factors contribute to explaining the problems with PLS:

- Systems development which is associated with problems and creates irritation;
- Shortcomings in the user-friendliness and reliability of PLS;
- A lack of clarity in respect of FMV's assignment-based and fee-financed working method.

The further systems development work is a challenge to FMV. In addition to the observations and conclusions presented above, the RRV would give the following recommendations for FMV's further work:

- Create common goals and courses of action
  - Create a common approach through clearer rules and routines for administrative work
  - Facilitate the use of the present PLS
  - Study the possibility of developing and supplementing PLS
  - Finalise the PLS project and establish a clear organisation for systems management of PLS
  - Ensure that a strong client function is established.
-

# The Swedish National Audit Office

## 3: Project SIRIUS - a risk analysis

(Projekt SIRIUS en riskanalys)

### Report No. 1997:49 (5.3)

The Swedish National Audit Office has been commissioned by the Government to make an analysis of the risks associated with the Swedish Armed Forces' project SIRIUS.

The Armed Forces are now at the stage where information technology is becoming an increasingly integral part of operations. This introduces new and partly changed requirements in respect of the organisation and skills of the Armed Forces to handle developments and to utilise the information systems. One important step in the information technology development is to create a common command system for all levels in the Armed Forces. This command system shall be based on systems products adapted to operations that are at present being developed in different projects. SIRIUS is one of these projects.

The SIRIUS project started in 1993. It shall produce a new generation of software products which shall support essential supplies, technical services, management of maintenance resources and the valuation of the war organisation's materiel. The project shall succeed some 40 old systems and replace these with new technical products. These products shall be placed at Armed Forces Headquarters, staff functions and units.

However the systems development which has been started in the SIRIUS project is fraught with a number of structural problems which affect the project. Firstly, in parallel with the development, under pressure of time, of a number of new software products, there is a comprehensive reorganisation taking place in the Armed Forces in which units are being decommissioned, reorganised and combined. These organisational changes concern, to a great extent, the operations which SIRIUS products are intended to support. Secondly the Armed Forces command system lacks a defined objective, despite the fact that the production of the command system is one of the goals of the SIRIUS products. Thirdly the planned products lack an administrative organisation which can exert an influence in the product development work to ensure the quality of the forthcoming administrative work.

Furthermore the SIRIUS project has the aim of making savings of some SEK 200 million per year possible from July 1999. For the period 1994 to 1999 a sum of SEK 1,600 million was budgeted. In the beginning of 1996, two years after the start of the project, the project decided on a change of course. Instead of developing systems itself, the project started making procurements of commercially available standard products (COTS). The procurement process has now proceeded for more than a year and decisions on orders have been postponed several times. This has had the result that the estimate made in 1993 is now highly uncertain. Furthermore personnel financed by appropriation are not included in the costs. At the end of May 1997 the reported costs of the project amounted to approximately SEK 200 million.

On account of the long, drawn-out analysis of tenders in the procurement of COTS, the project has lost time and the Armed Forces can, to put it in a somewhat simplified way, be said to be at a cross-roads. Either the work is accelerated prior to the year 2000 to keep SIRIUS' original time schedule, or the Armed Forces wait for the development of a basic system and co-ordination with other IT projects. The situation of the Armed Forces can be characterised in the following way:

*If the Armed Forces choose to accelerate the work in order to keep the time schedule for SIRIUS, there is a risk that:*

- co-ordination of the common command system will be delayed
- the aspired unification of the IT infrastructure will be delayed and more expensive
- it will be difficult to implement the Armed Forces Plan 97
- there will be a lack of resources.

# The Swedish National Audit Office

## 3: Project SIRIUS - a risk analysis

If the Armed Forces choose in the first place to co-ordinate its IT programme there is a risk that:

- planned savings will be pushed back in time and that
- the ongoing procurement process will be prolonged.

Regardless of the choice made by the Armed Forces there is a risk that:

- a lack of experience of the application environment in the Armed Forces will delay the undertakings made by suppliers
  - the introductory process will be delayed and made more expensive due to the lack of clarity
  - opportunities to rationalise will be lost
  - old systems will be replaced after 1999
  - the conflict of roles between the Armed Forces and the Defence Materiel Administration will make the implementation of the project difficult.
-

# The Swedish National Audit Office

## 4: The Swedish armed forces' systems development - a study of the projects ORION, ATLE-IS, LI FV and LIM

(Försvarsmaktens systemutveckling En granskning av projekten ORION, ATLE-IS, LI FV och LIM)

### Report No. 1997:49 (5.4)

The Swedish National Audit Office (RRV) has been commissioned by the Government to describe the projects ORION, ATLEIS, LI FV, and LIM and how they could be judged to function together as an entity.

The Swedish Armed Forces are now at the stage where information technology is becoming an increasingly integral part of operations. This introduces new and partly changed requirements on the organisation and skills of the Armed Forces to handle developments and to utilise the information systems. The development of information systems is part of the aspiration of the Armed Forces to create a command system in the organisation on both operative and tactical levels. The projects ORION, ATLE-IS, LI FV and LIM shall develop these systems.

The ORION project was started in 1994. The goal was to replace the present operative system LEO. The functionality of LEO was to be transferred from the old technical platform to a new platform in a client-server environment. According to the original time schedule ORION's products were to be operational on January 1, 1997. However it has not been possible to have the products accredited and they have not therefore been approved for operations. The project was reorganised on September 1, 1997. According to the present time schedule ORION's products shall be in operation no later than July 1, 1998. The project states that the costs amounted to SEK 213 million up to and including September 1997. The project has budgeted SEK 68.8 billion for development work in 1997.

The ATLE-IS project was started in 1995 to develop the army's information system. The project's products shall support the rapid and secure command of the army's units. In the spring of 1997 the project was reorganised in order to create a clear division of responsibilities. According to the current plan the project shall make its first version operational at the end of 1999. The project has stated that the costs have amounted to SEK 64.2 million up to and including October 1997. A further SEK 400 million have been planned for the project up to and including 2007.

The project LI FV has been running since 1985. It was restructured in 1990. The main goal of LI FV is to supply the Air Force command systems with support for orders, follow-up, analysis and decision which is necessary for the effective command of operations in times of peace, crisis and war. This shall be implemented by July 1, 2001. The project states that its work has focused on producing common hypotheses and a basic system. The development of the basic system has been taking place since 1996 as a joint armed forces project to meet the needs of functionality in all information systems. IS FV 0.2 is in operation. On April 1, 1998 IS FV1.0 shall be put into operation in the Air Force. LI FV shall be phased out as a project on December 31, 1998. Further development work shall be done in the line organisation. The project has stated that costs have amounted to SEK 565.5 million up to and including September 1997. An amount of SEK 460 million has been planned for development work at the Defence Materiel Administration up to and including 2007.

The LIM project was started in 1997 in project form, but has been running as a line activity since 1993. The main purpose of LIM is to maintain the marine command system which has been in place since the 1960s and to gradually convert this system into new technology. This means that LIM has worked with small, clearly defined tasks. Hitherto the project has built a number of prototypes on site, often prior to an exercise. The project has now put prototype version 2 of LIM into operation at all marine commands. The project shall, according to existing plans, have a mass produced version in operation by the year 2000. The project has stated that its costs have amounted to SEK 74 million up to and including September 1997. Up to the year 2000 the project plans to use SEK 129 million.

# The Swedish National Audit Office

## 4: The Swedish armed forces' systems development - a study of the projects ORION, ATLE-IS, LI FV and LIM

Despite the fact that the four development projects have been running for several years none of the projects has put its products into operation according to its original time schedule. This can be partly explained by the following:

- unclear description of roles;
- changes in conditions in the projects' environments;
- lack of co-operation between the projects;
- lack of resources.

The projects' products shall function together as a part of the Swedish Armed Forces' command system by the year 2001. Since no final versions of the products are yet in operation, it is difficult to assess whether it will be possible for them to function together as an entity. The following factors can affect the possibility of the products to function together:

- unclear definition of the management system;
- organisational boundaries between branches of the armed forces;
- inadequate client competence at the Swedish Armed Forces;
- overlapping management and controls at headquarters;
- focus on a common basic system.

In the light of the problems the four projects studied have encountered, the RRV considers that the Swedish Armed Forces should reach a decision on the following three questions prior to any further development work.

- What requirements do operations make on co-ordination?
- What is the total cost in relation to the results achieved?
- Is the ambition of the Armed Forces realistic in relation to the resources and time available?

The Swedish Armed Forces have stated that they have begun a comprehensive programme to reduce costs, organise management/ controls and to guarantee the co-ordination which is necessary.

---