European Commission

ESPRIT

Information Technologies RTD Programme

Domain 1: Software Technologies

Summaries of ESSI projects
SOFTWARE BEST PRACTICE

Fourth Framework Programme
Call of March ’96
(incl. some projects from Call of March ’95)

June 1997

Directorate-General III
Industry

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Check for updates to this document on the Web

http://www.cordis.lu/esprit/src/projects.htm
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A Austria
B Belgium
D Germany
DK Denmark
E Spain
F France
GR Greece
I Italy
IRL Ireland
L Luxembourg
NL Netherlands
P Portugal
S Sweden
SF Finland
UK United Kingdom

States associated with Esprit
CH Switzerland
FL Liechtenstein
ISL Iceland
ISR Israel
N Norway

Other countries participating in projects
CA Canada
EE Estonia
HU Hungary
USA United States of America

Project numbering
21000 Series: Framework Programme IV*
23000 and 24000 Series Framework Programme IV

* Only the project summaries of direct relevance to ST and not published in the July 1996 issue "Software systems and software best practice - Ref. III/6395/96-EN".
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Introduction to ESSI
The European Systems and Software Initiative (ESSI)

Introduction

Enterprises in all developed sectors of the economy — and not just the IT sector — are increasingly dependent on quality software-based IT systems. Such systems support management, production, and service functions in diverse organisations. Furthermore, the products and services now offered by the non-IT sectors, e.g., the automotive industry or the consumer electronics industry, increasingly contain a component of sophisticated software. For example, televisions require in excess of half a Mbyte of software code to provide the wide variety of functions we have come to expect from a domestic appliance. Similarly, the planning and execution of a cutting pattern in the garment industry is accomplished under software control, as are many safety-critical functions in the control of, e.g., aeroplanes, elevators, trains, and electricity generating plants. Today, approximately 70% of all software developed in Europe is developed in the non-IT sectors of the economy. This makes software a technological topic of considerable significance. As the information age develops, software will become even more pervasive and transparent. Consequently, the ability to produce software efficiently, effectively, and with consistently high quality will become increasingly important for all industries across Europe if they are to maintain and enhance their competitiveness.

Objectives - Scope of the Initiative

The goal of the European Systems and Software Initiative (ESSI) is to promote improvements in the software development process in industry, through the take-up of well-founded and established — but insufficiently deployed — methods and technologies, so as to achieve greater efficiency, higher quality, and greater economy. In short, the adoption of Software Best Practice.

The aim of the initiative is to ensure that European software developers in both user and vendor organisations continue to have the world class skills, the associated technology, and the improved practices necessary to build the increasingly complex and varied systems demanded by the market-place. The full impact of the initiative for Europe will be achieved through a multiplier effect, with the dissemination of results across national borders and across industrial sectors.

Strategy

To achieve the above objectives, actions are supported to:

- Raise awareness of the importance of the software development process to the competitiveness of all European industry.
• Demonstrate what can be done to improve software development practices through experimentation.
• Create communities of interest in Europe working to a common goal of improving software development practices.
• Raise the skill levels of software development professionals in Europe.

Target Audience (Who can participate, Who will benefit)

Any organisation in any sector of the economy which regards generation of software to be part of its operation may benefit from the adoption of Software Best Practice. Such a user organisation is often not necessarily classified as being in the software industry, but may well be an engineering or commercial organisation in which the generation of software has emerged as a significant component of its operation. Indeed as the majority of software is produced by organisations in the non-IT sector and by small and medium sized enterprises (SMEs), it is these two groups who are likely to benefit the most from this initiative.

In addition to the user organisations participating directly in the initiative, software vendors and service providers also stand to benefit, as demand for their methodologies, tools and services is stimulated and valuable feedback is given on the strengths and weaknesses of their offerings.

Dimensions of Software Best Practice

Software Best Practice activities focus on the continuous and stepwise improvement of software development processes and practices. Software process improvement should not be seen as a goal in itself but must be clearly linked to the business goals of an organisation. Software process improvement starts with addressing the organisational issues. Experiences in the past have shown that before any investments are made in true technology upgrades (through products like tools and infrastructure computer support) some critical process issues need to be addressed and solved. They concern how software is actually developed: the methodology and methods, and, especially, the organisation of the process of development and maintenance of software.

Organisational issues are more important than methods and improving methods is, in turn, more important than introducing the techniques and tools to support them.

Finding the right organisational framework, the right process model, the right methodology, the right supporting methods and techniques and the right mix of skills for a development team is a difficult matter and a long-term goal of any process improvement activity. Nevertheless, it is a fundamental requirement for the establishment of a well defined and controlled software development process.
Software development is a people process and due consideration should be given to all the players involved. Process improvement and implementation concerns people and needs to take into account all people related aspects (human factors). These are orthogonal to the technology and methodology driven approaches and are crucial to the success of adopting best practice.

Successful management of change includes staff motivation, skilling and promotion of the positive contributions that staff can make.

The people aspects cover all the different groups which have an input to the software development process including Management, and Software Engineers.

In order to ensure an appropriate environment for the successful adherence to a total quality approach it is imperative that Senior Management are fully aware of all the issues. Their commitment and involvement are crucial to the successful implementation of the improvement process and it might be necessary to raise their awareness regarding this issue.

It is important to identify clear milestones that will enable the software developer to measure progress along the road of software improvement. Certification through schemes such as ISO 9000, while not an end in itself, can play a valuable role in marking and recognising this progress.

**European Dimension**

The objectives of Software Best Practice can be accomplished by understanding and applying the state-of-the-art in software engineering, in a wide range of industries and other sectors of the economy, taking into account moving targets and changing cultures in this rapidly evolving area. The full impact for Europe will then be achieved by a multiplier effect, with the dissemination of results across national borders and across industrial sectors.

The definition of best practice at the European level has three main advantages. Firstly, there is the matter of scale. Operating on a European-wide basis offers the possibility to harness the full range of software development experience that has been built up across the full spectrum of industry sectors in addition to offering exposure to the widest selection of specialist method and tool vendors. In the second place, it maximises the possibility to reduce duplication of effort. Finally, it offers the best possibility to reduce the present fragmentation of approaches and, at the same time, to provide a more coherent and homogeneous market for well-founded methods and tools.

Moreover, as we move towards the Information Society, we need to develop and build the technologies necessary to create the Information Infrastructure (such as is
envisaged in the Commission White Paper on 'Growth, Competitiveness and Employment'); a dynamic infrastructure of underlying technologies and services to facilitate fast and efficient access to information, according to continually changing requirements. Within this context, software is seen as a major enabling technology and the way in which we develop software is becoming a key factor for industrial competitiveness and prosperity.

All of the above factors can be enhanced through the creation and use of standards, including de-facto standards for 'best practice' and, indeed, standards are vital in the long term. However, the proposed actions should not, at this stage of evolving standards, be restricted to one particular standard. Furthermore, the actions cannot wait for a full and accepted set to be established before being able to implement improvement. Nevertheless, a close look at the ISO-SPICE initiative and active contribution to it is suggested.

Types of project

The types of project included the March 1996 call were:

- **Process Improvement Experiments (PIEs) - task 1.28**
  PIEs are aimed at demonstrating software process improvement. These will follow a generic model and will demonstrate the effectiveness of software process improvement experiments on an underlying baseline project that is tackling a real development need for the proposing organisation.

- **Dissemination actions - task 1.29.**
  The objective is to raise the awareness and promote the adoption of software best practice. Actions will range from the dissemination of information about the effectiveness of the process improvement that has been successfully demonstrated in the PIEs, to the dissemination of generally useful software engineering material. Actions will provide software producing organisations with information concerning the practical introduction of software best practice, how it can contribute to meeting business needs and how those organisations can benefit.

- **Training actions - task 1.31.**
  Establishment of training actions, broad in scope and covering training, education and skilling for all groups of people who are involved in the software development process. Of particular importance is the need to address the universal problem of raising the profile of process improvement with senior management. Senior managers need to be shown measurable benefits of process improvement activities. The aim is to raise the awareness of management so as to ensure an appropriate environment for process improvement and the successful adherence to a quality approach.

Following the revision of the ESPRIT Work programme in 1997, the remaining call for *Software Best Practice* in the Fourth Framework Programme, in June 1997, includes in addition to the PIEs two new types of project:
• **ESSI PIE Nodes (ESPINODEs) -** task 1.36
Participation of an organisation as a regional node within a European network being established by the Commission to stimulate, support and co-ordinate a set of Process Improvement Experiments (PIEs) in order to exploit synergies, share experience, etc.

• **Pro-Active Software Best Practice Networks (ESBNETs) -** task 1.37
Establishment of European networks of organisations managing locally a set of closely related software best practice activities including hands-on activities - like the performance of small scale PIEs, assessments, improvement plans, etc. - information brokerage, experience exchange networks, demo sites, executive industrial visits or other schemes particularly tailored to meet the needs of the SMEs.

The two new ESSI tasks - 1.36 ESPINODEs and 1.37 ESBNETs - aim to continue and build upon the achievements of the initiative so far, but on a more regional basis. ESPINODEs aim with first priority to provide additional support to PIEs, whilst ESBNETs aim to integrate small-scale software best practice actions of different type implemented on a regional basis - with an emphasis on the non-PIE community.

By operating on a regional level, it is expected that ESPINODEs and ESBNETs will be able to tailor their actions to the local culture, delivering the message and operating in the most appropriate way for the region. Further, it is expected that such regional actions will be able to penetrate much more into the very corners of Europe, reaching a target audience which is much broader and probably less experienced in dealing with European initiatives. Such an approach should be of particular interest to SMEs and other organisations not in the traditional IT sector, for which it is perhaps difficult to deal directly with an organisation based in a different country, due to - for example - a lack of resources, cultural and language reasons.

**Previous ESSI calls**
As a result of previous ESSI calls - for the pilot phase in 1993 and then in 1995 and 1996 - ESSI has established a considerable portfolio of nearly 350 projects. This portfolio includes five types of project:\[1\]:

\[1\] It should be noted that the 1997 edition of the ESPRIT Work Programme contains only PIEs (task 1.28) from the previous editions of the Work Programme (used for previous calls). PIEs together with
1. Stand Alone Assessments

2. Process Improvement Experiments (PIEs)

3. Dissemination Actions

4. Experience Networks and/or User Networks

5. Training Actions

Feedback from industry on ESSI has been particularly valuable and proposers may find the following summary of their key observations to be useful when preparing proposals:

• The successful uptake of software engineering products — techniques, tools, methodologies — often necessitates considerable changes in the organisational process as well as the skills of the software professionals.
• For this process-innovation to succeed it is necessary to take a realistic view of the challenge: organisations should introduce process improvements in a step-wise manner.
• A balance between the different categories and disciplines of the technology is needed in addition to improvements at all levels of the organisation.
• Furthermore, it is necessary to base all actions on the use of mature, proven and appropriate techniques and processes.
• Best Practice activities need a focused orientation towards continuous and incremental improvement of the whole development process in software producing organisations, rather than just promoting the introduction of new technologies and tools.
• Improvements in the process must be measurable, giving a basis for assessing the level of maturity/practices and for comparability.
• Process improvement should be driven by business needs, not by technology.

Perhaps one of the strongest features of the previous ESSI calls was the manner in which the benefits individual organisations obtained were multiplied across the Community. This was accomplished both by the Dissemination Actions and by the creation of communities of interest. It is intended that this aspect will be developed further in the present call, through the ESPINODEs and ESBNETs.

the two new tasks, ESPINODEs and ESBNETs, are the subject of this call - no other type of ESSI project (tasks 1.27, or 1.29 to 1.31 in previous editions of the Work Programme) is being called for.
The Software Best Practice Library

The ESSI Dissemination Actions (DAs), and in particular the project 24119 VASIE II, are establishing a Software Best Practice Library of dissemination material. VASIE provides on-line access to Software Best Practice information properly packaged according to the needs of different audiences.

The library is "virtually" centralised and supported on paper, electronic media, multimedia and hyperlink pointers. DAs and other actions are populating it with their dissemination material and a Dissemination Board ensures co-ordination and high quality standards.

For example, it includes: experiences from PIEs, world-wide information, hyperlinks to relevant sources, calendar of events, news, new material available, material produced by ESSI actions, information about ESSI, press releases, etc.

For further information, including the Final Reports from completed ESSI projects, please refer to the VASIE world-wide web server: http://www.esi.es/VASIE/.
Summaries of some projects coming from the previous ESSI phase (21xxx)
**BUSINESS MOTIVATION AND OBJECTIVES**
PASS (Pay-roll Accounting and Settlement System) is a new business project. Its business purpose is to develop a modular, platform independent, integrated networked software system satisfying functional requirements of EU standards in public accountancy and applicable for the Hungarian as well as for the international market. The system will provide direct service among Employers, Employees and Banks.

The objective of the PIE is to improve the control of the development process (QA Unit, structured system analysis, improved testing process, efficient project planning, ISO 9001 documentation). Increasing the maturity level to 3 (at least 2.5). In certain attributes level 4. Compliance with ISO 9001 requirements.

**THE EXPERIMENT**
The experiment consists in substantial improvements in:

- Organisation (quality management, project management, training)
- Methodology (quality manual, documented process, standardised testing methods, measurement)
- Technology (Object Oriented Programming Module Library, configuration and change management, graphical planning tools)

**EXPECTED IMPACT AND EXPERIENCE**
MemoLuX Ltd is steadily growing and is managing larger and larger projects. While introducing best practices the company will effectively manage a higher number of projects in the future by reusing lessons learned. MemoLuX will benefit from having better control of the software development process, from the achievement of a quantitative view of the production process, from the higher credibility among Hungarian and EU customers through improved Bootstrap maturity profile and an increased level of compliance with ISO 9001.

ISCN runs a dissemination business line including an annual conference about process improvement, a WWW process improvement newsbox, as well as training’s (a European training initiative called PICO - Process Improvement Combined
approach), and the PIE results will be broadly disseminated through these means. Further ISCN establishes a set of metrics to be used in MemoLuX allowing to conclude the experience in quantitative terms. In addition ISCN is associated partner in an ESSI dissemination action EPIC which organises a number of Internet based video workshops connecting distributed local workshops together. One topic discussed is concerning banking and the Hungarian PIE PASS will be included in these workshops.

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**Start date:** 01/06/97

**Duration:** 18 months
BUSINESS MOTIVATION AND OBJECTIVES

The SPIRE project is centred on the promotion and dissemination of various media to encourage European companies and organisations of any type to define and improve their software process towards the defined level target (Level 3 of Capability Maturity Model (CMM)). Maturity level 3 target audience encompasses the wide set of companies dissatisfied with the way they currently master their software development process, and, which, either as a result of a direct competition pressure, or because of a more voluntarily continuous improvement spirit, will be receptive to an industrially proven way to improve things.

ACTIONS

The SPIRE Consortium will first of all gather relevant information from five European companies (the « Contributors »), selected as the more suitable to illustrate the concept, and partly from other various sources. The information will be stored into the SPIRE repository. The pilot CD–ROM (Maturity Level 3 Experience Base) prepared out of it will reflect the repository content and be an invaluable information resource on Maturity Level 3. The intention in this pilot is not to cover those topics in depth at experts level, but to provide an easy path for a non specialised audience to become evangelised and acquainted on these matters. Based on various media - such as text, data, audio, graphics, pictures - SPIRE will explain what could be the benefits of reaching Maturity Level 3 from the software business point of view, how Level 3 fits with a business strategy focused on competitiveness and why organisations at level 3 could offer benchmark practices for other ones. Three activities are therefore planned:

1. gathering experience from leading European companies in Software Process Improvement
2. using the material collected to prepare various media (including a CD ROM)
3. disseminate these various media to a large audience through different channels

EXPECTED IMPACT AND EXPERIENCE

The SPIRE results consist of:

• a printed publication, entitled Maturity Level 3 — the State of the Art;
• a CD–ROM, entitled Maturity Level 3 Experience Base
• a set of slides and notes (for tutorials and workshops), entitled Level 3 Presenter’s Pack.
• a set of WWW pages (based on the CD–ROM, plus a discussion group), entitled InterSPIRE;
Future exploitation: The SPIRE Web will be periodically updated. The CD ROM will be a periodic snapshot of the Web content, less frequently updated, but richer in terms of content. The SPIRE Web will behave as an advert for the CD ROM.

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FIRST INFORMATICS S.A.
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**Start date:** 01/09/96

**Duration:** 18 months
Esprit Project 21477 - EUROFAST
EUROPEAN FACILITY FOR ACCESSING SOFTWARE BEST PRACTICE
CASE STUDIES AND TOOLS

Key Words: On-line demonstration, hands-on evaluation, expert information service
Technologies/Methodologies/Tools: CASE Tools, structured analysis, object-oriented systems, GUI

BUSINESS MOTIVATION AND OBJECTIVES
The European Facility for Accessing Software best practice Case Studies and Tools (EUROFAST) project is a dissemination action in the framework of the European System and Software Initiative (ESSI). Its purpose is to establish a Forum for Assistance to European organisations, and especially to SMEs, who are wanting to use CASE tools and Software Best Practices to help their Software development needs.

ACTIONS
EUROFAST will support the provision of user orientated, vendor independent information on software best practice methods and technologies. This information will be sourced from real-life project covering the domains of Structured Analyses, Object Orientated Systems and GUI Design.

EUROFAST will provide the following services:
• On-line Demonstration Server
• Hands-on Evaluation Centre
• Expert Information Service

The Euro-ISDN base On-line Demonstration Server will provide on-line access to demonstrations of:
• software engineering implementation covering the complete project life-cycle
• best practice methods and tools
• real-life case studies

The Hands-on-Evaluation Centre will provide facilities for:
• in-depth software best practice and CASE tool evaluation
• access to CASE tool experts
• CASE Tool User days

This centre will be based in Braunschweig, Germany. In order to facilitate access to the centre National Contact Points will be established throughout Europe. These contact points will enable users to contact native speaking organisations who will have direct access to the material and results generated from work being performed in Braunschweig. The national contact points will formulate and run CASE user
days on regional basis. The project will support four such user days which will act as pilots for further events.

The Expert Information Service will be used to support the Hands-on-Evaluation Centre and On-line Demonstration Server Services. It will provide:

- case studies, examples, information on tools which will be located on the World Wide Web and supported by an Euro-ISDN based mailbox
- access to a panel of software process improvement (SPI) experts
- access to User and Supplier organisations

Access to the panel of SPI experts and Tool user Supplier organisations will be achieved through moderated on-line conferences and user groups.

EUROFAST will be run by a Consortium consisting of the CASE Service Centre (CSC) of the German Aerospace Research Establishment (DLR) and MARI (Northern Ireland) Ltd. DLR will be the Prime Contractor and will be responsible for developing the project infrastructure and services and for the provision case study information. MARI will be responsible for co-ordinating the expert panel and provide case study review and mentoring services to the project. In addition MARI will be responsible for project liaison activities with other initiatives and for project awareness actions. The Consortium will be supported by the project team Haug GmbH who, acting in a subcontractor capacity, will provide project management and dissemination activity support.

**EXPECTED IMPACT**

The project aims to stimulate information exchange within the European User Community and provide useful feedback to the vendor and supplier organisations. The target audience are primary those organisations who do not have the necessary knowledge, funding or time to evaluate the most suitable methods and tools to meet their needs.

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**Participant:** MARI  
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**Start date:** 07/11/96  
**Duration:** 18 months

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**Start date:** 07/11/96  
**Duration:** 18 months
BUSINESS MOTIVATION AND OBJECTIVES
Software process improvements have not achieved the desired improvements in product quality. This project raises awareness of quality issues in software products, and work in product evaluation leading to improving the quality of products.

ACTIONS
The subject matter of the project includes issues relating to software as a corporate asset, software product quality characteristics and their application in practice, existing standards and current work on standardisation relating to software product quality and evaluation of software, approaches to the evaluation of software including focusing on the critical quality characteristics in different categories of software and how they should be addressed, the process improvements recommended to achieve greater product quality, the results of evaluation work in Europe and the types of benefits being achieved, the techniques and tools available and how they are applied in the evaluation of the different quality characteristics of software products.

The target audience is all software development organisations, both IT and non-IT, but especially SMEs who are less informed on international developments on software product quality issues such as standardisation work, and evaluation and certification work. It also includes acquirers of software and key users of software. Some variations in emphasis exists from one country to another in terms of the type of organisation, the industry sector, the nature of the persons, and the type of products addressed.

The key mechanisms for dissemination are a web information service, an e-mail discussion list, workshops in many countries in Europe, a European conference in Dublin on 15-16 September 1997, a quarterly newsletter, and an enquiry response service available through the internet services. For details of the conference, electronic services, regional workshops, newsletter, contact the Centre for Software Engineering (Ireland). Associate partners include Delta (Denmark), Etnoteam.
(Italy), ICT (Spain), Kema (Netherlands), SMC (France), QualityLab Consortium (Italy).

**EXPECTED IMPACT AND EXPERIENCE**

The awareness of these issues will increase significantly in Europe. A number of changes in practices in software development will occur bringing about improvements in product quality. Product evaluation will be introduced more widely as part of the software development process. Third party evaluation will increase and certification schemes will emerge. This in time will be reflected in more effective standards for software product quality.

Each of the partners will offer an increasingly effective and comprehensive service to organisations to assist in achieving product quality improvements. Many will carry out evaluation with a view to certification of products.

The level of awareness of software product quality issues is perceived as very low. The quality of many products is unsatisfactory. More widespread use of information systems implies a significant improvement in usability. The software product quality model set out in ISO/IEC 9126 standard and under major improvement is rarely referred to by software developers, testers, and acquirers. Few products certification schemes exist and very few products are certified to an industry or national or international standard.

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KEMA  
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F  
QLC  
I

**Start date:** 01/09/96  
**Duration:** 18 months
Summaries of projects coming from the current ESSI phase
(23xxx & 24000)
Process Improvement Experiments (PIEs)
BUSINESS MOTIVATION AND OBJECTIVES

INASCO’s main business concern is to provide reliable products, as well as to improve its market competitiveness. To the satisfaction of this common business concern, the objective of the MIFOS experiment is to establish at INASCO a systematic framework for software quality measurements, which will be associated to specific business and technical goals.

THE EXPERIMENT

The MIFOS experiment will introduce the Goal-Question-Metric (GQM) approach to INASCO’s RTD department, focusing on a typical project as a baseline. The initial step of this PIE involves the setting-up and integration of the experiment with the baseline project, as well as the necessary personnel training. Subsequently, the main steps of the GQM approach will be followed and implemented in the context of the baseline project. The four main phases of the experiment are software development process analysis and primary goals definition, primary goals analysis, measurements plan implementation and, exploitation of measurements. The baseline projects involves development of engineering software for materials applications.

Through the MIFOS experiment, a systematic measurements based improvements framework will be established at INASCO’s RTD department leading to improved software products quality and consequently, to increased competitiveness for INASCO. The MIFOS experiment will take place at INASCO’s Research Technology and Development department which employs 7 highly qualified software engineers.

EXPECTED IMPACT AND EXPERIENCE

The main technical benefits expected out of MIFOS include: identification of process improvements, better control of projects and, improved quality in software products. Commercial benefits include reduction of software development costs, reduction of the lead-time for software products and increased product reliability during customer use. Through this PIE, INASCO will gain experience in establishing a measurements based improvements framework.
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Start date: 01/03/97

Duration: 18 months
BUSINESS MOTIVATION AND OBJECTIVES
The purpose of this PIE is to experiment a Software Change Management (SCM) process for managing new releases and many tailored versions of our software products for plant automation. These products typically are made up of a set of standard procedures which are tailored to the customer's production process. In this framework, this PIE aims at experimenting a SCM process which will a) allow visibility of product status and the tracing of its modifications; b) guarantee the alignment between the customer's version and the one on our file. Integration of the SCM process within our Quality Management System (QMS) will be ensured. The relevance of this experiment to the business of the participant relies on the need to:

• maintain flexibility in the software maintenance though being able to guarantee quality and product reliability to safeguard both the operator's safety and the production level;
• achieve a greater efficiency in the maintenance process to reduce costs and release valuable resources for new projects;
• reduce the risks associated to unchecked changes to the product directly implemented on the plant by our customers’ personnel.

THE EXPERIMENT
The achievement of the project’s objectives implies the realisation of the following activities:

• the analysis of the current practice and the set up of a remote monitoring environment; the definition of an improved SCM process;
• the creation of a common understanding of the SCM issues by providing training in the use of the tools;
• the experimentation of the new process on a baseline project and on another product with the same problems in order to make a comparison.

EXPECTED IMPACT AND EXPERIENCE
The likely impact of the experiment will be:

• to minimise the risk connected with the customer's direct interventions and to reduce the number of free-of-charge interventions to repair the effects of modifications for which it is difficult to ascertain the author;
• to obtain a greater product quality: the controlled management of the modifications in fact allows to pay closer attention to the quality of the interventions and to carefully screen the custom-made modifications to be transferred into the standard product;
• to increase the maintenance efficiency and allow for a greater interchangeability of maintenance personnel working on installations;
• to improve the work conditions for the programmers formerly operating on the plant, thanks to the possibility of using an automated environment to remotely work on the installed product.

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**Start date:** 01/03/97 **Duration:** 18 months
Esprit Project 23670 - CUSTOMIZE
EFFICIENT DEVELOPMENT AND MAINTENANCE OF SIMILAR, BUT NOT IDENTICAL CUSTOMISED SOFTWARE PRODUCTS

<table>
<thead>
<tr>
<th>Business Sector:</th>
<th>Manufacturing of production system Industry</th>
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<tbody>
<tr>
<td>Application Area:</td>
<td>Robot off-line programming</td>
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<td>Key Words:</td>
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<tr>
<td>Technologies/Methodologies/Tools</td>
<td>Re-usability of source code, change and configuration management</td>
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BUSINESS MOTIVATION AND OBJECTIVES
TTS delivers turnkey robot production systems with customised software for the shipbuilding industry. The customised software products are very similar, e.g. they have approximately 90% common source code, but not identical. The customised software accounts for approx. 25% of the total source code of a typical TTS contract, while the life cycle costs related to customised software accounts for in the area of 50%. The project objective is to reduce the life-cycle cost of products in a series of similar, but not identical customised software. The life-cycle cost will be reduced by putting more effort into the development of the base software. Re-usability of source code, documentation and maintenance are the main items which will be addressed. The primary goal is to reduce the life-cycle costs of customised software with 30% over a product series of four similar, but not identical products. The problem TTS faces with a large number of similar, but not identical customised software products is very common in the SME segment of the automation and production system industry.

THE EXPERIMENT
The scope of the project is to create a framework, that is tools, techniques and training for handling series of similar, but not identical software products. The experiment will be carried out in three phases. Firstly, the tools and techniques for implementing such a framework are acquired and implemented at TTS. The second phase is the actual implementation of the experiment. Revision training and dissemination are carried out in the last phase. The baseline project will be the development of the new TTS PC based CAD-robot interface software starting in 1997. TTS’ software developing unit consists of 9 people.

EXPECTED IMPACT AND EXPERIENCE
It is a goal for TTS that the quality of the customised software shall approach the level of standard software. Further on, the resources involved with supporting and maintaining this type of software shall coincide with the size and complexity of the source code. Notice, the most important deliverable from this experiment is the organisation consisting of trained personnel and the knowledge of how to implement the techniques derived in this project.
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| **Start date:** | 01/03/97  
| | **Duration:** 11 months
**Esprit Project 23671 - CITRATE**

**COMPETITIVENESS INCREASE THROUGH AUTOMATED TESTING**

<table>
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<th>Business Sector:</th>
<th>Software industry</th>
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<td>Application Area:</td>
<td>Health care information systems</td>
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<tr>
<td>Key Words:</td>
<td>Automated testing, software production process</td>
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<tr>
<td>Technologies/Methodologies/Tools</td>
<td>Automated testing methods and tools</td>
</tr>
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</table>

**BUSINESS MOTIVATION AND OBJECTIVES**

Software products require constant improvements, due to a rapid change of needs by the users. Successive releases of the products are delivered to the clients, requiring a great amount of time and effort for testing. The costs associated with this activity move forward the break even point of each individual product.

This is a common business concern and the main driver of this experiment, whose objective is to reduce total production effort, to reduce errors and to reduce maintenance resources.

**THE EXPERIMENT**

The CITRATE PIE will introduce methods and tools for automated testing, in the software development process of NOVABASE, in a stepwise and continuous way. The total duration of the experiment will be 18 months, starting in March, 1997.

The baseline project associated with the CITRATE PIE will be the development and upgrade of the CSI software product line, in the areas of materials management and act management, which constitutes an integrated offer for health care providers.

The testing effort, the number of errors and the maintenance costs will be compared along the experiment, against current metrics of the company.

NOVABASE employs 80 people, 10 of them involved in the baseline project.

**EXPECTED IMPACT AND EXPERIENCE**

Achieving the above objectives represents direct cost savings and an increase on the quality of the products. Higher margins will be obtained and increased competitiveness will be acquired.

NOVABASE expects the following impact:

- To limit the effort needed to test a software product to 10% of the global effort in software production.
- To reduce by 50% the total number of errors found after product release, leading to a higher quality level and a considerable reduction of risk in the implementation phase.
- To reduce by 50% the effort needed for client support, transferring the available resources to other productive areas.
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Start date: 01/03/97

Duration: 18 months
BUSINESS MOTIVATION AND OBJECTIVES
The potential of maintenance cost savings, release time reduction, better reuse of software artefacts, enhanced development productivity has motivated Infosys in proposing SCOUT experiment.

Through the experiment, the proposer intends to verify how software configuration management best practices can help in pursuing company objectives such as: software maintenance costs reduction, better control of the software development process, establishment of a measurement system, help in reusing software artefacts, diffusion throughout the company of a formalised way of working.

THE EXPERIMENT
The experiment named SCOUT intends to define a Configuration Management process suitable to the proposer's software development organisation. Then, by means of a selected CM tool, the process will be applied and experimented into a baseline project aimed to reengineer an off-the-shelf software package supporting civil engineers in CAD drawing and computations. The introduction of a measurement system will help in obtaining feedback on the achieved improvements as well as will establish a company metrics database.

EXPECTED IMPACT AND EXPERIENCE
Final product assembly and delivery will occur faster, thus allowing proposer software development organisation to lessen the gap between change request (bugs or new functionalities) and its implementation. Software maintenance will also be improved since a formalised control of each artefact (code, test case, design specification etc.) concurring to final product.

The major internal impact resulting by this PIE is expected to be the set-up of the Configuration Management process, supported by a suitable Configuration Management Environment, where the defined procedures, standards and templates have been experimented and validated during the PIE, and so, can be adopted in all the other company software development projects.
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Start date: 01/03/97

Duration: 15 months
Esprit Project 23683 - TESTART

IMPROVEMENT OF SOFTWARE TESTING PHASE, ESPECIALLY WITH RESPECT TO REQUIREMENTS MANAGEMENT AND CHANGE CONTROL

<table>
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<th>Business Sector:</th>
<th>Aerospace and Electronics</th>
</tr>
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<tbody>
<tr>
<td>Application Area:</td>
<td>Avionics systems</td>
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<tr>
<td>Key Words:</td>
<td>Software testing,, test coverage, requirements management, change control, traceability.</td>
</tr>
<tr>
<td>Technologies / Methodologies / Tools:</td>
<td>Requirements management, software coverage and traceability.</td>
</tr>
</tbody>
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BUSINESS MOTIVATION AND OBJECTIVES
Israel Aircraft Industries (IAI) develops, manufactures and maintains embedded systems for the aerospace and large electronics systems market. Software is an essential part of all IAI’s advanced products. We are interested to enhance the efficiency and effectiveness of the software testing phase, a major quality factor and cost driver in complex mission critical systems, especially with respect to automation of requirements coverage and change control.

The objective of this experiment is to reduce the time and effort required for testing activities without reducing product quality, thus reducing the cost of development to improve our competitiveness and shortening time to market while improving customer satisfaction.

THE EXPERIMENT
The aim of the proposed Process Improvement Experiment (PIE) is to improve the software testing phase at the component and at the integration level. The experiment especially focuses on the relation between testing and requirements coverage which is central to achieving satisfaction of our customers needs. This experiment will refer to following aspects of the development process:
1. Software testing during various software testing phases to obtain satisfactory coverage within project time and budget constrains using the Logiscope tool (or similar).
2. Management of system requirements allocated to software using RTM tool (or similar).
3. Management of requirements changes using a data base application developed at IAI (RCR). This will be used to control requirements changes : description of desired change, cost estimation of the change, impact and risk assessment of the change and recording of resolution. The output of this change control process will drive the changes to the base line requirements data base in RTM.

The baseline project is an advanced avionics system enhancement including hardware modifications as well as extensive software development of its main five components. The development effort is presently estimated at over 20 man years. This baseline project is typical for IAI and reflects the commercial market trend of our products which demands high quality, increasingly complex functionality and short development time.

EXPECTED IMPACT AND EXPERIENCE:
IAI expects to increase test coverage of requirements, increase the percentage of code exercised in testing and reduce integration testing cycle time. Consequently we expect to reduce software development costs while increasing product quality, especially in mission critical systems.

In the PIE we want to demonstrate the following Measurable Objectives:

a. Increase test coverage of requirements by 15%;
b. Reduce integration testing cycle time by 5%
c. Reduce software testing costs by 10%;
d. Increase percentage of code exercised in testing by 15%.

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Start date: 01/04/97
Duration: 18 months
Esprit Project 23690 - MAGICIAN
MAGIC DEVELOPMENT PROCESS IMPROVEMENT

<table>
<thead>
<tr>
<th>Business Sector:</th>
<th>Software Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application Area:</td>
<td>Application Generator Software Tools</td>
</tr>
<tr>
<td>Key Words:</td>
<td>Product Quality, Test Automation, Test Effectiveness</td>
</tr>
<tr>
<td>Technologies / Methodologies / Tools:</td>
<td>Automated test Tools</td>
</tr>
</tbody>
</table>

BUSINESS MOTIVATION AND OBJECTIVES
This project is designed to improve the software testing methodology of Magic Software Enterprises Ltd. It is part of an overall process to raise the level of development technology from level one on the SEI CMM scale to level two. Magic’s business is related to the provision of application development tools supported on a very wide range of platforms, OS and networks and interfacing to many different Data Base Systems. The principal product of the company is the Magic applications development tool which is an interactive, GUI form based system that is sold world wide to a broad range of customers. The effectiveness of the software testing activity is to ensure forward compatibility without regression. The objectives are to increase test coverage by 25%, to improve stability by 25%, to reduce QA (Quality Assurance) cycle time by 15% and improve reliability by 20%. In order to reduce the cost associated with the production and maintenance of each new system version and variant, we need to improve the efficiency and effectiveness of our software process by the use of automated and comprehensive test environment. The results of an external review of our processes has recommended the adoption of an integrated test management system as an essential step in achieving our quality goals.

THE EXPERIMENT
This 12 month PIE will enable us to complete the final selection of a suitable test tool set, its integration into the environment and its trial use of in a typical development project. The baseline project is planned to be part of a release of MAGIC Version 8 that will include expanded capability in handling of Web connectivity. In the PIE, the DB Gateway part of the product will be re-tested using new automatic procedures and compared to the current manual method. In addition to the work to be done by Magic Software Enterprises itself, KPA Ltd, an Israeli consultancy specialising in Software Process Improvement will be used to assist, particularly in reengineering of part of the test process. Consultants will also be used from the chosen tool supplier to integrate the test tools into the experimental environment.

EXPECTED IMPACT AND EXPERIENCE
The results will be broadly disseminated both within the company, within our industrial association and within the broader European IT users community via a series of presentations and events. If it is shown that the use of automatic testing has a positive impact, then they will be adopted into the company standard development environment for future product releases. Improvement in the customer perceived quality of delivered product; reduction in the manpower required in the testing...
phase for new product variants such as re-hosting onto different platforms and better assurance in the validity of different variant combinations, will allow a reduction in the uncertainty factor in delivery commitments. It will also lead to a reduction in the effort required for maintenance and ongoing support; the ability to plan future versions with greater confidence and will result in ongoing management commitment to further process improvement steps.

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http://www.magic-w.com

**Start date:** 01/03/97  
**Duration:** 12 months
Esprit Project 23696 - DSP- ACTION
IMPROVING DSP SOFTWARE DOCUMENTATION PROCESS TO
PROMOTE REUSE

<table>
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<tr>
<th>Business Sector:</th>
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</thead>
<tbody>
<tr>
<td>Application Area:</td>
<td>Digital Signal Processing</td>
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<tr>
<td>Key Words:</td>
<td>Software documentation process, revision, systematic reuse</td>
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<td>Technologies / Methodologies / Tools:</td>
<td>Experience Factory, Goal/Question/Metrics, PCMS</td>
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BUSINESS MOTIVATION AND OBJECTIVES
The role of digital signal processing (DSP) is increasingly important in modern electronic devices. As the amount of software constantly increases, and the product development times shorten, there are needs for software process improvement. Since the product development is often evolutionary, the best way to improve is to learn from the experience and re-use it at many levels. The objective of this experiment is to improve DSP software documentation to increase reuse of design documents, and decrease effort required to make and review documents by 50%.

THE EXPERIMENT
To achieve the objective, the approaches of Experience Factory and GQM are used. The experiment consists of following activities:

a) Selection and adaptation of new documentation tools for DSP algorithm and software development, compatible with version and configuration management system PCMS
b) Definition and implementation of GQM metrics for DSP documentation process follow-up
c) Training DSP designers on the improved documentation methods
d) Piloting the new methods and collect feedback by GQM metrics, and qualitative assessment.

The baseline application is DSP software development for a mobile telephone product.
Nokia Mobile Phones R&D-Oulu employs about 420 people, 30 of them are involved in this PIE.

EXPECTED IMPACT AND EXPERIENCE
NMP expects to decrease field failure rates and total costs, increase productivity, and have more satisfied customers. Technically NMP expects to ease the introduction of new features, have better quality of re-used source code along with increased reusability of design documents.
Upon successful completion of the PIE the results will be replicated in other NMP sites and lessons learnt disseminated for wider community.
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Start date: 01/03/97  

Duration: 18 months
Esprit Project 23697 - CREDIT
CLIENT REQUIREMENTS DEFINITION IMPROVEMENT

<table>
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<th>Business Sector:</th>
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<tbody>
<tr>
<td>Application Area:</td>
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<tr>
<td>Key Words:</td>
<td>Requirements Analysis, Definition, Traceability</td>
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<tr>
<td>Technologies / Methodologies / Tools:</td>
<td>Document Control, Analyst Workbench, Data Modelling</td>
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BUSINESS MOTIVATION AND OBJECTIVES
To effectively meet the increase in demand for our products and services TrendSoft has recognised the need to put in place the necessary underlying structures and processes. TrendSoft is currently implementing a Quality Management System and has identified the critical area of accurate Client functional requirements definition as being a fundamental aspect of our on-going Client management and thus future success. TrendSoft recognises that improvements in this area will yield a positive benefits down-the-line throughout the remainder of the development process. This is a common concern to the software industry where the primary business objective is to meet the customers requirements in terms of product as required, within the agreed costs and timeframe.

THE EXPERIMENT
The achievement of the above requires both the building of a ‘Stakeholder Partnership’ between ourselves, as supplier, and the Client, and, through this partnership and supported by methods and tools, an improvement of the company's ability to gather, specify and manage Client functional requirements. An appropriate method will be tailored to suit our needs. The tools would include:
(a) Analyst Workbench e.g. System Architect. Used to manage and control the clients information.
(b) Data Modelling e.g. ERwin. Used to model data relationships and elements.
(c) Document Management. Used to manage document versions. MS Word may suffice.
Vision Express are a major chain of Optical Product retailers. TrendSoft is continuing to develop the product in line with their needs and will use the 5th Phase of this project as the baseline application.
TrendSoft employs 20 people, 13 of whom are involved in software development.

EXPECTED IMPACT AND EXPERIENCE
The experiment is expected to yield higher productivity, shorter development timescales, and reduced levels of change requests and problems. It is also expected to lead to improvements in the company’s testing capability, to an enhanced product quality, to increased client satisfaction and to a strengthening of the company’s client retention capability. It will also raise the skill and motivation levels of our staff and, in tandem with our quality programme will enhance the quality culture of the organisation.
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email: trend@indigo.ie

**Start date:** 01/03/97

**Duration:** 14 months
Esprit Project 23699 - DECO
AN EXPERIMENT ON DECODING, MONITORING, CONTROLLING AND ENGINEERING A SOFTWARE PROJECT

| Business Sector:                | Software industry |
| Application Area:              | Management Information Systems |
| Key Words:                     | Process Modelling, Business Process Reengineering (BPR), Technologies / Methodologies / Tools: Use Cases, Activity Based Costing, System Architect BPR |

BUSINESS MOTIVATION AND OBJECTIVES
The Engineering Group is one the Italy’s leading privately owned software companies, specialising above all in major technological integration projects. The Group’s parent-company, Engineering Ingegneria Informatica (or, briefly, Engineering), was the first company in the Group, created in 1980. An important characteristics of the Group’s various operational units scattered throughout Italy is their great operational independence and strong roots in the various geographical and sectorial realities.

One main business objective of Engineering is to strengthen and widen its distributed structure.

The experiment is of great relevance for aligning the objective with the need for an effective and efficient central co-ordination, support and control. The revision of some crucial processes involving both local and central organisational entities will contribute to 1) reduce cycle times and work overheads; 2) enhance co-operation and sharing of experiences and know-how among distributed units.

Technical objectives to be achieved include:
• Better understanding of the activities performed in the software development process, both in terms of structures and costs.
• Higher ability to improve and reengineer company’s development process.
• Acquisition of higher reliability in the estimate of time and resources required by each process.
• Better resource allocation and management.
• Development of a corporate knowledge on BPR.

THE EXPERIMENT
The project’s goal of improving company’s software development process will be addressed by means of the adoption and experimentation of a method to:
• Describe the process
• Monitor and control its evolution
• Engineer, improve and reengineer it.

To describe the process and engineer it, the method conceived by Ivar Jacobson, based on an object oriented approach, and described in his book “The object advantage: Business Process Reengineering with Object Technology” will be adopted. To monitor and control a process evolution, an activity based costing approach will be adopted, and specifically the one designed by Innes and Mitchell.
The use of a tool - SA/BPR Professional by Popkin Software & Systems, Inc. - is envisaged to support modelling and analysis. The experiment will use as baseline a project devoted to the development of significant parts of the information system of a large Italian municipality. The project foresees both the customisation of company’s packages and the development from scratch with the joint involvement of local Production Site and central Package Department. It is a good sample of the kind of projects the company is normally involved in.

**EXPECTED IMPACT AND EXPERIENCE**

- Better development process: clear and neat description of the process, reliable data on resources consumption by the process
- Better management of company’s distributed structure: the overhead due to distribution is expected to reduce to 35% on the average (currently, 40-55%)
- More reliable estimates of development time and costs: The experiment applied to the baseline project is expected to make error on effort estimates go down to 15 - 20%
- More effective structure of the distributed activities: reengineering of non-ideal activities
- Reduction of cycle time and of work overhead: the actual delay in time to deliver of 10% is expected to be lowered to 7% in the PIE
- Information sharing
- Greater integration of the production process with the business and technical management and control and with the firm’s quality system.

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**Start date:** 01/05/97  
**Duration:** 18 months
Esprit Project 23705 - PREV-DEV

ESTABLISH DEFECT PREVENTION MECHANISMS AND TEST SAMPLING STRATEGY TO ACHIEVE HIGH QUALITY IN REDUCED CYCLE TIME

<table>
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<th>Business Sector:</th>
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<tbody>
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<td>Application Area:</td>
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<td>Key Words:</td>
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<td>quality, cost of slippage</td>
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<tr>
<td>Methodologies /</td>
<td></td>
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<tr>
<td>Tools:</td>
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</tbody>
</table>

BUSINESS MOTIVATION AND OBJECTIVES
Motorola Communications Israel Ltd. is an industrial company developing and manufacturing radio equipment and radio related products. MCIL is at the stage where products with embedded software are released to market with ever-growing quality. However, with new complex systems, the overheads required to achieve high quality are becoming substantial and development time is lengthening.

Correcting errors in later stages of the development is much more complicated and much more expensive and time consuming than correcting the same errors in earlier stages. It is intuitively understood that the avoidance of errors is the best way to optimise the development process and shorten the development time.

THE EXPERIMENT
The experiment will investigate patterns of errors that commonly occur in the development process and will define and implement techniques to prevent these errors from occurring. Success in this area will reduce the amount of re-work caused by errors and shorten the development time.

The PIE will define and implement defect prevention methods for each of the phases of the development life cycle and will conclude a strategy for determining the amount of testing needed in a defect prevention environment.

EXPECTED IMPACT AND EXPERIENCE
The experiment will yield a better knowledge of common error types and establish mechanisms to update this knowledge. The results of the experiment may be relevant to a wide range of companies developing telecommunications and real time software. The experience and mechanisms implemented in the experiment can benefit these companies and expedite their defect prevention programs activities.

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Start date:
01/04/1997

Duration: 18 months
Esprit Project 23724 - ESTREMA  
ESTIMATION IMPROVEMENT BASED ON IMPROVED REQUIREMENTS MANAGEMENT

| Business Sector: | Information Systems for the manufacturing and distribution sectors |
| Application Area: | administrative and financial systems |
| Key words: | estimation, requirements, change control |
| Technologies/Methodologies/Tools: | Client-Server/requirements management and cost estimation/ CASE for BPR |

**BUSINESS MOTIVATION AND OBJECTIVES**
Gruppo PRO’s core business is information systems automation in medium and large industrial companies. We customise and install products developed by ourselves and we provide assistance to the start up of the automated systems. Our process suffers from the low accuracy of the initial estimate of the customisation task. Due to the incompleteness of the initial requirements and to unmanaged changes a considerable percentage of unanticipated work creeps in during the very last project stages. Our goal is to increase the reliability of our cost and schedule estimates and to reduce the percentage of unanticipated work by improving our requirements management capabilities, including control over the requirements changes.

**THE EXPERIMENT**
The main actions in ESTREMA will focus on the following tasks:

- experimenting a methodical approach to the identification and representation of the user requirements. This method will involve the delivery of a feasibility study document serving as a basis for the initial cost and schedule estimate
- defining and experimenting a change control procedure to manage requirements modifications and their impact on the initial estimates
- experimenting with a project performance assessment practice to establish requirements fulfilment and estimation accuracy; to this aim the collection of project performance data should allow the creation of a historical baseline to be used for improving successive estimates.

In ESTREMA the experimentation will be carried out on a baseline project which consists of the adaptation and installation of our management information systems package PROJ in two companies belonging to sectors which are strategic for our business, and where the requirements are so different that our requirements and estimation process could be affected.

**EXPECTED IMPACT AND EXPERIENCE**
We expect that we will achieve a smaller deviation from the costs and schedule anticipated initially. Also, a higher estimation accuracy should allow a better planning of our resources and avoid that delays in one project preclude the release of precious resources. Finally, thanks to the definition of company standards and
procedures more people will be in a position to estimate projects reliably, whereas this responsibility is nowadays vested on few people with great experience.

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**Start date:** 01/03/97

**Duration:** 18 months
Esprit Project 23729 - IREASS
INTEGRATED REQUIREMENTS ENGINEERING APPROACH FOR ELECTRONIC SYSTEMS AND SOFTWARE

Key Words: Aerospace Industry
Type of Training Action: Helicopter Fly-by-wire Control System
Mechanisms: Requirements Engineering, Integrated Tool Support, Specification Validation
Target audience: Dynamic System Simulation, Rapid Prototyping

BUSINESS MOTIVATION AND OBJECTIVES
Liebherr as an international operating company for aircraft equipment has an essential need to cope with exploding system/software life-cycle costs for safety critical systems. The reduction of this costs, while keeping the quality factors high and in no case degrade safety margins, is regarded as an exercise to be done pretty well, if the company aims to stay in the business of development and production of enhanced aircraft equipment. The key features of aircraft equipment, safety criticality and the dedication to unique aircrafts (no standard systems) do not allow common industrial compromises like minimum effort or workshare transfer into low-wage countries. The only way out of this situation is the definition of a most effective development life cycle, anticipating the technical goal of a fast and error free development process, to deliver quality systems in short time by recognising the commercial need of low costs and short time to market.

THE EXPERIMENT
The experiments main focus is the definition and introduction of dynamic system modelling methods and techniques with integrated tool support. The selection of the appropriate method and tools will mark the starting point of the experiment, followed by an intensive training suite for the systems and software engineers. The requirements engineering process will be accompanied by coaching activities from an organisation with the appropriate knowledge in requirements engineering methods and techniques. The experiment will be finished when having evaluated the results by comparing the experiment overlaid sub-projects with the reference project. The primary objective is to use the dynamic system modelling technique for the behaviour system model and directly link mathematical performance simulation models for early specification validation and rapid prototyping. The ACT/FHS Helicopter Flight Control System project is selected as the underlying baseline project. The project target is to develop a centralised computer COS, collecting control commands from Sensors (pilot stick) and the flight control/management computer for a digital flight control system of the EC-135 Helicopter. These commands are to be correlated and processed for transfer to the actuator control electronic ACE, via fibre distributed special buses. The requirements for the COS shall be developed in conjunction with the process improvement experiment, while the ACE will serve as a reference project, with a conventional requirements engineering approach. About 100 employees are dedicated to electronics development and production, 15 of them are in charge with software. For the ACT/FHS project it is planned to select 11 electronic engineers, 3
for system/project management purposes, 4 hardware designers and a 4 member team for the software development.

**EXPECTED IMPACT AND EXPERIENCE**

It is expected that the implementation of the integrated requirements engineering approach with systematic method and tool support have a positive impact in significantly reduced software design and coding effort due to sophisticated specification data and faster availability of software due to fewer life cycle iterations. Both effects tend to lower costs and increase the companies maturity and reputation for delivery of high products.

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**Start date:** 01/03/97  
**Duration:** 18 months
BUSINESS MOTIVATION AND OBJECTIVES
The objective of this project is to investigate the balance between the use of review and testing to provide cost-effective error removal from real-time software.

The results of the project are expected to define which review and test methods are the most effective in reducing errors and increasing the quality of delivered software.

Software forms a significant part of the delivered systems of both participants and it is expected that this project will have an impact on reducing costs, errors and schedule in major software and systems projects.

THE EXPERIMENT
The experiment will involve the use of additional metrics, more automated review techniques and more automated testing techniques. During the experiment some of the ‘raw’ (i.e. before review and test) source code from the Baseline Project will be subjected to:

• Improved reviewing techniques using Ada Analyser from the Rational Apex environment for automated tool support.
• More rigorous unit test process, using Rational’s TestMate for automated tool support.
• A combination of improved reviewing techniques and more rigorous testing.

EXPECTED IMPACT AND EXPERIENCE
The results of the project are expected to define which review and test methods are the most effective in reducing errors and increasing the quality of delivered software.

Software forms a significant part of the delivered systems of both participants and it is expected that this project will have an impact on reducing costs, errors and schedule in major software and systems projects.
| Contractor: | GEC-MARCONI RADAR AND DEFENCE SYSTEMS, Radar Division  
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Mr Jim Hollom |
| --- | --- |
| Participant: | GEC-MARCONI RESEARCH CENTRE  
UK |
| Start date: | 01/03/97 |
| Duration: | 18 months |
Esprit Project 23743 - PCFM
PROOF BY CONSTRUCT USING FORMAL METHODS

<table>
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<tr>
<th>Business Sector:</th>
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<tbody>
<tr>
<td>Application Area:</td>
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<td>Key Words:</td>
<td>Reduced V&amp;V (Verification &amp; Validation) Effort, Reduced Code Corrections</td>
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<td>Technologies / Methodologies / Tools:</td>
<td>Formal Methods/ Lambda</td>
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BUSINESS MOTIVATION AND OBJECTIVES
Commercial negotiations in the Aerospace business are changing towards including system development costs within the system production price. To remain competitive we must therefore reduce our development costs for the same, if not better, quality.

V&V accounts for typically 41% of our total software production costs and code corrections for typically 32% of our total maintenance costs. Aiming to reduce these costs by 10% will represent an achievable and worthwhile contribution towards this business goal.

These types of cost are common to all software producers, although their severity will depend upon the level of quality and certification required. This experiment will provide a practical illustration for a real time, safety critical control system that can be interpreted by other applications for their particular needs. No special skills will be required for this, only an understanding of the application.

THE EXPERIMENT
The technical objectives of the experiment are to integrate design and V&V by formalising the definitions and terms used in the design and to enforce the necessary constructs/constraints to ensure that these formal definitions and terms will always be correct in the code.

The experiment starts by producing formal definitions for commonly used definitions and terms within our projects. These are then used to specify and prove part of the baseline design in parallel with the baseline project design and V&V. The results from both can then be directly compared and the benefits quantified.

The experiment is resourced from the project teams to ensure that the process is practical and acceptable to the ultimate users.

The baseline project will be a real time, safety critical control system for an aerospace application.

Lucas Aerospace, York Road, design, develop and manufacture real time, safety critical control systems. The site employs 880 people of which 130 are involved with engineering software.

EXPECTED IMPACT AND EXPERIENCE
It is expected to reduce the V&V and code correction costs by at least 10%. This will immediately increase our competitiveness, and justify the need for further improvements. How to use formal methods in a practical and acceptable manner to
the project teams (users), and contribute to the personal development of engineers is also expected.

**Contractor:**

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**Start date:** 01/04/97

**Duration:** 15 months
Esprit Project 23750 - SPIP
SOFTWARE PROJECTS IMPROVEMENT PROCESS

<table>
<thead>
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<th>Business Sector:</th>
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<tr>
<td>Application Area:</td>
<td>Management Information Systems</td>
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<tr>
<td>Key Words:</td>
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<td>Technologies / Methodologies / Tools:</td>
<td>Project, Client/Server, configuration management, testing</td>
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</table>

BUSINESS MOTIVATION AND OBJECTIVES
Due to ever growing user needs, software development complexity has reached a level where automated tools and methodologies have to be used. Our software development process needs reinforcement especially in the areas of testing and configuration management.

The PIE objectives are part of a larger program of improving our software development processes and practices. The software improvement process, although is a goal by itself, it is initiated by a wider, more important organisational and business goal, of positioning us as a provider of high quality software products.

THE EXPERIMENT
The experiment will include selecting tools and methodologies for configuration management and testing. The tools and methodologies will be used by the baseline project for 9 months. During this time data will be gathered and the results of the experiment will be evaluated according to this data. Based on the evaluation, changes will be introduced (if necessary) and a plan for assimilation will be developed.

The experiment will be performed at our office on a client/server project of about 15 man years. Onyx Technologies employs 90 full time employees, 70 of them involved in software engineering. 6 as part of the baseline project.

EXPECTED IMPACT AND EXPERIENCE
The expected impact includes: increase in customer satisfaction, reduction in the number of defects in the developed products, reduction in human resources needed for maintenance and increase in productivity.
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Start date: 01/03/97

Duration: 16 months
BUSINESS MOTIVATION AND OBJECTIVES
Within IBM Semea, the Product Development unit produces software intensive products and solutions for a very dynamic and competitive market, in which product quality, products costs, time-to-market are key competitive levers. To quickly develop high-quality, cost effective solutions for its international customers, the Product Development unit has identified, through a preliminary assessment of its current software development practices, a 1st-priority improvement step in its development process. Such improvement consists in the adoption of a re-use oriented software development practice.

THE EXPERIMENT
To achieve this goal, a specific methodology, namely REBOOT, and a supporting tool, namely EUROWARE, have been identified as the key enablers. IBM Semea, Product Development Unit intends to introduce both of them in its organisation, to validate and disseminate them and to measure the actual benefits through a pilot application which is based upon 2 specific baseline projects: Datavideo, the source of re-usable components, and Datasat, which will benefit from such re-usable components.

EXPECTED IMPACT AND EXPERIENCE
In the context outlined above, the expected business impact at IBM Semea, PD Unit are:
• To reduce the development costs of new products and solutions, thanks to the availability and use of existing re-usable software components. The goal is to reduce such costs by at least 25%.
• To reduce the evolution and maintenance of existing products and solutions, thanks to the use of consolidated, validated, well designed and well documented software components. The goal is to reduce such costs by at least 25%.
• To reduce the time-to-market of new products and solutions, thanks to the availability of re-usable, tested software components which will reduce the overall design/development/testing lead-time. The goal is to reduce time-to-market by at least 30%.
Finally, it is strategic objective of IBM Semea - Product Development unit to reduce the overload of its resources (less effort required to develop a product, thanks to re-
use of existing software components) and to optimise their allocation on the various projects, thus increasing the overall flexibility of the unit itself and its capability of timely getting new business opportunities.

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**Start date:** 01/05/97

**Duration:** 18 months
Esprit Project 23754 - TRUST
IMPROVEMENT OF THE TESTING PROCESS EXPLOITING
REQUIREMENTS TRACEABILITY

<table>
<thead>
<tr>
<th>Business Sector:</th>
<th>Aircraft and spacecraft</th>
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</thead>
<tbody>
<tr>
<td>Application Area:</td>
<td>Embedded and control systems for avionics</td>
</tr>
<tr>
<td>Key Words:</td>
<td>Requirement traceability, testing, software life cycle</td>
</tr>
<tr>
<td>Technologies / Methodologies / Tools:</td>
<td>MIL-STD-498/TestTracker</td>
</tr>
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</table>

BUSINESS MOTIVATION AND OBJECTIVES
In the Aerospace Industry product costs and time-to-market are today 2 key competitive levers. Helicopter is a very software intensive product, in which the avionics software contributes to the product costs by more than 30% and to the overall time-to-market by 40%. The software Testing and Validation activities significantly contribute to the above mentioned high avionics software costs (50%) and lead-time (40%).

The overall objective of the TRUST PIE is to improve the Testing and Validation Process, in order to reduce the related costs by at least 15% and to cut the avionics software development time by at least 10%. The emphasis is on improving the process, rather than on just automating some of the testing/validation activities.

THE EXPERIMENT
In order to achieve this objective, requirements traceability will be exploited, as the mean to directly and un-ambiguously relate subsets of testing and validation sequences to specific subsets of requirements. The goal is to keep track of what and how should be tested when requirements change or when amendments to faults in a product Release/Variant have to be propagated to all the other relevant active Releases/Variants.

EXPECTED IMPACT AND EXPERIENCE
In the context above the expected impacts are:
- reduction of the development costs of new version/variant
- improvement of the testing effectiveness and consistent reduction of testing effort
- improvement of the global software life cycle efficiency due to better traceability support

Participants:
- Agusta - Un’Azienda Finmeccanica SpA: Helicopter manufacturer, having in charge the development of both mechanical and avionics
- TXT Ingegneria Informatica: software house with large experience in software engineering practice and products development involved as external assistance provider.
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Start date: 01/04/97
Duration: 18 months
Esprit Project 23760 - IECS
IMPROVEMENT OF EFFICIENCY BY INTRODUCTION OF CCM AND SOFTWARE

<table>
<thead>
<tr>
<th>Business Sector:</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Application Area:</td>
<td>Image processing</td>
</tr>
<tr>
<td>Key Words:</td>
<td>real-time, metrology, quality control</td>
</tr>
<tr>
<td>Technologies / Methodologies / Tools:</td>
<td>CCM, Software Engineering Standards</td>
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BUSINESS MOTIVATION AND OBJECTIVES
The department of Industrial Image Analysis as part of the Institute of Digital Image Processing of JOANNEUM RESEARCH develops customer designed systems for industrial applications based on image processing techniques. The company was certified according to ISO 9001 standard 1995, but the guidelines for software development given in ISO 9000-3 are not fully applied. A couple of problems have been observed in the past and are still present in the software development process, which have to be corrected. An assessment of the current status showed big need but also big interest of the employees in more software quality management.
Main objectives of this PIE are:
- Shorter software development cycles
- Better code reusability
- Increase of reproducibility and readability of code
- More efficient Configuration and Change Management (CCM)
- Better documentation and problem tracking

THE EXPERIMENT
In this PIE, the influence of the establishment of a CCM tool is measured. As a prerequisite for selection and usage of this tool, a complete software lifecycle model will be worked out, which will act as basis for the CCM procedures. Especially the influence on code quality, error frequency, customisation, maintainability and reuse will be investigated in detail. Measured parameters indicating this influence will be: code metrics, efficiency based on time statistics, error statistics and reuse statistics

EXPECTED IMPACT AND EXPERIENCE
- Reduction of error frequency and time for solving errors
- More flexibility in planning of personal resources
- Better reuse of code
- Easier maintenance of code
- Higher confidence of customers
- Increase of motivation
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Start date: 01/04/97
Duration: 24 months
Esprit Project 23780 - IMPOSE
IMPROVEMENT OBJECT ORIENTED METHODS IN A VERY SMALL ENTERPRISE

<table>
<thead>
<tr>
<th>Business Sector:</th>
<th>Software consultancy and supply</th>
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<tr>
<td>Application Area:</td>
<td>Process planning and control</td>
</tr>
<tr>
<td>Key Words:</td>
<td>Requirement specifications, resource estimation</td>
</tr>
<tr>
<td>Technologies / Methodologies / Tools:</td>
<td>Object oriented methods and tools</td>
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</table>

BUSINESS MOTIVATION AND OBJECTIVES
The business idea of Mente Systemutvikling AS is to offer consultancy software development and software systems for the fishing industry. Projects getting out of control causing enormous internal costs in order to gain control has resulted in low profit from development projects. Appropriate cost estimates based on better requirement specifications is expected to increase control and profitability. The project is expected to reduce overrun time by 30%.

Similar problems are common among software companies in Norway and Europe. The results and the lessons learned will be of relevance to all software companies coping with the same kind of problems.

THE EXPERIMENT
The technical aim of the experiment is to improve the quality of the requirement specifications which the cost estimates are based upon. The method for cost estimation is also going to be improved. This will secure the business goal which is to make a profitable business on consultancy software development. Existing routines will be evaluated, new routines will be developed before they will be implemented in the organisation. The new routines will be used in a baseline project to gain experience and to measure their effect. The baseline application is likely to be a project developing solutions for the alimentation industry.

The company has 6 employed software developers, in addition the general manager takes part in planning and preparation of the projects and also some of the project administration.

EXPECTED IMPACT AND EXPERIENCE
The expected results are: 30% reduction of total overrun time and 20% reduction of financial loss caused by overrunning cost estimates and missing milestones. The experiment is expected to have a positive impact on the organisation and the software development cycle.

By successful completion of the PIE the next step will be continuous improvement of issues related to software development that are defined as critical. It is very likely that testing and verification will be the next area to put focus on.

No barriers or reluctances are seen within the organisation. Reluctances are only met among other software organisations unable to see what a very small enterprise can achieve by going through a project like this.
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Start date: 01/03/97  Duration: 15 months
Esprit Project 23794 - EURO2000  
SYSTEMATIZATION OF GLOBAL SOFTWARE ADAPTATION EFFORTS

<table>
<thead>
<tr>
<th>Business Sector:</th>
<th>Banking</th>
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<tbody>
<tr>
<td>Application Area:</td>
<td>Mission Critical Banking Applications</td>
</tr>
<tr>
<td>Key Words:</td>
<td>Global Portfolio, Evolution, Maintenance</td>
</tr>
<tr>
<td>Technologies / Methodologies / Tools:</td>
<td>Global Change Management.</td>
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</table>

BUSINESS MOTIVATION AND OBJECTIVES

The interest of CECA, as the Spanish Confederation of Savings Banks, in this PIE lies in the development of its business strategy: to act as the sponsor of technological development and test site for new technologies for its 50 associated Savings Banks.

The objective of the project is to implement an organisational structure and a method to handle global changes to a complete software portfolio.

At present, Savings Banks (as well as a large number of other organisations) are facing critical global changes to face the year 2000 problem and to make themselves capable of handling the Euro single currency.

We will use these critical global changes as the baseline project to test the method by using it to adapt the applications of the payments area, the resulting method will then be used to adapt CECA’s complete software portfolio and will be disseminated to its 50 associated Savings Banks.

THE EXPERIMENT

The PIE will consist of:

a) The implementation of an organisational structure that will be based on: The Euro2000 Steering Committee, The Euro2000 team, The adaptation teams and the Users team.

b) The implementation of a Method based on the following phases: 1) Applications Architecture Definition; 2) Planning and Prioritisation; 3) Change Management Set-up; 4) Detailed Situation Analysis and Solution Design; 5) Solution Implementation; 6) Test and Quality Analysis.

These organisational structure and method will be used to make the applications of the payments area capable of handling the Euro and be free of the year 2000 problem.

EXPECTED IMPACT AND EXPERIENCE

The Spanish Confederation of Savings Banks, CECA, expects to obtain the following benefits from the process implemented through this experiment:

- Ensure that all its portfolio of applications is prepared to handle the Euro currency and year 2000 dates by 1999
- Ensure that the best business sense and cost effective solution is taken for each application.
- Guarantee that the conversion process will not cause problems to the applications in production.
• Reduce risks of failure by ensuring that 98% of the required conversions are performed, tested and accepted by its business users.
• Increase the productivity form the present level of 2 programs of 2,5000 lines corrected per day to 8 programs of the same size corrected per day.
• Eliminate the person-application dependency which in-turn will increased the flexibility to use contracted programmers to speed up the work.
• Decrease cost by reducing the labour for detecting potentially troubled situations by 70%.
• Raise awareness and guarantee involvement from the senior management and business users in the resolution of this two critical problems.

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Start date: 01/01/97

Duration: 12 months
Esprit Project 23795 - PROMASYS

INTRODUCTION OF A SOFTWARE PROJECT MANAGEMENT SYSTEM

<table>
<thead>
<tr>
<th>Business Sector:</th>
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<tbody>
<tr>
<td>Application Area:</td>
<td>Business Critical, Near real time, Inter-enterprise Systems</td>
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<tr>
<td>Key Words:</td>
<td>Commitments, Credibility, Time-to-market</td>
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<tr>
<td>Technologies / Methodologies / Tools:</td>
<td>Project Management</td>
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</table>

BUSINESS MOTIVATION AND OBJECTIVES
As steel producers with a growing business, we are increasingly developing new services, products and relationships with customers, as a consequence of this, we have to develop and implement new and specialised software in order to meet new requirements. Nowadays, whenever there is a new customer or a new line of business, the steel production process should be adapted and also new software should be developed to cope with new suppliers strategies, just-in-time requirements, stock handling and so on.

Our interest in this PIE is quite clear, if we are not able to produce software in the same controlled manner as we produce steel components, we will hinder the business development of the company and we will not be able to support its growth. With the realisation of this PIE we will plant the first step towards having a software development process as controlled as we have the production of steel.

THE EXPERIMENT
The objective of the experiment is then to implement a Software Project Management System, meaning by that the introduction of a method to plan, control and track software projects, with the help of suitable tools. The idea is to implement a method that involves not only the software development department, but the business users (internal clients) as well as the external clients.

The Software Projects Management System (PROMASYS) will be implemented, tested and refined while developing a major set of improvements to the logistics and production management system. Although this project is very critical giving the fact that it will allow us to be more flexible when opening a new line of business or establishing a relationship with a new client it does not have an external deadline or suffer from day-to-day pressures. This will allow us not to focus only in developing the functionality, but also in the process of developing that functionality.

Based on this baseline project, the implementation of the project management system to be done during the experiment will have two sides:

1) The implementation of an organisational structure to organise roles and responsibilities.
2) The implementation of the appropriate Methods and Tools of the Project management System.
EXPECTED IMPACT AND EXPERIENCE
By implementing the Project Management System, we expect to be able to:

- Estimate the size of projects and the sub-products to be obtained during development.
- Accurately plan and schedule the work to be done. (with a maximum deviation of 15%)
- Establish beforehand the resources and skills required.
- Establish attainable commitments with internal and external clients.
- Provide the management with a way to periodically review and track the progress of software projects.
- Have a way to measure the success of Software Development Projects in terms of cost, schedule, performance and quality.

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Start date: 01/04/97 Duration: 11 months
Esprit Project 23813 - PIER
PROCESS IMPROVEMENT EXPERIMENT IN RE-USE

<table>
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<tr>
<th>Business Sector:</th>
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<tbody>
<tr>
<td>Application Area:</td>
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</tr>
<tr>
<td>Key Words:</td>
<td>Re-Use, Object Orientation, Project Management</td>
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<tr>
<td>Technologies / Methodologies / Tools:</td>
<td>Object Orientation, Project &amp; Library Management</td>
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</table>

BUSINESS MOTIVATION AND OBJECTIVES
Delivering competitive software solutions requires increasingly efficient use of resources. One key way of achieving this is to apply re-use in as many areas as possible. With the effective application of re-use similarities between projects can be exploited to avoid re-working. In addition, complex projects can be simplified by breaking them down and identifying where previously tried and tested components can be applied to provide rapid and high quality solutions.

The key objective of this experiment is to build a framework in which BYG is better able to deliver customers quality solutions in a cost effective and efficient manner.

THE EXPERIMENT
To achieve the objective the experiment will investigate the creation, maintenance and use of different resource libraries to include software modules (applying Object Orientation, C++ and Java), application code (authored multimedia scripts), multimedia resources (video, sound, images etc.) and documentation (specifications, user documentation, training materials etc.). The various library management tools/techniques investigated will be complemented by developing effective management of re-use. The baseline application is the development of the next generation of PC-based multimedia authoring tools, involving approximately 12 of BYG’s 35 total staff.

EXPECTED IMPACT AND EXPERIENCE
BYG’s staff will gain valuable practical exposure to concepts of re-use and how to apply them in their work, be it software development, testing, application programming or generation of documentation. The small trials using various library management techniques will be extended throughout the company, including into its other core business in 3D simulation technology. The appointment of a formal Quality Assurance Management function in the company will ensure future consolidation of results.
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| **Start date:** 01/03/97 | **Duration:** 18 months |
Esprit Project 23819 - MOODS
MANAGEMENT OF OBJECT ORIENTED DISTRIBUTED DEVELOPMENT SYSTEMS

<table>
<thead>
<tr>
<th>Business Sector:</th>
<th>software industry</th>
</tr>
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<tbody>
<tr>
<td>Application Area:</td>
<td>business application (accounting, sales, finance, manufacturing)</td>
</tr>
<tr>
<td>Key Words:</td>
<td>distributed software process, intranet</td>
</tr>
<tr>
<td>Technologies / Methodologies / Tools:</td>
<td>process modelling and measurement, iterative process improvement</td>
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</table>

BUSINESS MOTIVATION AND OBJECTIVES
OPENLAKE is a distributed software factory, with sites spread all over Italy and connected with phone lines and Internet links. Project management and quality assurance, are centralised, developers are distributed. This distributed organisation is not, today, completely successful, causing a waste of time and resources. On the other hand very limited industrial experience and practice is available about distributed software processes. This PIE aims to experiment a methodology and tools to establish efficient communication and work procedures among physically distant groups and improve this situation.

THE EXPERIMENT
The project will introduce a methodology for efficient production of software products in a wide area distributed environment, repeating the following steps:

- definition of the distributed production process
- definition of procedures and organisation for the distributed production process
- survey, evaluation and experimentation of supporting tools

The main issues to be addressed with the above methodology are:

- type and quantity of information to communicate to distributed developers for coding and unit test, allocation to developers of coding/testing units
- definition and allocation of stub classes for test, definition and management of a stub class repository
- distributed project tracking

EXPECTED IMPACT AND EXPERIENCE
The experiment will be considered successful if it will:

- improve communication and co-ordination among distributed developers; discipline frequency and type of interaction between developers
- reduce frequency and duration of meetings (therefore reduce cost of travel and subsistence)
- reduce the need of relocating personnel (therefore reduce cost of relocation)
- improve tractability (where and at which development stage is each distributed component)
• improve integration test of distributed components
• allow for iterative and prototyping development in a distributed environment.

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| http://www.consorziosw.it/openlake  
| Start date: 01/03/97  
| Duration: 18 months |
Esprit Project 23825 - PIBOP
PROCESS IMPROVEMENT BASED ON PSP

<table>
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<tr>
<th>Business Sector:</th>
<th>Telecommunications industry</th>
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<tr>
<td>Application Area:</td>
<td>Embedded software for digital telephony applications</td>
</tr>
<tr>
<td>Key Words:</td>
<td>Personal Software Process, PSP, process improvement</td>
</tr>
<tr>
<td>Technologies / Methodologies / Tools:</td>
<td>PSP Method</td>
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BUSINESS MOTIVATION AND OBJECTIVES
INTRACOM’s main business concern is to provide reliable and safe products as well as to improve its market competitiveness. To the satisfaction of this common business concern, the objective of the PIBOP experiment is to introduce W.H. Humphrey’s Personal Software Process (PSP) method at INTRACOM S.A. This method, focusing on the individual software engineer level, allows for systematic implementation of proven practices on planning, tracking and analysis of software design work and products.

THE EXPERIMENT
The PIBOP experiment will introduce the PSP method at INTRACOM, focusing on a typical project as a baseline. The initial step of the PIBOP PIE is the setting-up and integration of the experiment within a typical baseline project. Then, introduction and training on the PSP method is carried out, and the specific adaptation procedures for the baseline project are documented. The PSP will be executed throughout the baseline project and the PIE results will be evaluated based on appropriate measurements. The four main phases of the experiment are: PSP introduction, PSP adaptation, PSP execution and PSP evaluation. The baseline project involves development of software modules for AXE-10 Ericsson digital exchanges. The duration of the baseline project will be 12 months and the estimated effort will be 8 person-years.

The PIBOP experiment will take place at INTRACOM's Software Design Centre which employs 180 highly qualified software engineers.

EXPECTED IMPACT AND EXPERIENCE
Technical benefits from PIBOP include: identification of process improvements, prevention of defects in software development, better planning and control in projects and improved product quality. Commercial benefits include: reduction of software development cost, shortening of the time-to-market for software products and increased product reliability at customer’s site. Through PIBOP, INTRACOM will gain experience in introducing and applying the PSP method to software developing organisations.
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Start date: 01/03/97

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Duration: 18 months
BUSINESS MOTIVATION AND OBJECTIVES
Increasing pressures on IT Services within a Local Authority to achieve quality, performance and value for money gains, in order to contribute to corporate and service aims. Project aim is to evaluate CASE tools and associated methods to bring about:

- Improved software quality in terms of meeting customers requirements in product functionality
- Improved performance and productivity of software engineers
- Greater team working and improvement in relationships between developers and customers
- Reduced cost of ownership of systems through improved systems engineering and design
- Create a culture which is receptive to technological transfer and innovations as part of implementation strategy.

THE EXPERIMENT
The experiment will use a housing base-line project in order to evaluate the benefits, issues and impacts of Computer Aided Systems Engineering (CASE) Tools and methods in Information Systems (I.S.) design and development. Qualitative and quantitative improvements are expected in managerial and technical respects. Additionally, the experiment will provide the opportunity to examine and better understand organisational and human issues in technology transfer and implementation and so improve future working practices.

EXPECTED IMPACT AND EXPERIENCE
To help bring about tangible improvements in I.S. quality and value for money in future I.S. design and development by producing applications using CASE technology which is expected to deliver:

- Improved software quality by more closely meeting user requirements, through better team working between customer and developers.
- Improved productivity of developers.
- Lower system ownership costs through improved systems engineering.

Additionally, a more thorough understanding of human and organisational dynamics in technology transfer is expected to provide important experience in order to formulate:
- Effective implementation strategies for CASE technology within the service.
- Establish a stronger culture of continuous software engineering improvements and innovation.

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email:  

**Start date:** 01/03/97  

**Duration:** 18 months
Esprit Project 23833 - IDEA

IMPROVING DOCUMENTATION, VERIFICATION AND VALIDATION ACTIVITIES IN THE SOFTWARE LIFE CYCLE

| Business Sector:                         | Public Administration (Public Social Security) |
| Application Area:                       | Business oriented systems (Unemployment insurance) |
| Key Words:                              | Documentation, verification & Validation, Project management |
| Technologies / Methodologies / Tools:    | Document and document flow management, metrication environment support in verification and validation activities |

BUSINESS MOTIVATION AND OBJECTIVES
Software produced by INPS is aimed at automating its social security services and therefore it is highly related to the continuous law changes and needs for new services to the community. By the definition of a comprehensive document process during the software life cycle and of well specified Verification and Validation activities we want to improve the control over the whole software development process and, consequently, the ability to timely adequate our services to customer requirements.

THE EXPERIMENT
The intent of this project is to define a set of document standards together with the definition of clear rules and roles involved in the document flow management. Moreover we intend to experiment Verification and Validation activities to be executed on the outputs of each phase. Available environments as Lotus Notes for document management and a metrication tool as Metrication (by SPC) for collection and analysis of metrics (also derived by V&V activities) will be experimented in PIE project.

Major activities in the experiment will be: PIE management, PIE qualification and monitoring; Set up of the IDEA experiment, inclusive of training, definition of a methodology defining document and V&V processes, software tools selection and acquisition, preparation of technological layout; Application of defined methodology on top of the baseline project (methodology tailoring, definition of baseline project plans, production of specified documents, application of defined procedures on software development products, collection and analysis of metrics); internal and external dissemination of results.

The baseline project selected for this PIE concerns the reengineering of software used to collect requests and to order payments of unemployment indemnities to specific workers categories, a limited project but highly representative of our typical software production. It will be carried out by an IT peripheral software development structure (SIR - Bari), already owning a noticeable experience on this particular
application domain, with the control and supervision of the IT central structure (DCTI- Roma).
The whole IT department of INPS employs about 800 people in Italy, while the involved peripheral structure employs about 20 people.

EXPECTED IMPACT AND EXPERIENCE

We expect to gain some advantages such as the reduction of software maintenance times, a better understanding between different work groups and an easier exchange of people between them, the availability of standardised documents, etc.
As an indirect goal we think to increase the attention to well founded practices of software engineering in the whole IT department and, generally, to promote the introduction of quality concepts in our software development process.

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email:

Start date: 01/03/97
Duration: 18 months
BUSINESS MOTIVATION AND OBJECTIVES
Given the fact that the baseline project concerns the client/server version of a standard banking product which is used by hundreds of financial institutions, it is imperative that the solution offers not only sophisticated functionality but also superior quality with respect to reliability and security. This is an ambitious goal in light of the fact that state-of-the-art technology is used, software development cycles chronically suffer from time constraints, and demand among customers for a great variety of hardware and software requirements is high. Testing the right things at the right time to the right extent is the key to reducing failures at the customer sites and minimising the cost of fixing software problems during the development process.

Another objective of the project, which is important to any software solution provider, is to meet the market needs by ensuring that the functional specifications of the software product are exactly tailored to the customers' requirements. Also, the software provider needs to guarantee that the planned functionality has been realised technically in a way that any variations and combinations possible are taken into account.

THE EXPERIMENT
The implementation of a wider and deeper testing approach is meant to help us achieve the objectives stated above. There are three areas for improving the current test process which are reflected in the three experiments of the QUALITAS project:
I. Enhanced document testing by running intensified reviews on early development results, i.e. functional specifications and design documents.
II. Systematic functional testing and test-case determination is to be used to ensure that the functional requirement specification document is complete, that there are no versioning problems, and that implemented functions work as intended.
III. Automated installation and system integration testing is to be performed for each delivery to a customer site. Each delivered product is to come with an automated installation test suite guaranteeing that the product works properly in the customer's software and hardware environment.

The experiments will be conducted in the context of the realisation of a new version of CORONA CS, a client/server solution for the automatic reconciliation of accounts.
Management Data Vienna has 132 employees, with about 50% of them being employed in the software development unit. A staff of 15-20 is involved in the CORONA CS team.
EXPECTED IMPACT AND EXPERIENCE
Management Data expects to benefit from the optimised quality of the software product leading to an estimated cost reduction of about 20-40% owing to the decrease in the number of problem-fixing releases from 4 to 1. This will bring about further cost reductions e.g. in the support effort and other MD software projects. Besides, project-management procedures and co-operation between the product owners and the developing unit will be optimised; customer satisfaction will rise, installation time and effort will be reduced, which altogether is sure to boost our organisation's image as a reliable and highly professional software provider.

Contractor: MANAGEMENT DATA, DATENVERARBEITUNGS UND UNTERNEHMENSBERATUNGSGESELLSCHAFT M.B.H. Althanstrasse 21-25 1090 Vienna Austria

Mr Oskar Hofer
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Start date: 01/03/97
Duration: 18 months
BUSINESS MOTIVATION AND OBJECTIVES
In order to increment the effectiveness and the efficiency of software reuse, it is necessary to improve the software production process in terms of: correct resource allocation and better scheduling, improvement of the organisation and management of the production process, increase of productivity and production efficiency, and general software development process improvement.

By means of this experiment, it is expected to attain the following set of objectives, common ground for the whole industrial European Community: ability to quickly respond to extremely rapid changes in the market and increased customer satisfaction because of (a) higher quality of products, (b) reduced products' cost, (c) high degree of products customisability and (d) verticalization/specialisation chances.

Potential benefits of this experiment concerns the diffusion of Domain Analysis, providing to software firms in the EC convincing evidence that Domain Analysis methods and design frameworks are worthwhile.

THE EXPERIMENT
The achievement of the above objectives requires a deeper knowledge of the application domain, thus allowing Thera to better design and analyse software products, to increment the effectiveness and efficiency of software practices and reusability policies, and to reduce the effort due to the maintenance process. This can be obtained by the introduction of Domain Analysis and defining Frameworks for software reuse.

Main steps of the experiment are:

- methodology adaptation and training;
- application of adapted Domain Analysis method to the baseline project, formulating the Domain model, developing and then applying Reuse Frameworks;
- data collection, analysis, comparison and dissemination of results.
The baseline project is the development of a software system named "Production Management". Its main goal is to help a manufacturing organisation to plan and control the production activity and resource handling. It is foreseen that the developing unit of the baseline project will be composed of 13 persons.

**EXPECTED IMPACT AND EXPERIENCE**
Thera expects to improve its software development process by integrating Domain Analysis into it, improving the analysis and design activities, increasing productivity and production efficiency, generally improving the quality of the software development process.

From a commercial point of view, the achievement expected is the reduction of the prices of products and of the time-to-market, while augmenting customer satisfaction and improving the image of the company. Besides, it should allow the presence of Thera in the new market of semi-finished software applications.

Thera expects to gain a sound experience concerning application of Domain Analysis in the software development process, in particular for managing the complexity of software systems and modelling continuously changing domains and requirements. Upon successful completion of the experiment, Thera will redesign the whole software production process basing on Domain Analysis and Software Reuse.

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**Start date:** 01/03/1997  
**Duration:** 18 months
Esprit Project 23843 - USST
USAGE SPECIFICATION AND STATISTICAL TESTING

<table>
<thead>
<tr>
<th>Business Sector:</th>
<th>Telecommunication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application Area:</td>
<td>Testing of public and mobile switching systems</td>
</tr>
<tr>
<td>Key Words:</td>
<td>Usage Modelling, Statistical Testing, Reliability, MTTF</td>
</tr>
<tr>
<td>Technologies / Methodologies / Tools:</td>
<td>Cleanroom, Markov-Chains, toolSET_Certify</td>
</tr>
</tbody>
</table>

BUSINESS MOTIVATION AND OBJECTIVES
Due to growing complexity of software in telecom applications exhaustive testing becomes too expensive and is in contradiction with Alcatel’s goal to reduce time to market by 30%. Testing of large systems generally suffers from this coverage versus cost dilemma. This may lead to late delivery and insufficient quality. On the other hand software process improvement leads to an improved quality of software before test. Therefore an exhaustive testing isn’t efficient. Nevertheless testing is still necessary, but the focus of testing moves from error detection to certification of quality.

With the introduction of statistical testing based on a usage specification we want to improve the reliability of our software by 20% and be able to predict it. As a consequence we hope to accelerate the acceptance test by 20% and reduce the maintenance effort by 20%. The efficiency of tests shall be better than conventional testing.

THE EXPERIMENT
In order to certify and to improve the reliability of software by testing, it is necessary to regard the customers’ view on reliability. The experiment will introduce usage modelling and statistical testing for a subsystem of a quite large customer project, and will involve the customer in the early phases. Customers count failures per execution, whereas developers count defects per kilostatement. Statistical testing means random selection of representative test cases from the infinite number of possible executions of the software. The expected usage of the system is modelled with Markov-Chains. Test cases are generated from the usage model and run on test equipment. The test results are evaluated in order to predict the reliability of the system. The reliability of the delivered system is monitored and compared with the prediction. The modelling, test generation and evaluation is carried out using toolSET_Certify.

EXPECTED IMPACT AND EXPERIENCE
Alcatel SEL expects, that statistical testing will improve the reliability of the delivered system and that this reliability can be predicted. The benefits of increased reliability will be accelerated customer acceptance test and reduced maintenance effort. We expect also an increased efficiency of tests.
<table>
<thead>
<tr>
<th>Contractor: ALCATEL SEL AG</th>
<th>Mr Albrecht Beck</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lorenzstraße 10</td>
<td>tel: +49 711 821 46942</td>
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<tr>
<td>70435 Stuttgart</td>
<td>fax: +49 711 821 47362</td>
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<tr>
<td>Germany</td>
<td>email: AU.Beck@</td>
</tr>
<tr>
<td></td>
<td>stgl.sel.alcatel.de</td>
</tr>
</tbody>
</table>

**Start date:** 01/04/97

**Duration:** 17 months
Esprit Project 23845 - QARI
IMPROVING SOFTWARE DEVELOPMENT PROCESSES BY APPLYING
OBJECT-ORIENTED METHODS AND TECHNIQUES, FOCUSING ON
BETTER SPECIFICATION OF FUNCTIONAL REQUIREMENTS AND
SYSTEM DESIGN

<table>
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<tr>
<th>Business Sector:</th>
<th>Business Oriented Systems</th>
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<tr>
<td>Application Area:</td>
<td>Message handling system</td>
</tr>
<tr>
<td>Key Words:</td>
<td>X.400, X.500, Windows 95/NT, Unix, Internet, EDI</td>
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<tr>
<td>Technologies / Methodologies / Tools:</td>
<td>OMT/UML, C++, Rational Rose</td>
</tr>
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</table>

BUSINESS MOTIVATION AND OBJECTIVES
The objective of the experiment is to prove that MaXware will increase its margins by applying object-oriented methods for system documentation during the specification and design phases of projects. This will result in reduced development time and costs, lower maintenance costs, higher product quality, more satisfied customers, and higher sales. All these factors will contribute to better margins.

THE EXPERIMENT
The scope of the PIE is to improve the software development process by using the object-oriented method OMT and the modelling language UML (Unified Modelling Language). This will be accomplished by introducing the tool Rational Rose/C++ from Rational Software. The PIE project will focus on two baseline projects, Okeanos I and II. Okeanos is the working name of the e-mail client developed by MaXware. Development of Okeanos I started in the third quarter of 1996, and is expected to be released in the second quarter of 1997. Okeanos I is running without the use of object-oriented methods and will serve as a reference project in the PIE context (baseline I). The specification and design phases of Okeanos II are intended to start in the second quarter of 1997. Okeanos II will introduce and measure the effect of using the object-oriented method (baseline II). The project will include the following activities: pre-PIE analysis preparations, pre-PIE analysis, performing the experiment (i.e. training, specification, designing and developing document templates), post-PIE analysis, and spreading the information.

EXPECTED IMPACT AND EXPERIENCE
We expect to increase our margins by applying the object-oriented methods in system development. Using object-oriented methods will result in reduced development time and costs, lower maintenance costs, higher product quality, more satisfied customers, improved system documentation, earlier detection of errors, reduced cost of correcting errors. Getting this first experience in using the method will make the method more accessible for subsequent projects.
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C=no;A=telemx;P=maxware;S=marstrand;G=vivi;

Start date: 01/03/97
Duration: 18 months
BUSINESS MOTIVATION AND OBJECTIVES
TSc is a supplier of international telecommunications equipment which contain elements of integrated hardware, software and mechanical engineering. The software element continues to grow in importance and size and is often now the only differentiator in the market. With this increasing dependence on software, TSc wants to continue to increase its software reliability and quality. Improved Software testing is a key element required and the SWAT automated software testing project is part of a wider drive within TSc to deliver improved software. This will give external business benefits of improved time to market by increasing speed of testing; increasing the number of defects found and reducing the time taken to fix by providing better test feedback.

THE EXPERIMENT
The achievement of the above objectives require the improvement of the software testing phase by performing the following tasks:
1) Perform a ‘Health Check’ on and update existing Automatic Test System.
2) Measure software complexity and feed into test creation activity.
3) Compare manual and automatic testing on the baseline project.
This SWAT PIE involves the automating of the test phase of a separate baseline software development project (typically a future release of Central Unit software). The Baseline project will be selected on the basis of its suitability for use in the SWAT PIE. This baseline software requires a team of around 6 engineers over an extended period, which involves Alpha and Beta Test phases. A 50% reduction in the length of these phases and an increase in the number of defects found are SWAT PIE aims. TSc employs around 470 people, of which 45 are involved in software development.

EXPECTED IMPACT AND EXPERIENCE
The current test process relies heavily on manual testing. By automating testing, an increase in the reliability of the product software will be achieved, concurrently with a decrease in the time taken to carry out the testing. The decrease in the test time will allow the product to reach the market place earlier, leading to commercial advantage. Additionally the discovery of software defects earlier in the software lifecycle leads to reduced defect repair costs and improved customer perceptions. The experience gained will be applicable to other real-time software applications within TSc and other interested companies.
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Start date: 01/04/97

Duration: 15 months
Esprit Project 23860 - ASTEP
AUTOMATED SOFTWARE TEST ENVIRONMENT FOR PROCESS
AUTOMATION IN THE STEEL INDUSTRY

<table>
<thead>
<tr>
<th>Business Sector:</th>
<th>Software Industry</th>
</tr>
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<tbody>
<tr>
<td>Application Area:</td>
<td>Process &amp; Production Control Systems</td>
</tr>
<tr>
<td>Key Words:</td>
<td>Factory test, computer supported test</td>
</tr>
<tr>
<td></td>
<td>environment, simulation</td>
</tr>
<tr>
<td>Technologies / Methodologies / Tools:</td>
<td>Computer supported testing and simulation</td>
</tr>
</tbody>
</table>

BUSINESS MOTIVATION AND OBJECTIVES
The objective of the experiment is to put into practice an efficient, state-of-the-art test approach and environment, which is modular and thus scaleable to projects of different size but of similar base functionality and with similar requirements regarding reliability, maintainability, and safety. The experiment shall prove whether the application of software test methods and tools result in higher quality software systems, higher efficiency of the testing process, and reduced efforts for installing and maintaining the target process and production control systems in the steel industry.

THE EXPERIMENT
The test approach, consisting of a test concept and a supporting test and simulation environment, shall cover all system test phases starting from the factory test onto the final acceptance test.

In particular, it is foreseen to provide several sub-projects within the baseline project with tools supporting the test specification, preparation, and performance on system level. Especially for the integrate engineers of the customer in the experiment from the very beginning. In a second step, the test environment will be extended by an efficient simulation system to allow to determine in advance the operational behaviour and the side effects due to changes in the plant configuration as well as in production. The last step will be the introduction of the test and simulation environment at site for an even better integration of the end-user.

EXPECTED IMPACT AND EXPERIENCE
The expected impacts are not only more efficiently tested applications, reduced installation time and costs, reduced down time, better maintainability and training facilities for the end-user, but also in general higher quality software systems.
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Participant: VOEST-ALPINE STAHL LINZ
GmbH

Start date: 01/03/97

Duration: 18 months
Esprit Project 23875 - SPECS
SPECIFICATIONS ENHANCEMENT THROUGH CASE AND SDL

Key Words: Process Improvement, GSM systems, specification and design activities
Technologies / Methodologies / Tools: SDL specification language, SDT CASE tools

OBJECTIVES
The SPECS Project aims at introducing SDL based CASE tools as a support to the analysis/ design/ coding activities of Italtel BURM (Business Unit Reti Mobili), a Europe’s leading full-line manufacturers in the telecommunications field.

The PIE falls within the scope of a large Process Improvement Program running at Italtel BURM after a process assessment performed in June 1995. In this context, the baseline project will be a major release of a Network Element of a GSM system.

ACTIONS
The objectives will be achieved through the adoption of SDL (Specification and Description Language), a formal specifications language particularly suited for specifying and describing real-time systems (and thus for telecommunications software development projects).

The adoption of SDL will be supported by the adoption of the SDT CASE tool-kit. The distinguishing characteristics of the PIE can be identified as follows:

• tool selection, in order to procure the tools that better adhere to the specific needs;
• customisation for the specific environment, in order to adhere to the peculiarities of the proprietary operating system;
• pilot application, to run the experiment;
• analysis of results, to evaluate the success of the initiative;
• preparation for deployment and widespread adoption, if the analysis activities bring to positive results.

EXPECTED IMPACT AND EXPERIENCE
The PIE is expected to have a direct impact on several quantitative indicators such as Timeliness, Fault rate in analysis/design, Productivity. In particular, the main goals of the PIE are represented by the increase of the software productivity in development and the availability of better documentation both for internal usage and for customers; those aspects indeed have a direct influence on the costs and quality of the delivered products and hence on the company competitiveness.
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Mr S. Scotto di Vettimo

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Start date: 01/03/97

Duration: 15 months
BUSINESS MOTIVATION AND OBJECTIVES

Our business objective is to build a product that is easier customisable, flexible to adapt to new needs and that is open for integration with any existing hard- and software. Important herein is the symbiosis between domain knowledge and the application of state-of-the-art software engineering techniques. It is our goal to install a software product line for (television) program planning applications that can be tailored to the specific needs of our customers. Off-the-shelf products don’t work for this kind of complex business applications. Our experience shows that 80-90% of the business needs are the same for every station, but it is very important that the remaining 10-20% can be provided in a timely and cost effective way. OO Partners achieves this by using state-of-the-art software engineering techniques: object-orientation (OO) and framework technology.

THE EXPERIMENT

OO Partners’ mission is to be a competitive broadcast management application provider. Today our product, called PSI, already covers a number of modules that manage the planning process of television broadcasting. The baseline project is the development of a cost analysis module for the broadcast planning application PSI. As in any other module of PSI, the module will be designed as a framework to allow easy customisation for different television stations. The cost analysis module will be closely incorporated in the existing PSI framework. The goal of the experiment is to evaluate how, and to what extent, the application of a proven object-oriented analysis & design methodology (OMT, BOOCH, OBA, ...) during our software development process can contribute to the following two (related) issues:

- Applying the OO methodology to make the existing software product line more accessible for new team members and for experts in the problem domain that are themselves not experts in object technology.
- Applying the methodology to come to a higher level of reuse and to introduce a more formal approach towards reuse in the organisation during all the phases of
the software development process (analysis, design and implementation). On successful completion of the experiment this should result in higher quality software (less bugs, easier maintenance, better response times to requirements of customers).

EXPECTED IMPACT AND EXPERIENCE

As OO Partners is moving from a typical high tech start-up company to a stronger commercial, business-oriented organisation; and the nature of its software development is changing from ad hoc/ small team/ limited number of clients to larger team/ reuse based/ internationally located clients, adherence to a software methodology is critical.

Because all the versions of PSI are derived from the core, the core’s documentation should be directed towards its reuse at different television stations. The availability of reuse documentation has a direct impact on the quality of the resulting software. In the experiment we will evaluate how an OO methodology can provide this reuse documentation. The proposed experiment is a step in achieving the above goals. By providing reuse design documentation we hope to improve the quality of the software process. More specifically we want to improve the maintainability, reusability and adaptability of our PSI product line.

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Start date: 01/03/97
Duration: 12 months
Esprit Project 23887 - GRIPS
GETTING THE GRIP ON SOFTWARE PRODUCT SUPPORT THROUGH
ERROR PREVENTION MEASURES

<table>
<thead>
<tr>
<th>Business Sector:</th>
<th>Provider of Financial Systems</th>
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<tbody>
<tr>
<td>Application Area:</td>
<td>Treasury Management Systems, Pension Fund Systems</td>
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<td>Key Words:</td>
<td>Software product support and maintenance</td>
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<tr>
<td>Technologies / Methodologies / Tools:</td>
<td>Root cause analysis, Defect prevention, Test tools</td>
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</tbody>
</table>

BUSINESS MOTIVATION AND OBJECTIVES
SimCorp is currently in the final phase of developing a standard treasury management system and a standard pension fund system. To become successful, SimCorp’s new standard products will have to meet high expectations from our current and potential customers. It is therefore an urgent business need for SimCorp to be able to manage and control especially our new standard products in the product support phase.

In the context of GRIPS, specific objectives include to minimise changes, to ensure that no unintended side-effects are caused by changes and to reduce the number of errors in the software product releases of the baseline project.

THE EXPERIMENT
In GRIPS an experiment is made to improve the software product support process for one of SimCorp’s strategic products. Error prevention measures are selected through analysis of weaknesses in current practice. The effect of inserting the selected measures is studied for consecutive product releases over a 12 months period. Weaknesses are identified through a root-cause analysis performed on historic error reports.

The experiment is scheduled to begin in August 1997, following an initial preparation phase.

EXPECTED IMPACT AND EXPERIENCE
SimCorp expects the long term effect of the GRIPS project to be an increased credibility in the market as well as an improved ability to overcome the extra support work load caused by increased demand for our products.
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Start date: 01/03/97

Duration: 18 months

Dr Morten Elvang-Gøransson

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BUSINESS MOTIVATION AND OBJECTIVES
The objective of this PIE is to introduce software configuration management practices and measurements for faster delivery of products and for faster customer responses, to give good support for parallel development, for geographically distributed teams and for multiplatform environment. The customers will be satisfied with the much better product support that can be given to the old releases of products. Other objective is to measure our maturity level by applying the ISO-SPICE which is being developed within the ISO framework. The quantitative target of the project objectives is to increase the efficiency of the software configuration methods by reducing the costs 30%.

THE EXPERIMENT
Achieving the objective above requires the improvement of software configuration management practices supported by tools as follows:

a) Configuration management using ClearCase.
b) Geographically distributed software development using ClearCase Multisite.

These tools make it possible to develop the product together with parallel projects. Projects’ members can also be located in different regions. The product can be developed for different platforms.

The experiment will be performed around Damatic XD (Distributed Control System developed by Valmet Automation). Valmet Automation employs 1800 people.

The results will be measured comparing the new methods with the current methods.

EXPECTED IMPACT AND EXPERIENCE
Valmet Automation expects to gain know-how in the efficient usage of ClearCase and Multisite in software configuration management. With this knowledge it is possible to raise the product quality and speed time to market for Valmet Automation’s products.
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Start date: 01/05/97  
Duration: 13 months
Esprit Project 23892 - OOATS
OBJECT ORIENTED METHODOLOGY APPLIED TEST SYSTEM

<table>
<thead>
<tr>
<th>Business Sector:</th>
<th>Automatic Test Systems</th>
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<tbody>
<tr>
<td>Application Area:</td>
<td>Testing and Maintenance of Electronic Systems</td>
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<tr>
<td>Key Words:</td>
<td>Software Analysis and Design, Software Quality</td>
</tr>
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<td>Technologies / Methodologies / Tools:</td>
<td>OO Methodologies, OO CASE Tools</td>
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</table>

BUSINESS MOTIVATION AND OBJECTIVES
INDRA DTD has a great concern to improve quality related to systems design and development concerning its business area, through reduction of Maintenance cost and increased levels of Reliability and Reusability. It is also the aim of the Company to keep up to date with modern software development practices, whenever these new practices have revealed to improve the quality and productivity of the developments in the software areas of our concern. The frequent commitment of the Company in international projects recommends to be aware of the modern development methodologies followed by the wider community, and not to stay behind of the current trends.

One of the software engineering practices internally identified as needing such an updating is the analysis and design methodology. The objective of the project is to learn about Object Oriented Methodologies and to gain experience through its application to an actual software project.

THE EXPERIMENT
With the above goal, the Experiment will consist of three main phases. The first one will concentrate on technically preparing the participants in Object Oriented Methodologies, and make them ready to apply their knowledge to a real development. Next, the selected OO Methodology and Tool will be applied to a tool intended to support the development of Test Programs. Finally, the experience gained in the application of the methodology as well as in the usage of the CASE tool supporting it, will take form of written guidelines, recommendations and technical notes.

The Automatic Test Systems Department of INDRA DTD employs 130 persons, 10 of which are partially or totally devoted to engineering supporting.

EXPECTED IMPACT AND EXPERIENCE
The immediate results expected with the realisation of the Experiment will be, by the one side, to gain experience in software development using OO Methodology, both in the use of that technique as well as a CASE tool supporting it. It is anticipated that the new methodology will lead to better rates in software reliability and maintainability, and will promote software reusability.
It would also assess about the cost and effort of introducing the new technique in other projects and departments, having in mind its future expansion throughout the Department and the Company as an internal development standard.
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Start date: 14/04/97
Duration: 11 months
Esprit Project 23893 - REJOICE
REQUIREMENTS ENGINEERING THROUGH JOINT, OBJECT-ORIENTED, INTERACTIVE CONSULTATION EXPERIMENT

<table>
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<tr>
<th>Business Sector:</th>
<th>System and software development</th>
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<tbody>
<tr>
<td>Application Area:</td>
<td>Simulation and Modelling (but very widely applicable)</td>
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<tr>
<td>Key Words:</td>
<td>Requirements</td>
</tr>
<tr>
<td>Technologies / Methodologies / Tools:</td>
<td>RAD, JAD, object orientation</td>
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BUSINESS MOTIVATION AND OBJECTIVES
Proper understanding of a customer’s requirements for a system are crucial if problems such as cost/time overruns and re-work are to be avoided, and customer satisfaction is to be ensured. Unclear, incomplete and changing requirements must be enhanced and managed for a project to be successful, for both the customer and supplier.

The aim is to establish an improved technique which will assist customer and supplier to gain a better understanding of initial and changing requirements so that systems are delivered on time, to cost, and actually meeting the customer’s real need.

THE EXPERIMENT
The experiment defines a new requirements approach based on synergy between three strands:
1. human interaction skills
2. RAD and JAD
3. formalised requirements management

This approach will be used on a representative project, typically the simulation of a sensor or a moving body. The experiences on this project will be compared with that of a similar project using existing requirements techniques.

DERA employs about 12,000 scientists from many disciplines. Its Software Engineering Centre, which will carry out this project, employs about 200 staff, all involved in software development to industry standards. Typical projects have a team of about 6 or 8 people, but can be much larger.

EXPECTED IMPACT AND EXPERIENCE
The new technique is expected to be adopted as standard within the SEC, providing improved performance and customer satisfaction. The SEC has a role to promote best practice throughout DERA and more widely and will actively disseminate the project results.
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Start date: 01/04/97

Duration: 18 months

Mr Ted Dowling
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BUSINESS MOTIVATION AND OBJECTIVES
Real problems encountered in the currently applied development methodology, better quality of the delivered software and the emerging need for ISO 9001 standardisation are the major firing elements of this experiment.

The formalization of the software development methodology is expected to let the company solve some of the problems encountered so far, like reduced quality of the produced software, poor estimation of forthcoming projects and difficulties in new versions and support of existing products..

This formalization, consisting of the definition of a complete lifecycle model, description of the format of deliverables of each phase and the use of the software tools used to support the model, along with the use of object oriented techniques for the analysis and the design phase of the development, are the tangible objectives of this project.

THE EXPERIMENT
The definition and application of a software lifecycle model, based on object orientation, in the current context of the company's activities. Appropriate documentation forms will be generated, software development tools will be used and sufficient training will be provided, so as to deliver a well defined procedure for the development process.

The proposed model will be checked against a baseline project, is expected to deliver applusive results and be appropriately documented and disseminated, so as to be used as the core methodology inside the co-ordinating and other, with similar characteristics, companies.

EXPECTED IMPACT AND EXPERIENCE
The first target is the improvement of the quality of the delivered software. Restricted control on the development process is essential to guarantee that quality.

Apart from that, the metrics collection process is expected to provide better insight both on the cost of the process, as well as on a better estimation on the capabilities of the development team.
The experience gathered by this project and by the use of the methodology introduced is expected to improve the position of the company in the software development market.

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**Start date:** 01/03/97

**Duration:** 12 months
Esprit Project 23901 - ESPRIT-ESSI:PIE
IMPLEMENTATION OF A METRIC BASED QUALITY MANAGEMENT SYSTEMS FOR SOFTWARE DEVELOPMENT PROCESS

<table>
<thead>
<tr>
<th>Business Sector:</th>
<th>Measurement and testing equipment</th>
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<tbody>
<tr>
<td>Application Area:</td>
<td>Manufacturing / Production systems</td>
</tr>
<tr>
<td>Key Words:</td>
<td>Quality management, metric system, metric criteria, software process, data dictionary</td>
</tr>
<tr>
<td>Technology / Methodologies / Tools:</td>
<td>Data collection plan; metrics for processes, products, resources and expenditure</td>
</tr>
</tbody>
</table>

BUSINESS MOTIVATION AND OBJECTIVES
The motivation for performing the experiment was to improve the status of the engineering practice. With respect to process engineering, measurement and control of the software development process is not sufficient. Errors in the software development process are often found too late within the product development or its life cycle. This significantly affects the time and costs for product development itself.

The objective of the experiment is to develop and establish a metric system to be implemented in the software development process in order to improve the quality (i.e. reliability, performance, maintainability and safety) of our products. Additionally, the transfer of the results within the wider European Community will be achieved by appropriate publications.

THE EXPERIMENT
To achieve the objective above, the following methods and tools will be applied in the experiment:

- Data collection plan. This will be used for comparison, evaluation and verification of metrics.
- Metric tools. Tools which are suitable to collect metrics for evaluation process quality and software product characteristics.
- Quality management. Quantitative measurement of the quality of the software development process.

The metric system will be designed module scaleable for projects of different size and complexity.

The experiment will be performed around a baseline project, in this case a measurement equipment for general purpose measurement of components for advanced digital communications systems.

The baseline project team consists of 12-15 engineers involved with the development of hardware and 15-20 engineers developing the associated software.

EXPECTED IMPACT AND EXPERIENCE
The definition and analysis of the software development process by the introduction of metrics, including the creation of a comprehensive data dictionary for collection and evaluation of data, will allow to improve the software development process utilising measurable criteria.

The acquired capabilities concerning the development of high quality software will be utilised to improve software development practice and the software development process.

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**Start date:** 01/03/1997  
**Duration:** 18 months
**Esprit Project 23947 - SYMQAD**  
**SYSTEM REQUIREMENTS AND QUALITY ASSURANCE IN A DISTRIBUTION COMPANY**

<table>
<thead>
<tr>
<th><strong>Business Sector:</strong></th>
<th>Retail trade. (Consumer goods to retail and Hypermarkets)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Application Area:</strong></td>
<td>Automated management of warehouses</td>
</tr>
<tr>
<td><strong>Key Words:</strong></td>
<td>Requirements Management, Requirements Development, Quality Assurance in requirements</td>
</tr>
<tr>
<td><strong>Technologies / Methodologies / Tools:</strong></td>
<td>BOOTSTRAPCMM- IDEAL</td>
</tr>
</tbody>
</table>

**BUSINESS MOTIVATION AND OBJECTIVES**  
The key business factor in the consumer goods distribution sector is the optimization of all the processes as the sole means to guarantee sufficient competitive advantage in a business characterized by its rapid growth and daily changes. For this the use of information and management systems is essential.

Achieving the rationalization of EDP tasks and especially the adjustment of expectations and value hoped for by users supposes a key success factor. Particularly true when the need for change is usual in the development caused by the evolution of the business.

The objectives are: to reduce the development time, assure requirements traceability, manage changes and assure the value for each development.

**THE EXPERIMENT**  
The experiment involve of establishing the requirements development and management processes, including the creation of the process infrastructure, its roles and responsibilities; the development of appropriate procedures and techniques, linked to the requirements quality assurance activities.

The project includes the new requests and the change requests as well as the implementation of metrics to quantitatively control the process.

The main aspect to be quantified is the degree to which the business priority is achieved, in other words, the value of each development in terms of business, modeled from the integration of the utility perceived by the users. For this we foresee the development of a conceptual model and a set of measuring instruments.

The process, procedures and techniques developed will be tested on Eroski’s central warehouse management reengineering project which has an automated infrastructure and control via radio frequency. A new system oriented towards the optimization of the warehouse management will be installed. It will incorporate new direct system users lacking in experience in computer applications. The warehouse system will integrate the company’s total logistic management chain.
EXPECTED IMPACT AND EXPERIENCE
The main impact is to obtain the expected added value, in business terms, derived from incorporation of computer systems. In other words, that the business efficient management is really improved.

Additionally, a simplification in the launching procedure, linked to the near elimination of functional changes in the early stages of the service, should lead to an important reduction in the software resources used in this stage of the life cycle.

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Start date: 01/03/97
Duration: 15 months
Esprit Project 23951 - ASTERIX
AUTOMATED SOFTWARE TESTING FOR ENHANCED RELIABILITY IN EXECUTION

<table>
<thead>
<tr>
<th>Business Sector:</th>
<th>Information Systems (IS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application Area:</td>
<td>Space Systems (ground segment)</td>
</tr>
<tr>
<td>Key Words:</td>
<td>system testing, acceptance testing tools</td>
</tr>
<tr>
<td>Technologies / Methodologies / Tools:</td>
<td>object-oriented, C++, OMT</td>
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</table>

**BUSINESS MOTIVATION AND OBJECTIVES**
The objective of the ASTERIX project is to determine how greater attention to system-level testing can improve software product quality whilst reducing overall costs as measured across the full software development lifecycle (including extended warranty periods).

The resources, measured both in terms of cost and elapsed time, which have to be allocated under normal circumstances to system-level testing mean that there is usually a strong temptation to economise in this area. We believe that this situation will improve significantly only if a high level of automation can be brought to such testing.

ASTERIX will therefore provide the resources needed to establish whether such an approach, in conjunction with strong higher management support, will lead to real benefits on a major representative project.

**THE EXPERIMENT**
The baseline project chosen for this experiment is the Envisat-1 Monitoring and Control Facility (MCF) project. This 2.8 MECU development is being performed to tight budget and schedule constraints, and can benefit directly from the application of the techniques being proposed within ASTERIX.

The ASTERIX experiment will determine whether the additional effort supplied in the system testing phase is repaid in terms of higher product quality at a reduced overall price, compared with the measured quality on other similar projects performed by Anite Systems for major clients. This reflects the overall goal to demonstrate that the approach proposed will result in real gains both for the customer (through receiving a better quality product, allowing him to reduce operational costs) and for Anite (through reducing the overall lifecycle costs).

**EXPECTED IMPACT AND EXPERIENCE**
We see the results of ASTERIX as being having a wide potential application, and we welcome the opportunity to contribute to an overall improvement in the approach of the European software industry in this area. We will therefore take care to see that the ASTERIX results reach the widest possible European audience.
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Start date: 01/03/97

Duration: 18 months
Esprit Project 23955 - ARRIBA
AEROSPATIALE REQUIREMENTS CAPTURE IMPROVEMENT FOR BEHAVIOURAL SIMULATORS

<table>
<thead>
<tr>
<th>Business Sector:</th>
<th>Aerospace</th>
</tr>
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<tbody>
<tr>
<td>Application Area:</td>
<td>Command and Information System</td>
</tr>
<tr>
<td>Key Words:</td>
<td>Requirements capture, JAVA Language</td>
</tr>
<tr>
<td>Technologies/Methodologies/Tools:</td>
<td>Large systems modelisation and behavioural simulation</td>
</tr>
</tbody>
</table>

BUSINESS MOTIVATION AND OBJECTIVES
The aim of ARRIBA is to improve customer's requirements capture process by using behavioral simulators. In this experiment, AEROSPATIALE wants to qualify hypermedia and web techniques to develop such simulators in C3I systems. Those emerging technologies are expected to allow designers to build the same quality of simulators at lower costs, in shorter schedule and with the full support of the customer. The proposition enlightens the great importance of the requirements capture to build systems that match customer's needs.

THE EXPERIMENT
This PIE will be based on using a new technology (INTRANET and JAVA Language) through a parallel development of a large SCCOA sub-system behavioural simulator.

SCCOA is the Control Command Communication and Intelligence (C3I) system under continuous improvement for the French Air Force. It deals with over 50 sites, 5000 people, 300 planes, 1000 connected computers... The overall system breakdown structure holds about 2000 objects (either functions breakdown, data, activity tables...).

The behavioural simulator supports the requirements capture and analysis activities performed by the contractor, as well as the requirements validation performed by the customer.

EXPECTED IMPACT AND EXPERIENCE
Ensuring the same quality of simulators, the expected results are given below:

- 4 to 6 months behavioral simulator development Vs 8 months with actual technology,
- 50KF target systems instead of the 300KF actually targeted for those simulators,
- 50% development costs cut,
- not specialized people to develop such simulators
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Start date: 01/03/97

Duration: 14 months
### Esprit Project 23962 - COCOSPIE
IMPROVEMENT OF EFFORT, COST ESTIMATION AND COST CONTROL

<table>
<thead>
<tr>
<th>Business Sector:</th>
<th>Embedded and Control Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application Area:</td>
<td>Communication systems, avionic systems</td>
</tr>
<tr>
<td>Key Words:</td>
<td>cost models, cost estimation, cost control, cost and effort metrics</td>
</tr>
<tr>
<td>Technologies / Methodologies / Tools:</td>
<td>Function point, COCOMO</td>
</tr>
</tbody>
</table>

**BUSINESS MOTIVATION AND OBJECTIVES**
The growing competition in the software business constantly increases the pressure on companies’ potential profit margins, intensified even by low price offers from Eastern European countries. Therefore a reliable effort and cost estimation becomes a major concern for many software vendors.

As a significant amount of Philotech’s offers were rejected, because effort and cost were estimated to high and up to 25% of the projects ended without a profit or even with a loss, Philotech identified the effort and cost estimation and control as the part of the development process to be improved. To gain the capability to estimate the effort and cost of all projects within a sufficiently narrow confidence interval is the objective of this experiment.

**THE EXPERIMENT**
After evaluating the available cost estimation methods and tools, data of suitable former projects accomplished by Philotech will be inserted into a project database and used to calibrate the parameters of the selected cost estimation model and tool.

Finally, the Baseline Project, which is typical for Philotech’s area of software development, serves to validate the calibrated model(s) and tool(s). The estimated effort and cost figures, provided by the calibrated model/tool will be compared to the real effort and cost of the Baseline Project.

**EXPECTED IMPACT AND EXPERIENCE**
The experience gained during the PIE should give Philotech the capability to estimate the effort of all projects within a margin of 10 to 15% and to perform all projects within budget. Philotech plans to form a team of experts to support and train the staff of the company in estimating effort and cost for software projects. Additionally, this training will also provide them with the knowledge to early identify cost drivers in a project and to take timely measures to decrease the cost drivers’ negative impact.
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Start date: 03/03/97

Duration: 17 months
Esprit Project 23971 - VIGOROUS
VERSION MANAGEMENT WITH SOFTWARE REUSE ACROSS MULTIPLE PLATFORMS AND PROJECTS

<table>
<thead>
<tr>
<th>Business Sector:</th>
<th>Development of embedded processor applications according to customer specifications.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application Area:</td>
<td>Instrumentation, development tools, process control, communication, offshore.</td>
</tr>
<tr>
<td>Key Words:</td>
<td>Reusable Software modules, Version management, Configuration management, C/C++ source Libraries for Embedded processor, C/C++ source Libraries for Multiple-platform development.</td>
</tr>
<tr>
<td>Technologies / Methodologies / Tools:</td>
<td>Optimisation strategies for Collection, Documentation and Maintenance of Reusable Software modules. for software version handling.</td>
</tr>
<tr>
<td>CASE tools</td>
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</tbody>
</table>

BUSINESS MOTIVATION AND OBJECTIVES
To reduce the time and cost overhead associated with collection, documentation and maintenance of reusable software modules.

A base of reusable software source modules and drivers creates a software foundation, which significantly reduces the total development time for a software project and time-to-market for new projects. Such a software base contributes significantly to the competitive power of a company.

Normally reusable software modules will be extracted from on-going software development projects, and adapted and documented for reuse in future projects, and as time evolve the most popular software modules usually exist in multiple versions for different embedded processor types and platforms.

The goal with this PIE is to be able to increase the birth-rate of reusable software modules and to prolong the operational lifetime of existing reusable modules, with a minimum effort in hours of work.

The focus will be on achieving better management and design methods with respect to potential reuse, so the amount of software modules, which afterwards can be extracted from the existing designs and incorporated in the base of reusable software source modules, are increased. An important underlying part of this reuse management improvement is better capability to keep track on current version and revision state of the reusable software modules during the continuously on-going extraction and updating process.
THE EXPERIMENT
The experiment will be carried out over 2 software development projects (customer development orders) where reuse characteristics for the projects are measured. During the preparation phase of the PIE new CASE tools are taken in use, and new strategies are introduced. The first customer order acts as a reference and the reuse improvements are measured after the following customer project.

EXPECTED IMPACT AND EXPERIENCE
The expected result from the PIE experiment is better capability to create and maintain a larger number of high quality and portable SW modules at a lower cost. To ensure the long-term effect of the PIE result RAMTEX Engineering expect to end up with a practical set of general project management and software design guidelines. These guidelines (“How to create and maintain reusable and portable software modules with minimum time and cost overhead”) will be available via our WWW home page for use by programmers and managers of software development projects.

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Start date: 15/04/97
Duration: 15 months
BUSINESS MOTIVATION AND OBJECTIVES
Market openness, technological variety and rising customer expectations are forcing vendors in the field of telecommunications to come to market faster with higher quality products. Bosch Telecom as a developing and manufacturing company in this area is obliged to react to these requirements. Currently used system test methods, notations and environments are expensive, difficult to use and very time consuming. With the ISO standard 9646 including TTCN (Tree and Tabular Combined Notation) a growing technology has been established to overcome most of these problems. The main objective of the experiment is to reduce effort and development time by the automation of the test derivation process and by the reuse of formal test case descriptions.

THE EXPERIMENT
The experiment will use TTCN to introduce a formal notation for specifying abstract system test cases which are then automatically transformed into executable programs. These may be used and reused at system test but also during development and maintenance. Thus the experiment consists of two steps. The first step is the system testing of a product feature with TTCN, by means of the specification, translation and execution of TTCN test suites. The second step is the integration of a TTCN test system in the development environment, and the use of that system together with the test suites arising from the first step. The baseline project will be the comparable test tasks of the private communication network division performed with the presently prevailing development and test methods. The software department employs approx. 120 employees, 80 of them involved in the release development of the communication network which includes the baseline project.

EXPECTED IMPACT AND EXPERIENCE
Bosch Telecom expects to gain expertise in using a formal test specification language and an automated test environment to reduce testing effort, thus shortening development by 10 % (e.g. 150 KECU per release) and reducing test effort during customer-specific adaptation or maintenance (e.g. 5 KECU each).
The main expected experience is the winning of developer acceptance for a formal language and the investigation of the possibilities for using TTCN in the integration phase.

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**Start date:** 01/03/97

**Duration:** 18 months
BUSINESS MOTIVATION AND OBJECTIVES
The overall goal of the PIE is to strengthen the competitiveness of Schneider Automation GmbH (ASAD) by improving continuously our software development and maintenance process. The technical objective is to define, implement and evaluate a metrics system for our software development process with the best cost/benefit ratio.

THE EXPERIMENT
The PIE will be performed on a baseline project. In addition one or two other projects will be used for verification purpose. In the first step we will apply and test distinct metrics approaches on different phases of the software process of the baseline project. Next we will select those types of metrics with the best cost/benefit ratio and practise them in other projects. The results of these experiment will be carefully recorded, analysed and evaluated to find our best choice.

Finally the experience and knowledge learnt form the PIE will be disseminated both within our organisation and to external audience. In order to assure an efficient approach for the PIE we will involve appropriate consultancy.

EXPECTED IMPACT AND EXPERIENCE
After the PIE there will be a well established metrics system all over the software life cycle. The knowledge of the PIE and on metrics widespread in the company. The created experience database will help to develop future products with higher quality and reduced development time.
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Start date: 01/03/97

Duration: 18 months
Esprit Project 23982 - QUALIMET
IMPROVING SOFTWARE PRODUCTS QUALITY THROUGH THE USE OF METRICS

<table>
<thead>
<tr>
<th>Business Sector:</th>
<th>Industrial Processes Automation and Telecommunication.</th>
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</thead>
<tbody>
<tr>
<td>Application Area:</td>
<td>Process Monitoring and Control.</td>
</tr>
<tr>
<td>Key Words:</td>
<td>Software Quality, Metrics, Style Norms, Source Code, C++.</td>
</tr>
<tr>
<td>Technologies / Methodologies / Tools:</td>
<td>C++ Style Norms, Software Quality Metrics.</td>
</tr>
</tbody>
</table>

BUSINESS MOTIVATION AND OBJECTIVES
Quality requirements of industrial software are very high and the correctness of the source code is of great importance for this purpose. Traditionally, the correctness of a program has been checked through an exhaustive set of test cases that usually consider the program as a black box. It is well known that it is impossible to check the whole behaviour of the program through exhaustive tests, so an static analysis of the source code at an early stage can be of great help in order to pay special attention to those parts of the source code that are specially complex or not well written. The objective of QUALIMET is to improve this software development process, introducing a set of style norms to be used when coding in C++, and a set of metrics to be used on the source code in order to check its quality.

THE EXPERIMENT
The QUALIMET experiment will consist on the introduction of a methodology for analysing the correctness of the source code. This experiment will be carried out in the context of the development of a small distributed control system based on a PC network for process monitoring and control. The development in C++ of this small tool, following an object oriented methodology, will be the baseline project. The different aspects of the methodology that will be covered under the experiment are the following:

- Definition of a set of style norms to be used when coding in C++.
- Selection of software quality measurement tools suitable for their use in C++ source code.
- Selection of a set of metrics to be applied on the C++ source code.
- Usage of the selected style norms and metrics for C++ in the baseline project's source code.

The conclusions obtained through the experiment will allow to refine its results in order to be used in future applications.

ROBOTIKER employs 99 people, 68% of them are involved in software development.
EXPECTED IMPACT AND EXPERIENCE
After the end of QUALIMET, ROBOTIKER will incorporate these quality assurance techniques into its current methodology for developing software, in order to have a complete methodology that guarantees software products quality, minimising the complexity of the code earlier in the programming process, yielding more maintainable and less error-prone software and improving the quality of the software and the satisfaction of its customers.

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Start date: 01/03/97
Duration: 18 months
BUSINESS MOTIVATION AND OBJECTIVES
In a context of increased world-wide competition experienced by European companies and faced with US initiatives, improvement of the software intensive systems process is becoming a strategic issue for competitive improvement of the industry. The POSE experiments will help by validating the applicability of the model within the industry, reduce the risk of adoption, and provide an easier means of implementing improvement actions.

THE EXPERIMENT
To achieve the above objectives the work has been split into the following Work Packages.
Management: To handle the overall co-ordination of the project, relationship with sub-contractors, the EC and the wider user community.
Staged Model Preparation: To establish the POSE reference model for immediate use, to consolidate it for future use and dissemination.
Initial Assessment: To operate the technology transfer from the theoretical approach thus prepared to its use on projects.
Experiments: To conduct one experiment at each site focusing on specific domain and organisation related issues.
Final Assessment and Results: To perform a new assessment at the end of the POSE project in order to evaluate the progress accomplished.
European Systems Engineering Process Improvement: To prepare and disseminate validated material to be used by the wider community interested in systems engineering process improvement.

EXPECTED IMPACT AND EXPERIENCE
Results and impact: Related to business aspects, the expected impact is, for Thomson-CSF operational Units, to realise that process improvement is a key element in improving competitiveness. By providing a framework and guinea-pig experiments, POSE will speed up this awareness.
Plans for the future: If POSE is successful, the assessments and their associated improvement plans could then be organised within all Thomson-CSF Units, according to an appropriate schedule.
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email: Ian.Campbell@ttm.thomson.fr

Participants:
THOMSON TRAINING & SIMULATION S.A.
THOMSON - CSF AIRSYS S.A.
SYSECA Ltd
SIGNAALAPPARATEN BV
F
F
UK
NL

Start date: 01/05/97
Duration: 18 months
BUSINESS OBJECTS APPROACH IN RAPID DEVELOPMENT

**Business Sector:** (IS) Software consultancy and supply, data processing and related services.

**Application Area:** Software development (Analysis, Coding, Testing)

**Key Words:** Object-Orientation, Business-Objects, RAD Components, Reusability

**Technologies / Methodologies / Tools:** Component Architecture, RAD, OOP, Rational Rose

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**BUSINESS MOTIVATION AND OBJECTIVES**

Increase in cross-project reusability, enabling Sunsoft to be more productive and more effective in addressing new vertical markets, without sacrificing product quality and reliability. Production of modular software, thus increasing the flexibility to incorporate new technologies in user interface and database management systems, which will keep the company in the edge of technology. Improvement of test procedures by introducing test plans for the whole product and automating the test phase, thus increasing software reliability and robustness and reducing maintenance costs.

---

**THE EXPERIMENT**

The main task of the experiment is to produce a pattern or a set of guidelines, that will be used to clearly identify each component. The concepts behind the CORBA guidelines will be used to strictly define the term “Component” as it is perceived by it’s intended use in the Sunsoft development environment. Subsequent tasks are to identify components in the targeted baseline applications and evaluate the efficiency of these identification guidelines. A repository of basic “Components” will be build so that reusability issues will be addressed and properly measured.

---

**EXPECTED IMPACT AND EXPERIENCE**

The use of Object Oriented techniques in analysis, design and coding, the introduction of Business Components in the software production process and the use of automated testing procedures are expected to increase cross-project reusability, reduction of development and maintenance time and effort, increase of product quality and robustness and provide the company with a mechanism to capture and reuse the experience gained from each finished project. The clear separation of the Application, User Interface and Data Base domains is considered of prime importance as it will result in the effective incorporation of technology innovations in the last two domains.

The overall experience that will be gained in the application of object oriented methods and automated testing procedures is considered of great value, both for the development and the management and marketing people.
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Start date: 01/05/97

Duration: 17 months
BUSINESS MOTIVATION AND OBJECTIVES
The development of software according to a total quality model is becoming fundamental for the success of a software company. For this reason Softwareuno intends to obtain the ISO 9001 certification. A fundamental step towards reaching the required degree of quality is the application of a sound configuration management methodology. This is particularly true when visual programming techniques are adopted, since the structure of a system is less linear than in the traditional approach.

The introduction of a configuration management method will allow Softwareuno to achieve objectives like: decreased costs of the production, installation and maintenance of its products; a higher degree of safety and awareness in the process of change; a decreased number of errors due to a bad configuration of a software package; a greater degree of the customers’ satisfaction; a greater control on the actual status of the product.

THE EXPERIMENT
The achievement of the objectives above will be to obtain introducing a Configuration Management method with support of an existing tool (e.g. SourceSafe, ClearCase, CVS or Continuous).
A constant control and support of all the activities related to the use of the Configuration Management procedures will be granted to the developers in order to obtain a correct and effective use of the tool. A series of statistical data will be gathered.
The experiment is part of a greater software application called Ospiti, which consists in an integrated solution to the global management of old people’s homes.

Softwareuno employs 20 people, 10 of them are involved in the Ospiti project.

EXPECTED IMPACT AND EXPERIENCE
Greater speed in the updating of the products, costs saving due to less effort spent in Configuration Management activities, increased control on the status of a software package, increased safety when changing a product, are all expected results.
The creation of new professional roles (related to the activities of the maintenance of the releases and the configurations for different customers) and the raising of the quality culture inside the company are complementary goals.

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**Start date:** 01/03/97  
**Duration:** 18 months
Esprit Project 24053 - OMP/CAST
OM PARTNERS/COMPUTER AIDED SOFTWARE TESTING

<table>
<thead>
<tr>
<th>Business Sector:</th>
<th>Consulting and software development</th>
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<tbody>
<tr>
<td>Application Area:</td>
<td>Decision support systems in production planning and logistics</td>
</tr>
<tr>
<td>Key Words:</td>
<td>Software testing, product quality, management, databases, GUI, platform software</td>
</tr>
<tr>
<td>Technologies / Methodologies / Tools:</td>
<td>Regression testing, coverage analysis, version control</td>
</tr>
</tbody>
</table>

**BUSINESS MOTIVATION AND OBJECTIVES**

Our software systems are becoming more and more important for the daily operation of our customers. It is therefore necessary to deliver extremely reliable and stable software. On top of this, a rapidly evolving environment necessitates short time to market cycles. In this context, automated software testing provides a way to perform tests more consistently and more systematically. The objective of our experiment is therefore to increase software reliability and stability, and shorten time to market cycles for our generic modules. We want to decrease the time spent providing customer support solving software anomalies. This will allow us to implement a great product variety without loss of reliability.

**THE EXPERIMENT**

The experiment will consist of the following actions:

- Market survey, selection and acquisition of a software testing tool
- Installation of a measurement method
- Set-up of the test environment
- Experiment with change management of the testing environment in the light of software evolutions (releases)

The development process of our OMP/Master Production Scheduling software will be used as a baseline project. This system runs on a database, and is strongly oriented towards its graphical user interface. It consists of approximately 200,000 lines of C-code, some of which is shared with other products.

**EXPECTED IMPACT AND EXPERIENCE**

OM Partners n.v. expects to be able to increase even further its software quality while shortening the time to market of new releases. We intend to decrease the time spent on customer support due to software anomalies, while providing a large product customisability. This will be obtained thanks to a reduction of the time spent on executing a test session, resulting in higher test frequency.

After finishing the experiment, we foresee the application of the newly acquired know-how on the development process of our other products. To this end, work instructions will be established.
A future process improvement might consist in the implementation of a help desk tool, customer satisfaction being a continuous concern of OM Partners n.v.

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**Start date:** 01/05/97  
**Duration:** 18 months
Esprit Project 24060 - PSP-NC
PERSONAL SOFTWARE PROCESS IN NUMERICAL CONTROL PRODUCTION ENVIRONMENT

<table>
<thead>
<tr>
<th>Business Sector:</th>
<th>Manufacturing</th>
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<tbody>
<tr>
<td>Application Area:</td>
<td>Numerical Controls for machine tools</td>
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<tr>
<td>Key Words:</td>
<td>PSP, Personal Software Process, Individual motivation and measurement,</td>
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<td>Technologies / Methodologies / Tools:</td>
<td>PSP, Personal measurements</td>
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BUSINESS MOTIVATION AND OBJECTIVES
The critical factor in producing NCs is definitely the software. For our business we need: More reliable software, less time dedicated to the software maintenance, reduced time to market, better prediction of the time to market.

THE EXPERIMENT
A significant improvement in software quality is only possible if each software engineer really wants to achieve it.

ISO 9000 or other organisational rules are frequently applied in stereotyped way, thus reducing and even vanishing the possible benefits. Each software engineer should be in a kind of competition with himself and his previous results. Each software engineer should be motivated to use a disciplined personal process, partially defined by himself and fitting his needs.

The Personal Software Process (PSP), defined by Watts Humphrey (of the Software Engineering Institute at the Carnegie Mellon University) in his recent book “A Discipline for Software Engineering” takes precisely this point of view. This experiment aims at introducing the PSP in the company.

EXPECTED IMPACT AND EXPERIENCE
The main objectives are: Number of faults per Mloc, reduced to 25%. Maintenance effort, reduced to the 10% of the total development effort. Productivity, 25% improvement. More accurate prediction of the projects planned duration (<1,2). Improved motivation of the staff.
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Start date: 01/03/97
Duration: 18 months
BUSINESS MOTIVATION AND OBJECTIVES
Localisation of software is complex and presents difficulties in version control. Some software products include thousands of separate items (source code, bitmaps, etc.). This factor coupled with severe time pressure brought to bear by the client’s requirement to ship the product and its localised versions simultaneously makes it increasingly difficult to avoid the difficulties caused by loss of version control.

The main motivation for this PIE is to meet the following challenges with effective software configuration management:

- To reduce by 50% the incidence of incorrect configuration when versions of software products are released, avoiding the need for rework and thereby increasing customer satisfaction.
- To provide better control over the defect correction process, reducing by 50% instances of reported defects being missed or recurring after having been corrected.
- To allow control to be exercised over changes to products so that the complete change history for any component of any product version is available, showing who made each change, when it was made and why.

THE EXPERIMENT
The stated objectives will be achieved through improvement of configuration and change management.

Clockworks will define procedures for configuration management and defect correction at an early stage in the PIE, enlisting the aid of a human factors consultant. A tool or tools to support the procedures will be chosen that can support the complexity of version control in software localisation. The methodology used by Clockworks in software localisation will be modified dependent on the choice of configuration management tool.

The chosen procedures, methodology, and tool will be used during the course of the baseline project in the localisation of a software package through all stages including evaluation, project preparation, translation and engineering, assembly and checking, and delivery to client. The new procedures will be designed so that, at each stage in the baseline project, all parties involved will be aware of the status of every piece of software.

EXPECTED IMPACT AND EXPERIENCE
Clockworks expects to improve its delivery of localised software in terms of timeliness and accuracy. We also expect to improve the process of project management within the company by making accurate information available immediately to all concerned. The successful implementation of this PIE will decrease our dependency on key individuals and allow ease of dissemination of information regarding specific projects.

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**Start date:** 01/03/97

**Duration:** 12 months
Esprit Project 24078 - IMPACTS2

IMPROVEMENT OF PROCESS ARCHITECTURE THROUGH CONFIGURATION AND CHANGE MANAGEMENT AND ENHANCED TEST STRATEGIES FOR A KNOWLEDGE-BASED TEST PATH GENERATOR

<table>
<thead>
<tr>
<th>Business Sector:</th>
<th>Software consultancy and supply for analog and digital railway components</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application Area:</td>
<td>Test path generation for analogous circuits</td>
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<tr>
<td>Key Words:</td>
<td>Configuration management, change management, testing</td>
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<tr>
<td>Technologies / Methodologies / Tools:</td>
<td>Configuration &amp; Change-Management, Testing</td>
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</table>

BUSINESS MOTIVATION AND OBJECTIVES

DTK is developing a knowledge-based test path generator for safety relevant analogous hardware components for the use in the railway environment. High transparency, high traceability up to the developer in the case of incidents and very high product quality is required. It will be demonstrated how the process architecture for this test path generator can be improved by applying configuration & change management methods as well as enhanced test strategies.

THE EXPERIMENT

The development process shall be significantly improved by focusing on two key areas of SPI: testing and configuration & change management. Thus the PIE will deal with the following:

1. Introducing configuration & change management techniques and tools,
2. Introducing systematic testing methods and procedures, supported by suitable tools.

The PIE will concentrate on that part of the software that is already multiply reused under different configurations. This part would benefit most and has the most significance for the successful evaluation of techniques and tools. It will be referred to as the baseline project.

EXPECTED IMPACT AND EXPERIENCE

DTK expects to gain know-how on optimising its software development process with respect to configuration & change management and testing. Improved effort, time and cost estimations and planning of future projects will be achieved through enhanced test strategies, reliable managing of software documents as well as fast handling of change requests.
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Start date: 01/03/97
Duration: 15 months
Esprit Project 24085 - INTRASUPPORT
SOFTWARE PROCESS SUPPORT IN THE INTRANET USING THE LIVELINK PRODUCTS

<table>
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<tr>
<th>Business Sector:</th>
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<tr>
<td>Application Area:</td>
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<td>Key Words:</td>
<td>Intranet, Groupware, CSCW</td>
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<td>Technologies / Methodologies / Tools:</td>
<td>Intranet, Lotus Notes, Visual Planner</td>
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</tbody>
</table>

BUSINESS MOTIVATION AND OBJECTIVES

ICL Data Oy is a major software systems integrator, and one of the leading suppliers of client-server, Internet, and Intranet based systems in Finland. Within the company, custom software and applications are being developed by approximately 400 people. In addition to small and medium sized upgrades for existing systems, approximately fifty substantial customer projects are completed each year. Therefore, ability to increase the efficiency and productivity of the software development processes is of key importance for the future success of the company. The objective of the IntraSupport PIE is to improve the management of custom software development projects conducted within ICL Professional Services. In this PIE, therefore, special emphasis is on the management of project schedules and the estimation of work efforts of individual tasks in software development projects.

THE EXPERIMENT

Within the Baseline project, a customised Data Warehouse application for executive reporting and decision making will be developed. The system will include (1) an object-oriented database management module, (2) an interface module to external databases and (3) a reporting and graphical user interface module. The Data Warehouse application will be developed according to customer requirements, and the Baseline project will include the entire development life-cycle, from the requirements definition phase to the final installation and acceptance testing phases. Within the Experiment, based on data from prior similar projects, management of the Baseline project will be improved through defining and implementing project management related document templates for defining detailed schedules and work effort estimates for the different phases of development. Project management related templates will be developed, e.g., for the acquisition of customer requirements, for defining the system requirements and system architecture, for quality assurance, for configuration management, for testing, and for taking the system into use.

EXPECTED IMPACT AND EXPERIENCE

The anticipated benefits from the PIE will come from improving the process along the following dimensions: (1) timetable predictability, (2) work effort predictability, (3) productivity, and (4) ease of use of project management methodologies. An improved SW engineering process with document templates and a common
structure of activities and controls are seen as a way to improve the overall predictability of projects. Intranet is seen as a platform for distributing and maintaining the process across several divisions in an effective way.

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**Start date:** 01/05/97  
**Duration:** 16 months
Esprit Project 24091 - TOPSPIN
TEDOPRES PROJECT FOR SOFTWARE PROCESS IMPROVEMENT

Business Sector: Technical documentation
Application Area: Interactive electronic documentation systems (IEPC / IETM)
Key Words: Project management, project planning, requirements management, cost estimation, project monitoring,
Technologies / Methodologies / Tools: Project management

BUSINESS MOTIVATION AND OBJECTIVES
The company’s main product, technical documentation, is undergoing a fundamental change from paper-based systems to electronically based systems. There is a need to develop client specific, high quality database systems. Technical and software expertise for this purpose is well-developed, but project management lacks behind. In order to meet timely completion very often extra effort has to be put in, resulting in exceeded budgets and therefore commercial losses on projects. The objective of the project is to counterbalance this situation by concentrating on improving some of the management aspects of new development project and bring them to a normal level of profitability.

THE EXPERIMENT
The experiment will be performed in the course of a major development project for interactive electronic technical manuals combined with an interactive electronic parts catalogue for a company in forestry machinery. Improvements will be implemented in the following fields of project management:: analysis of requirements, systematising functional specifications, project planning and budgeting efficiency improvements relating to the process of development (administrative and technical) and project monitoring by generating new information on essential parameters. A better understanding of the customer’s demands and wishes is an essential input for good project planning and project execution.

Tedopres B.V. employs 70 people, of which 12 will be involved in the project which will concentrate on the work in the Interactive Electronic Documentation Department.

EXPECTED IMPACT AND EXPERIENCE
Through the project Tedopres will gain knowledge and experience to better prepare and plan projects on the basis of customer’s requirements and to keep the projects in well-defined limits of costs and time, creating a positive margin on the projects.
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Start date: 17/03/97

Duration: 15 months
Esprit Project 24099 - AMPIC
APPLICATION OF METRICS FOR PROCESS IMPROVEMENT FOR SAFETY CRITICAL SOFTWARE

<table>
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<tr>
<th>Business Sector:</th>
<th>Telecommunication, navigation</th>
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<tr>
<td>Application Area:</td>
<td>Voice communication systems for air traffic control, navigation systems for aircraft</td>
</tr>
<tr>
<td>Key Words:</td>
<td>Metrics, safety-critical, real-time programmable logic controller</td>
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<tr>
<td>Technologies / Methodologies / Tools:</td>
<td>AMI approach for metриcation</td>
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</table>

BUSINESS MOTIVATION AND OBJECTIVES
We experience problems with completing development projects within time and cost limits, and this is mainly caused by an increasing amount of software in the products. The amount of safety-critical software will increase in new development projects. Hence the quality for customers, and development process itself must be improved in order to demonstrate the quality for customers, and also in order to comply with very strict certification standards.

THE EXPERIMENT
Objective: We want to develop suitable metrics for software development projects in order to improve estimation, expose problem areas, and also in order to improve the development process itself in respect of quality and productivity.

Methodology: The planned methodology for the project is to follow the AMI approach as described in the AMI handbook, which was developed in an earlier ESPITI project.

Baseline projects: The experiment will be linked to two baseline project parallel in time, at former Normarc and GAREX respectively. The first one being a project for landing of aircraft based on satellite navigation, and the second one will cover two new releases of software for a voice communication system used in air traffic control.

Experiment plan:

- Assessment and development of metrics for both baseline projects and also for the PIE project itself.
- Metrification of a limited number of software modules in both baseline projects
- Assessment and evaluation of results from phase 1
- Improvement of metrics and development of new ones
- Metrification of a new set of limited software modules in both baseline projects
- Assessment and evaluation of results from phase 2
- Final evaluation and conclusion

EXPECTED IMPACT AND EXPERIENCE
• More accurate estimates and improved control of risk explosion, leading to better decision making.
• A more cost-effective development process, hence an increase in net margin.
• A common database of experience data, probably built upon existing release database at GAREX.
• Metrication defined as a standard activity within a Common Development Methodology (CDM).
• A better ability to prove quality towards customers, hence an increase in market share.
• A significant reduction in reported errors during system tests.

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Start date: 18/03/97
Duration: 18 months
BUSINESS MOTIVATION AND OBJECTIVES

SAET has three domains of activity: design and production of energy production, transmission and distribution systems; design and production of weighing, dosing and mixing systems; design and production of industrial automation systems. As regards safety, the strict quality standard EN89/392/September 93 is applied.

This traditional business, rooted in electrical engineering, has become more and more software intensive in the last three years. Today 10 employees of the company out of 40 are involved in software production. While customers demand greater reliability and cost effectiveness, the company was able to obtain productivity and quality improvements in the traditional part of its business, but not in software production. On the contrary, this still minor part of the business is causing an increasing part of faults and delays.

To gain control of software production, SAET decided in 1995 to set up for its software department a ISO9001 compliant quality system. The quality system is, up to date, paper oriented and has a number of drawbacks: waste of time, both from the staff and the quality manager, for clerical tasks, negative influence on the attitude of staff towards the quality system. The risk is high that, on the long run, the quality system be abandoned or have a negative effect on productivity.

The objective of this PIE is to improve the efficiency and effectiveness of the quality system. In measurable terms this means reduction in effort by staff using the quality system of 30%, productivity of quality manager improved 30%; 75 % of staff globally satisfied and having a positive attitude towards the quality system; reduction in number fault reports from installed software and rework effort.

THE EXPERIMENT

This project aims at automating the clerical tasks of the quality system (document search and retrieval, communication of documents, access to the quality manual, access to quality sheets and logs, measures collection and processing), by exploiting as much as possible the context of the organisation: a PC for each staff member, PCs connected by a LAN, MS Office tools on each PC.

The experiment, after an initial assessment dedicated to detailed analysis of the current situation of the quality system, will redesign the quality system, both to automate it and to adapt it to automation. Then the staff will be trained on the new
QS and the new QS experimented on a baseline project (a monitoring and control system for an hydroelectric plant ). Feedback from the experiment will be used to modify and improve further the QS.

**EXPECTED IMPACT AND EXPERIENCE**

**TECHNICAL IMPACT**  We expect that the productivity of work dedicated to the quality system will substantially improve. This means less time dedicated by the staff to the QS, more time for relevant work on the QS available for the quality manager.

**HUMAN FACTOR IMPACT**  Much more important, on the human factor side we expect that, reducing (possibly to zero) clerical quality tasks, the staff will change positively its attitude towards the QS, will consider the time dedicated to it a kind of value added, instead of time lost. This can produce a positive feedback effect: people more motivated to work with the QS, better products produced, more motivated people.

**COMMERCIAL/ORGANISATIONAL IMPACT**  We expect that the automation of the QS will make immediately available indicators (measures) of the state of projects, products, and the company in general. These are strategic data not available today because of the difficulty in processing data in paper form.

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**Start date:** 01/03/97  
**Duration:** 18 months
BUSINESS MOTIVATION AND OBJECTIVES
Testing is a significant task in all software development projects, but as long as software localisation is considered testing is the task with the major role. The quality of testing is directly connected to the quality of the localised Software that will be delivered back to the client and it constitutes the 53% of the overall software localisation costs. Failing to perform efficient testing, may lead to a decrease of the quality or fail to meet the project deadlines, both disastrous for the customer and the localisation service provider. Such inefficiencies are usually identified at the very end of the project, when a corrective action is very expensive and sometimes leads the whole localisation project to a clear loss. On the other hand, without having established a mechanism to determine when testing should be stopped, the project manager takes serious risks either by "over-testing" a product or by "under-testing" it. The ARETES project wishes to adopt and evaluate Software Reliability Engineering (SRE) methods in order to achieve close follow-up of the testing process, early failure detection, early prediction of delays, identification of testing team weaknesses and judgement when to stop testing.

THE EXPERIMENT
The SRE methodology imposes first of all the preparation of an Operational Profile for the product under test. The Operation Profile is defined as a set of operations that the software can execute along with the probability with which they occur and it aims at the identification of the part of the software that attracts the majority of the usage by a specific user profile. It helps testing teams to plan test activities, generate test cases and select test runs. In guiding regression testing, it tends to find, among the faults introduced by changes, the ones that have the most effect on the reliability.

The SRE methodology provides the ability to evaluate, at any phase of a software localisation (or development) project, the reliability factor of the product, with the application of a software reliability model. A software reliability model specifies the general form of the dependence of the failure process that affect it: fault introduction, fault removal and the operational environment. The failure rate of a system is generally decreased due to the discovery and removal of software failures. At any particular time it is possible to observe a history of the failure rate of the software. Software reliability modelling forecasts the curve of the failure rate by statistical evidence. The purpose of this evidence is twofold: (1) to predict the extra
time needed to test the software to achieve a specified goal; (2) to predict the expected reliability of the software when the testing is finished.

EXPECTED IMPACT AND EXPERIENCE
Software Reliability Engineering is a sector that has not yet been applied in the software localisation process. Archetypon wishes to evaluate its application and has specific expectations from the ARETES project: a significant reduction in testing costs, an increase in testing productivity, earlier failure detection for severe failures, a reduction in customer-reported problems and an increase in accuracy of prediction of a project's ending date. Of course, the experience gained by the ARETES project, can be of interest not only to the software localisation market but also to the whole software industry, since SRE provides methods to achieve better resource management, more efficient use of resources, opportune product delivery to the customer, early identification of problems in the performance of the development team and significant reduction of software maintenance costs.

Looking for more details

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Start date: 01/03/97 Duration: 12 months
Esprit Project 24149 - PROMISED
PROCESS IMPROVEMENT IN INTELLIGENT SIMULATION ENVIRONMENT
DEVELOPMENT PROMISED

<table>
<thead>
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<th>Business Sector:</th>
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<tbody>
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<td>Application Area:</td>
<td>Simulation Environments</td>
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<tr>
<td>Key Words:</td>
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<td>modelling, User defined metrics,</td>
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<td></td>
<td>Traceability and configuration</td>
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<td></td>
<td>management</td>
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<tr>
<td>Technologies / Methodologies / Tools:</td>
<td>ISO-SPICE model, Object Orientation, Concerto / SKIPPER</td>
</tr>
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</table>

BUSINESS MOTIVATION AND OBJECTIVES AND THE EXPERIMENT

The PROMISED experiment aims to increase the level of maturity of CSTB’s development process from its current status where procedures are performed on the basis of individual knowledge to a higher level of maturity (SPICE Level 3 - Well defined) where processes are described in a formal way and therefore can be repeated by new contributors.

The SPICE assessment of CSTB’s current software process revealed the limits of this process and possible ways of improvements. The experiment will focus on the following improvements:

- process modelling including user-defined metrics
- traceability management
- configuration management.

The tool chosen for the experiment is Concerto/SKIPPER of SEMA Group (F). The baseline project (ISE v3) developed by the SDSC (Software Development and Software Certification) team aims to develop an Intelligent Simulation Environment in order to allow encapsulation, at a reasonable cost, of various simulation tools in a homogeneous and user-friendly application. CSTB employs 560 people, 13 of them are members of the SDSC team.

EXPECTED IMPACT AND EXPERIENCE

The expected results of the experiment are improvements of CSTB’s development process. These improvements will be measured in order to quantify the impact of the tested solutions in relation with their costs. This information will then be used as an input for a decision making process aiming to define relevant milestones for a total quality approach applied to the software development activities of the organisation.
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**Start date:** 17/03/96  

**Duration:** 18 months
Esprit Project 24153 - VISTA
VISUALISATION SOFTWARE TESTING AUTOMATION

<table>
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<th>Business Sector:</th>
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<tr>
<td>Application Area:</td>
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<tr>
<td>Key Words:</td>
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<td>Technologies / Methodologies / Tools:</td>
<td>Automated testing tools</td>
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**BUSINESS MOTIVATION AND OBJECTIVES**
Software testing presently takes typically 30-50% of the total cost of visualisation software development. Multi platform applications require more testing effort than single platform applications. The cost of testing can be reduced at least by a factor of two through the use of automated testing. There are direct effects from the faster execution of the test and the repeatability of the test. The quality of testing will improve through optimisation of the tests.

These advantages also enable a shorter time to market. A more rapid response to demands from the market can be given. Automated testing therefore will significantly improve the competitive power of ECN and thus is an important factor in achieving the above described business goals.

**THE EXPERIMENT**
The PIE concerns the introduction of automated testing tools to the testing of visualisation software. ECN develops visualisation software of various degrees of sophistication (from Computational Steering to GUI's) and extension (from single platform to multi platform, from single machine to client-server applications). The PIE is to that end coupled to the testing phases of the baseline project, which is the upgrade of a graphical editor and viewer of geometry models of nuclear systems, to be used in conjunction with a particular physics calculation programme.

**EXPECTED IMPACT AND EXPERIENCE**
The prime anticipated benefit is cost saving in the software testing phase by a factor of at least two. Additional benefits are reduction of the release time and time to market and compliance to ISO 9000.
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Start date: 01/07/97

Duration: 12 months
Esprit Project 24155 - LANHOBEK
CLIENT RELATIONSHIPS AND REQUIREMENT MANAGEMENT IMPROVEMENT ANHOBEK

<table>
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<th>Business Sector:</th>
<th>Software consultancy and supply, data processing and related services.</th>
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<td>Application Area:</td>
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<td>Key Words:</td>
<td>Requirements acquisition, requirements management, change management, Quality assurance.</td>
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<td>Technologies / Methodologies / Tools:</td>
<td>Requirements management, metrics, prototyping, change control, SPICE.</td>
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BUSINESS MOTIVATION AND OBJECTIVES
LANTIK is an independent IT company that gives full IS services to the local government of Bizkaia province in the Basque Country. Its clients are different departments of the public administration.: Public Finance, Social Welfare, Publics Works. User’s needs are established annually. Nevertheless, reality when projects are progressing along the year and through the life cycle is that requirements demonstrate to be insufficiently stated and many changes occur in advanced phases of development leading the company to a difficult position with its clients and suppliers. Besides this, a recent SPICE assessment has shown the weakness of the activities in the requirements area.

The objective of the experiment is to establish and institutionalise management and engineering practices in the area of Acquisition, Definition and Management of User Requirements, in order to proceed with more stable specification downwards.

THE EXPERIMENT
1997 Adaptation of Company Tax System project has been selected as representative of the installation. Despite of some basic repetitive requirements, significant legal changes are foreseen as consequence of a future and new Company Law. The PIE proposes an integral action in the requirement area according to the following guidelines:

- Institutionalisation of analysis techniques to elicit user requirements Establish quality attributes form the initial specification. Collect requirement history of relevant projects and exploit in similar ones.
- Promote user involvement. Establish SCCB and basic metrics to track requirement changes.
- Implementing QA organisational definitions and activities.
- Compliance of TQM principles.

Lantik, S.A. employs 257 people, 83 of them involved in software developing.

EXPECTED IMPACT AND EXPERIENCE
The expected results of the experiment are:
• A higher efficiency. Development of new applications under contract in the annual plan.
• Availability of objective data to negotiate with the client the impact of the changes, promoting the user involvement.
• Easier relations with subcontractors based on more stable requirements. Better testability.
• Better planned projects with traceability to requirements and changes to requirements.
• Improved overall quality and productivity.

After evaluating, tuning and institutionalising this PIE, LANTIK is going to perform another external SPICE assessment in order to probe the changes and improve the quality pursuing ISO-9001 as an intermediate milestone.

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**Start date:** 01/03/97

**Duration:** 17 months
Esprit Project 24157 - FCI-STDE

FORMAL CODE INSPECTION IN SMALL TECHNICAL DEVELOPMENT ENVIRONMENTS CI-STDE

<table>
<thead>
<tr>
<th>Business Sector:</th>
<th>Software Industry, Technically Orientated Systems</th>
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<tbody>
<tr>
<td>Application Area:</td>
<td>Software Development Platforms, Multimedia Authoring, Architectural Engineering Applications</td>
</tr>
<tr>
<td>Key Words:</td>
<td>Formal Code Inspection, Process Improvement Planning</td>
</tr>
<tr>
<td>Technologies / Methodologies / Tools:</td>
<td>C++ Coding Standards, Test metrics, Formal Code Inspections, Statistics, Process Improvement Plan</td>
</tr>
</tbody>
</table>

BUSINESS MOTIVATION AND OBJECTIVES
Procedimientos-Uno SL produces and sells technical software for fields of Architecture and Engineering. The widespread use of GUIs has lead to higher testing complexity and cost. Holding the general objectives of cost containment and quality improvement in mind, the main objective of this PIE is to prove that Formal Code Inspection is cost effective in small technical development environments such as ours.

THE EXPERIMENT
The approach of the PIE will be to introduce an adequately tailored version of Formal Code Inspection as defined by Fagan, IEEE, etc. to the size of small development units. We plan to introduce 3 inspections in our standard software development lifecycle referring to an existing baseline project (known as NovaMedia); playing special attention to the testing costs of inspected modules re non-inspected.

EXPECTED IMPACT AND EXPERIENCE
This PIE is expected to lead to a higher quality of the baseline project’s components at less cost, thus proving FCI an adequate SQA technique for environments as ours. Cost savings should arise from reduced defect finding time and reduced time to market. Indirect benefits are expected, such as, helping to maintain a high level of team integration in a growing organisation, enhancing code maintainability (through improved readability) and reducing the number of unknown bugs in software releases. Positive experience should lead to full scale introduction of FCI for all projects in our organisation.
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Start date: 01/03/97  
Duration: 12 months
Esprit Project 24158 - PERSPI
PERSONAL SOFTWARE PROCESS IMPROVEMENT

<table>
<thead>
<tr>
<th>Business Sector:</th>
<th>Software House</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application Area:</td>
<td>Packaged and custom business-oriented software applications and system solutions</td>
</tr>
<tr>
<td>Key Words:</td>
<td>PSP, CMM, personal process, development efficiency, small teams</td>
</tr>
<tr>
<td>Technologies / Methodologies / Tools:</td>
<td>Personal Software Process</td>
</tr>
</tbody>
</table>

BUSINESS MOTIVATION AND OBJECTIVES
During the last two and a half years the company has started dealing explicitly with the improvement of its development process, focusing initially on the software engineering field, using Object Orientation, and then on the organisational-managerial field using the CMM process improvement framework. PERSPI has been designed to complement and support the above efforts, by addressing the most fine instrument of the software development process, the individual developer. It is expected that the successful introduction of Personal Software Process principles will directly improve personal development efficiency and personal commitment, which in turn are expected to increase productivity, product quality, and overall development responsiveness. It is also expected that this approach will directly involve developers in process improvement and will facilitate the institutionalisation of the improvement efforts done in the past.

THE EXPERIMENT
In its kernel, the experiment will attempt to streamline personal processes in four distinct and tangible core-phases, each of which will introduce and apply a fundamental concept with respect to personal software process improvement:

1. An initial phase that will define the baseline Personal Software Processes (PSP),
2. A phase that will introduce the notion of planning in individual processes,
3. A phase that will deal with the concept of personal management to quality, and
4. A phase that will introduce and apply the principles of cyclic development.

PERSPI will be based on the OMEGA project which aims at the development and enhancement of the OMEGA framework, an in-house developed environment acting both as a lower-CASE tool and an application framework, that provides the application developers with a comprehensive set of reusable high-level user interface and problem domain components.

EXPECTED IMPACT AND EXPERIENCE
Developers are expected to be better able to define, measure and track their work by having a defined personal process structure and measurable criteria for evaluating and learning from their own and others experiences. Furthermore, it is anticipated that the whole exercise will increase developers commitment and capability to be
more effective members of their development teams and projects through a
customised set of orderly, consistent, and high-quality personal practices.
The results and experiences will be fed back to improve the overall development
process, while a curriculum and a mentoring plan will be prepared to apply personal
best practice mentality through-out in the development department.

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Start date: 17/03/97
Duration: 12 months
Esprit Project 24176 - OUTSOURCE
SOFTWARE PROCESS IMPROVEMENT EXPERIMENT CONCERNING
EFFECTIVE OUTSOURCING MECHANISMS

Business Sector:
Systems analysis and design;
application-specific software development

Application Area:
Information system concerning the
loading and distribution of cars

Key Words:
Management of outsourcing,
requirements analysis, modelling,
design

Technologies / Methodologies / Tools:
Task Analysis Methodology (TAM),
Object Modeling Technique
(OMT),
Structured Systems Analysis and
Design Method (SSADM)

BUSINESS MOTIVATION AND OBJECTIVES
The objective of the OutSource project is to improve the software development
processes at the project partners ATB and BLG in a manner that the most critical
aspects of outsourcing, i.e. the requirements analysis, the system specification and
the system design phases, can be managed. BLG and ATB are in the typical relation
"outsourcing institution - outsourcing partner".

THE EXPERIMENT
The outsourcing experiment will focus on five topics: 1. Modification of basic
modelling techniques: A set of basic modelling techniques which have been practice
proven by ATB will be modified/fine-tuned with regard to outsourcing requirements
2. "Outsourcing milestones": Appropriate guidelines for "outsourcing milestones"
will be defined. "Outsourcing milestones" are certain milestones at which the
outsourcing institution is able to easily change outsourcing partners or to easily
decide in favour or against outsourcing. 3. Team organisation aspects: Guidelines
with regard to the choice of optimal team organisation parameters like size of teams,
frequency of meetings etc. will be defined. 4. Application of metrics: First
approaches for guidelines concerning the choice of most useful metrics with regard
to outsourcing will be developed. 5. Assessment of software tools: Appropriate
software tools will be tested and assessed with regard to outsourcing requirements.

The baseline project is the development of an information system concerning the
loading and distribution of cars. This project is a typical example for outsourcing at
BLG. ATB employs 16 people, 5 of which are directly involved in the baseline
project.

EXPECTED IMPACT AND EXPERIENCE
After successful completion of the OutSource project, ATB as a small and
specialised software-producing organisation will be enabled to better show its
customers that outsourcing of software development has no drawbacks but on the
other hand a lot of advantages. This will be a basis of an increase of ATB's annual turnover concerning the development of application-specific information systems. BLG will have gained experience in modern software engineering methods and modern development tools related to outsourcing. By this, BLG will be better enabled to successfully manage outsourcing in future.

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Participant: BLG
D

Start date: 01/03/97
Duration: 18 months


Esprit Project 24180 - ALBA

METHODS AND TOOLS FOR QUALITY ASSURANCE OF THE INTERNAL SOFTWARE DEVELOPMENT PROCESS

<table>
<thead>
<tr>
<th>Business Sector:</th>
<th>UNIVERSITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application Area:</td>
<td>Database intensive applications for economic and academic management</td>
</tr>
<tr>
<td>Key Words:</td>
<td>SQA, Software Process Assessment</td>
</tr>
<tr>
<td>Technologies / Methodologies / Tools:</td>
<td>Project Management, METRICA, SPICE, ISO 9000</td>
</tr>
</tbody>
</table>

BUSINESS MOTIVATION AND OBJECTIVES
MEP strategic goal is to increase its educational offer, in order to offer a better service to the Community and to increase the Organisation Quality level. The main objective is to improve the Internal Software Development Process by:

- Increasing the internal customer's satisfaction level.
- Increasing the productivity by doing a proper user requirements management and reducing the efforts of adding new functionality to the developed software.
- Defining a process that allow to know more accurately the actual capacity in order to do a continuos improvement and a better management of the available resources.

THE EXPERIMENT
The experiment addresses the definition of a Quality Assurance System model stated under standard ISO-9001, and adopting a software life cycle model as well as software engineering methods and tools adapted to the Organisation's internal management projects features and with the agreement of the different entities of the Organisation involved in the Process.

This SQA will focus on improving the specifications stage and the customer's involvement in the supervision and control of the project development in order to increase the satisfaction of the customer and it will have special care in the subprocess of requirements management. The specification of the Software lifecycle and the use of the best software practices will allow to obtain a better quality product and it will make easier the software changes to add new functionality.

EXPECTED IMPACT AND EXPERIENCE
Mondragon Eskola Politeknikoa expects to improve the quality level of the process of Internal Software Development Process by means of having a well defined and controlled process and with the agreement of the entities involved.
Increase the quality of the services it offers to its clients by the use of the proper computing applications at affordable cost.
Give the steps and means necessary to do a better management of the process setting the indicators that allow to know its true capacity.
The personnel who participate in the project will gain the skills that allow to transfer this experience to other Organisation’s process like Software Development Process for External Client Projects and Academic Plans in Software Engineering

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**Start date:** 01/03/97  **Duration:** 18 months
Esprit Project 24181 - HOSPUR

USER REQUIREMENTS AND REUSE IN HEALTH MANAGEMENT SYSTEMS

<table>
<thead>
<tr>
<th>Business Sector:</th>
<th>Health Care Institutions.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Key Words:</td>
<td>User Requirements Management, Software Reuse.</td>
</tr>
<tr>
<td>Technologies / Methodologies / Tools:</td>
<td>Client/Server systems, Workflow systems.</td>
</tr>
</tbody>
</table>

BUSINESS MOTIVATION AND OBJECTIVES
The partners want to measure the potential for improvement in product quality and user acceptance derived from formal procedures in user-supplier communication, while compromising with a cost-reduction strategy of software reuse. The main objective of the project proposed is to measure the impact of User Requirements Management (URM) on two main features of the software developed: quality, by means of an improved user-supplier communication, and cost, by means of increased software reuse.

THE EXPERIMENT
Establishing a cost-benefit analysis through a controlled experiment will allow us to validate the procedures, methods and tools defined to do URM in a baseline project. We will measure the effect of URM in the key features of quality and cost of the resulting software product. Quality will be measured in terms of the percentage of changes attributable to badly understood requirements. The current reference measure is 50%, which includes changes in software developed by G.O.C. and collaborators like B-kin Software. Cost will be measured indirectly in terms of reuse as the percentage of new code that is directly derived from previous developments. The current reference measure is 60%.

The baseline project selected is the development of a major revision of the Integrated Hospital Management system running in Aita Menni. The SGIH97 is a complex application covering all aspects in the daily work of a hospital: check-ins, check-outs, resource allocations, medical records, maintenance of facilities, invoicing, waiting list management, etc. The final user, Aita Menni, will define its user requirements and validate the delivered product. The consultant and application developer, G.O.C., will help to define requirements and develop software that responds to user’s expectations. The systems engineer, B-kin Software, will design and put in place the system architecture needed to solve the needs of the complete solution.

EXPECTED IMPACT AND EXPERIENCE
The partners often need to work very closely during the user requirements specification phase. All of them, from different perspectives, share the goal of better conformance to requirements of the product delivered and lower costs due to improved use of resources. The three companies recognise the fact, based on previous experience and expert counselling, that a formal procedure and method for
URM is needed in order to achieve their goal. They expect to set up the first URM system in each company and build up in their knowledge and awareness of software best practices.

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**Participants:**
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E  
B-KIN  
E

**Start date:** 01/03/97  
**Duration:** 16 months
Esprit Project 24182 - COORS
CONCEPTION OF OBJECT ORIENTED RESERVOIR SIMULATOR

<table>
<thead>
<tr>
<th>Business Sector:</th>
<th>Research and Development in Petroleum Industry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application Area:</td>
<td>Simulation of physical phenomena (fluid flow in porous media)</td>
</tr>
<tr>
<td>Key Words:</td>
<td>Object Oriented Development, Software, Re-use, POSC</td>
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<tr>
<td>Technologies / Methodologies / Tools:</td>
<td>Object Oriented Technologies, OMT, CASE tool</td>
</tr>
</tbody>
</table>

BUSINESS MOTIVATION AND OBJECTIVES
IFP is a research institute which produces software which is then industrialised and commercialised by specialised companies. The evolution, the industrialisation and the maintenance of this software are made more and more difficult by the complexity of the physical models represented, by the volume of data manipulated, by the flexibility necessary to continually integrate the results of ongoing research. These problems have lead IFP to begin a 'quality software procedure', aiming to improve the development process. One of the aims is to reduce the costs of development by producing reusable components and the costs of industrialisation by writing programs closed to their industrial version. Object-oriented technologies seem to be adapted to our needs in terms of reliability, flexibility, reusability and cost reduction. Moreover, they are compatible with the POSC data format currently being set up in the petroleum industry.

THE EXPERIMENT
The introduction of object oriented technologies seems to be the best way to improve the development process. But some uncertainties are first to be investigated as these methods were never used before in reservoir simulation, which is the application domain of the baseline project. The technical relevance of the solution is not proved so far, particularly in terms of performance and a deep change in the people's behaviour is necessary. As our reservoir simulator is a very complex software (>500000 lines of instructions), we propose to experiment the introduction of these new technologies on a reduced scale with a smaller program SIMTEST, which is representative of the encountered problems.

The experiment is the complete realisation of an object oriented library of business classes and its integration in the SIMTEST program. The OMT method of object analysis and design will be used together with a CASE tool.

IFP employs 1850 people, 185 involved in software development and 10 in reservoir simulation.

EXPECTED IMPACT AND EXPERIENCE
In terms of software development process, the following anticipated benefits for the proposed experiment are expected: acquire knowledge in object oriented design and development and on the POSC data model, gain experience in the use of object oriented technologies by achieving the development of the application proposed in
the experiment, acquire experience in the practise of an object oriented CASE tool for the design of reservoir characterisation applications, improve our software engineering practices in the research projects and more particularly the quality of software packages produced by research engineers. contribute to the production of reusable components.

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Start date: 04/01/97
Duration: 18 months
**Esprit Project 24187 - COQUIS**

**CONTINUOUS QFD-BASED QUALITY IMPROVEMENT OF SOFTWARE DESIGN PROCESS**

<table>
<thead>
<tr>
<th>Business Sector:</th>
<th>Mechanical engineering and related technical consultancy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application Area:</td>
<td>Project management software for small and medium size manufacturers of production plants</td>
</tr>
<tr>
<td>Key Words:</td>
<td>QFD-based methodology, fulfilment of customer requirements, project management, re-use of software components.</td>
</tr>
<tr>
<td>Technologies / Methodologies / Tools:</td>
<td>QFD-based methodology</td>
</tr>
</tbody>
</table>

**BUSINESS MOTIVATION AND OBJECTIVES**

IGA’s main business includes the development of customised software to support project management during the setting up of production systems/plans in the manufacturing area (robotics assembly, PPS, etc.). Today’s software development within IGA is highly customer oriented, but suffers from numerous iterative loops and from being very individual oriented with low information exchange among developers. The main objective of this project is to raise the quality and efficiency of the software development process:

- to more completely satisfy customers’ requirements
- to obtain a more team-oriented approach to software development
- to reduce software development time and costs by about 20%
- and to increase reuse of program functions by up to 25% while increasing product quality

IGA is typical of many small and medium size software developing organisations, so the project’s results may help others to achieve a better understanding of their customers’ wishes, to improve estimation and to reduce development time and costs.

**THE EXPERIMENT**

A “Quality Function Deployment” (QFD)-based methodology will be introduced. This methodology is intended to support:

- the correlation between the customer requirements and the functions of software components and modules to be used
- costs and time estimates
- performance review and measurement by metrics.

During the experiment, software engineers will use the QFD-based tool for managing their own work and co-operating with one another. The obtained improvements will be monitored by collecting suitable metrics. The experiment will
be carried out on a baseline project: the development of new and revised modules for a project management software package.

IGA mbH employs 15 people, 6 of whom are involved in software development.

**EXPECTED IMPACT AND EXPERIENCE**

IGA mbH expects to improve the quality and efficiency of their software development process, and thereby achieve a more complete satisfaction of customer requirements. We plan to strengthen the continuous improvement process by extensive internal training, the building of a data base for the documentation of weak areas, failures and bottle-necks in existing modules, and the use of metrics to manage the whole software development process.

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**Start date:** 01/05/97

**Duration:** 14 months
**Esprit Project 24189 - GEARS**

**GAINING EFFICIENCY AND QUALITY IN REAL-TIME CONTROL SOFTWARE**

<table>
<thead>
<tr>
<th>Business Sector:</th>
<th>Industry automation and test machines production</th>
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<tbody>
<tr>
<td>Application Area:</td>
<td>Real time software for data monitoring and testing</td>
</tr>
<tr>
<td>Key Words:</td>
<td>Object oriented design, implementation, software reliability and reusability, high performance.</td>
</tr>
<tr>
<td>Technologies / Methodologies / Tools:</td>
<td>workflow management, visual programming techniques, modelling oriented methods</td>
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</table>

**BUSINESS MOTIVATION AND OBJECTIVES**

MASMEC’s software is an integral part of the machinery produced by the company; it is the discriminating element which determines the user's satisfaction as regards operating flexibility and reliability under heavy operating conditions.

The target objectives of this project will support the company's policy in trying to enter new market segments and reinforce its presence through its customers, and specifically:

- To increase of the company turnover, within 6 months after the fulfilment of the PIE it is expected a growth by 15% of company turnover.
- To increase the production efficiency and profitability of each new supplied product.
  - Reduction of the cost for producing embedded software based on the company’s standard components and templates.
  - Reduction of the time to market of the overall machine, by diminishing the effort for software standardisation and customisation for new machines;
  - Reduction of the unitary costs of production for a machine;

**THE EXPERIMENT**

The PIE will be conducted on an already planned baseline project of strategic relevance for the company: the design and software implementation for stands performing test on assembled parts.

The goals of the experiment are:

1. To better and formally structure the software system specification process, by easing the modelling of the real-time behaviour of the testing machines and its translation into software systems specifications.
2. To improve the degree of reusability of the company's standard software components, by revising and re-engineering them in terms of granularity, flexibility of use and access methods.
3. To improve user’s interaction modalities through the introduction and formalization of graphical layout standards.
4. To improve the management of quality throughout the overall software process, by introducing, also, a first set of essential process and product quality metrics.

MASMEC actually employs 33 people, 10 of them are involved in software development.

**EXPECTED IMPACT AND EXPERIENCE**
MASMEC expects to enrich its know how on the system requirement specification, reducing the time necessary to produce its software, easing the software engineering process, and reducing the people effort.

Another important goal is to improve the management of quality through all the software process, introducing a first set of metrics regarding the product and the quality, and to assess a system of documents especially suitable for software development.

The expected results should also lead to a better acceptance of the system functionality and performance by the clients and to a more extensive reuse of base software components with reduced maintenance costs.

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**Start date:** 03/03/97  
**Duration:** 18 months
Esprit Project 24193 - STOMP
SYSTEMATIC TEST OF MULTI-PLATFORM PRODUCT

<table>
<thead>
<tr>
<th>Business Sector:</th>
<th>Software development</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application Area:</td>
<td>Business Systems</td>
</tr>
<tr>
<td>Key Words:</td>
<td>Quality assurance, automated testing, multi-platform test</td>
</tr>
<tr>
<td>Technologies / Methodologies / Tools:</td>
<td>automated multi-platform test</td>
</tr>
</tbody>
</table>

BUSINESS MOTIVATION AND OBJECTIVES
- cost reduction for software maintenance (50% reduction of error-costs within the first 6 months after release shipment)
- establish tool supply for software tests
- build up know-how for employees in software testing
- cost reduction of 50% for the porting of software to UNIX-platforms
- improve methods and procedures for software engineering

THE EXPERIMENT
- definition of procedures for systematic tool-based software testing
- build up database with test cases
- training of staff in test methods and tools
- compare new test method with existing test procedure
- detect higher amount of defects before shipment to the customers

EXPECTED IMPACT AND EXPERIENCE
- improve existing phase model for software development
- higher qualification of staff concerning software testing
- employees realise benefits of systematic software testing with tools
- achieve higher standards in software quality
- continuos improvement of software test process
- reuse of test case database in further releases for other platforms
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Start date: 01/04/97

Duration: 15 months
BUSINESS MOTIVATION AND OBJECTIVES

- TransAction is a database technology company founded in 1987. The products of TransAction are: (i) the relational database system TransBase and (ii) custom database application development on behalf of our customers. The primary product, named TransBase, is a relational database system available on a variety of different system platforms ranging from Apple Macintosh to main frame VMS. Users expect identical quality, performance and programming interfaces on all those platforms.
- One of the most important requirements is to assure quality in a multi-version, multi-platform environment. The importance of improving processes to ensure and increase quality in software development is not only recognised inside our company, but also expected by our customers who rely heavily on the quality of our software once it is released. Because the software is a basic part of their customer deliverables software quality of TransBase is very critical for our company and our customers.
- This PIE project has the following goals:
  - Increase our software quality by improving the software development process. In our case, this means establishing programming conventions, improving source code control, and establishing effective multi-platform validation procedures.
  - Reduce manpower costs for platform-specific overhead.

THE EXPERIMENT

- Establish design and programming conventions that are obligatory for each programmer and system designer. Try to eliminate platform-specific problems as early as possible.
- Improve configuration management. Replace or extend the current source code administration system by a more powerful system suited to handle multi-platform aspects and capable of handling code-related documentation and/or platform-specific test results.
- Improve the testability and comparability of the developed software; in particular, develop test suites which are platform-independent and can be run on all supported platforms to guarantee identical behaviour of the software.
EXPECTED IMPACT AND EXPERIENCE
We expect: to improve and stabilise our development process by establishing standards, to reduce manpower costs for platform specific overhead from around 50% to 30% or less, leading to more available capacity for product development, Reduce reaction time to customer maintenance requests while reducing maintenance charges.

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Start date: 01/05/97
Duration: 18 months
BUSINESS MOTIVATION AND OBJECTIVES
BMW is a company which produces high performance automobiles and motorcycles. The number and complexity of electronic equipment available in modern automobiles is rapidly increasing. Hence, the general objective of our experiment is the improvement of the software development process of electronic control units (ECUs) by means of time and quality. We expect a reduction of time by 20 -30%. A better quality is expected because of reuse and a rigorous formal approach. Electronic control systems also play an important part in other industries, like telecommunication or aviation. The experiences achieved can therefore be transferred to a wide community.

THE EXPERIMENT
In the PIE we want to apply a new development method, namely the ASCET method (object oriented), that promises to shorten the development time and to simultaneously increase the reliability of the software. To evaluate this method we have chosen a representative control system out of the chassis control area that consists of discrete and continuous software parts (hybrid system). The main activities in the project are modelling, simulation, rapid prototyping and targeting. Based on the baseline project and the current method used, we compare both methods by defined measurement activities. The results enable us to value the new method.

EXPECTED IMPACT AND EXPERIENCE
Based on technical benefits, like automatic code generation and reuse, the development time of ECUs can be reduced. New car functionalities are available at an earlier point of time. That means, time to market can also be reduced. This fact, together with the improved reliability and quality of the system, enhances the competitiveness of BMW. If the results confirm our expectations the new method will be applied in future projects at BMW and will also be added to our TQM activities.
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email: maximilian.fuchs@bmw.de
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Start date: 01/03/97

Duration: 18 months
BUSINESS MOTIVATION AND OBJECTIVES
The European shoe industry currently has two seasons, Spring/Summer and Autumn/Winter. There is a trend towards the creation of two additional intermediate collections which leads to the need for shorter product development and production cycles. This requirement ripples throughout the enterprise, also involving marketing, sales, distribution, and accounting.

To satisfy this emerging market requirement, it is necessary to optimise our business processes. For central product development and production planning at our headquarters in Rosenheim, it is important to have rapid access to all important control data from all of our European locations including our subsidiaries. It is equally important to distribute data for production control throughout the enterprise. This involves upgrades to the data processing applications that support these processes. To reach this goal, the supporting EDP applications must be developed and modified more rapidly.

Specific objectives of this experiment are:

- reduce development cycle time;
- reduce overall development costs;
- support more rapid changes in our business processes;
- integrate our users more effective into the development cycle.

THE EXPERIMENT
Initially, we will select an object-oriented method and its supporting development tools, train the staff for this method and the tools. Then, we will define an experimental process to be followed contrasting our current strict sequential waterfall model. This process must support evolutionary progress (Boehm’s spiral model). We will develop typical samples of our daily business using the new method. This will be done in two phases in order to eliminate the initial overhead caused by the new method. Gabor Shoes employs 2.800 people, 15 of them involved in the EDP team.
EXPECTED IMPACT AND EXPERIENCE

We expect an increased effort for the experiment because of initial learning efforts, but on the long run, we anticipate a cheaper and faster development process that delivers better quality:

We will consider the experiment successful if (1) the cost of the experiment is no more than 25% greater than the cost of the baseline (effort spent for the development); and (2) the number errors reported by users during the six months following release of the application is no more than 25% less than comparable projects developed previously.

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Mr Werner Vieth

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Start date: 01/04/97

Duration: 14 months
BUSINESS MOTIVATION AND OBJECTIVES
Software testing is very labour intensive across the industry. As our product grows in functionality it also increases in complexity. Ideally the product will be flexible enough to run on different platforms. Credo needs to keep up with the fast changing technologies of today. We need to organise our testing processes to allow automated testing to ease the costs associated with regression testing which is the main objective.

The costs of testing is a concern shared across the whole software industry.

THE EXPERIMENT
The experiment will involve benchmarking manual tests in old projects. The process of testing will be defined and applied to baseline projects. This includes the use of metrics, designing new test specifications, and the criteria for accepting software for testing. Test automation plays a key factor in this experiment.

There are 66 staff in Credo Group; 27 in actual development.

EXPECTED IMPACT AND EXPERIENCE
Reduced test time for major releases, improved software quality and customer responsiveness, allowing market expansion.

A complementary goal is to make testing more interesting for those involved, promoting it as an attractive, alternate career path.
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**Start date:** 03/03/97

**Duration:** 18 months
Esprit Project 24226 - GUIB

INTRODUCTION OF AN OBJECT ORIENTED GRAPHICAL USER INTERFACE BUILDER

<table>
<thead>
<tr>
<th>Business Sector:</th>
<th>Maritime electrical systems</th>
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<tbody>
<tr>
<td>Application Area:</td>
<td>Maritime control systems</td>
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<td>Key Words:</td>
<td>Turn key electrical systems, control systems, user interfaces</td>
</tr>
<tr>
<td>Technologies/Methodologies/Tools:</td>
<td>Graphical User Interface Builders, Oriented Programming</td>
</tr>
</tbody>
</table>

BUSINESS MOTIVATION AND OBJECTIVES
R&HS has a yearly turnover in the maritime market of turn-key electrical systems of about 50 million ECU. This turnover can only be maintained by innovating their products, especially the automation (including monitoring and control) parts, which forms the heart of complete electrical installations. The automation parts comprise 10 to 20 percent (5 to 20 million ECU) of the complete systems, requiring about 30 man-year programme development on yearly basis. Besides this maritime market, R&HS is active in the field of traffic control systems and factory automation. Also in these markets the same amount of development is required, resulting in a total amount of 60 man-years in software development.

THE EXPERIMENT
Within this PIE-project R&HS wants to introduce a graphical user interface builder (GUIB), that should create more sophisticated, flexible, maintainable and reusable software for GUI’s, to realise customer demands. The introduction of a GUIB, that is based upon object oriented (O&O) methodologies, will have an important effect on the current software architecture. Furthermore, software engineers of R&HS will have to be trained in using GUIB and O&O methodologies in the current software engineering process. The whole realisation of this introduction of GUIB and Object Oriented Technology (OOT) in the current software process will be the main objective of this ESSI project. Once this GUIB is installed, it will be used in the baseline project UNIMACS 3000, a development project for a totally new concept for controlling all functions on the bridge of large ships.

EXPECTED IMPACT AND EXPERIENCE
The benefit of using GUI-builders within the baseline project is, that the organisation will become familiar with the new design philosophy of object oriented (O&O) software development, which is required to design and build effectively the GUI’s. Using this new technology, R&HS will be able to deliver complex and sophisticated integrated automation systems, which can be adapted easily to the clients requirements, will be efficient to build, and easy to maintain. For demonstrating the influence of GUI-builders upon software engineering the demonstrator will also be presented on software-engineering conferences in Europe and during an in-house software symposium of R&HS (at Rotterdam) and the rest of the IMTECH group (containing about 70 sister organisations).
Experiences and results of introducing a sophisticated GUIB in an organisation as R&HS will be used by the suppliers of the GUIB-software, to improve their products. New clients of GUIB’s will therefore benefit directly as they can use R&HS’ experiences indirectly. The OOT-Consultant will improve consultancy services and disseminate these PIE experiences to other software developing organisations through workshops, conferences and publications.

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**Start date:** 01/03/97  
**Duration:** 18 months
BUSINESS MOTIVATION AND OBJECTIVES

CAS is a software house, developing Mapware and Groupware products for the mass market. With Map&Guide we are the European market leader for professional route planning. It was a strategic decision of the top management of CAS, to adopt the component approach and appropriate methods, to deal with reusability of our modules. Though object oriented design methods are well established and well tested, their successful application in small companies for component design and development is not yet proved. Therefore, we want to measure the efficiency of such techniques on a baseline project taken from our key business line, before promoting them in the whole company. Our goals in UNCODE are:

• to improve reusability and quality of our source code,
• to increase the efficiency of our software development
• to achieve full commitment of the participating staff members,
• to improve the maturity of our development process

THE EXPERIMENT

Within UNCODE we will apply the Unified Modelling Language (UML) to Map&Guide, an in-house continuously developed geographic information system, involving basic system, map kernel and application developers. Map&Guide will be restructured in 1997 to become the first fully component- and service-oriented geographic information system in Europe. This significant evolution stage will be the baseline project for this experiment. The integration of the UML in our development process and it’s correct application/use for component design & development will be supported by the Forschungszentrum Informatik (FZI) with teaching and consultancy.

EXPECTED IMPACT AND EXPERIENCE

From the software engineering point of view we expect after a successful completion of UNCODE:

• Design improvement: more flexible, adaptable, maintainable and compatible products
• Quality improvement: measured in error reports per month from the application development to the basic development department. Immediately after completion we expect 20% less reports, 50% one year later.

From the commercial point of view we expect:
• Faster time-to-market response: about 20% for Map&Guide and 60% for tailored versions, establishing CAS as technology leader
• Cost reduction: due to the shorter development cycles and reduced maintenance costs
• New markets: for CAS as a leading component provider.

Furthermore we expect significant social benefits from UNCODE. The job satisfaction of the staff members will increase by the application/use of sophisticated methods and tools, by:

• increase of productivity
• increase of creativity, as boring parts will be fulfilled by the purchased tool
• increase of the market value of the trained staff members

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**Start date:** 01/04/97

**Duration:** 19 months
BUSINESS MOTIVATION AND OBJECTIVES

Software Innovation is a software company that bases it’s business on sales of it’s two “off-the-shelf” products, SalesMaker and ProArc, and on development of customer specific solutions. Both products are targeted at the high-end market, SalesMaker mainly at large sales-organisations and ProArc mainly at document management in the offshore business. The company has experienced a rapid growth the last three years. Larger projects and larger project teams have been needed to meet the customers demand. This rapid growth has created a new environment, in which communication between development teams have been reduced and reuse is incorporated on an opportunistic level only.

The purpose of this PIE is to achieve measurable improvements in the company’s development process, through developing mechanisms that allow us to build reusable components and modules on a company wide basis. The goal is to arrive at increased quality, flexibility and productivity through both organised reuse and object oriented, component based system development.

THE EXPERIMENT

The experiment is to change the existing development process to a well-defined component-based development process with emphasis on reusable components. An object-oriented system development method for client/server systems will be selected. The project management model will be adopted to incorporate reuse activities, resources and documentation, enabling the project managers of the two products to plan and track the baseline project. Metrics will be selected and then used to evaluate both the quality and the reusability of components. The improved development process will be applied to our baseline project, the development of new Win32 based versions of our two products. Software Innovation has 82 employees of which 50 are working with system development. The baseline project is planned to allocate 12-16 persons over a 1.5 year period.

EXPECTED IMPACT AND EXPERIENCE

An increased reuse maturity level for the whole organisation is expected to be the major benefit of the experiment. Improvements in the software engineering process will lead to better quality. The flexible component based infrastructure will make it easier to adapt new technologies and make us competitive in the rapidly changing software industry. From the commercial point of view, this will form the basis for
an increased competitiveness on the existing market and on the evolving international market.

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**Start date:** 01/03/97  

**Duration:** 18 months
Esprit Project 24257 - RMATN

REQUIREMENTS MANAGEMENT IN ALCATEL TELECOM NORWAY
DEFENCE COMMUNICATIONS DIVISION

<table>
<thead>
<tr>
<th>Business Sector:</th>
<th>Telecommunications</th>
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<tbody>
<tr>
<td>Application Area:</td>
<td>Requirements management in development projects</td>
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<tr>
<td>Key Words:</td>
<td>Requirements management, SW development</td>
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<tr>
<td>Technologies / Methodologies / Tools:</td>
<td>Requirements management.</td>
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BUSINESS MOTIVATION AND OBJECTIVES
Due to the increasing complexity of software projects, keeping track of requirements and ensuring that the end product satisfies all requirements is becoming increasingly difficult and time consuming. This may result in rework and error corrections causing projects to exceed deadlines and budgets, leading to increased time to market, reduced customer satisfaction and commercial losses.

This is a common business concern and is the main driving force for this experiment whose objective is to ensure that all customer requirements are fulfilled and that products are delivered on schedule. More efficient requirements management will significantly reduce cost and shorten time to market.

THE EXPERIMENT
The achievement of the objective above requires the introduction of new procedures, methods and tool support, enabling the capturing and storing of requirements together with the rationale they are based on, in the early stages of a development project. New improved routines adjusted for the chosen tool support, for managing requirements throughout the project, will be introduced.

Alcatel Telecom Norway Defence Communications Division employs 270 people, of which 30 are expected to be involved in the process improvement experiment.

EXPECTED IMPACT AND EXPERIENCE
Alcatel Telecom Norway expects to gain knowledge in requirements management and to increase staff awareness of the importance of proper requirements management. The experiment is expected to lead to a 70 % reduction in errors due to incomplete management of requirements. In addition, it should be possible to produce a complete list of the status for each requirement, within two hours, in connection with monthly project progress reports.

Upon successful implementation of the experiment, the new procedures will be adjusted, based on experience gathered during the experiment, before the results are disseminated in the organisation and implemented in all projects.
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**Start date:** 01/03/97

**Duration:** 16 months
Esprit Project 24266 - EXOTEST
EXPERIMENTATION OF NEW TESTING STRATEGIES

<table>
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<tr>
<th>Business Sector:</th>
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<tr>
<td>Application Area:</td>
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<td>Key Words:</td>
<td>Software testing, reliability measurement</td>
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<tr>
<td>Technologies / Methodologies / Tools:</td>
<td>Statistically and mathematically-based software products and methods</td>
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</table>

BUSINESS MOTIVATION AND OBJECTIVES

Dassault Electronique manufactures systems which are more and more elaborated. They require correction and reliability from integrated software. Bearing this in mind, testing strategy and software validation performance is a key to the success of these projects.

The better control of the testing process we expect to draw from this experiment, will help us to reduce our development lead-times and costs, to improve our control over the risk management and to reduce our maintenance costs and the operating costs for our customers.

THE EXPERIMENT

To achieve these objectives, we will evaluate the potential contribution of statistical techniques in each and every aspect of the development cycle, from the unit tests to the acceptance test. These techniques, combined with our test tools (DEVISOR and SYLVIE) and methods, are: code quality measurement (using M-Square), statistical testing and software reliability modelling (using M-élopée).

The experiment will be performed on the embedded software of electronic equipment for commercial aircraft, developed by a five-person team over a two-year period. The main idea is to set up a test team using new testing strategies in addition to the project team.

EXPECTED IMPACT AND EXPERIENCE

Besides the above objectives, the quantification of our software reliability will certainly play a great part in the motivation of the technical teams, by offering them measurable targets and the direct feedback of their work results. Furthermore, it will also give concrete elements to decision-makers.

If these techniques are demonstrated to be powerful, they will be transferred to our software development process at large.
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Start date: 15/04/97
Duration: 15 months
Esprit Project 24287 - MASLYD
METRICS AND SOFTWARE LIFECYCLE DEFINITION

<table>
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<th>Business Sector:</th>
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<tr>
<td>Key Words:</td>
<td>Software lifecycle &amp; Cost Estimating</td>
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<td>Technologies /Methodologies /Tools :</td>
<td>Defined Lifecycles &amp; Metrics / Project Management Tool.</td>
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</table>

BUSINESS MOTIVATION AND OBJECTIVES
I.C.E. Computer Services Ltd., founded in 1972 to provide various secretarial support and recruitment services to local, West of Ireland, businesses, has evolved into a company providing a range of Computer related and non-Computer related services to local businesses and to the wider business community throughout Ireland. The services offered include Computer Systems Training and Software Development and Support for both custom developed systems and standard packaged software products. The focus of this PIE is on the Software Development and Support activities.

I.C.E. have identified the Software Development department as having major potential for growth in the next 5 years. We have recognised our vulnerability in that our key people do not work to a repeatable documented system. At present it is difficult to expand our business because of the lead-in time required for new staff to understand the existing software or how to maintain it. PIE objectives are to develop and document a software development lifecycle appropriate to our business needs and based on the new lifecycle to develop a complementary cost estimation formula. We hope to be in a position to hire additional staff, improve our productivity and ultimately improve overall profitability because new personnel will work to predefined guidelines and need less personal direction and support from existing staff. In addition we will be able to bid fixed price contracts knowing our costs and expecting the contracts to be profitable.

THE EXPERIMENT
I.C.E. Computer Services Ltd. will define a Systems Development Lifecycle process specifically suited to it’s business profile. I.C.E. will also define a project estimation algorithm, again, specifically suited to it’s business. These will then be implemented in the Software Development functions and subject to refinement / improvement. Their usage will be measured over time and their impact on the business will be assessed. This assessment will be carried out by continually recording details of actual time spent on each project / activity and measuring the impact on the software development functions in terms of predictability and efficiency. The measurements will include comparison with data gathered from prior to the implementation of the lifecycle methodology / costing algorithm and ongoing data gathered during the implementation.

EXPECTED IMPACT AND EXPERIENCE
More discipline will be brought into the software development and maintenance processes and into cost estimating for new contracts. Documented guidelines for
both will bring a consistency we have never achieved. - target is to have all projects completed to within 5% of original estimated cost. The programming staff members will be able to share work more easily and the quality and productivity of their work should improve. With a formal cost estimating system we will be able to determine when to bid on a contract and what profit we can expect from it. This process will be an initial step towards certification to ISO9001.

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**Ms. Margaret Cox**

**Start date:** 01/04/97

**Duration:** 12 months

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**fax:** +353 91 585070
**email:** margaret@icegroup.iol.ie
Esprit Project 24306 - GUI-TEST
AUTOMATED TESTING OF GRAPHICAL USER INTERFACES

<table>
<thead>
<tr>
<th>Business Sector:</th>
<th>Software industry</th>
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<tr>
<td>Application Area:</td>
<td>Testing Graphical User Interfaces (GUI)</td>
</tr>
<tr>
<td>Key Words:</td>
<td>software test, formal test specification, automated regression testing, metrics</td>
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<td>Technologies / Methodologies / Tools:</td>
<td>software test, GUI-Test automation tool</td>
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</table>

BUSINESS MOTIVATION AND OBJECTIVES
The goal of this PIE is to standardise, optimise and automate our methods for testing Graphical User Interfaces (GUI).
Currently our GUI-Systems are only tested manually with high expenditures in manpower and costs. The completeness and effectiveness of these tests are strongly dependent on the intuition of the corresponding tester; the results are extremely difficult to quantify and qualify. These deficits will be corrected by the experiment, resulting in the commercial benefits below:

- Improved calculability of testing costs due to standardised test procedures and on the basis of the expenditure variables accumulated during the experiment.
- Reduced testing costs and times due to test standardisation and automation.
- Lower guarantee and warranty costs because testing is more thorough and effective, thus leading to lower residual error rates.
- Lower total development costs and shorter time-to-market.

THE EXPERIMENT
We will first expand our know-how about formal test specifications, test methods, and the methodology of the GUI test and ensure that this know-how is state-of-the-art. On this basis we will select the most promising methods for the GUI test and demonstrate these within the company.
We will select a commercially available tool which allows us to apply the test methods selected in Action 1 to the baseline project. We will procure the selected test tool and introduce it to those employees involved in the PIE and the baseline project.
We will evaluate these new testing methods and test tool in the baseline project. For this purpose, during the test phase of the baseline project, we will conduct tests both according to our traditional manual methods and utilising the new, semi-automated or automated methods.
The old and the new methods will be compared. The criteria for this comparison will be established at the beginning of the PIE. If this analysis shows the superiority of the new methods, we will begin using these throughout the company at the conclusion of the PIE.

EXPECTED IMPACT AND EXPERIENCE
We anticipate the following results:
Software developers and testers will be familiar with state-of-the-art methods for the formal specification of GUI Tests.

A test-notation will be selected and put into use which permits the test specifications to be transformed into the syntax required by the test tools with a minimum amount of manpower.

Templates will be available for the efficient specification and notation of the tests. If necessary, templates will also be available for the specification of the corresponding system requirements.

GUI-Tests will be executable and recordable almost solely by means of tools/automatically.

The test documentation will be generated by the testing tool.

An appropriate test tool will be available and have been tested in routine use.

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Start date: 01/03/97
Duration: 12 months
BUSINESS MOTIVATION AND OBJECTIVES
Socrate Sistemi is a software provider for the automation of fashion and sportswear stores. Socrate Sistemi wants to become an Italian leader in this area, as well as to enlarge its market to other European countries (especially in the south of the France). The strategy chosen to face the growing competition in the field has been the gradual improvement of the development process with an enhancement of its productivity and of the quality of the products as perceived by the customers. The commercial objectives of the project are a consolidation of the market share in Italy by means of the reduction of costs and resource needed for the production of new application and the customisation of existing ones and a higher level of customer satisfaction thanks to the release of higher quality products. The same experiment can be replicated into the numberless small and medium sized enterprises in Europe working at the lowest level of maturity: they all need a defined starting point for improving their software process, and the measurement activities outlined by this PIE can be a good solution.

THE EXPERIMENT
The ASPIDE project is the application of the first Personal Software Process (PSP) steps (PSP0 and PSP0.1) to the employees of Socrate Sistemi S.a.S. From a technical point of view, the introduction of PSP0 and PSP0.1 into the software development process means the definition of time, defect and size measurement in order to define a better strategy for time and resource management and a baseline for future planning. The chosen baseline project is the complete re-engineering of the main Socrate Sistemi product, Arianna, a system for the administration of fashion, sportswear and in general clothing stores with the possibility of managing different points of sales in a distributed network, to integrate heterogeneous physical devices such as portable optical bar-code readers in a unique environment, to perform statistical analysis on the sales. The importance of this project is so high for Socrate Sistemi that most developers (6 men) will work on it for a year.

EXPECTED IMPACT AND EXPERIENCE
The organised application of PSP to most developers of a small enterprise is expected to have impact on the productivity and product quality of the whole company. For the short term, the first two steps (PSP0 and PSP0.1) are addressed: they respectively adds time and defects measurements (PSP0) and coding standards and size measurements(PSP0.1) to the development process. The completion of these two first stages in the improvement are the essential foundations for the following actions, dealing first with planning and then with quality.
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Start date: 01/03/97  
Duration: 18 months
Esprit Project 24344 - PIE-TEST
INTRODUCING A TESTING METHOD

<table>
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<tr>
<th>Business Sector:</th>
<th>Software Industry</th>
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<tr>
<td>Application Area:</td>
<td>Traditional MIS systems; General Ledger</td>
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<tr>
<td>Key Words:</td>
<td>Testing methods, testing tools</td>
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<td>Technologies / Methodologies / Tools:</td>
<td>client-server, Windows© / OO, testing / PowerBuilder, SQA</td>
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</table>

BUSINESS MOTIVATION AND OBJECTIVES
Most GUI development tools support an incremental life cycle. As subsequent versions of a system are released, testing and maintenance become the most effort demanding issues. The cause for this is that working components of the system have to be re-tested when new modules are released or when other components are changed. This calls for automated regression testing and in general for a more profoundly understood testing method and supporting tools. This testing method should also integrate a defect tracking mechanism, guaranteeing that discovered bugs are managed efficiently and ultimately get solved.

This PIE is aimed at introducing such a testing method in development process. This concern will gain increasing importance in the wider community of professional developers using a similar development method. In particular it is a step towards ISO-9001 certification.

The objectives are mainly to reduce maintenance costs and to test more efficiently.

THE EXPERIMENT
We will introduce SQA test tools and provide training and consulting to the employees involved with the base project. Especially people from QA will be involved, since they will be the key to reducing maintenance costs. Special attention will be given to the testing method as this is the only guarantee that we will use the tool as efficient as possible.

LGTsoft currently employs 9 people, 8 of them are involved in software development

EXPECTED IMPACT AND EXPERIENCE
We expect to reduce maintenance costs and structure our testing efforts. As a spin off we expect to get more motivated and skilled employees. We should also obtain a documented testing method.
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**Start date:** 01/03/96  
**Duration:** 7 months
Esprit Project 24362 - CONFITEST
CREATING A SOLID CONFIGURATION- AND TEST-MANAGEMENT INFRASTRUCTURE TO IMPROVE THE TEAM DEVELOPMENT OF CRITICAL SOFTWARE SYSTEMS

<table>
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<tbody>
<tr>
<td>Application Area:</td>
<td>Console- and paypoint-applications.</td>
</tr>
<tr>
<td>Key Words:</td>
<td>Configuration management, version control, testing procedures.</td>
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<tr>
<td>Technologies / Methodologies / Tools:</td>
<td>Configuration management, automated test procedures</td>
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</table>

BUSINESS MOTIVATION AND OBJECTIVES
The main business of TeSSA is “giving extensive and unlimited support for building business solutions”. A great part of these solutions are IT solutions. The core activities in TeSSA are developing AND implementing quality software systems.
We are aware that testing procedures, completed with version and configuration management are a real need to deliver quality software products in time. Another important reason to implement these procedures is teamwork. More and more people are working together on the same product. Working as a team on the same project, means introducing more procedures for testing and configuration management, otherwise the existing problems will escalate.
More control and confidence in the development environment results in a more stable atmosphere to work in. This reflects on all levels, from programmer to management. The people TeSSA invested in are very important for the continued existence of TeSSA.

THE EXPERIMENT
The experiment aim at a stepwise process improvement towards a fully controlled process with standard built in test procedures and configuration (version) control management on different levels.
The experiment will start by appointing 1 person, responsible for testing and quality improvement. He will be the driving force behind the experiment. Workgroups consisting of analysts and programmers will think of the best possible plan to implement the control management.
The status of the baseline is well known and registered, so the results of this improvement can be measured very well and disseminated to other organisations developing the same kind of software.

EXPECTED IMPACT AND EXPERIENCE
Organisational procedures in the domain of configuration and test-management will help the project leader to control the development process. The following results are expected:

- Cost reduction (10 - 15 %)
- Elimination of errors in an early phase of the process (1 in stead of 10)
• Quality improvement of delivered programmes. Reliability increase of installed programmes.
• And last but not least, acceleration of the definite product delivery. (about 10%)

Not only the thinking up and writing down of these procedures, but also the creation of driving forces behind the “quality-consciousness” of all people in the organisation, are important.

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*Mr Eddy Verstraeten*

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email: tessa innet.be

**Start date:** 01/03/97  
**Duration:** 12 months
Esprit Project 24387 - RETECTRA
REENGINEERING FOR TECHNOLOGY TRANSFER

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<th>Business Sector:</th>
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<td>Application Area:</td>
<td>integrated, distributed engineering and research applications</td>
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<td>Key Words:</td>
<td>re-engineering, structured software systems, object-oriented software systems</td>
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<td>Technologies / Methodologies / Tools:</td>
<td>reengineering, redesign, recoding</td>
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**BUSINESS MOTIVATION AND OBJECTIVES**
The German aerospace research establishment (DLR) co-ordinates large aerospace projects, encompassing the integration of highly sophisticated, innovative software systems and their technology transfer into an industrial environment. In this context, it is the task of DLR to perform quality evaluations and reengineering of third party prototype software in order to enable the integration of this externally developed software prototypes into large operational software systems.

**THE EXPERIMENT**
The objective of this process improvement experiment is to introduce a strategy and process for reengineering software prototypes developed by industrial research departments, small and medium size enterprises, research organisations, and universities. This reengineering process, based on state-of-the-art process and product metrics, supported by an underlying reengineering environment, comprises the evaluation of a software prototype, its redocumentation, redesign, recoding and regression testing, and thus provide the base for the integration of these software prototypes in operational software systems.

**EXPECTED IMPACT AND EXPERIENCE**
The anticipated impact and experience of this process improvement experiment, focusing on the definition and introduction of a best practice reengineering and integration process, include a significant reduction of the effort needed for the assessment and reengineering of internally and externally developed software prototypes. In addition, the ability to predict more precisely the integration and maintenance effort necessary is envisaged. Finally, it is anticipated, that the planned reengineering and integration process ensures the quality and maintainability of the software packages integrated into the operational software systems. By the achievement of these more technically and process oriented goals, it is anticipated to provide the basis for major commercial advantages. These advantages comprise the improved efficiency of software prototyping, reengineering and integration as well as more accurate estimation and project planning based on the introduced process and product metrics. Thus, the successful process improvement experiment is expected to improve the competitiveness of DLR as an integrator of highly innovative software systems.
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Start date: 01/03/97

Duration: 18 months
BUSINESS MOTIVATION AND OBJECTIVES
Increasing world-wide competition, a larger variety of increasingly complex products and shortening of lifecycles, affect the current development of textile CAD/CAM systems.
Moreover the expansion of NedGraphics to new market areas and maturing of standard platforms, require the software engineers to focus on new products. For these reasons NedGraphics can no longer afford to pursue the present working practices (including software process). Central focus of this PIE will be to reduce the time-to-market (TTM) with approximately 30%. Taking into account the small software engineering workforce of NedGraphics, this PIE is especially relevant for SME’s producing custom software systems.

THE EXPERIMENT
The baseline project comprises the development of new versions of NedGraphics’ main CAD product for the woven textile market. NedGraphics strategy is to deliver regular updates of this product about every 4 to 6 months. Within 18 months it is therefore possible to experiment two of these software development cycles. Prior to these cycles the measuring system will be set up.
The two software development cycles will both contain following phases: definition of new functionality, design of user interface and technical architecture, implementation, testing and deliverance with documentation. The software developing unit consists of 12 engineers (4 are involved in the project).

EXPECTED IMPACT AND EXPERIENCE
Following key-results are to be expected:

- faster and more flexible response to changing demands (new and adapted products);
- minimising of time requested for maintenance and related services.

An Object Oriented Approach supports the time-to-market reduction in following ways:
- starting with determining the objects in the problem domain of the end-user, it allows the end user to review the results and deliver input very early in the development process;
• it enables the reuse of separate modules which speeds up development and causes less time to test and debug the application;
• it supports the completion of a highly complex solid design, thus reducing the risk of creating an incomplete design, and preventing most product changes later on.

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Start date: 01/03/97  
Duration: 18 months
Esprit Project 24395 - INDEED
INFORMATION SYSTEM DEVELOPMENT & EMBEDDED ENGINEERING
DOCUMENTATION

<table>
<thead>
<tr>
<th>Business Sector:</th>
<th>Information Technology</th>
</tr>
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<tbody>
<tr>
<td>Application Area:</td>
<td>Software Development</td>
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<tr>
<td>Key Words:</td>
<td>Documentation, Workflow</td>
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<tr>
<td>Technologies/Methodologies/Tools:</td>
<td>Lotus Notes</td>
</tr>
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BUSINESS MOTIVATION AND OBJECTIVES
New software development techniques and fast changing business environments, bring frequent design changes during system development projects. To cope with this situation, all involved parties must be informed adequately, within minimum time frames. Objective is to integrate documentation production, incl. distribution & release management in the development process.

THE EXPERIMENT
Lotus-based toolkits will be introduced and implemented in the baseline project for Amsterdam Airport Schiphol. This is the second of a kind, to be developed in co-operation with Scheidt & Bachmann (Germany). The results (quality of the delivered system) will be analysed against those of the preceding project.

EXPECTED IMPACT AND EXPERIENCE
The software system, to be delivered from the baseline project should show better quality, and require less on site testing and reach a stable status sooner resulting in the following experiment objectives:

- A 50% reduction in failures after delivery
- A 20% reduction of development time until moment of stable systems
- A 50% reduction of acceptance tests,

All compared to the preceding project with Amsterdam Airport.
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Participant: SCHEIDT & BACHMANN

Start date: 01/03/97
Duration: 16 months
Esprit Project 24407 - DESAUTO
APPLICATION OF A SYSTEM DESIGN AUTOMATION TOOL TO EMBEDDED SOFTWARE CONTROL SYSTEMS

<table>
<thead>
<tr>
<th>Business Sector:</th>
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</tr>
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<tbody>
<tr>
<td>Application Area:</td>
<td>Temperature and refrigeration control</td>
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<tr>
<td>Key Words:</td>
<td>Design automation, time to market, product quality,</td>
</tr>
<tr>
<td>Technologies / Methodologies / Tools:</td>
<td>System design automation tool.</td>
</tr>
</tbody>
</table>

BUSINESS MOTIVATION AND OBJECTIVES
Elm Ltd is a UK based SME designing and manufacturing retail refrigeration and HVAC (HEATING, VENTILATING AND AIR CONDITIONING) control systems. The success of the company is largely based upon its ability to respond to individual customer requirements. The flexibility of Elm’s product range is dependent on its software engineering capability. The changing nature of the market and the strict deadlines imposed by customers for new store openings, requires a fast, efficient and dependable software development process. Project overrun, specification errors and implementation errors lead to customer frustration and possible loss of future business.

The main objective of the PIE is to improve the process of designing embedded software control systems. This will be achieved by improving the system design process and ensuring its uniform application by modifying existing processes and training and motivating staff. The adoption of a design automation tool that will largely replace the present manual process of implementing requirement specifications will greatly assist the PIE.

The benefits derived from this PIE to Elm can be obtained by many other companies engaged in similar developments and at a similar stage of software quality maturity. Elm is typical of many SMEs, both in the UK and across the European Community. It is hoped that the dissemination of our results shall benefit many other similar organisations.

THE EXPERIMENT
The PIE involves the application of an improved design process with the aid of a System Design Automation toolset to a baseline project which is the design of an Air handling Unit (AHU) embedded controller. This addresses two of the major deficiencies identified during the review of current software practices: project overrun and unplanned design iterations.

The major project activities are: Identify and purchase a suitable tool; Train staff to apply the improved process and toolset to baseline project by modelling the requirements; Validate output against requirements to determine process improvements; Monitor project application performance and documentation generation to compare it with previous performance; Involve staff by briefing them about the goals of the PIE and their input and suggestions taken fully into account. The results of the study will be disseminated locally, at suitable European events and through ESSI dissemination channels.
Elm Ltd employs 120 people, 10 of them are directly involved in software development.

**EXPECTED IMPACT AND EXPERIENCE**
The anticipated commercial impact is the driving force for this. Shortened development cycles and reduced design iterations shall not only improve profitability, but also significantly increase productivity which is an essential element in the company’s planned expansion programme. Elm expects to gain useful knowledge about design automation and to incorporate this method in its software development. Elm also intends that the PIE shall provide the benefit of improved software quality and another step on the path to achieving software quality certification.

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**Start date:** 01/05/97

**Duration:** 12 months  
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Dissemination Actions
Esprit Project 23659 - EPIC
EXCHANGING PROCESS IMPROVEMENT EXPERIENCES ACROSS SMEs
BY CONFERENCING ON THE INTERNET

Key Words: SPI Dissemination, Internet, WWW
Technologies / Methodologies / Tools: Internet, real-time-audio-(video) conference

OBJECTIVES
Software development industry in Europe is characterised by a large number of small software producing units, focusing on different application domains and thus with different needs; this results in problems in effective technology transfer of pragmatic experience about best practices.
The proposed action aims at proposing an innovative dissemination approach that should eliminate problems such as clustering of the companies in specific application domains with utterly different development practices and business needs, locality of the market, limited attendance to international conferences/events and narrow-scoped local meetings.
The objective of the action is to fulfil the needs of the target audience with adoption of innovative multimedia approach for the dissemination events.
The distinguishing characteristics can be summarised as follows:
• set-up of cluster meetings for specific topics;
• set-up of cluster meetings for specific application domains;
• presentation of pragmatic experiences matured in PIEs;
• focus mainly on non-IT companies and IT SMEs;
• set-up of Internet WWW sites for sharing information;
• usage of Internet real-time audio-(video) conference for management of the events;
• provision of material for the Software Best Practice Library.

ACTIONS
The project is aiming at circulating pragmatic experiences about Software Process Improvement through targeted events run throughout Europe and conducted with the support of the most advanced communication technologies.
The targeted events are subdivided into two sets:

• Cluster meetings focusing on the presentation of pragmatic experiences for specific application domains (telecommunications, banking/insurance/finance, industry, public administration, software houses).
• Cluster meetings on topics strictly related with Process Improvement (PI and Software Product quality/testing, PI and ISO 9000, PI Measures and Return On Investment, PI and security/formal certification, PI and new technologies).

The target audience is constituted of middle/high management and in particular Project Leaders, Department Leaders and R&D Chiefs. Special care will be put in
trying to involve people outside the ESSI community and working in non-IT companies (where most of the European software is developed and maintained).

**EXPECTED IMPACT AND EXPERIENCE**

The envisaged impacts for the target audience can be summarised as follows:

- exposure to success stories matured in their specific application domain;
- possibility to benchmark various approaches and related outcomes;
- access to up-to-date assets in a very cost effective way;
- possibility to discuss specific issues without barriers; in fact the organisation of parallel events in various sites will allow the EPIC partners to organise them in order to accommodate the dissemination approach and presentation style to the peculiarities of the location (cultural issues, language, etc.)
- possibility to have access to the dissemination material via WWW before and after the events, in order to prepare the participation and, afterwards, “to sell” the outcomes to the internal decision makers.

Such aspects are expected to have a strong positive influence on the start-up of SPI Projects and thus on the reaching of higher capabilities, resulting in increased competitiveness of the European Industry.

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LGAI  
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PSTI  
F  
UNIPAD  
D

**Start date:** 01/01/97  
**Duration:** 24 months
Esprit Project 23873 - SPIRE
SOFTWARE PROCESS IMPROVEMENT IN REGIONS OF EUROPE

Key Words: Software Process Improvement, Best Practice, SMEs
Technologies / Methodologies / Tools: Mentoring, SPI projects, Case studies, Best Practice Guide

OBJECTIVES
SPIRE’s objectives are to lower the barriers preventing SSDs from successful participation in SPI by:

- raising awareness of SPI benefits among decision makers and change agents in SSDs
- educating participating SSD managers and staff in practical SPI skills
- helping SSDs to maintain momentum in carrying through their improvement plans

ACTIONS
SPIRE will generate, analyse and disseminate significant new case study and best practice material, in order to raise awareness of best practice and its benefits among small software developers (SSDs), and to promote their adoption of software process improvement. This will be achieved by using experienced mentors (paid by SPIRE) to guide SSDs through an assessment of needs, the preparation of a sound plan for a cost-effective, small SPI project (funded by SPIRE to a maximum of 15 KECU), implementation of the project, and evaluation of results. The experience gained from the most successful projects will be published as short case studies aimed at decision makers in SSDs in 4 languages (German, Italian, English and Spanish). Data from all projects will be gathered in a standardised way, to permit analysis from which valuable lessons regarding best SPI practice for SSDs will be derived and published as a report. The results will be disseminated on paper, electronically and through workshops, both in the 4 participating regions of Ireland, Italy, Austria and Sweden, and throughout Europe. The partners are ARC Seibersdorf (Austria), ETNOTEAM (ITALY), IVF (Sweden), CSE (Republic of Ireland), and MARI and SIF (both in Northern Ireland). The project will be co-ordinated with other ESSI proactive dissemination projects DonQ-SPI and LSD, and will feed into the ESSI Best Practice Library, in particular the VASIE2 project.

EXPECTED IMPACT AND EXPERIENCE
The experienced and results generated and disseminated by SPIRE are expected to have major impact in raising the awareness of the benefits of SPI in a significant proportion of the 100 000 or so European SSDs. The impact will be seen particularly within the 4 regions, where it is hoped to substantially increase the
proportion of SSDs undertaking SPI projects, but will also extend right across Europe.

SPIRE is also expected to have major impact on the 73 or so SSDs which undertake focused process improvement projects under the guidance of mentors. The impact will be of two kinds:

- firstly they are expected to achieve worthwhile improvements in their processes, which will improve their business and competitive position,
- secondly their management and key staff will be educated in the skills of practical process improvement, with most of them being expected to apply the skills to make further improvements after SPIRE is finished.

Mentors will also benefit from SPIRE through the experience gained in helping to apply SPU in SSDs.

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SIF
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MARI
UK
IVF
SE

**Start date:** 01/01/97  
**Duration:** 18 months
Esprit Project 23945 - DONQ-SPI
SOFTWARE PROCESS IMPROVEMENT PROACTIVE DISSEMINATION
WITH EUROPEAN SMEs

Key Words: Dissemination, Best practice, European Network
Technologies / Methodologies / Tools: Seminars, Conferences, Dissemination network, DonQ Methodology

BUSINESS MOTIVATION AND OBJECTIVES
DonQ SPI consortium is aware of the difficulties to introduce Software Best Practice techniques into Software development SMEs. The regional and proactive approach needed to reach a sufficient number of them is the starting point of this project which has as main objectives to generate a set of six demonstrative pilot projects. The results of the pilots will be the core basis for a European wide dissemination campaign.

ACTIONS
The project follows DonQ Methodology, a tool to guide in the dissemination of technologies in adverse environments. It consist of the development of an proactive dissemination campaign centred in two regions (Basque Country and Bremen), including:

- a diagnosis and selection of innovation prone SMEs, approx. 16 SME to be diagnosed, 6 to be selected.
- a management training for the SMEs.
- a detailed analysis and posterior elaboration of an implementation plan per each SME.
- a European wide dissemination campaign at regional level, including the training of regional Trainers (for approx. 50 persons).
- the elaboration of a Generalised Methodology for the Dissemination of Software Best Practice.
- the continuous dissemination of the activities, the case studies, and the results of the project.

In parallel, DonQ SPI will co-ordinate its activities with other similar and complementary Dissemination Actions within ESSI programme.

EXPECTED IMPACT AND EXPERIENCE
DonQ SPI expects to directly (through seminars, conferences, visits,...) reach a number between 250 and 350 SMEs in each of the two regions where it will be implanted in the local stage. Besides the European wide dissemination action will reach aprox. 1000 persons involved in software development, or related to innovation in supporting public institutions.
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Participant: ATB
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Start date: 01/01/97

Duration: 15 months
Esprit Project 23960 - SURPRISE
SURVEY ON POSSIBILITIES OF REUSE IN SOFTWARE ENGINEERING

<table>
<thead>
<tr>
<th>Key Words:</th>
<th>Software Reuse, ESSI PIEs, Productivity, Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technologies / Methodologies / Tools:</td>
<td>Software Reuse</td>
</tr>
</tbody>
</table>

OBJECTIVES
Despite the very high potential impact widely recognised to reuse in building better software, cheaper and sooner, few companies have a solid and credible reuse programme in place. The reasons for the slow take-up of reuse is that it is difficult technically to achieve success, and there are complex sets of factors (human, organisational, process) influencing success. Sources of information about reuse exist, but they are often difficult to use and coming from research projects. ESSI PIEs dealing with reuse are a rich, up-to-date, industrial source of information, but material from these projects is scattered, difficult to find, and requires a lot of investment to be exploited. The objective of SURPRISE is to package this information in a usable, ready-to-use handbook on how to achieve reuse in an industrial context.

ACTIONS
The handbook will be the result of the following actions:
Definition of a framework for analysing and comparing reuse processes and their economic impact. The framework builds on existing material, and the Esprit REBOOT project in particular.
Analysis of PIEs concerning reuse, and assessment of their reuse processes against the framework. Considering the ESSI pilot phase, the 1995 and 1996 ESSI calls, it is expected that around 40 industrial reuse processes will be assessed. Moreover a selected subset of around 10 PIEs from the 1995 call will be assessed in depth.
Aggregation of data from analyses into a Reuse Handbook, including economic guidelines, for deciding whether to introduce reuse in an organisation; and technical guidelines, for choosing technology and tools and setting up technical and organisational conditions for achieving reuse.

When the Handbook will be available, its diffusion will start by using existing channels. Tutorials at international events, papers in conferences and journals, web sites, mailing lists will be used to advertise the existence of the Handbook and diffuse its essential contents. The distribution free of charge of copies of the Handbook will diffuse the entire contents to a selected, interested audience of 1000 European companies.

EXPECTED IMPACT AND EXPERIENCE
The impact which SURPRISE seeks to make is to encourage many more European organisations to embark on the high-impact strategy of software process and product improvement through successful reuse.
The benefits of SURPRISE are that it packages the available practical information on reuse in a carefully digested and usably presented form. The information is essentially of two kinds: evidence of past experience, and guidance on how to get
started. It is presented to the two key audiences: executive decision makers, and software practitioners.

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**Start date:** 01/04/97  
**Duration:** 18 months
Esprit Project 23973 - SMILE
SPREADING MULTIMEDIA INFORMATION FOR LEARNING AND ENLIGHTENMENT ABOUT SOFTWARE PROCESS IMPROVEMENT

<table>
<thead>
<tr>
<th>Key Words:</th>
<th>Software Process Improvement, Software Quality</th>
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<tr>
<td>Technologies / Methodologies / Tools:</td>
<td>Multi Media Information System</td>
</tr>
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</table>

OBJECTIVES

Software producing units are still facing problems in carrying out software development. Projects running over time and over budget, too many errors and not-sufficient quality are examples of the problems.

Software Process Improvement (SPI) is a promising new paradigm to be used to gain control over the problems. The perspective behind Software Process Improvement is that it pays to treat the entire software task as a process that can be controlled, measured, and improved.

However, only between 10% and 20% of European Companies are aware of SPI and how to assess the software task and take action in order to overcome the problems.

The objective of this dissemination action is to raise awareness of and disseminate basic knowledge on Software Process Improvement (SPI) and Software Quality. The expected result of the project will be:

- More management attention to SPI
- More organisations active in seeking information on SPI
- More organisations starting an SPI programme

ACTIONS

The dissemination action used in the SMILE project is multimedia CD-ROM containing information on Software Process Improvement. The information will be:

- tailored specifically to different management needs
- interactive thereby letting the users seek information in an interactive way
- in the form of lectures, case studies and interviews as well as literature reviews and links to relevant information sources

EXPECTED IMPACT AND EXPERIENCE

The expected impact and benefits to the target audience and the wider community will be:

- increased SPI awareness
- enhanced knowledge on how to seek information
- insight into what actions one can take within an SPI programme
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Participants: COPENHAGEN BUSINESS SCHOOL
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Start date: 01/04/97
Duration: 18 months
Esprit Project 24119 - VASIE-2
VASIE-2: VALUE ADDED SOFTWARE INFORMATION FOR EUROPE

Key Words:  
process improvement experiments, experience reports, software best practice library

Technologies / Methodologies / Tools:  
WWW

OBJECTIVES
• to develop a European software best practice library for the permanent dissemination of ESSI process improvement results
• to provide access to the information through WWW to the widest possible community
• to facilitate and solicitate the introduction of value-added information from the widest possible sources to ensure a continuously updating software best practice library based on industrial experience

ACTIONS
• enhance VASIE-1, the repository of final reports of ESSI Application Experiments, to build a broader library with information categorised based on a standard SPI framework (SPICE)
• process all existing ESSI PIE reports and those expected during the lifetime of the project for publication
• develop and operate best practice discussion fora
• develop and produce theme centred analysis of the repository

EXPECTED IMPACT AND EXPERIENCE
• facilitate widest possible permanent dissemination of ESSI programme results in an economic way
• enable access to approaches, user experiences and benefits of SPI to the whole software community
• enable exchange of experience involving users and suppliers
• form the kernel of a European-wide software best practice experience repository
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Start date: 01/03/97
Duration: 18 months
BUSINESS MOTIVATION AND OBJECTIVES
European companies must face the challenge of translating software engineering into a competitive advantage in the market place, by taking full advantage of the existing experiences and results. The process of overcoming existing barriers is not an easy one and particularly if they must be faced by companies on their own. It is a major issue to put at the disposal of companies a set of written case studies that obtain a practical view of software improvement impact and best practices. Successful experiences can demonstrate that existing barriers can be dismantled and this can be achieved in each organisation. This learning process, that takes time and requires continuity in the long term, will be fostered by the SISSI project.

The target audience for the SISSI case studies executives, i.e. decisions makers, in software producing organisations through Europe. This will include both software vendors and companies developing software for in-house use. The material will be selected in such a way that it is relevant for both small and large organisations.

Due to business orientation of the SISSI project, rather than the technical one, the target audience will be formed by CEOs, IT Managers and, in general, those people with a global view of the company and strategic vision of the market. In order to understand what all this business is about, a simple segmentation is suggested taking into account size and activity sector.

ACTIONS
SISSI develops and distribute a set of 35 case studies of about 4 pages each. Cases don’t have a technical orientation (not exclusively), but on the contrary, they have a clear business orientation and are focused on action. Cases are a selected compendium of the current and finished Process Improvement Experiments. They are classified according to different parameters and keywords so tailored and selective extractions can be made by potential users or readers. The main selection criteria are: size of the company, sector and application area.

The dissemination mechanisms of SISSI are: a selective telephoned-led campaign of mailing addressed to 5000 appropriate organisations together with follow up actions; and extensive mailing campaign targeting 5000 additional organisations which can select the relevant cases from an introductory document, Press articles in journals and magazines oriented to senior executives; Web pages with the full contents of the case studies more oriented towards software engineers and managers; Synergic actions with other Dissemination Actions of the ESSI initiative, like EUREX, SURPRISE and EPIC.

EXPECTED IMPACT AND EXPERIENCE
The benefits that software organisations can obtain through PIE experiences are expressed in terms of quality, productivity and time to market. But software executives facing this challenge do not often have a clear idea of establishing ambitious and realistic objectives for their own improvement projects. The use of case studies is an efficient way to get a clear idea of what can be obtained and how. SISSI foster transnational exchange of experiences and best practices of how organisations can overcome barriers for improvement.

SISSI will raise awareness among organisations on reward that they can obtain by efficient use of improved software processes and techniques. SISSI will bring executives tailored and condensed information according to one’s needs.

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**Participant:**  
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**Start date:** 01/04/97  
**Duration:** 14 months  

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Esprit Project 24239 - INSPIRE
PROVIDING THE INFORMATION ON SOFTWARE PROCESS
IMPROVEMENT REQUIRED BY EXECUTIVES AND SENIOR MANAGERS

Key Words: software quality, process improvement, executives, management, business journals, decision makers, awareness

Technologies/Methodologies/Tools: Bootstrap, ISO 9000, SPICE, CMM, TQM.

OBJECTIVES
The INSPIRE project will substantially increase awareness of process improvement amongst the largest possible number of senior managers. It will do so by providing business level information in easy and familiar business language through a media used every day by most senior managers - the business newspapers. The ultimate objective being to increase awareness and prompt senior managers to initiate process improvement actions or at the least, to recognise and be more supportive when such actions are proposed by subordinates.

ACTIONS
The INSPIRE project will create what is called in the newspaper business an "Advertorial" section for each of the leading French, German, UK business newspapers. This is a section of the regular newspaper normally 8 pages in length done in the same style, paper, lay-out and editing as the normal newspaper. It will include articles, editorials, testimonials, contact information, articles by business leaders, etc. all concerning the subject of software quality and the business issues surrounding expenditure on software development. The inserts themselves can be removed and kept for further reference and can be used as standalone information collaterals at conferences, workshops and other dissemination activities.

EXPECTED IMPACT AND EXPERIENCE
The result of the project will be to increase awareness of the field of software quality and process improvement and the benefits that can be obtained. This will be done at the highest management levels within thousands of organisation in the target regions. As a consequence we expect to see more improvement actions initiated by upper management and at the very least to create a more receptive environment when such actions are proposed by subordinates.
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Start date: 01/01/97
Duration: 12 months
Esprit Project 24380 - LSD
LARGE SCOPE DISSEMINATION

<table>
<thead>
<tr>
<th>Key Words:</th>
<th>Dissemination, ESSI, SME, Case Study, PIE, Quality, Training, Software Improvement</th>
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<tbody>
<tr>
<td>Technologies/Methodologies/Tools:</td>
<td>Awareness, Conferences, Workshop, Customised Sensibilisation.</td>
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**OBJECTIVES**

The aim of the LSD project is to target a large number of SME interested in raising their competitiveness through an improvement of their development process. Rather than a specific focused subject, methodology, or technology, LSD aims at disseminating what is best perceived as complement need from the target audience. The action will also address companies only marginally involved in the IT business, but who seek in the IT sector, usually the most advanced, for an example on how to improve their development process.

The ultimate objective of LSD remains the implementation of a solid network of local experts, not yet in the software domain, rather in that of the support of local SME. The language, when not jargon, spoken by software experts, in fact evolves so fast, according to the rate typical of the IT sector, that the gap between the software industry and its potential customers, is growing dangerously and too often suppliers and customers needs diverge.

As a side, intermediate objective, LSD aims at growing the right skills for a prototype disseminator that will better guarantee for an effective penetration of the IT culture in any industrial sector, so to finally increase the demand for a better quality software and trigger the expected virtuous loop.

**ACTIONS**

LSD does not focus on a specific IT related subject. Rather the action will start with the large spread of a questionnaire aimed at gathering the most common needs shared by the target audience.

It is expected to distribute this initial light questionnaire to about 1000 companies, and to receive it back from at least the 30% of the enquired companies.

The outcome of the questionnaire will then be exploited to filter out the material currently available in different electronic libraries (e.g. VASIE). Such a material, suitably translated (for sake of a better understanding in Italy) and integrated by other case studies will be distributed back to the above companies.

The only support adopted for this contact is a 3.5" diskette containing the customised information and a mini-browser to allow an easier navigation on it. This with the clear intent of training the target audience to the use of a not yet widely adopted way of exchanging information.

In fact, it is not unusual that even SME operating in the IT sector, at least in the Liguria and Mersey regions, are not familiar yet with emerging communication technology.

A local WEB site will gather the totality of the information borrowed by different sources and the case studies already developed by the partners. A set of modem will be set up to allow a free access to the site for those companies, the majority, who do not have access to internet yet.
The Web site will contribute and benefit from a larger exchange of similar experiences at European scale.
Trained mentors will tight the contact with a subset of the initial companies and provide direct assistance to those strongly committed in improving their software development process.

EXPECTED IMPACT
The expected impact from this action are multiple.
The growth of a local SPI culture supported by a new generation of mentors, with a constant eye to the SPI world, while the foot steadily drived on the SME play ground.
The local library is supposed to grow and become part of a large network of local libraries especially useful to derive ad hoc and well proven case study to implement, in a near future, a sort of reuse of SPI so to reduce, when not avoid, the need for an Improvement Experiment.
To foster the switch between the rare-at-workshop meeting and the continuous-at-work virtual-meeting.

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Start date: 05/05/97  
Duration: 18 months
Esprit Project 24478 - EUREX
EUROPEAN EXPERIENCE EXCHANGE

**Key Words:** Dissemination of ESSI PIE Experiences, Different Problem Domains (identified during analysis phase), Software Best Practice Reports
**Technologies / Methodologies / Tools:** 18 Regional Workshops, European Workshop and European Conference, 5 Books, CD-ROM

**BUSINESS MOTIVATION AND OBJECTIVES**
The overall objective of this Action is to assess, classify, categorise, and exploit the experience of ESSI Process Improvement Experiments (PIEs) and to make this experience accessible to everyone (including subsequent PIE Users) in a convenient form. In particular, we want to collect and make available to a broad European audience information about Software Best Practice and its introduction in specific problem domains. In addition, we will use this opportunity to inform a wider community of software practitioners, including potential new PIE applicants, about the collective experience of previous PIEs in their Problem Domain to avoid duplicated effort.

**ACTIONS**
The essence of the subject and material to be disseminated consists of PIE experiences documented and commented with expert opinions. This material will be gathered at Regional Workshops and at a pan-European Workshop and a Conference.

The problem domains to be addressed will be defined in the beginning of the project. It is one of the important activities of this Action to classify and filter the PIE problem domains in order to determine areas of particular value to European Industry. Examples of candidate problem domains include configuration management, test and verification, object-oriented methods, formal methods, metrics, complexity and estimation. The Regional Workshops will be theme-based and target the problem domains selected.

The material from the pan-European Conference will form the basis of a new Series of Books from Springer-Verlag, the Software Best Practice Reports, and of Executive Reports (of the content of the books, summarising benefits and risks of real cases).

There are three major dissemination mechanisms foreseen within the EUREX project: 18 Regional Workshops, a pan-European Workshop and a pan-European Conference, and the publishable material generated as a consequence of the work carried out in the workshops and conferences, in particular the proceedings, the Software Best Practice Reports (books and executive summaries) and a CD-ROM containing background material.

**EXPECTED IMPACT AND EXPERIENCE**
The effect of this Action is to raise awareness throughout the software development community (and their enclosing organisations) that many problems are common to a broad range of organisations and that feasible solutions exist widely. Success stories about the introduction of Software Best Practice will help SMEs in particular justify moving forward with process improvement actions, both with and without Commission support.

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**Start date:** 01/04/97  
**Duration:** 24 months
Training Actions
ESPRIT Project 24035 - RAPID
RAPID START-UP ON QUALITY MANAGEMENT SYSTEM
IMPLEMENTATION

Key Words: Training tools, QMS, SME, Software development process

Type of Training Action: Benefit awareness, SMEs Focused action
Mechanisms: Regional training sessions, dissemination of information via a WWW information service
Target audience: Senior Management and SMEs involved in the software development process

BUSINESS MOTIVATION AND OBJECTIVES
The RAPID Project aims at developing a modular training product for QMS implementation for small and very small software companies constituted by a self-contained training package suitable for self-teaching and by a training course to be managed by teachers and supported by on-site supervisors.

The project is constituted by two macro phases: the first one devoted to the preparation of a prototype of a training product followed by a test run in all the countries represented in the consortium to validate its content and format and its cultural independence; the second phase to take into account the feed-back collected during the test run to improve the product and its suitability to the users’ requirements. Finally a set of three training actions based on the product will be run in the countries were the partners are based (Italy, France, UK and Germany) to consolidate the product and to reach a wider audience. A preliminary benefit awareness action was included to stimulate response by the target audience.

ACTIONS

The product implemented will include a number of innovative features:

• it will be an excellent and self-contained tool for the training of QMS implementers, with considerable potential for transferability of know-how within the company;
• it will be a generalised culturally and sectorally independent product for use in different European contexts;
• it will provide the necessary competencies and working aids (templates, reference materials, etc.) to fully support a quick QMS implementation;
• it will contain a module for benefit awareness actions targeted to senior management for them to understand, measure and appreciate the advantages of introducing QMS in the software development process.

2. Organisation and management of benefit awareness actions in 4 countries to raise the interest of Senior Management.

3. Organisation and management of pilot courses for product validation by users. Pilot training actions targeted to very small companies will be run in 4 countries to validate the product with the users and make the best of their feedback for improvement.
4. Organisation and management of 3 training events in the 4 countries in which the partners are based and review of the training materials on the basis of the users’ feedback.

**EXPECTED IMPACT**

The implementation of the RAPID project will lead to the development of a truly European training product able to support the quick implementation of QMS in software SMEs and small software development teams through the provision of a set of templates and support materials. The project will assess the training actions’ impact in terms of the companies’ stimulation to start QMS implementation shortly afterwards. The training tools will facilitate the transfer of knowledge within the company through a self-teaching module enclosed in the package.

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**Start date:** 01/01/97
**Duration:** 24 months
Esprit Project 24042 - TRAPSP
ADVANCED MULTIMEDIA AND DISTANCE TRAINING FOR SME TEAMS
USING THE PERSONAL SOFTWARE PROCESS

**Key Words:**  
PSP (Personal Software Process), Multimedia Training, Distance Learning

**Type of Training Action:**  
Innovative, Non-traditional training methods, SME/Small focused actions

**Mechanisms:**  
CD-ROM, Distance Learning (WWW site), Pilot experiences

**Target audience:**  
SME and Individual or small software development teams, Senior management

**BUSINESS MOTIVATION AND OBJECTIVES**
The main project objective is to develop an application based on multimedia and distance learning techniques to train software engineers and senior managers in the PSP model.
The identified target audience of this project are software engineers and senior managers working in small and medium enterprises or small software development teams. One common characteristic of this collective (and, in general, of all people working for SME) is their impossibility to attend regular pre-programmed courses due mainly to their lack of time for training and formative purposes caused by their diary activities. Therefore, one of their main identified requirements, addressed directly by this project, is to provide flexible (not constrained to fixed dates) and accessible (on-site and self teaching training) ways to increase their knowledge and skills to develop software using best practice. Nowadays there is a general understanding that an effective way to tackle this problem is to use of multimedia educational software combined with distance learning techniques.

**ACTIONS**
- To develop the multimedia and distance learning (Internet) course.
- To use this application in two pilot experiences with two European SME enterprises (6 end-users) in order to evaluate its level of effectiveness and acceptability. Additionally, four ESSI PIEs projects will also participate in the definition of the specifications and the evaluation of its level of effectiveness and acceptability.
- Based on the results of the previous point to disseminate and extend the results of the project to the set of possible end-user companies making use of the special facilities and links provided in that area for the European Software Institute (ESI).

The metrics to measure the quality of the TRAPSP course and the user’s satisfaction with this software package will be the evaluation questionnaire to be fulfilled by the software engineers trained with the pilot experiments, the commitment, at the end of the project, of an external company to distribute the product and the degree of attendance and interest suscited by the TRAPSP course during the software dissemination activities (seminar and workshop).
EXPECTED IMPACT
By means of the information materials, self training courseware and knowledgeware that this proposal intend to disseminate, a wide community of European software organisations and non-IT organisations, mainly SME, will become aware of establish and carry out their improvement processes by themselves. They will be allowed to obtaining suitable training on the PSP at economical prices without the need of travelling or attend standard courses. Additionally, the objectives and activities of this project are an important contribution to the LABEIN and ESI software best practices dissemination actions.

The consortium will prepare a first version of the “Project Exploitation Plan (PEP)” at the project mid-term and update it at the end of the project. This PEP will, among other subjects, identify, select and involve an external training provider engaged mainly in production and distribution to assure the use of the product for continuing training and education beyond the life if this project. If the results of the pilot experiences are positive the consortium will put the product into the market at a reasonable low-price strategy.

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Start date: 01/3/97 Duration: 18 months
Esprit Project 24076 - MURMUR
MULTI-MEDIA TRAINING ON MANAGING USER REQUIREMENTS

Key Words: User Requirements, Multimedia, CD, Internet, Training
Type of Training Action: Innovative, non-traditional teaching methods
Mechanisms: CD ROM, WWW site
Target audience: teams at SMEs, non IT-sector and large software companies

BUSINESS MOTIVATION AND OBJECTIVES
The target audience and their needs are: Small Development and Information Systems groups; People who don’t have 3 days to spare away from the office; People whose projects are not synchronised with the two events a year when training is available; People whose organisations are too small to justify purchasing in-house training; All organisations who want to train staff exactly when the need arises; Individuals who want to train at their own pace wherever they prefer.

The Objectives are to: take a proven, existing set of Managing User Requirements training material and transform it into a prototype multi-media CBT package; do detailed evaluation of the product and its delivery system with 100 people at a mixture of organisations including SME’s, non IT sector organisations and larger software development companies; deliver two language versions of this CBT package and demonstrate techniques for further localisation; produce a product that is more cost effective than the current conventional 3-day training event; deliver a product with multiple entry and exit points for use as training material and on-line help; prototype an innovative Internet based delivery and technical support system which will include free demonstration and evaluation copies, on-line discussion groups and technical support.

ACTIONS
The Project brings together: Q·SET (SPI trainers and software developers); 3Soft (SPI consultants and software developers; Electric Paper (multi-media experts) and Pat Fehin (subject expert in User Requirements). Aside from project management and reporting, the project will have 4 phases; requirements from the market-place; product design; product development; product evaluation. During the project, 100 people will be trained while evaluating the prototype software. In addition, many more people will be introduced to the subject matter and delivery mechanism at exhibitions.

EXPECTED IMPACT
The project deliverables will include techniques for: development of SPI multi-media training products in general; development in new languages; delivery and support via Internet. This will lead to more organisations in the EU developing and receiving new SPI courses in new languages in multi-media format.
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Start date: 01/01/97

Duration: 18 months
Esprit Project 24238 - TAPISTRY
TAILORED APPLICATION OF SOFTWARE PROCESS IMPROVEMENT TECHNIQUES FOR SMALL ENTERPRISES

Key Words: Process Improvement, SME, Bootstrap, BootCheck, Improvement Plan, self diagnostic

Type of Training Action: Regional Workshops

Mechanisms: Advanced diagnostic tool, industry experts, tailored improvement plans

Target audience: Managers and Project Leaders for Small to Medium Enterprises (SME's)

BUSINESS MOTIVATION AND OBJECTIVES
Today there is a great wealth of research, tools and methods available to assist organisations in software process assessment and improvement. However, for an SME it is difficult to capture the core concepts and apply them without the use of consultants or a substantial investment in a software manager's time. In addition many SME software managers feel that the formal assessment methods are targeted towards large organisations and are not appropriate for SME use.

The primary objective of TAPISTRY is to bring to the SME the skills and expertise of some of the top industry experts in process improvement but in way that is specifically tailored to their organisation size and current situation. This is done through the use of a PC tool for collecting data on software practices and Workshops where industry experts work individually with participants to analyse the data and develop an improvement plan specific to their organisation.

ACTIONS
Collect from industry experts proven and repeatable improvement actions which are appropriate for SME's. Then using this combined knowledge, conduct Regional Workshops where SME's can within a period of just two days, first understand the key principles behind software quality and process improvement. And secondly, to have their particular situation analysed and a specific improvement plan defined by a software quality and process improvement expert.

EXPECTED IMPACT
SME's in the targeted regions will have access to industry process improvement experts and be able to undertake improvement actions at an affordable price. They will see the benefit of process improvement and see increases in software quality without having to invest in substantial consulting fees. The TAPISTRY project will provide for continued expansion of the Workshops into other regions by packaging and licensing the Workshop material. Process improvement consultancies in other regions will be trained to conduct TAPISTRY Workshops for SME's and once proven the TAPISTRY Workshops would be used to assist SME's throughout Europe on a commercially sustainable basis.
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Start date: 01/01/97
Duration: 18 months
Small Company Action Training and Enabling (SCATE)

**Key Words:** Software Process Improvement, SPI Training, Change agents

**Type of Training Action:** Train Trainers

**Mechanisms:** Training & coaching sessions

**Target audience:** Software Groups of less than 100 people

**BUSINESS MOTIVATION AND OBJECTIVES**

Software Process Improvement (SPI) has mostly been adopted by companies with large software teams. A potential audience that has not been reached adequately is the software group of less than 100 people, as an SME or as the IT department of a larger organisation.

The main objective of Small Companies Action Training and Enabling (SCATE) is to make SPI accessible to small software teams and to ensure that they have the necessary support from senior managers to succeed in their initiatives. SCATE addresses this in English, French, and Greek speaking countries through active and participative training of selected personnel from small software groups who will then go on to train others in their groups. A second objective of this multi-lingual project is to determine what key kernel is transferable from one country to another and what components work best in a specific culture. The business motivation of the partners is to raise the general level of awareness of the importance of good software processes. This will result in their own customer base expanding for their businesses as consultants and tool developers in SPI. In addition, their skills at helping others will be enhanced through the experience of the training process, use of the tools developed for the training, and the knowledge gained from interaction with the students and their organisations.

**ACTIONS**

The objectives will be accomplished through:

- raising the level of awareness among SME business managers through a series of initial meetings where a chaotic software environment is portrayed, the organised environment is presented, and basic education is provided in how to go from chaos to organisation.

- training of students from each client organisation in: software processes of the CMM, level 2 and how to implement them in a pilot project which will be begun in their own organisations during the training process; how to overcome resistance to change, present new ideas in acceptable ways, and help people work together to define and achieve goals

- developing the training course in two steps: a kernel which is common to all, and language- or culture-unique components

**EXPECTED IMPACT**

The expected impact will be at several levels:
• Increased awareness of the need for improved software processes will reach a broad spectrum of business managers in many countries through the initial meetings
• Detailed knowledge of what an improved process looks like and how to achieve it will be instilled in the organisations who choose to benefit from the training programme
• Students from all client organisations will meet and share their experiences at a final workshop where they can learn from each other
• Linkages will be established for the ESSI training action organisations through participation in five workshops where techniques are shared and common problem solving can take place.

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Start date: 01/01/97  
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