ANNUAL **REPORT**

2008

CENTRE OF EXCELLENCE IN INFORMATION AND COMMUNICATION TECHNOLOGIES

cetic

Your connection to ICT Research

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INTRODUCING CETIC

ICT IS BOOSTING INNOVATION

By supporting a collaborative access to information, ICT is the catalyst that creates knowledge and makes advances in sciences and technologies.

All businesses in all industrial sectors are directly concerned. ICT is boosting innovation, creativity and competitiveness thanks to its many multiplier effects.

ICT is impacting our daily lives. As citizens, customers or consumers, we are all concerned. Whether for public sector services, our dealings with government (e-Government), our education system and continuing training (e-Learning), or health (e-Health), IT is becoming more and more the first link between service recipient and provider. This creates new challenges in terms of reliability, security and accessibility of these services for all.

Among these sectors, CETIC invests in eHealth. Indeed, in a global context of an aging population combined with a shortage of doctors, ICT offers high added-value solutions to provide better care for elderly people at home. This social issue is at the heart of CETIC's strategy for the future.

Mastering ICT skills and knowledge is a major social, economic and political challenge. Having regional expertise, research and innovation capacity available to citizens and businesses is neither a luxury nor an option but rather a major requirement for a region that needs to accelerate its economic development.

That is the mission of the CETIC research centre accredited by the Walloon Region.

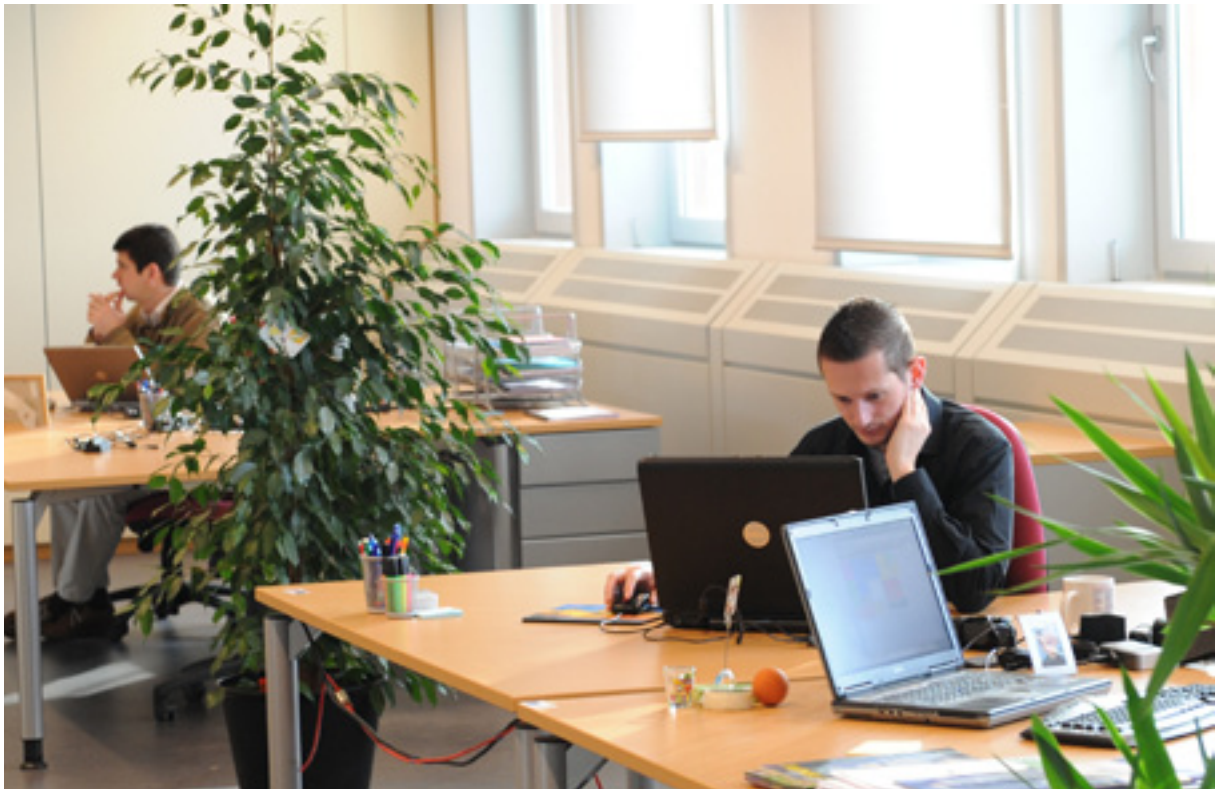
Our mission as an applied research centre for industry is implemented through the three following departments:

1. Software and Systems Engineering
   Providing methodological support to help companies develop products and services of higher quality, ensuring reliability, safety, and compliance with international standards.
2. Software and Service Technologies
   Providing businesses with strong technological expertise to help them more quickly implement distributed, service-oriented and dynamic computing architectures. Accelerate transformation of information into knowledge by semantic technologies. Exploit the real opportunities of open-source software.
3. Embedded and Communication Systems
   Helping companies invent embedded systems, including hardware and software, and quickly develop prototypes at their request. This department mainly focuses on intelligent and communicating wireless systems for a wide range of applications, from road transport to eHealth, as well as consumer electronics, home automation, etc.

Our slogan: **Helping businesses!**

Since 2004, CETIC has been accredited by the Walloon Region as a "collective research centre". The key criterion for this certification is the centre's self-financing capacity which must be above 50%. This means that the centre generates sufficient internal funding sources – apart from the Walloon Region authorities – for at least 50% of its total financial resources. In 2008, CETIC's self-financing level rose to 54% thanks to the important increase in revenues generated by services provided to businesses. Among these, we note the growth in R&D outsourcing to CETIC by a few major partners.

The year 2008 also saw CETIC conducting a major campaign to determine enterprise needs, especially those of regional SMEs, in research and innovation in the field of eHealth. The result led to the establishment of "eHealth - ICT for patients", a portfolio of projects, the most important eHealth R&D project in the Walloon Region, which will start in July 2009.



Research activities in CETIC are structured around two centres of expertise:

- The Centre of Expertise in Engineering and Quality Systems (CE-IQS), which aims to improve the quality of systems developed for businesses (focusing on the most critical and complex systems) in order to increase companies' productivity in development and certification phases.
- The Centre of Expertise in Open Source Software (CELLaVI), which aims to support an ecosystem of companies, provides a collaborative development environment fostering exploitation of Open Source software opportunities, and develop a regional competitive advantage.

These centres of expertise are supported by two laboratories and a wireless computer centre operated to serve businesses.

The year 2008 saw three major CETIC findings:

- February 2008 was marked by the launch of two major Seventh Framework Programme (FP7) projects in the field of service engineering, DEPLOY and RESERVOIR. DEPLOY focuses on the adoption of formal methods to develop services and RESERVOIR enables the deployment and management of IT services across different administrative domains through virtualisation techniques.
- In July, FEDER ICT Projects Portfolio (Call 1) started in CETIC by launching research activities within the Centre of Expertise in Engineering and Quality Systems (CE-IQS) and the Centre of Expertise in Open Source Software (CELLaVI)
- In November, CETIC was accredited by the French Ministry for Research as an R&D organisation, allowing French businesses working with CETIC to benefit from research tax credits (50% of R&D expenses per year, up to €100 millions for the first year). This recognition resulted in a collaboration contract between CETIC and KALISTICK, French company based in Lyon. KALISTICK contracted CETIC to benefit from its expertise in code analysis.

In addition to the partnership in collaborative research projects, CETIC supports companies in their innovation initiatives, improved products, processes or services, and in particular provides technological and methodological advice, development of prototypes and demonstrations or feasibility studies.

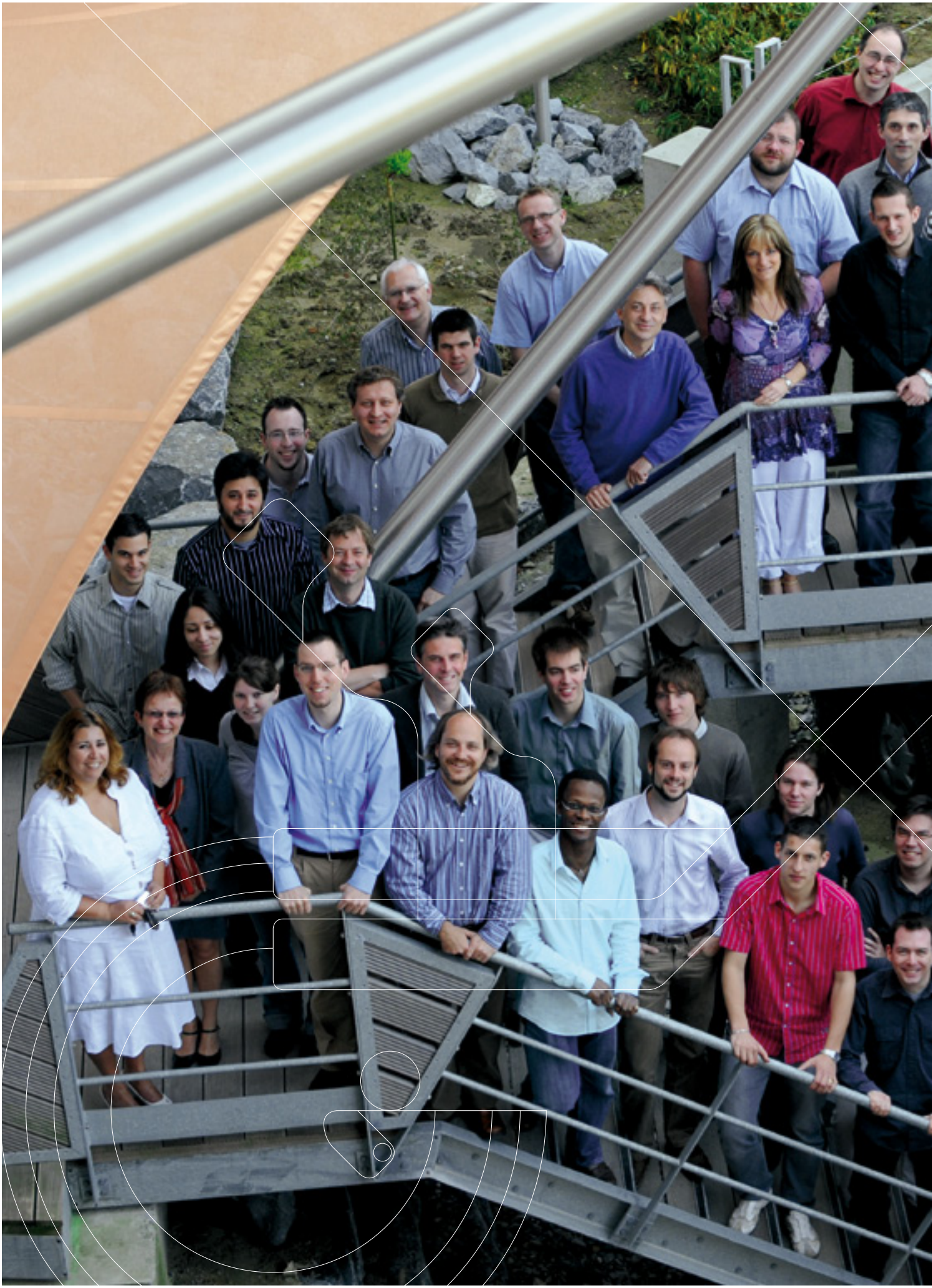
CETIC cultivates excellence to provide real business support. This is how we have defined our modus vivendi: operational excellence.

We thank our industrial partners for the interest and the trust they place in us, and all CETIC employees for their great creativity and expertise.

Simon ALEXANDRE

General Manager

« In addition to the partnership in collaborative research projects, CETIC supports companies in their innovation initiatives, improved products, processes or services, and in particular provides technological and methodological advice, development of prototypes and demonstrations or feasibility studies. »



ABOUT CETIC

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MEMBERS AND ORGANISATION

CETIC is a non-profit organisation (ASBL under Belgian law) established at B-6041 Charleroi, 29 rue des Frères Wright, and composed of the following members:

Four corporate bodies:

- Technology Industry Federation, AGORIA
- Faculté Polytechnique de Mons (FPMs)
- Facultés Universitaires Notre-Dame de la Paix de Namur (FUNDP)
- Université catholique de Louvain (UCL)

Fourteen physical bodies:

- Mr Bernard Bolle, Siemens IT Solutions and Services sa
- Mr Claude Cambier, Unisys Belgium
- Mr Philippe Fortemps, Professor, FPMs
- Mr Naji Habra, Professor, FUNDP
- Mr Jean-Luc Hainaut, Professor, FUNDP
- Mr Benoît Hucq, Océ Software Laboratories Namur sa
- Mr Roland Keunings, UCL
- Mr Jean-Didier Legat, Professor, UCL
- Mr Benoît Macq, Professor, UCL
- Mr Roger Malchair, Evadix.Net sa
- Mr Pierre Manneback, Professor, FPMs
- Madame Nicole Moguilevsky, Research Administration, FUNDP
- Mr Daniel Tuyttens, Professor, FPMs
- Mr Christian Verdonck, BizzDev sa

Members of the association have met on the following occasions:

- In statutory general assembly on May 21, 2008 to approve 2007 annual accounts
- In extraordinary general assembly on December 9, 2008 to approve the 2009 annual budget

TECHNICAL COMMITTEE

The research decree published on July 3, 2008 defines conditions and modalities for accredited Research Centre approval in Wallonia.

The decree specifies the Research Centre mission, which is to perform general industrial research that can be transferred to industry according to expressed needs and specificities.

In particular, the decree states that the Research Centre conducts collaborative industrial research general enough to be of interest to companies with similar needs. These needs determine its work and areas of research based on the needs and the typology of the Walloon Region, and under the guidance of a technical committee made up primarily of representatives of corporations.

In order to align research activities with industry needs, the Research Centre has set up a permanent technical committee in charge of validating the R&D strategy. The CETIC Technical Committee is composed of:

- Mr Simon Alexandre, CETIC
- Mr Jean-Louis Bolsée, Thales Alenia Space ETCA
- Mr Patrick Crasson, Sun MicroSystems
- Mr Laurent Cuvelier, Thales Alenia Space ETCA
- Mr Jean-Christophe Deprez, CETIC
- Mr Naji Habra, FUNDP
- Mr Jean-Luc Hainaut, FUNDP
- Mr Marc Hermant, Agoria ICT
- Mr Christian Huvelle, Siemens IT Solutions and Services S.A.
- Mr Igor Klapka, Open Engineering
- Mr Philippe Lecourt, Technord Automation
- Mr Jean-Didier Legat, UCL
- Mr Philippe Mack, Pepite
- Mr Pierre Manneback, FPMs
- Mr Philippe Massonet, CETIC
- Mr Yves Moulart, ST Microelectronics
- Mr Luc Onana, UMH
- Mr Dominique Orban, Rever
- Mr Emmanuel Ottevaere, BizzDev
- Mr Etienne Pourbaix, Thales Communications Belgium
- Mr Patrice-Emmanuel Schmitz, Unisys Belgium
- Mr Bruno Schroder, Microsoft
- Mr Daniel Tuyttens, FPMs
- Mr Luc Vandendorpe, UCL
- Mr Christian Vanhuffel, Agoria ICT
- Mr Axel van Lamsweerde, UCL

«The rate of CETIC's self-funding amounted to 21.3% in 2005, 38.5% in 2006 and 41% in 2007. It is still increasing remarkably, reaching 54% in 2008.»

The mission and objectives of the Technical Committee are:

- Advising the Board of Administrators and the General Manager on the scientific and technological objectives to develop according to the sector's needs. It works at the request of the General Manager, in particular for developing or updating CETIC's strategic plan.
- Evaluating, on request of the Board or the General Manager, proposals for new research directions. If relevant, it proposes new business opportunities and/or research projects consistent with the scientific and technological orientations.
- Supporting CETIC in its continuous process to remain an independent and internationally recognised applied research centre in ICT.
- Advising CETIC management on research exploitation opportunities for CETIC projects that are ongoing or likely to be initiated.
- Reporting annually to the CETIC Board of Administrators on its work and scientific achievements.

BOARD OF ADMINISTRATORS

Since December 31, 2008, CETIC's Board of Directors has been composed of:

- Mr Bernard Bolle, Siemens IT Solutions and Services S.A.
- Mr Serge Boucher, FPMs
- Mr Claude Cambier, Unisys Belgium
- Mr Marc Durvaux, Thales Alenia Space ETCA, President
- Mr Jean-Luc Hainaut, FUNDP
- Mr Benoît Hucq, Océ Software Laboratories Namur sa
- Mr Roland Keunings, UCL
- Mr Benoît Macq, UCL
- Mr Roger Malchair, Evadix.Net sa
- Mr Pierre Manneback, FPMs, Treasurer et Secretary
- Mr Lucyan Papiernik, IGRETEC
- Mr Michel Scheuer, FUNDP
- Mr Christian Verdonck, BizzDev sa

Mr Pierre Villers, DGO6, is the observing member appointed from the Walloon Region on the Board of Administrators and in the General Assembly.

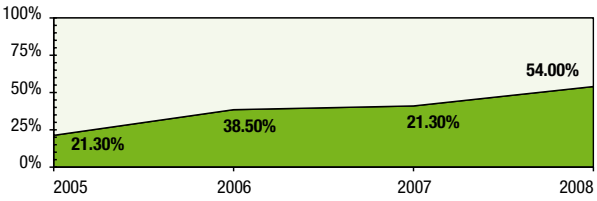
The General Manager appointed by the Board of Administrators is Mr Simon ALEXANDRE.

KEY FIGURES

CETIC funding sources are:

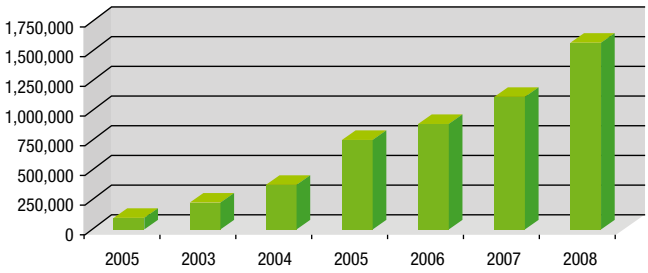
- The subsidies granted by the Phasing out of the Objective 1 Hainaut, through seven research agreements co-financed by the European Regional Development Fund (FEDER), a convention of equipment co-financed by the FEDER and a framework agreement, co-financed by the European Social Fund (FSE). All these conventions are also co-financed by the Walloon Region.
- The subsidies granted by the Convergence Objective in Hainaut through two research conventions co-financed by the European Regional Development Fund (ERDF), two conventions facilities and a convention of recovery also co-financed by ERDF, all of which are also co-financed by the Walloon Region.
- The subsidies granted by the Walloon Region in connection with the financing of the technological "guidance" cell, co-funding of Sixth Framework Programme projects and collective research.
- The turnover in the context of collaborative research contracts, mainly through the Sixth and Seventh Framework Programme.
- The turnover in the context of contract research.
- The turnover from services to third parties through the use of research results.

EVOLUTION OF SELF-FUNDING



The available reserves of the association are still growing and have exceeded €1.5 million as of December 31, 2008, allowing CETIC to invest in new research projects guaranteeing long-term development.

EVOLUTION OF FINANCIAL RESERVES



ABOUT CETIC

HUMAN RESOURCES

At December 31, 2008, the association had 36 employees (5 women, 31 men), 26 of whom are researchers divided into three departments:

- Software and System Engineering (9 researchers)
- Software and Service Technologies (9 researchers)
- Embedded and Communication Systems (8 researchers)

QUALITY POLICY

CETIC's mission is to make companies in the Walloon region more efficient and more competitive by helping them integrate ICT into their products and services effectively and quickly.

In this context, to ensure the satisfaction of all its partners (companies, universities, and public organisations), CETIC practices «operational excellence», i.e. CETIC commits itself to:

- Developing cutting-edge expertise in ICT.
- Delivering innovative results with high added value for companies by improving its technological innovation process.
- Ensuring objectivity and quality results thanks to its independent position, its international recognition, and its strict respect of ethical and scientific protocols.
- Ensuring the adequacy of the competence and technical requirements based on ongoing training and appropriate recruitment.
- Promoting the development and fulfilment of its employees by promoting a healthy environment conducive to creativity, professional achievement and teamwork.

This commitment applies to all the research projects that CETIC leads with and for companies, as well as the management of these research projects and the organisation of CETIC's development in the long run.

CETIC VALUES

CETIC is a centre for applied industrial research and technology transfer. It intends to be recognised as a reliable, efficient and professional partner. Strengthening its links with industry while maintaining close contacts with universities, CETIC develops its service portfolio and expertise in the field of ICT.

Prompted by its commitment to operational excellence, CETIC maintains a set of values enabling it to achieve a high level of satisfaction in its partners.

Respect the customer

CETIC employees make the quality of partner reception a point of honour, understanding client needs in order to provide the best tailored solutions. CETIC particularly offers customers an honest and user-friendly relationship. Its status as an SME and private, non-profit organisation allows it to collaborate with industry and the public sector in total independence within a framework of trust, in a spirit of cooperation without competition.

A high level of quality

CETIC applies its expertise to achieve the highest level of software quality to harvest maximum benefit. Thanks to the close links that exist between research teams, CETIC ensures control of all phases of a project.

Technological innovation

CETIC teams demonstrate initiative, creativity and curiosity in the research topics they select and use their complementary skills to ensure an innovative, high-quality result. Strong links with industry (including those of the Technical Committee) ensure the relevance of research projects CETIC chooses.

National and international visibility

Through its scientific and technological expertise, along with its ability to forge collaborations, and thanks to excellent results in its various projects, CETIC is a reference both nationally and internationally. This is evident in the numerous projects CETIC contributes to, as well as the numerous published scientific reports about its projects.

A regional commitment

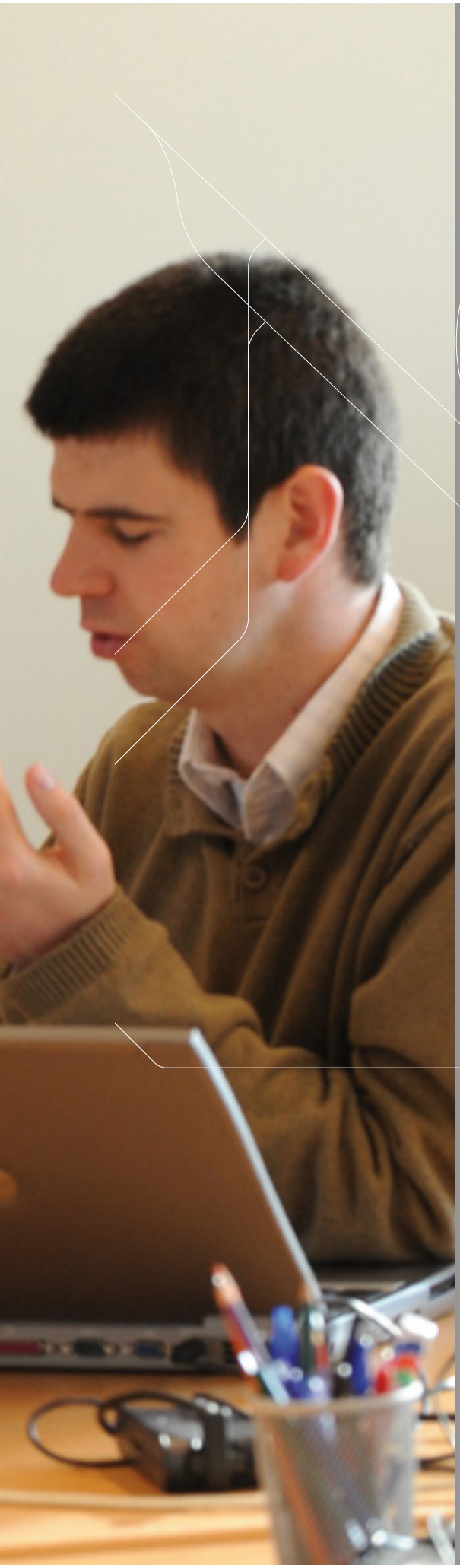
CETIC actively contributes to the regional development of Wallonia by supporting and stimulating innovation in the local economy, especially in SMEs. CETIC research orientations are validated by the Technical Committee, which is made up primarily of businesses and which guarantees adequacy to meet regional industries' needs.

Team spirit

CETIC works collaboratively both within and among teams. This team spirit is the strength of CETIC, allowing it to offer services and products of high quality.

Respect for human beings

CETIC offers its employees a challenging work environment that combines friendliness, flexibility and autonomy. The working environment offers to all employees personal development opportunities and freedom of speech in order to empower creativity and innovation. In addition, it offers to all collaborators the opportunity to continually improve their skills, thanks especially to the diversity of expertise represented in CETIC and the close collaboration between the teams.



SERVICES

SOFTWARE AND SYSTEM ENGINEERING (SSE)

The Software and System Engineering (SSE) department is actively helping enterprises to reach higher quality standards both for their IT development process and the resulting software-based products. Many companies are indeed facing day-to-day problems maintaining control of the software they are developing, which may be part of larger and increasingly interconnected systems. More than ever, adequate methods and tools are necessary to master the software development processes from the requirements to the delivery, to measure the quality of the resulting products, to assess the effort of internal and external development, and to comply with strict quality and certification criteria, especially related to security and safety. A direct consequence is a reduction in costs, an increase in quality and thus enhanced competitiveness.

The SSE department masters these methods and tools and successfully supports the industry by relying on a number of instruments such as the Expertise Centre for Engineering and Quality of Systems (CE-IQS), involving several companies, and the software engineering laboratory. Our services cover the needs of companies of all sizes and maturity levels from the adoption of best practices to more advanced quality improvement.

REQUIREMENTS ENGINEERING

Expertise

In the context of a software system, Requirements Engineering (RE) is the process of discovering its purpose by identifying stakeholders and their needs and documenting these in a form that can be analysed, communicated, and subsequently implemented. RE plays a critical and fundamental role within the software development process. Several studies have shown that it is one of the most critical success factors for on-schedule and within-budget delivery of software projects. In today's global development environment, it remains more important than ever to "get the requirements right".

CETIC has developed strong expertise in RE covering the whole spectrum of methods and application contexts, from lightweight methods combining structured templates and UML-based notations to rigorous models enabling early reasoning. The former fit the needs of most SMEs and IT departments while the latter targets specific needs of companies developing critical systems typically from a safety or security point of view. This expertise especially relies on the use of goal-oriented methodologies developed at UCL for which CETIC is actively maintaining and developing tool support (see FAUST project). This expertise is now being extended to the derivation of software architectures, especially targeting distributed systems and addressing specific non-functional requirements such as timing and resource/power consumption (see SPICES project).

Services

CETIC is actively helping enterprises in fields related to requirements engineering by:

- Improving RE practices by auditing current RE processes, delivering specific training, template tuning, and coaching on concrete projects.
- Assessing the quality requirements documents, identifying areas of problems (ambiguities, incompleteness, inconsistencies, etc.), and defining an acceptance plan.
- Conducting requirements analyses and producing precise requirements documents in a specific context, typically as part of an invitation-to-tender process.
- Helping in the selection of an adequate solution based on functional and non-functional requirements, possibly also as part of the evaluation of tenders.
- Formal modelling at early stages and specific verification and validation activities, possibly as support for certification.

In 2008, CETIC performed a complete analysis of a complex access control system for five Belgian parliaments at regional and federal levels (context: public procurement contract). This mission covered a full goal-based requirements analysis and UML use cases, high level and detailed architectural design, and technology comparison.

PROCESS QUALITY

Expertise

SSE has developed strong expertise in process quality and in related standard such as CMMI and SPICE. Because these target large organisations and are complicated and expensive to implement, their adoption by small structures is a problem. As an answer to this, the department has developed a software improvement approach for use by very small development structures, staged as follows:

- The first stage is a lightweight questionnaire called the micro-assessment, which is used to collect information about current software practices and to make people sensitive to the importance of software quality aspects. This questionnaire covers six key axes selected as the most pertinent and the most fundamental.
- The second stage is OWPL, directly inspired from CMM and SPICE yet simplified for SMEs, especially those of small size, limited complexity and a low process maturity level. It covers ten processes which are broken into discrete practices. Key success factors are also defined.

CETIC is also involved in the standardisation of these processes through the ISO/IEC JTC1-SC7.

A specific specialisation of the micro-assessment method has also been defined for a lightweight security audit to evaluate security maturity and help companies to prioritise investments needed to cover security.

Services

A number of process-related services are available to assess the maturity of the software process, to plan software process improvements at an adequate pace, and to address specific needs.

- Micro-assessment, carried out in one day, provides a risk-based evaluation and proposes concrete recommendations for improvement. It can be repeated on a regular basis (e.g. every 6 months) to monitor progress.
- OWPL provides a more detailed assessment and more precise recommendations without being too resource consuming. It can open the way to future CMMI or SPICE certification.
- A security micro-assessment highlights current security strengths and weaknesses and identifies practical improvement solutions. It can also focus on specific practices.

« Direct customer benefits are reduced development time through a continuous evaluation of quality, reduced maintenance costs by strategic decision making about bad parts, improved confidence in the code quality, and a supported decision process. »

Micro-evaluation has been applied in several SMEs all over Wallonia. OWPL has been applied in a number of companies producing commercial software (e.g. PEPITe). A micro-assessment has been applied to assess the security of a hospital IT department.

PRODUCT QUALITY

Expertise

While process quality is an enabling condition for delivering quality products, it is necessary to measure product quality. Key characteristics to check at code level are maintainability and evolvability. CETIC had adapted a metrics-based approach based on state-of-the-art tools for performing precise code level measurements. CETIC also developed its own integration framework called D-Side Dashboard, which generates clear reports allowing project managers or developers in the decision-making process and suggesting relevant improvements.

Services

Code analysis based on D-Side Dashboard is proposed in a variety of contexts such as:

- Continuous code assessment during project development to assess delivery maturity
- Internal assessment of code subject to evolution or legacy code
- External quality assessment of the delivery quality in a client-provider relationship
- Validation of maturity of open source components (see also CELLAVI)

It relies on third party parsers and currently integrates support for Java, Delphi, C, C++ and C#.

Direct customer benefits are reduced development time through a continuous evaluation of quality, reduced maintenance costs by strategic decision making about bad parts, improved confidence in the code quality, and a supported decision process.

Success story

Many code audit analyses have been carried out, especially in a public sector context for the French Community Parliament (evaluation of open source components, assessment of newly developed components) and software editors (e.g. in the CRM domain).

DEVELOPMENT EFFORT ESTIMATION

Expertise

The accurate characterisation of a software development effort is a challenge with a high impact on the project organisation and schedule. Currently, it often relies on past experience. CETIC has developed expertise in this area based on COSMIC, a widely used method of estimating software size. COSMIC is based on objective criteria and rules allowing repetitiveness of measures. The method is applicable early in the software lifecycle and at the specifications level. It is completely independent of software development technologies and methods.

Services

The following effort estimation services are provided:

- Functional size, effort and cost estimation for sizing internal development or as part of an invitation to tender process
- Training IT companies in software functional size and development effort estimation

CETIC successfully performed the effort estimation of a wide-scale Web application for the European Commission administration and the estimation of a modular application to be used jointly by five Belgian federal and regional parliaments (context: public procurement contract).

CERTIFICATION

Expertise

Certification is often required in a number of industrial domains as a condition to access a market or is imposed by regulatory bodies. Security critical products like smart cards or firewalls can be subject to the Common Criteria (ISO/IEC 15408). In safety critical domains a number of safety standards are also required such as DO-178B (aeronautics) and Cenelec 50126/8/9 (railways). In other areas, more generic standards (IEC61508) can apply. Mastering the certification process is not trivial and requires knowledge about the standard and how to implement it within the software lifecycle in order to optimise the effort. CETIC is actively developing expertise and experience in those fields.

Services

Related to security certification, CETIC can help companies prepare their protection profiles or security targets. To improve the security target, missing elements or problems can be detected. In addition, static code analysis can be used to track vulnerabilities.

Related to safety, CETIC can provide expertise regarding the generic IEC-61508 standard and domain specific specialisations.

CETIC has contributed to the evaluation process of the first security device approved by the Belgian national security authority (ANS). The device was developed by Thales Alenia Space. CETIC reviewed the security target and made a number of suggestions for improving it.

EMBEDDED AND COMMUNICATION SYSTEMS (ECS)

EMBEDDED SYSTEMS PROTOTYPING

Expertise

CETIC has developed strong expertise in the integration of embedded systems based on wireless technologies and programmable logic. CETIC has set up demonstrations to illustrate efficient solutions to industrial problems.

CETIC masters innovative technologies in embedded and communicating systems for a wide range of applications. CETIC's solutions enable different kinds of equipment (e.g., industrial and automotive) to be connected and monitored wirelessly. Furthermore, an embedded processor allows local data storage and processing for efficient transmission. Likewise, CETIC especially focuses on modularity, which allows for easy customisation of these systems in view of a particular application.

CETIC has developed substantial competence in the most recent development techniques. It is experienced in embedded systems design, development and hardware/software co-design. In particular, it has long experience with soft processors embedded in FPGAs.

User interfaces in embedded systems exhibit very specific requirements. This is due to the simplicity and restrictions of the interfaces – small LCDs or screens, a limited number of buttons, roughness of packaging for industrial applications, etc. In order to bypass these limitations, CETIC pioneered new types of interface – e.g., a vocal system, touch screens, and motion capture. CETIC investigates end user ergonomic interfaces for industrial systems, but also for specific uses, like eHealth systems to be used by elderly people.

Services

CETIC masters leading edge technologies for modelling and implementing embedded systems. CETIC can develop embedded electronic systems meeting the needs of industry in applied research and development (prototyping). The design flow covers several aspects: an evaluation of user needs, the elaboration of specifications, system design and the implementation of embedded code or the operating system. The overall goal of the applied research is a proof of concept.

CETIC's objective is to transfer the involved technologies to the enterprises so that they can achieve their industrial application goals. CETIC transfers both the source code and the hardware description files. Whenever possible, CETIC also transfers the complete development environment and methodologies.

In association with CETIC's Software and Systems Engineering department, the ECS department can help enterprises assess their technical requirements and their user interfaces.

PicView

PicView is a digital companion imagined by the H.O.P. Company. In concept it is a versatile, portable touch screen combining the features of a picture and video repository and presentation album, an open platform for applications and games, and Web 2.0 services for backup, picture sharing, notifications, etc. The main idea was to provide a tool for all members of a family – a tool that is easy to use without any technical knowledge and without a PC, yet offering advanced features and secured functioning (e.g. backup). CETIC's role was to study the project's feasibility, define its technical specifications, and realise two prototypes.

The project demanded innovative solutions to maximise its impact while remaining within budget. The prototype bodies were mocked up by the Sirris research centre, and CETIC reused internal parts of netbooks (miniPC) to lower expenses. The software development relied on a graphic tool chain especially selected for its rendering quality and its development efficiency in terms of cost and delay. The ergonomic interface was incrementally developed based on customer feedback. The two prototypes are used to demonstrate the concept to investors and possible partners. Numerous demonstrations have already taken place in Europe and United States.

WIRELESS COMMUNICATION

Expertise

CETIC has developed strong expertise in wireless technologies. These fast growing technologies offer a multitude of opportunities that could not be envisioned until recently. Many types of equipment can benefit from a suitable connexion taking into account their particular constraints. The multiplicity of technologies is magnified by the explosion of electronic architecture and modules. Programmable communication modules allow dramatic reductions in development costs and delays for rapid prototyping; Systems on Chip (SoC) integrate communication stacks with processing units; FPGA and SoPC offer, in addition, versatile capabilities in terms of configuration and adaptability.

In embedded systems, CETIC can rapidly integrate wireless technologies such as WiFi, Bluetooth, Zigbee, GSM, GPRS, 3G, etc. by using commercially available components. In addition to the transmission technologies, CETIC has advanced network capabilities like sensor networks, dynamic routing, etc.

CETIC adds value via its capabilities in rapid prototyping, thanks to its generic platforms and its expertise in embedded software for smart devices.

Services

CETIC can advise enterprises about the best technologies to adopt. Using the most precise technology can provide a significant competitive advantage. New protocols and technologies are introduced to provide the best possible optimisation between throughput, range and power consumption. Using several wireless standards, solutions are adapted to their usage context. CETIC can rapidly build proofs of concept to demonstrate the relevance of the solution and its adequacy for the specific industrial case. In cooperation with the wireless lab (see the 'TIC Equipement' project), CETIC can also provide services for evaluation and training on the relevant equipment and tools.

Wireless communication add-on for e-health devices

At the request of the Vitaltronics company, CETIC prototyped a small add-on for medical devices such as glucometers. This add-on can send a medical measurement automatically to a medical centre via a mobile phone. It communicates via Bluetooth with the cell phone,

« CETIC adds value via its capabilities in rapid prototyping, thanks to its generic platforms and its expertise in embedded software for smart devices. »

formats an SMS, and sends it to the centre. This very small component completely changes the relationship between patients and physicians by allowing real-time monitoring at home. There is no need for a nurse or hospitalisation. This add-on was successfully demonstrated to several prospects.

QUALITY AND CERTIFICATION OF EMBEDDED SYSTEMS

Expertise

In a strong relationship with the SSE department, the ECS department masters all aspects of embedded software development including, for example, specification and design methodologies, source code quality management, testing and validation.

CETIC investigates the certification aspects of critical systems from a hardware and a software point of view, especially the DO-178B and DO-254 norms for aeronautics.

Services

CETIC can help enterprises leverage their development practices. Embedded systems often imply specific methods and tools because such systems have heavy constraints regarding specific operating systems, programming languages, requirements for resource management, real-time implementation, etc. Standard methodologies and tools are not well adapted, and those dedicated to embedded systems are numerous and weakly compatible but with strong coupling to low level solutions and constraints. CETIC can help enterprises evaluate and select the best methodologies and tools for their context.

Certifications concerning hardware and software development are required more and more, even outside domains that traditionally demand it, such as aeronautics and railways. SMEs are often prevented from entering these domains due to the large investment required by standard mastering. CETIC is not a certification centre, but it can help enterprises by customising their methodologies to support standards, and then to anticipate certification issues through the complete life cycle of their products.

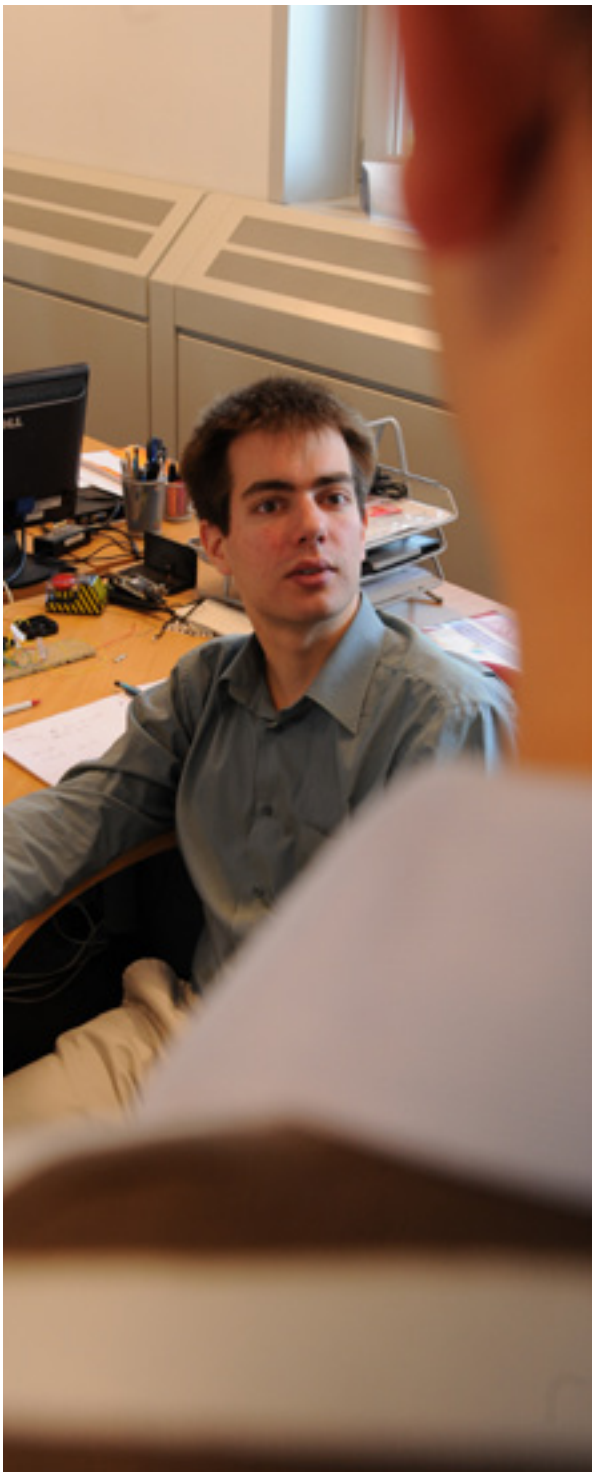
CETIC can also support enterprises in their quality improvement efforts.

Escrow audit

An escrow service consists of a deposit of source code or other design documents or procedures at a third party's premises in order to guarantee the customer against a default risk by its provider. The escrow contract defines the conditions for a possible release of the deposit to the customer (typically a bankruptcy, company buyout or a support failure of the provider). A client may require a source code escrow if the envisioned product is strategic for its activities and/or if the provider cannot offer sufficient guarantees about its support capabilities or its financial health.

Most escrow agents are able to safely manage the deposit, but it may be very complex to guarantee that the deposit - if used by the customer - will allow the real product to be built and ensure the complete development process for further evolution. CETIC acts as an escrow agent for a technical audit of the escrow material (source code, hardware design, procedures, etc). Especially for complex systems, when the product is not merely a simple software product relying on standard hardware and middleware components, it may be impossible to simply rebuild and test the product when it is deposit in escrow due to the expenses required for hardware manufacturing, for example. In this case, CETIC can check the documents and procedures of the deposit, including the hardware design files as Gerber files, to ensure their consistency, their completeness and their correctness (compared with a reference product).

As an independent research centre and a non-profit organisation, CETIC is recognised as a technical expert in embedded systems and also as a trustworthy escrow agent by customers and providers; it protects the intellectual property of the provider and gives accurate information to the customer about the usability of the deposit.



SERVICES

SOFTWARE AND SERVICES TECHNOLOGIES (SST)

The Software & Service Technologies (SST) department covers three key areas in the context of Information and Communication Technologies: Service-Oriented Architectures, Open Source Software Technologies and Intelligent Content & Semantics. The skills and approach focus on new capabilities that companies need to master.

The objective of the SST department is to help companies to take advantage of the new distributed, dynamic and service-oriented architectures of the ICT industry, by helping those companies select and implement the associated technologies. CETIC provides advisory services, feasibility studies, training and technical support in these areas.

SELECTING AND IMPLEMENTING GRID MIDDLEWARE AND SOA SOLUTIONS

Expertise

High performance computing has evolved from the use of supercomputers to the use of clusters. Grid computing is a coherent continuation of this evolution. By taking advantage of the Internet, the Grid aims to make these computing resources and storage interoperable so that they are as easily available as electricity. Inside Grid technologies, the industry showed most interest for features such as flexibility and scalability. CETIC masters these web-services based capabilities that are the building blocks of modern SOA solutions.

Services

This service typically includes, in whole or in part, assistance to undertake the following activities:

- State-of-the-art and definition of strategic choices and technology
- Drafting of specifications
- Preparation and execution of a benchmark
- Development of Proof of Concept (PoC)
- Workload performance measurements of the target infrastructure
- Deployment of the solution

For a financial institution, CETIC took part in the selection of its Grid solution, including drafting the specifications, monitoring the tender, proposing the standard Grid API, and testing the benchmark applications. Our partner was then in a position to select the best solution. CETIC also helped in porting a financial application on the Grid.

SAAS FEASIBILITY AUDIT

Expertise

In line with Grid computing, the idea of offering not merely infrastructure but also software services on demand has spread. Many software vendors are planning to adopt the Software as a Service (SaaS) business model. It becomes a natural idea to compose these services to provide more advanced solutions.

The spread of Web services and virtualisation technologies has also enabled the emergence of cloud computing. The computing infrastructure nowadays becomes part of the network.

All the technologies mentioned above are rapidly evolving, and CETIC follows them through numerous research projects where its expertise is recognised.

Services

The SaaS business model is a strong trend that affects all software vendors. For them, the challenge is to reach new markets, but also to retain customers who would require their suppliers to apply this model in the future.

CETIC aims to help software vendors to think about the technical and economic feasibility of offering all or a part of their bundled software in SaaS mode. CETIC will help to identify critical points that should be taken into consideration so that vendors can base their decisions on objective, documented and verified criteria. We propose to proceed in three phases. The first phase will take into account the technological aspects in order to determine:

- The necessary changes to applications in SaaS mode
- The constraints of operating in terms of tools, computing power and storage
- The definition of the SLAs that the vendor wishes to offer its customers

These elements will determine, in a second phase, the total cost of investment in applications, the recurrent costs of maintenance, and the rental costs of the infrastructure powering the solution. In a third phase, these steps will allow exploration of business models that could ensure the SaaS project's financial feasibility via a profitability analysis.

CETIC studied the potential transition of applications to Service Oriented Architecture.

TESTING AND IMPLEMENTING CLUSTER AND GRID-BASED SOLUTIONS

Expertise

Thanks to its infrastructure and its experience with tools and middleware, CETIC can test cluster and Grid computing solutions. Our cluster architecture was developed for flexibility, and can be partitioned to run multiple groups of operating systems and different applications. Currently, our cluster primarily runs on Linux, but MS Windows is also available.

Services

The cluster represents an opportunity for companies that want to adapt themselves faster to technologies like Grid or SOA. The cluster can also efficiently host proof-of-concept activities in the context of Grid, SOA and SaaS services.

«The objective of the SST department is to help companies to take advantage of the new distributed, dynamic and service-oriented architectures of the ICT industry, by helping those companies select and implement the associated technologies. »

INDEXING DIGITAL CONTENT

Expertise

Nowadays companies must keep control of the increasing amount of information they deal with. The Intelligent Content & Semantic (ICS) team at CETIC develops methods and tools for information management in business. It targets unstructured information on the Internet and in private networks.

Some intrinsic features of information make it difficult to manage. With the advent of the Internet and integrated enterprise information systems, digital content has become overwhelmingly abundant, while it is still poorly structured and constantly changing.

In this context, CETIC's ICS team helps companies extract precise knowledge from their unstructured data. The team's specific expertise includes knowledge extraction from unstructured content, search engines, semantic Web concepts and tools, and Web services standards and protocols.

Services

CETIC offers services for content indexing and knowledge extraction from unstructured data. This enables development of tailored search engines as well as automated processes for website migration and Web intelligence tools.

As regards semantic extraction from unstructured data, CETIC is able to automatically extract content from Web pages using reverse engineering techniques while preserving the meaning of data. Hence, Web-based data migration is simplified, and tracking Web content like press releases, product catalogues, news, etc. gets easier. CETIC also acts as a technology partner during a migration process or for the implementation of tailored dashboards.

CETIC's ability to develop tailored search tools allows for more comprehensive and fresh pages databases, handling of specific file types, and implementation of semantic search capabilities. CETIC has strong expertise in all the steps involved in search engine development, including crawling (i.e. discovering and collecting Web pages or files), indexing (i.e. transforming information into a searchable structure) and defining and implementing user interfaces.

The main applications are custom search engines, intranet search engines, search engines for product catalogues, and even general purpose public search engines of several million pages.

OPEN SOURCE ENGINEERING

Expertise

For years CETIC has been involved in the open source movement, covering aspects like business models, development models, software quality measurement, open source community analysis, and so on.

Specifically, CETIC has developed recognised expertise as regards:

- Support for code release, existing code audit and open source project management, as well as help in setting up collaborative development infrastructures. Indeed, releasing source code to an open community requires preparation that must not be neglected, in order to maximise the chances for a successful operation.
- Architecture analysis and selection of software components: to prevent strong disappointment, the integration of open source blocks in an application must not be overlooked.
- Choice of a license and impact on business models: the open source model has already been successfully embraced by many providers. However, the licensing and the business model are of crucial importance and vary with the context and objectives.

Services

CETIC can help elaborate software specifications, taking into account the specificity of open source. Releasing the sources of existing software or pooling development resources requires specific skills. As a follow-up in drafting specifications, CETIC can also participate in the selection of open source providers in the context of a call for tenders.

CETIC can help analyse open source code, facilitate the development process and assist in the selection of open source components.

CETIC has assisted the "Parlement de la Communauté française de Belgique" and the "Parlement Francophone Bruxellois" to share their development (projects Tabellio and Libellio). Ultimately, these programmes are available in open source.

SUPPORTING INDUSTRY THROUGH ICT RESEARCH AND INNOVATION

cetic

SEMANTIC

SOFTWARE QUALITY

CLOUD COMPUTING

SERVICE ORIENTED ARCHITECTURE

SECURITY

GRID COMPUTING

REQUIREMENTS ENGINEERING

- RESEARCH
- DEVELOPMENT
- TECHNOLOGY TRANSFER
- INNOVATION
- BUSINESS

PROTOTYPING

WIRELESS TECHNOLOGIES

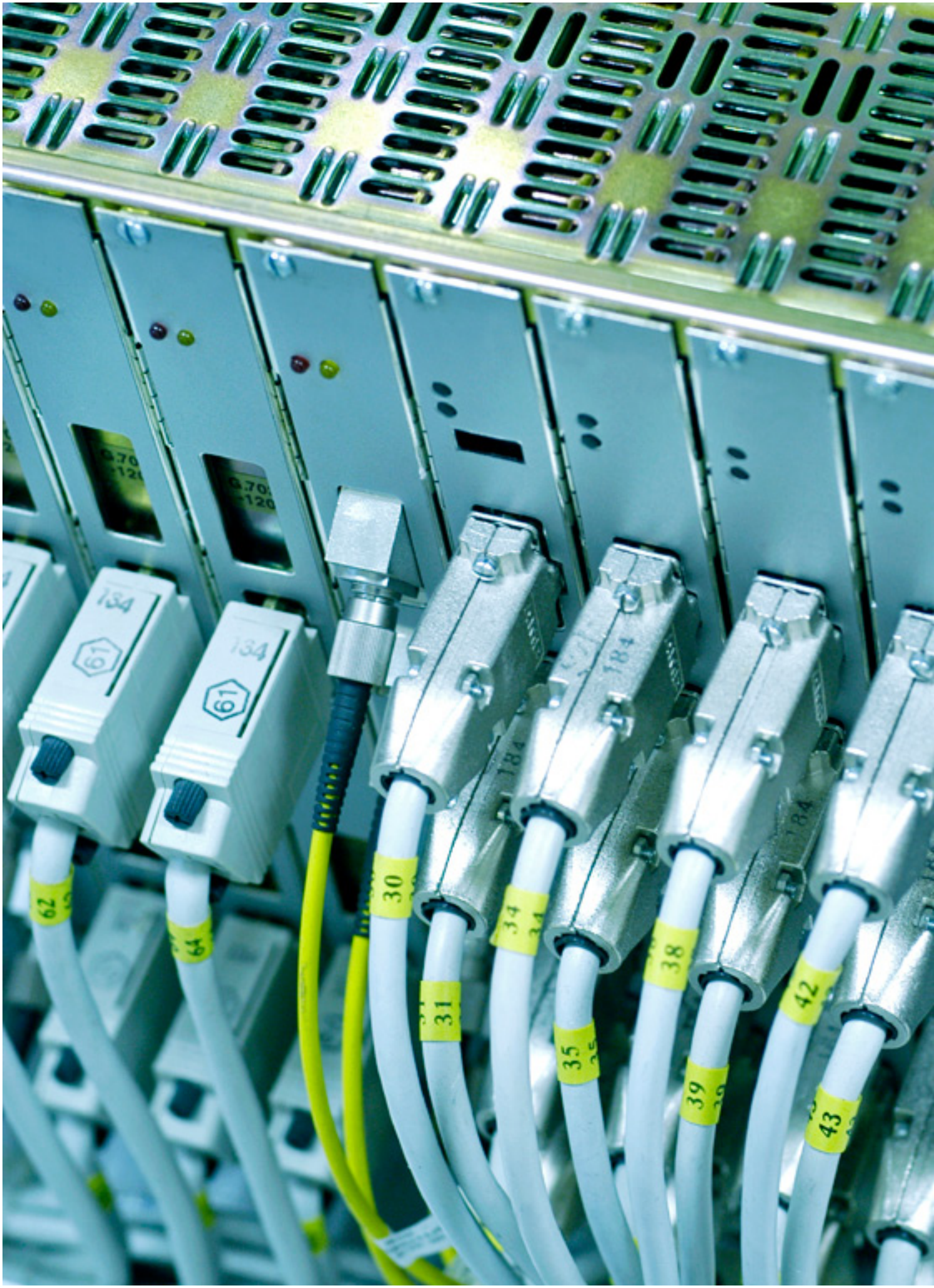
CERTIFICATION

EMBEDDED SYSTEMS

TRUST

ENERGY EFFICIENCY

OPEN SOURCE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WALLOON RESEARCH PROJECTS

Biomanufacturing

Type of project: Walloon Region – FEDER – Objective of Convergence
CETIC budget: €144 703
Duration: 2008-2011
CETIC department: Embedded and Communication Systems

BACKGROUND

The Biomanufacturing project is about the processing and the exploitation of human bio-signals to control orthotic devices, a subclass of articulated prostheses. The main goal of this project consists in developing a neural interface and a system to exploit measured brain activity. Extracting representative information from EEG (electroencephalogram) and EMG (electromyogram) signals and processing this data through an artificial neural network will allow matching patterns to activate the orthotic devices.

Orthotic devices are prostheses designed to compensate for missing articular or muscular functions. Performing this body assistance requires intelligent guidance, raising a great challenge in the field of human-to-machine interfaces. The Biomanufacturing project aims to develop intuitive control for orthotic devices, using state-of-the-art processing of bio-signals from EEGs and EMGs, which measure brain and muscle activity respectively.

It is a multidisciplinary project and will require collaboration between several research teams to elaborate a functional orthotic prototype. The bio-signals must be processed in order to extract useful information concerning the control of the orthotic devices. This will likely be implemented using a Dynamic Recurrent Neural Network (DRNN), following encephalographic signal sampling and processing. This DRNN will be a critical part of the decision-making process, as its output will determine the design of control signals and manufacturing of adequate orthotic devices and their associated actuators and regulation systems. The overall system architecture is yet to be determined, but the different components will most likely be connected wirelessly using a Wireless Personal Area Network (WPAN) standard such as Bluetooth or ZigBee.

In this project, CETIC's Embedded and Communication Systems (ECS) department is appropriate for the design of the overall system architecture, and in the technical integration of the system components.

Based on a functional system requirements analysis and many other factors such as the electromagnetic compatibility of the system with the human body, CETIC will exploit its expertise in wireless communications systems to evaluate different cutting edge technologies in order to select an adequate wireless technology. Following this work, CETIC will be responsible for integrating the wireless technology in the system to ensure robust communication between modules.

CETIC is also in charge of the hardware implementation of the neural network. The choice of technology (embedded processor, DSP, FPGA, dedicated chip, etc.) will also be based on a detailed system requirements analysis. As most of today's neural networks are designed exclusively on software platforms, a custom hardware implementation on FPGA or DSP with good enough performance is an interesting challenge and could have great scientific value.

> « The main goal of this project consists in developing a neural interface and a system to exploit measured brain activity. »

PARTNERS Cenaero, Faculté Polytechnique de Mons (FPMs), Sirris, University of Mons-Hainaut (UMH)

CE-IQS

Type of project: Walloon Region – FEDER – Objective of Convergence
CETIC budget: €7 131 576
Duration: 2008-2013
CETIC departments: Embedded and Communication Systems, Software and Services Technologies, Software and System Engineering

BACKGROUND

The Expertise Centre for Engineering and Quality of Systems (CE-IQS) is part of the ICT project portfolio proposed and won by CETIC and its partners for the first call of convergence/competitiveness supported by the Walloon Region and the European Commission.

The convergence objective focuses on the Hainaut province of Belgium and is intended to strengthen the economic convergence with the mainstream European Community thanks to a global research budget of €1.5 billion.

Amongst the different axes of the convergence objectives, the second axis focuses on human capital, knowledge, know-how and research by funding projects at research centres and universities for establishing research programmes, purchasing special equipment, and technology transfer.

The ICT research project is the main research programme in this area; it is completed by ICT Equipment for special equipment and by ICT Valorisation for technology transfer and the promotion of research results.

The ICT project portfolio is internally organised around two expertise centres.

The first one, Expertise Centre for Engineering and Quality of Systems (CE-IQS), groups together all functional areas of the research programmes. Beyond CETIC's coordination of the centre, the other research partners are the Université catholique de Louvain (UCL) for methodologies, the University of Namur (FUNDP) for software quality and product line management, the Université Libre de Bruxelles (ULB) for hardware certification and Cenaero, the Faculté Polytechnique de Mons (FPMs), and the University of Mons-Hainaut (UMH) for distributed systems.

The other expertise centre, Expertise Centre for Open Source in Industrial Applications (CELLaVI), is intended to provide a unique entry point grouping together all relevant topics for use and development of Open Source applications in the professional world. CELLaVI is coordinated by CETIC. The partners of this centre are the Faculté Polytechnique de Mons (FPMs) for economic models and the Research Centre on IT and Law (CRID) department of FUNDP for legal issues. Multitel also participates in this expertise centre, assuring training tasks for enterprises.

R&D activities

CE-IQS is the expertise centre for engineering and quality of systems. Its objective is to provide Walloon ICT enterprises with advanced expertise for developing software-based systems. The performance and competitiveness of the industrial network relies more than ever on the mastering of information and communication technologies. This yields benefits for all key economic sectors, such as logistics, mechanics, pharmaceuticals, aeronautics, etc. SMEs are especially vulnerable given the low resource level they can allocate to R&D in this domain. CE-IQS answers this need by closely associating ICT enterprises with innovative research carried out by a strong applied research consortium composed of major research centres and universities active in this field.

The CE-IQS project is providing applied research services to companies through a structured set of applied research activities involving specialised partners among the involved universities and research centres. Any enterprise in the Walloon Region can be associated with the research of the centre by submitting a simple file describing its needs. These will be matched and will help CE-IQS focus on one or more research tasks structured around five main themes.

Theme 1: methodologies for system development and evolution. In this theme, state-of-the-art methodologies for system development are investigated, especially with the aim of easing their evolution. In particular, specific activities are devoted to model-driven development at an earlier stage than code (architecture, requirements) and software product lines. CE-IQS does not only provide business methods but also investigate related productivity tools to maintain and improve the control of systems throughout their lifespans. The study of embedded systems is also a specific focus.

Theme 2: strategies for verification, validation and quality assessment of systems. The objective is to improve quality assurance practices, especially those related to testing in order to allow cost reduction, better quality and quicker time to market. More specifically, this theme investigates techniques for identifying optimal test coverage related to code quality, for precisely assessing that coverage, and for automating the test process based on a number of techniques, including model-based testing. A complementary task related to design time verification is also investigated.

Theme 3: certification. Certification is required in a growing number of applications with critical aspects, such as security or dependability; moreover, assurance levels are also constantly increasing due to the ubiquitous presence of software in current systems. A number of standards define the certification rules to be met, such as the common criteria (IEC/ISO 15408) for security IT and DO-178B in aeronautics. The CE-IQS will help companies prepare for certification through all phases of the project and especially improve required practices. This will also enable companies to reach new markets. CE-IQS will also defend the enterprises' interests on the international

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« CE-IQS is the expertise centre for engineering and quality of systems. Its objective is to provide Walloon ICT enterprises with advanced expertise for developing software-based systems. »

committees that develop standards. Belgian eID application will also be considered from this point of view.

Theme 4: distributed and embedded systems. Software systems are increasingly interconnected through a variety of networks. This results in richer but also more complex to design systems. A variety of such systems will be actively investigated, including:

- Service oriented applications (SOA) composed in highly dynamic business chains which enable new competitive business models based on networks of companies of all size.
- Grid applications enabling on-demand access to resources and performances that scale.
- Embedded communicating systems combining wireless, low consumption, and intelligent sensors and processing devices.

Theme 5: semantic information processing. In the Information Age, being able to filter, organise and process information is critical for more and more companies relying on it for their business. The aim of this theme is to identify, adapt and further develop new processing technologies such as search engines, indexers to meet the needs of those companies.

ICT Equipment

The ICT Equipment project focuses on two types of special equipment for ICT: the software engineering tools and the software and hardware tools for design and test of wireless systems.

These tools are grouped and managed in two laboratories – the software engineering lab and the wireless lab.

'Special' must be understood here as rare. This rarity is linked to the price of these types of equipment but also to the difficulty of securing a return to enterprises due to their limited use. The purpose of CETIC in this context is to make them available for multiple enterprises and research centres and then to allow regional entities to locally access these shared resources and benefit from CETIC's expertise to carry out their experiments with them.

In the ICT world, the software engineering tools are probably the most complex ones because they have to manage not only the complexity of developed systems themselves but all the processes enabling this development including the specification, design and test phases.

Relying on advanced methodologies and models, these tools require a substantial learning process, and CETIC can also provide efficient consulting and support services to companies wishing to use them.

The wireless systems have several advantages over wire line systems. The race for efficiency and performance results in a multitude of technologies aiming to provide the most adequate system for a given application area. New protocols and standards are introduced to increase the throughput, improve the range, lower the power consumption or optimise performance trade-offs. These new wireless technologies associated with multiple electronic technologies make choosing the correct solution difficult. CETIC selects software and hardware tools encompassing all emerging technologies for its wireless lab. Enterprises may then evaluate them and identify the correct solution to fulfil their needs. CETIC develops its mastery of these technologies through various research programmes and can share its expertise via adapted consulting and support services.

In 2008, the initial part of the project consisted of identifying the most remarkable tools and analysing in depth their suitability in light of research priorities and the needs of enterprises. Using the feedback received from partners and enterprises, the project evaluates the corresponding business model in order to ensure the relevance of these tools in the context of expected benefits for the regional enterprise ecosystem.

CETIC is coordinating the CE-IQS portfolio and is responsible of the active involvement of SMEs in project activities. CETIC is also developing the main research themes and triggering specific dissemination activities directed towards the enterprises.

▶ MAIN ACHIEVEMENTS

The project officially started on July 1, 2008. During the first six months, the first tasks, mainly state-of-the-art, were initiated in the different research areas. Contacts were established with numerous enterprises to ascertain their requirements and to refine the research agenda. This is a process that will be continued throughout the project.

The expected project result is a transfer of expertise and innovation from applied research towards Walloon ICT enterprises based on their needs. By the adoption of efficient ICT methods and tools, companies will better master their core businesses, improve their competitiveness and further develop themselves. A multiplication effect will spread the project's benefits to the wider community of companies across all activity sectors.

PARTNERS Cenaero, Faculté Polytechnique de Mons (FPMs), Université catholique de Louvain (UCL), Université Libre de Bruxelles (ULB), University of Mons-Hainaut (UMH), University of Namur (FUNDP)

CELLaVI

Type of project: Walloon Region – FEDER – Objective of Convergence
CETIC budget: €3 056 390
Duration: 2008-2013
CETIC departments: Embedded and Communication Systems, Software and Services Technologies, Software and System Engineering
Website: www.cellavi.be

BACKGROUND

The TIC project portfolio was proposed by CETIC and its partners for the first call of "Convergence/Competitiveness" supported by the Walloon Region and the European Union. The convergence objective focuses on the province of Hainaut in Belgium and intends to strengthen economic convergence with the European Union mainstream, thanks to a global research budget of €1.5 billion. The TIC project portfolio belongs to the second axis of the convergence objective, focusing on human capital, knowledge, know-how and research, and which funds research programmes at research centres and universities, purchasing of exceptional equipment and support for technology transfer. Consequently, the TIC project portfolio is divided in three parts: the "TIC Research" project is the research programme in ICT; it is completed by the "TIC Equipment" project for exceptional research infrastructure and by the "TIC Valorisation" project for technology transfer and the promotion of research results.

The TIC project portfolio is internally organised around two Centres of Expertise (CoE). The first one, CE-IQS – CoE for Engineering and Quality of Systems – groups all functional areas of the research programmes. In addition to CETIC's coordination of the CoE, the other research partners are the Université catholique de Louvain (UCL) for methodologies, the University of Namur (FUNDP) for software quality and product line management, the Université Libre de Bruxelles (ULB) for hardware certification and Cenaero, the Faculté Polytechnique de Mons (FPMs) and the University of Mons-Hainaut (UMH) for distributed systems.

The second Centre of Expertise, CELLaVI – for Open Source use in industrial applications – is an initiative to foster adoption of Open Source software in the Walloon Region. The project is focused on software editors (ISVs), software services companies, and end users. The project is intended to provide a unique entry point for these professionals by grouping together all relevant topics for use and development of Open Source applications. CELLaVI is tackling specific aspects of Open Source such as software components quality, software life-cycle, management of development, business models, legal aspects, open hardware, and training. The project will also provide a collaborative environment supporting related innovative services and tools. CELLaVI is coordinated by CETIC. Partners in this CoE are FPMs for economic models, and the research centre of FUNDP on ICT and law (CRID) for legal issues. Multitel is assuring training aspects.

R&D activities

Many companies are interested in free software, both technologically and economically, but the path to successful adoption is not clear. Open Source software brings new licensing schemes, requires making clear economic choices, and encourages new models for development. The choice is even more complex when one includes the so-called hybrid licensing (i.e. between full Open Source and classic software licenses).

Also, few mutualisation structures exist. These structures support networking between the different industrial actors from both the private and public sectors; the latter plays a role in terms of adoption of Open Source software and can act as a stimulus. An efficient collaborative environment needs to stay independent with respect to business actors, licensing, business models and technologies used.

Through the various research tasks, the project plans to support three categories of companies:

- Software editors: Open Source implies specific business models, as free software creates a distinction between the main development activities and value added activities such as support and advanced functionalities. Software companies in the Walloon Region are usually generalists and SMEs. They can take advantage of Open Source software to turn these two characteristics into assets for exporting their skills. Open Source allows for very small companies to become world-wide references, while the availability of the code provides a strong guarantee for the customer. On the other side, open access can require that the publisher remain the expert on its reference product. With Open Source, classic ISVs also face the risk of competition from new entrants distributing Open Source software.
- Software services companies: Open Source software can be incorporated into specific solutions. Integrating Open Source software, based on the reuse of proven components and avoiding licensing costs, can provide a strong competitive advantage. Still, there is a need for help selecting the appropriate software components and, where appropriate, taking into account trust issues, traceability of licenses and possible legal risks. There is also the opportunity to provide a knowledge base of existing free software in some areas, and knowledge about outstanding contributions coming from research projects and innovative initiatives.
- End users: Open Source software is important for companies and administrations for various strategic tasks. As new applications emerge, their functionality and quality catch up with, and even out-

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« CELLaVI is an initiative to foster adoption of Open Source software in the Walloon Region. »

perform, classic commercial applications. Users face the difficulty of selecting Open Source software tailored to their needs, with the required quality and support.

In order to support all these actors, CELLaVI provide several answers, in different areas:

1. By setting up a forge and a collaborative environment, CELLaVI meets the needs of companies looking for an online service to host their applications. This service is a means to promote the software, but it is also a tool to support co-development between a company and its partners.
2. CELLaVI helps companies questioning the potential benefits of free software, by providing services in these areas:
   - Legal (choice and combination of licenses)
   - Economic (choice of business model, support in management of Open Source projects)
   - Technical (choice of software components, application architecture, etc.)
   - Training (knowledge of Open Source platforms, training certificates, etc.)
3. By taking into account emerging fields such as open hardware, or automated software analysis, CELLaVI provides a decisive advantage for companies federated around the initiative. It will help them to remain at the leading edge of developments in the area of Open Source software.

CETIC is coordinating the CELLaVI Centre of Expertise and is responsible for the active involvement of SMEs in project activities. CETIC is also leading the main research themes and is triggering specific dissemination activities directed towards the enterprises.

CETIC is specifically responsible for:

- Deploying the project portal, called Pallavi, based on a forge, and supporting the dissemination of the project outcomes
- Quality assurance of Open Source software, especially analysing metrics, software life-cycle and product lines
- Specific expertise about the use of Open Source software for embedded devices, and specifically open hardware
- Dissemination and exploitation of project results

▶ MAIN ACHIEVEMENTS

The project started in July 2008. Several results are available.

CETIC prepared the set-up of Pallavi, the project portal and the forge to host the Open Source projects. After an initial screening, four Open Source forges were deeply tested and a final candidate has been chosen. CETIC is now able to provide advice on all four evaluated forges. Also, specific attention was paid to related technologies, such as the use of Open Source virtualisation solutions. These techniques allow the provision of flexible and adaptable IT infrastructure, also used for Service Oriented Architectures.

CRID has focused on legal assistance and dissemination of results. CRID analysed the situation regarding free/Open Source licenses with respect to Belgian law. General research on intellectual property has been performed. CRID particularly studied the law on protection of computer programmes and conducted research on Belgian, European and American doctrine and jurisprudence regarding Open Source.

Multitel worked collaboratively with enterprises on identifying aspects which need to be covered by new training courses, identifying new applications gaining use for daily operations, and elaborating a list of training centres in the Walloon Region. A LAMP (Linux - Apache - MySQL - PHP) training is being organised.

The project participants attended various conferences locally and in neighbouring countries, as some concerns are similar. Specifically, CELLaVI was represented at the EOLE conference (European Open Source Lawyers Event), Paris, Capitale du Libre, the World Open Forum in Paris, the JuriTIC seminar on «cloud computing» in Brussels, the Communia workshop in Amsterdam, a conference on copyright and open access in scientific research in Berlin, and a UCL workshop on commons governance in Brussels.

PARTNERS Faculté Polytechnique de Mons (FPMs), Multitel, University of Namur (FUNDP)

eCMR

Type of project: Walloon Region – Marshall Plan
CETIC budget: €147 861
Duration: 2007-2009
CETIC department: Embedded and Communication Systems

BACKGROUND

The CMR paper form (a legal vehicle form defined and regulated by the Convention on the Contract for the International Carriage of Goods by Road) is essential in transport and logistics. It is mandatory according to the Geneva Convention of May 19th, 1956. However, the CMR form is tedious to fill out and process, particularly for small and medium-sized fleets that provide services for third parties. The introduction of an electronic CMR with handwriting recognition should therefore simplify and speed up processing while preserving the practices. Beyond the legal framework defining the use of CMR, there is a real opportunity to ensure traceability of goods with precise cost evaluation for operations. A significant amount of time will be saved compared to current procedures for encoding and managing data, especially for high volumes.

The eCMR project targets efficient electronic handling and exploitation of the CMR forms. Through the development of an embedded system for seamless acquisition and transmission of a CMR form's information, the eCMR project aims at allowing crosschecking with various other sources of information in vehicles, so that data is processed and managed in order to optimise fleet management through development of new and innovative services with strong added value.

The information sources used to enhance the CMR form's information can be extracted from different devices which equip vehicles. These include:

- CAN/FMS
- Various sensors
- A positioning system (GPS)
- A digital tachograph (recording the driver's activities, speed, and distances, and identification data of the vehicle, etc.)

In this project, CETIC applies its skills and expertise in implementing embedded communicating systems. Indeed, CETIC is in charge of implementing an intelligent embedded system dedicated to the acquisition, local pre-processing and transmission of data. That is why CETIC takes up the challenge of mastering the heterogeneity of equipment, communication protocols and interfaces.

Considering the various wireless communication technologies that may be available in the vehicle (GSM/GPRS, Wireless/DSRC, Bluetooth) and the available processing power of embedded devices, the challenge focuses mainly on the deployment of reliable, seamless and standard data transmission.

Besides the communication devices, a centralised information management system is required. Such a system implies a sufficient level of abstraction as to allow the end operator to overcome the specific constraints related to the heterogeneity of the equipment.

Due to the multitude of wireless and wireline protocols involved, the reliability and smart routing of data is a complex issue for which CETIC serves as the leader.

CETIC is also responsible for optimising the usage of local resources (tablet acquisition, GSM, PDA, on-board computer, etc.). The importance of communication between heterogeneous systems is addressed by an adequate architectural approach.

MAIN ACHIEVEMENTS

During 2008, CETIC activity for this project mainly focused on developing a smart wireless communication device. In this way CETIC designed the Bluetooth Dongle. This device allows Bluetooth-wireless transfer of digitised CMR forms from an acquisition tablet (or any USB storage) to any Bluetooth-enabled device. This device automatically detects new files on the tablet and autonomously manages authentication with a trusted Bluetooth peripheral.

Another main focus of CETIC this year was the development of a centralised information management system. CETIC implemented the abstraction layer required for data collection from vehicle devices, which is the basis for the development of a centralised information management system.

« CETIC is in charge of implementing an intelligent embedded system dedicated to the acquisition, local pre-processing and transmission of data. »

PARTNERS Connector, Docledge, Orditool, Paquet, Smolinfo, University of Namur (FUNDP)

HM+

HEALTH MONITORING IN AERONAUTICS

Type of project: Walloon Region – Marshall Plan – Aeronautical and Space Pole (Skywin)

CETIC budget: €53 224

Duration: 2008–2011

CETIC department: Embedded and Communication Systems

BACKGROUND

Since January 2008, CETIC has begun collaborating with HM+ ("Health Monitoring +"), a Marshall Plan-funded project that meets the requirements of the Walloon competitiveness cluster for aeronautics and space: Skywin (www.skywin.be). The HM+ project aims at reducing health monitoring (predictive maintenance) costs in aeronautics by using embedded devices and information technologies in aircraft.

The HM+ project is divided into two two-year phases. The first phase (2008-2009) consists of specifying and designing a complete health monitoring system for three specific applications. The second phase (2010-2011) will consist in developing and validating a functional prototype. Health monitoring is a very multidisciplinary domain for which all specific skills already exist in the Walloon Region, but their combined use within a coordinated project and the practical experience in aeronautics are still absent. The HM+ project has been proposed in order to fulfil this.

In a general way, the project aims at increasing reliability and safety inside aircrafts through the use of health monitoring techniques. Three specific applications have thus been envisioned in this context:

- Actuator systems and damage simulation inside the aircraft (this application is managed by SONACA).
- Monitoring of engines and equipment inside the aircraft (managed by Techspace Aero).
- Electrical distribution systems and arc fault detection inside the aircraft (managed by Thales Alenia Space ETCA).

Research subjects are as follows: design, integration and validation of new sensors, electronics, and interfaces inside the aircraft, damage assessment, methodologies and algorithms for default detection and error recognition and processing of signals from sensors inside the aircraft.

The contribution of CETIC to HM+ concerns monitoring engine oil system status in terms of temperature, pressure, rejection rate, coking phenomena, etc. Having strong expertise in embedded software development, CETIC accomplishes the task of migrating the detection algorithms developed by university partners onto the prototype platform designed by industrial partners. This task takes into account the embedded platform constraints, like processor and memory limitations, at the engines' working temperatures. More specific aspects, such as the certifiability of the embedded platform by the aeronautical standards RTCA-DO-178B (software) and RTCA-DO-254 (hardware), are also planned for this project.

MAIN ACHIEVEMENTS

Since January 2008, the specification and initial design of a status monitoring system have been realised for several parts of the aircraft, including actuator systems, engine, electrical distribution and arc faults detection systems. Regarding engine and equipment monitoring, a technical-economic study has been conducted by Techspace Aero in collaboration with the engine partners.

The most important constraints regarding specifications for an embedded monitoring platform concern the environmental constraints when engine temperatures vary from -55°C to +125°C. Two possible architectures have been identified: a centralised status monitoring platform, and a more distributed approach, including delocalised processing units, close to sensors. The second approach has been rejected due to technological limitations and to engine environmental constraints.

Migration of the detection algorithms developed by university partners, which will be used on-flight and on the ground, has been realised on a generic embedded platform in order to evaluate memory footprint and to design the future embedded platform.

Finally, CETIC has provided advice regarding the production of an RTCA-DO-178B (software) and RTCA-DO-254 (hardware)-compliant, mixed aeronautic platform.

> « Health monitoring is a very multidisciplinary domain for which all specific skills already exist in the Walloon Region, but their combined use within a coordinated project and the practical experience in aeronautics are still absent. »

PARTNERS Cissoïd, CRIBC, Deltatec, GDTech, Open Engineering, SONACA, Samtech, Thales A.S. ETCA, Techspace Aero, Université catholique de Louvain (UCL), Université Libre de Bruxelles (ULB), University of Liège (ULg), and University of Mons-Hainaut (UMH)

TELECOM

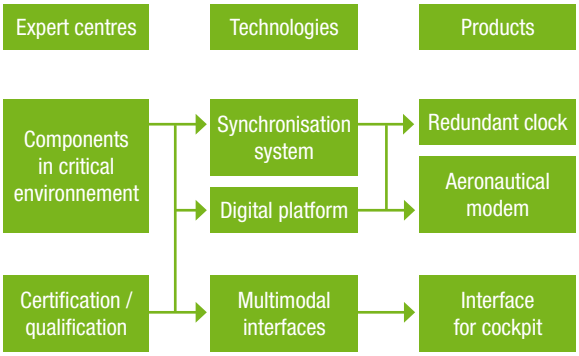
Type of project: Walloon Region – Marshall Plan – Aeronautical and Space Pole (Skywin)
CETIC budget: €219 380
Duration: 2007-2010
CETIC department: Software and System Engineering
Website: www.skywin-telecom.be

BACKGROUND

The TELECOM project is a research project of the aeronautical enterprise sector (Skywin) which aims at increasing the economic potential of this sector by developing ways to loosen the constraints to which this market is subjected during innovation phases. TELECOM is a technological answer to the Walloon Region's limitations with respect to this field of expertise.

The project is focused on developing a new generation of embedded and electronic systems such as the redundant clock. It covers both the essential technological bricks and the research needed to design new generic systems. The project is centred on the use of all these new elements in applications and products in order to address the future needs of the aeronautical and space industry such as safety norms, radiation hardening, etc.

In order to address these new markets, the control of new digital technologies is essential – particularly certification of their compatibility with civil and military aviation safety regulations. It will be also necessary to obtain concrete results (i.e. demonstrators) which will be used as technological bases for the development and industrialisation of the concrete applications derived from the new needs addressed by this project.



The project is organised in three successive phases. The first phase consists of developing new competence in certification and components in critical environments, supported by two expert centres. The second phase will use this expertise to create new generic technologies such as synchronisation systems and multimodal interfaces. Based on these technologies, new products (i.e. a new cockpit interface) will be designed in the third phase.

CETIC is responsible of establishing an expert centre to support the certification of software components used within embedded systems in aeronautics and requiring assurance regarding their safety behaviour. Through this acquired expertise, CETIC will be able to assist companies seeking to certify their product safety.

MAIN ACHIEVEMENTS

The project is based on the creation of two expert centres making it possible to develop three new technologies which support the creation of new applications. Hence the main achievements are:

- Expert centres able to bring essential know-how to the aeronautical markets that may be too expensive for SME or for the large companies due to problems with certification and/or qualification of their components
- Strong potential and high added value technologies including a new system of synchronisation, a new digital platform and multimodal interfaces
- Short term marketable products for both targeted niches and a very broad market such as a new redundant clock, a new aeronautical modem and a new cockpit interface

> « The project is focused on developing a new generation of embedded and electronic systems such as the redundant clock. »

PARTNERS CISSOID, Faculté Polytechnique de Mons (FPMs), GILLAM-FEI, Multitel, Thales Alenia Space ETCA, Thales Communication Belgium, Université catholique de Louvain (UCL), University of Liège (ULg), University of Namur (FUNDP)

3WSA

WALLONIA WORLDWIDE SPACE APPLICATIONS

Type of project: Walloon Region – Marshall Plan – Aeronautical and Space Pole (Skywin)

CETIC budget: €126 700

Duration: 2007-2010

CETIC departments: Software and Services Technologies, Software and System Engineering

Website: www.skywin.be/3wsa

BACKGROUND

The 3WSA project was officially approved by the Walloon Region early in 2008 as part of the Marshall Plan for boosting the local economy.

The project addresses the development of, and experimentation with, technical tools merging state-of-the-art Information and Communication Technologies (ICT) with existing and future infrastructures for space applications, especially GALILEO and GMES. The purpose of the project is to provide decision tools to the security agencies and citizens in the areas of public security, environmental issues, mobility and management of natural resources.

The 3WSA project intends to initiate in the Walloon Region a centre of geomatic services addressing European and even global markets, built on existing infrastructures – especially in Redu, Belgium – and providing several industrial and commercial initiatives, namely:

- A reference platform (technical infrastructure and operational structure) for service orchestration in security, the environment, mobility, natural resources and disaster management.
- A European centre for communication of secured and broadband messaging between fixed and mobile entities.
- A European reference centre for management of industrial risks, particularly addressing hazardous sites like SEVESO plants and transportation of hazardous substances.
- A start-up incubator, WSLux, to support Walloon initiatives in space infrastructure.

An example of applications of service orchestration is the selection of satellite photography from a limited zone – e.g. a SEVESO plant – from which a specific service provider will identify the storage tanks and their contents. Afterwards, it should be possible to launch a new service to determine the required security zones and dispersion areas around the tanks according to the risk posed by the substances of concern.

The 3WSA project provides a competitive benefit to Walloon enterprises thanks to the technological platform for geomatic services. It creates the starting point for further cooperation between Walloon partners towards the industrialisation and commercialisation of applications investigated in the numerous research projects in this area.

CETIC participates in the development of the platform MASS/SSE (based on SOA - Services Oriented Architecture) implementing the service orchestration by providing its expertise in the areas of security, certification and billing. It transfers the corresponding technologies to its partner, Spacebel.

CETIC is charged with evaluating and making improvements to several key aspects:

- The platform IT security which is widely distributed and which requires the implementation of adequate means to protect customers' data and service providers' algorithms.
- The management of financial flows, in order to be able to ensure equitable invoicing of composed services according to a suitable financial model, taking into account the different stakeholders involved in the service chain.
- The certification of treatment modules in order to ensure that the services integrated into the platform respect the minimum performances as defined in the Service Level Agreement (SLA).

These activities are based largely on CETIC expertise as regards SOA/Grid, and in relationship with the European platform, NESSI, as regards modelling and quality as well as certification of the software systems.

MAIN ACHIEVEMENTS

Because of its federative character, the 3WSA project makes it possible for Walloon companies to take a more competitive position with respect to the technological tools necessary to build geomatic service platforms.

This project also creates essential dynamics to increase co-operation between Walloon actors in the industrialisation and marketing of applications resulting from research tasks in progress in the fields targeted by the project.

« The 3WSA project intends to initiate in the Walloon Region a centre of geomatic services addressing European and even global markets, built on existing infrastructures – especially in Redu, Belgium – and providing several industrial and commercial initiatives. »

PARTNERS Agence Prévention et Sécurité (ULg), AMOS, Aquapole, CREACTION, IONIC Software, SPACEBEL, Centre Spatial Liège (CSL), Vitrociset-EPB, WALPHOT, WSLlux

FAUST

Type of project: Walloon Region – FEDER – Objective 1 – Phasing out – Hainaut
CETIC budget: €2 351 923
Duration: 2001-2008
CETIC department: Software and System Engineering
Website: www.faust.cetic.be

BACKGROUND

The FAUST project (Formal Specification Using Specification Tools) aims at reaching high quality in requirements documents, especially for complex systems with critical aspects related to security, dependability or simply business. The FAUST toolset was developed to support an early formalisation process enabling validation, verification, and test generation directly based on requirements of such systems. To preserve communication, the formal level of analysis is made accessible through a natural integration within text and graphical goal-oriented notations. Moreover, a graphical animation tool also allows the stakeholders to have a direct understanding based on domain-specific visualisations. Integration in industrial methods and tool chains is also addressed.

Requirements engineering is a crucial step in the development of a software system. High quality is especially imperative in mission-critical systems. Goal orientation is among the major approaches of this field. Goals enable the precise structuring of system-level properties from high level goals to operation requirements and assumptions about the environment. It also enables rigorous reasoning about completeness, consistency and conflicts. This approach was developed by the computer science department of Université catholique de Louvain.

The objective of the FAUST project is to propose an integrated toolset for production of high quality requirements documents for complex industrial systems. This toolset relies on the requirements formalisation using goal-orientation. It supports the formal level of the methodology more precisely:

- Verification: checking that the requirements are complete, consistent and robust; more specifically, it allows verification of the way abstract requirements are refined into more concrete ones and finally into correct operations specifications
- Validation: checking that the requirements reflect user needs; this is achieved by generating goal-oriented animation based on finite state machines associated with generic and domain-based representations
- Acceptance: checking that the delivered system meets the requirements by generating a number of representative validation traces providing property-based coverage

In order to make the tools accessible to the industrial user, formal techniques are hidden as much as possible. Automated techniques like model checking and SAT engines are used and can yield a useful explanation in case of failures which can be visualised using the animation tools.

MAIN ACHIEVEMENTS

- A software toolset for managing requirements of critical systems by formalising where and when necessary they are needed, with the tools easing and hiding the formalism as much as possible
- A better integration between the requirements process and downstream development steps: traceability, generation of architectures, data models, etc. The approach fits with model-driven engineering/model-driven development
- Integration in an industrial tool chain, based on the Objectiver Requirements Engineering tool and the Eclipse platform. Extension to industrial architecture (AADL) and specification languages (B/Event B) are addressed in more specialised projects
- A set of requirements and design-level services available to companies having mission-critical needs

Appreciation of the project for the companies

- Goal-orientation was successfully applied in a number of contexts such as aeronautics (air-traffic control) and eGovernement (parliamentary workflow), with the help of formalisation for specific aspects.
- Industrial validations were also conducted in the scope of a number of other research projects especially in a Grid context where models for virtual organisations and access control policies (Chinese Wall access control model) were developed.

> « The objective of the FAUST project is to propose an integrated toolset for production of high quality requirements documents for complex industrial systems. »

PARTNERS Respect-IT S.A., Université catholique de Louvain (UCL)

CEDIE

EXPERTISE CELL IN REQUIREMENTS ENGINEERING (CRAQ 153)

Type of project: Walloon Region – FEDER – Objective 1 – Phasing out – Hainaut

CETIC budget: €696 980

Duration: 2001-2008

CETIC department: Software and System Engineering

BACKGROUND

Software requirements engineering is the initial step of every software development process. Its role is to define accurate software specifications. For this it relies on a number of techniques for capturing, structuring and validating stakeholders' needs and to understand the organisational context. Those techniques are poorly mastered by most companies, especially SMEs. The goal of the CEDIE cell was to contribute to the improvement of engineering practice requirements through a number of instruments, such as templates, advice, training, review, and coaching in requirements writing. These activities are now part of the core services of the Software and System Engineering department.

The first step is without doubt the most crucial part of software development, as it governs the work of the subsequent steps. Any undetected problem at the initial step will inevitably be encountered later in the development process, usually resulting in unforeseen costs and delays. Recent surveys have shown that more than two thirds of software projects still fail or exceed allocated time/budget due to poorly defined specifications.

Requirements engineering is even more crucial when the development process is externalised. Besides fulfilling its role of guideline for a developer, a well-structured software specification will ensure proper software compatibility with its intended running environment, fewer bugs and a certain global level of quality. The contractual aspect of such a document further stresses its importance.

Through CEDIE, Walloon companies have benefited from easy access to requirements engineering techniques tailored to their needs. This concrete and active help often took the form of direct involvement in the requirements engineering phase of the related project. These improvements were usually integrated in an overall enhancement of quality, assisting the developing team to achieve quality certification. Easing software development sub-contracting has helped IT companies to increase their efficiency, thus resulting in greater competitiveness.

MAIN ACHIEVEMENTS

- Guides, templates and training (case studies, Unified Modeling Language, goal-oriented methodologies) available to the companies
- Organisation of information and training events (CETIC and Infopole workshops)
- Advice given to a number of Walloon Region enterprises, contributing to the improvement of their practices in concrete cases

CEDIE has delivered guides and templates to improve a number of engineering requirement documents: requirements documents, tests plans, model types, etc. These ensure a certified quality, enhancing the corporate image of the IT products and companies of the region.

A number of enterprises have benefited from the direct expertise of CEDIE, especially for customising the developed material to the company context. This service was appreciated as it provided a valuable return to participating companies, a majority of which are active in high quality software design, for example in the transport and telecommunications sectors.

> « Through CEDIE, Walloon companies have benefited from easy access to requirements engineering techniques tailored to their needs »

PARTNERS University of Namur (FUNDP)

Certification of Software Products

CRAQ155

Type of project: Walloon Region – FEDER – Objective 1 – Phasing out – Hainaut
CETIC budget: €711 970
Duration: 2001-2008
CETIC department: Software and System Engineering

BACKGROUND

Certification and labelling are crucial for the regional market, which is characterised by a large number of SMEs often in an improvement phase and, therefore, seeking recognition and solid partnerships in a wider market. The mission of this project was to become a regional reference point for software certification in a broad sense, i.e. to provide objective, stable and consistent evaluation criteria to facilitate the exchange of products and services in the ICT domain.

The issue of certification and /or labelling can take various forms depending on the aspect that should be certified:

- The evaluation of some aspects is already governed by a standard certification following models that are standards of fact or law. For example, there are models defining the level of maturity of software processes of an enterprise (the CMM which is a de facto standard in the U.S. and the Spice model becoming an ISO standard) and standards defining software security levels (the ISO/IEC 15408 aka Common Criteria). For these aspects, the objective of the centre was to become the regional point of reference with accredited assessors and, where appropriate, the necessary adaptation of these models to the regional reality.
- The evaluation of other aspects such as compliance with specifications or compliance with the ergonomics is based on various criteria which are not necessarily covered by a standard. For these aspects, it is desirable to have specific and public criteria for evaluating, applied in a uniform manner. The centre, having a high level of technical expertise and a total independence from the market players, proposes to be such a reference. It provides the necessary assessments and shall publish its criteria for giving out the status label and the necessary recognition. A suitable tool is also necessary to conduct these evaluations in an objective manner.

Through the production and dissemination of these criteria, CETIC also plays an advocacy role in the ICT market in general. This sensitisation is an integral part of its mission.

MAIN ACHIEVEMENTS

To support the objective assessments underlying the certification process, CETIC developed D-Side Dashboard, a decision aid tool to support project managers, quality engineers and software developers. This tool enables identification of weakness in the source code. For each profile, a dashboard is created specifically to improve the decision-making in the early stages of development.

Since then, several companies have asked CETIC for an opinion regarding the use and quality of third-party software. The arguments, analysis and methods adopted by CETIC have always been a success.

As a reference centre for certification, CETIC has become a widely involved actor in various regional and federal groups, such as the label eTIC, the working group on the electronic identity card led by Agoria and the Belgian Information Security Initiative working towards the adoption of a common criteria approach in Belgium.

The project developed D-Side Dashboard, a tool for analysing code. The results given by this tool are presented as a dashboard composed of graphics. Each graphic answers a question about a specific quality aspect of an application. This tool was used within many companies, generally either internally or conducted by CETIC to perform static code analysis whose results were documented in clear, decision-helping reports. The companies which benefited from this expertise are, for the most part, active in the design of software for which quality is a vital criterion. D-Side Dashboard was even adopted by a partner as part of his business.

At the security certification level, CETIC has contributed to the first approval of a security-critical application by the National Security Authority. The security target of the product, developed in Belgium by Thales Alenia ETCA, was reviewed, and it confirmed the document quality in terms of scope, threats, security objectives and the way they are satisfied.

« To support the objective assessments underlying the certification process, CETIC developed D-Side Dashboard, a decision aid tool to support project managers, quality engineers and software developers. »

PARTNERS University of Namur (FUNDP)

ORAGE

TOOLS TO IMPLEMENT GLOBAL AND EFFICIENT APPLICATIONS (ORAGE148)

Type of project: Walloon Region – FEDER – Objective 1 – Phasing out – Hainaut
CETIC budget: €1 338 104
Duration: 2001-2008
CETIC department: Software and Services Technologies

BACKGROUND

ORAGE is a research project financed by the Walloon Region in the scope of the Objective 1 Phasing out. Through this project, launched in 2001, CETIC has developed its expertise in the field of distributed systems. ORAGE was initiated from Mozart, a distributed systems development platform developed in part by the UCL Département d'Ingénierie Informatique. CETIC has studied generic components around Mozart in order to ensure proper fault tolerance in distributed modes, shared memory management, distributed computing based on a peer-to-peer communication model and a distributed storage system. CETIC has studied Grid technologies for several years through European research projects. Since 2007, the research team has also taken into account higher-level services aspects such as Web Services and Service Oriented Architectures (SOA).

« In the scope of the ORAGE project, CETIC has contributed to Grid technology research in an effort to standardise the execution platforms for distributed systems. »

MAIN ACHIEVEMENTS

In the scope of the ORAGE project, CETIC has contributed to Grid technology research in an effort to standardise the execution platforms for distributed systems.

In 2008, CETIC continued developing its expertise in Grid middleware, notably with the Globus Toolkit and its monitoring & discovery systems (MDS) module to allow more efficient computing resource management. Fura middleware, the Platform Symphony environment and Proactive framework were also studied. CETIC's experience helped a major Belgian bank evaluate the adoption of Grid infrastructure and adapt existing distributed applications to Grid middlewares. The project has also further developed the authentication aspects via credentials, or public keys (PKI) and standard job submission methods using the RSL, JDSL & DRMAA formats. In this same year, CETIC evaluated Microsoft's new version of high-performance computing solution: the Compute Cluster Server (CCS) 2008. CETIC participated in the Grid@Mons event in May 2008, presenting attendees with technical requirements for Grid use in a business environment.

The spread of SOA architectures has brought the concept of Web Services to Grid interface tools, allowing them to be more independent from the Grid services implementation languages and offering network functionalities. This evolution, combining resource management (Grid) with services (SOA), is known as Services Oriented Knowledge Utilities (SOKU). The knowledge acquisition process in Web Services development tools and interoperability tests between Web Services and Grid were performed on CETIC's cluster between 2007 and 2008.

Important maintenance tasks were performed on the CETIC cluster. In particular, the administration nodes' operating system and monitoring were updated, offering a much improved stability, especially for the storage bay. Fault detection was also enhanced in order to install a preventive maintenance system. Finally, an automated backup for the administration nodes was also implemented.

PARTNERS Faculté Polytechnique de Mons (FPMs), Université catholique de Louvain (UCL), University of Mons-Hainaut (UMH)

Retroweb

CRAQ-REVERSE (CRAQ-154)

Type of project: Walloon Region – FEDER – Objective 1 – Phasing out – Hainaut

CETIC budget: €731 559

Duration: 2001-2008

CETIC department: Software and Services Technologies

Website: www.retroweb.cetic.be

BACKGROUND

Nowadays the Internet has become a rich and invaluable source of information for businesses. In order to stay competitive, companies have to cope with this large amount of unstructured information. In this context, the CRAQ-Reverse project aims at providing a tool-supported methodology for web data extraction (also called web wrapping).

Web wrapping techniques transform unstructured web data sources to structured and semantically rich content which can be more easily interpreted and automatically used by computers.

The research team has developed Retroweb, a tool that generates extraction rules for web data sources (mostly web pages). The main benefit from using Retroweb is the graphical interface implemented to analyse web pages and extract data. Thanks to this component, Retroweb becomes very easy to use even for non-technical users. The generic approach adopted by CETIC allows Retroweb to be used in many contexts and applications: customised search engines, migration of (semi-) static web sites, toolboxes for competitive intelligence, etc. Technically, Retroweb is a Java 6 application based on the Eclipse framework; it uses the Firefox rendering engine to display html data.

The team has also developed strong expertise in document management and search engines. They have created a toolbox for crawling documents, extracting text from any common format (doc, pdf, html, rtf, ppt, etc.), and indexing document content.

The project ended in mid-2008 with several positive achievements. The wide range of targeted application has led to several missions in the fields of eHealth, document management, chemistry, and database management systems. Starting from a research prototype, Retroweb has been brought towards a fully functional and finalised product. In order to encourage the use of the tool, documentation has also been a major focus.

On the CRAQ-Reverse project, CETIC acts as a project leader and R&D provider. CETIC provides the tool-supported methodology and transfers its know-how to local SMEs according to their specific needs.

MAIN ACHIEVEMENTS

The expertise of the team in web data extraction, search engines and knowledge management has led to the realisation of missions in a wide range of application domains. Besides the development of its own tool for web data extraction, CETIC has notably implemented Illicopresto (Agoria), a web search engine focused on innovation in Wallonia, and ArcheWeb (DocLedge), a toolbox for competitive intelligence over the Internet.

> « They have created a toolbox for crawling documents, extracting text from any common format (doc, pdf, html, rtf, ppt, etc.), and indexing document content. »

PARTNERS DocLedge, FUNDP, REVER

RETICOM

REAL TIME COMMUNICATION

Type of project: Walloon Region – FEDER – Objective 1 – Phasing out – Hainaut
CETIC budget: €1 884 873
Duration: 2001-2008
CETIC department: Embedded and Communication Systems

BACKGROUND

During the 2001 to 2008 period, the RETICOM project has allowed CETIC to develop expertise in the design of flexible and efficient embedded systems that are able to process data and to communicate with the external world (smart phones, PDAs, laptops, server stations, etc.) The RETICOM project ended in June 2008, and has allowed CETIC to build an international reputation as well as strong expertise in embedded systems prototyping and in design methodologies for embedded software.

Research was oriented towards the following topics:

- Realisation of reconfigurable architectures based on programmable logic devices such as FPGAs with an embedded soft-core processor, or relying on inexpensive processors that constitute a good compromise between processing capabilities and low power consumption. Moreover, such systems offer the possibility of implanting an embedded operating system (µClinux).
- Integration of communication peripherals, including development of Open Source drivers, allowing exploitation of wireless (WiFi, Bluetooth 2.0, etc.) and wired (USB2.0, etc.) communication standards to collect data from the external world (GPS, CAN, vehicle's self-diagnostic data, etc.) and manage embedded communication ports (USB 2.0, OneWire, RS-232, etc.). In this context the extension to emerging standards (WiMax, WAVE-DSRC, etc.) has also been envisioned.
- Implementation of centralised or distributed computing algorithms dedicated to digital signal processing (DSP), automatic data recognition, and automatic learning (artificial neural networks, parallel computing, etc.).

> « The RETICOM project has allowed CETIC to build an international reputation as well as strong expertise in embedded systems prototyping and in design methodologies for embedded software. »

MAIN ACHIEVEMENTS

Research led to the development of two communicating platforms: SAND (Smart Adaptable Networking Device) and WAND (Wireless Adaptable Networking Device). The first platform is a smart system, including an entirely configurable FPGA, regarding its hardware (soft-core processor Nios II), software or embedded operating system (µClinux). The second is a cheap platform characterised by low power consumption (working autonomously with batteries). SAND emerged in the transport sector, with acquisition, processing, and sending of data from vehicles. This system suggested a large number of possible applications, such as fleet management, vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) communications. Moreover, SAND won the first prize in the "Wireless design 2007" contest organised by the LANTRONIX Company in April 2007 in San Jose, California.

WAND has been successfully applied to the domain of telemedicine, and also to other domains such as industrial control and home automation (domotics), thanks to its capability to communicate wirelessly with devices including medical devices, industrial sensors, graphics tablets, etc. Through its activity in the e-Health sector, CETIC has become a member of the Walloon health competitiveness cluster, BioWin. Thanks to its expertise in communication technologies applied to the telemedicine domain, CETIC has developed a medical gateway in collaboration with two companies, Niko and Vitalsys, in order to collect data from medical devices that communicate using the Bluetooth protocol, and send them to a centralised server through a secured Internet connexion. WAND has also been successfully applied to other domains, and has been interfaced with industrial force sensors to monitor data logging through a wireless Bluetooth connection.

Finally, CETIC has developed a didactic demonstrator for technologies embedded in vehicles, like GPS, WiFi, and OBD. This demonstrator has made it possible to establish a travel expense sheet automatically, according to the effective distances covered by the vehicle. This demonstrator is also able to distinguish professional and personal trips. Prototype development for this demonstrator was very fast (less than one month), thanks to the previous existence of the low-level functions library developed by CETIC and dedicated to rapid prototyping of applications for the SAND embedded system.

The expertise acquired by CETIC has allowed identification of future research domains, such as fast prototyping, specification and quality evaluation methodologies for embedded systems and software.

PARTNERS Université catholique de Louvain (UCL)

EXTRA

EXPERIENCE TRANSFER AND KNOWLEDGE MANAGEMENT IN SMES DEVELOPING AND DELIVERING SOFTWARE PRODUCTS

Type of project: Walloon Region – CORNET
CETIC budget: €300 000
Duration: 2008-2010
CETIC department: Software and System Engineering
Website: www.cornet-extra.eu

BACKGROUND

EXTRA's main goal is to help SMEs active in software development and delivery to improve their practices. Product quality and customer satisfaction can be increased by capitalising on the company's previous experiences. In order to do this, the company should record its experiences.

Unfortunately, existing approaches to knowledge management are seldom applicable in SMEs because they often require a large investment in time, resources and money.

The project aims at producing and sharing a set of good practices in software development for SMEs based on:

- Theoretical research in the knowledge management area
- Feedback from participating SMEs on their current experience in transfer and knowledge management

The outcome of the project is a handbook consisting of a set of tools for managing knowledge inside companies: ideas, step-by-step guides, templates and training material.

The techniques and tools will be specially designed to meet SMEs needs. To this end, the research follows the Action Research paradigm. In this methodology, researchers and users work together. They develop and test innovations in a local context. The work is done in an iterative learning process in which researchers and SME partners collaborate. Their joint objective is to find, understand and solve problems that they have in common. The iterative process ensures the commitment of the actors as well as the quality and relevance of the research.

CETIC is a key partner in the EXTRA project. It has several roles:

- leader of the work package related to SME requirements analysis
- leader of the work package relative to toolset elaboration
- active participation in validation and exploitation tasks
- application of its strong expertise in process assessment and improvement methods

MAIN ACHIEVEMENTS

Two main tasks were achieved during the first year of the project:

1. Analysis of SME requirements: A questionnaire was developed to collect the understanding and current experiences of participating SMEs (Belgian SME partners are NSI, Océ Software Laboratories, DocLedge and BSB).

   The questionnaire addressed participants' current interests and future strategies for knowledge management. A gap analysis was undertaken between SMEs' current and future situations with respect to different types of knowledge management strategies.

   The results from the SMEs from the three participating countries were combined and analysed. They served as the basis for the handbook.
2. The elaboration of the first version of the handbook: The handbook will consist of a set of techniques to set up or make knowledge sharing easier inside SMEs. A few techniques for helping SMEs improve their knowledge management were written and submitted to the participating SMEs for comment.

   The complete handbook will contain a questionnaire that will help SMEs assess their current level of knowledge management and direct them to the techniques most suitable for them based on their level.

   The validation of the techniques will be done by the participating SMEs, which will test these techniques on existing projects during the second year of the project.

> « The outcome of the project is a handbook consisting of a set of tools for managing knowledge inside companies: ideas, step-by-step guides, templates and training material. »

PARTNERS CITEA, IKT Norway, Intelliscape, SINTEF, Virtual IT

C2A

CONNECT TO ALL

Type of project: Walloon Region - Interreg IV
CETIC budget: €327 000
Duration: 2008-2012
CETIC department: Embedded and Communication Systems

BACKGROUND

C2A is a cooperative project between the Walloon Region and France targeting the transport and logistics sector in the trans-border region. The project idea started from a general observation about ICT usage in transport vehicles. The number of embedded communications systems has significantly increased over time. Systems include mandatory devices such as the digital tachograph as well as radio communications systems (GSM/GPRS), localisation devices (GPS), data loggers, PC tablets, cameras, mobile phones, on-board computers, etc.

These devices and their associated solutions represent a substantial investment. They are intended to automate processes and offer significant added value and economic return. However, in practice, technology exploitation is sub-optimal and usually there is very limited communication and resource sharing among systems. This results in features redundancy, services duplication, and sub-utilisation of deployed hardware and software resources.

To address this issue, the C2A project aims at designing, developing and implementing a generic and intelligent interconnection system for embedded hybrid systems, enabling more interoperability and efficient resource sharing. The system should have flexible architecture that allows efficient data handling from a wide range of devices, sensors and communications interfaces.

The project is structured around two main actions:

- A research and development action (R&D) focusing on the design of the innovative embedded system (hardware and software)
- A dissemination and communication action whose objective is to implement a structured and interactive platform involving both ICT services companies and transport and logistics operators

CETIC is mainly involved in the R&D action of the project. The work includes:

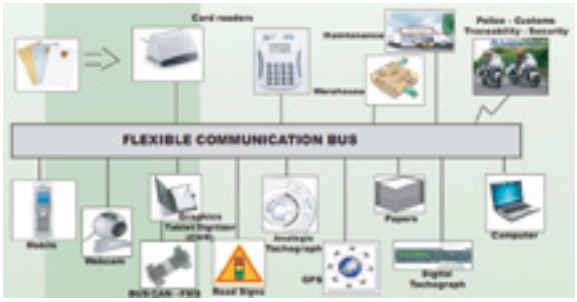
- An assessment of the state of the art of available technologies and research projects related to C2A
- Establishment of functional and non-functional specifications
- Definition of relevant case studies and implementation scenarios
- Definition and design of a flexible, open and upgradeable architecture
- Prototype development and validation

CETIC will build its efforts on its expertise with rapid embedded systems prototyping and implementation of wireless communications.

MAIN ACHIEVEMENTS

The C2A project started in the last third of 2008. The main work during this period consisted of setting up the project and preparing the first annual meeting scheduled for the first quarter of 2009. Preliminary analysis of the state-of-the-art was begun.

The ultimate objective of the C2A project is to provide an innovative technology solution allowing rationalisation and optimisation of investments for transport companies and paving the way for the creation of innovative new services.



« The C2A project aims at designing, developing and implementing a generic and intelligent interconnection system for embedded hybrid systems, enabling more interoperability and efficient resource sharing »

PARTNERS Carinna, CReSTIC/URCA, Docledge, Forem, Gunnebo, INFOPOLE Cluster TIC, Monnier Borsu Sotradel, Smolinfo

EUROPEAN RESEARCH PROJECTS

AssessGrid

ADVANCED RISK ASSESSMENT FOR TRUSTABLE GRIDS

Type of project: European Commission – Sixth Framework Programme – Information and Communication Technologies – Specific Targeted Research Project

CETIC budget: €455 110

Duration: 2006-2009

CETIC department: Software and Services Technologies

Website: www.assessgrid.eu

BACKGROUND

The goal of AssessGrid is to address obstacles to wide adoption of Grid technologies by bringing risk management and assessment to this field, enabling the use of Grid computing in business and society. AssessGrid delivers Open Source software providing users' estimation and aggregated confidence information for provider selection and fault-tolerance/penalty negotiations, as well as risk assessment methods such as decision support for accepting/rejecting Service Level Agreements (SLAs), price/penalty negotiation, and capacity and service planning.

Grid technologies have reached a high level of development, but adopters still highlight core shortcomings related to security, trustworthiness, and dependability of the Grid for commercial applications and services. Users require a job execution with the desired priority and quality to negotiate Service Level Agreements (SLAs) to define all aspects of the business relationship. Nevertheless, providers are reluctant to adopt this mechanism because agreeing on SLAs, including penalty fees, is a business risk. For example system failure or operator unavailability can actually lead to SLA violation. On the other hand, providers require risk assessment methods as decision support for accepting/rejecting SLAs, for price/penalty negotiation, for activating fault-tolerance actions, and for capacity and service planning. Customers, Grid end-users and brokers also need estimation and aggregated confidence information for provider selection and fault-tolerance/penalty negotiations.

AssessGrid addresses risk awareness and consideration in SLA negotiation, self-organising fault-tolerant actions, and capacity planning for both providers and customers. The project develops and integrates methods for risk assessment and management in all Grid layers. The cornerstones are risk management scenarios reflecting the perspective of Grid end-users, brokers and providers. The outcomes of the project will support all Grid actors by increasing transparency, reliability, and trustworthiness, as well as providing an objective foundation for planning and management of Grid activities. Thus, AssessGrid will supply Next Generation Grids with additional innovative and required components to close the gap between SLAs as a concept and an accepted tool for commercial Grid uptake.

CETIC led one of the project's critical tasks: providing the requirements of the projects. By providing the AssessGrid requirements, CETIC not only gains expertise in the specificities of Grid domain requirements, but also reinforces its know-how offered as services to enterprises. Under CETIC lead, implementation of the requirements is tested through a verification and validation process for each of the project's software deliverables. CETIC is also involved in the dissemination activities. Participating in the dissemination strengthens CETIC's experience in this field and contributes to its mission of providing Belgian enterprises with a high level of technical information.

MAIN ACHIEVEMENTS

Methods and algorithms elaborated in AssessGrid are applied and delivered through generic, customisable, and interoperable open-source software for risk assessment, risk management and decision support in each Grid layer.

AssessGrid software is released in three steps, following the use-cases defined in the project: for the end-user, from a Grid service broker viewpoint and for all stake-holders.

- Risk-aware end-user client
  The first outcome focuses on the end-user perspective. It contains basic mechanisms on risk management and allows negotiation of Grid jobs from end-user to several providers through a brokering service. Main software components (risk management and assessment components, confidence service, risk assessor) are deployed into the Grid software architecture. The software prototype was released in September 2007.
- Risk-enhanced broker service
  In the second phase the AssessGrid system is enhanced to consider risk management methods especially for improving analysis performed by the broker service. The risk assessment is based on dynamic data. The software prototype was released in July 2008, and demonstrations took place from August to November.
- AssessGrid risk management system
  This is the main AssessGrid outcome: a vertically integrated solution including all planning, monitoring and risk management methods for the Grid end-user client, Grid broker and Grid provider. It further enhances the risk assessment by considering statistical/historical data (like events log), ad-hoc input, and general data on the Grid infrastructure (such as human operator availability). Overall, this outcome will enhance the second result from the provider's perspective. It will be released at the end of the project.

PARTNERS ÅBO Akademi, Atos Origin, IAMSR, Technical University of Berlin, TÜV Rheinland help AG, University of Leeds, University of Paderborn, Wincor-Nixdorf

BEinGRID

Type of project: European Commission – Sixth Framework Programme – Information and Communication Technologies – Integrated Project

CETIC budget: €1 313 510

Duration: 2006-2009

CETIC departments: Scientific Communication, Software and Services Technologies

Websites: www.beingrid.eu – www.gridipedia.eu

BACKGROUND

Grid computing uses distributed computing resources connected through a network, presenting them as a coherent and scalable infrastructure in order to get access to a coordinated set of services.

While ICT is evolving towards a more widespread use of software services (Service Oriented Architecture - SOA, Service as a System - SaaS) and the use of remote infrastructures (cloud computing), Grid technologies still play a crucial role in this context, by providing high level services to the user (standard interfaces, security, reliability, optimal resource usage, etc.).

The mission of BEinGRID is to establish effective routes to foster the adoption of Grid technologies across the European Union (EU) and to stimulate research into innovative business models using Grid technologies.

Business Experiments in GRID (BEinGRID) is the EU's largest integrated project funded by Information Society Technologies (IST) research, which is part of the EU's Sixth Framework Programme (FP6) in R&D. The project aims are to understand the requirements for Grid uptake in the commercial environment involving software vendors, IT integrators, service providers and end users; and to enable and validate the adoption of Grid technologies by businesses.

BEinGRID has undertaken twenty-five targeted Business Experiments (BEs) designed to implement Grid solutions across a broad spectrum of European business sectors, in order to develop and deploy a critical mass of Grid-enabled pilots with different needs and requirements in terms of technological Grid challenges.

Complementing this work, Gridipedia, a knowledge and toolset repository, is being developed. It consists of Grid service components and best practices to support European businesses with the adoption of Grid technologies.

CETIC key responsibilities on the project:

- Leading the first wave of 18 experiments, with 70 partners involved and a total effort of about 1100 person-months
- Leading dissemination activities
- Strong involvement in security analysis and business modelling work packages, and quality assessment of the project dissemination portal Gridipedia.eu

MAIN ACHIEVEMENTS

Three major outcomes available at the end of the second year of the project:

1. The case studies resulting from BEinGRID's first wave of 18 Business Experiments are gathered in a booklet entitled "BEinGRID: Better Business Using Grid Solutions - Eighteen Successful Case Studies Using Grid". As dissemination leader, CETIC led the publication process and coordinated the content edition across the 18 business experiments.
2. The project is producing four "BEinGRID Demos" which are promotional material telling stories of successful use of the Grid within industry settings, from both a business and a technology perspective. Two demos were produced this year. One was built on CETIC's Business Experiment "Grid for Architects". It explains how CETIC built a portal offering on-demand Grid rendering services, providing substantial cost savings to their clients. The demo package contains a key story which explains the business benefits, a set of slides, and a rolling video. The application web portal can be accessed upon request.
3. The BEinGRID project held its Industry Days from June 3 to 5 in Barcelona, in co-location with the Open Grid Forum's 23rd edition. The event demonstrated how businesses can apply Grid technologies to solve a variety of problems. More than 500 participants attended this major Grid event, ranging from Grid experts to representatives from SMEs and large companies interested in learning how Grid can be a solution for their businesses. As dissemination leader, CETIC took a major role in the organisation of the Industry Days, and this event especially showcased the result of the first 18 Business Experiments, which were coordinated by CETIC.

« The mission of BEinGRID is to establish effective routes to foster the adoption of Grid technologies across the European Union. »

PARTNERS Consortium of 96 partners - Core team: Atos Origin, British Telecom, Centrale Recherche SA, Centro di Ricerca in Matematica Pura ed Applicata, ENEA, EPCC, Fraunhofer SCAI, K.U. Leuven, Logica, National Technical University of Athens, Telefónica I+D, T-Systems, University of Economics and Business of Athens, University of Stuttgart, University of St. Gallen

CoreGRID

Type of project: European Commission – Sixth Framework Programme – Information and Communication Technologies – Network of Excellence

CETIC budget: €732 821

Duration: 2004-2008

CETIC departments: Scientific Communication, Software and Services Technologies, Software and System Engineering

Website: www.coregrid.eu

BACKGROUND

CoreGRID was a network of excellence in Grid technology funded by the European Commission under the Sixth Framework Programme for Research and Development. The project involved 46 research teams (including CETIC and the Faculté Polytechnique de Mons) from 19 countries, 18 of which were in Europe. The project brought together 161 full-time researchers and 164 PhD students. CoreGRID has now been re-launched as a self-sustaining ERCIM Working Group covering research activities on both Grid and service computing, while maintaining the momentum of the European collaboration on Grid research.

The objective of CoreGRID was to strengthen Europe's scientific and technological advances in the areas of Grid and peer-to-peer technologies. CoreGRID stayed at the forefront of scientific and technological excellence, encouraged the mobility of researchers, and ensured sustainable integration of research teams beyond the funding period of four years.

CoreGRID was an ambitious programme of joint activities structured around six complementary research areas, namely:

- Knowledge and Data Management
- Programming Model
- Architectural Issues: Scalability, Dependability, Adaptability
- Grid Information, Resources and Workflow Monitoring Services
- Resource Management and Scheduling
- Grid Systems, Tools and Environments

These research areas had been selected on the basis of their strategic importance, their research challenges and the recognised European expertise to develop next generation Grid middleware.

CETIC researchers actively participated in two of the six working groups (called «institutes») of CoreGRID, namely Knowledge and Data Management and Resource Management and Scheduling. CETIC was also responsible for the dissemination activity of the project (Spreading Excellence) and shared its expertise in technology transfer between academic research and industrial companies. Various tasks related to this important mission included organisation of scientific and industrial conferences of the CoreGRID network, communication with the press, leading the CoreGRID industrial advisory board and managing both production and dissemination of marketing materials (brochure, poster, newsletter, etc.).

MAIN ACHIEVEMENTS

CoreGRID not only successfully integrated and coordinated the European research community in Grid technology, but also effectively linked academic research institutes with industry. The project achieved the goal of boosting the EU industrial sector by harnessing research and innovation for businesses.

To gain higher visibility and raise public participation and awareness, CoreGRID Network implemented an integrated programme for spreading excellence targeting researchers and industry-based computer scientists and leaders. Activities included dissemination and communication, liaison with industry, scientific communication, as well as training and education. Major achievements of the CoreGRID Spreading Excellence campaign include:

- Establishing an "industrial task force" to strengthen the network's links with industry
- Initiating the Industrial Fellowship programme
- Active participation in the European and international initiatives such as NESSI (Networked European Software and Services Initiative) and OGF (Open Grid Forum)
- Increased public awareness and visibility through marketing material (brochure, annual report) and communication actions (press campaign)
- Strengthened the benefits for CoreGRID researchers, thanks to an active and appropriate internal network communication policy, as well as internal workshops

The expertise developed by CETIC researchers during the course of the CoreGRID project can be used by local enterprises to deploy the cutting edge Grid and SOA technologies.

> « CoreGRID not only successfully integrated and coordinated the European research community in Grid technology, but also effectively linked academic research institutes with industry. »

PARTNERS 330 researchers and post-doctoral students from 46 European research institutions

GridTrust

TRUST AND SECURITY FOR NEXT GENERATION GRIDS

Type of project: European Commission – Sixth Framework Programme – Information and Communication Technologies – Specific Targeted Research Project

CETIC budget: €540 697

Duration: 2006-2009

CETIC department: Software and System Engineering

Website: www.gridtrust.eu

BACKGROUND

GridTrust is a European project from the Sixth Framework Programme coordinated by CETIC. The overall objective of the GridTrust project is to develop the technology to manage trust and security for the Next Generation Grids (NGG). The project proposes to take a vertical approach to tackling issues of Trust, Security and Privacy (TSP) from the requirements level down to the application, middleware and foundation levels. CETIC is contributing to the development of models and tools to assist in reasoning about TSP properties across the whole architecture.

The GridTrust consortium involves a large panel of industrial partners, end users, SMEs and European research groups covering requirements engineering, Grid technology and security, among other issues. Moviquity, HP and Interplay are providing important case studies to validate the GridTrust framework, including innovative applications such as inter-enterprise knowledge management and distributed authoring. Moviquity and De Agostini are committed to the implementation and exploitation of the results of the project middleware and foundation levels. The main output of GridTrust is a framework consisting of the following.

1. A methodology and an interactive execution environment that will help Grid service requestors and providers to express and reason about trust, security and privacy properties for different kinds of Virtual Organisation (VO) topologies, taking into account aspects such as self-organisation, self-management, self-adaptation and evolvability.
2. A reference Grid security architecture, including an autonomic policy management for fine grained usage control of Grid resources.
3. An Open Source reference implementation of trust and security management systems, validated by scenarios in the business domain. The resulting tools will be of a generic nature and will be validated on innovative applications from different application sectors. The tools will not be specific to the applications considered in the GridTrust project. The tools will be compliant with the Open Grid Services Architecture (OGSA).

CETIC is coordinating the project and is actively involved in the tasks related to the specification of trust and security requirements, and the derivation of trust and security policies based on formal modelling and model transformation technologies.

MAIN ACHIEVEMENTS

The results of the GridTrust project will allow companies to set up and operate virtual organisations that are secure and trusted. The approach will provide tools to design security and trust requirements into the virtual organisation. Virtual organisations will allow companies to provide and to access Grid resources to achieve common goals. Virtual organisations are also valuable in the larger context of Service Oriented Architectures to set up virtual markets.

> « The approach provides tools to design security and trust requirements into the virtual organisation. »

PARTNERS Consiglio Nazionale delle Ricerche, De Agostini, HP Innovation, Interplay, Moviquity, Science and Technology Facilities Council, Volk Universitit Amsterfam

HPC4U

HIGHLY PREDICTABLE CLUSTERS FOR INTERNET GRID

Type of project: European Commission – Sixth Framework Programme – Information and Communication Technologies – Specific Targeted Research Project
CETIC budget: €402 000
Duration: 2004-2007
CETIC departments: Software and Service Technologies, Software and System Engineering
Website: www.hpc4u.eu

BACKGROUND

Today many companies use their internal computing resources (e.g. clusters) to run high performance computing applications. They often take days of computation time. Since hardware is often not reliable enough, being prone to failure, companies face the loss of computation time and money. Moreover, current resource management systems (RMS) do not provide any guarantee regarding the deadline for job completion. Only best effort planning is offered to the users.

HPC4U addresses those issues and provides as a software solution a generic and modular Grid middleware which enables an increased level of fault tolerance and covers multiple administrative domains. HPC4U integrates quality of service in the product by using an RMS called CCS which implements Service Level Agreements (SLA). The quality of the service component provides a reliable and clear statement about the service level for a job, which can be submitted and fulfilled despite hardware or software failures.

HPC4U worked on the realisation of an SLA-aware Grid fabric consisting of multiple elements. An open source resource management system, OpenCCS, (http://www.openccs.eu), developed by the University of Paderborn, represents the top layer element. It is responsible for managing the cluster in general, as well as serving as the master interface to upper layer clients. Within HPC4U, the Technical University of Berlin integrated the resource management system with the Globus Toolkit 4 in order to set up a Grid-ready environment able to migrate jobs over the Internet on remote available resources. This integration also allows Grid middleware components to negotiate on SLAs. The resource management system is responsible for only accepting jobs where the SLA can be fulfilled in the current system condition. In particular it is responsible for fulfilling all agreed SLAs, even in case of failures such as resource outages.

At the cluster level, the resource management system interacts with several subcomponents offering fault tolerance mechanisms. The MetaCluster checkpointing subsystem of IBM provides process fault tolerance mechanisms; the storage subsystem of Seanodes (VSM/Metanode and Exanodes) offers storage virtualisation coupled with fault tolerance mechanisms. The third system, in charge of network aspects, is made of Scali MPI libraries and a Dolphin SCI interconnect.

CETIC was in charge of the specification work package (requirements and architecture) and validation activities. It also served as dissemination manager for the project.

MAIN ACHIEVEMENTS

The HPC4U solution is made of a mix of open source and proprietary software embedded in three outcomes. The first one is an SLA-aware and Grid-enabled resource management system including SLA negotiation, multi-site SLA-aware scheduling, security and interfaces for storage, checkpointing, and networking support. It is multi-platform in nature and available as open source. The second HPC4U outcome is a vertically integrated commercial product with proprietary Linux-specific developments for storage, networking and checkpointing. The third outcome is also a vertically integrated system consisting of freeware components only. This outcome is ready to be used and can be downloaded, like all other materials and sources, from the HPC4U website.

> « HPC4U provides as a software solution a generic and modular Grid middleware which enables an increased level of fault tolerance and covers multiple administrative domains. »

PARTNERS Dolphin, Fujitsu, IBM, LIU, Scali, Seanodes, Technical University of Berlin, University of Paderborn

OLDES

OLDER PEOPLE'S E-SERVICES AT HOME

Type of project: European Commission – Sixth Framework Programme – Information and Communication Technologies – Specific Targeted Research Project

CETIC budget: €555 360

Duration: 2007-2009

CETIC department: Embedded and Communication System

Website: www.oldes.eu

BACKGROUND

In the next few years, due to the ageing of the population, Europe and the rest of the world will have to cope with significant challenges in supporting elderly persons and providing them with good quality health care services. Many elderly persons live alone at home and have lost most of their social contacts. Most of them suffer from chronic diseases like diabetes or heart failure and cannot visit hospitals or doctors regularly. This complex situation generates expenses which will significantly increase in the near future. For these reasons the European Commission put the research topic "Assisted Ambient Living for the Ageing Society" at the centre of the research programme's priorities.

The OLDES project started in January 2007 with two main objectives related to improving the quality of life of elderly persons living at home.

The first objective of the OLDES project consists in developing IT solutions to improve the quality of life of elderly persons living at home. More precisely, it aims at developing a low-cost computer-based digital companion connected to a television to enable an elderly person to access online services easily. The project is focusing on home health telemonitoring with wireless medical devices (glucometer, pulse oxymeter, sphygmomanometer, weight scale, and electrocardiogram) and interactive online entertainment. Participants can access online news, videos and audio content and are able to communicate easily using modern Internet-based Voice Over Internet Protocol (VOIP) communication technologies. The OLDES system includes an on-line discussion group led by facilitators who encourage interest and solicit reactions from participants.

The second objective aims at ensuring optimal exploitation of the project results. It focuses on engaging all the stakeholders in the co-construction of the system in order to guarantee that all their needs are taken into account, and to ensure acceptance of the final project results.

Starting from April 2009, two 12-month pilot projects will run to test and validate the systems. The first one in Bologna will focus on the assessment of the entertainment system with 100 elderly persons, 10 of whom elderly persons suffering from a chronic disease. The second project in Prague will validate the health telemonitoring system with 20 diabetic patients. The objectives of these pilots are to assess the final acceptance of the system, the improvement of the quality of life of the elderly persons, and the economic impact of such systems in Bologna and Prague.

The OLDES project has a high potential for application and acceptance. In the Belgian Walloon Region, CETIC set up some regional research projects in order to evaluate, implement and deploy eHealth systems based on the expertise built through the OLDES project. CETIC is also in touch with companies and universities in order to exploit project results by creating spin-offs.

CETIC is a key partner of the OLDES project. It has several roles:

- Leading the work package related to the platform
- Collecting the user and system requirements
- Elaborating the platform specifications
- Developing the health telemonitoring system and the entertainment system using its strong expertise in wireless technologies and embedded hardware and software development

MAIN ACHIEVEMENTS

During the first project year (2007), the OLDES project focused on creating dialog among all the future stakeholders of the platform to help them participate in its construction. Dynamic focused group sessions elicited the needs of all stakeholders. On the basis of these requirements, the stakeholders then built and approved the first specifications of the OLDES platform alpha version.

During the second year of the project (2008), the OLDES project focused on developing the first integrated prototype of the platform based on the collected requirements and the specifications. This prototype was successfully presented to European Commission representatives in June 2007 and served as a tool during the focus groups OLDES partners led from September 2008 to the end of the year. It helped the stakeholders participate in elaborating the specifications of the second prototype, which will be finalised in 2009.

> « The first objective of the OLDES project consists in developing IT solutions to improve the quality of life of elderly persons living at home. »

PARTNERS Agentscape, Bologna Health Authority, Bologna University, CUP2000, ENEA, INK Media, Municipality of Bologna, Technical University of Prague, University of Charles, University of Newcastle

QualOSS

QUALITY OF OPEN SOURCE SOFTWARE

Type of project: European Commission – Sixth Framework Programme – Information and Communication Technologies – Specific Targeted Research Project

CETIC budget: €799 465

Duration: 2006-2009

CETIC department: Software and System Engineering

Website: www.qualoss.eu

BACKGROUND

QualOSS is developing a methodology to assess free and Open Source software (F/OSS) endeavours. In particular, the standard QualOSS assessment method evaluates the robustness (capability to handle problems) and the evolvability (capability to remain viable in the long term) of F/OSS endeavours. These two aspects are very important for making informed decisions before integrating a F/OSS component or a new version of a F/OSS component in products, services or infrastructure. Indeed, organisations should only trust F/OSS endeavours that they consider robust and evolvable; otherwise they will run the risk of wasting time and effort learning and integrating F/OSS components that will soon become obsolete.

Besides using the QualOSS methodology to develop a smart F/OSS acquisition programme, companies may also use it to monitor their own software development endeavours. For example, it is possible with minimal effort to tailor the standard QualOSS assessment method to evaluate internal proprietary software projects. In particular, the QualOSS platform that uses the QualOSS methodology will perform automated measurements on data repositories from tools often used by F/OSS projects such as CVS, Subversion, GIT, Bugzilla, and Sourceforge Tracker. But connecting proprietary tools often used in the software industry would definitely be feasible.

« QualOSS is developing a methodology to assess free and Open Source software (F/OSS) endeavours. »

MAIN ACHIEVEMENTS

Efforts in 2008 primarily focused on solving the problem encountered with the prototype built in 2007. Based on the lessons learned, the QualOSS methodology is now made to be flexible and to impose rigour when conducting assessments. In particular, it is designed to adapt to many F/OSS acquisition situations and to force information recording to guarantee a high degree of traceability in assessment results. This is achieved by splitting the methodological from the assessment methods.

The QualOSS methodology consists of a framework of requirements that assessment methods must satisfy. The standard QualOSS assessment method was built to fulfil these requirements. Furthermore, it addresses the other weaknesses of the prototype. Firstly, it clearly identifies specific questions that an assessment answers. This in turn makes assessment results easier to understand. Secondly, the standard QualOSS assessment method imposes a workflow to better orchestrate an assessment. In consequence, the synchronisation of datasets measured in an assessment is performed a priori. During the latter part of 2008, measures and indicators needed to answer the clear, specific questions were defined.

In parallel to the R&D effort, an initial set of three industrial case studies was identified. The initial studies aim to verify if the standard QualOSS assessment method can be used, first by AdaCore to assess F/OSS endeavours corresponding to different versions of the GCC backend; second by Océ Software Laboratories to determine whether to integrate the lpr client from yanolc in one of its products or whether to re-implement it from existing OSL internal components; and third by Freecode to identify how to better collaborate with the Asterisk developer community.

In the first half of 2009, the standard QualOSS assessment will be tested on various F/OSS endeavours and also on the initial set of case studies. Subsequently, the measures and indicators will be adjusted until an initial version of the standard QualOSS assessment method is frozen around June 2009. In the second half of 2009, the QualOSS platform will be made more robust. Furthermore, validation on additional case studies is expected in order to check the applicability of the standard QualOSS assessment method to various F/OSS acquisition scenarios. It is also planned to study the effort required to adapt the standard QualOSS assessment method into new, specific QualOSS assessment methods better suited to the F/OSS acquisition scenarios where the standard method is of limited help.

PARTNERS AdaCor, Fraunhofer IESE, Maastricht Economic and Social Research and Training Centre on Innovation and Technology (MERIT), PEPITe, Universidad Rey Juan Carlos, University of Namur (FUNDP), ZEA Partners

DEPLOY

Type of project: European Commission – Seventh Framework Programme – Information and Communication Technologies – Integrated Project

CETIC budget: €829 776

Duration: 2008-2010

CETIC department: Software and System Engineering

Website: www.deploy-project.eu

BACKGROUND

DEPLOY is a research project of the European Commission (FP7) which aims at promoting the use of formal methodology in European industry, and developing industrially scalable formal methods. DEPLOY is a technological answer to the increasing complexity of engineering systems, and to our increasing dependence on automated systems for critical tasks, notably in safety-critical contexts.

The overall objective of DEPLOY is to make major advances in the industrial practices of engineering for dependable systems, through the deployment of formal engineering methods and tools.

Industries are facing the challenges of mastering the development of ever more complex systems with ever higher assurance. Formal engineering methods provide an answer to both of these challenges through precise modelling of the system, powerful reasoning support for the models (using automated analysis tools such as theorem provers and model checkers), and afterwards exploitation in domain-specific models and code generation.

Industries are now increasingly considering formal engineering methods. DEPLOY aims at overcoming problems of integrating these methods into industrial development lifecycles, and at presenting evidence of their overall efficiency and benefits in order to foster their adoption.

Throughout the lifetime of the project, DEPLOY methods and tools will be intensively deployed in real industrial settings by the industrial partners in order to test them against the industrial imperatives of cost-effectiveness, scaling and ability to cope with evolution of requirements. The industrial deployment will be in five sectors, each of which is key to the future of European industry and society: automotive, rail transportation, space systems, telecommunications and business information. Each deployment sector will be led by a partner who is a major player in that sector.

DEPLOY capitalises on the latest research from FP6 on formal engineering methods and tools along with related research on combining formal engineering methods with methods for resilience engineering. DEPLOY will deliver major new advances over these existing methods and tools. A number of DEPLOY partners have contributed to these existing FP6 results, enabling the project to take advantage of their existing research and development bases. The rich and complementary mix of expertise with engineering challenges from the industrial deployment partners, together with the extensive technology base of the academic and service providers, comprises a consortium which is ideally suited to addressing the DEPLOY aims and which is unique in Europe and indeed internationally.

CETIC's responsibility in the project is to quantify the benefits gained by the deployment of formal methods in industry. Such a measure is particularly critical, as it will be the main motivation for additional industrial players to deploy formal methods. To this end, CETIC first has to propose concrete measures that can provide such evidence, and then evaluate the improvement in practice of industrial partners when they deploy formal methods.

MAIN ACHIEVEMENTS

The result will include both methods and tools supporting the effective deployment of formal engineering methods in the industrial setting, together with evidence about the effects of applying formal methods on productivity and dependability.

> « The overall objective of DEPLOY is to make major advances in the industrial practices of engineering for dependable systems, through the deployment of formal engineering methods and tools. »

PARTNERS Bosch, ClearSy, ETH Zurich, SAP, Siemens Transportation Systems, Space System Finland, Systerel, University of Düsseldorf, University of Newcastle, University of Southampton

RESERVOIR

Type of project: European Commission – Seventh Framework Programme – Information and Communication Technologies – Integrated Project

CETIC budget: €494 827

Duration: 2008-2011

CETIC departments: Software and Services Technologies, Software and System Engineering

Website: www.reservoir-fp7.eu

BACKGROUND

The RESERVOIR project, REsources and SERvices Virtualisation withOut BarrIERS, will provide a foundation for a service-based online economy, where – using virtualisation technologies – resources and services are transparently provided and managed on an on-demand basis at competitive costs with high quality of service. The project consortium is coordinated by IBM Haifa Research Lab, and includes a good balance of industry and academia.

Cloud computing allows data centres to operate more like the Internet by enabling computing across a distributed, globally accessible fabric of resources, delivering on-demand services over the Web, reducing software complexity and costs, expediting time-to-market, improving reliability and enhancing accessibility of consumers to government and business services. Thus, cloud computing represents a true materialisation of Service-Oriented Computing (SOC)'s visionary promise. In RESERVOIR, we are developing breakthrough systems and service technologies that will serve as the infrastructure for cloud computing. However, conditional to the wide-scale penetration of SOC to the economic landscape, the ICT industry needs to solve several well-recognised technical challenges. One such key challenge is the development of a scalable and effective service-oriented infrastructure. This is the challenge addressed by RESERVOIR.

The vision of RESERVOIR is to enable the delivery of services on an on-demand basis, at competitive costs, and without requiring a large capital investment in infrastructure.

The Service Oriented Infrastructure (SOI) Equation

To accomplish the vision, our work will extend, combine and integrate three technologies: Virtualisation, Grid computing and Business Service Management (BSM). We believe this approach can deliver ubiquitous utility computing by harnessing the complementary strengths of these technologies. Virtualisation technology has been shown to be useful in overcoming some barriers to commercial adoption of Grid technology. On the other hand, RESERVOIR will add virtualisation-awareness to the Grids, by using low-level monitoring information for metering and billing.

To benefit fully from the dynamic nature of the RESERVOIR computing cloud, the project will develop a uniform policy-driven management layer that will automatically allocate resources to services and monitor execution and utilisation to ensure compliance to Service Level Agreements (SLA) by adjusting resource allocation level and location. The new capabilities of the infrastructure will enable us to explore new allocation policies, optimising over a range of parameters that is wider than what is commonly done today, e.g. the reduction of power consumption.

CETIC is the dissemination activity leader, and is in charge of analysing threats, defining a security architecture, and implementing security solutions for the RESERVOIR infrastructure.

MAIN ACHIEVEMENTS

The main results of the project will be an architecture for a flexible, secure and scalable service-oriented infrastructure together with a reference implementation. This implementation will be based on open standards and new technologies for the provision of on-demand services. The proposed infrastructure will be tested using several scenarios of complex services which are impossible to achieve with existing infrastructures. These scenarios will illustrate the significant and measurable improvements in productivity, quality, availability, reliability and cost of service delivery.

> « The vision of RESERVOIR is to enable the delivery of services on an on-demand basis, at competitive costs, and without requiring a large capital investment in infrastructure. »

PARTNERS Elsag Datamat, IBM Haifa Research Lab, SAP Research, Sun Microsystems, Telefónica Investigación y Desarrollo, Thales, The Open Grid Forum E.E.I.G. Standards Organisation, Universidad Complutense de Madrid, University College of London, University of Lugano, University of Messina, University of Umeå

STRUCTURED COLLABORATIONS

STRUCTURED COLLABORATIONS

CETIC's motto is «Your Connexion to ICT Research". CETIC acts as a liaison between research and business. It is in this spirit that CETIC has established formal links with many partners.

RESEARCH IN WALLONIA

CETIC research teams are actively collaborating with the following academic laboratories:

- The Computer Science and Management Group at the Faculté Polytechnique de Mons (FPMs - www.fpms.ac.be)
- The Faculty of Computer Science at the University of Namur (FUNDP - www.fundp.ac.be)
- The Communications and Remote Sensing Laboratory (TELE), the Microelectronics Laboratory (DICE) and the Department of Computer Science and Engineering (INGI) at the Université catholique de Louvain (UCL - www.uclouvain.be)
- The Embedded Electronics research unit at the Université Libre de Bruxelles (ULB - www.ulb.ac.be)
- The Computer Science Institute at the University of Mons-Hainaut (UMH - www.umh.ac.be)

CETIC is a founding member of Accord Wallonie (www.accord-wallonie.be), the association of Walloon research centres, and participates in the work and events organised by it. Through this association, CETIC participates in many bilateral exchanges and cooperative projects with other research centres and universities active in Wallonia.

With CENAERO (www.cenaero.be), the Centre for Aerospace Research, CETIC established a computer centre that is unique in bringing both organisations' hardware together for high performance. CENAERO and CETIC comprise an outstanding team at the European level which is at the service of research activities and businesses.

ENTERPRISE NETWORKS

CETIC was heavily involved as a member and representative to the Board of Administrators of the association Infopôle ICT Cluster (www.infopole.be), the network of partners for information systems in Wallonia, with more than 150 members. In 2008, CETIC and Infopôle signed a partnership agreement in order to structure collaboration between both organisations.

Also in 2008, CETIC reinforced its involvement in the Marshall plan (www.polesdecompetitivite.eu) through strong participation in R&D calls launched by the competitiveness clusters by the end of 2008.

INTERNATIONAL COLLABORATIONS

CETIC and CITI (the Innovation Centre for Information Technology, Department of Public Research Centre Henri Tudor) (www.tudor.lu) have developed a strategic collaboration to establish a European centre of excellence in quality services and software products to companies in the greater region.

CETIC (Belgium) and the Ecole de Technologie Supérieure (www.etsmtl.ca - Montréal, Canada) have established a network of international experts in software engineering to help very small enterprises (0 to 25 employees) active in software development. Both institutions – participants in the International Organisation for Standardisation (ISO) on system and software engineering – are collaborating to help SMEs by providing it with training materials, including guides for improving software practices.

CETIC is a member of the European Technology Platform NESSI (Networked European Software & Services Initiative, www.nessi-europe.com) and participates in four working groups: software engineering, trust and security, service engineering and service-oriented infrastructure. CETIC also works with ARTEMIS (www.artemis-office.org), the technological platform on embedded systems.

In the field of software quality, CETIC has also entered into a partnership with the Idéo Technologies (www.ideotechnologies.com) with Océ Software Laboratories Namur and REVER SA.

OTHER PARTNERS

CETIC is also a partner with Innovatech (www.innovatech.be) in promoting innovation in Wallonia. With the support of universities and research centres, Innovatech offers technological and legal advice to businesses. It informs, educates and supports companies to foster the process of technological innovation.

CETIC works in collaboration with Igretec (www.igretec.com), the economic development agency of Charleroi in charge of finding global solutions for large or small companies and new or established investors in the region.

And CETIC works as well with the Heracles (www.heracles.be) businesses centre.

EQUIPMENT

CETIC'S CLUSTER – SINUS PROJECT

AN OPEN AND FLEXIBLE INFRASTRUCTURE

CETIC owns and operates a cluster with a reasonable compute and storage capacity which can easily be reconfigured and flexibly partitioned between different kinds of operating systems. The servers, or "nodes" of this clusters, are fitted with high-bandwidth network cards (Infiniband and Dolphin SCI technologies) in addition to standard 1GB ethernet.

OPEN TO ENTERPRISES

This infrastructure allows CETIC to offer a broad variety of services. It is remotely accessible to run proof of concepts, to perform scalability tests, to benchmark different kinds of solutions, to temporarily host SaaS deployment in launch phase, to migrate applications between heterogeneous operating systems, to experience new frameworks…

OPEN TO RESEARCH

Another role of the cluster is to be the work bench and test bed for research activities conducted at CETIC. It is obviously the case for research projects sponsored by the Walloon Region but also for projects from the Sixth Framework Programme (FP6) of the European Union. In this context, the cluster has been used in research projects in the field of Grid computing (BEinGRID and AssessGrid). However, computing resources of the cluster have also been used in other fields with QualOSS and OLDES projects. Computing power and storage capacity of the cluster are valuable help for the projects, and its use enhances efficient use of CETIC's computing resources.

THE SINUS PROJECT

In October 2006 the cluster moved to a new technical room with better power, air conditioning, and security. Purchase and installation of equipment for this room has been done in close coordination with Cenaero, which settled its own cluster in the same room. This way the two research centres optimise their spending and gather their resources. In light of the results, they both have decided to strengthen their cooperation in the SINUS regional research project. SINUS is the Cenaero research project in the Objective of Convergence research programme of the Walloon Region. In this scope, CETIC and Cenaero have decided to design and operate a common IT infrastructure with complementary tools, with Cenaero focusing on a high-performance computing cluster while CETIC's goal is to implement a scalable, virtualised, secure Grid infrastructure with flexibility and ease of remote access significantly better than solutions currently deployed on the CETIC cluster.

CETIC tasks in 2008 in SINUS were related to tests and benchmarks on virtualisation technologies in order to prepare purchase in 2009.

« This infrastructure allows CETIC to offer a broad variety of services. It is remotely accessible to run proof of concepts, to perform scalability tests, to benchmark different kinds of solutions, to temporarily host SaaS deployment in launch phase, to migrate applications between heterogeneous operating systems, to experience new frameworks… »

SCIENTIFIC PUBLICATIONS

SCIENTIFIC PUBLICATIONS

SOFTWARE AND SYSTEM ENGINEERING

J.-C. Deprez, A. Majchrowski - **An Operational Approach for Selecting Open Source Components in a Software Development Project** - Proceedings of EUROSPI2008 - Dublin - 2008

C. Laporte, S. Alexandre, R. O'Connor - **A Software Engineering Lifecycle Standard for Very Small Enterprises** - Proceedings of EUROSPI2008 - Dublin - 2008

S. Naqvi - **VIPSEC: Virtualised and Pluggable Security Services Architecture for Grids** - International Journal of Information Security and Privacy (IJISP) - Vol. 2, No. 1 - Jan-Mar 2008

C. Laporte, S. Alexandre, A. Renault - **Developing International Standards for Very Small Enterprises** - IEEE Computer - March 2008

S. Alexandre, T. Mäkinen, T. Varkoi - **Implementation of a Software Process Standard as an Electronic Process Guide** - Proceedings of SPICE2008 - Nuremberg - May 2008

J.-C. Deprez, S. Alexandre - **Comparing Assessment Methodologies for Free/Open Source Software: OpenBRR & QSOS** - Proceeding of PROFES2008 - Rome - May 2008

C. Laporte, S. Alexandre, A. Renault, K. Crowder - **The Development of International Standards for Very Small Enterprises** - Proceedings of 18th Annual Symposium of INCOSE - 2008

M. de Miguel, P. Massonet, J. Silva, J. Briones. - **Model Based Development of Quality-Aware Software Services** - Proceedings Eleventh IEEE Computer Society Symposium Dealing with the Rapidly Expanding Field of Object/Component/Service-oriented Real-time Distributed Computing (ORC) Technology (ISORC08) - Orlando - May 5-7, 2008

S. Naqvi, C. Ponsard, P. Massonet, A. Arenas - **Security Requirements Elaborations for Grid Data Management Systems** - International Journal of System of Systems Engineering (IJSSE) - 2008

S. Naqvi, P. Massonet, J. Latanicki - **Challenges of Deploying Scalable Virtual Infrastructures - A Security Perspective** - CESNET Conference on Security, Middleware and Virtualisation - Prague - September 25-26, 2008

J. Bicarregui, A. Arenas, B. Aziz, P. Massonet, C. Ponsard - **Towards Modelling Obligations in Event-B** - ABZ 2008 Conference - September 2008

C. Ponsard, V. Fries- **An Accessible Viewer for Digital Comic Books** - International Conference on Computer Helping People with Special Needs (ICCHP'08) - Linz - July 2008

C. Ponsard, G. Deberdt, J. Tournemenne - **Modelling Parliamentary Workflows: a Case Study in Belgian Parliaments** - Interdisciplinary Workshop on Regulations Modelling and Deployment (ReMoD08) - Montpellier - June 17, 2008

EMBEDDED AND COMMUNICATION SYSTEMS

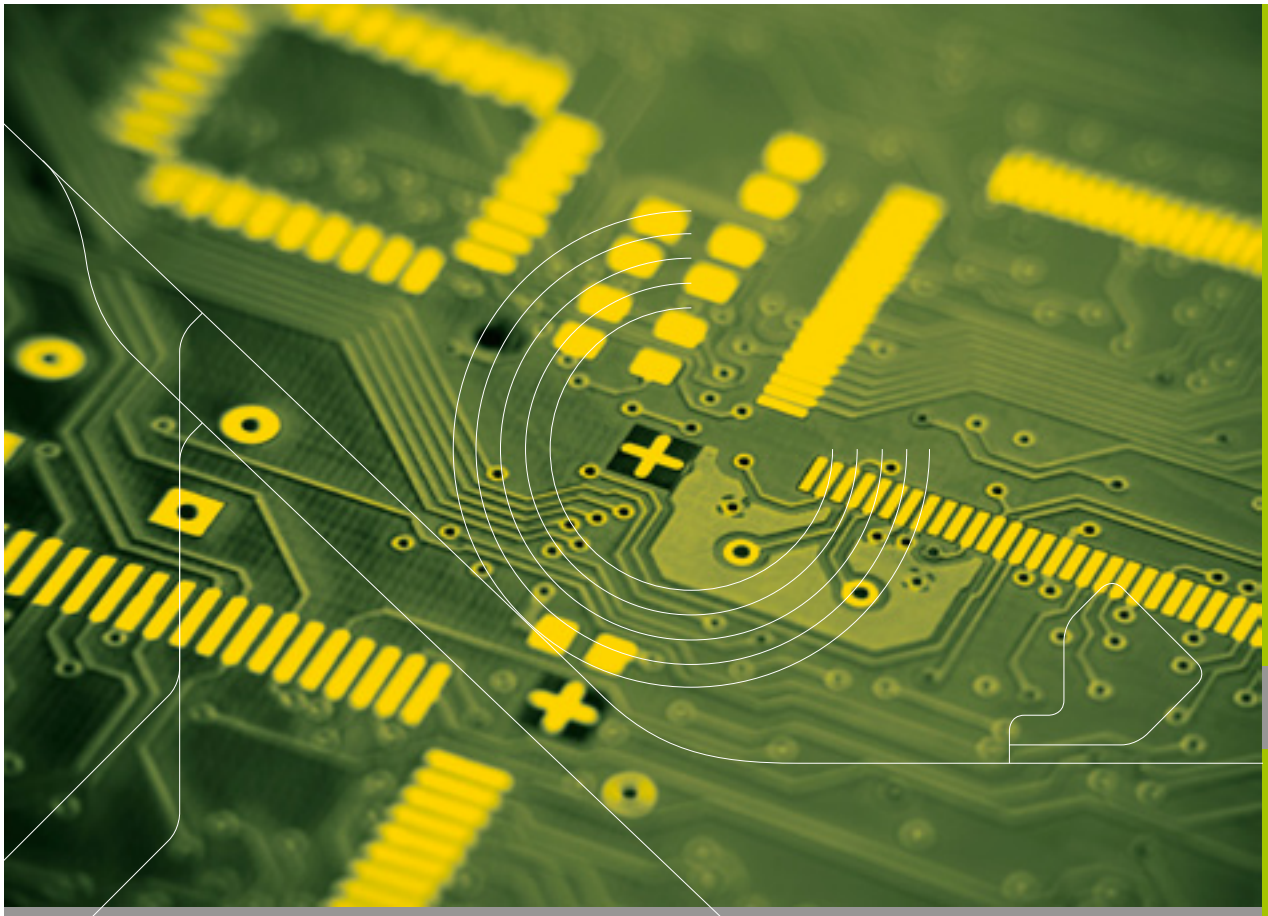
C. Ponsard, M. Martin, S. Walsh, S. Baines, S. Rousseaux, G. Rinaldi, F. Tamburriello, - OLDES: **Designing a Low-Cost, Easy-to-Use e-Care System together with the Stakeholders** - International Conference on Computer Helping People with Special Needs (ICCHP'08) - Linz - July 2008

SOFTWARE AND SERVICES TECHNOLOGIES

S. Naqvi - **Environment Friendly E-Environments** - eChallenges Conference 2008 - Stockholm - October 22-24, 2008

S. Naqvi, S. Mouton, P. Massonet, G. Silaghi, D. Battre, M. Hovestadt, K. Djemame - **SLA-based Approach to Handle Sabotage Tolerance in the Grids** - CoreGRID Symposium 2008 - Las Palmas de Gran Canaria - August 25-26, 2008

A. Arenas, A. Bilas, C. Comito, M. Dikaiakos, A. Gounaris, J. Luna, M. Marazaki, P. Massonet, S. Naqvi, J. Smith, F. Stagni, D. Talia, P. Watson - **Knowledge and Data Management in Grids: Notes on the State of the Art** - CoreGRID WP2 Whitepaper - April 19, 2008



DISSEMINATION

DISSEMINATION

CETIC disseminates its results and communicates about its research activities through three major means: its website, the promotion at fairs and events and the newsletter.

WEBSITE

In 2008, CETIC decided to create a more modern website reflective of its activities. The aim of this new website is to highlight CETIC's missions and to present current and past research activities. It also publishes regular news about CETIC's participation in various fairs and events and announces important information.

FAIRS AND EVENTS

In order to increase its visibility at events, CETIC invested in a brand new stand. In 2008 CETIC participated in the following fairs and events:

- January 11, 2008 – Charleroi: Press Conference "Convergence" Charleroi/Sud Hainaut: 100 projects for €331 million
- March 6, 2008 – Charleroi: Solutions Business
- April 11, 2008 – Brussels: NESSI-TSD Workshop on Privacy
- April 2, 2008 – The Netherlands: CETIC presented BEinGRID at the Industry Days of the Dutch Grid Forum Society
- April 25-27, 2008 – Tournai: Demonstration of a relay centre for deaf persons
- May 8-9, 2008 – Mons: CETIC presented the BEinGRID business and technical results at Grid@Mons
- May 18-23, 2008 – Berlin: CETIC represented Belgium at the plenary meeting of ISO/IEC JTC1-SC7
- May 22, 2008 – Charleroi: Security Day 2008
- May 26, 2008 – Finland: Formal Aspects of Virtual Organisations (FAVO) Workshop
- May 2008 – Europe: Industrial kick-offs of European Project Deploy
- June 2, 2008 – Barcelona: CETIC presented the European Project QualOSS at the Open Grid Forum
- June 3-5, 2008 – Barcelona: BEinGRID Industry Days
- June 4-5, 2008 – Barcelona: CETIC organised the CoreGRID Industrial Showcase
- June 22-23, 2008 – Istambul: CETIC presented BEinGRID business results at the Business Track of the EGEE annual conference
- July 9-11, 2008 – Linz: The international conference on accessibility ICCHP
- September 17, 2008 – Brussels: The Belgian Information Security Initiative, an expert group which includes CETIC, published a white book: "Towards a Belgian Strategy for the Safety of Information"
- September 25-26, 2008 – Lyon: ICT 2008 Wallonie/Rhone-Alps collaboration days ICT2008
- October 7-8, 2008 – Brussels: IBM's 3rd Innovation week
- October 10, 2008 – Brussels: du HIT@ Healthcare Symposium
- October 23, 2008 – Brussels: CETIC showed Grid Computing applicability at BEgrid Seminar
- October 22-24, 2008 – Stockholm: eChallenges 2008 conference
- November 25-27, 2008 – Lyon: ICT2008
- December 1-2, 2008 – Paris: Open World Forum
- December 3-4, 2008 – Nîmes: CETIC animated a workshop about requirement engineering at AFIS'08

CETIC NEWSLETTER

The CETIC electronic newsletter is a key communication and dissemination tool targeting all the regional actors impacted by the research and technology transfer activities conducted inside our research centre. It also reports about the major events in which CETIC has been involved and about the future events where it will be possible to meet our researchers, especially events organised or co-organised by us.

The newsletter is issued in French every three months except during the summer.

In 2008, three issues were produced. The general organisation was quite similar to the 2007 issues with the same graphical layout. The main sections were slightly refocused, concentrating on "services for enterprises" (reporting on our short-term technology transfer, training and consulting work in close touch with enterprises) and "technological and methodological innovations" (reporting on longer-term work at regional and European levels). Two important new sections were also added: a section reporting on our latest publications and a section interviewing a CETIC employee to give visibility to our day-to-day work, each newsletter including one profile. At the infrastructure level, the mailing system was changed. The new system is simpler to manage and provides the reader with a better method for subscribing and unsubscribing.

Each newsletter is developed around a central theme. In 2008, those themes were:

- February 2008: international research at CETIC, highlighting results from ending European projects (such as HPC4U) and presenting new projects (FP7 DEPLOY, FP7 RESERVOIR and CORNET EXTRA).
- June 2008: objective of convergence, with the presentation of the CE-IQS and CELLaVI projects.
- November 2008: eHealth activities and perspectives with examples of some current projects at the European level (FP6 OLDES) and with local companies (Vitaltronics). Key related IT challenges we plan to address in the future were also developed.

ANNUAL **REPORT**

2008

CENTRE OF EXCELLENCE IN INFORMATION AND COMMUNICATION TECHNOLOGIES

cetic

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RÉGION WALLONNE

The European Regional Development Fund and the Walloon Region invest in our future.