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# **Open System for Inter-enterprise Information Management in Dynamic Virtual Environments**

## **IST-1999-10491**

### **Project Presentation**

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## Summary

*This document presents the Open System for Inter-enterprise Information Management in Dynamic Virtual Environments (OSMOS IST-1999-10491) project. It begins with a description of the background to the construction industry context in which the project lies, and the current state of the art in construction IT. An outline of the major objectives and goals of the OSMOS project follows this. The proposed incremental and iterative work structure of the OSMOS approach is then illustrated. The consortium undertaking the work is described in terms of the partners involved and their roles and relationships within the project. Finally, information is included outlining previous research work on which the project draws.*

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## Abbreviations

API	Application program interface
EDM	Electronic document management
LAN	Local area network
OSMOS	Open System for Inter-enterprise Information Management in Dynamic Virtual EnvirOnmentS
PDM	Product data management
R&D	Research and development
SME	Small / medium enterprise
VE	Virtual enterprise
WAN	Wide area network
WP	Work package

## 1. Introduction

The building and construction domain, despite having for decades adopted the modus operandi of the so-called Virtual Enterprise (VE), is still referred to as a traditional industry. Buildings are, however, frequently designed and constructed by non co-located teams of separate firms who come together for a specific project and may never work together again. Organisations and individuals participating in a team bring their own unique skills, knowledge and resources, which include proprietary and commercial software applications (see Figure 1).

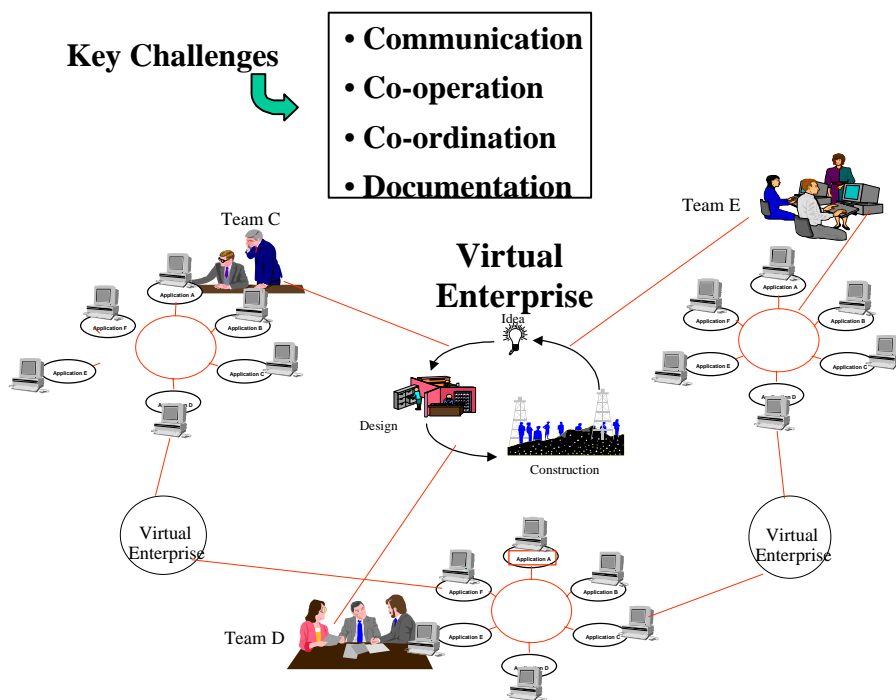


Figure 1: Construction Industry Context

The technology solutions currently in use in building and construction continue to present characteristics such as a lack of homogeneity, high entry-level costs, lack of scalability, and a tendency to be application centric and lacking in support for business processes. This leaves the industry still facing challenges in four key areas: communication, co-operation, co-ordination, and documentation. Overall, these challenges often result in information inconsistencies, business process inefficiencies, and problems with change control and regulatory compliance.

IT in use in the construction industry is characterised by two facets, on the one hand, integrated infrastructures, tools and systems, and on the other, the organisational peculiarities and complexities intrinsic to this sector. These two facets have to be harmoniously integrated to target the need for supporting smooth co-operation between non co-located teams, and the co-ordination of their work and activities in an environment that promotes trust and social

cohesion. The overall infrastructure should give construction project participants increased flexibility, and effective access to project information regardless of its form, format, and location. In order to address this wide scope, the OSMOS project is driven by the needs of end-users and the market, through the expertise of leading European construction businesses, including construction IT service providers, and leading European research centres.

## **2. Aims and Objectives of the Project**

The overall aim of the OSMOS project is to enhance the capabilities of construction enterprises, especially small / medium enterprises (SMEs), to act and collaborate effectively on projects by setting up and promoting value-added Internet-based flexible services that support teamwork in the dynamic networks of the European construction industry. This translates into the Scientific and Technological measurable objectives described below:

1. Specify Internet-based services for collaboration between dissimilar construction applications and semantic cross-referencing between the information they manipulate.
2. Specify Internet-based services allowing the co-ordination of interactions between individuals and teams in a dynamic construction virtual enterprise.
3. Specify a model-based environment where the release of, and access to, any shared information (including documents) produced by actors participating in projects is secure, tracked, and managed transparently (in real time whenever possible, otherwise asynchronously).
4. Provide low entry-level tools (cheap and user-friendly) to small enterprises to act and participate in construction virtual enterprises.
5. Allow end-users to use their proprietary and commercial applications on projects, by implementing the services specified in objective 1 (e.g. via plug-ins), and allow them to transparently participate to collaborative work in dynamic virtual enterprises.
6. Implement the model-based environment, specified in Objective 3, providing a distributed information management support for the virtual enterprise.
7. Set up two OSMOS Internet-based teamwork prototype service providers for the purpose of the project, and ensure their take-up, as commercial offers, after completion of the project.
8. Define the migration path to using the OSMOS approach.
9. Analyse the likely benefits of adopting the OSMOS approach.

One of the fundamental measurable objectives of the OSMOS proposal is the ability to deploy a flexible adapted teamwork solution within days or a few weeks, as opposed to the months currently required to deploy Electronic Document Management (EDM) and Product Data Management (PDM) systems in construction companies. The OSMOS consortium expects, through user interest groups (that include non-construction companies), to provide ways of translating the results to other industrial sectors.

### 3. Structure of the Work

The OSMOS work is structured and will be carried out in five work packages (WP), with a sixth forming the project management:

**WP1: *State of the art and Requirements Capture*** This work package will analyse intra-company business processes and information management practices, with a focus on the dynamics, type, and nature, of inter-company interactions taking place on multi-disciplinary construction projects. This will lead to the definition of the requirements of the OSMOS infrastructure.

**WP2: *Architecture Definition and Specification*** This work package will define the basic system architecture underlying the OSMOS system, and will provide a comprehensive specification of its components.

**WP3: *OSMOS Infrastructure Implementation*** This work package will consist of the implementation, in an incremental manner, of the OSMOS models and services, based on identified end-users' proprietary and commercial applications. It will also provide information repositories, toolkits, and OSMOS plug-ins.

**WP4: *Evaluation and Organisational Recommendations*** This work package will test and validate the proposed OSMOS solutions, mainly through field trials, and propose a migration path to the adoption of the OSMOS solutions.

**WP5: *Dissemination and Exploitation*** This work package is concerned with the dissemination and exploitation of the OSMOS results.

**WP6: *Project Management*** This work package is concerned with the overall management of the project.

The consortium is adopting an incremental and iterative approach to address the OSMOS objectives. The timeframe for the project is 27 months, allowing the work to be conducted through three full iterations of nine months each. The intention is that the first iteration will demonstrate teamwork in a local area network (LAN); the second will employ the same infrastructure but increased functionality, across a wide area network (WAN); the third will use Internet based technology to globally broaden the scope of the VE.

## 4. The OSMOS Consortium

The OSMOS consortium involves construction end-users, construction-specific IT providers, and academic and research institutions drawn from four EC countries (Finland, France, Sweden, and the UK). This mix of industry and research partners ensures that a pragmatic approach is taken in OSMOS; that previous works and ongoing national projects are incorporated; that knowledge of standardisation and current research results are known; that real users are involved; and that solid development skills are available. The six partners comprising the consortium are described below.

### 4.1 The Partners

1. **DERBi** DERBi is a subsidiary of the French consulting engineering firm Groupe OTH. Founded in 1970, DERBi employs twenty people and has an annual turnover of 3M Euro. The company is engaged in three main fields of activity: Research, software and application design and development; implementation of solutions for computerised data exchange; and network management consultancy.



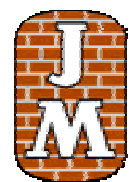
2. **CSTB** The "Centre Scientifique et Technique du Bâtiment" (CSTB) is a French public research establishment in the construction field. CSTB's activities cover four major fields: research, technical consultancy, quality assessment and knowledge dissemination.



3. **Olof Granlund** Olof Granlund is the largest engineering company in building services consulting in Finland. Founded in 1960, it employs 270 people, and is privately owned (mainly by the employees). The company's main activities are building services design, facilities management consulting, and development of design and facilities management software.



4. **JM** JM AB (publ) is Sweden's largest housing developer, with an increasing focus on project development of both residential and commercial properties. Founded in 1945, it employs approximately 2,200 people, and is a public company. Restricting most of its activities to the particular niche of housing construction, JM undertakes the complete building project from land acquisition to the development of detailed development plans.



5. **USAL** The Information Systems Institute (ISI) was founded as a partnership between Salford University and leading businesses in the United Kingdom. The ISI research centre involved in the OSMOS project, one of the most successful in the UK and internationally recognised, is focused around information and management systems applied to the built and human environment.





6. VTT is the largest research establishment in the Nordic countries and one of the largest in Europe. The research group of VTT Building Technology involved in the OSMOS project focuses on four main activities: design methodology, project management, information networking and product data technology.



## 4.2 Roles and Relationships

The OSMOS construction end-users are already involved in making significant improvements to their business processes through the use of integrated information technologies. Each is now involved in extending the benefits of such improvements across all functional areas and all divisions of their companies with the aim of making significant reductions in costs and improvements in quality. The OSMOS end-users will be mainly involved in the analysis and requirement capture work of the OSMOS project. They will also be responsible for testing and validating the proposed tools and infrastructure. These end-users, some of which will also play a determinant role in the development of the OSMOS infrastructure, are Olof Granlund, DERBi and JM.

Olof Granlund have made a considerable investment in R&D, and have developed their own IT solutions, including facility management software, with hundreds of users in Finland, Germany, and the UK. DERBi have been responsible for the provision of tools and IT solutions for Groupe OTH since their creation. They have recently begun to offer their skills and services to other construction companies in France. DERBi have a very good understanding of users' needs and requirements in the construction sector. Their role will also include requirement analysis and capture. They will collaborate for this specific task with other subsidiaries from Groupe OTH, including OTH Bâtiment. JM will represent the construction industry and as end-users they will make specifications on the system and also perform tests and evaluations on a real-life project.

DERBi and Olof Granlund have great expertise in developing construction-specific IT solutions. They will extend their existing software and services to incorporate and implement the OSMOS results. This includes the development of commercial implementations of the OSMOS API, the extension of existing proprietary and commercial software (including proprietary facility and document management systems) to make use of the API, and the creation of new information management facilities built around the OSMOS platform. In particular, these two companies will each set up an OSMOS compliant Internet-based service provider, to be used within their projects, and also ensure their take-up as a national and European commercial offer.

CSTB and VTT have a privileged position in the construction industry, in France and Finland respectively, and are members of several national and European networks. The ISI on the other hand, specialises in the application of IT to the industry in general, with excellent results within the construction sector. These three institutions will be involved in the analysis,

specification, implementation, dissemination, and technology transfer of OSMOS good practices, techniques, tools, and infrastructures.

National user interest groups will be set up in each of the four countries to ensure that OSMOS developments will be directed by many of its potential users, and that a commercially viable system emerge at the end.

## 5. Background Research Projects

The proposed work will build on Construction IT projects undertaken by CSTB, VTT, JM, and the University of Salford. This includes findings from the following research:

ATLAS (Ep 7280): The ATLAS project has defined a methodological framework, conforming to STEP, a set of models and software tools to enable the integration of Large Scale Engineering Applications. CSTB was involved in this project.

GENIAL (Ep22284): This is a key project within the GEN initiative. GENIAL develops a Common Semantic Infrastructure for global engineering marketplaces, which enables enterprises from different sectors to combine internal knowledge with knowledge accessed on-line and world-wide. CSTB is involved in this project.

CONCUR (Be96-3016): This concerns product data based information flow between actors in inception, design and tendering. The research focus is on inception while existing technologies for the latter stages will be used and demonstrated. VTT is involved in this project.

CONDOR (Ep23105): CONDOR aims to provide a migration path from document-based to model-based information structuring and representation. University of Salford, DERBi, JM, and CSTB are involved in this project.

ELSEWISE (Ep20876): Defines IT priorities for Large Scale Engineering and aims to specify high level models. The technology-oriented reports on Product Data and IT are ready but the LSE industry vision and requirements are still underway. The results can be used as inputs for later projects and OSMOS will carefully look at the results. CSTB is involved in the project.

RISESTEP (Ep20459): Enterprise Wide Standard Access to STEP Distributed Databases. Driven by the European aerospace and automotive industries, it will contribute to the achievement of an information infrastructure providing the required data for the business process. It relies on STEP and CORBA. CSTB is involved in this project.

ToCEE (Ep20587): Is concerned with concurrent engineering and data sharing between actors and life cycle stages. VTT is involved in this project.

VEGA (Ep20408): Is implementing distributed databases using CORBA, to bridge the gap between standards (STEP, IAI-IFC, etc.), and will develop a platform (COAST) for

distributing CAD applications in the Large-Scale-Engineering industry. CSTB is involved in this project.

PROCESS PROTOCOL: This is a UK IMI project in its second phase and is led by the University of Salford.

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## 7. Conclusion

The OSMOS project is specifically concerned with defining the working practices, processes, techniques, tools and technical infrastructure to allow the European construction industry to progress from its current position towards a large scale, computer integrated approach. As such, it is an industry-led project involving construction end-users, construction IT providing companies, and academic and research organisations. Each of these groups has a very important, complementary role to play in the exploitation of the OSMOS project results. In addition, OSMOS user interest groups will be set up in Finland, France, the UK, and Sweden, involving representatives from a variety of construction and non-construction industry companies. The roles of these groups will be to assist in the wider dissemination of the OSMOS results, and to ensure that they are sufficiently generic to be transferred to industries other than construction. It is expected that some of these organisations will be interested in adopting the Internet-based team work services support offered by the OSMOS partners, and spread the resulting practices across their organisation, and business partners.

Further information regarding the OSMOS project may be found at the following web site:

<http://cic.vtt.fi/projects/osmos/>.

## Acknowledgements

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## References

OSMOS (1999) *Part B*; Open System for Inter-enterprise Information Management in Dynamic Virtual Environments, IST-1999-10491.

OSMOS (1999) *Part C*; Open System for Inter-enterprise Information Management in Dynamic Virtual Environments, IST-1999-10491.