

Editor's Corner



Welcome to this first issue of the **CoSpaces** Newsletter. We hope you will enjoy regularly reading this project newsletter. We recommend that you to bookmark our public project website URL: www.cospaces.org

Inside this first issue, following the coordinator's message by Scott Hansen, of The Open Group, there is a short presentation of the **CoSpaces** project, which is one of the FP6 IST CWE Integrated Projects. This is followed by a technical article about the **CoSpaces** Software Framework for Collaborative Workspaces in Engineering Design. Then, you will also find another very interesting article entitled "A Secure Infrastructure for Dynamic Collaborative Environments". Recently, there was a **CoSpaces** workshop, held during the ICE'2007 Conference, entitled "Collaborative Platform for Innovative Complex Engineering Projects" which was chaired by Terrence Fernando, CoSpaces Technology Director, University of Salford, UK The detailed program of the workshop is available at the following URL: www.ice-conference.org

Towards the end of this newsletter there are descriptions of recent events as well as up-coming events, which might be of interest to you.

You will get also an opportunity to learn more about the **CoSpaces** website. If you are a member of the AMI@Work communities then you can find the **CoSpaces** wiki pages in the list of projects or directly at: www.ami-communities.eu/wiki/CoSpaces

Marc Pallot, CoSpaces Newsletter Editor

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Coordinator's Message



European engineers in the Automotive, Aerospace and Construction industries are renowned around the world for innovation, quality and reliability in the products they design and manufacture. Delivering these values is fundamental to maintaining Europe's position as a pre-eminent provider of complex and technically advanced products and systems. Maintaining this competitive edge in the future while meeting ever increasing market expectations and cost pressures is what the CoSpaces project is all about.



CoSpaces is an Integrated Project that brings together the leading European research organisations developing advanced technologies that enable product design and manufacturing teams to work more effectively – both in terms of productivity and in making the best and most informed product design decisions. At the heart of the CoSpaces project is the development of a new platform that will enable European industry to create a new generation of working environments, enabling design teams to collaborate in real-time and access the information they need whether team members are located in the same building, in different production facilities, or spread around the world.

Designing complex products requires teams that are dynamic and multi-disciplinary. Each team member must be able to participate in decision-making, view designs, propose modifications, and access reference materials in a way that's specific to their discipline, and to interact in real-time using a range of devices depending on their location and situation. CoSpaces intends to deliver an industry standard technology framework that makes this level of collaborative engineering possible.

In addition to new technologies, new models and techniques for design team collaboration are important research areas of the project. Industry partners working with business process researchers will analyse design team practices, identify new opportunities, and exploit new technology-enabled collaboration techniques. These industrial partners will also be the first to utilise CoSpaces technologies as a *Living Lab* where engineering design teams will help shape and validate the CoSpaces technology as its being developed.

We encourage all those involved in engineering design and also suppliers of supporting technologies to regularly visit our website at www.cospaces.org where we will make our results available as the CoSpaces project progresses.

Scott Hansen
The Open Group
CoSpaces Project Coordinator

Innovative Collaborative Work Environments for Design and Engineering

Developing organisational models and distributed technologies for collaborative workspaces for individuals and project teams within distributed virtual manufacturing enterprises, enabling effective partnerships, innovation, improved productivity and reduced design cycles.

Introduction

Globalisation is causing the migration of design and production activities throughout the world, in order to optimise logistic and supply chains, and to differentiate products according to the needs and regulations of regional markets. Engineering sectors in Europe are under severe pressure to reduce the lead-time for new products, and to improve both quality, and customer and market responsiveness, due to strong competition from overseas companies that have gained significant shares in European markets. However, globalisation is also offering European manufacturers new opportunities for expanding their businesses in emerging countries where currently EU penetration is confined only to specialised and niche products.

Globalisation is also pushing the evolution of company strategies towards deconstruction and a focus on core competencies, giving rise to the concept of *distributed virtual enterprises*. Likewise, engineering activities are also evolving, demonstrated by the shift from discipline-based to process-based organisations. Competitiveness in the future will best be achieved by agile and adaptive organisations that are highly responsive to market demands, advanced in their approach to costs, cycles and quality, and whose engineering process is distributed among a network of varied, highly collaborative knowledge teams.

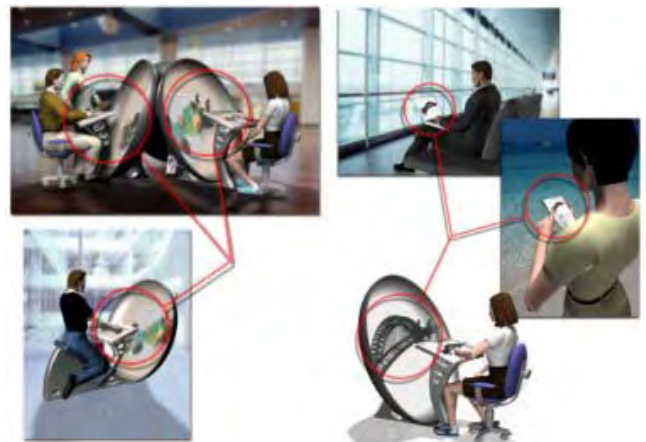
CoSpaces will provide an evolutionary path towards these new and more collaborative work environments by developing organisational models and distributed technologies that support innovative collaborative workspaces. Focused on individuals and project teams within distributed virtual manufacturing enterprises, *CoSpaces* will enable EU industries to establish effective

partnerships, enable dynamic collaboration and creativity, improve productivity, reduce the length of design cycles and take a holistic approach to implementing product phases.

Focus

CoSpaces focused on three key areas:

1. Evaluating collaboration at individual, team and enterprise levels and developing new capabilities for decision-making and increased productivity with emphasis on problem solving, creativity, and inclusive product design;
2. Creation of new and innovative distributed information technologies to support the easy creation of collaborative work environments for distributed workers and teams engaged in collaborative design and engineering tasks.
3. Validation of *CoSpaces's* collaborative workspaces through the use of *Living Labs* in three industrial sectors: *Aerospace, Automotive* and *Construction*.



Expected Impact

The research advances in *CoSpaces* will push the state-of-the-art of collaborative work environments in several key areas and will deliver important business value to industry:

- New collaborative models and technologies that empower workers and teams to be better manage joint design initiatives opening the door to new, improved business models for competing in global markets.
- Uncovering and addressing real-world constraints and barriers allowing industrial engineers to access and deploy the latest scientific research technologies in collaborative working.
- Innovative deployment of collaborative workspace will provide an environment for distributed teams to be more flexible, allowing workers to work more effectively, from anywhere and at anytime.
- Dynamic support for distributed organisations and extended value chains executing complex processes and producing complex products.
- Improved product design and reduced design cycles by involving all stakeholders in the collaborative design process.
- Reductions in design and production costs and in product lead-time, made achievable by more efficient and effective engineering, and reduced design cycles.
- Greater team productivity through real-time knowledge sharing, collaboration, problem solving and collective learning, irrespective of geographic location.
- Enhanced decision-making capabilities, made possible by heightened interaction and real-time knowledge sharing between geographically dispersed teams, users and other stakeholders.

Industry Workspaces

Three collaborative workspaces will be developed for validating industrial applications from the Automotive, Aerospace and the Construction industries:

- ***Distributed Design Workspace*** to empower ad-hoc and scheduled collaboration between distributed, multi-functional design teams. Collaboration through fixed installations and mobile environments will be considered in this workspace.



Distributed Design Workspace

- ***Co-located Design Workspace*** to address how ad-hoc and planned meetings between co-located, multi-functional design teams could be supported, providing enhanced immersion, visualisation, interaction, mobility and flexibility.



Co-located Design Workspace

- ***Mobile Service Workspace*** to address challenges in supporting mobile site workers to collaborate with remote experts during the realisation or the support phase.



Mobile Service Workspace

Importantly, the impact of *CoSpaces* research is also expected to provide broad value to other EU industries due to the wide applicability of the new *CoSpaces* technologies for collaboration.

Users of *CoSpaces* technologies in manufacturing and design, in cooperation with their suppliers, will be able to configure their own collaborative workspaces and utilise ground-breaking innovations in context-aware interfaces, natural interfaces, and “human-centric” workspaces supporting a range of collaboration scenarios and product lifecycles.

CoSpaces Community in Action



Project Management Board Meeting
Funchal, Madeira
March 2007

Roadmap Implementation

CoSpaces addresses the vision developed by the *Future Workspaces* roadmap project involving over 100 key players from multiple disciplines and defining a 10-year European Vision for future collaborative working environments and scenarios.

CoSpaces will begin to implement this 10-year European vision for the benefit of European business, workforce, and society.

At a glance: CoSpaces

Project coordinator : Scott Hansen The Open Group Tel: +32 2 675 1136 Fax: +32 2 675 7721 Email: s.hansen@opengroup.org Project website: www.cospaces.org	Duration: May 2006 – Oct. 2009 Total cost: 11,839,600 € EC funding: 8,000,000 € Strategic Objective: IST-2005-2.5.9: Collaborative Working Environments Project Identifier: IST-5-034245
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Partners:

 CIMPA (F)	 CERFACS (F)	 CARSA (ES)	 COWI (DK)
 ESoCE-NET (IT)	 FILAS (IT)	 Fraunhofer Institute Angewandte Informationstechnik	 EMIT
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CoSpaces Software Framework for Collaborative Workspaces in Engineering Design

by Terrence Fernando, CoSpaces Technology Director, University of Salford



The main aim of the CoSpaces project is to develop a generic collaborative engineering environment which can support **real-time collaboration** between geographically dispersed teams working within distributed virtual engineering enterprises. The CoSpaces project plans to explore how advanced technologies such as virtual reality, augmented reality, tele-immersive interfaces, mobile technologies, context-awareness and web services can be deployed in creating human-centric collaborative workspaces for supporting product design and down stream maintenance and constructability processes. Building on advances in web services and context modelling technology, the CoSpaces project aims to create an underlying configurable and dynamic software framework so that the system can easily be adapted to suit the user and his or her context. .

The CoSpaces project will create a novel distributed software framework which will allow the users to dynamically create distributed, knowledge-rich, worker-centric, adaptable and scalable collaborative work environments, on-demand. These collaborative work environments will provide interactive virtual meeting places for problem solving, conflict resolution, knowledge sharing and receiving expert advice on-demand and will offer seamless and natural collaboration amongst distributed knowledge workers and teams.

The distributed software framework being developed within the CoSpaces project is focusing on four key research themes: Group Management, Knowledge Support, Dynamic Service Management and Real-time Conferencing.

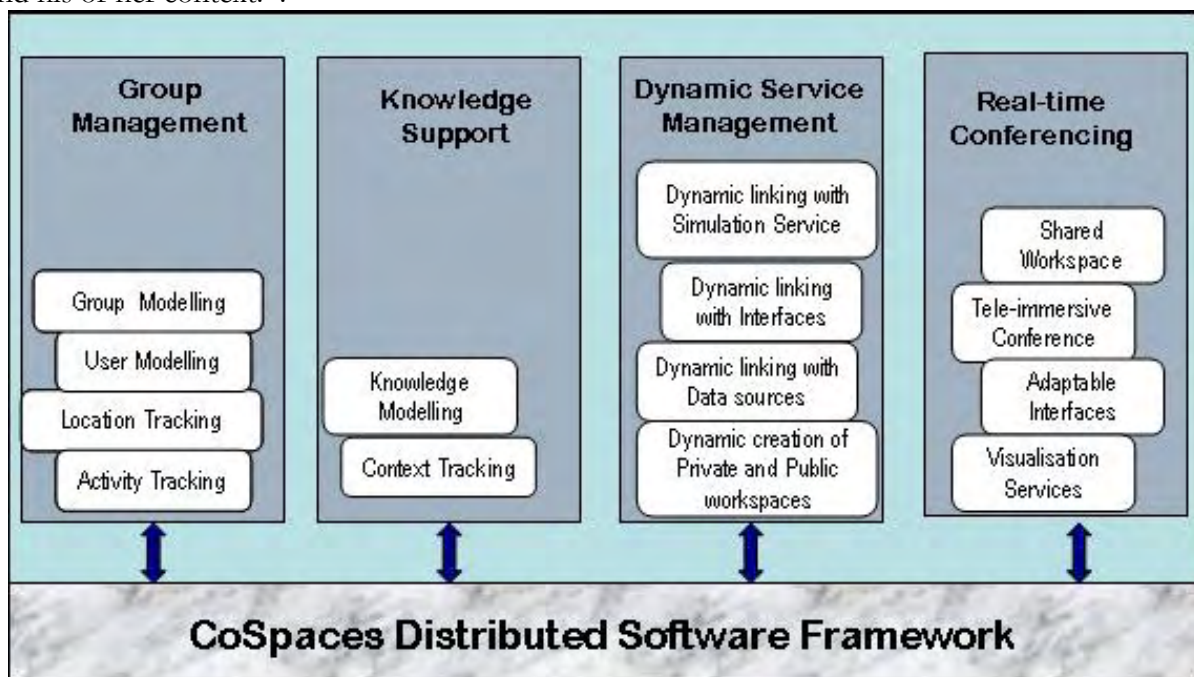


Figure 1: Four Key Technical Themes within the CoSpaces Project

The main technology innovations CoSpaces will focus on each of these areas is as follows:

Group Management

The main aim of this theme is to model the context of groups so that they can create collaborative workspaces based on their roles, responsibilities, access rights, preferences, current context and hardware settings. The value of such group management tools is numerous and the CoSpaces project is planning to use this theme to support the following high level applications:

- Secure Access to engineering and simulation data
- Configuration of collaborative workspaces for a given set of users on demand
- Personalised Interfaces based on the user profile and group context
- VR Interface which can visualise otherwise invisible project partners working at remote locations to create the sense of a community.

The low level services that are being considered in developing such high level group management services are security, group modelling, location tracking, activity tracking and user modelling etc.

Knowledge Support

The main aim of this research theme is to investigate techniques for providing timely and task specific context-based information to individuals and teams. This work will investigate a software framework for representing context properties relevant to collaborative working. This theme will also draw on the activities from the ECOSPACES project for attaching Meta data to virtual objects so that the decisions taken by the stakeholders during previous meetings can be traced back.

The low level services that are being considered in developing this theme are context tracking and knowledge modelling techniques for developing “intelligent objects” which keep information on previous design decisions and experience.

Dynamic Service Management

The main purpose of this theme is to investigate web service approaches to allow the user to

configure collaborative workspaces by linking with appropriate simulation services, shared workspaces, security services, interfaces computational resources and people. Once such linking is established real-time execution of the collaborative workspace will be handled by the real-time conferencing services.

Real-time Conferencing

Building on the services provided by the other three themes, this theme is the main technology theme of the CoSpaces project which is responsible for providing the following real-time collaborative applications:

- Collaborative Virtual Reality Framework
- Tele-Immersive Environment
- Mobile Augmented Reality Framework

Special emphasis is being placed on the developing of new real-time collaborative applications to support real-time conferencing of knowledge workers. In particular, the **Collaborative Virtual Reality Framework** will be based on the COVISE VR environment developed by the University of Stuttgart and will be extended to support the collaborative features required to handle complex collaborative design sessions. The key technical challenges investigated in developing the Collaborative Virtual Reality Framework are:

- Multi-user interface framework which can be personalised to suit the roles and context of the users.
- Support for creating private and shared workspaces that are required for collaborative meetings.
- An optically tracked multi-user interaction paradigm for supporting co-located design review tasks.
- Distributed visualisation services which can offer rendering services to multi-screen environments to visualise multi-perspective data sets for multifunctional teams engaged in co-located design tasks.

As a longer term research theme, the CoSpaces project is also investigating the creation of a future tele-immersive environment to enable geographically dispersed users to have face-to-face design reviews as if they were in the same

physical space. This advanced tele-immersive environment is being developed by combining 3D video streams and 3D virtual worlds into a single mixed reality environment. Once a tele-immersive environment between two remote participants is achieved, the CoSpaces project plans to extend the tele-immersive environment to the use by multiple partners for creating a “round-table” conference in true 3D settings.

The Mobile Augmented Reality Framework will be an advanced conference environment developed within the CoSpaces project and will be based on the MORGAN AR framework, developed by Fraunhofer FIT, and will be extended to support two mobile workspaces, namely, the mobile maintenance workspace and the mobile constructability workspace.

Expected Technology breakthroughs

The intended new product technologies of the CoSpaces project can be categorised as follows:

- **Component and Systems:** The generic software components and software frameworks produced as a part of the distributed software framework

- **Workspace Applications:** The tailored workspaces developed for supporting specific collaboration instances within aerospace, automotive and construction industries.
- **Soft Knowledge:** The models, guidelines and evaluation methodologies

The CoSpaces project will use a Living Lab concept as a method for implementing user-centred and participatory approaches for developing the above CoSpaces products. The basic principle behind our Living Lab approach is to involve user companies as co-creators and design partners in creating the collaborative technology for their organisations. The benefit to this approach is that when the research and development work is completed in just under 3 years, the CoSpaces software framework and the technology products that have been developed will have been validated in actual industrial environments and will provide industry with a new innovative platform for creating collaborative work environments that’s innovative, robust and specifically tailored to the needs of European engineers involved in collaborative design.

Table 2 shows the key products expected from the CoSpaces project.

Category	Product	Features
Components and Systems	CoSpaces Software Framework	This module will provide a distributed software framework which will allow people to set-up collaborative workspaces. The core framework will support three types of controllers. The first controller will support non time critical applications and will be based on a web service framework, allowing the users to link up with simulation applications, databases, security modules, context monitors etc. The second controller will allow the users to link up with real-time conference systems such as Collaborative VR, Augmented Reality Environments and Tele-Immersive Systems. The third controller will support the overall workspace definition, creation and management.
	Distributed Group Management Module	A software module which allows teams to define roles, responsibilities, access rights, preferences and monitor their individual and group context (location, activities etc) within collaborative work settings. The applications of this module within collaborative working settings are user authentication, ability to automatically configure private and shared workspaces including interfaces and applications for individuals and teams. This module will also provide a virtual environment interface that can represent the distributed team members and their location as well as supporting social interaction and ad-hoc meetings.
	Knowledge Support Module	This module will be an add-on module for the Group Management Module to offer knowledge relevant to collaborative working sessions.
	Collaborative Virtual Reality Environment	This module will allow distributed teams to bring their virtual prototypes and simulation data into a single virtual environment and conduct design reviews in real-time with adequate security. This module will offer different types of workspaces such as private workspaces and shared workspaces, allowing teams to conduct multifunctional design reviews.
	Augmented Reality Framework	This module will offer multiple features. It will allow teams to superimpose virtual designs within a real world context to ensure the proposed design is sound as well as checking the final physical product against the design specification. Most importantly, it will allow mobile workers to link up with remote experts to receive advice to help solve problems. The experts will be able to see the problems that the mobile site worker is facing and propose or demonstrate possible solutions to the site worker through augmented information (text, 3D models, animations etc).
	Tele-immersive Environment	This module will provide a futuristic tele-conferencing system where distant participants will appear in a virtual environment as 3D video avatars. This environment will be able to mimic face-to-face round table meetings with design artefacts and simulation results in front of the participants. This is considered as long-term research since many performances, usability and cost issues need to be addressed before it is possible to make a significant market penetration in this area.

Workspace Applications	Co-Located Design Workspace	This module will combine the modules and systems presented in the previous category to offer a co-located design workspace tailored to the automotive, construction or aerospace sectors. The key modules offered with this product will be a CoSpaces Software framework with the ability to interface with appropriate simulation and databases with appropriate security control, the Collaborative Virtual Reality Environment (without the support for distributed teams). In addition it will offer different types of interaction techniques such as interaction with large screens via users' individual workstations, via tracked tablet PCs or 3D interaction devices, providing seamless interaction during co-located meetings. It will also allow the teams to visualise various product information on multiple displays to support multi-functional discussions.
	Distributed Workspace	The key modules integrated in creating this product will be the CoSpaces Software Framework with access to simulation and databases with appropriate security control, the Distributed Group Management Module, Knowledge Support Module, the Collaborative Virtual Reality Environment with full distribution capability. This environment will be tailored to the aerospace, automotive or construction sectors, depending on the user preferences.
	Mobile Workspace for Aircraft Maintenance	This module will offer maintenance teams in the aerospace sector the ability to setup mobile collaborative workspaces so as to receive expert advice to solve AOGs (Aircraft on Ground) situations in an efficient manner. The technologies used in creating this module are the CoSpaces Software Framework, the Augmented reality Framework with additional mobile multimedia communications, the Distributed Group Management Module and the Knowledge Support Module.
	Mobile Workspace for Construction	This module will offer support for the construction industry to address unforeseen constructability problems at the construction site. It will allow the problem owner to bring experts together to explain the problems they are facing at the site and agree and perform virtual tests to agree sensible solutions. The technologies used in creating this module are the CoSpaces Software Framework, the Augmented reality Framework with additional mobile multimedia communications, Distributed Group Management Module and Knowledge Support Module.
Soft Knowledge	Software Architecture framework	This architecture framework will provide a valuable input to the research community by defining a Reference Architecture for Collaborative Workspaces
	Design Guidelines for CWE	These guidelines will ensure that the interfaces are human centred and reflect real end user needs and capabilities.
	Evaluation Framework	This evaluation framework will be valuable for researchers who are developing collaborative workspaces to ensure that they develop user-centric workspaces.

A Secure Infrastructure for Dynamic Collaborative Working Environments

by Matthias Assel and Alexander Kipp

HLRS - High Performance Computing Centre of University Stuttgart



Introduction

Current B2B¹ collaborations take place in a very limited and even reserved way. Most cross-organizational data transfer is carried out via a simple e-mail exchange between corresponding business partners. These messages typically contain confidential information that is usually neither encrypted nor digitally signed. Instead of directly accessing data at the appropriate location or sharing data across different partners within a secure environment, for example a Virtual Organization [1], many companies are afraid of having their data misused not only by a third party, but in the same way even by the trusted organization(s).

CoSpaces aims to develop a reference architecture and implementation framework to support the set-up and execution of dynamic sessions for designers and engineers in the aerospace, automotive and construction sectors. The project's main challenge is to meet the requirements of workers within these fields, supporting the dynamic nature of collaborative work, whilst considering associated issues of trust and security. The system will provide information support to users, supporting knowledge of availability of users and applications, and must also consider current user contexts. Specifically, the framework will support users in the on-demand selection of participants, documents and data, required in a collaborative session. Participants will be easily integrated into collaborative sessions with regards to their access to and from both their co-collaborators and applications, requiring partner

machines that can be automatically configured for ad-hoc collaborations.

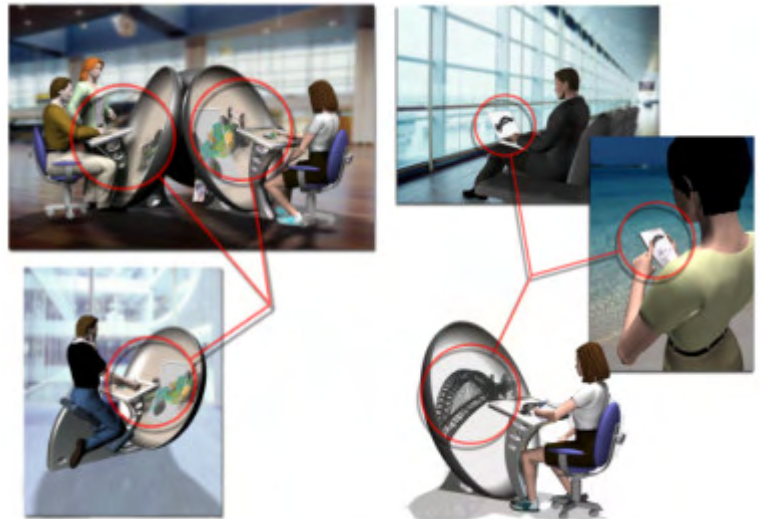


Figure 1: Innovative collaboration environment within CoSpaces

Similar approaches with a focus on dynamic composition of services regarding business aspects have been considered in other European Commission support projects, like Akogrimo² [3] and TrustCoM³ [4]. The currently running IP BREIN⁴ [5] extends this eBusiness approach by merging semantics, agents, and Grid technologies to provide an intelligent, self-manageable infrastructure. However, these approaches do not consider the needs of collaborative users' sessions.

² Access to Knowledge through the Grid in a mobile World

³ A framework for trust, security and contract management within dynamic virtual organizations

⁴ Business objective driven Reliable and Intelligent grids for real business

¹ Business-To-Business

To face real users' needs and requirements, concrete user scenarios have been developed within CoSpaces in co-operation with industrial partners, and these will be evaluated against the defined concepts. Sharing data and documents between partners stresses security issues to be of the utmost priority and importance while developing collaborative working environments for business partners and / or academic institutions. These include several levels of security implying trustworthiness among participants to meet appropriate collaboration goals without encountering legal issues, as well as maintaining the users' privacy.

In the following, we will present general security issues that are being considered within CoSpaces while developing environments for dynamic business collaborations, corresponding technologies that meet those requirements, as well as an example demonstrating such a secure infrastructure to be realized within the CoSpaces project.

Security Requirements

Focusing on distributed collaboration environments between organizations across different countries, the specific and even dynamic requirements for services and applications regarding security issues differ from normal local collaboration federations.

In order to determine appropriate technologies for different usage scenarios, we have analyzed and roughly summarized important prerequisites.

- The easy usage of the collaboration platform should be provided through a decentralized authentication and authorization model based on a Single-Sign On (SSO) procedure across and within organizational boundaries
- The dynamic set-up of collaboration partners including also the dynamic set-up of firewalls in order to guarantee that only trusted partners are allowed to execute corresponding operations
- Hierarchical user roles and unified user attributes to perform role-based access control

- Dynamic management and control of attribute-based access policies necessary to authorize users before accessing services, applications, and resources
- The data being shared between partners is only available for those being foreseen for the collaboration
- The control about who is allowed to access data, services, and applications remains at the corresponding resource or service provider site
- Recording of user interactions for doing auditing, accounting, and pricing
- Secure data transmission based on data encryption on different levels (e.g. encrypted messages as well as secure protocols) ensuring trustworthiness and integrity of exchanged information
- Additional security for data storage
- Keeping the user's privacy and protecting his / her confidentiality by anonymizing or excluding irrelevant information
- Satisfying requirements under the Data Protection Act as well as explicit consent from all parties concerned

Technological Concepts

Several technologies and solutions that meet presented requirements have been considered within CoSpaces. Shibboleth⁵ [6] could be used for authentication and authorization of users concentrating on the decentralized approach. Security of communication between machines could be ensured by using for instance the Grid Security Infrastructure (GSI) [7]. While dealing with simple Web Services or even invoking applications directly, other standards such as WS-Security [8] or SSL⁶ should be utilized. As provided solutions are complex and contain many separate components, different set-up patterns can be used in various ways. The approach taken to provide authentication, authorization, and data

⁵ <http://shibboleth.internet2.edu>

⁶ Secure Sockets Layer

encryption within the CoSpaces project will be described in detail in the following sections.

Authentication and Authorization using Shibboleth

Since the CoSpaces project involves intensive collaboration between several institutions across different countries around Europe, a scalable, decentralized, and flexible authentication and authorization system is essential. In our approach, the service / application providers make authorization decisions basing on the attributes assigned to the user by his / her organization. This protects the resources without harming the flexibility and maintainability of the working environment. The architecture of Shibboleth perfectly meets the above-mentioned requirements.

The basic Shibboleth components need to be connected to different elements of the CoSpaces infrastructure, generally named as the Home Organization (HO) and the Application Controller (AC). In figure 2, these components are shown together with corresponding CoSpaces elements.

There are two security-related tasks that Home Organizations in CoSpaces should handle. Firstly, the HO is responsible for the authentication of people who belong to this institution. This is usually performed by their own system – for example using a LDAP-Server. After successful authentication, a handle including a proper Security Assertion Markup Language (SAML) entry will be created and passed to the AC using a cookie session mechanism.

The second task of the HO is to manage attributes of users. Resource providers ask the HO for authorization attributes associated with a given handle by sending a request to the HO's Attribute Authority (AA). Once more SAML information encapsulating those attributes is created and sent back to the provider (compare with step 7 and 8 explained in figure 3).

The Application Controller to be developed within CoSpaces binds different security functionalities.

Firstly, it is responsible for checking a user's authentication which is mainly done by the Service Provider (SP) module. In the case of an unknown user, the WAYF⁷ service redirects the unknown person to his / her corresponding HO in order to authenticate the user against the "shibbolized" infrastructure. Secondly, if someone wants to access a resource behind the AC, the SP also demands authorization. Then, the Attribute Requester (AR) sends a message to the user's HO using his current security token and requests the attributes which can be passed to a local Policy Decision Point (PDP) [9], which grants or denies access to a specific service or resource.

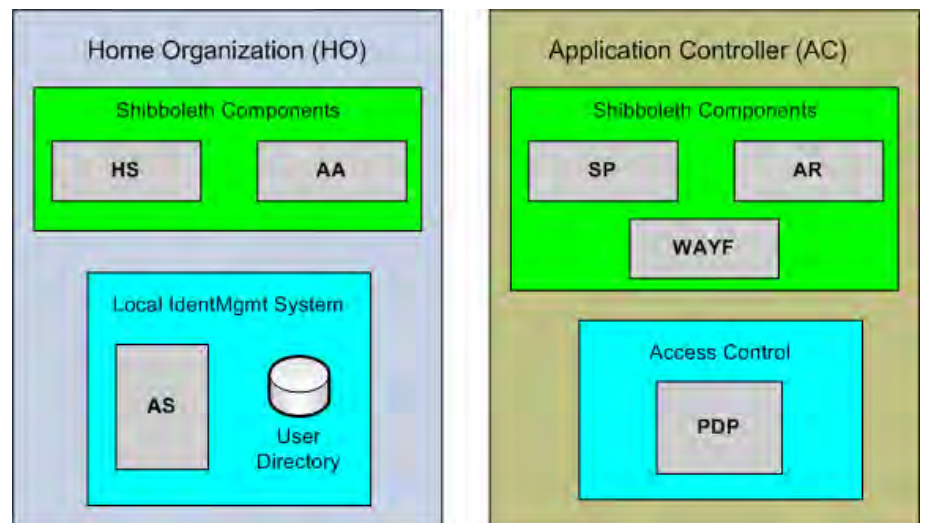


Figure 2: Location of Shibboleth and other components

Secure Data Transfer

At the lowest level of communication we must ensure within CoSpaces that data is transferred via a secure conversation between different parties. Firstly, we have to ensure a secure communication as well as message integrity in communication between users and components over an un-trusted network, like the Internet. A solution is the "Transport Layer Security"/"Secure Sockets Layer" (TLS/SSL) paradigm. The second concern is to make nodes communicate only with trusted machines and services that are part of the federation in order to ensure that the Grid Security Infrastructure (GSI) or WS-Security can be applied

⁷ Where Are You From

depending on the provided services and technologies.

Apart from internal collaborations within the corresponding company intranet, CoSpaces assumes that parties also connect with each other over the Internet where encrypted data exchange is a prerequisite for security reasons. Specifically all information being sent between user site, Home Organization, and provider site have to be secured. The most popular solution, based on a public key cryptography, is the TLS/SSL protocol.

The Secure Sockets Layer is a layer which can be placed between the network connection layer (e.g. TCP/IP) and the application protocol layer (e.g. HTTP), and which establishes secure communication based on mutual authentication, integrity based on digital signatures, and privacy based on encryption.

One of the problems in providing security within Virtual Organizations is to make sure that grid nodes know and recognize each other. This means nodes in a collaborative working environment can contact each other and be sure that security is sufficiently assured. To provide this, Grid Security Infrastructure is applied.

When resources get requests from some user(s), they have to perform verification at two levels: check if the user is allowed to access a specific resource (user authorization) and if communication with target service is done in secure way (encrypted information).

GSI is also based on a public key cryptography. The central element in GSI is a certificate. All parties in the Grid are typically identified by certificates which contain the following information: subject name - object for which certificate is issued, public key of an object, the identity of the Certificate Authority (CA) and signature of the CA. Certificates are encoded in X.509 format [10]. Users can generate proxy certificates with short life-spans that are passed from one component to another and form the basis of authentication, access control, and logging.

GSI provides low-level authentication meaning that nodes know and trust each other. It allows access to nodes directly from other machines but it

does not provide access to resources for particular users. This is done, for example, using the Shibboleth approach.

CoSpaces Usage Scenario

In the following figure and usage scenario, we assume to have an Application Controller as the basic communication and controlling element installed at each partner site which coordinates every outgoing as well as incoming request by consecutively enforcing different activities such as authentication, authorization, or message encryption on request according to the current circumstance.

Specifying a typical use case, we consider the following situation where a user wants to access and execute an application provided by a specific business partner. Basically, access to this application is restricted and only permitted to users participating within the CoSpaces collaboration working environment. To run and use the application, the following steps are needed and principally performed in an more or less automated way.

1. A user wants to invoke the application directly but his request is interrupted by his own local Application Controller (AC)
2. If the current user is unknown meaning he has not a valid session id (session cookie set by Shibboleth) he is redirected by the WAYF service to his home organization via a secure channel (e.g. HTTPS)
3. His Home Organization (HO) acting as a Shibboleth Identity Provider (IdP) forces him to provide his credentials (usually username and password) in order to authenticate himself
4. The provided login information is verified by the local identity management system (e.g. LDAP repository) and authentication information are sent back to the IdP which accepts or rejects the inputs

5. If the user is successfully identified, his call is either encrypted before delivering, for example using GSI in the case of dealing with grid services or WS-Security for simple Web Services, or his data is transferred via a secure channel like HTTPS, SSL, SSH, or even VPN to the appropriate endpoint

back to his local AC which then does some kind of exception handling

Conclusions

Dynamic collaboration based on distributed business workflows, is an exciting and promising field of interdisciplinary cooperation and will provide new and interesting working environments that facilitate cross-organizational data exchange and communication. It has attracted worldwide attention and several international research projects have already designed and implemented first prototypes for appropriate infrastructures. Currently, there is one major shortcoming seem in each of these developments: security is seen as important and critical but instead of looking for a flexible solution, almost every project is favouring a static security infrastructure, which does not allow dynamic changes and / or adjustments, particularly during runtime.

In this paper, we have presented the vision of the CoSpaces project, which aims to create ad-hoc collaborative work environments that guarantee the utmost dynamic configuration for providers and customers without neglecting important security issues. We have identified some key features and requirements which make the mission of CoSpaces different to current collaboration infrastructures. A short overview of technologies involved was given and how those are being applied within CoSpaces to meet the overall objectives and to overcome the difficulties of current approaches. We hope that CoSpaces will have a great impact on almost every aspect of future business collaborations and will also play an important role in future research projects.

Acknowledgements

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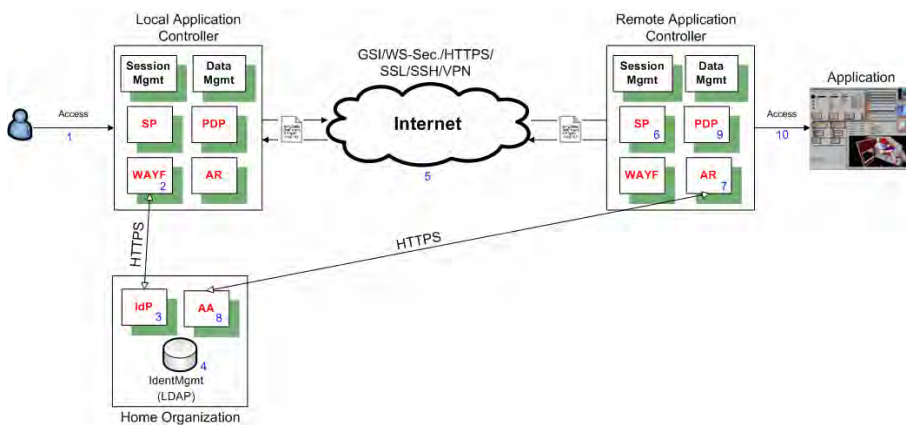


Figure 3: Typical usage scenario depicting the core security operations

6. Arriving at the remote AC of the corresponding partner, the request is now interrupted by the Service Provider (SP) component which indicates that the partner is “shibbolized” as well
7. In order to grant access to the local application, the Attribute Requester (AR) at the partner site requests user attributes from the Attribute Authority (AA) of the user’s HO
8. The AA responds with a set of specified user attributes
9. To manage access control, a Policy Decision Point (PDP) which contains a set of access policies is called and the current user attributes are compared to the existing policies
10. If access is permitted, the user can finally run the application and if access is denied, his request is rejected and sent

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Towards innovative collaborative workspaces in AEC-FM

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Farzad Khosrowshahi, *University of Salford, United Kingdom*

Jens Ove Skjærbæk, *COWI, Denmark*



Modernisation of the workplace has been a topic for research and innovation for a long time, supported on studies which proved that ICT-related workspace innovations accounts for growth and productivity (e.g. Black and Lynch, 2004). The main challenge is to realise real innovation and change in workplace, and cope with the many obstacles – human, organisational, societal, and technological – through learning and experimentation [The Future Workspaces Book]. These so-called next generation collaborative workspaces will be achieved through enhanced human communication, innovative visualisation, knowledge support and natural interaction and aim to transform current practice to more competitive, productive and creative collaboration-driven work patterns.

Considering the AEC-FM (Architecture-Engineering-Construction and Facilities Management) domain, innovation of the workplace is of major importance, as practice is intrinsically collaborative, within knowledge-rich multi-functional working environments. Such team-work exists in all key-phases of life-cycle: from Planning, e.g. where planners interact with Public Authorities to develop zone plans; to Design, e.g. where architects interact with engineers and owners to develop the construction project; to Build, e.g. where many contractors for many purposes cooperate towards the goal of building the structure, and with owners to report on progress status; to Facilities Management, where operation & maintenance personnel rely on information made available after project conclusion, to, along with technology (ICT, ubiquitous computing and BIM) be effective and efficient in their tasks; and also on many Supporting Activities, e.g. training where

trainers communicate with trainees aiming to enhance learning experiences for instance concerning security and skills; or more usually on marketing and selling activities.

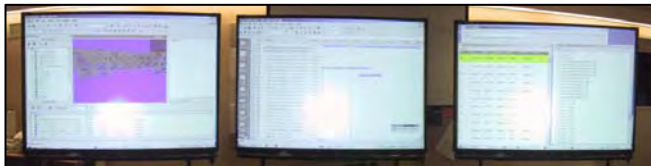
For example, it is commonly agreed that co-locating the design and construction team on a construction project can improve communication and information sharing along the supply chain. It can lead directly to better design, reduced risk and more timely delivery. It can also lead to improved and continuing relationships based on mutual trust, with accompanying commercial benefits. KPIs used on the co-located Bank of England refurbishment project revealed enhanced productivity, while co-location at Glaxo



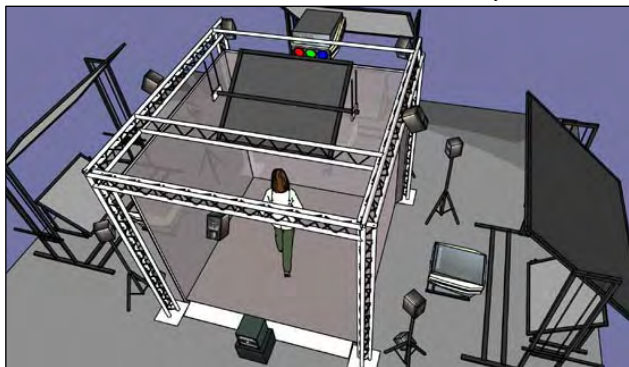
Smith Kline’s HQ in Brentford arguably saved over £10 million. At the Royal Bank of Scotland’s Gogaburn head office, co-location greatly improved mutual understanding and dramatically speeded up decision-making, leading to more buildable designs and lower costs. However, co-location is not right in every circumstance. The size, location, speed and complexity of projects, the contractual context, the balance of costs and benefits, and - perhaps above all - the implications for staff and technology matters can tip the balance.

With this in mind, much has been experimented in real-time interaction and ambient interfaces supported by mixed reality, ubiquitous computing, advanced communication and other approaches to improve practice in processes and activities of individuals and teams in construction projects life-

cycle. Ambient Interfaces – and the associated research domain of Ubiquitous Computing – represent, for many people, a third wave in computing. This paradigm shift is characterised by the integration of the increasingly complex technological landscape with the work environment, removing perception of the computer in tasks and activities undertaken. In practice the nature of these ambient interfaces ranges from the simple, e.g. by creating devices that notify users of events by extending the computer interface into the workplace environment; through to the complex, where intuitive interface technologies such as optical tracking and gesture recognition are used to provide the user with the ability to directly and interactively manipulate highly visual information sets without perceiving the underlying technological infrastructure.



In this field, research led by Martin Fischer at CIFE (Centre for Integrated Facility Engineering, Stanford University, USA) on Interactive Workspace is a prime. Research focuses on exploring how AEC multidisciplinary project teams can use an Interactive Workspace environment to support group tasks, such as project review and project planning. The overall objective is to define and evaluate new ways for project teams to interact with and visualize project information, to facilitate fast and effective decision-making based on overall contribution of multidisciplinary teams of experts. CIFE developed iRoom and iRoom2Go interactive workspaces, a collection of linked software and hardware that allows users to readily structure,



display and manipulate the various information used on designing and implementing a construction project.

Also, the experiments of using the EVE: A Virtual Environment at HUT (Helsinki University of Technology) for decision support by improving client briefing environment (e.g. HUT-600 Auditorium-600 project) or visualization of Building Services in Virtual Environment (e.g. for visualizing indoor climate and visual comfort parameters and integrating these with photorealistic space models, i.e. BS-VE project), proved the potential and benefits of advanced ambient interfaces and enhanced visualisation in the AEC-FM domains.

Or else, the use of 3D interactive workspaces, like RWB (Responsive Work-Bench, a cooperative project between Stanford University and GMD, now FHK-IMK) for



assembly-planning using desktop Virtual Reality, so that for instance alternate sequences can be tried out until full agreement about the best assembly and installation order between all contractors is reached; or for construction site planning, in order to better visualise and plan site layout arrangement and how to construct the building in there.



In Operation & Maintenance activities, where the use of ICT-enhanced mobile technology and ubiquitous computing combined with mixed-reality systems as proven to be much effective, in such a way that it presents specialized personnel with superior visualization of the building, its components and associated characteristics thus aiding facilities management procedures like identification, location and disassembly of defective parts, and ordering & assemblage of new ones.

Even on supporting activities, like training on safety to prevent risks on construction worksites, e.g. EC VAR-TRAINER project aiming to design



and develop a versatile real-time augmented reality

simulator, in order to train workers in the safe use of and work with construction machinery. And also the use of mobile learning and mixed reality setups to improve communication abilities with trainees towards an enhanced learning experience for improving skills and competences of workers.

Not to speak of course about the most typical use of advanced visualization technologies to enhance interaction and communication in selling, marketing and promotional activities. Here, techniques like Augmented Reality (AR) and Mobile Augmented Reality are being successfully used for Virtual Advertisement of building or also for developing virtual indoor decoration projects.

On the other hand, the adoption of interoperable and integrated practices in Design and Construction is progressing, e.g. by realizing BIM-supported practices and IFC-based information exchange. Recent surveys in Finland and USA clearly showed that VDC (Virtual Design and Construction) and BIM (Building Information Modelling) are now used across all phases and addressing key process problems. Industry reports dramatic success and plans for broader scale VDC use.

Clearly, academia is also a catalyst for this change and is progressing towards educational programmes/curricula that either include or are built-around collaborative engagement supported by technology. This is the case for instance of the Master's Course on IT Management in Construction at the University of Salford, that aims to deliver knowledgeable reflective practitioners that are able to initiate and implement change in the design, construction and property industries; or curricula of the Faculty of the Built Environment at the University of New South Wales in Australia, where students are educated on BIM,

where CAD learning is replaced by BIM education for design collaboration.

Thus, by combining the workspace dimension in the collaborative process with performance boosters like



interoperability (e.g. data-exchange based on Building Information Model), integrated business processes such as internal and/or external to the organization and enhanced visualisation & analysis techniques (e.g. nD-modelling) one gives birth to the next-generation VBE (Virtual Building Environment)

where both workers and businesses exploit technologies to perform superiorly.

These so-called VBE exist already in several locations in the globe: at LBNL, USA (design); CIFE, USA (construction); UBC, USA (IT); GaTech, USA (structural); VTT, Finland (operation); and IKEA, Germany (HVAC). Such VBE centres are physical places where end users can get true help, with expert assistance in creating and operating virtual buildings for real life projects along with training activities. Such apparatus makes possible to define a building, its parts, behaviour and performance; manipulate data that are used in the planning, design, construction and operation of a building; and conduct experiments without first erecting a building or its parts.

In spite of all this, workspace innovation is still hard to notice in real-world at AEC-FM domain, and only few clusters in the European industry have



tried and partly implemented fractions of collaborative workspaces such as project webs and shared 3D repositories. Construction industry seems not to be tuned into the paradigm of advanced workspace dimension in the collaboration process, and has not fully realised its benefits and value. A recent study conducted by Warwick Manufacturing Group in UK on the use of 3D VR technologies in construction has

found that the construction industry does not know about VR-based visualisation technologies that well; few had heard about projection display systems and CAVE automatic virtual environments; and none have ever used them in their construction work. Moreover, within the scope of this survey no one knew about emerging technologies such as immersive Cyber sphere visualisation system and PowerWall 3D display systems.

CoSpaces Integrated Project is devoted to change this situation by realizing innovative collaborative workspaces for individuals and project teams within distributed virtual manufacturing enterprises. It will do so by focusing RTD activities on three classes of workspaces – co-located workspaces, distributed workspaces and knowledge-supported mobile workspaces – while applied to the key phases of the life-cycle – design, build and operation.

Work will first explore the needs, requirements and challenges for realizing such enhanced collaboration supported by IT technologies. For this, reference scenarios have been conducted and will be used as a starting point for exploring the understanding and evaluation of collaboration at individual, team and enterprise levels, focusing on applications such as problem solving, creativity, participatory and knowledge-based design. Current scenarios involve

Co-located design on site for making late and urgent design decisions during the construction process; Site Management, for ensuring contractual obligations are met on site, on behalf of the client; and Site Supervision, where one sub-contractor faces a constructability problem and relevant stakeholders need to be brought together to agree on a solution.

Based on these, collaboration practices, methods and patterns will then be identified and used to create conceptual collaboration models, thus establishing the proper and needed scientific ground for subsequent technological development. A distributed software framework will be developed that supports the swift creation of collaborative working environments for supporting knowledge workers and teams engaging on collaborative design and engineering tasks. It is envisaged that the CoSpaces project will help the AEC industry to venture new collaboration models and embrace the advanced technology in order to maximise its efficiency and decision processes.

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CoSpaces Project's Website

by David Vidal



The CoSpaces website is one of the main tools that the consortium is using to communicate the project evolution and outcomes. The web site is accessible at the following URL: www.cospaces.org

The CoSpaces website structure will increase in complexity and content as the project progresses through the planned phases of research and technology development. The website content during the first phase of the project is structured as follows:



The screenshot shows the CoSpaces website homepage. At the top left is the CoSpaces logo. To the right are navigation links: Home | Contact | Downloads. Below the logo is the text 'Innovative Collaborative Work Environments for Design and Engineering'. A secondary navigation bar contains links: Project Objectives, Project Structure, Industry Workspaces, and Partners. The main content area is divided into two columns. The left column is titled 'Introduction to CoSpaces' and features a collage of images showing people interacting with large, circular, multi-colored virtual workspaces. Below the images is a paragraph of text describing the project's goals and funding. The right column is titled 'Events' and lists several upcoming events with their dates and locations, each followed by a 'More information' link. At the bottom right of the page is an 'Internet' icon.

Home Page

The home page provides an introduction to CoSpaces, a list of relevant events, e.g. relating to CWE and Living Labs, and links to some CoSpaces related web sites

This web page provides details of CoSpaces' Coordinator at the Open Group.

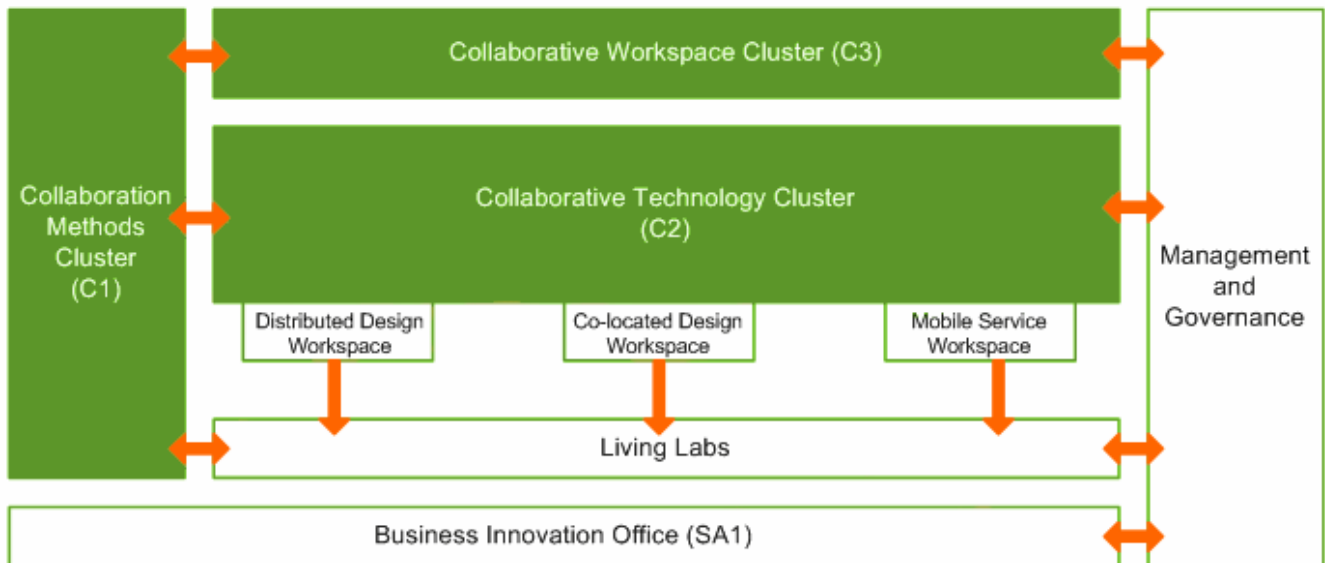
Project Contact Details

Project Objectives

This web page provides an introduction to the project objectives, describes the objectives and the expected impact of the project.

Project Structure

This web page briefly describes, by way of a diagram and text, the purpose and interactions between the five project clusters:



- Collaboration Methods Cluster
- Collaborative Technology Cluster
- Collaborative Workspaces Cluster
- Business Innovation Office
- Management and Governance

Industry Workspaces

This web page describes the primary workspaces that CoSpaces will develop to validate industrial application:

- Distributed Design Workspace will address ad-hoc and scheduled collaboration between distributed, multi-functional design teams. Collaboration through fixed installations and mobile environments will be considered in this workspace.

- Co-located Design Workspace will address how ad-hoc and planned meetings between co-located, multi-functional design teams could be supported, providing enhanced immersion, visualisation, interaction, mobility and flexibility.
- Mobile Service Workspace will address generic challenges in supporting mobile site workers to collaborate with remote experts

during the realisation or the support phase.

Partners

This web page provides the details of the project partners grouped under the headings: Industry Partners; Researchers, and Dissemination & Networking Partners.

Downloads

Currently the CoSpaces brochure and a Microsoft PowerPoint presentation of CoSpaces are available for download. Also Newsletters and additional public deliverables become available for download.

Additionally, an Internal Workspace for and Wiki pages are accessible for the projects partners.

Latest News from CoSpaces Partners

Fraunhofer FIT announced the release of a **new version of the BSCW** Shared



Workspace System. A number of new features - including **single sign on** using Shibboleth, online presence and **Web 2.0 features** such as Blogs, Tags, Communities and Wiki-like document based collaboration - bring the widely used BSCW groupware in its new version 4.4 to an even more comprehensive solution for Web-based collaboration. The new version is available at:

<http://www.bscw.de/english/bscw44.html>

HLRS announces the 1st **HLRS Parallel Tools Workshop** on July, 9th/10th. Developing for current and future processors will more and more require parallel programming techniques for application and library programmers. HLRS wants to offer its industrial and scientific user community, as well as the tools developers itself an in-depth workshop on the state-of-the-art of parallel programming tools, ranging from debugging tools, performance analysis and best practices in integrated developing environments for parallel platforms. More information available at:

http://www.hlrs.de/news-events/events/2007/tools_ws/

The Open Group announced the launch of a **new professional association for enterprise architects**. Called The Association of Open Group Enterprise Architects (AOGEA), the body was formed to further the profession by maintaining and enforcing standards of excellence and ethics for all members, much like the fields of law and accounting. Prior to launch, the AOGEA

registered over 700 Open Group certified practitioners as founding members. More information is available at: <http://www.aogea.org>.

ESoCE-NET has made available for downloading **A Roadmap towards the Collaborative Enterprise - CE Vision 2010**. The analysis has concurrently considered several complementary perspectives, namely social, customer, business, workplace, technology, and legal to build up the Collaborative Enterprise vision and roadmap providing important guidance for organisations towards improving collaboration within manufacturing enterprises. The Roadmap is available at:



<http://esoce.net/Roadmap%20Summary%20v17.pdf>

ESoCE-NET announced the International Conference on Concurrent Enterprising (Concurrent Engineering, Virtual Enterprise, and Collaborative Environments and Innovation) - **ICE'2008** - to be held in Lisbon, Portugal, from 23 to 25 June 2008. Call-for-Papers will be available soon, watch regularly the ICE conference website at:

<http://www.ice-conference.org/>

All ICE conference papers are freely accessible on the ICE Proceedings website at:

<http://www.ice-proceedings.org/>

Recent Events

ICE 2007 – 13th International Conference on Concurrent Enterprising –
4-6th June 2007, Sophia Antipolis, France

CoSpaces Workshop "Collaborative Platform for Innovative Complex Engineering Projects"

Chair: Terrence Fernando, University of Salford, UK



ICE 2007
13th International Conference on Concurrent Enterprising
Sophia-Antipolis, France, 4-6 June 2007

ICE 2007 registration is now open, to register please [click here](#)

Online credit card payment is also now available via [registration & payment page](#)

Concurrent Innovation: an emerging paradigm for Collaboration & Competitiveness in the extended enterprise

The ICE Conference is a premier forum to enable practitioners, researchers as well as tool vendors to present, demonstrate and share the results and achievements of their work in the broad domain of Concurrent Enterprising.

Conference Topics

- Ambient Assisted Environments, Location & Identification
- Ambient Intelligence (AmI) to support the Product Life-cycle
- Augmented & Virtual Reality for CE Applications
- Co-creation, Co-Innovation and Open Innovation
- Collaborative and Breeding Environments for Innovation
- Collaborative Value Systems and Clusters
- Collaborative Web Environments
- Concurrent Engineering Methods and Processes

Workshop W9

- Title: **"Collaborative Platform for Innovative Complex Engineering Projects"**
- Organised by: the COSPACES project
- Chair: Terrence Fernando, University of Salford, UK

Workshop purpose

The purpose of this workshop is to explore the challenges in developing collaborative technology platforms for supporting complex engineering projects in sectors such as aerospace and automotive. This workshop will be led by the CoSpaces (www.cospaces.org) project consortium in collaboration with the INTUITION VR Network of Excellence and will address a range of topics such as user requirements for collaborative workspaces, collaboration models, challenges in developing shared data spaces, model driven workspaces, architectural concepts, dynamic service management and real-time collaboration issues. The invited presentations will be given by the CoSpaces project partners and leading international experts in the area of collaborative workspaces.

Workshop programme

8:30 Registration and Coffee

9.00 am: Overview of the Workshop (Terrence Fernando, University of Salford)

Session 1 : User Requirements and Collaboration Models

9.10 am: User requirements for Distributed Workspaces, Terrence Fernando, University of Salford, UK

Organised by: **ESoNET**

In collaboration with:

- European Union
- Information Society Technology
- AITPL
- AMPWork

<http://www.ice-conference.org/>

CCE 2007 – Challenges in Collaborative Engineering – 11-13th April 2007, Krakow, Poland

CHALLENGES IN COLLABORATIVE ENGINEERING (CCE'07)

Coordination of Collaborative Engineering: State of the Art and Future Challenges

11th-13th April, 2007



Kraków, Poland
in conjunction with DDECS'07

Objectives
Programme
AITPL cluster session
Event Committees
Important dates
Information for authors
Venue
Accommodation
Registration
Social event
DDECS'07

Call for Papers
CCE Portal

CCE'07 is sponsored by EU 6 FP project



In cooperation with



Event Objectives

The 5th anniversary of the workshop series on challenges in collaborative engineering will focus on an essential aspect of collaboration: the coordination of work in dispersed groups. Collaborative Engineering aims at providing concepts, technologies and solutions for supporting work in dispersed engineering teams. The increased industrial demand for this innovative approach is based on the fact that networked organization structures are common practice in numerous industry sectors, like automobile, aerospace, electronics or construction. Collaboration has become a key issue for agile and flexible engineering processes.


As in the previous years, the CCE workshop will have a special focus within collaborative engineering, but contributions from all areas are encouraged. In its 2007 edition, focus of CCE will be on coordination. An understanding of the coordination demand from different engineering domains is crucial for providing adequate organisational and technical support. This is reflected in the main aspects to be covered in CCE'07:

i-ESA 2007 – Interoperability for Enterprise Software & Applications – 26-27th March 2007, Funchal, Madeira



The screenshot shows the website for the 3rd International Conference on Interoperability for Enterprise Software and Applications (i-ESA 2007). The page features a navigation menu on the left with items like Welcome, Committees and sponsors, Scope and topics, Workshops, Doctoral Symposium, Programmes, International school on interoperability ISI, Exhibition, Brokerage Event, Parallel events, Interoperability Award, Keynote speakers, Brochure, and Best paper award. The main content area includes the conference title, dates (March 26th-27th and 28th-30th, 2007), location (Funchal, Madeira Island, Portugal), and contact information (info_i-esa@uninova.pt). There is also a section for workshops and a download brochure button. The footer contains logos for IntelOP, ATHENA, eic, and Information Society Technologies.

Intuition 2006 – 30th Nov. – 1st Dec. 2006, Stuttgart, Germany



3rd INTUITION International Workshop

Network of Excellence on Virtual Reality And
Virtual Environments
Applications for
Future Workspaces



2006

November, 30th & December, 1st 2006

Invitation Programme Accommodation Exhibitors Access Plan Sponsoring

With great honour, The INTUITION Consortium invites you to ...

The 3rd International INTUITION Workshop on November, 30th & December, 1st 2006 at "Schwabenlandhalle" in Fellbach (Stuttgart, Germany). You will have the opportunity to:

- ✎ Participate in a workshop supported by experts with long experience in the field of VR/VE;
- ✎ Attend a number of parallel papers, poster sessions ([download the poster template in ppt format](#)) and a set of expert panels;
- ✎ Be informed on the latest SoA regarding tools, methods, applications and best practices so far in the field;
- ✎ Attend an exhibition with demos addressing several application areas within VR;
- ✎ Identify future opportunities and needs for VR exploitation;
- ✎ Learn more about the INTUITION network and its activities and join its [Forum](#).

INTUITION: Project and Activities

Virtual Reality (VR) technology is a rapidly evolving and diversifying field. The massive research and development process in this field has reached a degree which makes a pan-European structuring and integrating effort an absolute necessity.

To promote the enhancement of the adoption of Virtual Environments (VEs) in industrial and other processes and assess the impact of its "penetration" into the workplace and everyday life, 58 organizations from 15 European countries have joined together to create INTUITION, a Network of Excellence



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Fax: +49 711 970 - 2213
manfred.dangelmaier@fhg.de

IST 2006 – 21st-23rd November 2006, Helsinki, Finland

IST 2006 21-23 November 2006 STRATEGIES FOR LEADERSHIP HELSINKI



IST 2006 in Helsinki, presenting the ICT research programme of the 7. Framework Programme, was the largest IST event ever. More than 4,500 people attended the conference, exhibition, networking events and workshops.

On behalf of the Finnish organisers, Tekes and the Finnish Ministry of Trade and Industry wish to thank everyone involved in making the IST 2006 a success.

The presentations and webcasts from the IST 2006 event are available at the European Commission's IST event website.

[EUROPEAN COMMISSION IST 2006 WEBSITE](#) →



ECSCW 2007 – 10th European Conference on Computer Supported Co-Operative Work, 24-28th September 2007, Limerick, Ireland



http://www.ecscw07.org/

ECSCW 2007

Limerick, Ireland
September 24 - 28, 2007

The 10th European Conference on
Computer Supported Co-operative Work

Céad Míle Fáilte!
One Hundred Thousand Welcomes!

****Call for Student Volunteers****
****Outline Programme****

Conference co-chairs
Liam Bannon,
University of Limerick (Ireland)

Ina Wagner,
Technical University of Vienna (Austria)

Programme co-chairs
Richard Harper,
Microsoft Research (UK)

Carl Gutwin,
University of Saskatchewan (Canada)

- Home
- Call for participation
- Conference Programme
- Registration
- Submissions
- Author's Kit
- Conference committees
- Venue
- Travel
- Accommodation
- Blog
- Previous conferences (free online proceedings)
- Student volunteers
- Sponsors
- Contact

ECSCW 2007

VRAP 2007 – 3rd International Conference on Advanced Research on Virtual & Rapid Prototyping – 24-29th September 2007, Leiria, Portugal



VR@P 2007

3rd International Conference on Advanced Research in Virtual and Rapid Prototyping
Leiria, 24th to 29th September 2007

- Home
- Conference Topics
- Scientific Committee
- Invited Speakers
- Proceedings
- Organising Committee
- Important Dates
- Contact Details
- Location
- VR@P 2003
- VR@P 2005

The conference will take place at the School of Technology and Management which is at an important industrial centre and historical city of Portugal, Leiria, distant around 1 hour from Lisbon. This School provides education in the sectors of technology and management for more than 5000 students and is one of the five Schools forming the Institute Polytechnic of Leiria. VRAP is designed to be a major forum for the Scientific exchange of multi-disciplinary and inter-organisational aspects of virtual and physical prototyping and related areas.

On October 2003 the Institute Polytechnic of Leiria hosted the 1st International Conference on Advanced Research in Virtual and Rapid Prototyping. The Conference carried out a full paper submission.

This conference is endorsed by:



The International Academy for Production Engineering



Global Alliance of Rapid Prototyping Associations

Organised by



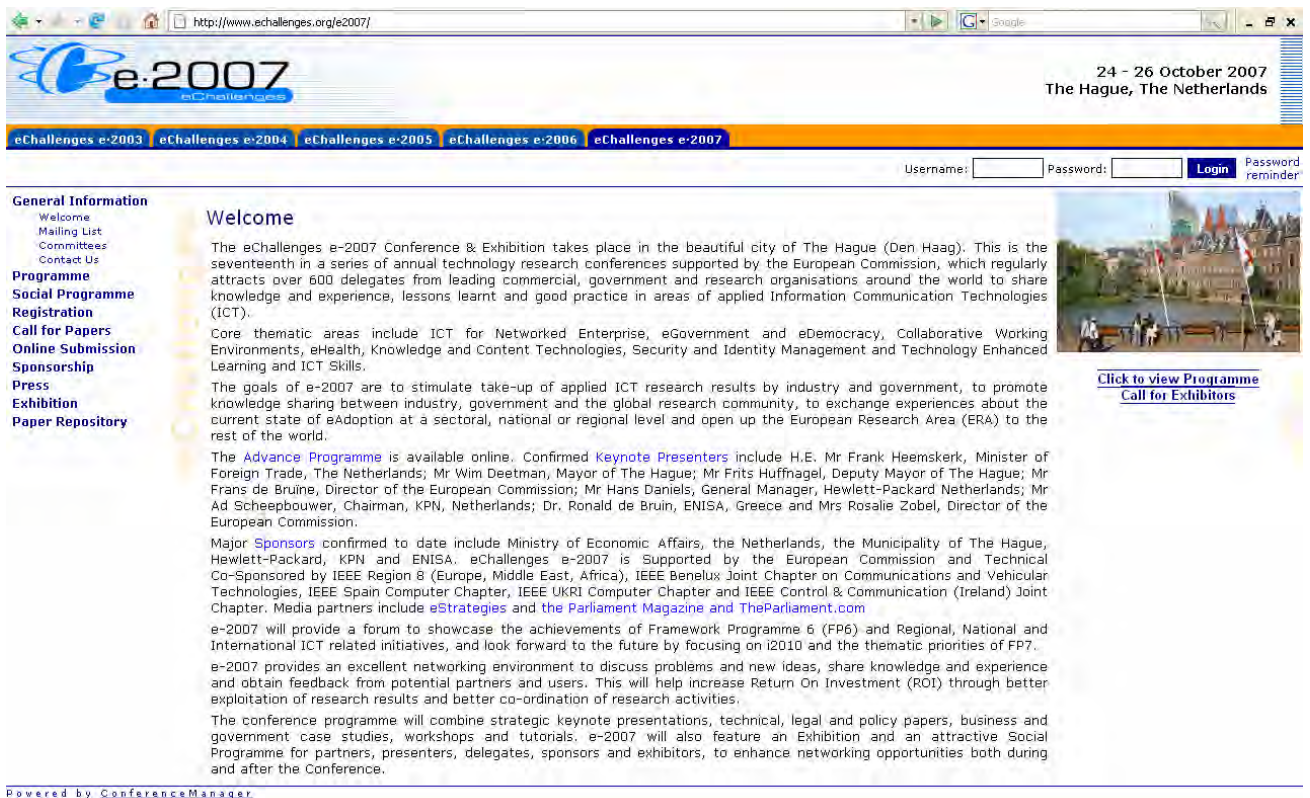
IPL
Instituto Politécnico de Leiria
Instituto Politécnico de Leiria
Instituto Politécnico de Leiria

Intuition 2007 – 4-5th October 2007, Athens, Greece



The screenshot shows the homepage for the 4th Intuition International Conference and Workshop. The header features the 'intuition 2007' logo and the text '4th INTUITION International Conference and Workshop' with the dates '4-5 October Athens, Greece'. A navigation menu on the left includes links for Home, Call for Participation, Venue, Program, Participants, Committees, Paper, and Submission. The main content area contains an invitation from the Intuition Consortium, details about the conference theme 'Virtual Reality and Virtual Environments', and information about the organizing committee, including Dr. Angelos Amditis.

eChallenges e-2007 Conference – 24-26th October 2007, The Hague, The Netherlands



The screenshot displays the eChallenges e-2007 website. The header includes the 'e-2007' logo and the dates '24 - 26 October 2007, The Hague, The Netherlands'. A navigation bar lists previous conferences from e-2003 to e-2007. A login section is visible with fields for 'Username:' and 'Password:' and a 'Login' button. The main content area features a 'Welcome' message, a list of core thematic areas (ICT for Networked Enterprise, eGovernment, etc.), and a list of confirmed keynote presenters from various organizations. A sidebar on the left provides links for general information, programme, social programme, registration, call for papers, online submission, sponsorship, press, exhibition, and a paper repository.

Group 2007 – Computer-Based Collaborative Systems Event – 4-7th November 2007, Florida, USA



Group 2007
November 4 - 7

- Home
- Accommodations
- Call for Participation
 - Scope
 - Papers
 - Notes
 - Panels
 - Workshops
 - Posters
 - Doctoral Consortium
- Visiting Sanibel Island
- Student Volunteers
- Committee
- Related Sites



Group 2007

Group 2007

November 4th - 7th, Sanibel Island, Florida, USA

GROUP '07 is interested in topics related to computer-based systems that have an impact on groups, organizations and social networks . A strong emphasis of GROUP '07 is to foster a discourse on collaborative technology that bridges the fields of Computer Supported Cooperative Work (CSCW) and Information Systems (IS). Relevant issues include the design, implementation, deployment, evaluation, and impact of these systems as well as examinations of relevant research methodologies.

GROUP'07 is sponsored by the Association for Computing Machinery Executive Committee.

Group 2007 Co-Chairs
Tom Gross (Bauhaus-University Weimar, Germany)
Kori Inkpen (Dalhousie University, Canada)

Latest News

Important Dates
May 21, 2007
Full paper abstracts due.
(Updated!)

May 28, 2007
Paper, Notes, and Workshop submissions due. **(Updated!)**

Early July, 2007
Notification of acceptance.

July 13, 2007
Doctoral Consortium, Panel and Poster submissions due.
(Updated!)

November 4, 2007
GROUP 2007 conference begins

CollaborateCom 2007 – 3rd International Conference on Collaborative Computing: Networking, Applications and Worksharing – 12-15th November 2007, New York, USA



CollaborateCom 2007



Crowne Plaza White Plains, New York, USA
November 12-15, 2007



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The 3rd International Conference on Collaborative Computing: Networking, Applications and Worksharing

Jointly sponsored by **IEEE Computer Society**, **Create-Net**, and the **International Communication Sciences and Technology Association (ICST)**

Crowne Plaza White Plains, New York, USA, November 12-15, 2007




Notice: THIS WEB SITE IS UNDER CONSTRUCTION

Over the last two decades, many organization and individuals have relied on electronic collaboration between distributed teams of humans, computer applications, and/or autonomous robots to achieve higher productivity and produce joint products that would have been impossible to develop without the contributions of multiple collaborators. Technology has evolved from standalone tools, to open systems supporting collaboration in multi-organizational settings, and from general purpose tools to specialized collaboration grids. Future collaboration solutions that fully realize the promises of electronic collaboration requires advancements in networking, technology and systems, user interfaces and interaction paradigms, and interoperation with application-specific components and tools.

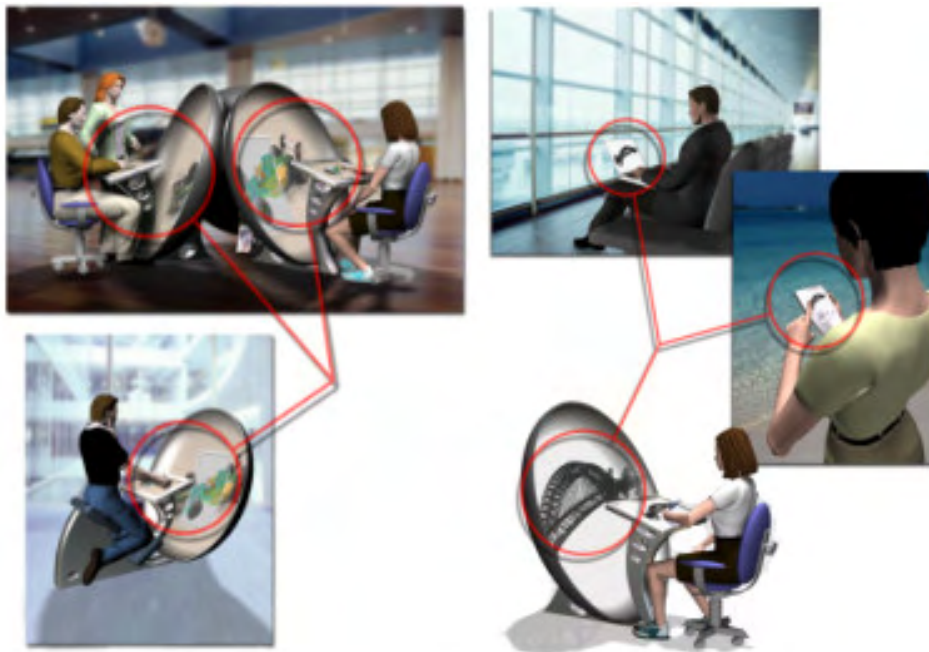
Scope

The 3rd International Conference on Collaborative Computing (CollaborateCom 2007) will continue to serve as a premier international forum for discussions among academic and industrial researchers, practitioners, and students interested in collaborative networking, technology and systems, and applications.

Contributions addressing all areas related to collaborative networking, applications and worksharing are solicited. Topics include, but are not limited to, the following:

- Architectures, protocols, and enabling technologies for collaborative computing networks and systems
- Autonomic computing and quality of services in collaborative networks, systems, and applications
- Collaboration in pervasive computing applications
- Collaborative e-education, e-learning, and collaborative computing in large scale digital libraries
- Collaborative mobile networks, sensor networks, unmanned air and ground vehicle networks & applications
- Collaborative technologies for fast creation and deployment of new mobile services
- Computer Supported Collaborative Work with distributed systems
- Data management and middleware support for collaborative information systems

CoSpaces Software Framework for Collaborative Workspaces in Engineering Design



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