

Project objective(s)

Rapidly evolving advances in networked audiovisual communication technology are facilitating the emergence of computer-supported collaborative work (CSCW) systems. These systems are striving to seamlessly support collaboration between geographically distant teams for the purpose of achieving higher levels of participation, productivity, and creativity. They therefore address a major societal and economic challenge.¹

Since visualisation is one of the most natural and intuitive ways to exchange information between humans, it has become the principal medium used in co-operative and multi-user situations. At the present time, however, state of the art collaborative real-time audiovisual systems typically rely on essentially 2D environments (traditional flat screens) to share information. For many professional applications, however, the main goal is to share the physical 3D object of common interest. These applications typically include clinical discussions among teams of medical specialists, multi-disciplinary scientific debate, design reviews between OEM's and suppliers using computer aided design (CAD), where the objects may be anatomical, molecular and product models respectively. Since these are almost exclusively very complex 3D objects, providing collaborative environments able to process, transmit and display 3D data in ways that match human perceptual abilities is therefore of primary importance and would represent a significant technology breakthrough. However, at present the only computer displays able to provide all the depth cues processed by the human brain to reconstruct a three-dimensional scene are unfortunately limited to *single user* configurations. Quite ironically, these limitations have led to networked solutions that facilitate remote collaboration only *at the expense of the isolation of each participant* from their local physical environment.

In the COHERENT project, six leading European organisations in their respective fields provide complementary competencies to **create a new networked holographic audio-visual platform** striving to seamlessly support *real-time collaborative 3D interaction* between *geographically distributed teams*. The display component will be based on innovative holographic techniques that can present, *at natural human interaction scale, realistic animated 3D images* to an *unlimited number of freely moving simultaneous viewers*. The design of the basic networked audiovisual components will be driven by **two innovative demanding applications** – a collaborative medical visualisation system and a collaborative design review system for the automotive industry – that will constitute by themselves an advancement of the state of the art in their specific domains. Both applications will provide intuitive access and interaction with shared 3D models through a *sensory rich 3D user interface* based on non-intrusive wireless interaction and offering 3D audio cues.

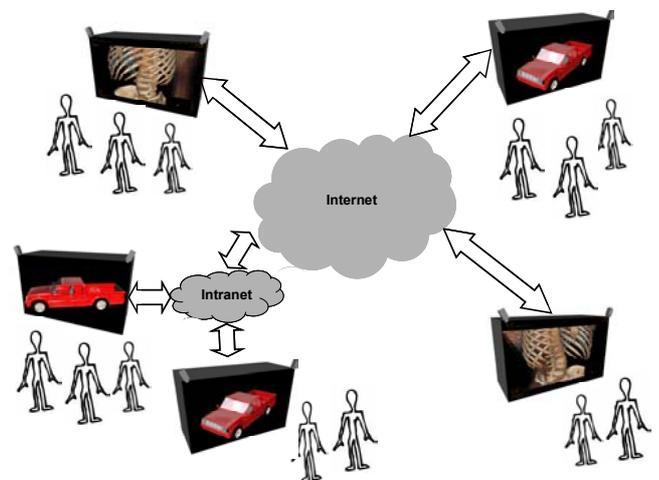


Fig. 1 COHERENT networked holographic audio-visual platform concept

Research will strongly concentrate on enabling technology for intuitive multi user access and interaction with complex 3D signals and objects. The technical feasibility of the proposed holographic display solution has been recently demonstrated with the development of a “*small scale*” proof-of-concept, using white light based, 24 bit **true colour, holographic 3D display**. This project proposes to build on this earlier success to produce a working high-resolution display in the one metre size range that, thanks to its human scale work area, will

¹ IST Priorities, 6th Framework Program Workplan

be ideally suited for **multi-user collaborative working in true 3D**. The challenge of providing the large visualisation data flow needed to drive such a device will be met using a cost-effective parallel solution based on commercial-off-the-shelf graphics and computing technology.

The driving applications have been chosen in two important sectors where collaborative 3D technology and networked audiovisual communication have a clear potential impact and provide a sizeable market for the

future exploitation of the project results. Moreover, the need for distant teams to work together for a collaborative goal is becoming increasingly common in many industrial and social situations. Therefore, the best practice and methods opened-up by this project will have implications in other application domains. In particular, they will concern high potential, industry-driven domains such as next generation 3D-TV, electronic cinema, virtual & tele-presence and future mixed-reality-based communication services.

The consortium has centred the project workplan around continuous and detailed end-user involvement in the research, development, evaluation, and validation activities. The end-users will also play an instrumental role in reaching their larger community as part of the dissemination and exploitation strategy.

The research will be conducted against an ambitious, but achievable, 30-month schedule, to guarantee early delivery, evaluation, and demonstration of tangible results.

The main project objectives, completion criteria and target dates are summarized in Table1.

Objective	Completion Criteria	Month
1. Producing an exhaustive state-of-the-art.	The production of a report presenting: <ul style="list-style-type: none"> • Analysis of 3D display technology • On-going 3D standardization • Analysis of networked 3D applications • Data Issues & approaches to collaboration 	M3
2. Taking into account market and end-users requirements.	The production of a report presenting: <ul style="list-style-type: none"> • Requirements of the medical market • Requirements of the industrial market • Definition of target system parameters • Definition of interaction approaches and networked collaborative approaches 	M3 <i>For the first documents. (Market and end-users requirements will be regularly updated throughout the project duration)</i>
3. Developing the hardware and software system	The provision of a networked holographic audio-visual platform containing: <ul style="list-style-type: none"> • Large scale holographic display, scalable graphics clusters, and user-interface components • Network communication layer • Collaborative medical application • Collaborative design review application 	M30 for final release
4. Evaluating COHERENT impact on real cases.	The provision of a report outlining an assessment of the benefits of the technology as well as its updated potential economic, educational and social impact. This report will focus on the validation of both the technology and best practice from an end-user's point of view.	M30
5. Establishing conditions for subsequent successful commercialization of the project outcomes	Public demonstration, conferences and raising awareness of "key" players in the field. Setting-up the dissemination/commercialization network including demonstration sites, web site, etc.	M30

The end users will be the ultimate judges of the final success of the systems. Project partners in the respective end user domains will play instrumental role in reaching the larger community as part of the dissemination and exploitation strategy.