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# Deliverable 16.3

## Demonstration Activity Report

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Work-package: WP16 - Demonstration

Type: Technical Report

Distribution: Public

Status: Final

Date: 31.01.2010

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## ABSTRACT

This deliverable continues to report on the demonstration activity carried out by the industrial and research partners, with a focus on the second phase of the project. The industrial use cases and the newer public use case have all served very well in the demonstration of the technologies developed by each work package and the project as a whole. Success is seen in the very positive feedback from target audiences and the customisation and adoption of X-Media technologies in multiple sectors of industry and government.

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# 1 Introduction

D16.1 lays out the demonstration and exploitation plans for the X-Media project, and D16.2 reports on the activity carried out in Phase I of the project. The early stages of the project made use of vision demonstrators to present the results of user studies and the KM requirements identified for each use case. The demonstrators were used to communicate the research done in each work package within the consortium, in order to identify overlaps between work packages and new areas of application, and ensure that each partner's work fed into the overall project requirements.

Outside the consortium a variety of demonstration venues have been targeted, from research and industry workshops and conferences to smaller meetings with specific organisations to magazines and web sites. The public use case (first mentioned in D16.2) was further developed, providing a test bed that allows demonstration to external organisations without violating the restrictions in sharing the data and processes associated with the industrial use cases outside the X-Media consortium. This deliverable details the demonstration activity toward the end of Phase I and throughout Phase II, starting with the X-Media use cases. Demonstration by research partners to showcase their contribution to use-case specific requirements is also summarised. The deliverable continues to detail the demonstration activity of the remaining industrial partners and the plans for continued demonstration and exploitation of the results of the X-Media project. We conclude with a summary of more general demonstration activity by the research partners to industry, academia and members of the public, and the joint demonstration of the work of the entire consortium at project reviews and the X-Media Industry Day.

## **2 X-Media Test Beds**

The Rolls-Royce aerospace engineering domain provides scenarios for examining “Product Life Cycle Management”, and the FIAT automotive manufacturing domain scenarios that elicit the requirements for “Knowledge Management (KM) for Product Improvement”. The two formal usability evaluations (one at the end of each phase) for the Rolls-Royce and FIAT test beds served a dual purpose; the research partners obtained information from target end users on the utility and usability of the technologies developed by project partners. At the same time the evaluations provided an avenue to disseminate information about the X-Media project to target end users and demonstrate the support being developed for KM activities. Evaluation participants had the opportunity to try out selected key features and assess the potential value that each could bring to their normal KM, information retrieval and analytical activities.

The Bike Brakes use case provides a test bed containing non-sensitive, publicly available data, allowing the demonstration of the work done in the X-Media project to external organisations.

We detail next the demonstration activities carried out by the (industrial) use case owners and the research partners who contribute to the work done in work packages (WP) 12 and 13.

### **2.1 Rolls-Royce Use Cases**

Two use cases, Issue Resolution (IR) and Experimental Vibration (EV), have been used to elicit requirements for KM at Rolls-Royce plc. We continue from D16.2 which describes the use of vision demonstrators to illustrate the results of the user studies that led to the design of the first and second prototypes, and to showcase the research work by the X-Media partners to meet the KM requirements identified. The IR test bed involves the management and analysis of different types of text and cross-media reports, images and text-based databases. The EV use case is concerned predominantly with numeric and image data, and a much smaller corpus of (text) documents. Process support tools have been developed for each use case, on top of the underlying infrastructure (built by WP11) that enables communication between the semantic repository and the independent knowledge management, information retrieval and data analysis tools.

Research partners continue to demonstrate the technologies developed to target end users for each test bed, via dedicated user workshops and meetings with domain experts. Participation in meetings with other projects such as IPAS<sup>1</sup> have also provided opportunities to showcase the work done in X-Media to other researchers and industry in a semi-formal environment.

### **2.1.1 External Demonstration and Exploitation by Rolls-Royce**

Rolls-Royce presented X-Media at the conference “Managing Information Security, Data, Social Networking Risks and Knowledge Capability” in London in September 2009. The event was organised by the British Ministry of Defence and was attended by industrial and academic organisations including the British Standards Institute, Vikstrom, Government Communication Headquarters and the University of London. The conference was reported in the December 2009 issue of the Chartered Institute of Librarians and Information Professionals magazine.

Jonathan Barrass, who represented Rolls-Royce at the event, described the work done in X-Media to enhance KM at Rolls-Royce using the IR and EV use cases. Snapshots of prototypes developed by project partners were used to illustrate the technologies developed. For the IR use case these included the:

- Geoplot,
- Timeline,
- Engine topology map and the
- Root causes analysis tree.

Prototype snapshots for the EV use case included the:

- ZMod automatic feature identification tool and the
- ESPI similarity matcher.

### **2.1.2 The Issue Resolution Use Case**

The IR use case owner, Andy Harrison, demonstrated the research and development work done to senior management at Rolls-Royce in the second half of 2009, using snapshots of the XMediaBox integrated knowledge framework, to obtain buy-in for

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<sup>1</sup> IPAS - Integrated Products and Services - a project funded by the UK Technology Strategy Board's Collaborative Research and Development Programme and Rolls-Royce plc, to study knowledge transfer between the three worlds of new service design, new product design and the continued operation of existing services and products. (See also <http://www.3worlds.org>)

the technologies that show potential to add value to the normal analytical and information retrieval activity of engineers at Rolls-Royce.

Bi-weekly planning and progress meetings were held at the University of Sheffield with the IR use case owner, the lead of the IPAS project, Colin Cadas, and other interested parties from Rolls-Royce, in the lead up to the evaluation of the second prototype.

A pilot evaluation and a formal usability evaluation of the second prototype were held at the Rolls-Royce Derby site in December 2009 using Level 3 data. Aba-Sah Dadzie (Sheffield University), Tarrance Kennedy, Andy Harrison and Stephanie Newman (all Rolls-Royce) were involved.

### **2.1.3 The Experimental Vibration Use Case**

A usability evaluation for the EV use case was carried at the Rolls-Royce Derby site in November 2009 using Level 2 data. Christine Preisach, André Busche (Hildesheim University), Steve Fullerton (Solcara), Mark Walters and Wye Houn Leong (Rolls-Royce) were involved.

### **2.1.4 External Demonstration by Research Partners**

For the IR use case demonstration was done by the University of Sheffield. In Nov 2009 Jonathan Butters presented his work on terminology recognition at the Rolls-Royce Engineering and Technology Creativity Award. In June 2009 Jonathan Butters presented his work on terminology recognition to the Design Systems Engineering group at Rolls-Royce.

Aba-Sah Dadzie demonstrated the design rationale for the XMediaBox knowledge framework and the process support it provides for the IR process at ESWC 2009 [Dadzie et al., 2009]. Fabio Ciravegna and Aba-Sah Dadzie presented the work done on the IR use case to the Director of Controls at the Rolls-Royce site in Bristol in 2008. The aim of the meeting was to determine potential avenues for the re-use of the work being done in X-Media.

For the EV use case demonstration was done by LaBRI and Hildesheim University. LaBRI took part in CBMI'09, presenting their work on Modeshape Similarity Search for the EV use case [Vieux et al., 2009]. Christine Preisach presented a paper at the International Workshop on Machine Learning for Aerospace in July 2009 [Preisach

2009]. Lars Schmidt-Thieme was invited to speak at NEC Research Labs, Heidelberg in August 2008 and at the Technical University Clausthal-Zellerfeld in December 2008.

## 2.2 FIAT Use Cases

During the project, two FIAT working applications have been built, developing a complex system where different tools work together to extract semantic information from different media sources for the:

- Competitor scenario forecast (CSF) use case,
- Noise curve analysis and evaluation (Noise) use case.

X-Media tools elaborate collected data and extracted annotations and store them in a Semantic Repository allowing to:

- automatically classify heterogeneous documents (news, technical reports),
- retrieve separately pieces of information originally contained in non-structured documents (images, noise curves, textual information),
- compare different pieces of information (images, curves, etc).

**The FIAT Portal** is the graphical user interface that queries the semantic repository and presents the information to the user in the most suitable way for the task s/he has to carry out. The two applications were an effective vehicle for demonstration both internally in FIAT and in other companies of the FIAT group during the lifetime of the project.

### 2.2.1 The Competitor Scenario Forecast Use Case

The current version of the Competitor Scenario Forecast is a real, working application that supports the process of:

- collection of automotive news articles coming from external or internal data sources,
- extraction and classification of textual information and images contained in news pages, according to the FIAT domain ontology,



- recognition of Forecasted model, expected launch data and classification of Forecasted models in the correct segments according to predefined rules,
- Build of Launch calendars for forecasted models.

The test beds integrate several tools developed in Area 1 and Area 2 for the extraction and classification and fusion of the information contained in the original news items. The FIAT portal supports user tasks, allowing the retrieval and presentation of all information across several pages; each page manages a specific activity, querying the acquired knowledge by means of the indexers services implemented for the CSF (accessed via the X-Media Kernel).

The initial CSF vision demonstrator has been presented to several FIAT and CRF (Centro Ricerche FIAT) departments:

- FIAT Competitor analysis department
- FIAT Marketing department
- FIAT Product Portfolio Management department
- FIAT ergonomomy department
- FIAT methodologies
- FIAT After Sales
- CRF vehicle design.

Moreover, because it is easy to understand, the CSF test bed has been chosen as the most effective demonstrator of X-Media potentiality both internally in the FIAT Group and externally during official events.

In particular the prototype was presented during a Competitor analysis workshop organized in CRF at the end of 2008 and involving beyond FGA other FIAT Group companies.

## **2.2.2 The Noise Reduction Use Case**

The present implementation of the Noise test bed supports the complex process of designing comfortable components solutions (feasibility studies), with respect to the aerodynamic noise for new vehicles in development. To support the process the use case application allows users to query knowledge extracted from past test results.

Analysis of past test results allows wind tunnel experts to identify “which noise spectra are comfortable for humans” and, together with images and technical data, supports the design of component solutions adequate to achieve targets assigned by the model responsible for aerodynamic noise performance of a new FIAT model. The noise test bed has been used to demonstrate the advantages of semantic technologies in supporting the design phase of automotive (and non automotive) system components.

Using the initial vision demonstrator, internal demonstrations of the Noise prototype were made to several FIAT departments:

- FIAT Acoustic department
- FIAT Wind Tunnel department
- CRF Acoustic department
- CRF product design.

### **2.2.3 External Demonstration and Exploitation by FIAT**

FIAT organised a workshop where the tools developed for the CSF use case were demonstrated to other industrial organisations, including CNH and IVECO. The final release of the Competitor scenario forecast prototype, which was successfully demonstrated during the X-Media industrial day held in Vienna in December 2009, will continue to be used to demonstrate the work done in X-Media to other FIAT group companies and related organisations outside FIAT.

## **2.3 The Public Use Case**

Confidentiality of data and processes in especially the Rolls-Royce test bed restrict the demonstration of the X-Media prototypes outside the consortium. The public use case, Bike Brake Failure (see D19.2), was developed to provide an avenue for the public demonstration of work done across the project and to illustrate the genericity of the technologies developed, using publicly available data.

The Bike Brakes use case was built as a simplified version of the IR use case. The main contributors were Ontoprise, the University of Sheffield, CERTH, LaBRI and FBK-Irst. Quinary and the University of Koblenz have also contributed to building the use case and showcasing the technologies developed within the project.

### **2.3.1 External Demonstration by Research Partners**

Aba-Sah Dadzie demonstrated the K-Views application for visual, ontology-guided hypothesis investigation, developed as part of the research on knowledge lenses in WP4 at the IEEE VAST 2009 poster session.

### **3 Demonstration and Exploitation by other Industrial Partners**

In addition to the demonstration of X-Media research based on the industrial and the public use cases it is important to demonstrate the applicability of the technologies developed to other fields and domains. Quinary, Solcara, Ontoprise, CognIT and K-Now have between them demonstrated different aspects of the work done across the consortium in their specific target fields, in several instances highlighting the similarities in the information requirements of different sectors of industry to those explored in the X-Media use cases. Each industrial partner has also identified new sectors of industry that they propose to target or have already begun communication with.

Quinary and Solcara detail the demonstration done in the legal field on the support developed in X-Media for knowledge sharing. Quinary has also demonstrated the Semantic Web (SW) technologies developed to the utilities, oil & gas sector, among others, to support KM activities in issue investigation similar to that presented by the Rolls-Royce IR and the public Bike Brakes use cases. Quinary is also investigating the application of our work to the health sector, demonstrating the correlations between information held in different types of media. Solcara has also demonstrated the contribution of semantic information extraction and retrieval from text-based documents to enhanced KM to the pharmaceutical and health sectors and the security services. In academia, Solcara has demonstrated SW and business applications to MBA students at Cranfield University.

Ontoprise have been concerned with the demonstration of the ontology modeling tool built during the X-Media project, and the development of training material for its use. CognIT have focussed on demonstration in strategic and operational intelligence through the support of semantic information extraction and retrieval, to the insurance sector and government agencies such as the security services, military and taxation. CognIT are also investigating, among others, the application of our work to the energy and oil sector. The work done in the FIAT use cases provides a jump-off point for the sectors that CognIT target, having similar KM and intelligence gathering requirements.

Finally, K-Now, which is a university spin-off company whose main aim is to exploit the technologies developed within the X-Media project, has carried out targeted demonstrations to selected organisations predominantly in the aerospace and defence sectors, and also to the spend analysis domain, among others. K-Now has also

participated in industrial conferences such as the Knowledge Management Marketplace in 2009.

### 3.1 Quinary

Quinary has been active for a long time in unleashing and taking to the market the results of advanced R&D (research and development) in the field of semantic web technologies, knowledge management and information extraction. These themes are rooted in Quinary's background, as testified even by the company name<sup>2</sup>. Given this attitude and the generality of the issues in managing knowledge and information treated in X-Media, the impact could be rather pervasive and the experience gained and technology developed could be used in a wide range of applications. There are currently 2 major market sectors where a direct impact can be foreseen and has been, and will continue to be, actively pursued.

The first is the legal sector. Quinary is already active in the legal field, where a vertical Knowledge Sharing environment targeting law firms and legal organisations (LKMS/Mnemosyne, see <http://mnemosyne.quinary.it> and [D16.1] for more detail) has been built. Mnemosyne/LKMS already embeds a semantic layer, and exploits information extraction (IE) techniques to extract from legal documents meaningful information to fill the semantic layer, used in turn to provide knowledge rich support to search and sharing. The system is currently used by two major Italian law firms for everyday work, an association of Italian lawyers and judges to manage a repository of court sentences (<https://km.giuslav.it/kat>), and a worldwide association of law firms (<http://www.iuslaboris.com>) to host a sharing semantic wiki (<https://www.wikilex.eu>) also based on the same technology.

Research activities in X-Media and development and marketing activities for LKMS/Mnemosyne have been cross-fertilised throughout the X-Media project, leading to new ideas and components. LKMS/Mnemosyne marketing activities were used as a demonstration channel for X-Media as well. Two major events worth mentioning, the first a participatory, with a paper and demos, at the V Legislative XML Workshop held in Fiesole (Florence) on 14-16 June 2006, where X-Media activities and expected fallbacks on the system were presented (about 100

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<sup>2</sup> Quinary was founded in 1985 with the aim of supporting an economy of professional services and knowledge exchanges; the name 'Quinary' was derived from a definition of the 'quinary sector' including advanced knowledge services in the technology and R&D areas taken from a paper from P. Hatt, N Foote in "American Economic Review" May '53.

researchers attending), the second a special workshop on legal knowledge management organised in Milan in 2008 (30 Sept. 2008 - <http://www.algiusmi.it/node/55>).

The second market sector where we expect direct impact is utilities and oil & gas. In both fields Quinary has an active presence with customers such as Terna (the Italian company running the electricity infrastructure) and ENI (one of the world's leading oil and gas companies). In both areas there are ongoing activities to support maintenance and operations, where issues are not dissimilar to those coped with by the RR use cases in X-Media. The experience gained is therefore valuable, and we expect to leverage it to be able to propose advanced services. The development of the X-Media public use case has therefore been instrumental in being able to concretely demonstrate the feasibility of solutions. Material from the use case, alongside Consortium presentations developed for the Industry Day held in Vienna in December 2009 will be used in special events already planned. An on site workshop is expected to take place at ENI E&P corporate premises in Milan in February 2010, and a similar one will be held – in February, also in Milan – at Cesi Spa, with expected attendance from Cesi, a service company mostly working on electricity, utilities and environment, and Erse (formerly Cesi Research), a research institution working on research projects of general interest to the Italian national electricity system, focusing on applied research and with a system-oriented approach. Discussions with ENI and Cesi (and Terna) about possible exploitation paths already took place in autumn 2009, with interest raised in each case; initial plans were for them to attend the Industry Day in Vienna, but logistics issues made this impossible. We have therefore resorted to a custom workshop to be held in Milan. In this field, we expect X-Media results about images and cross-media analysis, which plays a minor role in the legal domain, to prove crucial.

Further demonstration activities have been undertaken within the context of specific projects with selected customers. Worth mentioning is a big project with an Italian provider of normative technical documents, where Quinary is developing an e-commerce service to sell such documents (with various modalities – one shot or by subscription); in this framework part of the X-Media kernel infrastructure has been adapted to support indexing and extraction services from the document base to provide advanced search and interlinking capabilities.

Last but not least, Quinary is currently investigating paths to enter the public Health sector. While such activities are still at a very preliminary stage, X-Media results are being actively demonstrated, due to the strong need to correlate structured data (i.e.

,patient data) with text (such as diagnostic notes) and images (e.g. X-Ray, TAC, NMR and diagnostic images in general).

### **3.2 Solcara**

The majority of Solcara's efforts in this area have concentrated on how semantic search, retrieval and information extraction from text (mainly covered by WP4 and WP5 technologies) may enhance either internal knowledge management systems or suppliers and vendors of existing applications and services, mainly in legal markets. Unfortunately the opportunity to discuss image and data semantic applications has not arisen.

Solcara have met with three of the United Kingdom's largest legal information service providers (Practical Law Company, LexisNexis and Justis) to discuss the potential for the implementation of semantic technologies in the legal search domain. Also, two legal application/portal vendors were invited to see how semantic technologies could enhance their product offering. In addition, meetings with a number of Law Firms, to which Solcara already provide knowledge management and integrated search services including those of the three above named vendors, have been undertaken to discuss and demonstrate how semantic technologies may aid information retrieval tasks.

The use of semantic applications and search technologies were presented to two leading U.K. pharmaceutical companies, with Europol regarding the potential within police and security applications, and with the National Patient Safety Agency (where entity extraction from text techniques are already used within a sensitive data cleansing solution) regarding the health sector.

Solcara presented its semantic integrated search technology within the X-Media Use Case scenarios as a poster with demonstration at ESWC 2009 (Heraklion) and as a stand-alone tool in a presentation and demonstration session at ESTC 2009 (Vienna) [Fullerton, 2009].

Finally, Solcara's most recent engagement was to present a talk and demonstration to MBA students at Cranfield University about semantic web and business applications.

### **3.3 Ontoprise**

Ontoprise designed, developed and instantiated a training "Certificate Ontology Modeller" with duration of 7 half days.

The training material was completely authored by mm2flo and translated automatically into:

- \* about 100 html pages which are all highly linked,
- \* 10 different F-Logic ontologies,
- \* different views on the same ontology snippets.

Ontoprise not only used mm2flo to produce the training material and the example ontologies, but additionally gave the participants training in how to use mm2flo. As a result some participants of this course volunteered to provide a formative evaluation of the tool.

Currently mm2flo (which is currently only a functional prototype) generates (a) an html web site and (b) a corresponding ontology, with links from the HTML to the respective ontology snippets. Planned exploitation involves recoding mm2flo such that the ontology statements are embedded directly into the HTML pages both in F-logic and in RDFa.

### **3.4 CognIT**

CognIT's primary market for the technology produced for X-Media is insurance (anti-fraud and money laundering) and government bodies such as the police, national tax authorities and the military. In addition CognIT is targeting oil (global oil exploration and gas market intelligence) as well as media (journalist support). CognIT's intention is to apply X-Media results in their effort to pursue commercial and government markets related to strategic and operational intelligence. The software and concepts developed for X-Media will be insourced into the Navigator suited developed and marketed by CognIT. Navigator is a combined search and extraction-based system that manages federated sources and various forms of advanced search-in-search. It also features an analyst workbench for visual analytics. It builds and extends ontologies with the analyst by suggesting extensions through semantic analysis of text. Currently the system supports formal and semi-formal text sources. Some support is given to management of images. The aim is to extend Navigator analysis into other media such as video and sound using concepts developed in X-Media.



X-Media results combined with CognIT's existing Navigator platform has been presented to some of the more notable energy companies in the North Sea including ConocoPhillips, Total and Statoil. As part of the X-Media exploitation plan these companies have pledged to take part in a future demo where X-Media/Navigator elements will be slightly customised to demonstrate the potential of a fully fledged application aimed at oil exploration. A demo application directed to geological intelligence and exploration is being built based on this. The demo and the underlying technology will be presented to the companies mentioned above in February 2010.

X-Media technologies have been deployed for solving cases of antifraud, both by different government bodies (see the following sections) and by insurance companies: CognIT has been in contact with all the major insurance companies in Norway, to offer support and technology for their investigations. When there are suspicions against a company's clients of breaking the rules for receiving insurance premiums, an investigation will normally be launched. One of the tasks is collecting and analysing information that may highlight a possible fraud attempt. CognIT has as consultants been running Navigator to collect and analyse information from the Internet. A typical scenario has been that CognIT with very little effort has been able to find crucial information that the often long lasting investigations of the insurance companies have not been able to disclose.

One of CognIT's primary focus for many years has been the government sector. For X-Media CognIT has solicited a small group of government agencies that can be considered technology pioneers. They have a profound need to systematically gather intelligence in ways similar to that described for the FIAT test bed. However, as state agencies they are not very much interested in competitors – their attention is predominantly occupied with law enforcement. These bodies have to monitor a large amount of data distributed across many types of media and sources, both within and beyond the organisation. They need to fuse content from many different sources in order to establish trends and identify new practices and behaviour among individuals or larger groups. This group consists currently of the National Lottery Board, the Norwegian Tax Agency, the District Police of Hordaland and the Norwegian Intelligence Battalion in Afghanistan (Part of ISAF). All of these have been presented with the ideas and possibilities promised by X-Media and all but one have been exposed to early mock-ups and demos of the more mature parts of the X-Media architecture and components.

The National Lottery Board was introduced to the status of X-Media in April 2008, and signalled their interest in trying out more of the tangibles stemming from the X-Media project. The Norwegian Lottery Board co-operates with other agencies in Northern Europe. CognIT has established an ongoing dialog with this agency. The task of the National Lottery Board is to enforce national legislation related to lotteries and gambling, and a major challenge is to monitor the on-line gambling market and assure proper conduct and compliance with rules and regulations. See D15.6 for more detail.

The Norwegian Tax Agency is intrigued by the prospects of X-Media, and was exposed to early demos during May 2008. They are interested in trying out the X-Media system and components once early tests have been documented. Part of their work is to systematically gather evidence from various sources on the Internet about improper business conduct. This includes monitoring activities on sites such as eBay and comparing these with internal tax payers' records. It also includes collecting evidence about on-line businesses that might be hosted by a foreign server but is systematically directed toward the national, domestic market. See D15.6 for further detail.

The work of the eBatallion in Afghanistan and the police have restriction clauses associated with it. However, it can be disclosed that a prime objective is to improve pro-activity in the way FIAT has described for their competitive intelligence. However, the focus will be on anticipated events and incidents rather than new products and materials. Both have been exposed to X-Media through CognIT and have signalled strong interest in the coming deliverables.

### **3.5 K-Now**

K-Now is a company set up with the explicit aim to commercialise technology born from within X-Media. As such K-Now have been active in showing and demonstrating X-Media derived technologies to as wide an audience as possible. K-Now has created targeted demos to expand the potential reuse of X-Media technology, ranging from general technical demonstrations at international conferences to showcases in industrial marketplace events, and separately to specific organisations.

**General technical demonstrations:**

General multi-audience technical demonstrations of K-Now technology, notably K-Search, have been given at the ESWC 2009 [Bhagdev et al., 2008], at ESTC 2009 and ASWC 2008 [Bhagdev et al., 2008]. Each of these peer-reviewed demonstrations gave the audience an understanding of how K-Search could be employed beyond the X-Media project. These talks garnered a great deal of interest and highlighted the technology K-Now brings to commercialising X-Media developments. Since these demonstrations a number of collaborations are under discussion to create state of the art industrial standard technology from continuations of this work. Most demonstration work however has focused upon a targeted approach to specific Industrial verticals or even individual organisations.

**Industrial demonstrations:**

K-Now has focused demonstrations on the needs of vertical markets to best gain adoption of X-Media born technology within each targeted market. K-Now as part of this wide endeavour was for example asked to the invitation only event Knowledge Management Marketplace 2009. This closed event is aimed at IT procurement in the Defence sector. K-Now demonstrated X-Media technology to the UK Ministry of Defence, Airbus, BEA, Rolls-Royce and Lockheed Martin, amongst many other leaders in this sector. As well as the defence sector K-Now has gained strong interest from a number of other industry sectors. Much of this interest is leading to further commercialisation of X-Media derived technology in the form of new innovative work. K-Now for example have demonstrated to KPMG the use of technology for application to the spend analysis domain where the ability to combine instance information intelligently allows improved business intelligence for strategic purchasing. Agreements are being finalised with a large international FTSE100 financial company and the UK NHS (National Health Service) to apply this technology to identifying procurement overspend across complex organisations. Other demonstrations have led to publicly visible project work<sup>3</sup> focusing upon collating specialised heterogeneous knowledge for the Royal Kew Gardens in England; this work is being undertaken with several world leading research establishments on both sides of the Atlantic as users. K-Now having demonstrated technology coming from X-Media born technology (notably K-Search) has led to K-Now filling the IT role in this JISC funded project. Also to improve public understanding of the potential of

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<sup>3</sup> The Grassportal project <http://www.grassportal.org/>

cross organisation IT systems with the ability to semantically link heterogeneous data, K-Now are currently working on a paid industrial pilot application crossing multiple service focused departments of the University of Sheffield to apply K-Forms technology to handle customer retention across large multi-service organisations. It is envisioned that this pilot project will be used to launch a commercial application focusing on this market. K-Now expects to continue demonstrating and promoting X-Media technology after the end of the project as it is core to K-Now's commercial success.

## 4 Other Demonstration and Exploitation by Research Partners

Demonstration by research partners has taken place in public meetings, outreach programmes and during workshops and conference demonstration sessions. Other forms of demonstration and exploitation have been the use of web sites to disseminate the results of X-Media research and provide access to the tools developed. Online and print magazines have also been used to showcase the research and development work done during the project. This deliverable focuses on the demonstration activities while 15.6 provides more detail about dissemination activity involving full paper presentations at conferences and talks by invited speakers.

### 4.1 LaBRI

Demonstration activities carried out by LaBRI in the context of the project have taken the form of presentations both in and outside the lab. The work on multi-class object detection and categorization has been described in a submission to CVPR 2010 [Vieux et al., 2010]. Remi Vieux presented work and results related to X-Media to several institutions visiting LaBRI in 2009, including the ENS Paris (Ecole Normale Supérieure).

Jenny Benois-Pineau presented the X-Media project and results as an invited speaker in the University of Delft to members of the PETA (Peer to Peer Tagged Media) Network of Excellence in January 2010.

Finally, a webpage has been set up, dedicated to the improvements and development of LaBRI's free software tool **GIRL** (General Image Representation Library) developed with X-Media funding, available at: <http://girl.labri.fr/xmedia.html>.

### 4.2 University of Hildesheim

Christine Preisach wrote the news article "*ISMLL works on information extraction from vibration data and develops knowledge management system*" for the monthly Hildesheim University journal. A copy of the article is also available from the university webpage. Other web resources maintained by Hildesheim are the web pages for the **RelEms** software developed as part of the X-Media project published on the group's website.

### **4.3 CERTH**

CERTH institute has demonstrated the project results in several face-to-face meetings with industry and academia, as well as in organised events with audiences relevant to the project's goals.

In September 2009 CERTH gave a presentation on the activities of their institute that are related to industrial applications during a visit from the commercial airplane company Boeing. Most of the topics in this presentation concerned the technologies developed within the X-Media project. In December 2008 under a common agreement members of CERTH visited the Yahoo premises in Spain in order to investigate avenues for joint research. Some of the scientific achievements that were presented to the Yahoo researchers were related to the scientific outcomes of the X-Media project. In November 2008 some of the conclusions of CERTH's involvement in the industrial use cases of the X-Media project were presented as part of a general strategic research agenda for research and development in Northern Greece. The event concerned various research activities that were funded by the Greek government and the audience included people from both the enterprise and academic sectors. In February 2007 members of CERTH gave a presentation to the technology scouts of Kodak imaging company. At this point some early results of the X-Media project on semantic image analysis were presented.

## **5 X-Media Consortium Demonstration**

The demonstration activities of the consortium as a whole occur during the annual scientific reviews. Because these meetings involve only consortium partners, the project officer and the additional reviewers who are all subject to the non-disclosure agreement for the industrial use cases, the technologies developed for the X-Media use cases are demonstrated in these semi-formal sessions, with a focus on the research activity done in each work package and overall for each of the X-Media use cases. Finally the X-Media Industry Day Workshop, co-located with the 3rd European Semantic Technology Conference (ESTC 2009), provided an avenue for demonstrating the work of X-Media in the latter stages of the project to a wide range of commercial organisations with an interest in the use of SW technology for the enhancement of their normal KM and information extraction and retrieval activities.

### **5.1 Annual Project Reviews**

Each review included a poster and demonstration session where project partners were able to demonstrate their research to the project officer, the scientific reviewers and the industrial board as well as other project partners not directly involved in their work.

#### **5.1.1 Review April 2007**

A set of working demonstrations, videos of pre-recorded interaction with X-Media tools and the vision demonstrators, and posters were shown to the reviewers to showcase the work done in the early stages of the project.

#### **5.1.2 Review May 2008**

Working demonstrations for this review were centred around the four main industrial use cases:

- Issue Resolution
- Experimental Vibration
- Competitor Scenario Forecast
- Noise Curve Analysis and Evaluation

Other posters included:

- the Bike Brake Ontology

- X-Media Architecture Posters
  - FIAT architecture (1 for each use case)
  - Rolls-Royce architecture (1 for each use case)
- Object Identification – Blocker
- Fusion Framework & Inconsistency Resolution
- Metaknowledge
- Search with Metaknowledge

### 5.1.3 Review May 2009

The last review grouped posters and demonstrations by work package, supplemented by joint and integrated posters (in bold face) that illustrated the relationships between different work packages and tools.

WP1: Dynamic Knowledge

- OWL Meta K: Reasoning with Meta Knowledge

WP2: Uncertain Knowledge

- Process Provenance: Data Centric Process Provenance
- Experimental Vibration

WP3: Knowledge Fusion

- Fusion: Enhanced Knowledge Fusion

WP4: Knowledge Lenses and Process Support

- **Cross-Tool Knowledge Management with Meta Knowledge**
- SemSearch with Lena Integration: A Ranking Driven Approach to Semantic Search
- SemSearch Xplorer: Large Scale Knowledge Management across Media
- Lena: Lena Browsing RDF Data more complex than Foaf
- K-Views: K-Views: Visual, Semantic, User Centred Sense making
- K-Search & Terminology Recognition: K-Search: Knowledge Sharing and Reuse in Complex Organisations
- CognIT Summarizer: The Corporum Summarizer
- Timeless/GeoPlot/EngineMap
- K-Now: K-Now: Enabling your Knowledge, Now

WP5: Information Extraction and Text Mining

- Terminology Recognition in X-Media.
- Semantic Annotation of Domain Terminology in Aerospace Engineering



- Compute Semantic Relatedness Using Knowledge from Wikipedia

WP6: Semantically Driven Image Analysis

- Content Based Component Clustering: Investigation Bag of Regions approach in X-Media
- Mode Shape Similarity Search by Radon Transform
- Bag of Regions Similarity Search
- Mode Shape Similarity Matching: Visualisation Pattern Analysis and Retrieval
- Mode Shape Classification: Object Detection using weak Annotations
- Composite Components Detection

WP7: KE from Raw Data

- Experimental Vibration Use Case 2 Phase
- Identification of Eigenmodes in Vibration Data
- Qualitative Time Series

WP12: Product Life Cycle Management

- **X-Media Box Knowledge Framework: Multiple Points of View in Knowledge Retrieval and Sharing**
- **Information Extraction Technologies in the Experimental Vibration Use Case**

WP13: KM for Product Improvement

- **Competitor Scenario Forecast**
- **Noise curve analysis and Evaluation**

WP19: Public Use Case

- **The Public Use Case**
- Lightweight Ontology Authoring with mm2f10

## 5.2 X-Media Industry Day Workshop

The theme of the X-Media Industry Day workshop<sup>4</sup> was "*Our Vision - X-Media: Knowledge Sharing and Reuse across Media*". This event was co-located with ESTC 2009 in order to take advantage of the presence of the representatives of commercial organisations and other research institutions at the conference. X-Media also sponsored the conference, providing yet another opportunity to advertise the work done in the project.

The workshop presented talks on:

- the sharing and reuse of knowledge,
- knowledge acquisition and capture,
- the architectures for large scale KM.

Rolls-Royce and FIAT also presented the application of the research in X-Media to their respective domains and use cases.

This was followed by a poster and demonstration session in which both the industrial and research partners demonstrated the work done in X-Media to enhance large-scale, cross-media KM. Among others, the final release of the Competitor scenario forecast was demonstrated. The XMediaBox UI was used to demonstrate the integration of the work of different consortium partners to support the knowledge lifecycle using the IR and Bike Brakes use cases. The loosely coupled components built to support the EV use case were also demonstrated. Solcara's federated search system, K-Search and the mm2flo.xsl prototype were also demonstrated to and discussed with the attendees. The work done in WP6 on semantically driven image analysis and terminology recognition was also presented. Finally, the design and architecture of the X-Media Kernel was presented to attendees.

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<sup>4</sup> <http://www.x-media-project.org/workshop.html>

## 6 Conclusions

The vision demonstrators developed in Phase I of the project continue to be useful for demonstrating the work done in X-Media to both industry and academia. We are however increasingly using the prototypes developed in Phase I and especially Phase II to demonstrate the research in Areas 1-3 to other members of the consortium, to identify links across work packages. Demonstrations have been held to showcase the SW-enabled technology provided by the standalone tools, or using the integrated systems built to satisfy the KM requirements identified for each use case, and the use of the underlying X-Media Kernel architecture to support data exchange and other communication between independent modules.

Demonstration activity outside the X-Media consortium is often performed in the context of the industrial and public use cases as they provide realistic, familiar scenarios that aid understanding of the research done and the technologies developed throughout the project. This has proved to be very successful; the power of the technologies demonstrated to enhance the KM process has been reported to be clearly recognised by our target audiences.

Demonstration activity has been led by the industrial partners with a focus on government and industry; in several instances this has led to the adoption of the technologies showcased, with customisation to suit different environments as required. Section 3 presents plans to continue demonstration of the work performed throughout the project to new sectors in industry. A number of research partners have also been involved in interaction and demonstration activities not only in research conferences and workshops and to other research institutions, but also with the public and commercial organisations.

D15.6 provides detailed information on patent applications submitted for technologies that have come out of the project work. Sub-sets of the X-Media consortium will continue to work together to extend the research on SW-enabled KM in other research and industry-driven projects; further detail can also be found in D15.6.

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