

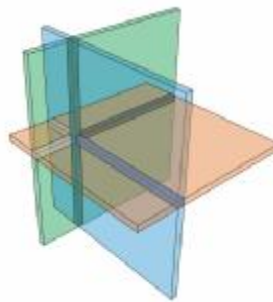
**SIXTH FRAMEWORK PROGRAMME
PRIORITY 2
Information Society Technologies IST**



Contract for:

NETWORK OF EXCELLENCE

Annex I - "Description of Work"



Project acronym: K-Space

Project full title: Knowledge Space of semantic inference for automatic annotation and retrieval of multimedia content

Contract no.: FP6 - 027026

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1 Project Summary

K-Space is a network of leading research teams from academia and industry conducting integrative research and dissemination activities in semantic inference for automatic and semi-automatic annotation and retrieval of multimedia content. K-Space exploits the complementary expertise of project partners, enables resource optimization and fosters innovative research in the field.

The aim of K-Space research is to narrow the gap between low-level content descriptions that can be computed automatically by a machine and the richness and subjectivity of semantics in high-level human interpretations of audiovisual media: The Semantic Gap.

Specifically, K-Space integrative research focus on three areas:

- Content-based multimedia analysis: Tools and methodologies for low-level signal processing, object segmentation, audio/speech processing and text analysis, and audiovisual content structuring and description.
- Knowledge extraction: Building of a multimedia ontology infrastructure, knowledge acquisition from multimedia content, knowledge-assisted multimedia analysis, context based multimedia mining and intelligent exploitation of user relevance feedback.
- Semantic multimedia: knowledge representation for multimedia, distributed semantic management of multimedia data, semantics-based interaction with multimedia and multimodal media analysis.

An objective of the Network is to implement an open and expandable framework for collaborative research based on a common reference system.

Specific dissemination objectives of K-Space include:

- To disseminate the technical developments of the network across the broad research community
- To boost technology transfer to industry and contribute to related standardisation activities.

2 Project Objectives

2.1 Main Objectives

K-Space integrates leading European research teams to create a Network of Excellence in semantic inference for semi-automatic annotation and retrieval of multimedia content. The aim is to narrow the gap between content descriptors that can be computed automatically by current machines and algorithms, and the richness and subjectivity of semantics in high-level human interpretations of audiovisual media: The Semantic Gap.

The main objectives of K-Space are:

- To bring together leading European research teams to create critical mass for innovation of currently highly fragmented research groups addressing semantic inference for semi-automatic annotation and retrieval of multimedia content.
- To build an open and expandable framework for collaborative research on knowledge acquisition based on system made up of flexible, modular and interconnected technology.
- To disseminate the technical developments of the network across the broad research community
- To boost technology transfer to industry, influence and contribute to related knowledge-based multimedia standardisation activities.

2.2 Specific Objectives for Joint Research Activities

The joint research activities of the network are aimed at convergence and resources optimization by exploiting important multidisciplinary aspects of multimedia knowledge extraction. This will be achieved by linking research efforts over the following three research clusters underpinning the K-Space framework. Each one of these clusters constitutes a project workpackage.

- Content-based multimedia analysis (WP3): Tools and methodologies for low-level signal processing, object segmentation, audio processing, text analysis, and audiovisual content structuring and description.
- Knowledge extraction (WP4): Building of a multimedia ontology infrastructure, knowledge acquisition from multimedia content, knowledge-assisted multimedia analysis, context based multimedia mining and intelligent exploitation of user relevance feedback.
- Semantic multimedia (WP5): knowledge representation for multimedia, distributed semantic management of multimedia data, semantics-based interaction with multimedia and multimodal media analysis.

The networking and distributed interaction between partners modules is supported by suitable interfaces, database management and networking tools. The integration of these tools, to build the K-Space communication infrastructure is conducted within workpackage 6 (WP6). Figure 1 shows a high-level abstraction of the K-Space framework.

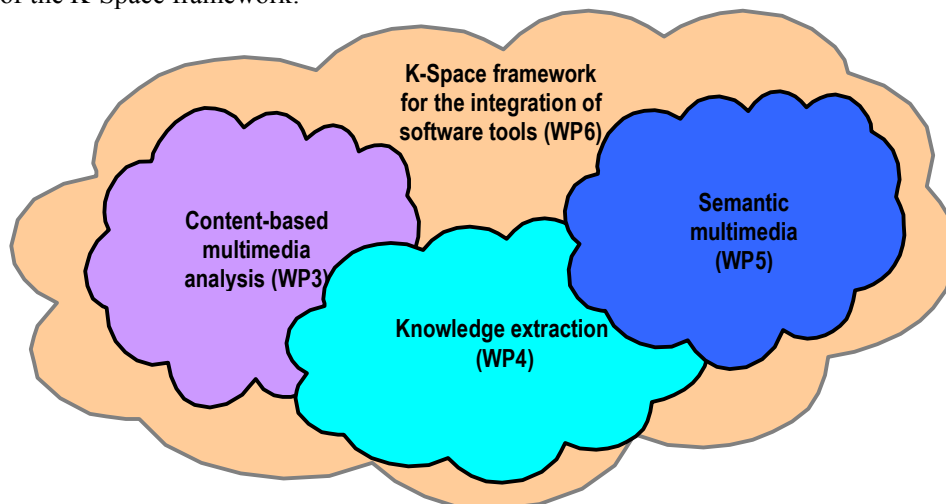


Figure 1: The K-Space framework.

Technical Background: Most of the technical work builds on existing technology, advancing the state-of-the-art by linking research across different communities and using available technology including.

- Ontobroker reasoning engine, Sesame RDF store, Protege Ontology Engineering environment and (c-)Pankow - information extraction technology

- Ostensive browsing, a new approach called ostensive browsing is introduced to address the issue of semantic gap and the developing nature of information needs.
- EGO a new system addressing the issue of result handling in query specification and personalization.
- QMUL/BUSMAN system developed in a past IST project, featuring low-level video analysis functionality.
- DCU content structuring tools including temporal segmentation, sequence classification, event detection, spatial segmentation tools, indexing tools and associated retrieval engines.
- The M-Onto-Annotiser tool and the multimedia ontology infrastructure, created in aceMedia, as well as aceMedia image analysis algorithms based on ontological structures (RDF).
- OWL-DL, OWL-QL and SWRL developed in KnowledgeWeb for representing reasoning and querying vague and imprecise information.

2.3 Specific Dissemination Objectives

Dissemination will be achieved by the usual mechanisms of research papers but also by issuing training material and tutorials on key topics. So, as well as research papers, each project partner will make available tutorial material so as to allow others to have ready access to developments in knowledge extraction, management, modelling, sharing and use. These contributions will be combined into coherent courses targeting chosen topics and offered at different locations in Europe. The NoE will use this material to prepare a joint distance learning course that will be linked into Masters courses at many of the contributing universities when the project is finished. A thematic book will be published at the end of the funding period.

A specific objective is to influence and contribute to related knowledge-based multimedia standardisation activities. Several dissemination forums, standardization bodies, international conferences and exhibitions have been identified and are targeted as part of the dissemination activities of the network.

The International Conference on Semantic and Digital Media Technologies (SAMT) is the main yearly event of the Network. It will serve as forum to disseminate scientific results to the broad research community and to foster links with other projects in the area. SAMT will be held at the end of each year in different locations according to the results of yearly open call for proposals to host the workshop. SAMT 2006 will be the first conference directly sponsored by K-Space and it is regarded as a follow up of the two previously organized EWIMT workshops in London 2004 and 2005. Other relevant events targeted by K-Space include but are not limited to: ACM Multimedia, XML Europe, WIAMIS, International Conference on Image Processing (ICIP), International Workshop on Content based Multimedia Indexing (CBMI), European Semantic Web Conference (ESWC) and the International Joint Conference on Artificial Intelligence (IJCAI).

2.4 Multidisciplinarity and Integrative Research

WP4 (knowledge extraction) aims at bridging low-level multimedia content processing techniques, with high-level domain and multimedia ontological knowledge. It combines the research activities of WP3 and WP5 in an interoperable way.

More specifically, activities in this WP combine segmentation and other low-level image analysis algorithms with ontological knowledge and reasoning processes. Partners with expertise in different research fields participate in the corresponding activities. QMUL, DCU and JRS deal with the low-level image analysis algorithms, Uni Ko-Ld and INA with the ontological knowledge and reasoning while CERTH focus on knowledge assisted multimedia analysis.

Similarly, building a multimedia ontology infrastructure in the same WP will involve the expertise of Uni Ko-Ld and DFKI on knowledge representation, ontology languages and tools. This is complemented by CERTH, JRS and CWI with expertise on low-level visual feature representation, multimedia standards and annotation.

In both cases, the research is focused on the pillar of "knowledge extraction" between content-based multimedia analysis and semantic multimedia, being at heart of the effort of bridging the semantic gap. It clearly evidences the integrative nature of most of the research and developments in the project and the fact that such multidisciplinary approach would not be feasible using developments conducted by each participant independent from each other.

2.5 Integrative Research Evidence and Key Tangible Outputs

Clearly, the planned integrative research goes beyond the participants' own research activities and the work they are performing within ongoing IST projects. This is evidenced by several factors including:

- The multidisciplinary nature of the envisaged research work. It draws on expertise from three different research communities involved in the project. The aim is not to incrementally advance the state-of-the-art independent from each other but to merge existing models into new multimodal paradigms.
- Publication of papers authored by members of different research communities involved in the project
- Use of complementary expertise to develop truly multimodal approaches.

2.6 Integrative Research Beyond K-Space Core Consortium

K-space foresees working relationship with other projects working on related areas of research and development. In particular we foresee building of strong links with the following projects: *X-Media* (common partners: Uni Ko-Ld and CERTH); *NeOn* (common partner: Uni Ko-Ld); *MESH* (common partners: QMUL, CERTH); *SALERO* (common partners: GU, JRS); *aceMedia* (common partners: QMUL, Uni Ko-Ld, DCU, CERTH); *MUSCLE* (common partner: CERTH); *KnowledgeWeb* (common partner: CERTH) and *Aim@Shape*.

3 List of Participants

Partic. Role*	Partic. Number	Participant name	Participant short name	Country	Date enter project	Date exit project
CO	1	Queen Mary, University of London	QMUL	UK	Month 1	Month 36
CR	2	Universitaet Koblenz-Landau	Uni Ko-Ld	D	Month 1	Month 36
CR	3	Joanneum Research Forschungsgesellschaft mbH	JRS	AT	Month 1	Month 36
CR	4	Centre for Research and Technology Hellas	CERTH	GR	Month 1	Month 36
CR	5	Dublin City University	DCU	IR	Month 1	Month 36
CR	6	Centrum voor Wiskunde en Informatica	CWI	NL	Month 1	Month 36
CR	7	Groupe des Ecoles des Télécommunications	GET	F	Month 1	Month 36
CR	8	Institut National de l'Audiovisuel	INA	F	Month 1	Month 36
CR	9	Institut Eurécom	EURECOM	F	Month 1	Month 36
CR	10	University of Glasgow	GU	UK	Month 1	Month 36
CR	11	German Research Centre for Artificial Intelligence	DFKI	D	Month 1	Month 36
CR	12	Technische Universität Berlin	TUB	D	Month 1	Month 36
CR	13	Ecole Polytechnique Fédérale de Lausanne	EPFL	CH	Month 1	Month 36
CR	14	University of Economics, Prague	UEP	CZ	Month 1	Month 36

Table 1: List of participants (*CO = Coordinator, CR = Contractor).

4 Relevance to the objectives of the IST Priority and Strategic Objective Semantic-based Knowledge and Content Systems

4.1 Relevance to main targets of the IST priority in FP6

Being a Network of Excellence K-Space' main contribution is to "facilitate the aggregation of public and private research effort on a European scale and enable the development of a European Research Area (ERA) in IST". This is reached by bringing together 14 renowned research organisations which are active in three different fields up to now only peripherally connected. The aggregation of research effort on an European scale is enabled and supported by developing and supplying a common software-infrastructure allowing directly using and exchanging research results from the different fields. This is accompanied by an ambitious program of scientific exchange (use of common tools and data, academic and industrial researcher exchange, joint conferences, seminars and curricula).

By providing algorithms to closing the semantic gap high level information could be extracted from multimedia content which in turn enables to implement "future generation of technologies in which computers and networks will be integrated into the everyday environment, rendering accessible a multitude of services and applications through easy-to-use human interfaces". The human interfaces will be easier to understand as the information to be provided by the user (e.g. in formulating a query) as well as information provided to the user with its higher semantic level is directly related to the personnel knowledge of the user and her experience. Overall results of K-Space will make media creation cheaper, by enhancing the quality of content annotation at the same or lower price point and such enabling wider content reuse as suitable content is easier to find. K-Space will contribute to standards that make technology adoption safer for the purchasing industries. Industry standards in the description of media content will be critical in allowing the innovation emerging from the NoE to be adopted on a large scale across multiple platforms. To achieve this, K-Space researchers will use the understanding developed during the project to contribute to key standards bodies and industry forums to ensure meaningful and useful standards for describing content are developed in lines with the needs of the industry. All this contributes to the goals of the e-Europe action plan.

4.2 Relevance to Strategic Objective 2.4.7 (Semantic-based Knowledge and Content Systems)

The IST strategic objective addressed for K-Space is the one concerned with semantic-based knowledge and content systems (2.4.7). Fundamental to this strategic objective is the acquisition and manipulation of multimedia content. Such content will increasingly be available across different modalities and subject to interaction via speech, gesture, feel and touch, and other senses. Many of the processes, interactions, and objects described in that objective are dependent on the semantics and context. That is, to acquire, model, navigate, retrieve, represent, visualise and make use of shared knowledge effectively depends on capturing the semantics of media objects in context. The objective of K-Space consortium is to develop techniques and tools for the semi-automatic annotation of multimedia content and its retrieval in context.

More specifically, although description of multimedia information has recently seen significant progress, the pace of automatic extraction of such a description, and especially of its semantic part, is rather slow and still remains an open issue. On the other hand, considerable achievements have been made in speech/text-based/ontology/semantic web knowledge representation, extraction and management techniques. A main novelty and objective of the work in K-Space is to bring these two communities' work together and develop a common knowledge representation framework for as automated as possible and efficient knowledge acquisition and modelling for multimedia content. This will result in automatic semantic metadata extraction and annotation, indexing and retrieval of multimedia content. It will also contribute to the maturity of the intelligent content vision. The diversity, complexity and multidisciplinary nature of this topic requires experts from fields such as signal processing, natural language processing and understanding, pattern recognition, knowledge representation and human factors engineering, complementarily represented in the K-Space consortium. Developing robust, flexible, and efficient solutions to this problem is perhaps the single most important and significant research challenge currently facing the multimedia analysis community for many years to come.

Successful resolution of these matters will allow more efficient and user-friendlier access to all forms of data and will improve data accessibility for all. Today, multimedia technology has expanded to encompass all facets of our daily lives - at work, at school, at home for leisure and learning and on the move - and it is reaching ever-widening segments of society. The Internet, e-mail, mobile phones, etc. are already standard channels for Europe's information society to communicate, gain access to new multimedia services and to learn new skills. Entrepreneurs are using multimedia and need new knowledge-based access technologies to improve their competitiveness and create new business opportunities.

5 Potential impact

5.1 Strengthening Scientific and Technological Excellence

Europe has a unique position in the scientific field of semantic technologies, where many of its core proponents come from Europe. For instance, Europe was at the forefront of developing OIL/OWL, at the forefront of the Semantic Web overall and a clear sign for this dominance is the fact that at the premier Semantic Web conference of last year, ISWC-04 in Japan, the number of European papers accepted outnumbered the American ones by a ratio of about 2:1. Though this is a solid starting point concerning the foundations of semantic technology, research on semantics is not done for the sake of its own, but in order to enable new possibilities for human-computer interaction or computer-computer interaction, such as multimedia management, knowledge management or e-business. Research in these areas has traditionally been a stronghold of research outside of Europe, such as the US or Japan. Notwithstanding European successes, scientific results leading to standards in these application areas and later on to products have been produced predominantly outside Europe.

K-Space seizes this unique opportunity by addressing the mutual needs of semantic technologies and multimedia from its both ends bringing a selection of the best researchers on the Semantic Web and multimedia together in the K-Space NoE.

5.2 Industrial Impact

Bridging the semantic gap in multimedia content processing makes it possible to provide higher level semantic information with less cost. This is viable for lots of business applications dealing with multimedia content; e.g. broadcast, media production, media monitoring and alike.

The recent PrestoSpace survey estimated that the total European holdings of audiovisual content amount to over 100 million hours. As well as being intrinsically valuable in a heritage and historical context, this repository also represents a significant financial asset. For example, it is stated in a recent EBU archive report, that the BBC, as part of an accounting exercise, valued its archive at €714 million based solely on the costs required to physically replace it were it to be destroyed. Clearly, these holdings represent a significant asset for both broadcasters and the general public alike. However, in order to achieve the real potential of these archives, there are a number of obstacles to overcome. One of these is the sheer volume of effort required for cataloguing this information store. The EBU report estimated, based on members' experiences, that a time ratio of 1:8 for TV material and 1:3 for radio material can be applied to the task of cataloguing. In practice, this means that a three hour program could feasibly take three working days to catalogue. Furthermore, depending on the granularity of cataloguing required, this can scale up to a ratio of 1:24! Research advances such as those proposed in K-Space can only serve to improve these ratios. In addition to savings during the cataloguing step further advantages could be realised on the base of the high-level semantic annotation as search times decrease and content is more easily found and thus more often reused.

Based on the higher quality information provided by K-Space new forms of media production (especially automated content assembly) could be developed and introduced. By giving European media professionals first sight of the new capabilities and by working with them at the innovation level to enable the programme ideas that can only be imagined today, K-Space can stimulate the creation of valuable knowledge-based assets that will bring wealth into the European Union. New, truly innovative formats enabled by K-Space could thus create significant wealth coming into Europe based on knowledge-based assets.

K-Space will also enable the development of new personalised services for e.g. iTV. The higher level semantic information could more easily be combined with user-profiles thus allowing more targeted information of the user or aggregation of information for a user.

5.3 Impact on SME's

Linked with technology transfer, SMEs will be encouraged to send employees to visit centres for periods so as they can share and contribute with the work at the centre. In particular they can learn how to use the ideas and tools being developed. Each site will also contribute private consultancy, particularly targeted to SMEs, so their problems can be addressed. All K-Space partners have strong links with other institutions outside the consortium and a number of spin-off companies originated in the past by consortium members. Spin-offs SMEs include: Insonify and Qmedia – spin-offs of QMUL; Emitall S.A – spin-off of EPFL; Ontoprise GmbH, Germany and wizAI-Solutions GmbH, Germany – spin-offs of Uni Ko-Ld; Oratrix – spin-off of CWI; HS-Art digital Service GmbH and doors2knowledge GmbH – spin-offs of JRS. SMEs in close collaboration with the participating teams will be approached and asked to host K-Space researchers' on short-term visits. The NoE participants expect this activity to foster industrial links and to help researchers to become familiar with real-world problems and means to tackle them.

5.4 Impact on Trans-European Education Master programs

We estimate that by 2006 Master programs in which K-Space partners are involved will train up to 800 Masters students a year. Several K-Space partners already offer distance learning and have facilities to initiate the programme. Relevant synergies with education at all levels will be set out and K-Space partners will be instrumental in this. The following are selected examples of relevant educational involvement of K-Space partners.

The Department of Electronic Engineering at QMUL specialises in Information Technology, in which area knowledge based multimedia processing features very prominently. Multimedia Applications, Internet Security and E-Commerce are expanding areas for the Department. As a consequence, the Department is now attracting around 200 new postgraduate students annually. This project will provide QMUL with a possibility to extend its expertise and the knowledge gained from the project will ensure that the content of QMUL's final year degree courses and its postgraduate courses is kept abreast of current and forthcoming developments in the Multimedia area. In particular, the Department has set up a new Master course in Multimedia Systems Technology. The results of this project will feed directly into this course. This will enable QMUL to extend its research profile and will also be invaluable in the context of its educational work.

Specialised in the field of Information Technology, the Groupe des Ecoles de Telecommunications current development plans call for a 50% increase in size over the next four years. The place of multimedia in the broad array of activities of GET is gradually increasing and the attractiveness of this area is receiving a continuously growing interest from our students. Although a strong cooperation for education is in place between the different graduate schools of GET, all of them have already a well established network with other European institutions. For example, ENST (Télécom-Paris) has joint degree agreements with five partner institutions in different European countries and agreements with a number of other institutions to provide the students with the possibility of completing their diploma requirements for ENST by enrolling independently in a recognized M.Sc. programme. As another example of already established cooperation at the European level, Eurecom institute, one the Graduate schools of GET was co-founded with EPFL and is now administered by a consortium of European academic and industrial partners. Clearly, K-Space will help to strengthen and extend such cooperation especially in the field of multimedia.

Dublin City University is fully committed to working with other academic institutions within the K-Space NoE in order to develop new trans-European education initiatives in the field of cross-media. The University already has a number of initiatives in place allowing remote access to undergraduate and postgraduate programmes as well as having formal agreements in place with a number of EU universities for exchange of students, whereby the results of modules undertaken in DCU constitute a formal component of an academic award in the collaborating university. These existing agreements and initiatives will be used as a spring-board for development of similar activities with K-Space partners. Many of the practical mechanisms required for trans-European education initiatives are already in place in DCU. For example, in recent years, the School of Electronic Engineering has launched a postgraduate programme entitled RACeE - Remote Access to Continuing Engineering Education¹. These courses have a total of almost 200 registered students annually. The M.Sc. in Technical eCommerce can trace its roots back to EUROIEMASTER (IE2012) project (Towards the Development of European Education and Training Qualification in Information Engineering), a horizontal RTD activity in Information Engineering as part of the EU FP4, finished in 1997.

The Department of Computing Science, University of Glasgow have initiated an integrated MSc programme and advanced MSc programme from October 2004 onwards. The idea of this course is to train students at an advanced level in various fields of computing of which multimedia is an important area. It is expected that students from Europe and the rest of the world would undertake this course. The K-Space activities and especially the distance learning modules would be a real benefit for this course by providing advanced techniques by leading experts from Europe. This will allow us to train the students on latest in the field and thus increasing the quality of the output and thus increasing our research and teaching profile.

DFKI has a technology transfer agreement with the Saarland University, more specially the Faculty of Informatics and the Department of Computer Linguistics. The Department of computer linguistics is involved in an International Graduate College, dedicated to Natural Language, Perception and Cognition. DFKI would investigate how research work in K-Space could be integrated in this Graduate College. DFKI also has good connections with Sympalog GmbH, a successful spin-off of DFKI in the domain of voice applications.

¹ www.racee.ie

5.5 Contributions to standards

With a view to bringing new functionalities with reduced cost, increased performance and more flexibility and easiness, the K-Space NoE will aim at contributing to existing and emerging standards. It is now widely recognised that the standardization of a new technology is beneficial to the industry and to the end-user. This is the reason why K-Space will invest significant efforts into standards activities and will contribute wherever and whenever possible.

This project is tackling several topics which are currently under consideration by ISO/IEC JTC1/SC29 WG 11 (MPEG), WG1 (JPEG) as well as XML, XML Namespaces, RDF, XSL, XSLT (W3C) standard bodies. An objective of K-Space is therefore to actively participate and contribute to these standardisation activities with the expectation of having a significant impact on the development of these standards. As an example, adoption of the ontology layer features OWL (Ontology Web Language) which is a family of richer ontology languages (OWL Lite, OWL DL, OWL Full) is targeted in K-Space activities. K-Space also strengthens and supports partner's participation in the development of future XML-based standards.

The aim of this Semantic Web Best Practices and Deployment (SWBPD) Working Group is to provide hands-on support for developers of Semantic Web applications. Within SWBPD WG there is an effort for the creation of a Task Force (TF) aiming at bridging the gap between ISO standards (RDF, OWL) and W3C standards (MPEG7, MPEG21). K-Space will contribute in the investigation of potential approaches for multimedia annotation strategies that combine and/or integrate the SemWeb languages with MPEG-7 tools in an interoperable way. The efforts for creating this WG are coordinated by CWI and CERTH. CWI is a contributor to the W3C SMIL 1.0, SMIL 2.0, and XHTML recommendations and as well as to ISO's MPEG7 DDL Working Group. CWI is currently participating in the W3C Semantic Web Best Practices group which aim is to provide hands-on support for developers of Semantic Web applications. This involvement will greatly contribute to WP5 that builds a reference architecture that will be used throughout the K-Space project.

In the eContent project LIRICS, DFKI contributes to standardisation activities within the ISO TC37/SC4 committee dedicated to language resource management. The link between standards for language resources and MPEG-7/MPEG-21 will be one of our main concerns. DFKI is also contributing to the ISO TC37/SC4 Task Domain Group (TDG) on multimodal semantic representation.

K-Space also addresses important standardization issues of MPEG-7 and MPEG-21. As an early adopter of MPEG-7 and MPEG-21, the NoE builds know-how in these fields to be able to contribute new technologies along the road. Joanneum Research (JRS) is an avid user and supporter of MPEG-7. In past projects a comprehensive API for MPEG-7 has been implemented and made publicly available (MPEG-7 library: <http://iis.joanneum.at/MPEG-7>). Based on this API a media repository focusing on content based indexing and retrieval has been implemented. As a result of the experiences JRS proposed the "Detailed Audiovisual Profile". In the course of K-Space it is expected that a number of new descriptors and description schemes as well as profiles suited to certain application areas will be developed and actively contributed to ongoing MPEG-7 standardisation activities. JRS also focuses on industry standards directly linked to media production like MXF and AAF.

JPEG has recently started a new work item, JPSearch, to standardize technology for indexing, search and retrieval of JPEG 2000 images. The Ecole Polytechnique Fédérale de Lausanne has been one of the initiator of this new activity and will continue its involvement in the future. It will also be a liaison between JPSearch and the MPEG-7 group, as these two groups are considering similar issues.

6 Outline Joint Programme of Activities (JPA) for the Full Duration of the Project

The project consists of eight workpackages (WPs). WP1 is dedicated to the coordination activities. The division between the other seven WPs has been chosen to group activities and skill types required to implement the strategic objectives of the NoE. While WP2, WP6 and WP7 are dedicated to the Integration and Dissemination activities, two main strategic objectives of K-Space, the other four WPs group all the R&D activities of the Network. WP8 focus on the assessment and evaluation of the project progress and outputs. As shown in Figure 2 the Jointly Executed R&D activities of K-Space (JRA) are the backbone of the Network. The JRA are embraced by the two WPs dedicated to integration and excellence spreading. The strategic objective of sustainability and lasting impact is embedded in several activities across the seven WPs of the project. Figure 2 shows the interconnections between WPs. Interaction will also be required at activity and sub-activity level, particularly where R&D work is concurrent or dissemination activities are needed to spread excellence and to disseminate specific research results.

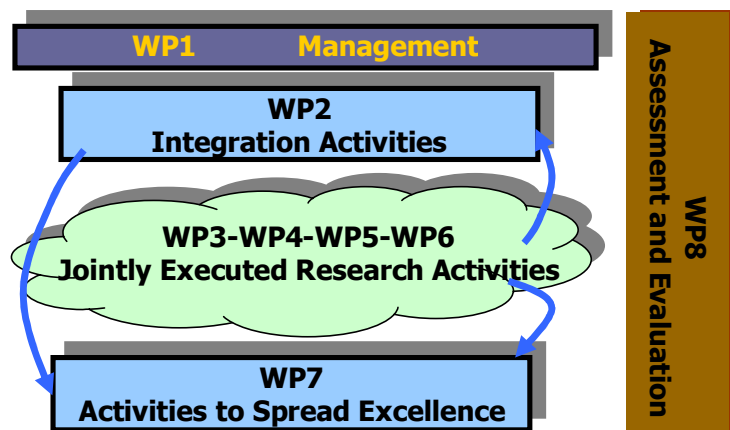


Figure 2: WP structure and interrelation with the main activities.

Many of the partners of K-Space either currently collaborate or have collaborated in the past. However, for the most part this corresponds to a loose set of bilateral (or trilateral) collaborations focusing on a specific technological aspect, which whilst demonstrably successful are difficult to sustain and by their very nature have relatively little impact on the European Research Area as a whole. K-Space builds on existing relationships where they exist and will forge new interdisciplinary relationships where previously there have been none. Clearly, initially this will happen between the existing partners within the network. However during its lifetime the network will also reach out to the wider academic and industrial community and initiate new collaborations with partners not currently members of the K-Space NoE. Integration activities will be carried out as a number of multi-partner tasks within WP2 and WP6. The envisaged integration activities can be divided into two main streams:

- Facilitating mobility of researchers and shared teaching resources, WP2
- Implementation of the K-Space infrastructure for integrative research, WP6

At technical level K-Space focus on collaborative research and development on knowledge acquisition. The key objective of the work in WP3, WP4 and WP5 is to narrow the gap between the low-level content descriptions that can be computed automatically by a machine and the richness and subjectivity of semantics in high-level human interpretations of audiovisual media. While the integration activities in WP2 are the natural by-products of a network that supports concerted collaborative activities between large numbers of researchers, the objective of WP6 is to design and instantiate the technical infrastructure required to enable and facilitate these integration activities to take place. It will ensure that the necessary support is in place in order to allow partners to collaborate effectively. Finally, WP8 is dedicated to the project monitoring and assessment.

6A - Activities

6A.1 Integration activities - WP2

In this section, a description of the different types of non-technical integration initiatives envisaged within WP2 is given. Technical integration activities are described within WP6.

Activity WP2.1: Exchange of Academic Research Personnel and PhD Students

This activity aims to facilitate the mobility of research personnel with the Network via three sub-activities targeting different kinds of scientific missions. As coordinator of this activity, GU has responsibility for gathering reports submitted by partners after a scientific mission has taken place, i.e. collecting formal reports on the achievements and outputs of each mission and feeding these back to the Network.

Exchange of researchers via short-term fellowships will be organised and will consist of a series of research personnel exchanges whereby one partner will host researchers from another partner for up to 3 months. These short-term research fellowships will be approved by the Network Executive Committee (NEC) based on proposals submitted by partners. In special cases the short term fellowships may have financial support from the central budget allocated to support PhD exchange. This will apply only to partner with no PhD students in the network.

Exchange of PhD students is a main target of the network and will be supported financially from a central budget allocated with this aim. PhD exchanges will be carried out through the whole project duration and will last minimum 6 months and maximum one year. It is estimated that 30 PhD exchanges will be conducted by the end of the project.

Short visits by the senior researchers in order to foster new collaborations are also supported. Here, established researchers will visit another partner for activities such as a presentation of his/her research, a tour of the host's lab facilities, demonstrations of the host's research results, etc.

Activity WP2.2: Industrial Placement of Research Personnel

In this activity, industrial players will be approached to host Network researchers. Special liaison activities and placements will be sought with the members of the K-Space Industrial Advisory Board. As coordinator partner UEP will have responsibility for gathering reports submitted by partners after an internship has taken place, i.e., collecting formal reports on the achievements and outputs of each internship and feeding these back to the NoE.

It is expected that PhD and postdoctoral level researchers will be hosted by industrial players for short periods of time. During this period, the researchers will act as short-term employees participating in the day-to-day business of the industrial participant in this NoE schema. It is expected that the members of the K-Space Industrial Advisory Board plays an important role in helping to realise this activity.

In the period immediately following the submission of a thesis by a PhD student within the Network, the student will have the opportunity to take up a short-term industrial placement. The placement acts a "finishing school" for PhD students, giving them breathing space in a relevant training environment prior to the next stage of their career.

Activity WP2.3: Shared Teaching Resources

This activity will leverage existing teaching resources of the academic partners as well as new resources prepared for the K-Space annual Summer school. It will develop the tutorial material prepared for the annual Summer school and the technical presentations made as part of the workshop for web-based access. This will involve producing an indexed and searchable version of the material presented, adding any web-based demos available and structuring the content to provide links between specific resources.

Activity WP2.4: Summer schools and European Master and PhD program

The summer school program will be introduced to bring the young researchers in touch with the most promising research in the fields covered by K-Space. To this end, annual thematic summer schools will be held. These summer schools will consist of several tutorials delivered by researchers from the network, each of at least 1/2 day perhaps with hands-on practical work. Another aspect of the summer school will be a mini-conference, at which the students present their research (either as a poster or spoken presentation) to one another. Prizes and commendations will be awarded. Students across Europe will be able to apply for scholarships for attending this activity. A limited number of scholarships will be awarded to fund the associated travel expenses.

K-Space plans to devise European Masters programmes and modules designed to train the next generation of media technologists, content engineers and technology-aware content originators. It would also represent an essential path towards the harmonisation of high level education in Europe. This is a long term goal to which K-Space partners are committed.

The first Master program will be launched in 2007, in which there will be sharing of materials across institutions (for example using the K-Space Tutorials) but each will teach its own students locally from those common materials. This is to ensure the robustness of the programmes before releasing to potentially large

audiences. In the following year, and making reference to considerable experience in distance learning throughout the NoE, each module will be delivered from a single site over the Internet to students registered at a variety of partner institutions. Here we foresee that there is a significant opportunity in advanced training modules delivered ‘to the office’ by distance learning for students/engineers who are in full-time employment.

K-Space will also propose a European Ph.D. Program to pave the way for the achievement of this objective, several initiatives will be conducted:

- The establishment of a *co-supervision framework* to allow a student to have two supervisors from different universities/countries
- The introduction of special distinctions such as the *European Doctorate distinction* for Ph.D. thesis defended in front of a truly international defence committee.
- Promote a much stronger integration of doctoral programs between the universities of the network. Such integration would include signing of inter-university agreements to include common teaching stage and common research stage leading to an European mention for thesis carried out within this programme.

6A.2 Programme for jointly executed research activities: JRA (WP3, WP4, WP5 and WP6)

6A.2.1 Content-based multimedia analysis – WP3

Research into tools and methodologies for low- and medium-level multimedia content analysis will be conducted. The target is to tackle the semantic gap in a bottom-up approach, i.e. adapting low-level techniques for knowledge-based multimedia analysis. For the results of these analysis algorithms suitable descriptors or description schemes for MPEG-7 or other appropriate description standards will be developed. The information provided by this WP will be used in WP4 and WP5 to gain higher-level information from the extracted low- to mid-level information. The modules or applications will follow the interfaces defined in WP6 enabling easy access by applications from other WPs.

A detailed description of the research plan for the first phase of the project (months 1- 18) is given in section 9. The following is an outline of the workplan for the second project phase (months 19 - 36).

Outline of research work for the second project phase (months 19 – 36): MPEG-7 description schemes will be further elaborated and finally contributed to the appropriate standardisation bodies within WP7.7 “Contribution to standards”. The research activities in this workpackage (content structuring, moving object segmentation, event detection, audio processing, text analysis and data mining) will be further extended and finally combined in a manner yielding the optimum result. Content description is a transversal topic across all the other activities in this WP, and in close relation to other workpackages extracting content descriptions, proposing on the one hand extended and new descriptors and description schemes and on the other hand profiles suitable for media processing and inference of higher level descriptions.

Activity WP3.1 Content Structuring

Revealing the structure of content items (film, video) helps in inferring semantic information, and is an important prerequisite for summarization and browsing. Despite the different structure in different types of content, there is a set of commonly applied rules to express content coherence, which are generally understood by a human audience. The ultimate goal would be to decode this “grammar of moving images”, thereby giving the user a high level structural overview on the content. This activity focuses on extracting the structure of one audiovisual content item. The features that are extracted for this purpose are also highly relevant for data mining, especially for supporting browsing and exploration of multimedia collections.

A detailed description of the research plan for the first phase of the project (months 1- 18) is given in section 9. The following is an outline of the workplan for the second project phase (months 19 - 36).

Outline of research work for the second project phase (months 19 – 36): In order to be able to further decode the structure of content items and to infer semantic content coherence, more low-level information will be used. This encompasses shot and transition information in the audio and visual domain (here also the detection of graphical/effect transitions/wipes are important), scene segmentation (by using features like speaker(s) continuity, camera movement detection, shot similarity (again in the audio and visual domain)), detection of concepts such as events, detection of setting or classification of shot setting (indoor, city ...) and scene type (dialogue, action, montage, etc). In most of the cases multimodal techniques have to be used to infer the content structure. This activity will focus on the reliable extraction of the lower level information and using this as the basis for techniques for content structuring.

Activity WP3.2 Moving 2D and 3D Object Segmentation and Indexing

Information on the objects present in a scene is fundamental for high level knowledge extraction, object recognition and classification. Based on the extraction of individual moving objects and their categorization and description the interaction between objects can be described. This task will deal with segmentation and indexing of objects extracted from video sequences and annotation of 3D objects.

During the first 18 months, approaches to moving object segmentation will be investigated and the extracted objects will be described in a manner suitable for higher level knowledge extraction. This includes extracting both the low-level features (colour, texture, shape) of the regions constituting the object and a structural description of the object (relation of the object's regions) and the interrelationship of the individual regions over time. Work in the period, will also focus on preliminary investigation of 3D model indexing. To this end, a suitable test corpus of 3D models will be sourced (e.g. from existing projects such as AIM@SHAPE, where appropriate) and a comparative assessment of 3D indexing techniques carried out.

A more detailed description of the research plan for the first phase of the project (months 1- 18) is given in section 9. The following is an outline of the workplan for the second project phase (months 19 - 36).

Outline of research work for the second project phase (months 19 – 36): In the second project phase, segmentation work will focus on extending segmentation and classification techniques to video sequences and more extensive feature extraction (e.g. based on feedback from the research on relevance feedback being carried out elsewhere in the Network).

In this period, existing state of the art in 3D annotation and indexing will be extended via the development of pose-invariant geometric features and associated matching metrics as well as evaluation of same using the identified test data sets.

Activity WP3.3 Audio/Speech Processing and Text Analysis

The aim is to advance the state-of-the-art in audio semantic analysis and feature extraction. Furthermore, it appears essential to develop low-level, ontology-aided techniques and cognitive processing engines able to integrate knowledge and intelligence even in low-level analysis. Extension of state-of-the-art processing and analysis algorithms to handle high-level, conceptual representations of knowledge embedded in audiovisual and textual content based on reference ontologies and intelligence techniques will be explored.

The activity considers all types of audio sources ranging from speech to complex polyphonic music signals. The recently standardized MPEG-7 defines how audio signals can be described at different abstraction levels: from the lowest level primitives, such as temporal or audio spectrum centroids, spectrum flatness, spectrum spread, inharmonicity, etc., to the highest level, related to semantic information. Semantic information is related to textual information on audio such as titles of songs, singers' names, composers' names, duration of music excerpt, etc. Methods for the classification and time-frequency segmentation of audio signals will be developed.

Text extracted using optical character recognition will be analysed. The activity will also be concerned with available textual metadata on an image/video or with texts surrounding an image (like caption or typical expressions referring to the content of an image, like "This picture depicts a..."). Textual analysis can also be applied to a certain extent to the transcripts resulting from speech recognition procedures.

A more detailed description of the research plan for the first phase of the project (months 1- 18) is given in section 9. The following is an outline of the workplan for the second project phase (months 19 - 36).

Outline of research work for the second project phase (months 19 – 36): Jointly time and frequency domain feature extraction will be extended. Linear data-driven feature transformations which transform the original feature stream into a base with lower dimensionality and better statistical properties will be investigated. Particular attention will be devoted to the evaluation of various acoustic modelling strategies and statistical inference methodologies. These will include e.g. hidden Markov models, dynamic Bayesian networks, neural networks, and support vector machines, for each of these, various learning strategies will be considered.

Limitations of techniques developed in the first project phase will be assessed and tackled. The focus will be on integrating technology developed in this activity with the content extracted in WP5.4 in the framework of a multimodal content structuring.

Activity WP3.4 Content Description

We aim at developing tools and means to describe the metadata extracted by the content analysis tools of this WP. Based on existing standards for multimedia content descriptions (MPEG-7), description schemes and descriptors will be extended or new descriptors will be defined. In cooperation with WP 7.7., these

extensions will be contributed to the appropriate standardisation bodies. The profiles are tailored towards their respective application domain, so that they avoid unnecessary generality and thus foster interoperability and reduce the complexity of applications working with the descriptions. This activity is horizontal to the other activities of this WP.

A more detailed description of the research plan for the first phase of the project (months 1- 18) is given in section 9. The following is an outline of the workplan for the second project phase (months 19 - 36).

Outline of research work for the second project phase (months 19 – 36): As a structuring activity, infrastructure for automatic content analysis will be developed. In addition to this, metadata profiles will be developed appropriate to hold all the information needed for efficient content based indexing, search and retrieval. Furthermore both local and distributed infrastructure for creation and manipulation of MPEG-7 documents, including reference implementation for the newly defined descriptors and description schemes, will be provided. The content analysis and MPEG-7 infrastructure will be based on components currently developed at JRS and provided together with WP3 to all relevant WPs.

6A.2.2 Knowledge extraction – WP4

WP4 aims at exploiting the development and results of WP3 and WP5 to provide techniques for the semantic analysis, annotation and retrieval of multimedia content. The overall approach will be based on knowledge assisted content analysis and annotation using a multimedia ontology infrastructure. More specifically, semantic and low-level attributes of the objects to be detected in combination with appropriately defined rules developed within WP5 will determine the set of algorithms, which will be the aim of WP4, and parameters required for the detection of semantic objects. Semantic concepts within the context of specific domains will be defined in ontologies, extended with qualitative attributes of the semantic objects (e.g. colour homogeneity), multimedia processing methods (e.g. colour clustering), and numerical data or low-level features (e.g. colour models, also defined in the ontology). Semantic Web technologies will be used for knowledge representation including rules to describe how tools for multimedia analysis should be applied according to different object attributes and low-level features as extracted in WP3.

A detailed description of the research plan for the first phase of the project (months 1- 18) is given in section 9. The following is an outline of the workplan for the second project phase (months 19 - 36).

Outline of research work for the second project phase (months 19 – 36): The main objectives are to finalise and integrate the multimedia annotation and analysis tool and the ontology infrastructure in the K-Space framework and insert new knowledge to create new tools according to the requirements produced in the first 18 months. In particular:

- create new multimedia ontologies and update the existed ones
- create multimedia domain ontologies that represent specific domain from a multimedia analysis perspective
- finalise and integrate the knowledge assisted analysis tool
- construct a rule-based reasoner to work on top of the constraint reasoner
- implement the fuzzy reasoner based on the fuzzy extensions of OWL-DL
- integrate the intelligent user relevance feedback and the context based multimedia mining

Activity WP4.1 Specification of a Multimedia Ontology Infrastructure

Development of a multimedia ontology infrastructure based on the knowledge representation infrastructure and language extensions developed within WP5. This will contain qualitative attributes of the semantic objects e.g. colour homogeneity, multimedia processing methods, e.g. colour clustering, and numerical data or low-level features, e.g. colour models. Furthermore, to facilitate full scale annotation of multimedia documents, the ontology infrastructure will also contain the representation of the top-level structure of multimedia documents.

Specific activity objectives are: firstly, the research on top-level multimedia content ontology will develop representation of the structure of the content of multimedia documents; secondly, the research on low-level visual feature ontology will concentrate on modelling the concepts and properties that describe visual features of objects, especially the visualizations of still images and videos in terms of low-level features and media structure descriptions; lastly, designing the prototype knowledge base will enable automatic object recognition in images and video sequences. Prototype instances will be assigned to classes and properties of the domain specific ontologies, containing low level features required for object identification.

A detailed description of the research plan for the first phase of the project (months 1- 18) is given in section 9. The following is an outline of the workplan for the second project phase (months 19 - 36).

Outline of research work for the second project phase (months 19 – 36): Specific activity objectives of the last 18 months are: firstly, to update the existed multimedia ontologies with the new requirements that have been produced during the first 18 months; secondly, to create multimedia domain ontologies that represents a specific domain (e.g. Football) from a multimedia prospective; thirdly, align and maintain the multimedia ontologies; lastly, to update the knowledge base according to the new knowledge that is inserted. Additional aspects of the work in the second project phase include:

- update the existing multimedia ontologies with the new requirements produced during the first phase
- create multimedia domain ontologies that represent a specific domain (e.g. football) from a multimedia analysis perspective
- align and maintain the multimedia ontologies and update the K-Space knowledge base.

Activity WP4.2 Knowledge-assisted Multimedia Analysis

This activity addresses semantic object detection exploiting the ontologies of WP4.1 and the content processing algorithms of WP3 in order to apply the most appropriate detection steps for the analysis process. Knowledge assisted multimedia analysis is divided in two levels. In the first level, numerical algorithms are used to exploit symbolic a-priori knowledge to extract objects that may have symbolic meaning. In the second level, ontological knowledge will be employed to infer high-level concepts and events through which context can be acquired. Both are carried out in an interactive fashion. This is a central activity of WP4, as the multimedia ontology infrastructure of WP4.1 is employed to analyze content, assisted also by the reasoning and context analysis techniques of WP4.3 and WP4.4, respectively.

A detailed description of the research plan for the first phase of the project (months 1- 18) is given in section 9. The following is an outline of the workplan for the second project phase (months 19 - 36).

Outline of research work for the second project phase (months 19 – 36): The main objective is to import domain and multimedia knowledge in low-level multimedia analysis algorithms. Multimedia visual, structural and domain ontologies along with multimedia reasoning will provide the means for combining low-level multimedia analysis algorithms and semantic descriptions of multimedia content. Specific components of the workplan include:

- development of multimedia analysis tools combining spatiotemporal knowledge and constraint reasoning processes for object labelling in images/video
- development of tools to extract visual context from images/video and employ it in their analysis
- exploitation of rules to infer higher level knowledge such as composite concepts and events
- creation of specific concept detectors, e.g., human detector, for assisting the automatic annotation process.

Activity WP4.3 Multimedia Reasoning and Annotation

This activity targets extraction of meaningful interpretation of high level events and automatic semantic annotation, in collaboration with numerical and symbolic analysis of WP4.2. Although at the knowledge assisted multimedia analysis stage of WP4.2 the produced segments bear semantic information, further analysis and consistency checking is required to provide for the robust, accurate detection and representation of meaningful concepts in compliance with human perception. This is not simply a post-processing step; knowledge-assisted analysis and reasoning are rather two coupled mechanisms. A multimedia constraint reasoner will be developed to process the set of initial region labels produced in WP4.2 and generate a reduced number of regions along with a reduced set of hypotheses for each one, thus assisting in the task of semantic analysis in WP4.2. Along with the constraint and the rule-based reasoning, general purpose reasoning will enable full scale semi-automatic annotation of the multimedia content. For this purpose, it is essential to check the consistency and the validity of the produced instances, extract implicit knowledge using subsumption and equivalence relations defined in the ontologies and, finally, transform semantic knowledge into numerical data, if necessary, to be used in the analysis process.

A detailed description of the research plan for the first phase of the project (months 1- 18) is given in section 9. The following is an outline of the workplan for the second project phase (months 19 - 36).

Outline of research work for the second project phase (months 19 – 36): The main objective is the completion and the integration of the reasoning modules in the K-Space framework. The workplan for the second project phase includes the following specific aspects:

- finalize the constraint reasoner and integrate it with the knowledge assisted multimedia analysis tool
- implement a fuzzy constraint reasoner to handle fuzzy spatiotemporal constraints

- implement a rule-based reasoner to handle topological and partonomic rules to further improve multimedia annotation
- carry out fuzzy extensions to Description Logics and more specifically to SHOIN(D) (OWL-DL) to enable reasoning algorithms to handle uncertain knowledge; uncertainty handling is a key task in multimedia analysis and annotation where matching, detection, representation, and retrieval are not a matter of yes or no

Activity WP4.4 Context based Multimedia Mining

The objective of this activity is to mine relationships between and among data items in a collection and use them for intelligent retrieval. Such relationships can be encrypted between the components of the data items, e.g., video and audio, between data items in the collection or the usage information associated with the data items. Making use of the relevant results of other activities in this workpackage and WP5, we will develop new techniques for mining, intelligent retrieval and adaptive presentation. Specifically we will make use of the abundant contextual information available. Visualisation of the information with spatial distances between pieces of information will be used to filter, mine, disambiguate and make contextual large amounts of information. These aspects are related to content mining, i.e. studying the message carried by or hidden in the document contents from a given domain, taking into account various type of information linkage and user's interactions. A special area to tackle here is the structuring and browsing of raw material (so called rushes), this often contains very similar and lengthy shots. Providing tools to be able to get a quick overview on the set of rushes and depict the items/sections most relevant to the current production is an essential aspect of the work in this activity. A description of the research plan for the first phase of the project (months 1- 18) is given in section 9. The following is an outline of the workplan for the second project phase.

Outline of research work for the second project phase (months 19 – 36): During the second 18 months we will extend the results of pattern mining developed in the first phase to study relationships between components of multimedia items e.g., audiovisual content. In this phase we need to link, and synchronise mined patterns from various components, e.g., events detected from audio with that of image components of video. New techniques will be devised and applied to new domains, e.g., football video. Study of new technique for mining image collections and presenting the data retrieved using the mined patterns is also targeted. Finally, building on the results obtained during the first project phase improved visualisation tools will be developed. Summarization tools will be combined with visualization and graphic user interfaces to provide appealing means for browsing of multimedia content.

Activity WP4.5 Intelligent Image Classification and User Relevance Feedback

The main objective of this activity is to exploit human-machine interaction as complex interplay between user, the audio-visual content, and their semantic interpretations. Initial work will focus on binary classification problems using support vector machines and biologically inspired image classification techniques. Additional work will study semantic information from past experience using relevance feedback. Given a piece of multimedia content, the user will input information on its relevance with respect to a predefined semantic concept. The machine will learn from this input and infer corresponding classes of content in a further classification iteration. Multi-objective optimization and meta-heuristic approaches inspired on biologic systems will be investigated and intermediate results will be use to reinforce automatic annotation extracted in other activities. A detailed description of the research plan for the first phase of the project (months 1- 18) is given in section 9. The following is an outline of the workplan for the second project phase.

Outline of research work for the second project phase (months 19 – 36): The workplan for the second project phase will be based on the results obtained in the first 18 months. Using the results from WP4.3, intelligent image classification will exploit ontological analysis and reasoners developed in the first project phase. Work will be extended to complex media and multimodality will play an important role in the relevance feedback and learning processes targeted for this project phase.

An important part of the work in the second project phase will be devoted to the use of multi-objective optimization and meta-heuristic approaches inspired on biologic systems, as well as the integration into the K-Space software framework coordinated in WP6. Focus will be given to techniques based on ant colonies, swarm particle optimization and artificial immune systems.

Another important aspect of the work will be the integration of derived semi-automatic annotation tools with visualization techniques from WP4.4. The use of graphical user interfaces and visualization techniques developed in WP4.4 to enhance relevance feedback is also part of the work in the second project phase.

6A.2.3 Semantic multimedia – WP5

This workpackage will use and extend semantic web technology in order to respond to the needs of multimedia analysis and knowledge extraction and, thus, to facilitate the bridging of the semantic gap top down. The rationale behind the approach in this workpackage is that a purely bottom-up approach will not be sufficient to close the semantic gap, because a lot of knowledge around the use and the context of multimedia sources is needed in order to bridge between low level multimedia features and the pragmatics of its use.

Research in this WP is structured along four tasks:

- Represent semantic metadata as well as experience and needs of users semantically in order to represent bottom-up results and user context.
- Investigate how people interact with multimedia in order to derive new semantic characterizations, which may be exploited in the life cycle of the multimedia data.
- Extract knowledge from complementary sources (such as subtitles of movies or web sites of similar multimedia data) in order to derive additional semantic characterizations.
- Provide a mechanism to handle such additional context-based characterizations, i.e. constructing, representing, querying and using them.

A detailed description of the research plan for the first phase of the project (months 1- 18) is given in section 9. The following is an outline of the workplan for the second project phase (months 19 - 36).

Outline of research work for the second project phase (months 19 – 36):

The second project phase will be used:

1. in order to implement specifications from the first phase,
2. to go from centralized solutions (semantic management of multimedia on one node, content analysis on one node) towards decentralized solutions (semantic management of multimedia in a distributed framework, analysis of distributed data), and to
3. to go from one way mode of retrieving multimedia towards a more interactive style of handling multimedia objects.

Activity WP5.1 Knowledge Representation for Multimedia

Existing standards for knowledge representation do not appropriately allow distinguishing facts about a picture, such as a picture being 5MB, from topics of a picture, such as a picture being about a tsunami, and from quotations of an event or state that a picture shows, e.g. a picture depicting Schuhmacher winning pole position. While RDF provides very simple primitives (reification) to do this in principle, these primitives are not easily usable, they are not powerful enough and they do not easily scale up to more powerful ontology languages – thus languages like OIL or OWL always have ignored them leading to the unfortunate situation that it is hardly possible to describe a complex event appearing in some multimedia.

Activity WP5.1 provides the comprehensive means to represent semantic multimedia content and context and reason with it. In the first year the work will be restricted to defining the corresponding languages. After month 12, the development of reasoning mechanisms for extended semantic multimedia representations will be started

A detailed description of the research plan for the first phase of the project (months 1- 18) is given in section 9. The following is an outline of the workplan for the second project phase (months 19 - 36).

Outline of research work for the second project phase (months 19 – 24): This task is intended to finish in month 24.

The work started after month 12 will be continued in order to provide extended semantic reasoning mechanisms for the languages defined until month 12. Eventually semantic metadata should be exploited in a most fruitful way using the expressive capabilities of the extended knowledge representation language and the ontologies. To this end we will investigate semantic reasoning mechanisms such as semantic similarity reasoning, spatiotemporal reasoning and access to quotations about multimedia data.

Activity WP5.2 Reference Framework for Distributed Semantic Management of Multimedia Metadata

This activity works towards a collaborative distributed framework for annotating multimedia and sharing those annotations. Since it is unrealistic within the scope of a basic research project to provide a full-fledged

implementation that includes state-of-the-art clients and full client usability, this activity does not aim at such an objective, but rather at a framework specification for such a collaborative framework.²

A detailed description of the research plan for the first phase of the project (months 1- 18) is given in section 9. The following is an outline of the workplan for the second project phase (months 19 - 36).

Outline of research work for the second project phase (months 19 – 24): While the first 18 months aim at a basic implementation for handling multimedia metadata at one node as specified in activity WP5.1, the work in months 19-36 aims at a full-fledged description of the collaborative Distributed Reference Framework (month 24) and its realization in a concrete prototype (month 36). The objective is that if k people share n multimedia items providing m annotations on each item, the resulting amount of metadata could achieve $O(kmn)$ annotations.

Activity WP5.3 Semantics-based Interaction with Multimedia

This activity serves the need for semantics-based interaction with multimedia including retrieval of relevant data by querying and filtering, for interactive presentation and for annotation by mining the interaction path in order to feedback user interaction into the multimedia semantics (emergent semantics by interaction).

A detailed description of the research plan for the first phase of the project (months 1- 18) is given in section 9. The following is an outline of the workplan for the second project phase (months 19 - 36).

Outline of research work for the second project phase (months 19 – 24): In the first 18 months this activity will focus on the task of semantic retrieval. In the second 18 months, this activity will elaborate the possibilities to *interact* with semantic multimedia in order to generate dynamic presentations based on semantics and in order to feed back semantic annotation derived from user interaction back into the knowledge base.

Activity WP5.4 Knowledge Extraction from Complementary Sources

The human understanding of multimedia resources is often facilitated by usage of complementary resources. This activity develops mining activities from complementary resources in order to reduce the semantic gap by deriving annotations from these complementary resources.

This activity will address mining within two different types of resources:

- Mining Primary Resources: Analysis of the primary resources that are attached to the multimedia data, e.g. texts around pictures, subtitles of movies, etc.
- Mining Secondary and Tertiary Resources: Analysis of data and text related to the multimedia data under consideration, e.g. a programme guide for a TV broadcaster or a web site displaying similar pictures.

In the first 18 months this activity will focus on the development and evaluation of mining methods from primary complementary resources.

A detailed description of the research plan for the first phase of the project (months 1- 18) is given in section 9. The following is an outline of the workplan for the second project phase.

Outline of research work for the second project phase (months 19 – 24): In the second 18 months this activity will focus on the development and evaluating of mining methods from secondary complementary resources. In particular, we will investigate how co-occurrence of multimedia objects or names of multimedia objects in other contexts (e.g. on another website) may be used in order to propose metadata about the multimedia object itself.

6A.2.4-Space Framework for the Integration of Software Tools –WP6

The objective of WP6 is to design and instantiate the technical infrastructure required to enable and facilitate integration activities to take place. It will ensure that the necessary support is in place in order to allow partners to collaborate effectively. To achieve this objective it is necessary to facilitate research resource sharing between partners so that tools, interfaces, test data and results can be exchanged in a straightforward manner by multiple partners. The project will put in place the necessary software and network interfaces required to ensure that every partner has access to the research resources of other partners. In order to achieve this, the project will seek to leverage the outputs from other EU projects, such as the AIM@SHAPE and 3DTV Networks of Excellence, that are carrying out similar activities.

² A comparable distinction between reference framework and implementation is made for the highly successful middleware reference framework, J2EE with its open source implementation JBoss.

The output of this WP can be thought of as the physical instantiation of the K-Space. It will consist of distributed repositories of partners' software, test data and results accessed via a central portal that supports remote use of these resources. The design, instantiation and maintenance of the distributed environment will be the full-time responsibility of a K-Space system administrator who will lead these activities supported by dedicated effort from all partners. The K-Space system administrator is a full-time researcher based at DCU and in charge of implementing and maintaining K-Space's distributed research environment. The activities in the first 18 months of the project will focus on the design and specification of the infrastructure as well as an initial implementation. The second 18 months will focus on wider deployment of the infrastructure so that a more extensive collection of partners' tools and resources are made available. This will require iterations on the initial specification and design as well as subsequent implementations of the framework.

Activity WP6.1 Distributed Research Environment Design and Implementation

This activity has two main objectives. The first is to investigate which technology can be reused or further exploited for making K-Space research more efficient. The second is to design a suitable set of specifications that partners can conform to in order to integrate their resources into the distributed research environment.

A more detailed description of the research plan for the first phase of the project (months 1- 18) is given in section 9. The following is an outline of the workplan for the second project phase (months 19 - 36).

Outline of research work for the second project phase (months 19 – 24): In the second 18 months, this design will be iterated based on feedback on the initial implementation of the framework and an updated specification produced suitable for integration of a broader collection of partners' resources.

Activity WP6.2 Research Resource Sharing

The objective of this activity is to review the existing research resources available within the Network on an ongoing basis and collect these into (distributed) repositories that can be accessed via the distributed environment designed in WP6.1. In the first 18 months, an initial collection of suitable resources will be integrated, whilst the second 18 months will focus on extending this initial collection to a broader collection.

6A.2.5 K-Space Content

The consortium has identified several sources of Multimedia content to be used for research, development, demonstration and training purposes. The main content provider will be Deutsche Welle as associate partner and member of the Industrial Advisory Board. Deutsche Welle has agreed to provide content from its own repository for research, demonstration and training purposes. Initial discussions with Deutsche revealed that enough content will be made available at no cost for R&D within the K-Space project.

An additional source of content will be TrecVid which provides content for research and benchmarking within the TrecVid forum. TrecVid is one of the main benchmarking activities in K-Space. Consortium partners including the coordinator QMUL have obtained the whole TrecVid Corpus of content which contains several hundred hours of video, audio and text material. An important feature of this content is that it is annotated and thus very suitable for benchmarking and testing of multimedia algorithms. Since K-Space will be participating in TrecVid from project outset, it is planned to sign the content agreement early in 2006. This agreement will enable K-Space to use this content for research, development, demonstration and training purposes.

The Network will also liaise with other projects in order to share content. The Cost292 EU Action has been identified as one possible target for clustering and content share. A working group of this forum is building a content database for research. Several K-Space partners are involved in this Cost292 initiative and are committed to facilitate content sharing.

6A.3 Activities to spread excellence (WP7)

K-Space plans to spread excellence by providing training, conducting dissemination of the research results and enabling technology transfer. The planned activities will be conducted over the whole project duration. A detailed workplan for the first 18 months is given in section 9. In the second 18 months period, the same activities will be continued in an incremental manner. However, the second project phase will use experiences gained in the activities scheduled for the first 18 month to improve the Network impact and achieve more effective excellence spreading in even larger audiences.

The main activities of this WP are:

- Establishment of a conference series. *The International Conference on Semantic and Digital Media Technologies (SAMT)* is the main dissemination forum of the Network. This workshop will keep the character and scope fully aligned with the technical objectives of the NoE. It will serve not only to disseminate and demonstrate the main achievements of the network every year but also as primary feeding ground for networking and exchange of ideas with other members of the wide scientific community. We will form a permanent steering committee to set and maintain the scientific standards of this activity. One important objective of the NoE is to broaden participation to the point where it becomes the main Conference in the area. This conference will be one of the lasting achievements of K-Space.
- Participation in other relevant conferences. Hereby the NoE will organize special sessions in the following conferences: ACM Multimedia, XML Europe, WIAMIS, International Conference on Image Processing (ICIP), International Workshop on Content based Multimedia Indexing (CBMI), European Semantic Web Conference (ESWC) and the International Joint Conference on Artificial Intelligence (IJCAI). Special sessions will be used to further disseminate the Network to the research community. K-Space partners attending and contributing to the special sessions in these 7 selected conferences are eligible to use the EU grant to cover travel expenses even if the conference is held outside Europe.
- Publications in relevant journal with specific focus in IEEE Transactions, IEE and ACM proceedings.
- At least one joint publication on knowledge-based multimedia analysis. This will not be in the first phases of the NoE but during the second phase. This publication should be in the form of a book. Structure and contents of the publication will be inline with the development of common curricula and scope of K-Space. Given the subject –knowledge-based multimedia analysis– this publication will showcase multidisciplinary nature of K-Space research.
- Participation and contribution to JPSearch, MPEG and W3C Semantic Web Best Practices group.
- Technology transfer aiming at an efficient exploitation and reuse of technology developed in the Network. The Industrial Advisory Board will play a crucial role in identifying, facilitating and speeding up transfer of technology.

In summary, the activities to spread excellence aim at establishing excellent recruitment and application opportunities, new and efficient forms of dissemination with world-wide impact, and exploitation and reuse of technology. The activities are described in more detail in the following sections. Specifically, we will have the following sub packages:

Activity WP7.1 Website and Electronic Newsletter, K-Space Posters and Brochures

An important tool of dissemination and promotion will be the K-Space web site. It will support delivery and spread of K-Space promotional material such as information leaflet, electronic newsletter, etc. The Web site will work as a portal, electronic archive or digital library of the community and store different types of documents: fundamental papers, training and teaching material, software, K-Space researchers' papers, test collections or links to them, Ph.D. and Masters theses.

Six-monthly Electronic Newsletter will be an instrument for regular exchange of information among network members and the research community at large. The creation of a Newsletter dedicated to the K-Space initiative will constitute the primary means to collect the results achieved through the network activities, and to spread them. This Newsletter will be strongly related to the main initiatives in the field, so that the activities undertaken within K-Space will be properly connected within a more general and distributed research framework. The main objectives of this newsletter are:

- To report the main activities promoted and undertaken within the NoE context;
- To link to both European and international initiatives in the field, and;
- To publish papers (position papers, state of the art, reviews) of researchers involved in the network.

Three project brochures will be issued at months 6, 18 and 30. The brochures content will be suitable for experts and non experts. It will be a publicly available document and a electronic version it will be made available on the project web site.

Posters illustrating the project activities will be produced and presented in different events including project presentations in EU concertation meetings and SAMT.

Activity WP7.2 The International Conference on Semantic and Digital Media Technologies (SAMT)

This conference will keep the character and scope fully aligned with the technical objectives of the NoE. It will serve not only to disseminate and demonstrate the main achievements of the network every year but also as primary feeding ground for networking and exchange of ideas with other members of the wide scientific community. The conference will be organized as a single-track event with special sessions on:

- Content-based multimedia analysis for annotation and retrieval
- Knowledge extraction for high-level multimedia annotation, search and retrieval
- Semantic multimedia

In addition, there will be a number of plenary talks featuring invited presentations that cut across and unify these three topics. Invited speakers will be drawn from industry and academia using the excellent existing links of partners to other world leaders both in the EU (e.g. via frame-work funded activities) and beyond.

Activity WP7.3 Towards a Scientific Forum in Multimedia Knowledge Extraction and Analysis

To ensure the persistence of K-Space beyond EU funding, the creation of a scientific forum in multimedia knowledge extraction and analysis is envisaged. Initially, the principles, problems and benefits of creating such forum will be discussed. The first task within this activity is to produce a plan for the achievement of the scientific forum and draft the guidelines that will govern the forum. This draft guidelines and plan will be produced during the first 6 months. The work for the full project duration will be linked to this plan.

Activity WP7.4 Joint Publications

Jointly publications will help to spread excellence outside the network and to enlarge the network audience. K-Space will sponsor and coordinate special sessions in the following important international and well established conferences. *ACM Multimedia, XML Europe, WIAMIS, International Conference on Image Processing (ICIP), International Workshop on Content based Multimedia Indexing (CBMI), European Semantic Web Conference (ESWC) and the International Joint Conference on Artificial Intelligence (IJCAI)*. Special sessions and K-Space papers in these conferences will be used to further disseminate the Network to the broad research community. K-Space partners attending and contributing to the special sessions in these 7 selected conferences are eligible to use the EU grant to cover travel expenses even if the conference is held outside Europe.

Organization of Special Issues in leading journals, such as EURASIP, IEE Proceedings, ACM and IEEE Transactions. This activity will be facilitated by the fact that a number of partners already serve as associate editors or editors-in-chief of some of the most relevant journals including IEEE Trans. on signal processing, IEEE Trans. on circuits and systems for video technology, IEEE Trans. on image processing, IEEE Trans. on Multimedia, Eurasip Journals, International Journal of Metadata, Semantics and Ontologies, Journal of Web Semantics, International Journal on Human-Computer Studies, IEEE Intelligent Systems.

A related activity targets the publication of at least one text book on “*Knowledge-based multimedia analysis technology*”. This will consist of a unified and coherent view of this multidisciplinary domain. It will include specially invited chapters putting in perspective the interaction between user needs and technology development in cross media. It will not merely be a collection of papers but a comprehensive book with solid and coherent presentation.

Activity WP7.5 Exhibitions and Demonstrations

In order to maximize K-Space’s impact, this activity will consist in having an identifiable presence at important international meetings and exhibitions, such as the International Broadcasting Convention (IBC) and EU organized concertation meetings and information events. The NoE will, where deemed appropriate by the Steering Board, sponsor K-Space stands at which the research, training and other activities of the network can be promoted.

Activity WP7.6 Contribution to Standards and Technology Transfer

Over the last ten years, significant steps have already been taken towards the development of consensual standards in the K-Space domain, thanks to a number of ongoing international initiatives such as ISO/TC 37/SC 4, SMPTE, ISO MPEG-7 and ISO JPSearch. K-Space will actively participate and contribute to these and other standards bodies with the expectation of having a significant impact on their development. In particular, K-Space will address issues such as content description (metadata), user preferences and content adaptation and transcoding, which are in the scope of MPEG-7, MPEG-21 and JPSearch.

Contributions to standardisation activities will be linked to technology transfer aiming at an efficient exploitation and reuse of technology. Several members of K-Space have experience with IP and markets, and with K-Space in place, we will dedicate effort towards removing some of the boundaries between academia and markets. Thus, we will direct K-Space European research towards a fruitful exchange between academia and business. The K-Space Industrial Advisory Board will not only help to identify suitable modules for speedy exploitation but also facilitate the transfer of such technology. Aiming at efficient technology transfer, the following activities will be executed:

- Identify internal (K-Space) and external (related research areas, big players, SMEs) technology knowledge. The result of this activity is a report about multimedia technology that has been developed, used, or is under development.
- Establishment of a database of K-Space IP and patents.
- Outlining a research strategy for directing K-Space and multimedia research in Europe according to industrial trends and needs.
- Establish a K-Space workshop aiming at transferring technology to researchers in related fields and SME's. This workshop can be linked with SAMT if appropriate.

6A.4 Assessment and Evaluation Activities (WP8)

This WP will conduct internal and external project assessment based on effectiveness studies and peer-reviews. It addresses the identification of an objective tree for the project and the establishment of measures for assessment of the eventual level and degree of success in achieving of these objectives. This will form a framework for self-assessment of the project.

This WP will also develop mechanisms for monitoring the project objectives and re-orientation of the project if the objectives change.

One specific activity within this WP will be devoted to periodically gathering evidence of the success (or otherwise) of the network's integration activities. This evidence will be delivered to the Board of Scientific Advisors, so that it can feed-back recommendations to shape the evolution of the network's activities.

Activity WP8.1 Definition of Project Objective Tree and Assessment metrics

It addresses the identification of an objective tree for the project. The objective hierarchy together with the objectives themselves will be used as target to measure the project success.

In this activity metrics to measure the deviation of the objectives at any hierarchical level and the current project achievements will be developed. The metric will be based on a set of objective and subjective criteria. The result will be interpreted as eventual level and degree of success in achieving the objectives specified in the project objective tree.

This activity is limited to the first project phase. The objective tree and metrics defined in the activity will be valid and used during the second project phase.

Activity WP8.2 Annual Project review and project re-orientation

In cooperation with WP1 (Coordination) this activity will help to prepare the annual project reviews, reports and corresponding demonstrations. Crucial project aspects will be reviewed internally or by members of the Board of Scientific Advisors in preparation for presentation during the annual reviews.

This activity will also ensure that the outcome of both internal reviews and annual project assessment is carefully considered in the definition of the workplan for the subsequent years and propose project re-orientations in case some objectives change.

Activity WP8.3 Monitoring and Evaluation of Integration Activities

This activity has responsibility for evaluating integration activities on an ongoing basis. It will gather evidence of the success (or otherwise) of integration activities and feeding this back to the network Scientific Advisory Board for evaluation.

This activity will also ensure that the outcome of the evaluation is carefully considered in the definition of the workplan for the subsequent years and propose solutions or alternative actions where needed.

6A.5 Consortium management activities (WP1)

The management structure of the Network consists of three main hierarchical layers: Management Centre, Network Steering Board and the Technical Management Committee which consists of the seven workpackage leaders. The Network Steering Board is chaired by the project coordinator. It is supported by the K-Space Administration Office which is part of the Management centre. The Administration Office is the Network secretariat and management support. It is headed by the Administration Executive, who is a professional full-time manager dedicated to the day-to-day network management. The Administration Executive will be appointed by the coordinating organisation and will be responsible for all NoE business on a day-to-day basis. He/she acts on behalf of the Network Steering Board.

The Network Steering Board consists of five senior members of the network from five different institutions: The project coordinator, the integration and excellence spreading executive and three executives representing the Joint Research Activities of the Network. The project coordinator is the chair of the Network Steering Board and will be designed by the coordinator partner. Important issues like financial planning and updated JPA will be decided upon the Network Steering Board on a regular basis. Aiming to strike the right balance between representation and efficiency the day-to-day decision making is undertaken by the Administration Office on behalf of the Network Steering Board.

To ensure that all network members are consulted in important cases that may affect the whole Network, a general assembly will be held once a year. The general assembly will consist of the most senior representative of the institutions participating in the project. In extraordinary cases, the general assembly can be called to meetings to secede on conflict resolution or to vote on procedures to deal with persistent defaulting partners.

Specific activities of the project coordination are described below. A detailed workplan for the first 18 months is given in section 9. In the second 18 months period, the same activities will be continued in an incremental manner. However, the second project phase will use experiences gained in the activities scheduled for the first 18 month to improve the efficiency of the Network management.

Activity WP1.1 Overall Coordination of the Joint Activities of the Network

This is the main activity and main task of the project coordinator and administration executive. The progress of individual actions and achievements in the corresponding activities will be supervised by the WP leaders who report to the administration executive. The administration executive will ensure that relevant information on NoE progress and status is being exchanged among the members of the Network. Using this information the Network Steering Board can quickly identify if changes are needed and efficiently decide what corrections or new actions should be implemented.

Activity WP1.2 Communication with the EU Commission and Management Reports

One senior member from each partner will interface with the Chair of the Network Steering Board. This way, there is a clear communication interface between the commission and the NoE. For the production of the progress reports that will be ratified by the Network Steering Board, the WP leaders will rely on the expertise of involved network members. Regular management reports will be produced and delivered to the EC.

Activity WP1.3 Planning and Coordination of Project and Boards Meetings

This activity will prepare and coordinate all project meetings requiring managerial involvement. It will liaise with WP-Leaders to plan technical meetings. It will also call for and organize voice meetings. Planning of meetings and activities involving external boards including the Industrial Advisory Board is also within the scope of this activity.

Activity WP1.4 Financial Planning

A detailed financial plan will be written by the administration executive, based on the outline financial plan of the project and the recommendations of the Network Steering Board. This plan will be updated and approved by the Network Steering Board 4 times during the 36 months of network funding: at project beginning, before month 12, before month 24 and before month 30. The periodic financial plan will be used to review the financial status of the project, to reallocate resources if needed and to generate reports to the EU commission.

Activity WP1.5 Accounting and Financial Audits

It will ensure that financial audits as required by the EU are being implemented in the network. If needed the administration executive will use network funds for the auditing procedure. Based on the accounting figures, future budgets will be planned and put forward to the Network Steering Board for approval.

Activity WP1.6 Handling of Legal and Ethical Matters

This activity will cover the way that partners behave with respect to each other according to the terms of the Consortium Agreement. It will deal with the liability of partners, partner withdrawal procedures, the settlement of disputes, the responsibilities of partners regarding accurate and timely reporting of difficulties, confidentiality, including the difference between foreground and background information, IPR, including arrangements for licensing and special duties of the coordinating Partner.

Activity WP1.7 Concertation, Consensus and Clusters

The Network is committed to the exchange of information and integration with other related projects in the framework of Clusters or other concertation mechanisms that might be established in order to achieve the

overall project vision. This task will identify potential for clustering and use diverse project activities to perform concerted actions with other networks and projects.

Activity WP1.8 Coordination of the Annual Project Review

This activity will prepare and provide the means for successful annual project reviews as required by the EC. The administration executive will ensure that the major annual deliverables are submitted on time to the reviewer. Logistic organization of the review will be also planned and provided.

This activity will coordinate the writing of the revised technical annex as required by the EC every year. The administration executive will ensure that a plan for drafting and finalizing the document is put in place and executed in a timely manner.

6B - Plans

6B.1 Plan for Using and Disseminating Knowledge

A number of activities within WP7 will enable the dissemination of knowledge beyond the consortium. Most of these activities are designed to outlast the network funding period. Spreading of excellence of the results and research findings will target academics and industry players. Activities such as WP7.1 “Web site and electronic newsletter”, WP7.2 “K-Space conference” and WP7.3 “Towards a Scientific Forum in Multimedia Knowledge Extraction and Analysis” are instrumental to achieve that goal. Activities WP7.5 “Exhibitions and demonstrations” and WP7.6 “Contribution to standards and technology transfer” are also extremely important for disseminating knowledge to industry players as well as to the ordinary citizen. Additionally, the network will carry out activities targeting students and young researchers by means of courses and training programs that could lead in the longer term to integrated doctoral programs. In fact, it is predicted that a major long term impact will come from the Masters programmes. We estimate that by 2010, such programmes, either coming from K-space or inspired by K-space’s success will produce up to 500 new Masters graduates a year. Most of these will be finding employment in Europe in research laboratories or R&D. Some will be employed by the media corporations. The concept of offering seminars by web-cast is already dramatically on the increase. We expect K-space partners to continue broadcasting their excellent activities in this way.

We also expect our research under WPs 3,4,5 and 6 to lead to new techniques and products, together with patents, licences and spin-offs. The common tools and databases developed in K-space will be made available whenever possible after the funding duration of the network and will serve as means for continuing integrating research. Similarly, research and commercial exploitation of the component developed under K-space will ensure the continuation of the Network.

Plan for Using and Exploiting Knowledge: All K-Space partners will support technology and support liaisons with industrial players seeking opportunities for exploitation of result emanating from the joint research activities. The Industrial Advisory Board will play a crucial role in K-Space using and dissemination of knowledge.

The design and execution of a plan for technology transfer is one major task within Activity WP7.6, coordinated by CErTH. This plan aims at properly transferring technology to industry. Furthermore a plan for the exploitation of technological results will be created in this project activity. Partners will act according to this plan making sure that products and services arising from K-Space research are identified and the steps needed for their commercialisation are evaluated following advice of the Industrial Advisory Board. K-Space exploitation plan will be drafted during the first six months and will be kept as “live document” which will be constantly updated through the project life. This plan is aimed at providing the tools and mechanisms to enable exploitation of research results within members of the consortium as well as creating opportunities for technology licensing and transfer to members of the Industrial Advisory Board and other industrial players where appropriate. Specific issues to be addressed in the exploitation plan include:

- Development and maintenance of an Intellectual Property plan (IP plan), respecting the IPR statements of the Consortium Agreement
- Analysis of each workpackage to identify opportunities for generation of patents will be conducted every six months in cooperation with the industrial advisory board.
- Periodic consideration of the creation of a patent pool, with defined exploitation and licensing terms commensurate with each partner's contribution to development of knowledge in the project
- Timetable for the assessment of opportunities for exploitation of IPR by licensees, and by wider European industry on an annual basis
- Essential business analysis related to potential products and services including external analysis such as STEP factors (sociological, technological, economic, and political) and competitive analysis, as well as internal analysis such as SWOT factors (strengths, weaknesses, opportunities and threats) and organisational analysis
- Evaluation of opportunities in target markets following advice and recommendations of the members of the Industrial Advisory Board
- Development and verification of business models and potential spin-offs and start-ups originated by K-Space technology

6B.2 Gender Action plan

The consortium has 25 female participants³ constituting 21% of the Network membership. This includes the leadership of activities in different WPs. A major barrier to wider participation of women is the low percentage of female researchers in related areas across Europe. K-Space could be instrumental in attracting more female researchers to the area and provide a gateway to increased participation of women in the multimedia research and industry. In this project gender issues should be addressed rather than being swept under the umbrella of equality. This will involve implementation of positive action to promote women participation in all stages and spheres of the project. A policy statement will be included in the consortium agreement, which outlines the steps that secure the implementation of positive action. These include extended efforts to employ researchers and engage female members of staff into the project. However, these will be undertaken without compromising equal opportunity principals incorporated within EU policy documents. Although K-Space partners are not in the position to significantly affect the socio-cultural reasons that originate the gender bias in technology-oriented schools, the consortium has planned a set of specific actions aimed at reducing the gender disproportion.

The following is an action plan indicating actions and activities that will be developed to promote gender equality in all forms within the project. The plan will consist of the following:

- The K-Space Administration Office will make special efforts in order to be as gender-balanced as possible in the first place, and will monitor the impact of the NoE activities on gender-related issues
- K-Space partners will initiate promotional initiatives to illustrate university curricula in high schools, with the specific goal of reducing gender bias in technical universities. Numerous actions will be initiated with the goal of transforming the stereotypes of computer innovators, such as remembering women pioneers; promoting women's study groups; having female tutors illustrate the most technical aspects of communications and new media; etc.
- The partners of this NoE will promote the creation of women's new media communication systems users group in order to provide women with a more comfortable environment to ask questions.
- System interfaces will be evaluated in terms of user preferences in order to account for gender peculiarities in person-machine interaction. In fact, research indicates that interaction with services and technology is strongly gender-dependent, therefore an increased participation of women as software and system interface designers will be pursued by K-Space partners.

The plan will try to abide by the Commission's threefold relationship between women and research, articulated around the following:

- women's participation in research to be encouraged both as scientists/technologists and within the evaluation, consultation and implementation processes
- research must address women's needs, as much as men's needs
- research must be carried out in such a way as to contribute to an enhanced understanding of gender issues.

To guarantee equality of opportunity and treatment between women and men in research a set of standards will be set and their implementation monitored by the Administration Office. Women will participate in and benefit from technical cooperation activities in all areas of concern. Particular efforts will be made to ensure that gender issues are considered during all planning, designing and implementing of the network activities. K-Space hopes to gather and analyse information on issues of concern to women scientists/researchers and gender equality in order to guide efforts to improve their status. This will be for use within the Network and the knowledge will be shared for implementation in other projects. Through education and capacity building, women can be better prepared to take up decision making positions in research as well as in employers' and workers' organisations. Here the Master courses offered by the different academic institutions in the consortium will be instrumental. Female graduated from these courses will be encouraged to pursue research carriers under the support of this project.

At JRS the project DIANA (supported by the Austrian Federal Ministry of Transport and INNOVATION programme FEMtech) is currently running and will provide concrete demands of men and women working in an R&D environment. Out of that, guidelines will be developed and implemented in order to guarantee improved awareness and better opportunities for men and women, taking into account their individual personal and family situations.

³ This figure includes full time researchers and PhD students

6C - Major Milestones over full project duration

In this section the major milestones (MMS) during the course of the action are described. In order to match the yearly project reviews, these major milestones are defined in months 12, 24 and 36.

6C.1 Integration Activities Major Milestones (WP2)

MMS1 – First year assessment of all integration activities of the Network: In Month 12 the first thorough assessment of the integration activities will be conducted. The assessment will be based on the four project milestones for the first 18 months specified in section 9.

MMS2 – Second year assessment of all integration activities of the Network: In Month 24 a second assessment of the integration activities will be conducted. The assessment will be based on the specific milestones and deliverables to be achieved during the second year according to the second year plan of work.

MMS3 – Final assessment and report of all integration activities of the Network: In Month 36 the final assessment of the integration activities will be conducted. The assessment will be based on the specific milestones and deliverables to be achieved during the third year according to the third year plan of work.

6C.2 Join Research Activities Major Milestones (WP3, WP4, WP5, WP6)

MMS4 Specification of the K-Space framework for software tools integration and first set of stand alone modules for the K-Space framework: In month 12 the specification of the framework for software tools integration will be completed. The first set of algorithms and tools to be integrated in K-Space framework should be available. These tools will be research and development output of WP3, WP4 and WP5. MMS4 is based on the fifteen project milestones for the first 18 months specified in section 9.

MMS5 – Stable version of the K-Space framework for software tools integration: In month 24 a stable version of K-Space framework will be available. The K-Space software environment will embrace all algorithms jointly developed by the network partners. A showcase of the functionalities of the framework will mark the achievement of this major milestone.

MMS6 – Final version of the expandable and modular K-Space framework for software tools integration: In month 36 the final version of K-Space framework will be available. The K-Space software environment will embrace all algorithms jointly developed by the network partners during the funding period. A showcase of the functionalities of the framework will mark the achievement of this major milestone. The expandability and modularity of the framework will show potential use and further development after the funding period.

6C.3 Excellence Spreading Activities Major Milestones (WP7)

MMS7 – First year assessment of all activities to spread excellence: In Month 12 the first thorough assessment of activities to spread excellence will be conducted. The assessment will be based on the project milestones for the first 18 months specified in section 9.

MMS8 – Second year assessment of all activities to spread excellence: In Month 24 a second assessment of the activities to spread excellence will be conducted. The assessment will be based on the specific milestones and deliverables to be achieved during the second year according to the second year plan of work.

MMS9 – Final assessment and report of all activities to spread excellence: In Month 36 the final assessment of the activities to spread excellence will be conducted. A report on all achievements will be produced and delivered. The assessment will be based on the specific milestones and deliverables to be achieved during the third year according to the third year plan of work.

7 Quality of the integration and performance indicators

K-Space JPAs are designed to integrate basic research in semantic web technologies, multimedia processing, information retrieval, resource management in heterogeneous networks, semantic inference, user modelling and interaction, with technological development by producing software platforms and open libraries that will be available to the cross and multimedia scientific forum, thereby achieving vertical integration. Horizontal integration is achieved by integrating, for a purpose, what can be disparate disciplines including image processing, information retrieval, human computer interaction and industrial and private users groups. The productivity of the integration activities and inclusion of the wider community is achieved through joint training schemes, joint workshops and joint education tools and courses, as well as access to much of the resources such as platforms and data.

The particular nature of knowledge-based multimedia analysis and multi-media research demands integration of techniques from various disciplines and the K-Space JPA is designed to achieve the required degree of integration. Additionally, the envisioned research can only proceed if these activities are shared; no single site is large enough to support this kind of infrastructure. Also, while small number of student exchanges take place already, this is difficult and inefficient because of the lack of shared tools and data. Lack of common teaching resources also makes the joint training and dissemination activities difficult. Both are addressed in the work plan. The work plan also, as explained below, ensures that the communication infrastructure and early tutorial and seminar information exchange is established early in the project.

7.1 Activities Contributing to Quality of the Integration

The JPA proposed by the K-Space consortium incorporates a considerable number of actions that should achieve a high degree of integration not only between the different partners of this NoE but also within the researchers in the whole research community working on the research topics addressed.

The workplan shows many areas of close cooperation. For example WP6 builds a software framework that will be used throughout the project as glue to help ensure the components developed through the joint action can communicate and interact in an agreed manner. WP3, WP4 and WP5 build joint interoperable component libraries, with contributions from all participants, for many functions in the cross and multimedia delivery chain. The activities in WP6 monitor and manage all key integration activities. Each of the activities in WP2 will be reported regularly, throughout the funded lifespan of the NoE. Specifically, they include the monitoring and management of the exchange of PhD students, industrial placement of research personnel, sharing research test data, sharing teaching resources and creation of joint research environments.

The K-Space consortium believes that education is one of the driving factors that will effectively contribute to the continuity of the network and its integration. Following this belief, teaching material including books, CD-ROMs with text, audio tracks and video clips, tutorials and reports will be published on the K-Space Website. This material will provide a thorough coverage of all scientific and technological results of K-Space and will endure and be used beyond the NoE budgeted lifetime.

It is important that the project sets up communications infrastructure early, so as to establish and support the integration. For this reason the detailed work plan in section 9 shows that during month 2, the web portal will be finalized. A website will be established at the start of the project but by month 2 this will have a fully functional information retrieval system embedded within. This will enable users to exchange research (software libraries, algorithms, etc), data (images, audio, video, metadata and text) and publications (tutorials, journal and conference papers, etc). Discussion/work-group areas will be supported and information on how to use such facilities will be disseminated to NoE members and beyond. Arguable for such a research area such information is redundant, but we want to draw in a wide community, and easy access to help people with diverse skills to use the communications technology is not a waste of resource.

Progress in setting up the communications infrastructure will be closely monitored. By the end of month 3, the entire communications infrastructure necessary for K-Space-related research should be firmly established. Whether the requirements have been fulfilled can be checked simply by asking whether all researchers have the ability to share information with each other in a timely and efficient manner, and whether all important information is recorded and documented. Should that not be the case, it is easy to determine which steps have been omitted. For instance, if a researcher has a large unused test bed of video files, then those files should be integrated into the file server and made visible through the website. Similarly, if an industry is unaware of some aspects of K-Space research, then those aspects should be promoted and advertised via the newsletter and mailing lists. The first month of K-Space are mostly confined to setting up the necessary infrastructure. The relevant work groups will set up mailing lists, points of contacts, file servers, news groups, web servers, and any other tools necessary to support communication. This will be organised primarily in WP6, and involves all the research groups.

In order to draw members into the NoE it is also important that other forms of information exchange, through news letters, and better, through seminars and tutorials start early. Month 6 should see the release of the first newsletter, and the beginning of the seminar series. These seminars will be recorded for later use. Month 6 will see the beginning of the tutorials based on expertise already developed. The development of knowledge-based multimedia analysis applications requires that a significant number of researchers have an understanding of how to work with multiple media types. The tutorials will explain, for example, what an audio expert should know about video, and what a video expert should know about audio. New tutorials can be submitted at any time, and they will be sorted and organised as they are received. For those subject areas which have not been covered, tutorials will be solicited by experts. The tutorials will also cover the formats for manipulation of metadata, such as XML and MPEG-7.

7.2 Qualitative and Quantitative Indicators

Researchers are increasingly aware of the benefits of integrated networks as a means of synergistic cooperation. The domain of K-Space is naturally suited to collaborative research as innovative and potentially deployable developments depend on the synthesis of ideas from assorted scientific and technological areas in order to provide a consistent and efficient solution. K-Space researchers are extremely motivated to these issues and are committed to this purpose.

The activities in K-Space to support these statements are primarily

- Those related to the setting up of joint work on coherent architectures for the supply chain, resource management and delivery, demonstrations using simulations and laboratory test-beds of heterogeneous networks where the techniques and applications developed within the framework of this NoE will be tested. Also the key theme pervading many workpackages of Quality of Experience will be used to give focus to user centric demands, services and their provisioning.
- Training and other forms of dissemination of excellence. Partners will collaborate to produce accessible high-quality material, in the form of books, training material and articles to be published in scientific journals and conferences
- Active contributions to developing standards, e.g. Motion Picture Experts Group (MPEG), Joint Photographic Experts Group (JPEG), International Telecommunication Union (ITU), Society of Motion Picture and Television Engineers (SMPTE), Internet Engineering Task Force (IETF), 3rd Generation Partnership Project (3GPP), Open Mobile Alliance (OMA), European Telecommunications Standards Institute (ETSI), Language resources management (ISO TC 37/TC4) and the Java Community Process (JCP).

Table 2 shows a list with selected qualitative and quantitative indicators that can be used to provide an indication of the performance of K-Space. The K-Space committee will look at these indicators regularly to assess the degree of integration and use them to guide its management decisions.

Activity Type	Quantitative indicators	Qualitative indicators
Integration activities	<ul style="list-style-type: none"> • Degree of use of shared databases containing source material, testing procedures, results, working tools and documentation and the extent to which the use of and provision to this databases are shared by all partners; • Development and degree of use of common platforms and test-beds and their use by a variety of partners • Setting up test environments and cross validation of techniques and the results of different partners • Number of common resources • Usage of common resources 	<ul style="list-style-type: none"> • Sharing of resources such as research tools, lab facilities, network simulators and test-beds, visualisation equipment; • Accessibility to the shared tools and platforms; • Standardisation of K-Space technology; • Wide acceptance of existing and proposed standards • Release of deliverables on time; • Meeting the targeted milestones
Training and Mobility	<ul style="list-style-type: none"> • Number of K-Space students attending and receiving the K-Space linked European Master Programs • Number of K-Space researchers involved in K- 	<ul style="list-style-type: none"> • K-Space sponsored graduate and postgraduate programs are widely recognized • Links and support (if possible)

	<p>Space linked graduate and post graduate programs</p> <ul style="list-style-type: none"> • Number of K-Space researchers involved in short visits/exchanges • Number of joint summer schools /workshops/seminars and short tutorials aimed at creating awareness of the K-Space research outcomes 	<p>to underdeveloped countries, particularly in Europe</p>
<p>Dissemination and Spreading of Excellence</p>	<ul style="list-style-type: none"> • Number of special issues • Number of contributions to K-Space conference (SAMT) • Number of participants in SAMT • Number of daily visits to the K-Space Website • Number of Web seminars broadcasted • Number of participants in Web seminars • Number of industry short courses • Number of independent and joint contributions to standardisation bodies; • Regular Joint progress reports or scientific manuscripts produced by participants active in several research areas; • Publication of scientific articles in all the research areas of K-Space; 	<ul style="list-style-type: none"> • K-Space is recognized internationally • Established links with external forums and industry • Numbers of K-Space, non- K-Space, industrial, non-European participants in K-Space conference (SAMT) • Provision of consultancy services by K-Space members and technology transfer to SME's.

Table 2: Qualitative and quantitative indicators that will be used to provide an indication of the performance of K-Space.

8 Organisation and management

The management structure of the Network consists of three main hierarchical layers: Management Centre, Network Steering Board and Workpackage Teams or Technical Management Committee. The Management Centre consists of the coordination office and the Administration Office. It is headed by the project coordinator, who is in charge of the overall network coordination and the communication with the European Commission officers. The Administration Office is the Network secretariat and management support. The Management Centre will have project monitoring and control powers to make sure that the project achieves the stated objectives and it takes place in accordance with the consortium agreements, and EU's legal and procedural requirements.

The Network Steering Board consists of five senior members of the network from five different institutions: The project coordinator, the integration and excellence spreading executive and three executives representing the Joint Research Activities of the Network. The project coordinator is the chair of the Network Steering Board and will be designed by the coordinator partner. Important issues like financial planning and updated JPA will be decided upon the Network Steering Board on a regular basis. Aiming to strike the right balance between representation and efficiency the day-to-day decision making is undertaken by the Administration Office on behalf of the Network Steering Board.

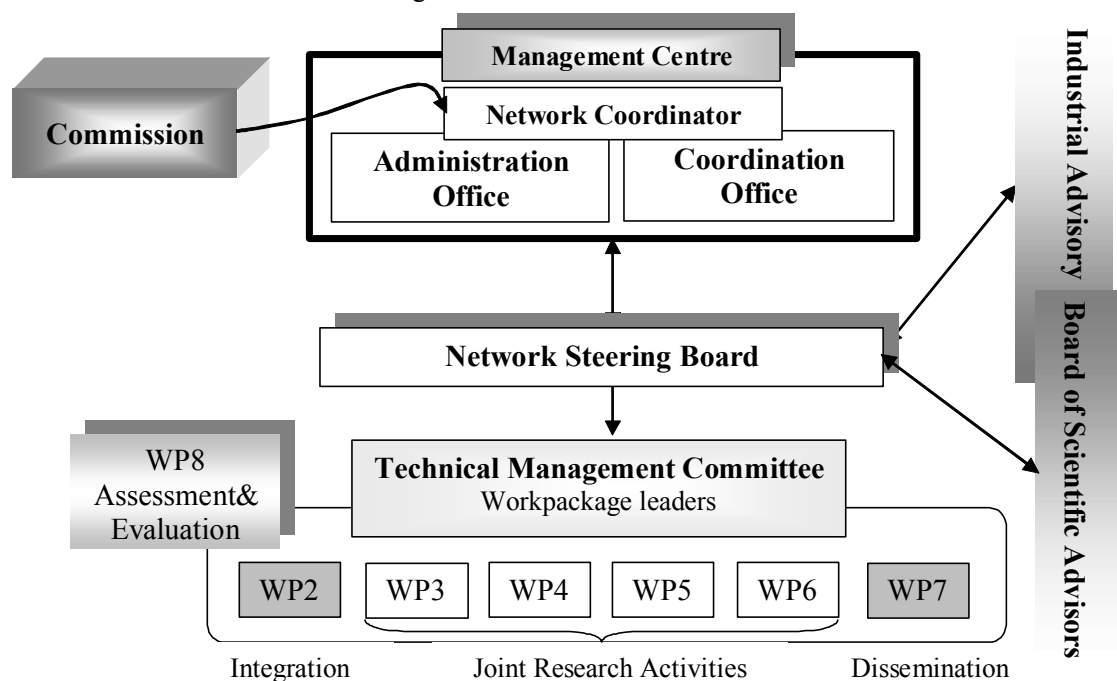


Figure 3: Overview of K-Space management structure.

The Technical Management Committee consists of the seven workpackage leaders. Its mission is to coordinate the technical workpackage teams and steer the technical direction of the Network according to their own technical judgment and the advice given by other internal and external bodies attached to the Network. The workpackage teams are formed according to the work packages defined in the JPA. Their members are therefore the researchers and PhD students allocated to every non managerial WP. The main responsibility of the WP-Leaders is to ensure that activities are carried out according to plan, milestones are achieved on time and deliverables are produced to an appropriate quality, in a time scale and at a reasonable cost.

To ensure that all network members are consulted in important cases that may affect the whole Network, a general assembly will be held once a year. The general assembly will consist of the most senior representative of the institutions participating in the project. In extraordinary cases, the general assembly can be called to meetings to decide on conflict resolution or to vote on procedures to deal with persistent defaulting partners.

In addition to these management bodies, two other important Network Boards will provide advice and ensure that high quality standards are addressed in all aspects and activities of K-Space: the Industrial Advisory Board and the Board of Scientific Advisors. An overview of the K-Space management structure and the

position of the different management committees with respect to each other and the commission officers is shown in Figure 3.

The above outlined Management Structure has been designed to secure efficiency without compromising quality and representation. As it is schematically shown in Fig. 3, this structure is both hierarchical and democratic. It was cumulatively developed from several discussions involving most K-Space partners during the project preparation stages. Subsequently, general consensus on the following guidelines related to the management structure were agreed by all network members:

- There should be a small steering group of network members to drive the project forward
- The size of the Network Steering Board should not be so large as to compromise efficiency
- All main activity clusters should be represented in the decision making of the Network Steering Board
- The creation of sub-committees is encouraged on a dynamic basis according to the temporary relevance of specific activities
- The creation of sub-committees is delegated to the Workpackage leaders

These principles led to the development of the management structure of K-Space as shown in Figure 3. The structure is centralised because the five core partners forming the Network Steering Board will guide the strategic decision making and the overall coordination of the project. The structure is democratic because the mission of the Network Steering Board is to represent the general assembly with all Network members. The above outlined principles are also stated in the Consortium Agreement.

K-Space Management Centre (KMC)

The KMC is the managing body of the network. Its main responsibility is the operational direction of the NoE. It has the decision making powers bounded by the consortium agreement, the JPA and the budget approved by The Network Steering Board. The KMC consists of the coordination office and the Administration Office. It is headed by the project coordinator, who is in charge of the strategic network coordination and the communication with the European Commission officers. The KMC will ensure that the joint programme of activities is executed as planned. Since the network activities are well defined by work packages in the JPA, the task of the KMC will be to coordinate these efforts by working with WP leaders and to share relevant information with the Network Steering Board.

The Network Coordinator

The Network coordinator ensures that there is sufficient communication between the executives to successfully coordinate the whole network efforts. The coordinator also serves as interface between the K-Space Management Centre and the EU Commission.

The coordinator is responsible for:

- Communicate with the European Commission officers
- Coordinate Network Steering Board activities and liaise with fellow board members
- Allocate funds according to the JPA and budget distribution approved by the Network Steering Board
- Oversee the overall network strategic directions
- Call and chair Network Steering Board meetings

The Administration Office

It is the administrative hand of the Network. It is responsible for providing day-to-day secretariat, data/information gathering, document management, record keeping and communication structure of the consortium. The administration office is also a decision and legal support system mainly for the Network Steering Board and the Technical Management Committee. It also provides basic-level technical support and information to all members of the NoE. The Administration Office is headed by the Administration Executive, who is a full-time professional dedicated to the day-to-day network management. The Administration Office will facilitate the day-to-day monitoring and dissemination of schedules, as well as introducing coherence in consortium activities. It will organize the meetings of the Network Steering Board, the Technical Management Committee and the general assembly. It will organize voice conferences and will administer the project communication system. The Administration Office will support the coordinating organisation with the financial management of the project. The Administration Office will also contribute to sustain the integration of the network, validation and dissemination of results. The additional role of the Administration Office is to support the knowledge-in-use task, in order to extend the project quality control to knowledge acquisition in aid of promoting good practice. Important functions of the Administration Office include:

Legal management: It will maintain a consistent legal framework within the NoE such that corrective actions against defaulting partners, and resolution of conflicts between partners, are carried out in a fair, reasonable, timely, and low complexity manner.

Communication: An important function of the Administration Office is to ensure that the NoE members communicate appropriately and that important information is shared between partners and the management committees. It ensures that reporting to the European Commission officers is carried out in a correct and timely way. Regular reports as required by the rules of FP6 will be written and sent to the EC on time. This task will be performed jointly with the Project Coordinator who is the person that will communicate with the Commission officers. The Administration Office will also prepare the annual technical reviews, with the collaboration and effort of the Technical Management Committee. It will coordinate the writing of ongoing 12 month technical and financial plans so that they are available for review at the end of each 12 month period.

Summary of management roles and functions of the Administration Office:

Key responsibility: Provide day-to-day secretariat, data-information gathering, document management, record keeping, communication and legal support to the NoE

Other responsibilities:

- Provide basic-level technical support and information to all members of the NoE
- Facilitate the day-to-day monitoring and dissemination of schedules
- Organize face-to-face and voice conference meetings of the NSB, the TMC and the general assembly
- Administer the Project Communication System
- Provide the financial management of the project
- Implement and monitor network auditing systems, including financial auditing and accounting
- Draft technical and financial plans and pass on to Network Steering Board for approval
- Prepare regular progress reports for the Commission and the Network Steering Board
- Prepare project, stage and exception plans in collaboration with the Network Steering Board
- Enforce gender policies

The Administration Executive

The Administration Executive is the head of the Administration Office. He is responsible for all the actual running of the NoE activities on a day-to-day basis on behalf of the Network Steering Board. Every consortium partner will assign one staff member to answer all administrative requests. The writing of the annual report as requested by the Commission will be coordinated by the Administration executive to ensure that deadlines and integration quality standards are met. Working with the Network Steering Board, the administration executive will oversee that network policies on gender and social issues are being implemented. Finally, the financial and accounting procedures as required by the consortium contract and the Commission regulations will be implemented by the administration executive.

Other specific responsibilities of the Administration Executive include:

- Perform overall quality assurance checks by using predefined qualitative and quantitative indicators
- Conduct quality inspections -then take necessary actions as part of the contingency plan
- Prepare financial and technical project plans and pass them to the Network Steering Board for approval
- Call and conduct meetings and form the link between the Network Steering Board and the other management boards, specially the Industrial Advisory Board and the Board of Scientific Advisors.

Network Steering Board (NSB)

It consists of five senior members of the network from five different institutions as follow:

- The project coordinator, Prof. Ebroul Izquierdo, QMUL
- The integration and excellence spreading executive, Prof. C. J. Van Rijsbergen, UG
- JRA executive, Prof. Steffen Staab, Uni Ko-Ld
- JRA executive, Dr. Noel O'Connor, DCU
- JRA executive, Prof. Stefanos Kollias, CERTH

The project coordinator is the chair of the NSB. The NSB is the decision-making body vis-a-vis the broad objectives of the project. It will ensure that decision-making in the network is done democratically. Every

member of the NSB has one vote. Decisions are made with simple majority voting. Principal issues like financial planning and the annually updated joint programme of activities (JPA) will be decided upon by this body. The NSB is also responsible for the production of guidelines for the JPA, which has to be updated for the EU Commission every 12 months. These guidelines are binding for the work of the Network. For the production of these guidelines, the NSB will consult the Industrial Advisory Board and the Board of Scientific Advisors. The NSB is also concerned with network disputes as described below.

Summary of roles and functions of the Network Steering Board:

Key responsibility: Strategic direction of the Network

Other responsibilities:

- Ensure that this is a coherent project organization structure and logical sets of plans
- Monitor and control the NoE at a strategic level, especially reviewing progress against milestones
- Ensure the changes of scope, timescales, costs are in line with NoE objectives
- Keep the network in line with the expectations of the EU commission
- Provide guidelines for network activities and approval of JPA Budget distribution

The General Assembly

To ensure that all network members are consulted in important cases that may affect the whole Network, a general assembly will be held once a year. The general assembly will consist of the most senior representative of the institutions participating in the project. At the yearly meeting, the general assembly will ratify the members of the NSB and empower them to act on their behalf.

In extraordinary cases, the general assembly can be called to meetings to secede on conflict resolution or to vote on procedures to deal with persistent defaulting partners. The general assembly is the last instance for conflict resolution.

K-Space Steering Board Officials

The research executives: There will be three research executives. They oversee the work done in the Joint Research Activities and ensure that progress is made towards completing the objectives and achieving the deliverables. Together with the Administration Executive, they monitor the progress of WP's and perform regular technical audits to ensure that quality standards are met and deliverables are produced at specified deadlines.

The integration and excellence spreading executive: The integration and excellence spreading executive represents WP2 and WP7. Together with the Administration Executive, he will ensure that all dissemination activities goals are met according to plan. This executive will also oversee the work and progress of the integration activities. This executive will coordinate convergence efforts and optimize resources when targeting important multidisciplinary research aspects by finding links between all K-Space research activities. Additionally, the integration executive will coordinate liaison and cooperative work with leading research institutions world wide. The integration executive is also responsible for assessing the quality of integration of K-Space members.

Technical Management Committee

This committee is built by the seven WP leaders. Its mission is to coordinate the technical WP teams and steer the technical direction of the Network according to their own technical judgment and the advice given by other internal and external bodies attached to the Network. The WP Teams consist of the six WP dealing with non managerial activities (WP2-WP7). They are formed according to the work packages defined in the JPA. Their members are therefore the researchers and PhD students allocated to every non managerial WP. The chair of each WP Team is naturally the WP leader. Their main responsibility is to ensure that activities are carried out according to plan, milestones are achieved on time and deliverables are produced to an appropriate quality, in a time scale and at a cost acceptable to the respective Executive.

Summary of roles and functions of the Technical Management Committee:

Key responsibility: Ensure that WP activities are carried out according to the time plan

Other responsibilities:

- Prepare plans for the different jointly activities and agree those with the NSB
- Receive authorization from the NSB to act and create products

- Direct, motivate, plan and monitor the WP-team's work
- Take responsibility for the WP-team's progress and take corrective action where necessary
- Advise administrative executive and respective NoE executive of any changes with the NoE plan
- Liaise with the Administration Office
- Liaise with the Quality Assurance Committee

Industrial Advisory Board

This is a board external to the Network core members. The mission of this Board is to ensure that the output of the targeted research becomes the primary feeding ground for industrially innovation. The Industrial Advisory Board with has a core of four industrial players: Motorola (chairing the board), Deutsche Welle, British Telecommunications PLC and Telefonica I+D.

The Industrial Advisory Board will give advice that help with the strategic positioning of the network activities with respect to commercial trends. Thus, a main objective of the Industrial Advisory Board is to enable speedy and sustainable feedback from industry and a better mutual understanding between the academic and the industrial communities involved in fields related to K-Space. In month six the first jointly meeting between the core Industrial Advisory Board and the Network Steering Board is planned. The aim of this meeting is to discuss industrial expectations and set up a preliminary plan for technology transfer. Prior to the meeting, a list of technical objectives will be provided by the Network members. These objectives will be assessed by the Industrial Advisory Board and used as basis for feedback regarding their interests and the research directions with the greatest commercial potential.

Board of Scientific Advisors

To avoid the possibility that K-Space might drift from its objectives of high quality technical outputs, integration, dissemination and lasting impact by having an inward looking focus, the Network has set up an independent Scientific Board comprising experts who are not core members of K-Space. The Scientific Board will be asked periodically to review technical progress such that K-Space remains innovative, forward looking, and ensures that it is producing work of high technical quality. Over the lifetime of K-Space, the Network Steering Board will select one deliverable from each activity to undergo a peer review such that technical quality of the deliverables is verified. The Scientific Board may choose to review the deliverable themselves or may ask an independent reviewer to do so. Suitable honoraria will be paid to reviewers to enable them to carry out this task.

Disputes within the network and conflict resolution

The consortium agreement (CA) signed by every partner is binding. Should disputes arise amongst network partners concerning an issue which is not treated in the CA, then the Administrator Executive will call for a Steering Board meeting to discuss and find the best solution to the conflict through democratic means. After the meeting, the NSB will hold separate talks with the disputing parties and seek an amicably solution. If tension is not defused and the conflict persists, the NSB will appoint an ad-hoc committee, made of independent parties from both inside and outside K-Space, to deal with the conflict and seek a sensible solution. The committee's task will be to identify the reason of the conflict by holding separate talks with the disputing parties, report findings to the NSB and seek an amicably solution. If tension is not defused and the crisis persists, the NSB will call for an extraordinary general assembly. The general assembly will meet to secede on conflict resolution or to vote on procedures to deal with the conflict. The general assembly is the last instance for amicably conflict resolution.

Disputes that cannot be settled amicably shall be settled according to the following two steps.

Step 1 (Arbitration): All disputes or differences which cannot be settled amicably shall be finally settled by arbitration in Brussels under the Rules of Arbitration of the International Chamber of Commerce by one or more arbitrators to be appointed under the terms of those Rules. In any arbitration in which there are three arbitrators, the chairman shall be of juridical education. The award of the arbitration will be final and binding upon the *Contractors* concerned.

Step 1 (Appropriate National Court): All disputes or differences which cannot be settled amicably or through arbitration, shall be subject to the jurisdiction of the appropriate national court of the *Contractor* who would be the prospective defendant in legal action on the issue.

9 Detailed Joint Programme of Activities – first 18 months

9.1 Introduction

The first month of K-Space are mostly confined to setting up the necessary infrastructure. The relevant work groups will set up mailing lists, points of contacts, file servers, news groups, web servers, and any other tools necessary to support communication. This will be organised primarily by the WP-Leaders, and involves all the research groups. During the first month all the activity leaders will call for meetings involving activity participants in order to discuss the steps to follow and organize the first working groups according to the budget plan and overall activity plan approved by the Network Steering Board during the K-Space kick-off meeting to be held during the first or second week of the project. A careful plan for transfer of researchers will be discussed and first relevant transfers will be agreed, i.e., the specifics of who should travel where, will be ratified by the Network Steering Board. The first researcher exchanges will commence soon after the kick-off meeting and not later than month six. The research activity plan will follow the recommendations of the WP leaders as described in the next subsection.

Relevant material, state-of-the-art analysis and background expertise already developed will be assembled by month 3. The development of knowledge-based multimedia analysis applications requires that a significant number of researchers have an understanding of how to work with multiple media types. For those subject areas which have not been covered, tutorials will be solicited by experts. At the end of month 6, the first newsletter will be issued. It will provide background information on K-Space, information on the resources that have so far been made available, and a description of the upcoming work.

Before month six a first meeting with representatives of the industry forum will be organized. This will facilitate technology transfer and ensure that practical industrial needs are considered in the JRAs of the NoE at the outset. The Industrial Advisory Board will permit a clear and sustainable feedback from industry and a better mutual understanding between the academic and the industrial worlds. Prior to the establishment, a list of goals will be provided by the researchers. This will be analysed by the Industrial Advisory Board. In turn, the Industrial Advisory Board will provide feedback and suggestions regarding their interests and the directions which they would like to see pursued.

During month 2, the web portal will be finalized. A website will be established at K-Space's inception, and by month 6 this should have a functional information retrieval system embedded within. Thus, users will be able to have a first exchange of research and expertise, test data and relevant publications, e.g., tutorials, journal and conference papers.

Throughout this time frame, progress will be closely monitored. By the end of month 3, the entire communications infrastructure necessary for K-Space-related research should be firmly established. Whether the requirements have been fulfilled can be checked simply by asking whether all researchers have the ability to share information with each other in a timely and efficient manner, and whether all important information is recorded and documented. Should that not be the case, it is easy to determine which steps have been omitted. For instance, if a researcher has a large unused testbed of video files, then those files should be integrated into the file server and made visible through the website. Similarly, if industrial organizations are unaware of some aspects of K-Space research, then those aspects should be promoted and advertised via the newsletter and mailing lists. At this point, progress reports will be required on various projects including conducted and ongoing research exchanges.

Integration activities will be carried out by all members of the NoE within WP2 and WP6. Each activity has a coordinating partner who will be responsible for ensuring the smooth running of the activity and timely production of deliverables and milestones. One specific activity within this WP8 will be devoted to periodically gathering evidence of the success (or otherwise) of the network's integration activities. This evidence will be delivered to the Network Steering Board, so that it can feed-back recommendations to shape the evolution of the network's activities. Table 3 summarises key tangible outputs of the integrative work in K-Space and measurable and verifiable results. Milestones and deliverables given in this table are described in the next section.

Key tangible integration outputs	Measurable and verifiable results
Reference Framework for Distributed Semantic Management of Multimedia Metadata: The core deliverable of workpackage 5 during the full runtime of the project. This Reference Framework provides an anchor point for tying together different	Main milestones and deliverables towards its progress in the first 18 months are: <i>MS5.1</i> : Extension of RDF / OWL /SWRL <i>MS5.2</i> : Metadata store

multimedia knowledge tasks, such as knowledge extraction and user interaction with it, in a distributed setting.	D5.1: Report on extension of RDF / OWL /SWRL D5.2: Metadata store specification
Implementation of the K-Space distributed research environment: Such an environment does not currently exist and thus extends existing research activities.	The initial implementation will be available in month 18 (Deliverable D6.3). Two key deliverables are planned at month 10 to ensure the timely development of the platform. D6.1: Distributed research environment specification, Month 12 D6.2: Contents and description of shared resource repositories, Month 10
Use of the the K-Space distributed research environment to benchmark the different techniques developed in the project	Number of focused scenarios aimed at testing the technical implementations in real-world applications and serve as proof of concept for the model.
Demonstration of the features of the K-Space distributed research environment	Number of joint demonstrations of the resulting framework in key European events including the European Workshop on the Integration of Knowledge, Semantics and Digital Media Technology.
K-Space has an activity dedicated to the exchange of research personal and PhD students. A part of the project budget has been allocated to support this exchange.	Degree of researcher mobility within the Network measured by the number of short and long term scientific missions

Table 3: Key tangible outputs of the integrative work in K-Space and measurable and verifiable results.

9.2 Description Planning and timetable

The following is a detailed description of the activity plan for the first 18 months broken down by WPs. In this description the deliverables are marked as D. Deliverables can be of public or restricted dissemination nature. However all deliverables are contractual and will be sent to the Commission (Project Officer) and the consortium members. Milestone are denoted by MS.

9.2.1 Integration activities, detailed workplan – WP2

This WP is dedicated to non-technical activities aimed at fostering integration among K-Space partners. The expected time frame and the leader of each activity are shown in brackets.

WP2.1: Exchange of Academic Research Personnel and PhD Students (GU, months 1 – 18)

Activity WP2.1 is concerned with mobility of academic members of the Network including PhD students. This activity will start in month 1 and continue over the full project duration. It is coordinated by University of Glasgow and embraces the following sub-activities:

- **WP2.1.1** Exchange of Researchers via Short-term Fellowships (M3-18)
- **WP2.1.2** Exchange of PhD Students (M1-18)
- **WP2.1.3** Visiting Scientists (M1-18)

WP2.1 will continue for the entire lifetime of the Network. Its work results in a deliverables for the first 18 months, updated on an annual basis thereafter.

Deliverable: D2.1 (University of Glasgow, month 12): Annual report on academic researcher mobility.

Milestone: MS2.1 (University of Glasgow, month 12): Completion of at least six PhD exchanges.

Measurable Results by Month 18: Exchange of 12 PhD Students and 6 Researchers

WP2.2: Industrial Placement of Research Personnel (UEP, months 6 – 18)

Activity WP2.2 deals with industrial placements for Network members. The activity will start in month 1 and continue over the full project duration. It is coordinated by University of Economics, Prague and embraces the following sub-activities:

- **WP2.2.1** Short-term Industrial Fellowships (M1-18)
- **WP2.2.2** Take-up of PhD Students for Industrial Experience (M1-18)

WP2.2 will continue for the entire lifetime of the Network. Its work results in a deliverables for the first 18 months, updated on an annual basis thereafter.

Deliverable: D2.2 (University of Economics, Prague, month 18): Annual report on industry placements.

Milestone: MS2.2 (University of Economics, Prague, month 18): Completion of at least three industry placements.

Measurable Results by Month 18: At least 5 short term industrial fellowships

WP2.3: Shared Teaching Resources (TUB, months 3 – 18)

This activity is coordinated by the Technische Universität Berlin and deals with sharing teaching resources amongst network participants. Updated versions of these teaching resources will be produced every 18 months during the lifetime of the project. In the first 18 months, this activity results in one deliverable:

Deliverable: D2.3 (Technische Universität Berlin, month 12) Annual report on K-Space online teaching resources.

Milestone: MS2.3 (Technische Universität Berlin, month 12): Initial structured database of K-Space teaching resources available online over the K-Space web portal.

Measurable Results by Month 18: Teaching repository with at least 28 substantial contributions

WP2.4: Summer schools and European Master and PhD program (GET, months 3 – 18)

A summer school is planned for each year during July or August. The summer school 2006 will be organized by the Activity leader Groupe des Ecoles des Télécommunications and it is a main milestone.

The European Master and PhD program is planned in several phases. The first phase towards the harmonisation of high level education in Europe. This is a long term goal and will initially involve only a few partners. The first phase of the Master program will be planned for September 2006, in which there will be sharing of materials across institutions (for example using the K-Space Tutorials) but each will teach its own students locally from those common materials. First phase for a proposition of a European Ph.D. Program. In this first phase, different initiatives will be promoted including: the establishment of a co-supervision framework, the introduction of special distinctions such as the European Doctorate distinction for Ph.D. thesis defended in front of a truly international board of experts. Ultimately, these actions will lead to a much stronger integration of doctoral programs between the universities of the network.

In the first 18 months, this activity results in one deliverable:

Deliverable: D2.4 (Groupe des Ecoles des Télécommunications, month 12): First yearly report on the summer school, the European integration of master and doctoral programs.

Milestone: MS2.4 (Groupe des Ecoles des Télécommunications, month 8): First K-Space summer school.

Measurable Results by Month 18: 1 successful summer school

9.2.2 Joint research activities on content-based multimedia analysis – WP3

The activities in this WP concentrate on the research of low- to mid-level content extraction techniques aiming to provide concise information for WP4 and WP5. One of the main tasks of WP3 will be to establish a state-of-the-art report for multimedia content analysis which will be made public. The report will also depict a research road-map for the rest of the project. The WP consists of the following activities:

WP3.1: Content Structuring (JRS, months 1 – 18)

Activity WP3.1 concentrates on techniques to structure content based on low-level features and multimodal analysis. The following specific tasks are planned during the first 18 months.

- **WP3.1.1** Preparation of a State-of-the-art Report on Multimedia Content Structuring (*JRS, months 1 – 4*)

- **WP3.1.2** Research in Multimedia Content Structuring (*JRS, months 1 – 18*)

The report on multimedia content structuring will be part of the overall state-of-the-art report for WP3, and will therefore be updated before the end of the project. The research in multimedia content structuring will be partially steered by the state-of the art report and in collaboration with WP4 and WP5. In W3.1 activities will continue for the entire lifetime of the Network. This work results in a deliverable during the first 18 months which will be updated on an annual basis thereafter.

Deliverable: D3.1 (Joanneum Research Forschungs-gesellschaft mbH, month 5): State-of-the-art report on multimedia content analysis.

Milestone: MS3.1 (Joanneum Research Forschungs-gesellschaft mbH, month 12): Initial software modules for multimedia content structuring.

Measurable Results by Month 18: Stable software module for multimedia content structuring.

WP3.2: Moving 2D and 3D Object Segmentation and Indexing (DCU, months 1 – 18)

Techniques to segment and describe moving objects will be investigated in this activity. The following specific tasks will take place in the first 18 months, coordinated by Dublin City University.

- **WP3.2.1** Moving Object Segmentation (*DCU, months 1 – 18*)
- **WP3.2.2** Indexing of 3D Objects and Models Segmentation (*DCU, months 1 – 18*)

A report on moving object segmentation will be part of the overall state-of-the-art report for WP3 (D3.1), and will therefore be updated before the end of the project. The research in moving object segmentation will be partially steered by the state-of the art report and in collaboration with WP4 and WP6. WP3.2 activities will continue for the entire lifetime of the Network. This work results in the following deliverable during the first 18 months.

Deliverable: D3.2 (Dublin City University, month 12): Technical report on moving object segmentation.

Milestone: MS3.2 (Dublin City University, month 12): Initial software modules for moving object segmentation.

Measurable Results by Month 18: Stable software module for moving object segmentation.

WP3.3: Audio-/Speech Processing and Text Analysis (GET, months 1 – 18)

Activity WP3.3 concentrates on techniques for audio and speech processing and text analysis, specifically extraction of audio properties and the associated text. It will be coordinated by Groupe des Ecoles des Télécommunications, and will consist of the following specific tasks:

- **WP3.3.1** Audio/Speech Processing (*GET, months 1 – 18*)
- **WP3.3.2** Text Analysis (*GET, months 1 – 18*)

The report on audio and speech processing will be part of the overall state-of-the-art report for WP3 (D3.1), and will therefore be updated before the end of the project. The research in extraction of audio properties and audio segmentation will be partially steered by the state-of the art report and in collaboration with WP4 and WP6. WP3.3 activities will continue for the entire lifetime of the Network. This work results in the following deliverable during the first 18 months.

Deliverable: D3.3 (Groupe des Ecoles des Télécommunications, month 12): Technical report on audio and speech processing.

Milestone: MS3.3 (Groupe des Ecoles des Télécommunications, month 12): Initial audio and speech processing tool-box.

Measurable Results by Month 18: Stable audio and speech processing tool-box.

WP3.4: Content Description (EURECOM, months 1 – 18)

Activity WP3.4 is concerned with content description, profile definition and infrastructure for content analysis and content descriptions. The following specific tasks will take place in the first 18 months, coordinated by EURECOM.

- **WP3.4.1** Gathering of Requirements for Content Analysis and Content Description Infrastructure (*EURECOM, months 1– 3*)
- **WP3.4.2** Definition of Architecture for Content Analysis and Content Description Infrastructure (*JRS, months 3– 5*)

- **WP3.4.3** Implementation of the Infrastructure and Integration within WP6 (*JRS, months 3– 5*)
- **WP3.4.4** Definition of Descriptors and Description Schemes (*EURECOM, months 10– 18*)
- **WP3.4.5** Definition of Suitable Metadata Profiles for Multimedia Content Analysis, Search and Retrieval (*EURECOM, months 10– 18*)

The definition of Architecture for Content Analysis and Content Description Infrastructure will be based on already existing components at JRS in close cooperation with WP6. The next task will implement the infrastructure, in coordination with the implementation work in WP6, with which it will be integrated. The Definition of Suitable Metadata Profiles for Multimedia Content Analysis, Search and Retrieval will define descriptors and description schemes according to the results of previous tasks. All subtasks will be conducted in close collaboration with WP7. WP3.4 activities will continue for the entire lifetime of the Network. This work results in one deliverable in the first 18 months:

Deliverable: D3.4 (EURECOM, month 8): MPEG-7 content descriptors and profiles.

Milestone: MS3.4 (JRS, month 10): Interfaces for content analysis and content description infrastructure.

Measurable Results by Month 18: Stable interfaces for content analysis and description.

9.2.3 Joint research activities on knowledge extraction – WP4

This workpackage aims at studying and implementing techniques for knowledge assisted content analysis and annotation using a multimedia ontology infrastructure. More specifically, semantic and low-level attributes of the objects to be detected in combination with appropriately defined rules developed within WP5 will determine the set of algorithms, which will be the aim of WP4, and parameters required for the detection of semantic objects.

WP4.1: Specification of a Multimedia Ontology Infrastructure (*Uni Ko-Ld, months 1 – 18*)

Activity WP4.1 focuses on the development of a multimedia ontology infrastructure based on the knowledge representation infrastructure and language extensions developed within WP5. The first 18 months, WP4.1 focuses on the creation of the basic multimedia ontologies and the development of the multimedia annotating tool, while in the last 18 months it focuses on the creation of the prototype knowledge base, the extension of the existing multimedia ontologies, and the creation of multimedia domain ontologies that capture a domain from a multimedia analysis prospective. It is coordinated by Uni Ko-Ld, and it consists of the following tasks:

- **WP4.1.1** Top-level Multimedia Content Ontology (*Uni Ko-Ld, months 1– 18*)
- **WP4.1.2** Low-level Visual Feature Ontology (*Uni Ko-Ld, months 1– 18*)
- **WP4.1.3** Prototype Knowledge Base (*Uni Ko-Ld, months 1– 18*)

This work results in the following deliverable in the first 18 months:

Deliverable: D4.1 (Uni Ko-Ld, month 12): Annotation/population tool, first version of the multimedia ontologies.

Milestone: MS4.1 (Uni Ko-Ld, month 12): First version of the multimedia ontology infrastructure.

Measurable Results by Month 18: Stable software annotation and population tool.

WP4.2: Knowledge-assisted Multimedia Analysis (*CERTH, months 1 – 18*)

Activity WP4.2 deals with the semantic object detection, exploiting the ontologies of WP4.1 and the content processing algorithms of WP3 in order to apply the most appropriate detection steps for the analysis process. The first 18 months, WP4.2 aims at creating numerical to symbolic analysis tools. An automatic way for transition from low-level features to symbolic entities will be employed. Segmentation algorithms available from WP3 and based on low-level features such as colour, texture, edges and motion, will partition images in segments that may have symbolic interpretation. State of the art algorithms based on region homogeneity, boundary and saliency criteria will be examined in a unified way in this activity, while fusion techniques will be employed to combine and merge different partitions. Machine learning techniques such as neurofuzzy networks or support vector machines will be trained to match the regions to instances of the prototype knowledge base and detect an initial list of possible region labels.

After merging, partition hierarchy construction and initial labelling, not only objects may be identified, but semantic events as well, while scenes may be categorized in predefined classes (e.g. indoors/outdoors/landscape/city etc.). To facilitate this and shift the analysis process to the semantic level,

ontological knowledge about the domain of interest will be employed. The ontologies will contain domain knowledge structured in a way to assist the recognition and final labelling process. Partonomic relations of composite objects (e.g., table, chair, house) along with general purpose relations, rules and spatiotemporal coherence constraints will provide the means to accomplish this subtask. Such knowledge facilitates consistency checking and the extraction of implicit knowledge. Tracking techniques will be applied to identify and track independent motion of labelled objects in video scenes, especially in cases of articulated motion, occlusion, and multiple disconnected regions with similar motion requiring perceptual grouping. In the first 18 months 2 tasks are considered:

- **WP4.2.1** Numerical to Symbolic Analysis (*CERTH, months 1– 12*)
- **WP4.2.2** Symbolic to Semantic Analysis (*CERTH, months 8– 18*)

This work is led by the Centre for Research and Technology Hellas and leads to the following deliverable in the first 18 months:

Deliverable: D4.2 (Centre for Research and Technology Hellas, month 12): Technical report on knowledge assisted multimedia analysis.

Milestone: MS4.2 (Centre for Research and Technology Hellas, month 12): Initial implementation of the knowledge assisted analysis.

Measurable Results by Month 18: Stable software module for knowledge assisted analysis.

WP4.3: Multimedia Reasoning and Annotation (*CERTH, months 1 – 18*)

This activity deals with the extraction of meaningful interpretation of high level events and automatic semantic annotation of multimedia content, in collaboration with numerical and symbolic analysis of previous activities. The first 18 months, WP4.3 focuses on the development of the constraint reasoner with extension to handle fuzzy constraints. The following 3 tasks are considered:

- **WP4.3.1** Constraint Based Reasoning (*CERTH, months 1 – 18*)
- **WP4.3.2** Rule Based Reasoning (*CERTH, months 1 – 18*)
- **WP4.3.3** Content Annotation (*CERTH, months 1 – 18*)

Exploiting the spatiotemporal information of the processed audiovisual segments plays a significant role in the identification, tracking, annotation and retrieval of objects and events from multimedia content, since part of the underlying semantics is implicitly embodied in the spatiotemporal relations of the multimedia data. Spatiotemporal relations can be interpreted as constraints between variables representing the defined domain concepts, thus forming a problem to be solved using a constraint reasoning system. Constrained reasoners are systems designed to prove whether or not a given set of constraints is satisfiable on a specific set of variables and to provide the possible solutions if such exist. A multimedia constraint reasoner will be developed to process the set of initial region labels produced in WP4.2 and generate a reduced number of regions along with a reduced set of hypotheses for each one, thus assisting in the task of semantic analysis in WP4.2. In order for the reasoning system to be able to handle the two considered tasks, i.e. region merging and evaluation of the plausibility of the initial hypotheses, appropriate rules need to be defined. Considering the first task, the defined rules could exploit topological information. For example, a set of segments initially labelled as belonging to the same object class should be merged to form a single object instance, if related to one another through adjacency or inclusion. In a similar way, partonomic and spatiotemporal information can be exploited to reduce the hypotheses of a region, depending on its neighbouring segment labels and spatial interrelations. Consequently, the second task deals with the expectation of typical locations of the sought objects – either absolute within a scene or in relation to each other. The integration of low-level features in the reasoning process will further improve the plausibility of the detection results.

Along with the constraint and the rule-based reasoning, general purpose reasoning will enable full scale semi-automatic annotation of the multimedia content. For this purpose, a reasoner is essential to check the consistency and the validity of the produced instances, extract implicit knowledge using subsumption and equivalence relations defined in the ontologies and, finally, transform semantic knowledge into numerical data, if necessary, to be used in the analysis process. Different approaches exist for constructing general purpose reasoners according to the logic formalism that is used for constructing the ontologies. Description logics have proved suitable for multimedia applications since they have large expressive power and preserve considerably low computational complexity. However, the inherent uncertainty of multimedia information, involved in tasks like query, retrieval, or recognition, imposes the need to extend current logic formalisms to represent fuzzy concepts (e.g., high mountain, or fat person) and adapt existing reasoners to handle such knowledge and produce ranked query responses.

This work is led by the Centre for Research and Technology Hellas and results in one deliverable:

Deliverable: D4.3 (Centre for Research and Technology Hellas, month 18): Report on evaluation of algorithms for multimedia reasoning

Milestone: MS4.3 (Centre for Research and Technology Hellas, month 12): Early algorithms for multimedia reasoning.

Measurable Results by Month 18: First prototype of multimedia reasoning tools.

WP4.4: Context based Multimedia Mining (GU, months 1 – 18)

Context based multimedia mining will be investigated in this activity. During the first 18 months, we will study mining in the context of image collections. Specific emphasis will be given to contextual data gathered through user interaction. In image collections grouping information is available (e.g., users grouping images as belonging to one category). The issue will be to mine the patterns in such grouping and use them for finding images with such patterns. This is an incremental mining problem. During this process we will capture the semantics associated with the mined patterns. We will first study various techniques available and provide a literature survey. Subsequently we will devise a new technique for mining image collections and presenting the data retrieved using the mined patterns. During the first 18 months 2 tasks are considered:

- **WP4.4.1** Study of the state-of-the-art on reasoning for knowledge extraction (GU, months 1 – 4)
- **WP4.4.2** Research in reasoning for knowledge extraction (GU, months 1 – 18)

The research under this activity investigates a number of approaches to multimedia processing and knowledge extraction. In this activity we will investigate the development of effective and efficient techniques for data mining. Such approaches will cater not just knowledge extraction but also information retrieval in context.

These tools should help the users in finding the nuggets and knowledge that are hidden in these masses of distributed data they potentially have access to. The traditional list of documents displayed to the user upon the receipt of her/his query is no longer satisfactory. The answer to an information need cannot simply be found in a document, as a variety of resources are relevant in a given context to extract or to create the relevant pieces of information. In addition to efficient information retrieval engines that give direct access to the documents that are stored, users need some tools that provide them with global views of the available information, help them to discover information in huge mass of documents and derive new information or knowledge from target sub-collections of documents. Visualisation of the information with spatial distances between pieces of information can be a useful tool to filter, mine, disambiguate and make contextual large amounts of information. These aspects are related to content mining, i.e. studying the message carried by or hidden in the document contents from a given domain, taking into account various type of information linkage and user's interactions. By giving the user a suite of flexible tools to represent, manipulate and analyse information, the user can form and test hypotheses, which could lead to a better retrieval experience. A special area to tackle here is the structuring and browsing of raw material (so called rushes), this often contains very similar and lengthy shots. Providing tools to be able to get a quick overview on the set of rushes and depict the items/sections most relevant to the current production is an essential aid to the production team.

This work is led by the University of Glasgow and leads to the following deliverable in the first 18 months:

Deliverable: D4.4 (University of Glasgow, month 12): Report specification of the mining based image retrieval technique

Milestone: MS4.4 (University of Glasgow, month 12): Initial implementation of the mining based retrieval technique.

Measurable Results by Month 18: Stable software module for mining based retrieval.

WP4.5: Intelligent Image Classification and User Relevance Feedback (QMUL, months 1 – 18)

This activity aims at exploiting human-machine interaction and enhanced learning to derive semantic information from past experience using relevance feed-back. Initial work will focus on binary classification problems using support vector machines and biologically inspired image classification techniques. Given a piece of multimedia content, the user will input information on its relevance with respect to a predefined semantic concept. The machine will learn from this input and generalize corresponding classes in a second classification step. Multi-objective optimization and meta-heuristic approaches inspired on biologic systems will be investigated. Specifically, techniques for image classification based on ant colonies, swarm particle optimization and artificial immune systems will be developed.

The following specific tasks will be carried out in the first 18 months, coordinated by QMUL:

- **WP4.5.1** State-of-the-art study on user relevance feedback and biologically inspired systems for multimedia classification (*QMUL, months 1 - 4*)
- **WP4.5.2** Initial implementation of a generic technique for user relevance feedback based on support vector machines (*QMUL, months 1 - 6*)
- **WP4.5.3** Biologically inspired systems for image classification, research and development of preliminary algorithms (*QMUL, months 3 - 12*)
- **WP4.5.4** Kernel methods for specific classification tasks and image analysis (*QMUL, months 9 - 18*)

The following deliverables will be issued during the first project phase:

Deliverable: D4.5 (QMUL, month 12): Report specification of developed techniques for intelligent image classification

Milestone: MS4.5 (QMUL, month 12): Initial implementation of developed techniques for intelligent image classification and relevance feedback.

Measurable Results by Month 18: Stable software module for intelligent image classification and relevance feedback.

9.2.4 Joint research activities on semantic multimedia – WP5

This workpackage aims at investigating how to represent multimedia content and context in appropriate ways such that the further distribution, analysis and interaction with content and context can help to add to the description of the multimedia objects and reduce the semantic gap.

WP5.1: Knowledge Representation for Multimedia (*Uni Ko-Ld, months 1 – 18*)

This activity investigates ways of representing content and context of multimedia data. In particular, we will investigate the question of quotation in order to distinguish facts describing a multimedia object from facts describing the content of a multimedia object. Once a language is proposed for these purposes the task of implementing a corresponding reasoning mechanism will be started.

- **WP5.1.1** Extension of RDF / OWL / SWRL for Representing Semantic Data (*Uni Ko-Ld, months 1 - 12*)
- **WP5.1.2** Reasoning with extended RDF/OWL (*Uni Ko-Ld, months 13 - 18*)

Activity WP5.1 is overseen by Uni Ko-Ld and it results in the following deliverable for the first 18 months:

Deliverable: D5.1 (Uni Ko-Ld, month 12): Report on extension of RDF/OWL/SWRL

Milestone: MS5.1 (Uni Ko-Ld, month 12): Extension of RDF/OWL/SWRL

Measurable Results by Month 18: Initial version of semantic reasoner

WP5.2: Reference Framework for Distributed Semantic Management of Multimedia data (*Uni Ko-Ld, months 1 – 18*)

This activity provides the means to store content and context in an appropriate metadata repository. In months 1-12 a centralized metadata store will be provided. Subsequently a task will be started in order to specify a distributed version of the same metadata store for easier sharing of multimedia objects and multimedia content and context descriptions by many users.

- **WP5.2.1** Storage of Metadata (*Uni Ko-Ld, months 1 - 12*)
- **WP5.2.2** Specification of collaborative Distributed Reference Framework (*Uni Ko-Ld, months 13 - 18*)

Activity WP5.2 is also overseen by Uni Ko-Ld and it results in the following deliverable for the first 18 months:

Deliverable: D5.2 (Uni Ko-Ld, month 10): Metadata store specification

Milestone: MS5.2 (Uni Ko-Ld, month 12): Metadata store

Measurable Results by Month 18: Stable metadata store module.

WP5.3: Semantics-based Interaction with Multimedia (CWI, months 1 – 18)

This activity deals with using and creating semantic metadata at the user interface level. The following specific tasks will take place for this activity in the first 18 months, coordinated by the Centrum voor Wiskunde en Informatica:

- **WP5.3.1** Semantic Retrieval (*CWI, months 1 - 12*)
- **WP5.3.2** Semantics-based Presentation of Multimedia (*CWI, months 1 - 12*)

The first task offers the user the possibilities to query and browse for metadata and related content. The second task adapts queried results and multimedia database content according to the semantic metadata and its user. One deliverable will be produced during the first 18 months. This deliverable is coordinated by the Centrum voor Wiskunde en Informatica with mayor contributions from the German Research Centre for Artificial Intelligence.

Deliverable: D5.3 (Centrum voor Wiskunde en Informatica, month 12): Report specification of Semantic Retrieval.

Milestone: MS5.3 (Centrum voor Wiskunde en Informatica, month 12): First implementation and evaluation of Semantic Retrieval.

Measurable Results by Month 18: Stable module for semantic retrieval.

WP5.4: Knowledge Extraction from Complementary Sources (UEP, months 1 – 18)

This activity is concerned with augmenting the semantic multimedia metadata basis. In the first 18 months, this task will be restricted to primary sources directly attached to the media, e.g., text captions in images. This task will be coordinated by University of Economics, Prague and it results in the following deliverable for the first 18 months:

Deliverable: D5.4 (University of Economics, Prague, month 12): Report on algorithms for mining primary complementary Sources.

Milestone: MS5.4 (University of Economics, Prague, month 12): Initial algorithms for mining primary complementary Sources.

Measurable Results by Month 18: Stable software for mining primary complementary Sources.

9.2.5 K-Space Framework for the Integration of Software Tools – WP6

There are two activities in this workpackage, both of which run for the entire duration of the project.

WP6.1: Distributed Research Environment Design and Implementation (DCU, month 1-18)

This activity focuses on designing and implementing the physical instantiation of the K-Space research environment that will be used as a tool to aid collaboration. In the first 18 months, this include the following sub-activities:

- **WP6.1.1** Distributed Research Environment Requirements Specification (*DCU, month 1-4*)
- **WP6.1.2** Study and Selection of Suitable Network Communication Mechanisms (*DCU, month 5-12*)
- **WP6.1.3** Study and Selection of Suitable Media Database Management Tools (*DCU, month 5-12*)
- **WP6.1.4** Study and Selection of Suitable Machine Independent Interface Technologies (*DCU, month 5-12*)
- **WP6.1.5** Initial Instantiation of Distributed Framework (*DCU, month 11-18*)

The objective in WP6.1.1 is to create the requirements for the distributed research environment by identifying the functionality that this environment should support in order to facilitate collaborative research.

Given the requirements specified in WP6.1.1, the activities WP6.1.2-4 will carry out a review of the current state-of-the-art technologies for supporting collaborative work addressing issues such as network communication mechanisms for exchange of data and remote execution of software, remote access to media databases and software repositories and platform independent mechanisms for interfacing Graphical User Interfaces. In each case potential candidate state-of-the-art technologies will first be identified. Then a small subset in each category will be selected for trial usage. Trial usage will involve a small set of partners volunteering to act as a beta testers for specific functionalities using an early subset of the available research resources from WP6.2. Potential examples of functionalities to be tested include checking software in/out of

the repository, remotely running analysis tools, exchange of analysis results, interfacing a local GUI with a remote content-based search engine. Based on these investigations and partner feedback on trial usage, technologies that fulfil the specified requirements will be selected for the initial implementation of the collaborative research environment.

The objective of this activity is to use existing stable state-of-the-art technologies that are currently being used in a variety of novel and successful educational and economic web services. In choosing appropriate technology, the knowledge gained in other Networks, such as AIM@SHAPE and 3DTV, will be leveraged wherever possible. Particular emphasis will be placed on open source frameworks and tools, thereby ensuring the sustainability and accessibility of the developed environment. Example technologies that may be used include:

- XML-based technologies, such as those recommended by the Web Services Activity of the W3C, for application/service communication;
- CVS for effective management of the software repository;
- Web Services (J2EE) or Enterprise Java Beans (EJB) for distributed applications;
- JBoss, (an open source, J2EE standards-compliant application server) for deployment of web applications and distributed components;
- servlets/JSP technology for thin interface clients;
- JDBC/ODBC APIs for communication with databases.

WP6.1.5 focuses on the implementation of the initial version of the distributed environment. It will employ the technologies identified in WP6.2.1-4 in order to populate the environment with resources incorporated from WP6.2.

This activity results in the following deliverable for the first 18 months:

Deliverable: D6.1 (Dublin City University, month 12): Distributed research environment specification.

Milestone: MS6.1 (Dublin City University, month 12): Contents and description of shared resource repositories.

Measurable Results by Month 18: Stable K-Space tool integrating partners software modules.

WP6.2: Research Resource Sharing (DCU, month 11-18)

This activity focuses on reviewing the existing research resources available within the Network on an ongoing basis in order to collect these into (distributed) repositories that can be accessed via the distributed environment designed in WP6.1. It consists of the following sub-activities in the first 18 months:

- **WP6.2.1** Review of Existing and Planned Resources (*DCU, month 1-3*)
- **WP6.2.2** Collection and Organisation of Test Content Repository (*DCU, month 4-12*)
- **WP6.2.3** Collection and Organisation of Analysis Software Repository (*DCU, month 4-12*)
- **WP6.2.4** Identification of a Suite of Front End User Interfaces (*DCU, month 4-12*)

WP6.2.1 focuses on identifying existing partners' resources that can be used in the first implementation of the distributed research environment. This will identify the existing systems, software tools and test data that already exist within the Network and that partners are committed to sharing. It will also identify the resources that will be developed within the first year of the Network based on planned collaborations in the other technical workpackages (WP4, WP5 and WP6). Of all identified resources, a subset will be chosen for integration into the initial implementation of the distributed research environment.

WP6.2.2, WP6.2.3 and WP6.2.4 each focus on building the repositories required to populate the distributed research environment with useful resources. Separate activities are planned for test content (WP6.2.2), software (WP6.2.3) and user interfaces (WP6.2.4). Each activity will address issues in sharing research resources, such as Intellectual Property and copyright considerations independently. These sub-activities do not just gather resources into one large repository that is unusable in any real manner, but rather will also involve wrapping the identified resources in the interfaces identified in WP6.1. As such, close communication will be required between each activity in WP6.2 and the corresponding sub-activity in WP6.1 on specification of interfacing technology. The outputs of each sub-activity feed into WP6.1.5 where they will form the core of the first implementation of the distributed research environment.

After month 12, this entire activity repeats so that available resources within the Network are reviewed and collected into the environment on an ongoing basis.

This activity results in the following deliverable for the first 18 months:

Deliverable: D6.2 (Dublin City University, month 10): Content and description of partners' research resources.

Milestone: MS6.2 (Dublin City University, month 4): Initial review of partners' research resources.

Measurable Results by Month 18: Library catalogue of all available K-Space research resources.

Joint programme of activities to spread excellence – WP7

There are six main activities in this workpackage. All of them run for the entire duration of the project. The second part of the project will continue incrementally with the same activities and will add new ones if needed. The following is the workplan for the first project phase.

WP7.1: Website and Electronic Newsletter, K-Space Posters and Brochures (UEP, month 1-18)

An important tool of dissemination and promotion will be the K-Space web site. It will support delivery and spread of K-Space promotional material such as information leaflet, electronic newsletter, etc. The Web site will work as a portal, electronic archive or digital library of the community and store different types of documents: fundamental papers, training and teaching material, software, K-Space researchers' papers, test collections or links to them, Ph.D. and Master thesis.

Six-monthly Electronic Newsletter will be an instrument for regular exchange of information among network members and the research community at large. The creation of a Newsletter dedicated to the K-Space initiative will constitute the primary means to collect the results achieved through the network activities, and to spread them. This Newsletter will be strongly related to the main initiatives in the field, so that the activities undertaken within K-Space will be properly connected within a more general and distributed research framework. The main objectives of this newsletter are:

- To report the main activities promoted and undertaken within the NoE context;
- To link to both European and international initiatives in the field, and;
- To publish papers (position papers, state of the art, reviews) of researchers involved in the network.

The first project brochure will be issued at months 6. It will be updated every six months thereafter. So, 3 different versions will be produced during the first 18 months. The brochures content will be suitable for experts and non experts. It will be a publicly available document and a electronic version it will be made available on the project web site.

Posters illustrating the project activities will be produced and presented in different events including project presentations in EU concertation meetings and SAMT. The first K-Space poster will be produced by month six. New versions will be issued subsequently every six months.

Four sub-activities are considered:

- **WP7.1.1** The K-Space Website (*QMUL, month 1-18*)
- **WP7.1.2** Sixmonthly Electronic Newsletter (*UEP month 1-18*)
- **WP7.1.3** Project Brochures (*UEP month 1-18*)
- **WP7.1.4** Project Posters (*UEP month 1-18*)

These activities results in the following deliverable for the first 18 months:

Deliverable: D7.1.n.x (University of Economics, Prague, months 6, 12, 18): Newsletter (D7.1.1.x), brochures (D7.1.2.x) and posters (D7.1.3.x)

Deliverable: D7.1.4 (QMUL, month 2): K-Space Webpage fully functional.

Measurable Results by Month 18: Three news letters and three K-Space brochures.

WP7.2 International Conference on Semantic and Digital Media Technologies -SAMT- (QMUL, month 1-18)

The K-Space conference will promote and support the flagship dissemination forum of the Network: The International Conference on Semantic and Digital Media Technologies (SAMT). The objective is to establish of a conference series on the research areas of the network. It will serve as platform for the presentation of research paper from network members and the wide research community.

Strategy and Vision: The main goal of this activity is to consolidate a key event in the area at European level and beyond. One important objective of this activity is to broaden participation to the point where it becomes the main Conference in the area. It is expected that the fourth version of this event becomes a main conference with wide participation. The resulting yearly conference will be one of the lasting achievements of K-Space. The vision is for SAMT to become “The” conference in the area attracting most relevant technical papers and presentations world-wide.

It will be one important long-term legacy of K-Space.

The overall strategy of the event will be defined by a steering committee. This permanent steering committee will be set within the first two months. The mission of the steering committee is:

- To maintain the high quality scientific standard of the conference
- To release open call for proposal for conference host
- To assess proposals to host the conference and decide on the most suitable in a competitive basis
- To ensure that event grows and becomes the most important conference in the field

SAMT steering committee will meet at least three times a year and the conference plan for growth and impact will be updated on a regular basis to ensure the conference is kept abreast with the latest technical developments.

The event will keep the character and scope fully aligned with the technical objectives of the NoE. It will serve not only to disseminate and demonstrate the main achievements of the network every year but also as primary feeding ground for networking and exchange of ideas with other members of the wide scientific community.

The third version of the workshop in year 2006 will be sponsored by K-Space. The workshop will feature special sessions on:

- Content-based multimedia analysis for annotation and retrieval
- Knowledge extraction for high-level multimedia annotation, search and retrieval
- Semantic multimedia

In addition, there will be a number of plenary talks featuring invited presentations that cut across and unify these three topics. Invited speakers will be drawn from industry and academia using the excellent existing links of partners to other world leaders both in the EU (e.g. via frame-work funded activities) and beyond.

Based on the guidelines and strategy outlined here, the conference steering committee will produce a detailed plan in order to achieve the main goals of this event. The plan will be agreed during the first meeting in January 2006. The activity will be driven by this plan following the strategy and vision set in this document.

This activity results in the following deliverable for the first 18 months:

Deliverable: D7.2 (K-Space Partner hosting SAMT’06, month 11): Proceedings of SAMT06.

Milestone: MS7.2 (K-Space Partner hosting SAMT’07, month 11): Call for papers for SAMT07.

Measurable Results by Month 18: Proceedings of SAMT06 with over 120 technical contributions.

WP7.3 Towards a Scientific Forum in Multimedia Knowledge Extraction and Analysis (DFKI, month 1-18)

During the first 18 months of K-space the consortium will launch an association similar to the Dutch Stichting, German Verein or scientific society. The mission of the Verein or Society is the promotion of Semantic Multimedia Research and Technology, e.g. SMART e.V. The first task within this activity is to produce a plan for the achievement of the scientific forum and draft the guidelines that will govern the forum. This draft guidelines and plan will be produced during the first 6 months. The work for the full project duration will be linked to this plan.

The society or *Verein* will be used to create a lasting movement for the following objectives:

- Organisation of the k-space conference
- Knowledge brokering services in the realm of semantic multimedia
- Training services in the realm of semantic multimedia

The financial sustainability of the association will be ensured by:

- Reasonable fees from its academic and industrial members
- the conference, which will to be self-financing after a short initial period of at most 2 years

- knowledge brokering services: companies that want to make use of such services pay for access to these services
- training services: participants pay small fees in order to access training materials; update of training materials will be provided by members of the association; motivation for contributors and users will be the quality stamp assigned by the association

The society aim is to ensure the persistence of K-Space beyond EU funding. Initial discussions on the society constitution will be carried out in a meeting of the steering board and WP-Leaders before month 6. Several alternatives will be considered including:

K-Space knowledge society with its own bye-law. This would be an association often registered as a charity. K-Space organization like Stichting which would be a legal entity.

This activity results in the following deliverable for the first 18 months:

Deliverable: D7.3 (German Research Centre for Artificial Intelligence, month 12): Report on the practicality of the scientific forum and its implementation plan.

Milestone: MS7.3 (German Research Centre for Artificial Intelligence, month 6): Jointly management boards meeting⁴ to discuss a plan for the realization of the forum.

Measurable Results by Month 18: Final plan for the realization of K-Space forum.

WP7.4 Joint Publications (EPFL, month 1-18)

Joint publications will help to spread excellence outside the network and to enlarge the network audience. Joint publications will be tackled by two different means:

- **WP7.4.1** (month 1-18) Special Sessions in Relevant Conferences (*EPFL, month 1-18*)
- **WP7.4.2** (month 2-18) Special Issues in Leading Journals (*EPFL, month 1-18*)

In WP7.4.1, identification of important international and well established conferences that are likely to accept a special session on K-Space topics will take place during the first three months of the project. Later activities include nomination of an organisation committee, selection of conferences and organisation of the special session (selection of technical committee, call for paper, reviewing process, financial support for students) The task will target special sessions in the following events:

- ACM Multimedia
- XML Europe
- International Conference on Image Processing (ICIP)
- International Workshop on Content based Multimedia Indexing (CBMI)
- European Semantic Web Conference (ESWC)
- International Joint Conference on Artificial Intelligence (IJCAI).

In WP7.4.2, the tasks will include identification of a leading journal and selection of papers from the conference special session. Organization of Special Issues in leading journals, such as EURASIP, IEE Proceedings, ACM and IEEE Transactions is targeted.

WP7.4 results in the following deliverable for the first 18 months:

Deliverable: D7.4 (Ecole Polytechnique Fédérale de Lausanne, month 18): Report on special sessions in leading conferences

Milestone: MS7.4 (Ecole Polytechnique Fédérale de Lausanne, month 12): Agreement with editorial board of a leading journal for a special issue.

Measurable Results by Month 18: Three special sessions in conferences and two journals special issue.

WP7.5 Exhibitions and Demonstrations (INA, month 1-18)

During the first 18 months the project will be presented in a EU concertation meetings and other information events. During the first 6 months a list of targeted important international meetings and exhibitions will be produced and the feasibility of K-Space demonstrations at such events will be studied.

WP7.5 results in the following deliverable for the first 18 months:

⁴ The Network Steering Board, Workpackage Leaders, Industrial Advisory Board and the Board of Scientific Advisors will participate in this jointly meeting.

Deliverable: D7.5 (Institut National de l'Audiovisuel, month 18): Report on participation in dissemination events.

Milestone: *MS7.5* (Institut National de l'Audiovisuel, month 18): Active participation in at least one major exhibition event.

Measurable Results by Month 18: Participation in at least one major exhibition event.

WP7.6 Contribution to Standards and Technology Transfer (CERTH, month 1-18)

This activity consist of two subactivities:

- **WP7.6.1** Contributions to Standards (*CERTH, month 1-18*)
- **WP7.6.2** Technology Transfer (*GET, month 1-18*)

The first subactivity will seek active participation in the following initiatives is targeted during the first 18 months: ISO/IEC JTC1/SC29 WG 11 (MPEG), WG1 (JPEG), JPSearch, Unicode, URI, XML/XML, RDF, RDFS, OWL, OWL Lite, OWL DL and OWL Full.

Subactivity WP7.6.2, will aim at properly transferring technology to industry. Contributions to standardisation activities will be linked to technology transfer aiming at an efficient exploitation and reuse of technology. Several members of K-Space have experience with IP and markets, and with K-Space in place, we will dedicate effort towards removing some of the boundaries between academia and markets. Thus, we will direct K-Space European research towards a fruitful exchange between academia and business. The K-Space Industrial Advisory Board will not only help to identify suitable modules for speedy exploitation but also facilitate the transfer of such technology. Aiming at efficient technology transfer, the following tasks will be executed during the first 18 months:

- Identify internal (K-Space) and external (related research areas, big players, SMEs) technology knowledge. The result of this activity is a report about multimedia technology that has been developed, used, or is under development.
- Establishment of a database of K-Space IP and patents.
- Outlining a research strategy for directing K-Space and multimedia research in Europe according to industrial trends and needs.

WP7.6 results in the following deliverable for the first 18 months:

Deliverable: D7.6 (Centre for Research and Technology Hellas, month 12): First yearly report on standardisation contributions.

Milestone: *MS7.6* (Groupe des Ecoles des Télécommunications, month 18): First set of technology transfer initiatives and feedback from industry.

Measurable Results by Month 18: At least two contributions to standards and one technology transfer agreement.

9.2.7 Assessment and Evaluation Activities – WP8

During the first 18 months the objective tree for the project will be identified. Mechanisms for monitoring the project objectives and re-orientation of the project if the objectives change will be developed. The WP is divided into three activities.

WP8.1 Definition of Project Objective Tree and Project Assessment Metrics (EURECOM, month 1-18)

The initial task consists of the identification of an objective tree for the project and the establishment of measures for assessment of the eventual level and degree of success in achieving of these objectives. This will form a framework for self-assessment of the project. Two subactivities are considered

- **WP8.1.1** Definition of project objective tree (*EURECOM, month 1-6*)
- **WP8.1.2** Assessment metrics (*EURECOM, month 3-12*)

The activity results in the following deliverable for the first 18 months:

Deliverable: D8.1 (Institut EURECOM, month 6): Report on measurable project objectives (objective tree).

Milestone: *MS8.1* (Institut EURECOM, month 10): First version of the project assessment and evaluation criteria.

WP8.2 Annual Project Review and Project Re-Orientation (QMUL, month 6-15)

Preparations for the first annual review will start in month 6. The actual review will happen in month 12. After the review the new program of work will be revised and amended according to the recommendation of the external evaluators and the scientific advisory board. The program of work for the second project phase will be delivered by month 14.

The activity results in the following deliverable for the first 18 months:

Deliverable: D8.2 (QMUL, month 14): Program of work (Technical Annex) for the second project phase.

Milestone: MS8.2 (QMUL, month 12): First external project review.

WP8.3 Monitoring and Evaluation of Integration Activities (DCU, month 6-18)

This activity deals with monitoring the integration activities taking place within the network and reporting on the success (or otherwise) of these. The work in this activity continues for the life-time of the project. It results in a single deliverable within the first 18 months, with annual updates thereafter:

Deliverable: D8.3 (Dublin City University, month 12): Report on integration activities.

Milestone: MS8.3 (Dublin City University, month 14): Formulation of recommendations on integration activities to the Network Steering Board.

9.2.8 Consortium Management Activities – WP1

The management activities are designed to guarantee that the project runs smoothly by ensuring that the goals are clearly defined and understood. The proposed management structure of the Network will be functional immediately after the project kick-off meeting. The following management activities will be undertaken during the first 18 months:

- **WP1.1** Overall Coordination of the Joint Activities of the Network
- **WP1.2** Communication with the EU Commission and Management Reports
- **WP1.3** Planning and Coordination of Project and Boards Meetings
- **WP1.4** Financial Planning
- **WP1.5** Accounting and Financial Audits
- **WP1.6** Handling of Legal and Ethical Matters
- **WP1.7** Concertation, Consensus and Clusters
- **WP1.8** Coordination of the Annual Project Reviews

The Management Centre is in charge of all coordination activities. It will seek advice from the Network Steering Board.

WP1.1 is the main activity and main task of the Management WP. The progress of individual actions and achievements in the corresponding activities will be supervised by the WP leaders who report to the Network Steering Board (NSB). The administration executive will ensure that relevant information on NoE progress and status is being exchanged among the members of the NSB. Using this information the NSB can quickly identify if changes are needed and efficiently decide what corrections or new actions should be implemented. The results of these efforts will flow into the progress reports.

In WP1.2, one staff member from each partner is appointed as administration contact to interface with the administration executive. This way, there is a clear communication interface between the commission and the NoE. This activity will deliver sixmonthly activity reports to the EC. These reports will include summaries of network expenditures and previous submission will be ratified by the NSB. To produce these reports, in particular financial information, the administration executive will rely on information provided by the administration contact person of each partner.

WP1.3 will offer logistic support for the planning and coordination of all project and boards meetings. This activity is also in charge of making all necessary arrangements for a successful project start including the kick-off meetings.

In WP1.4, a detailed financial plan will be written by the administration executive, based on the outline financial plan of the project. This plan will be used to review the financial status of the project on a regular basis, and used to generate reports to the Network Steering Board.

WP1.5 will ensure that financial audits as required by the EU are being implemented in the network. Based on the accounting figures, future budgets will be planned and overspending will be limited.

The activity WP1.6 will cover the way that partners behave with respect to each other according to the terms of the Consortium Agreement. It will deal with the liability of partners, partner withdrawal procedures, the settlement of disputes, the responsibilities of partners regarding accurate and timely reporting of difficulties, confidentiality, including the difference between foreground and background information, IPR, including arrangements for licensing and special duties of the coordinating Partner.

WP1.7 addresses exchange of information and integration with other related projects in the framework of Clusters or other concertation mechanisms that might be established in order to achieve the overall project vision. This task will identify potential for clustering and use diverse project activities to perform concerted actions with other networks and projects. The results of these efforts will flow into the progress reports. This activity will be linked and feed-back to the activities in WP7. This task will be in charge of preparing the ***Project Presentation Sheet*** at the beginning of the project.

WP1.8 will prepare and provide the means for successful annual project reviews as required by the EC. The administration executive will ensure that the major annual deliverables are submitted on time to the reviewer. Logistic organization of the review will be provided. The administration executive will ensure that a plan for drafting and finalizing the document is put in pace and executed in a timely manner. This activity is closely linked to WP8.2 and will support the production and achievement of the deliverable and milestone in D8.2.

Since this Workpackage is responsible for ensuring that all the milestones of the project are achieved on schedule, no specific milestones are set. Rather all project milestones will be supervised by WP1.

The activities in WP1 lead to the following deliverable for the first 18 months. QMUL as coordinator partner is responsible for all the deliverables in WP1.

Deliverable: D1.1.x (QMUL, month 2x): Bimonthly management reports

Deliverable: D1.2.x (QMUL, month 6x): Sixmonthly activity reports

Deliverable: D1.3.x (QMUL, month x): Agendas and official minutes of relevant project meetings

Deliverable: D1.4 (QMUL, month 12): Yearly financial plan

Deliverable: D1.5 (QMUL, month 12): Financial audit reports

Deliverable: D1.6 (QMUL, month 18): Status report on legal and ethical matters

Deliverable: D1.7 (QMUL, month 2): Project presentation sheet

Additional deliverables: According to Appendix X to the contract two additional set of deliverables will be produced in WP1: 12-monthly periodic reports and final activity report. Annual public reports will be also produced and made available to the broad research community. A more detailed specification of these deliverables is given in Appendix X to the contract.

9.3 WP Plan Tables

9.3.1 Workpackage list (months 1 – Month 18)

WP No ⁵	Workpackage title	Lead contractor ⁶	Person-months ⁷	Start month ⁸	End month ⁹	Deliverable No ¹⁰
WP1	Consortium management activities	1	39.7	1	18	D1.1, D1.2, D1.3, D1.4, D1.6, D1.7
WP2	Integrating activities	10	48	1	18	D2.1, D2.2, D2.3, D2.4
WP3	Content-based multimedia analysis	3	162	1	18	D3.1, D3.2, D3.3, D3.4
WP4	Knowledge extraction	4	163	1	18	D4.1, D4.2, D4.3, D4.4, D4.5
WP5	Semantic multimedia	2	111	1	18	D5.1, D5.2, D5.3, D5.4
WP6	K-Space Framework for the Integration of Software Tools	5	50	1	18	D6.1, D6.2
WP7	Activities to spread excellence	11	73	1	18	D7.1, D7.2, D7.3, D7.4, D7.5, D7.6
WP8	Assessment and evaluation	9	11.4	1	18	D8.1, D8.2, D8.3
	TOTAL		658.1			

⁶ Number of the contractor leading the work in this workpackage.

⁷ The total number of person-months allocated to each work package.

⁸ Relative start date for the work in the specific workpackages, month 0 marking the start of the project, and all other start dates being relative to this start date.

⁹ Relative end date, month 1 marking the start of the project, and all ends dates being relative to this start date.

¹⁰ Deliverable number: Number for the deliverable(s)/result(s) mentioned in the workpackage: D1 - Dn.

9.3.2 Deliverables list, sorted by deliverable ID (months 1 – Month 18)

Del. no.	Deliverable name	WP no.	Lead participant	Nature ¹¹	Dissemination level ¹²	Deliverable month ¹³
D1.1.x	Bimonthly management reports	WP1	1	R	CO	2x
D1.2.x	Sixmonthly activity reports	WP1	1	R	CO	6x
D1.3.x	Agendas and official minutes of relevant project meetings	WP1	1	R	CO	x
D1.4	Yearly financial plan	WP1	1	O	CO	12
D1.5	Financial audit reports	WP1	1	R	CO	12
D1.6	Status report on legal and ethical matters	WP1	1	R	PU	18
D1.7	Project presentation sheet	WP1	1	O	PU	2
D2.1	Annual report on academic researcher mobility	WP2	10	R	PU	12
D2.2	Annual report on industry placements	WP2	14	R	RE	18
D2.3	Annual report on K-Space online teaching resources	WP2	12	R	PU	12
D2.4	First yearly report on the summer school, the European integration of master and doctoral programs	WP2	7	R	PU	12
D3.1	State-of-the-art report on multimedia content analysis	WP3	3	R	PU	5
D3.2	Technical report on moving object segmentation	WP3	5	R	PU	12
D3.3	Technical report on audio and speech processing	WP3	7	R	PU	12
D3.4	MPEG-7 content descriptors and profiles	WP3	9	R	PU	8
D4.1	Annotation/population tool, first version of the multimedia ontologies	WP4	2	R	PU	12
D4.2	Technical report on knowledge assisted multimedia analysis	WP4	4	R	RE	12
D4.3	Rep. on evaluation of algorithms for MM reasoning	WP4	4	R	PU	18
D4.4	Rep. specification of the mining based image retrieval technique	WP4	10	R	PU	12
D4.5	Report specification of developed techniques for intelligent image classification	WP4	1	R	PU	12
D5.1	Report on extension of RDF/OWL/SWRL	WP5	2	R	PU	12
D5.2	Metadata store specification	WP5	2	R	PU	10
D5.3	Report specification of Semantic Retrieval	WP5	6	R	RE	12
D5.4	Rep. on alg. for mining primary/complementary Sources	WP5	14	R	PU	12
D6.1	Distributed research environment specification	WP6	5	R	PU	12
D6.2	Content and description of partners' research resources	WP6	5	R	PU	10
D7.1.n.x	Newsletter (D7.1.1.x), brochures (D7.1.2.x), posters (D7.1.3.x) and (D7.1.4) Webpage	WP7	14	O	PU	2, 6, 12, 18
D7.2	Proceedings of SAMT06	WP7	1	O	PU	11
D7.3	Rep. on the scientific forum and its implementation plan	WP7	11	R	CO	12
D7.4	Report on special sessions in leading conferences	WP7	13	R	PU	18
D7.5	Report on participation in dissemination events	WP7	8	R	PU	18
D7.6	First yearly report on standardisation contributions.	WP7	4	R	CO	12
D8.1	Report on measurable project objectives (objective tree)	WP8	9	R	CO	6
D8.2	Program of work for the second project phase.	WP8	1	R	CO	12
D8.3	Report on integration activities	WP8	5	R	PU	12

¹¹ **R** = Report
P = Prototype
D = Demonstrator
O = Other

¹² **PU** = Public
PP = Restricted to other programme participants (including the Commission Services).
RE = Restricted to a group specified by the consortium (including the Commission Services).
CO = Confidential, only for members of the consortium (including the Commission Services).

¹³ Month in which the deliverables will be available. Month 1 marking the start of the project, and all delivery dates being relative to this start date.

9.3.3 Complete deliverables list sorted by delivery date (months 1 – Month 18)

Delivery month	Deliverables	
2	D1.1.1 (1st bimonthly management report),	D1.7, D7.1.4
4	D1.1.2 (2nd bimonthly management report)	
5	D3.1	
6	D1.1.3 (3rd bimonthly management report), D7.1.1.1 (1st newsletter), D7.1.3.1 (1st poster),	D1.2.1 (1st sixmonthly activity report), D7.1.2.1 (1st brochure), D.1.3.1, D8.1
8	D1.1.4 (4th bimonthly management report),	D3.4
10	D1.1.5 (5th bimonthly management report),	D5.2, D6.2
11	D7.2	
12	D1.1.6 (6th bimonthly management report), D7.1.1.2 (2nd newsletter), D7.1.3.2 (2nd poster), D2.1, D3.2, D4.2, D5.1, D6.1, D8.2,	D1.2.2 (2nd sixmonthly activity report), D7.1.2.2 (2nd brochure), D1.4, D1.5 D2.3, D2.4 D3.3, D4.1 D4.4, D4.5 D5.3, D5.4 D7.3, D7.6 D8.3
14	D1.1.7 (7th bimonthly management report),	
16	D1.1.8 (8th bimonthly management report),	
18	D1.1.9 (9th bimonthly management report), D7.1.1.3 (3rd newsletter), D7.1.3.3 (3rd poster), D4.3,	D1.2.3 (3rd sixmonthly activity report), D7.1.2.3 (3rd brochure), D1.6, D2.2 D7.4, D7.5

Additional deliverables: According to Appendix X to the contract two additional set of deliverables will be produced and made available to the project officer and peer-reviewers: 12-monthly periodic reports and final activity report. Annual public reports will be also produced and made available to the broad research community. A more detailed specification of these deliverables is given in Appendix X to the contract.

Major outputs at the end of year one: The following deliverables are due in month 12 and build the set of major non-managerial project outputs at the end of month 12:

- D2.1 Annual report on academic researcher mobility*
- D2.3 Annual report on K-Space online teaching resources*
- D2.4 First yearly report on the summer school, the European integration of master and doctoral programs*
- D3.2 Technical report on moving object segmentation*
- D3.3 Technical report on audio and speech processing*
- D4.1 Annotation/population tool, first version of the multimedia ontologies*
- D4.2 Technical report on knowledge assisted multimedia analysis*
- D4.4 Report specification of the mining based image retrieval technique*
- D4.5 Report specification of developed techniques for relevance feedback*
- D5.1 Report on extension of RDF/OWL/SWRL*
- D5.3 Report specification of Semantic Retrieval*
- D5.4 Report on algorithms for mining primary/complementary Sources*
- D6.1 Distributed research environment specification*
- D6.2 Content and description of partners' research resources*
- D7.6 First yearly report on standardisation contributions.*
- D8.3 Report on integration activities*

9.3.4 Milestone list (months 1 – Month 18)

Milestone no	Milestone title	Achieve date
MS2.1	Completion of at least one PhD exchange and start of four others	12
MS2.2	Completion of at least three industry placements	18
MS2.3	Initial structured database of K-Space teaching resources available online over the K-Space web portal	12
MS2.4	First K-Space summer school	8
MS3.1	Initial software modules for multimedia content structuring	12
MS3.2	Initial software modules for moving object segmentation	12
MS3.3	Initial audio and speech processing tool-box	12
MS3.4	Interfaces for content analysis and content description infrastructure	10
MS4.1	First version of the multimedia ontology infrastructure	12
MS4.2	Initial implementation of the knowledge assisted analysis	12
MS4.3	Early algorithms for multimedia reasoning	12
MS4.4	Initial implementation of the mining based retrieval technique	12
MS4.5	Initial implementation of techniques for intelligent image classification	12
MS5.1	Extension of RDF/OWL/SWRL	12
MS5.2	Metadata store	12
MS5.3	First implementation and evaluation of Semantic Retrieval	12
MS5.4	Initial algorithms for mining primary complementary Sources	12
MS6.1	Contents and description of shared resource repositories	12
MS6.2	Initial review of partners' research resources	4
MS7.2	Call for papers for SAMT'07	11
MS7.3	Jointly management boards meeting ¹⁴ to discuss a plan for the realization of the forum	6
MS7.4	Agreement with editorial board of a leading journal for a special issue	12
MS7.5	Active participation in at least one major exhibition event	18
MS7.6	First set of technology transfer initiatives and feedback from industry	18
MS8.1	First version of the project assessment and evaluation criteria	10
MS8.2	First external project review	12
MS8.3	Formulation of recommendations on integration activities to the Network Steering Board	14

¹⁴ The Network Steering Board, Workpackage Leaders, Industrial Advisory Board and the Board of Scientific Advisors will participate in this jointly meeting.

**9.4 Work planning showing the timing of JRA -Gantt charts
WP2**

Task ID	Task Name	Month																	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
WP2.1	Exchange of Academic Research Personnel and PhD Students																		
WP2.1.1	Exchange of Researchers via Short-term Fellowships																		
<i>D2.1</i>	<i>Annual report on academic researcher mobility</i>	◆																	
WP2.1.2	Exchange of PhD Students																		
<i>MS2.1</i>	<i>Completion of at least six PhD exchanges</i>	★																	
WP2.1.3	Visiting Scientists																		
WP2.2	Industrial Placement of Research Personnel																		
WP2.2.1	Short-term Industrial Fellowships																		
WP2.2.2	Take-up of PhD Students for Industrial Experience																		
<i>D2.2</i>	<i>Annual report on industry placements.</i>	◆																	
<i>MS2.2</i>	<i>Completion of at least three industry placements</i>	★																	
WP2.3	Shared Teaching Resources																		
<i>D2.3</i>	<i>Annual report on K-Space online teaching resources</i>	◆																	
<i>MS2.3</i>	<i>Initial structured database of K-Space teaching resources available online over the K-Space web portal</i>	★																	
WP2.4	Summer schools and European Master and PhD program																		
<i>D2.4</i>	<i>First yearly report on the summer school, the European integration of master and doctoral programs</i>	◆																	
<i>MS2.4</i>	<i>First K-Space summer school</i>	★																	

WP3

Task ID	Task Name	Month																	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
WP3.1	Content Structuring																		
WP3.1.1	Preparation of a State-of-the-art Report on Multimedia Content Structuring																		
WP3.1.2	Research in Multimedia Content Structuring																		
D3.1	State-of-the-art report in multimedia content analysis						◆												
MS3.1	Initial software modules for multimedia content structuring													★					
WP3.2	Moving 2D and 3D Object Segmentation and Indexing																		
WP3.2.1	Moving Object Segmentation																		
WP3.2.2	Indexing of 3D Objects and Models Segmentation																		
D3.2	Technical report on moving object segmentation													◆					
MS3.2	Initial software modules for moving object segmentation													★					
WP3.3	Audio-/Speech Processing and Text Analysis																		
WP3.3.1	Audio/Speech Processing																		
WP3.3.2	Text Analysis																		
D3.3	Technical report on audio and speech processing													◆					
MS3.3	Initial audio and speech processing tool-box													★					
WP3.4	Content Description																		
WP3.4.1	Gathering of Requirements for Content Analysis and Content Description Infrastructure																		
WP3.4.2	Definition of architecture for content analysis and content description infrastructure																		
WP3.4.3	Implementation of the Infrastructure and Integration within WP6																		
WP3.4.4	Definition of Descriptors and Description Schemes																		
WP3.4.5	Definition of Suitable Metadata Profiles for Media Content Analysis, Search and Retrieval																		
D3.4	MPEG-7 content descriptors and profiles								◆										
MS3.4	Interfaces for content analysis and content description infrastructure											★							

WP4

Task ID	Task Name	Month																		
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
WP4.1	Specification of a Multimedia Ontology Infrastructure																			
WP4.1.1	Top-level Multimedia Content Ontology																			
WP4.1.2	Low-level Visual Feature Ontology																			
WP4.1.3	Prototype Knowledge Base																			
<i>D4.1</i>	<i>Annotation population tool, first version of multimedia ontologies</i>													◆						
<i>MS4.1</i>	<i>First version of the multimedia ontology infrastructure</i>													★						
WP4.2	Knowledge-assisted Multimedia Analysis																			
WP4.2.1	Numerical to Symbolic Analysis																			
WP4.2.2	Symbolic to Semantic Analysis																			
<i>D4.2</i>	<i>Technical report on knowledge assisted multimedia analysis</i>													◆						
<i>MS4.2</i>	<i>Initial implementation of the knowledge assisted analysis</i>													★						
WP4.3	Multimedia Reasoning and Annotation																			
WP4.3.1	Constraint Based Reasoning																			
WP4.3.2	Rule Based Reasoning																			
WP4.3.3	Content Annotation																			
<i>D4.3</i>	<i>Report on evaluation of algorithms for multimedia reasoning</i>																		◆	
<i>MS4.3</i>	<i>Early algorithms for multimedia reasoning</i>													★						
WP4.4	Context based Multimedia Mining																			
WP4.4.1	Study of the State-of-the-art Report on Reasoning for Knowledge Extraction																			
WP4.4.2	Research in Reasoning for Knowledge Extraction																			
<i>D4.4</i>	<i>Report specification of the mining based image retrieval technique</i>													◆						
<i>MS4.4</i>	<i>Initial implementation of the mining based retrieval technique</i>													★						
WP4.5	Intelligent User Relevance Feedback																			
WP4.5.1	State-of-the-art study on User Relevance Feedback for Multimedia Annotation and Retrieval																			
WP4.5.2	Initial Implementation of a Generic Technique for User Relevance Feedback Based on Support Vector Machines																			
WP4.5.3	Relevance Feedback in a Multimodal Environment, Research and Development of Preliminary Algorithms																			
WP4.5.4	Kernel Optimization According to Specific Classification Tasks and Media Analysis																			
<i>D4.5</i>	<i>Report specification of developed techniques for intelligent image classification</i>													◆						
<i>MS4.5</i>	<i>Initial implementation of techniques for intelligent image classification and relevance feedback</i>													★						
Measurable result	Stable software module for relevance feedback																		▲	

WP5 - WP6

Task ID	Task Name	Month																	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
WP5.1	Knowledge Representation for Multimedia																		
WP5.1.1	Extension of RDF / OWL / SWRL for Representing Semantic Data																		
WP5.1.2	Reasoning with Extended RDF/OWL																		
D5.1	Report on extension of RDF / OWL / SWRL																		
MS5.1	Extension of RDF / OWL / SWRL																		
WP5.2	Reference Framework for Distributed Semantic Management of Multimedia Metadata																		
WP5.2.1	Storage of Metadata																		
WP5.2.2	Specification of Collaborative Distributed Reference Framework																		
D5.2	Metadata store specification																		
MS5.2	Metadata store																		
WP5.3	Semantics-based Interaction with Multimedia																		
WP5.3.1	Semantic Retrieval																		
WP5.3.2	Semantics-based Presentation of Multimedia																		
D5.3	Report specification of semantic retrieval																		
MS5.3	First implementation and evaluation of semantic retrieval																		
WP5.4	Knowledge Extraction from Complementary Sources																		
D5.4	Report on algorithms for mining primary complementary sources																		
MS5.4	Initial algorithms for mining primary complementary sources																		

Task ID	Task Name	Month																	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
WP6.1	Distributed Research Environment Design and Implementation																		
WP6.1.1	Distributed Research Environment Requirements Specification																		
WP6.1.2	Study and Selection of Suitable Network Communication Mechanisms																		
WP6.1.3	Study and Selection of Suitable Media Database Management Tools																		
WP6.1.4	Study and Selection of Suitable Machine Independent Interface Technologies																		
WP6.1.5	Initial Instantiation of Distributed Framework																		
D6.1	Distributed research environment specification																		
MS6.1	Contents and description of shared resources repositories																		
WP6.2	Research Resource Sharing																		
WP6.2.1	Review of Existing and Planned Resources																		
WP6.2.2	Collection and Organisation of Test Content Repository																		
WP6.2.3	Collection and Organisation of Analysis Software Repository																		
WP6.2.4	Identification of a Suite of Front End User Interfaces																		
D6.2	Contents and description of partners' research resources																		
MS6.2	Initial review of partners' research resources																		

WP7

Task ID	Task Name	Month																	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
WP7.1	Website and Electronic Newsletter, K-Space Posters and Brochures																		
WP7.1.1	The K-Space Website																		
WP7.1.2	Sixmonthly Electronic Newsletter																		
<i>D7.1.1.x</i>	<i>Newsletter</i>						◆					◆						◆	
WP7.1.3	Project Brochure																		
<i>D7.1.2.x</i>	<i>Brochures</i>						◆					◆						◆	
WP7.1.4	Project Posters																		
<i>D7.1.3.x</i>	<i>Posters</i>						◆					◆						◆	
<i>D7.1.4</i>	<i>K-Space webpage fully functional</i>		◆																
WP7.2	K-Space Conference - The International Conference on Semantic and Digital Media Technologies SAMT																		
<i>D7.2</i>	<i>Proceedings of SAMT06</i>																		◆
<i>MS7.2</i>	<i>Call for papers for SAMT07</i>																		★
WP7.3	Towards a Scientific Forum in Multimedia Knowledge Extraction and Analysis																		
<i>D7.3</i>	<i>Report on the practicality of the scientific forum and its implementation plan</i>																		◆
<i>MS7.3</i>	<i>Jointly management boards meeting to discuss a plan for the realization of the forum</i>																		★
WP7.4	Joint Publications																		
WP7.4.1	Special Sessions in Relevant Conferences																		
WP7.4.2	Special Issue in Leading Journals																		
<i>D7.4</i>	<i>Report on special sessions in leading conferences</i>																		◆
<i>MS7.4</i>	<i>Agreement with editorial board of a leading journal for a special issue</i>																		★
WP7.5	Exhibitions and Demonstrations																		
<i>D7.5</i>	<i>Report on participation in dissemination events</i>																		◆
<i>MS7.5</i>	<i>Active participation in at least one major exhibition event</i>																		★
WP7.6	Contribution to Standards and Technology Transfer																		
WP7.6.1	Contributions to Standards																		
WP7.6.2	Technology Transfer																		
<i>D7.6</i>	<i>First Yearly report on Standardisation contributions</i>																		◆
<i>MS7.6</i>	<i>First set of technology transfer initiatives and feedback from industry</i>																		★

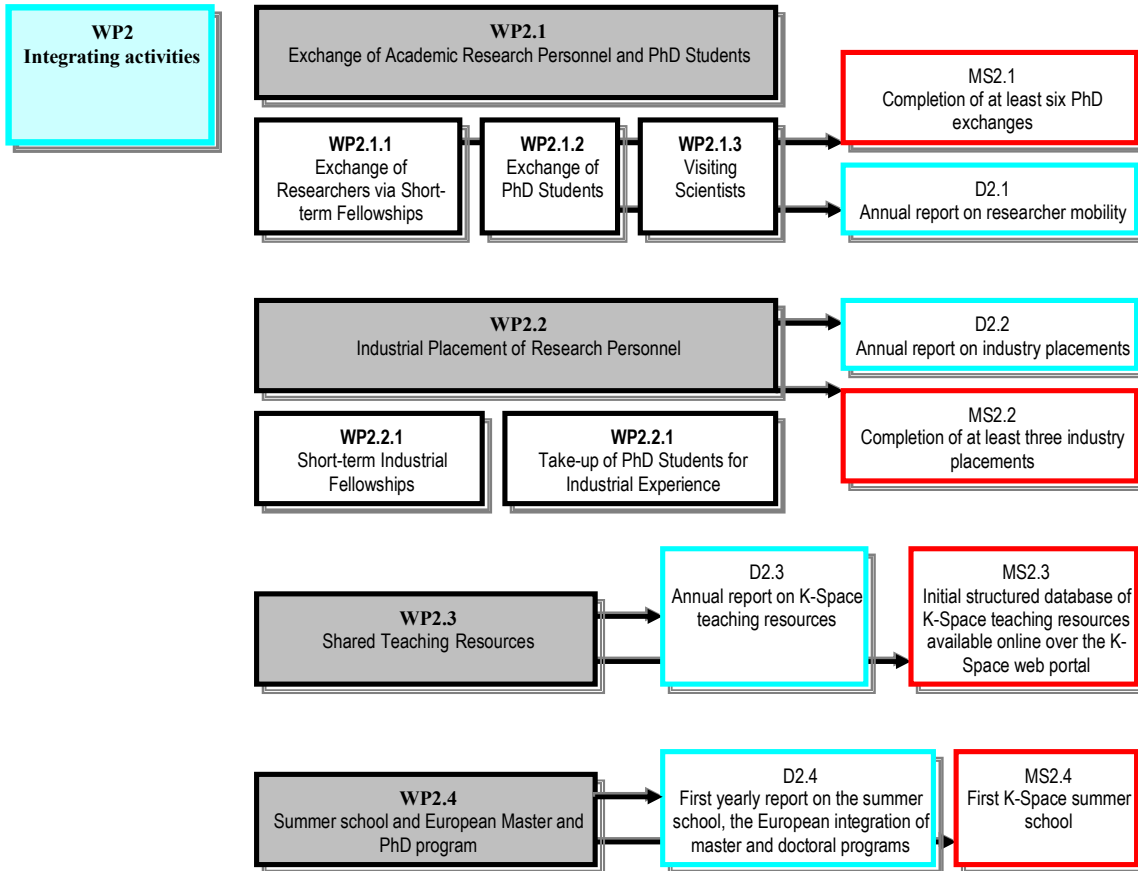
WP8

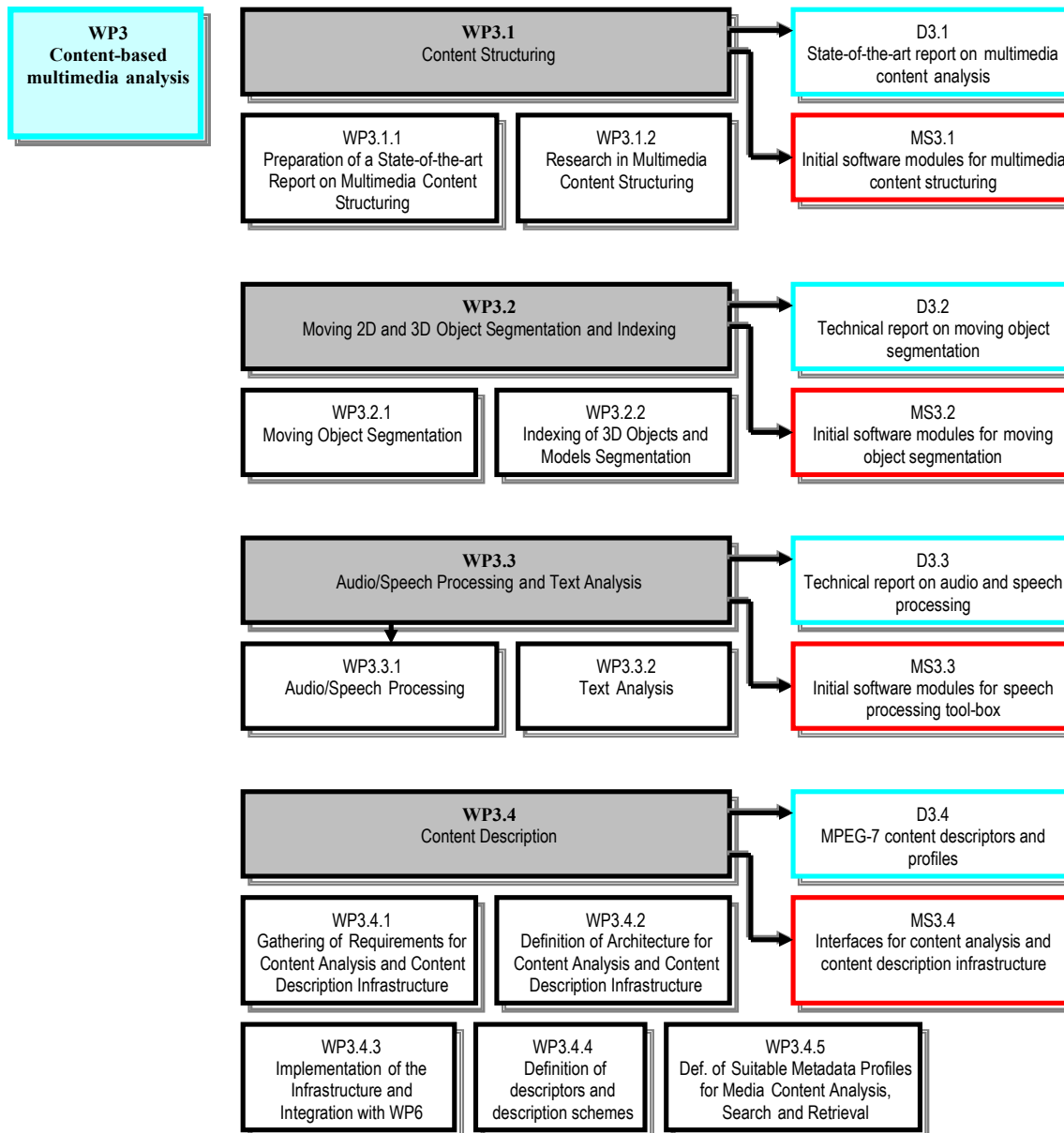
Task ID	Task Name	Month																				
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18			
WP8.1	Definition of Project Objective Tree and Project Assessment Metrics																					
WP8.1.1	The K-Space Website																					
WP8.1.2	Assessment metrics																					
D8.1	Report on measurable project objectives (objective tree)																					
MS8.1	First version of the project assessment and evaluation criteria																					
WP8.2	Annual Project Review and Project Re-Orientation																					
D8.2	Program of work (Technical Annex) for the second project phase																					
MS8.2	First external project review																					
WP8.3	Monitoring and Evaluation of Integration Activities																					
D8.3	Report on integration activities																					
MS8.3	Formulation of recommendations on integration activities to the Network Steering Board																					

WP1

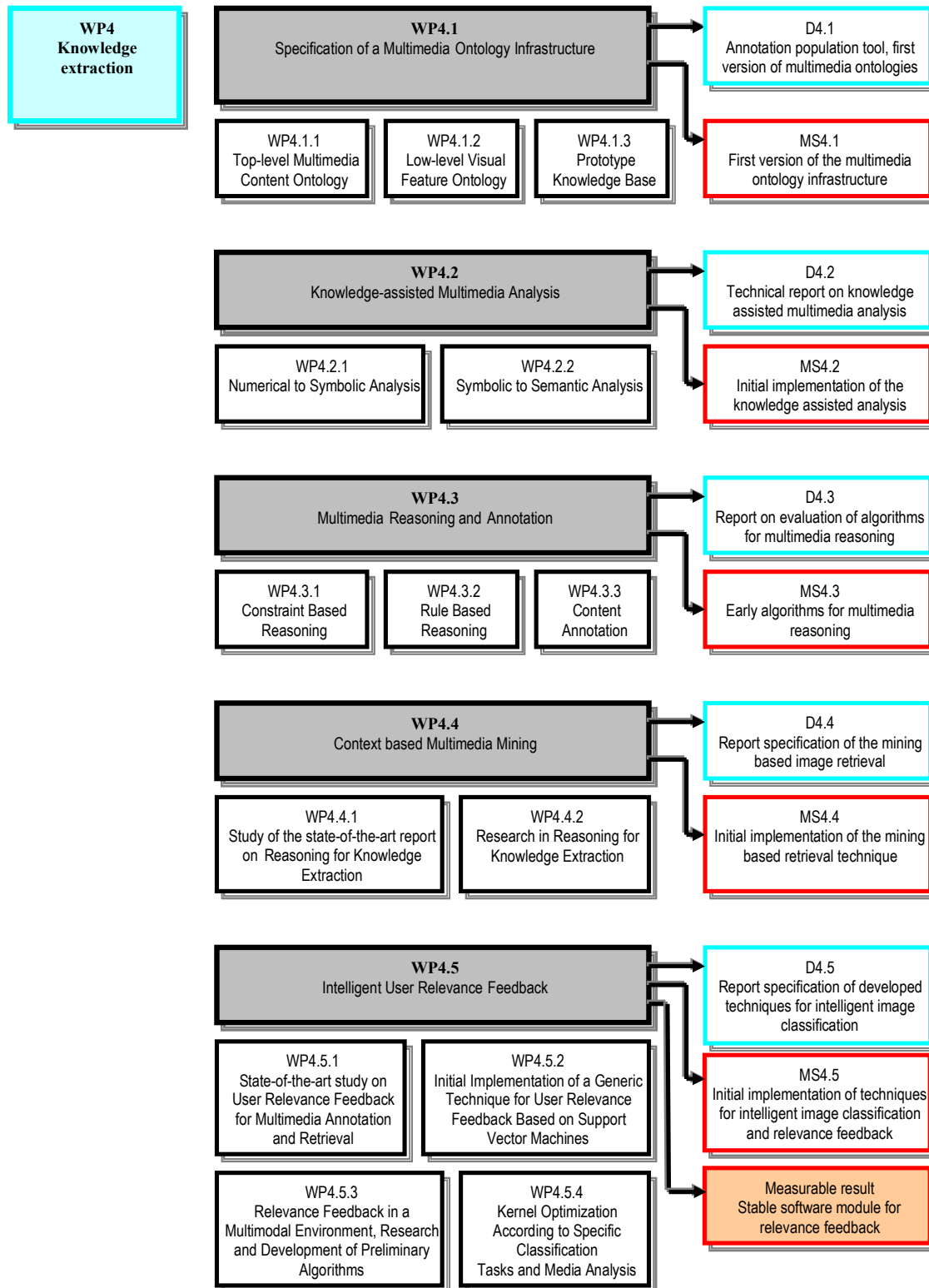
Task ID	Task Name	Month																	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
WP1.1	Overall Coordination of the Joint Activities of the Network																		
WP1.2	Communication with the EU Commission and Management Reports																		
WP1.3	Planning and Coordination of Project and Boards Meetings																		
WP1.4	Financial Planning																		
WP1.5	Accounting and Financial Audits																		
WP1.6	Handling of Legal and Ethical matters																		
WP1.7	Concertation, Consensus and Clusters																		
WP1.8	Coordination of the Annual Project Reviews																		
D1.1.x	Bimonthly management report			◆		◆		◆		◆		◆		◆		◆		◆	
D1.2.x	Sixmonthly activity reports																		
D1.3.x	Agendas and official minutes of relevant project meetings	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
D1.4	Yearly financial plan																		
D1.5	Financial audit reports																		
D1.6	Status report on legal and ethical matters																		
D1.7	Project presentation sheet	◆																	

9.5 Graphical presentation of work packages - Pert Diagrams

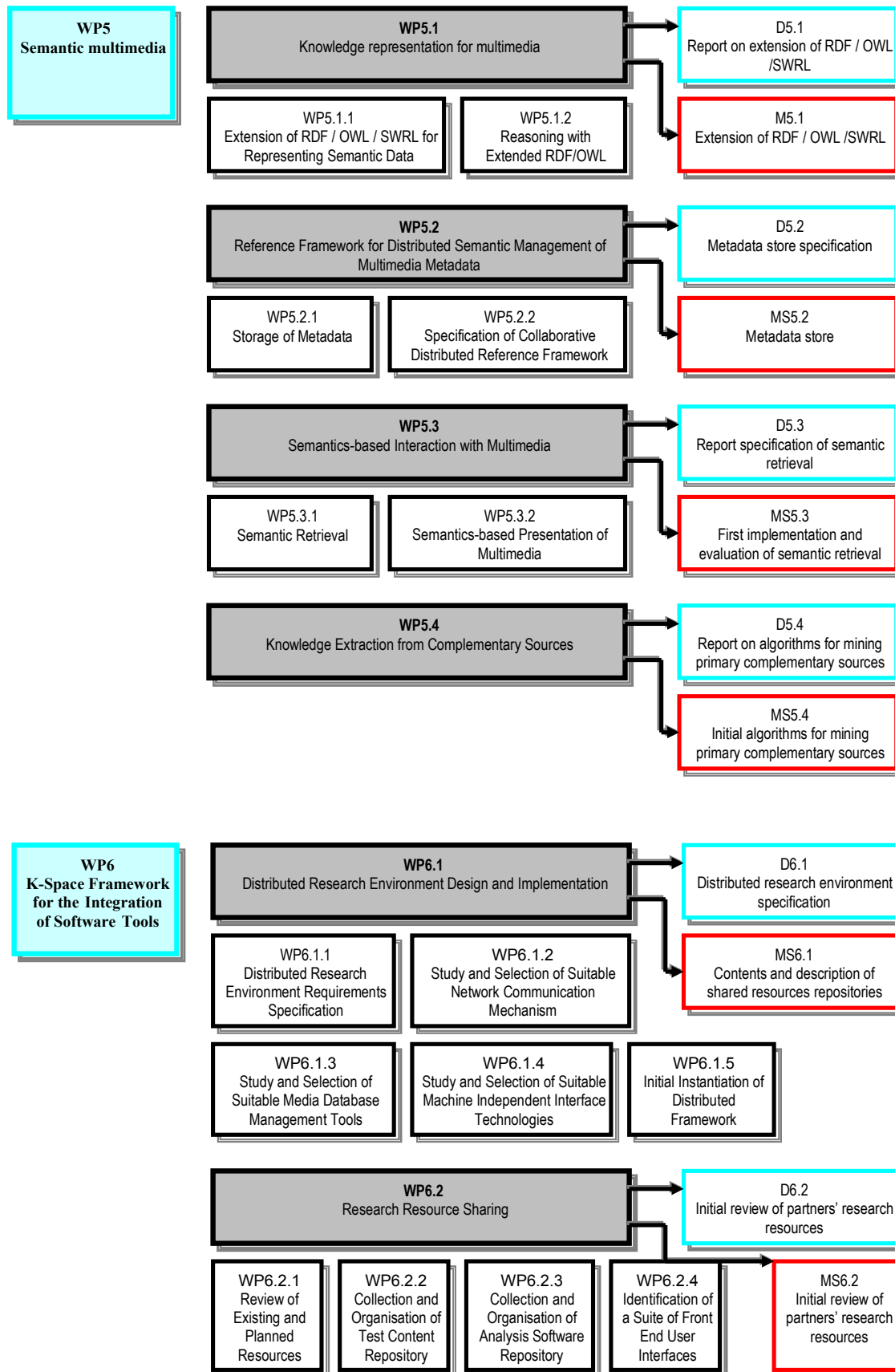




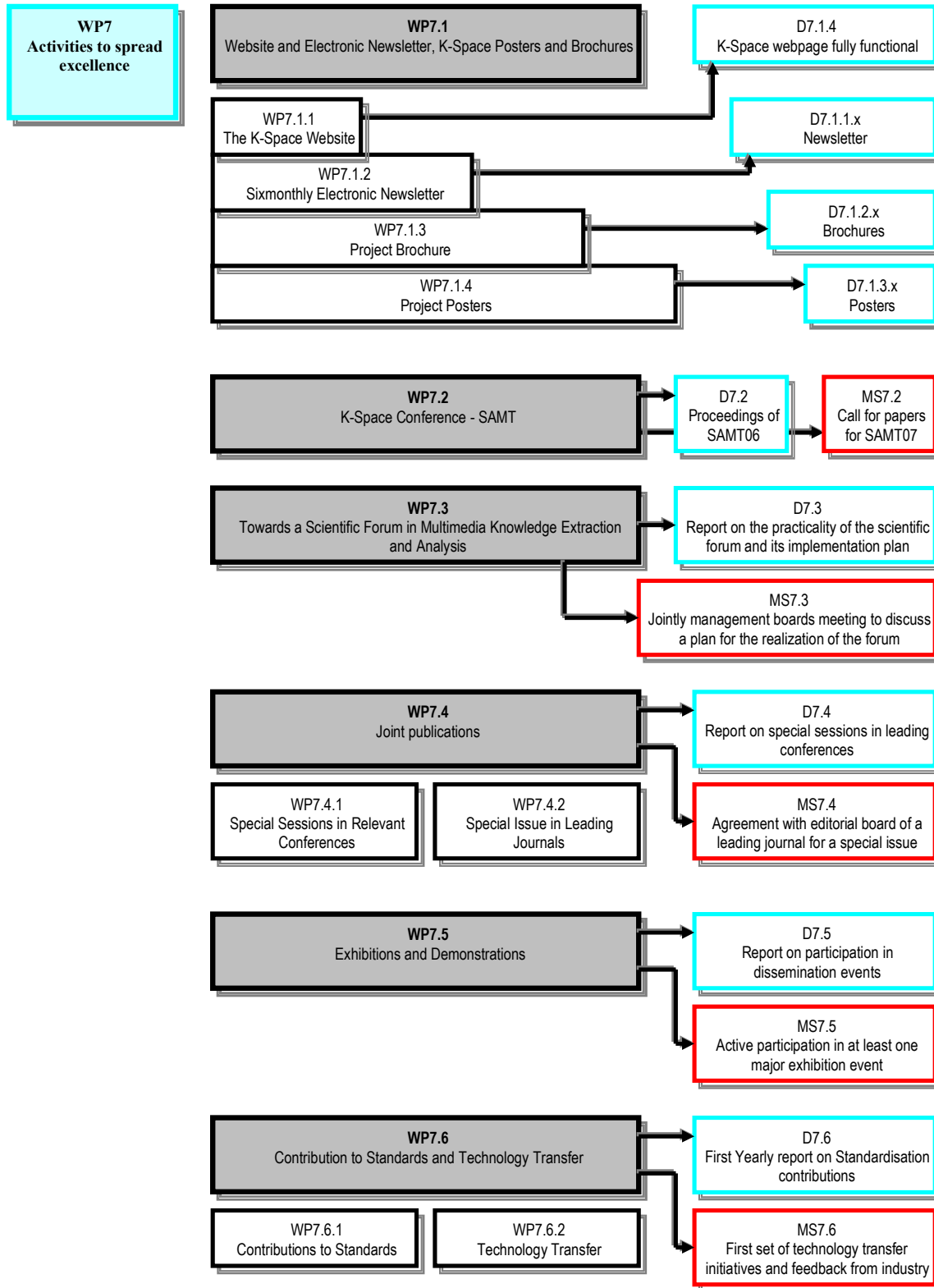
Knowledge Space of Shared Technology and Integrative Research to Bridge the Semantic Gap



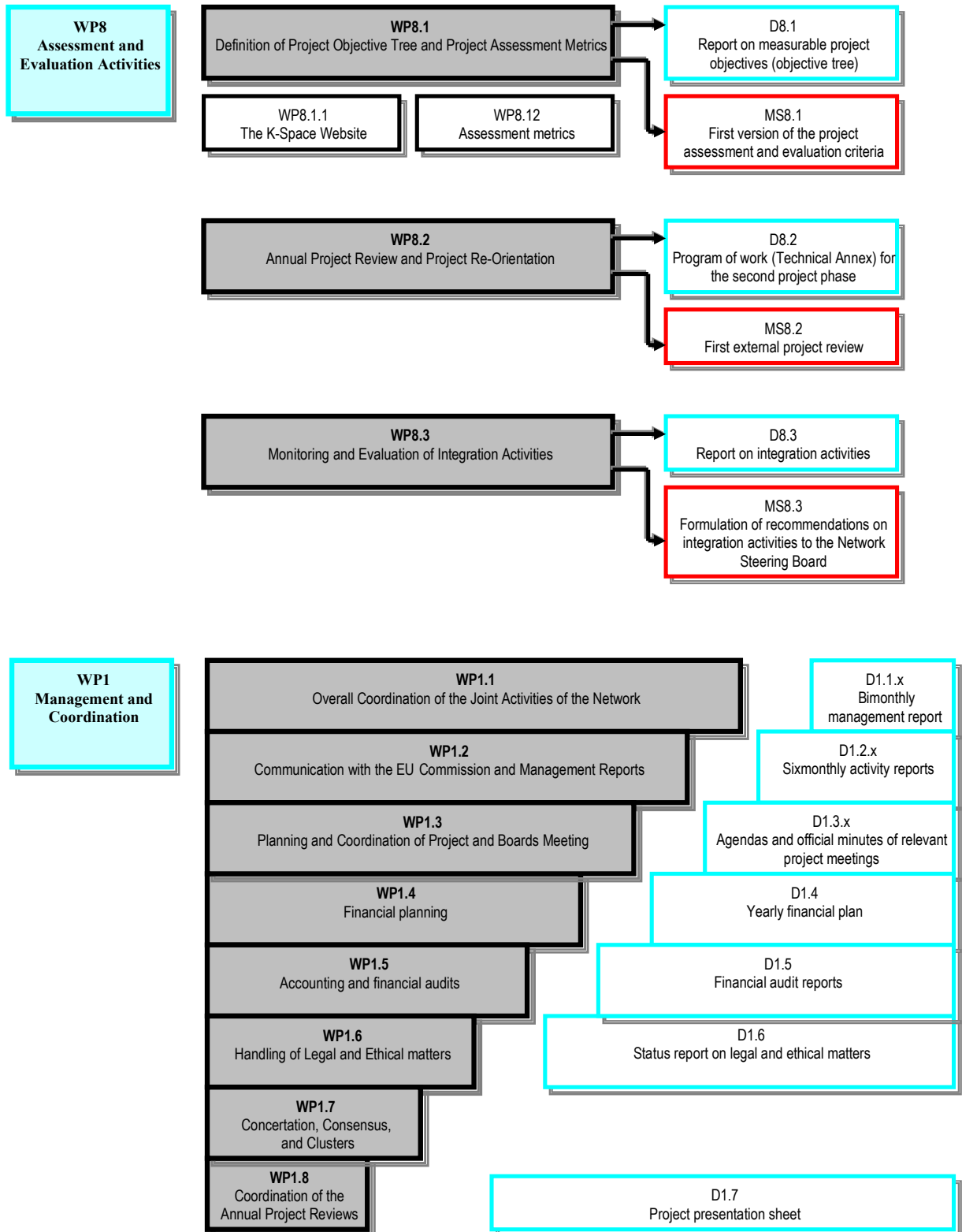
Knowledge Space of Shared Technology and Integrative Research to Bridge the Semantic Gap



Knowledge Space of Shared Technology and Integrative Research to Bridge the Semantic Gap



Knowledge Space of Shared Technology and Integrative Research to Bridge the Semantic Gap



9.6 Workpackage description tables

WP2											Start date or starting event:				M1
Integration activities															
Participant id	1	2	3	4	5	6	7	8	9	10¹⁵	11	12	13	14	
Person-Months	4	3.5	2.5	2.5	3.5	3.5	4.5	2.5	3.5	3.5	2.5	4	3.5	4.5	

Objectives

To create a sustainable and lasting relationships between partners
 To take care of growth of interdisciplinary collaborative research aligned with research objectives
 To create new inter-disciplinary links and bonds between partners not possible via other routes

Description of work

The WP2 will facilitate the exchange of personnel within the network. Specifically, it targets: placement of researchers from academic partners for short stays in the laboratories of other partners; shorter visits of senior academic personnel for information exchange and identification of synergies; placement of personnel from the academic partners with industrial players as interns so that K-Space researchers become familiar with the requirements, methods and practices of industry.

WP2.1: Exchange of Academic Research Personnel and PhD Students (GU, M 3 – 18)

Activity WP2.1 is concerned with mobility of academic members of the Network including PhD students. This activity will start in month 1 and continue over the full project duration. It is coordinated by University of Glasgow and embraces the following sub-activities:

- WP2.1.1 Exchange of Researchers via Short-term Fellowships (M1-18)
- WP2.1.2 Exchange of PhD Students (M1-18)
- WP2.1.3 Visiting Scientists (M1-18)

WP2.2 Industrial Placement of Research Personnel (UEP, M 6 – 18)

Activity WP2.2 deals with industrial placements for Network members. The activity will start in month 1 and continue over the full project duration. It is coordinated by University of Economics, Prague and embraces the following sub-activities:

- WP2.2.1 Short-term Industrial Fellowships (M1-18)
- WP2.2.2 Take-up of PhD Students for Industrial Experience (M1-18)

WP2.3 Shared Teaching Resources (TUB, M 3 – 18)

This activity is coordinated by the Technische Universität Berlin and deals with sharing teaching resources amongst network participants. Updated versions of these teaching resources will be produced every 18 months during the lifetime of the project.

WP2.4: Summer schools and European Master and PhD program (GET, M 3 – 18)

A summer school is planned for each year during July or August. The summer school 2006 will be organized by the Activity leader Groupe des Ecoles des Télécommunications and it is a main milestone.

The European Master and PhD program is planned in several phases. The first phase towards the harmonisation of high level education in Europe. This is a long term goal and will initially involve only a few partners. The first phase of the Master program will be planned for September 2006, in which there will be sharing of materials across institutions (for example using the K-Space Tutorials) but each will teach its own students locally from those common materials. First phase for a proposition of a European Ph.D. Program. In this first phase, different initiatives will be promoted including: the establishment of a co-supervision framework, the introduction of special distinctions such as the European Doctorate distinction for Ph.D. thesis defended in front of a truly international board of experts. Ultimately, these actions will lead to a much stronger integration of doctoral programs between the universities of the network.

Deliverables

- D2.1** (M12) Annual report on academic researcher mobility (GU)
D2.2 (M18) Annual report on industry placements (UEP)
D2.3 (M12) Annual report on K-Space online teaching resources (TUB)
D2.4 (M12) First yearly report on the summer school, the European integration of master and doctoral programs (GET)

Milestones and expected result

- MS2.1** (M12) Completion of at least one PhD exchange and start of four others (GU)
MS2.2 (M18) Completion of at least three industry placements (UEP)
MS2.3 (M12) Initial structured database of K-Space teaching resources available online over the K-Space web portal (TUB)
MS2.4 (M8) First K-Space summer school (GET)

¹⁵ WP-Leader

WP3			Start date or starting event:										M1	
Content-based multimedia analysis														
Participant id	1	2	3¹⁵	4	5	6	7	8	9	10	11	12	13	14
Person-Months	9	2	14.5	2	12	0	34.5	10	18	11	5	27	17	0

Objectives

This WP will research low- to mid-level content analysis techniques suitable for higher level semantic inference in the following areas:

Content structuring

Moving Object segmentation

Audio-/Speech processing

Appropriate descriptors/description schemes and profiles will be developed as well as a common infrastructure for content analysis and description implemented based on existing components.

Description of work

WP3.1 Content Structuring (JRS, M 1 – 18)

Working towards decoding the “grammar of moving images” and giving the user a high level structural overview on the content.

- **WP3.1.1** Preparation of a State-of-the-art Report on Multimedia Content Structuring (*JRS, M 1 – 4*)
- **WP3.1.2** Research in Multimedia Content Structuring (*JRS, M 1 – 18*)

WP3.2 Moving 2D and 3D Object Segmentation and Indexing (DCU, M 1 – 18)

Will investigate approach to moving object segmentation. The extracted objects will be described in a manner suitable for higher level knowledge extraction.

- **WP3.2.1** Moving Object Segmentation (*DCU, M 1 – 18*)
- **WP3.2.2** Indexing of 3D Objects and Models Segmentation (*DCU, M 1 – 18*)

A report on moving object segmentation will be part of the overall state-of-the-art report for WP3 (D3.1), and will therefore be updated before the end of the project. The research in moving object segmentation will be partially steered by the state-of the art report and in collaboration with WP4 and WP6. WP3.2 activities will continue for the entire lifetime of the Network.

WP3.3 Audio/Speech Processing and Text Analysis (GET, M 1 – 18)

Extension of state-of-the-art processing and analysis algorithms to handle high-level, conceptual representations of knowledge embedded in audiovisual and textual content based on reference ontologies and intelligence techniques will be explored.

- **WP3.3.1** Audio/Speech Processing (*GET, M 1 – 18*)
- **WP3.3.2** Text Analysis (*GET, M 1 – 18*)

WP3.4 Content Description (EURECOM, M 1 – 18)

Definition of descriptors/description schemes and profiles as well as implementation of a common infrastructure for content analysis and description based on existing components.

- **WP3.4.1** Gathering of Requirements for Content Analysis and Content Description Infrastructure (*EURECOM, M 1– 3*)
- **WP3.4.2** Definition of Architecture for Content Analysis and Content Description Infrastructure (*JRS, M 3– 5*)
- **WP3.4.3** Implementation of the Infrastructure and Integration within WP6 (*JRS, M 3– 5*)
- **WP3.4.4** Definition of Descriptors and Description Schemes (*EURECOM, M 10– 18*)
- **WP3.4.5** Definition of Suitable Metadata Profiles for Media Content Analysis, Search and Retrieval (*EURECOM, M 10– 18*)

Deliverables

D3.1 (M5) State-of-the-art report on multimedia content analysis (JRS)

D3.2 (M12) Technical report on moving object segmentation (DCU)

D3.3 (M12) Technical report on audio and speech processing (GET)

D3.4 (M8) MPEG-7 content descriptors and profiles (EURECOM)

Milestones and expected result

MS3.1 (M12) Initial software modules for multimedia content structuring (JRS)

MS3.2 (M12) Initial software modules for moving object segmentation (DCU)

MS3.3 (M12) Initial audio and speech processing tool-box (GET)

MS3.4 (M10) Interfaces for content analysis and content description infrastructure (JRS)

WP4				Start date or starting event:										M1
Knowledge extraction														
Participant id	1	2	3	4 ¹⁵	5	6	7	8	9	10	11	12	13	14
Person-Months	16	12	3	23.5	15	12.5	6	3	22	21	5.5	0	14.5	9
Objectives														
To provide techniques for the semantic analysis, annotation and retrieval of multimedia content.														
To be based on knowledge assisted content analysis and annotation using a multimedia ontology infrastructure.														
Semantic and low-level attributes of the objects to be detected in combination with appropriately defined rules														
Description of work														
WP4.1: Specification of a Multimedia Ontology Infrastructure (Uni Ko-Ld, M 1 – 18)														
Focuses on the development of a multimedia ontology infrastructure based on the knowledge representation infrastructure and language extensions developed within WP5.														
<ul style="list-style-type: none"> - WP4.1.1 Top-level Multimedia Content Ontology (<i>Uni Ko-Ld, M 1– 18</i>) - WP4.1.2 Low-level Visual Feature Ontology (<i>Uni Ko-Ld, M 1– 18</i>) - WP4.1.3 Prototype Knowledge Base (<i>Uni Ko-Ld, M 1– 18</i>) 														
WP4.2: Knowledge-assisted Multimedia Analysis (CERTH, M 1 – 18)														
Deals with the semantic object detection, exploiting the ontologies of WP4.1 and the content processing algorithms of WP3 in order to apply the most appropriate detection steps for the analysis process.														
In the first 18 months 2 tasks are considered:														
<ul style="list-style-type: none"> - WP4.2.1 Numerical to Symbolic Analysis (<i>CERTH, M 1– 12</i>) - WP4.2.2 Symbolic to Semantic Analysis (<i>CERTH, M 8– 18</i>) 														
This work is led by the Centre for Research and Technology Hellas.														
WP4.3: Multimedia Reasoning and Annotation (CERTH, M 1 – 18)														
Deals with the extraction of meaningful interpretation of high level events and automatic semantic annotation of multimedia content, in collaboration with numerical and symbolic analysis of previous activities.														
<ul style="list-style-type: none"> - WP4.3.1 Constraint Based Reasoning (<i>CERTH, M 1 – 18</i>) - WP4.3.2 Rule Based Reasoning (<i>CERTH, M 1 – 18</i>) - WP4.3.3 Content Annotation (<i>CERTH, M 1 – 18</i>) 														
WP4.4: Context based Multimedia Mining (GU, M 1 – 18)														
Will investigate the development of effective techniques for data mining. Such approaches will cater not just knowledge extraction but also information retrieval in context.														
<ul style="list-style-type: none"> - WP4.4.1 Study of the state-of-the-art on reasoning for knowledge extraction (<i>GU, M 1 – 4</i>) - WP4.4.2 Research in reasoning for knowledge extraction (<i>GU, M 1 – 18</i>) 														
WP4.5: Intelligent User Relevance Feedback (QMUL, M 1 – 18)														
Aims at exploiting human-machine interaction and enhanced learning to derive semantic information. It consists of the following tasks:														
<ul style="list-style-type: none"> - WP4.5.1 State-of-the-art study on user relevance feedback and biologically inspired systems for multimedia classification (<i>QMUL, months 1 - 4</i>) - WP4.5.2 Initial implementation of a generic technique for user relevance feedback based on support vector machines (<i>QMUL, months 1 - 6</i>) - WP4.5.3 Biologically inspired systems for image classification, research and development of preliminary algorithms (<i>QMUL, months 3 - 12</i>) - WP4.5.4 Kernel methods for specific classification tasks and image analysis (<i>QMUL, months 9 - 18</i>) 														
Deliverables														
D4.1 (M12) Annotation/population tool, first version of the multimedia ontologies (Uni Ko-Ld)														
D4.2 (M12) Technical report on knowledge assisted multimedia analysis (CERTH)														
D4.3 (M18) Report on evaluation of algorithms for multimedia reasoning (CERTH)														
D4.4 (M12) Report specification of the mining based image retrieval technique (GU)														
D4.5 (M12) Report specification of developed techniques for intelligent image classification (QMUL)														
Milestones and expected result														
MS4.1 (M12) First version of the multimedia ontology infrastructure (Uni Ko-Ld)														
MS4.2 (M12) Initial implementation of the knowledge assisted analysis (CERTH)														
MS4.3 (M12) Early algorithms for multimedia reasoning (CERTH)														
MS4.4 (M12) Initial implementation of the mining based retrieval technique (GU)														
MS4.5 (M12) Initial implementation of techniques for intelligent image classification and relevance feedback (QMUL)														

WP5		Start date or starting event:										M1		
Semantic multimedia														
Participant id	1	2¹⁵	3	4	5	6	7	8	9	10	11	12	13	14
Person-Months	12	23	8	9	6	17	0	3.5	0	3.5	4	0	0	25

Objectives

- To use and extend semantic web technology for needs of multimedia analysis and knowledge extraction
- To diminish the gap between semantic technologies and low level multimedia analysis
- To provide an implementation framework that deals with knowledge representation issues specific for multimedia
- To deal with creating, using and presenting semantic metadata in different ways – tailored to the needs of a heterogeneous group of users.

Description of work

WP5.1 Knowledge Representation for Multimedia (*Uni Ko-Ld, M1 – 18*)

This activity goes hand in hand with WP5.2 such that the definition of structures is followed by some immediate example implementation. In the first 18 month the following subtasks are thus concerned:

- **WP5.1.1** Extension of RDF / OWL / SWRL for Representing Semantic Data (*Uni Ko-Ld, M1 - 12*)
- **WP5.1.2** Reasoning with extended RDF/OWL (*Uni Ko-Ld, M13 - 18*)

WP5.2: Reference Framework for Distributed Semantic Management of Multimedia data (*Uni Ko-Ld, M1 – 18*)

This activity goes hand in hand with WP5.1 such that the definition of structures is followed by some immediate example implementation. In the first 18 months the following subtasks are thus concerned:

- **WP5.2.1** Storage of Metadata (*Uni Ko-Ld, M1 - 12*)
- **WP5.2.2** Specification of collaborative Distributed Reference Framework (*Uni Ko-Ld, M13 - 18*)

WP5.3: Semantics-based Interaction with Multimedia (*CWI, M1 – 18*)

This activity deals with using and creating semantic metadata at the user interface level. The following specific tasks will take place for this activity in the first 18 months, coordinated by the Centrum voor Wiskunde en Informatica:

- **WP5.3.1** Semantic Retrieval (*CWI, M1 - 12*)
- **WP5.3.2** Semantics-based Presentation of Multimedia (*Uni Ko-Ld, M1 - 12*)

The first task offers the user the possibilities to query and browse for metadata and related content. The second task adapts queried results and multimedia database content according to the semantic metadata and its user.

WP5.4: Knowledge Extraction from Complementary Sources (*UEP, M1 – 18*)

This activity is concerned with augmenting the semantic multimedia metadata basis. In the first 18 months, this task will be restricted to primary sources directly attached to the media, e.g., text captions in images. This task will be coordinated by University of Economics, Prague.

Deliverables

- D5.1** (M12) Report on extension of RDF/OWL/SWRL (*Uni Ko-Ld*)
- D5.2** (M10) Metadata store specification (*Uni Ko-Ld*)
- D5.3** (M12) Report specification of Semantic Retrieval (*CWI*)
- D5.4** (M12) Report on algorithms for mining primary complementary Sources (*UEP*)

Milestones and expected result

- MS5.1** (M12) Extension of RDF/OWL/SWRL (*Uni Ko-Ld*)
- MS5.2** (M12) Metadata store (*Uni Ko-Ld*)
- MS5.3** (M12) First implementation and evaluation of Semantic Retrieval (*CWI*)
- MS5.4** (M12) Initial algorithms for mining primary complementary Sources (*UEP*)

WP6					Start date or starting event:					M1				
K-Space framework for the integration of software tools														
Participant id	1	2	3	4	5¹⁵	6	7	8	9	10	11	12	13	14
Person-Months	2	3.5	3.5	2	18	1	2	1	2.5	3	2	3	3	3.5

Objectives

To design and instantiate the technical infrastructure required to enable integration activities to take place
 To build an open and expandable framework for collaborative research on knowledge acquisition based on system made up of flexible, modular and interconnected technology
 To facilitate research resource sharing between partners

Description of work

WP6.1: Distributed Research Environment Design and Implementation (DCU, M 1-18)

This activity focuses on designing and implementing the physical instantiation of the K-Space research environment that will be used as a tool to aid collaboration. In the first 18 months, this include the following sub-activities:

- **WP6.1.1** Distributed Research Environment Requirements Specification (*DCU, M1-4*)
- **WP6.1.2** Study and Selection of Suitable Network Communication Mechanisms (*DCU, M 5-12*)
- **WP6.1.3** Study and Selection of Suitable Media Database Management Tools (*DCU, M 5-12*)
- **WP6.1.4** Study and Selection of Suitable Machine Independent Interface Technologies (*DCU, M 5-12*)
- **WP6.1.5** Initial Instantiation of Distributed Framework (*DCU, M 11-18*)

WP6.2: Research Resource Sharing (DCU, M 11-18)

This activity focuses on reviewing the existing research resources available within the Network on an ongoing basis in order to collect these into (distributed) repositories that can be accessed via the distributed environment designed in WP6.1. It consists of the following sub-activities in the first 18 months:

- **WP6.2.1** Review of Existing and Planned Resources (*DCU, M 1-3*)
- **WP6.2.2** Collection and Organisation of Test Content Repository (*DCU, M 4-12*)
- **WP6.2.3** Collection and Organisation of Analysis Software Repository (*DCU, M 4-12*)
- **WP6.2.4** Identification of a Suite of Front End User Interfaces (*DCU, M 4-12*)

Deliverables

- D6.1** (M12) Distributed research environment specification (DCU)
D6.2 (M10) Content and description of partners' research resources (DCU)

Milestones and expected result

- MS6.1** (M12) Contents and description of shared resource repositories (DCU)
MS6.2 (M4) Initial review of partners' research resources (DCU)

WP7		Start date or starting event:										M1		
Activities to spread excellence														
Participant id	1	2	3	4	5	6	7	8	9	10	11¹⁵	12	13	14
Person-Months	6	5	5.5	5.5	4.5	5	4.5	4	4.5	4.5	5	4.5	5.5	9

Objectives

To disseminate the technical developments of the network across the broad research community
 To influence and contribute to related knowledge-based multimedia standardisation activities
 To support technology transfer to industry.

Description of work

WP7.1: Website and Electronic Newsletter, K-Space Posters and Brochures (UEP, M 1-18)

The K-Space web site will support delivery and spread of K-Space promotional material such as information leaflet, electronic newsletter, etc. The newsletter will report the main activities promoted and undertaken within the NoE context.

- **WP7.1.1** The K-Space Website (*QMUL, M 1-18*)
- **WP7.1.2** Sixmonthly Electronic Newsletter (*UEP M 1-18*)
- **WP7.1.3** Project Brochures (*UEP M 1-18*)
- **WP7.1.4** Project Posters (*UEP M 1-18*)

WP7.2 K-Space Conference (QMUL, M 1-18)

The K-Space conference will promote and support the flagship dissemination forum of the Network: The International Conference on Semantic and Digital Media Technologies (SAMT). The third version of the conference in year 2006 will be sponsored by K-Space. It is expected that the fourth version becomes one of the most relevant conferences in the field.

WP7.3 Towards a Scientific Forum in Multimedia Knowledge Extraction and Analysis (DFKI, M 1-18)

K-Space will launch an association similar to the Duch Stichting, German Verein or scientific society. The mission of the Verein or Society is the promotion of Semantic Multimedia Research and Technology, e.g. SMART e.V. The first task within this activity is to produce a plan for the achievement of the scientific forum and draft the guidelines that will govern the forum. This draft guidelines and plan will be produced during the first 6 months. The work for the full project duration will be linked to this plan.

WP7.4 Joint Publications (EPFL, M 1-18)

Joint publications will help to spread excellence outside the network and to enlarge the network audience. Joint publications will be tackled by two different means:

- **WP7.4.1** Special Sessions in Relevant Conferences (*EPFL, M 1-18*)
- **WP7.4.2** Special Issues in Leading Journals (*EPFL, M 1-18*)

WP7.5 Exhibitions and Demonstrations (INA, M 1-18)

During the first 18 months the project will be presented in a EU concertation meetings and other information events. During the first 6 months a list of targeted important international meetings and exhibitions will be produced and the feasibility of K-Space demonstrations at such events will be studied.

WP7.6 Contribution to Standards and Technology Transfer (CERTH, M 1-18)

This activity consist of two subactivities:

- **WP7.6.1** Contributions to Standards (*CERTH, M 1-18*)
- **WP7.6.2** Technology Transfer (*GET, M 1-18*)

Deliverables

D7.1.n.x (M2, 6, 12, 18) Newsletter (D7.1.1.x), brochures (D7.1.2.x) and posters (D7.1.3.x) (UEP), K-Space Webpage fully functional (D7.1.4, QMUL)

D7.2 (M11) Proceedings of SAMT06 (K-Space Partner hosting SAMT'06)

D7.3 (M12) Report on the practicality of the scientific forum and its implementation plan (DFKI)

D7.4 (M18) Report on special sessions in leading conferences (EPFL)

D7.5 (M18) Report on participation in dissemination events (INA)

D7.6 (M12) First yearly report on standardisation contributions (CERTH)

Milestones and expected result

MS7.2 (M11) Call for papers for SAMT07 (K-Space Partner hosting SAMT'07)

MS7.3 (M6) Jointly management boards meeting to discuss a plan for the realization of the forum (DFKI)

MS7.4 (M12) Agreement with editorial board of a leading journal for a special issue (EPFL)

MS7.5 (M18) Active participation in at least one major exhibition event (INA)

MS7.6 (M18) First set of technology transfer initiatives and feedback from industry (GET)

WP8				Start date or starting event:								M1		
Assessment and Evaluation														
Participant id	1	2	3	4	5	6	7	8	9¹⁵	10	11	12	13	14
Person-Months	2	0.5	0.6	0.5	2	0.6	0.6	0.6	0.6	1	0.6	0.6	0.6	0.6

Objectives

- To identify an objective tree for the project
- To develop mechanisms for monitoring the project objectives and re-orientation of the project if the objectives change
- To monitor and evaluate the integration activities

Description of work

WP8.1 Definition of Project Objective Tree and Project Assessment Metrics (EURECOM, M 1-18)

The initial task consists of the identification of an objective tree for the project and the establishment of measures for assessment of the eventual level and degree of success in achieving of these objectives. This will form a framework for self-assessment of the project. Two subactivities are considered

- **WP8.1.1** Definition of project objective tree (EURECOM, M 1-6)
- **WP8.1.2** Assessment metrics (EURECOM, M 3-12)

WP8.2 Annual Project Review and Project Re-Orientations (QMUL, M 6-15)

Preparations for the first annual review will start in month 6. The actual review will happen in month 12. After the review the new program of work will be revised and amended according to the recommendation of the external evaluators and the scientific advisory board. The program of work for the second project phase will be delivered by month 14.

WP8.3 Monitoring and Evaluation of Integration Activities (DCU, M 6-18)

This activity deals with monitoring the integration activities taking place within the network and reporting on the success (or otherwise) of these. The work in this activity continues for the life-time of the project.

Deliverables

- D8.1** (M6) Report on measurable project objectives (objective tree) (EURECOM)
- D8.2** (M14) Program of work (Technical Annex) for the second project phase (QMUL)
- D8.3** (M12) Report on integration activities (DCU)

Milestones and expected result

- MS8.1** (M10) First version of the project assessment and evaluation criteria (EURECOM)
- MS8.2** (M12) First external project review (QMUL)
- MS8.3** (M14) Formulation of recommendations on integration activities to the Network Steering Board (DCU)

WP1		Start date or starting event:										M1		
Consortium management activities														
Participant id	1*	2	3	4	5	6	7	8	9	10	11	12	13	14
Person-Months	35	0.5	0.3	0.5	0.5	0.3	0.3	0.3	0.3	0.5	0.3	0.3	0.3	0.3

Objectives

- To oversee the coordination of the project
- To assign responsibilities clearly at activity and sub-activity level
- To define clear lines of communication among the participants.

Description of work

The management activities are designed to guarantee that the project runs smoothly by ensuring that the goals are clearly defined and understood. The proposed management structure of the Network will be functional immediately after the project kick-off meeting. The following management activities will be undertaken during the first 18 months:

WP1.1 Overall Coordination of the Joint Activities of the Network (QMUL, M 1-18)

It is the main activity and main task of the Management WP. The progress of individual actions and achievements in the corresponding activities will be supervised by the WP leaders who report to the Network Steering Board (NSB). The administration executive will ensure that relevant information on NoE progress and status is being exchanged among the members of the NSB. Using this information the NSB can quickly identify if changes are needed and efficiently decide what corrections or new actions should be implemented. The results of these efforts will flow into the progress reports.

WP1.2 Communication with the EU Commission and Management Reports (QMUL, M 1-18)

This activity will deliver sixmonthly activity reports to the EC. To produce these reports, in particular financial information, the administration executive will rely on information provided by the contact person of each partner.

WP1.3 Planning and Coordination of Project and Boards Meetings (QMUL, M 1-18)

It will offer logistic support for the planning and coordination of all project and boards meetings. This activity is also in charge of making all necessary arrangements for a successful project start including the kick-off meetings.

WP1.4 Financial Planning (QMUL, M 1-18)

A detailed financial plan will be written by the administration executive, based on the outline financial plan of the project. This plan will be used to review the financial status of the project on a regular basis.

WP1.5 Accounting and Financial Audits (QMUL, M 1-18)

It will ensure that financial audits as required by the EU are being implemented in the network. Based on the accounting figures, future budgets will be planned and overspending will be limited.

WP1.6 Handling of Legal and Ethical Matters (QMUL, M 1-18)

It covers the way that partners behave with respect to each other according to the terms of the Consortium Agreement. It will deal with the liability of partners, partner withdrawal procedures, the settlement of disputes, the responsibilities of partners regarding accurate and timely reporting of difficulties, confidentiality, including the difference between foreground and background information, IPR, including arrangements for licensing.

WP1.7 Concertation, Consensus and Clusters (QMUL, M 1-18)

It addresses exchange of information and integration with other related projects in the framework of Clusters or other concertation mechanisms that might be established in order to achieve the overall project vision. This task will identify potential for clustering and use diverse project activities to perform concerted actions with other networks and projects.

WP1.8 Coordination of the Annual Project Reviews (QMUL, M 1-18)

It will prepare and provide the means for successful annual project reviews as required by the EC. The administration executive will ensure that the major annual deliverables are submitted on time to the reviewer. Logistic organization of the review will be provided.

Deliverables

- D1.1.x (M2x)** Bimonthly management reports (QMUL)
- D1.2.x (M6x)** Sixmonthly activity reports (QMUL)
- D1.3.x (Mx)** Agendas and official minutes of relevant project meetings (QMUL)
- D1.4 (M12)** Yearly financial plan (QMUL)
- D1.5 (M12)** Financial audit reports (QMUL)
- D1.6 (M18)** Status report on legal and ethical matters (QMUL)
- D1.7 (M2)** Project presentation sheet (QMUL)

10 Project resources and estimation of incurred eligible costs

10.1 Project management level description of resources and grant

K-Space integrates 14 partners over 36 months, amounting to a total of **1317** staff months (*SMs*), to achieve all objectives. The total cost of the envisaged activities in the network amounts to over **8.9 Million Euros**. This figure represents the real cost of the project. It has been estimated considering the full cost of the personnel involved, including PhD students in the estimation of the average SM cost. Clearly, the requested funding according to the rules of NoEs in FP6 is much less than the real economical cost of the project as given in the tables below. With a total of **85** full-time researchers and **38** doctoral students, the EU grant is approximately 3/5 of the real project cost.

About **7%** of awarded EU grant is for management, covering the activities in WP1. It should be noted that additional management activities will be carried out by the WP leaders, and in particular the leader of WP7 who will assist with strategic and communication management activities. It is clear again that the management funding of such an enterprising project will exceed the 7% recommended Model Contract Cost Models document. A total of 79 SMs are estimated to be needed for coordination activities. The coordinator partner has calculated that it is impossible to correctly manage a project of the size of K-Space without at least one professional full time Project Manager, which is the administrative executive described in section 8 a full-time assistant dealing with additional secretarial issues and accounting and the overall network coordinator dedicating 20% of his time to the Network business. Since it is expected that the management cost will exceed the **7%** allocated from the requested funding, the coordinating partner will assume the cost excess.

The following table gives estimates of the grant allocation per network activity. The figures in this table are given in Thousands (1K) Euros.

	Integration Activities	JRA	Spreading Excellence	Coordination
Personnel and Travel	504	3770	562	388.5
Others	150	0	175.5	0
TOTAL	654	3770	737.5	388.5

Table 4: Indicative grant breakdown per activities (in K Euros).

As appropriate for a project focusing on few key technological developments, the JRA of the network will require approximately **67%** of total awarded resources. These resources will be distributed among the research oriented WPs (WP3, WP4, WP5). This will ensure that the necessary support is in place in order to allow partners to collaborate effectively sharing resources and data. The remaining **26%** of awarded grant will be used for integration and excellence spreading activities, WP2, WP6, WP7 and WP8.

The Network has approximately equal allocations of staff resources in WP3, WP4 and WP5, which a total of 324 SMs in WP3, 326 SMs in WP4 and 222 SMs in WP5. The K-Space partners have been also keen to ensure that sufficient resources are allocated to exploitation and dissemination tasks, in order for the innovations realized in the project to be used and valued by Europe's industrial and research communities.

All K-Space partners have participated in developing the project staff and financial budget, and have discussed intra and inter WP collaboration during preparation of this proposal, such that task responsibilities and dependencies are clearly defined. Careful attention has been paid to the sufficient allocation of staff resources to each task and subtask, to ensure that the required progress can be achieved within the timescale needed to meet project milestones, such as the integration of distributed tools over the K-Space framework to be put in place in WP6. This technically integrative WP has a total of 100 SMs allocated.

10.2 EU Grant Allocation per Partners

According to the number of researchers and PhD students to be integrated in K-Space the requested EU grant for the whole project is 5556K Euros. The maximum agreed EU grant is **5550K Euros**. According to the EC rules the maximum grant for coordination activities is the equivalent to 7% of the total grant. That is, a total of **388.5K Euros** has been allocated for coordination.

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In addition, **325.5 K Euros** have been allocated for specific integration and spreading of excellence activities. This integration budget will be administrated centrally by the coordinator partner. It is available to cover the cost of the activities specified in Table 5 and therefore any partner coordinating or participating in a related activity can use this budget previous approval of the NSB. It is agreed that no overheads can be charged to costs related to any of the activities described in Table 5.

Description	Budget
Additional support for PhD exchange (minimum 6 months)	150.0
Workshops/Conferences and Summer schools	60.0
Teaching resources online, web dissemination	24.0
Newsletter	8.0
Short training courses RAs/Industry	16.0
Exhibitions	18.0
Support for joint MSc/PhD Program	6.0
Support for Benchmarking and testing activities	15.0
Travel expenses external board members	28.5
TOTAL	325.5

Table 5: Budget allocated for selected integration and spreading of excellence activities in K Euros.

Table 6 shows the budget allocated to individual project partners. This grant is to cover any costs incurred within K-Space activities. The figures in Table 6 are also given in K Euros.

Contractor No	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Individual Budget	396	396	336	360	456	312	384	228	372	372	252	324	312	336

Table 6: Partners Budget Allocation (in K Euros).

According to table 6 the sum of the individual budgets allocated to the Network partners is **4836 K Euros**. This grant can be used to cover any cost incurred to achieve the project objectives, including Personnel (PhD studentships or research assistants), travel expenses, equipment, consumables, audit certificates or any other eligible cost according to the used cost model (AC or FC).

The budget of contractor number 5 (DCU) includes **108 K Euros** to cover part of the cost of a full-time system integrator in charge of coordinating and developing K-Space software framework as described in WP6.

Clearly, the individual grants are not enough to cover the total cost of partner contributions in this project. For that reason a significant portion of SMs will be contributed to K-Space through other activities of the project partners. Specifically, partners using the FC model will bring additional SMs funded by other related activities. Partners in the AC model will contribute with effort brought by permanent staff. In both cases PhD students are regarded as fully integrated researchers and will equally contribute to the total 1317 SMs planned in this project. Table 7 shows a breakdown of the SMs that will be fully cover by the EC grant and SMs brought to the project either through other activities (FC¹⁶ partners) or using permanent staff (AC¹⁶ partners).

For the sake of further clarification and for the avoidance of any doubt, lets consider the case of contractors number 2 and 3 as explanatory examples. Contractor number 2 is using the AC model and is contributing with a total of 100 SMs to the project. However, only 47 SMs out of the total 100 are fully (100%) covered

¹⁶ Refers to the cost model used by the corresponding partner

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by the EU grant given in table 6. Since this partner uses the AC model these 47 SMs should be provided by additional (non-permanent staff including PhD students). The remaining 53 SMs will be covered by *permanent staff*. On the other hand, contractor number 3 uses the FC cost model and it is committed to bring 76 SMs to the project. However, only 32 SMs are fully covered (100%) by the EU grant according to table 6. The remaining 44 SMs will be brought to the project using staff working in other related ongoing activities of partner 3.

Note that the ratio between SMs covered by the EC grant (827.5 SMs) and total number of SMs committed to the project (1317 SMs) is approximately equivalent to the ratio between the EU grant (5.5 Million Euros) and the total project cost (8.9 Million Euros).

Contractor No	1	2	3	4	5	6	7	8
SMs covered by EC grant	151	47	32	79.5	107.5	36	46	20.5
SMs Covered by other Sources	18	53	44	11.5	15.5	44	59	29.5
Total SMs	169	100	76	91	123	80	105	50

Contractor No	9	10	11	12	13	14	Totals
SMs covered by EC grant	31	81.5	25	42	32.5	96	827.5
SMs Covered by other Sources	74	14.5	25	37	56.5	8	489.5
Total SMs	105	96	50	79	89	104	1317

Table 7: Breakdown of SMs according to the funding source (figures rounded to 0.5 SM).

Finally, it is important to note that the 325.5 K Euros allocated for specific integration activities, as shown in table 5, are administrated by the coordinator partner but cannot be regarded as part of coordinator's individual budget. The individual grant for the coordinator partner is the one given in table 6¹⁷. As a consequence the total EU grant has been allocated as follows:

- 388.5 K Euros for coordination activities (7% of the grand total)
- 325.5 K Euros for specific integration and excellence spreading activities (according to table 5)
- 4836 K Euros individual partners budget (according to table 6)

This makes a grand total of 5550 K Euros.

The following two tables summarise the total estimated cost of resources each partner bring to the Network, the requested contribution from the EC grant and the cost breakdown according to project activities. The last two tables in this section show a detailed breakdown of the effort (in SMs) brought to the project by individual partners.

¹⁷ This figure does not includes the grant for coordination activities.

Estimation of incurred eligible costs – for whole duration –

Participant n°	Participant short name	Cost model used	Estimated eligible incurred costs for implementing JPA (whole duration of project)		Estimation of incurred eligible costs			Total receipts
					Joint Programme of Activities ¹⁸ (1)	Consortium Management Activities (2)	Total (3)=(1)+(2)	
1	QMUL	AC	Eligible costs	Direct costs (a)	424690	310560	735250	
				of which subcontracting	0	9000	9000	
				Indirect costs (b)	84938	60312	145250	
				Total eligible costs (a)+(b)	509628	370872	880500	
			Requested EC contribution	413628	370872	784500		
2	Uni Ko-Ld	AC&	Eligible costs	Direct costs (a)	455000	0	455000	
				of which subcontracting	0	0	0	
				Indirect costs (b)	91000	0	91000	
				Total eligible costs (a)+(b)	546000	0	546000	
			Requested EC contribution	396000	0	396000		
3	JRS	FC&	Eligible costs	Direct costs (a)	216574.3	4083.1	220657.4	
				of which subcontracting	0	0	0	
				Indirect costs (b)	126459.02	3266.9	129725.92	
				Total eligible costs (a)+(b)	343033.32	7350	350383.32	
			Requested EC contribution	328650	7350	336000		
4	CERTH	FC	Eligible costs	Direct costs (a)	203357.55	2198.46	205556	
				of which subcontracting	0	0	0	
				Indirect costs (b)	203357.55	2198.46	205556	
				Total eligible costs (a)+(b)	406715.10	4396.92	411112	
			Requested EC contribution	360000	0	360000		
5	DCU	AC&	Eligible costs	Direct costs (a)	430654	0	430654	
				of which subcontracting	0	0	0	
				Indirect costs (b)	91200	0	91200	
				Total eligible costs (a)+(b)	521854	0	521854	
			Requested EC contribution	456000	0	456000		
6	CWI	FC&	Eligible costs	Direct costs (a)	396890	0	396890	
				of which subcontracting	0	0	0	
				Indirect costs (b)	332312	0	332312	

¹⁸ 'other specific activities' according to Article II.25 of Annex II to the contract: JPA, except management of the consortium activities

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				<i>Total eligible costs (a)+(b)</i>	729202	0	729202
			Requested	EC contribution	312000	0	312000
7	GET	FC&	Eligible costs	<i>Direct costs (a)</i>	546707	4489	551196
				<i>of which subcontracting</i>	0	0	0
				<i>Indirect costs (b)</i>	224150	1841	225991
				<i>Total eligible costs (a)+(b)</i>	770857	6330	777187
			Requested	EC contribution	384000	0	384000
8	INA	FC&	Eligible costs	<i>Direct costs (a)</i>	310000	0	310000
				<i>of which subcontracting</i>	0	0	0
				<i>Indirect costs (b)</i>	250000	0	250000
				<i>Total eligible costs (a)+(b)</i>	560000	0	560000
			Requested	EC contribution	228000	0	228000
9	EURE-COM	FC&	Eligible costs	<i>Direct costs (a)</i>	640465	5139	645604
				<i>of which subcontracting</i>	0	0	0
				<i>Indirect costs (b)</i>	595465	5139	600604
				<i>Total eligible costs (a)+(b)</i>	1235930	10278	1246208
			Requested	EC contribution	361722	10278	372000
10	GU	AC	Eligible costs	<i>Direct costs (a)</i>	358834	0	358834
				<i>of which subcontracting</i>	0	0	0
				<i>Indirect costs (b)</i>	71766.8	0	71766.8
				<i>Total eligible costs (a)+(b)</i>	430600.8	0	430600.8
			Requested	EC contribution	372000	0	372000
11	DFKI	FC&	Eligible costs	<i>Direct costs (a)</i>	293266	0	293266
				<i>of which subcontracting</i>	0	0	0
				<i>Indirect costs (b)</i>	210479	0	210479
				<i>Total eligible costs (a)+(b)</i>	503745	0	503745
			Requested	EC contribution	252000	0	252000
12	TUB	AC&	Eligible costs	<i>Direct costs (a)</i>	455040	0	455040
				<i>of which subcontracting</i>	0	0	0
				<i>Indirect costs (b)</i>	91008	0	91008
				<i>Total eligible costs (a)+(b)</i>	546048	0	546048
			Requested	EC contribution	324000	0	324000
13	EPFL	AC&	Eligible costs	<i>Direct costs (a)</i>	607350	0	607350
				<i>of which subcontracting</i>	0	0	0
				<i>Indirect costs (b)</i>	121470	0	121470
				<i>Total eligible costs (a)+(b)</i>	728820	0	728820
			Requested	EC contribution	312000	0	312000
14	UEP	AC&	Eligible costs	<i>Direct costs (a)</i>	299000	0	280000
				<i>of which subcontracting</i>	0	3000	3000

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			<i>Indirect costs (b)</i>	59800	0	56000
			<i>Total eligible costs (a)+(b)</i>	358800	3000	339000
			Requested EC contribution	336000	0	336000
Common budget for specific integration activities			<i>Direct costs (a)</i>	325500	0	325500
			<i>of which subcontracting</i>	0	0	0
			<i>Indirect costs (b)</i>	0	0	0
			<i>Total eligible costs (a)+(b)</i>	325500	0	325500
			Requested EC contribution	325500	0	325500
TOTAL (for whole duration)			Eligible costs	8516733.22	402226.92	8918960.14
			Requested EC contribution	5161500	388500	5550000

Estimation of incurred eligible costs –18 months period, month 1 - 18

Participant n°	Participant short name	Cost model used	Estimated incurred eligible costs (detailed JPA for months 1-18)		Estimation of incurred eligible costs			Total receipts Month 1-18
					Joint Programme of Activities ¹⁹ (1) Month 1-18	Consortium Management Activities (2) Month 1-18	Total (3)=(1)+(2) Month 1-18	
1	QMUL	AC	Eligible costs	Direct costs (a)	215000	155000	370000	
				of which subcontracting	0	3000	3000	
				Indirect costs (b)	43000	31000	74000	
				Total eligible costs (a)+(b)	258000	186000	444000	
			Requested EC contribution	208000	186000	394000		
2	Uni Ko-Ld	AC&	Eligible costs	Direct costs (a)	227500	0	227500	
				of which subcontracting	0	0	0	
				Indirect costs (b)	45500	0	45500	
				Total eligible costs (a)+(b)	273000	0	273000	
			Requested EC contribution	198000	0	198000		
3	JRS	FC&	Eligible costs	Direct costs (a)	108287.15	2041.55	110328.7	
				of which subcontracting	0	0	0	
				Indirect costs (b)	63229.51	1633.45	64862.96	
				Total eligible costs (a)+(b)	171516.66	3675	175191.61	
			Requested EC contribution	164250	3675	168000		
4	CERTH	FC	Eligible costs	Direct costs (a)	101678.77	1099.23	102778	
				of which subcontracting	0	0	0	
				Indirect costs (b)	101678.77	1099.23	102778	
				Total eligible costs (a)+(b)	203357.55	2198.46	205556	
			Requested EC contribution	180000	0	180000		
5	DCU	AC&	Eligible costs	Direct costs (a)	215327	0	215327	
				of which subcontracting	0	0	0	
				Indirect costs (b)	45600	0	45600	
				Total eligible costs (a)+(b)	260927	0	260927	
			Requested EC contribution	228000	0	228000		
6	CWI	FC&	Eligible costs	Direct costs (a)	198445	0	198445	
				of which subcontracting	0	0	0	
				Indirect costs (b)	166156	0	166156	

¹⁹ 'other specific activities' according to Article II.25 of Annex II to the contract: JPA, except management of the consortium activities

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				Total eligible costs (a)+(b)	364601	0	364601
				Requested EC contribution	156000	0	156000
7	GET	FC&	Eligible costs	Direct costs (a)	273353	2245	275598
				of which subcontracting	0	0	0
				Indirect costs (b)	112075	921	112996
				Total eligible costs (a)+(b)	385428	3166	388594
				Requested EC contribution	192000	0	192000
8	INA	FC&	Eligible costs	Direct costs (a)	155000	0	155000
				of which subcontracting	0	0	0
				Indirect costs (b)	125000	0	125000
				Total eligible costs (a)+(b)	280000	0	280000
				Requested EC contribution	114000	0	114000
9	EURECOM	FC&	Eligible costs	Direct costs (a)	320233	2570	322802
				of which subcontracting	0	0	0
				Indirect costs (b)	297733	2570	300302
				Total eligible costs (a)+(b)	617966	5139	623105
				Requested EC contribution	180861	5139	186000
10	GU	AC	Eligible costs	Direct costs (a)	201100	0	201100
				of which subcontracting	0	0	0
				Indirect costs (b)	40220	0	40220
				Total eligible costs (a)+(b)	241320	0	241320
				Requested EC contribution	196558.85	0	196558.85
11	DFKI	FC&	Eligible costs	Direct costs (a)	150834	0	150834
				of which subcontracting	0	0	0
				Indirect costs (b)	108255	0	108255
				Total eligible costs (a)+(b)	259089	0	259089
				Requested EC contribution	129544	0	129544
12	TUB	AC&	Eligible costs	Direct costs (a)	227520	0	227520
				of which subcontracting	0	0	0
				Indirect costs (b)	45504	0	45504
				Total eligible costs (a)+(b)	273024	0	273024
				Requested EC contribution	162000	0	162000
13	EPFL	AC&	Eligible costs	Direct costs (a)	303675	0	303675
				of which subcontracting	0	0	0
				Indirect costs (b)	60735	0	60735
				Total eligible costs (a)+(b)	364410	0	364410
				Requested EC contribution	156000	0	156000
14	UEP	AC&	Eligible costs	Direct costs (a)	149500	0	140000
				of which subcontracting	0	1000	1000

Knowledge Space of Shared Technology and Integrative Research to Bridge the Semantic Gap

			Indirect costs (b)	29900	0	28000
			Total eligible costs (a)+(b)	179400	1000	169000
			Requested EC contribution	168000	0	168000
Common budget for specific integration activities			Direct costs (a)	162750	0	162750
			of which subcontracting	0	0	0
			Indirect costs (b)	0	0	0
			Total eligible costs (a)+(b)	162750	0	162750
			Requested EC contribution	162750	0	162750
TOTAL (for months 1-18)			Eligible costs	4294789.21	201178.46	4495967.67
			Requested EC contribution	2595963.85	194814	2790777.85

10.3 Network Effort Form - Indicative efforts for full duration of project

<i>Network Activity Type</i>	Joint Programme of Activities²⁰			Consortium Management activities	TOTAL per PARTICIPANT
	Integrating Activities ²¹	Jointly research activities ³	Spreading of Excellence activities ³		
QMUL	10.9	78	11	69.1	169
Uni Ko-Ld	8.1	81	10	0.9	100
JRS	6.3	58	11	0.7	76
CERT	6.1	73	11	0.9	91
DCU	11.1	102	9	0.9	123
CWI	8.3	61	10	0.7	80
GET	10.3	85	9	0.7	105
INA	6.3	35	8	0.7	50
EURECOM	10.3	85	9	0.7	105
GU	9.1	77	9	0.9	96
DFKI	6.3	33	10	0.7	50
TUB	9.3	60	9	0.7	79
EPFL	8.3	69	11	0.7	89
UEP	10.3	75	18	0.7	104
TOTAL per ACTIVITY TYPE	121	972	145	79	
Overall TOTAL effort					1317

²⁰ 'other specific activities' according to Article II.25 of Annex II to the contract

²¹ Includes activities from WP2 and WP8, except management of the consortium activities


10.4 Network Effort Form 1 - 18 months period

Network Activity Type	Joint Programme of Activities ²²			Consortium Management activities	TOTAL per PARTICIPANT
	Integrating Activities ²³	Jointly research activities ³	Spreading of Excellence activities ³		
QMUL	6	39	6	35	86
Uni Ko-Ld	4	40.5	5	0.5	50
JRS	3.1	29	5.5	0.3	37.9
CERT	3	36.5	5.5	0.5	45.5
DCU	5.5	51	4.5	0.5	61.5
CWI	4.1	30.5	5	0.3	39.9
GET	5.1	42.5	4.5	0.3	52.4
INA	3.1	17.5	4	0.3	24.9
EURECOM	4.1	42.5	4.5	0.3	51.4
GU	4.5	38.5	4.5	0.5	48
DFKI	3.1	16.5	5	0.3	24.9
TUB	4.6	30	4.5	0.3	39.4
EPFL	4.1	34.5	5.5	0.3	44.4
UEP	5.1	37.5	9	0.3	51.9
TOTAL per ACTIVITY TYPE	59.4	486	73	39.7	
Overall TOTAL effort					658.1

²² 'other specific activities' according to Article II.25 of Annex II to the contract

²³ Includes activities from WP2 and WP8, except management of the consortium activities

10.5 EC contribution for the full duration of the project

Contract Preparation Forms		
	EUROPEAN COMMISSION	Network of Excellence
	6th Framework Programme on Research, Technological Development and Demonstration	
		A3.2

Proposal Number	027026	Proposal Acronym	K-Space
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Number of researchers and doctoral students to be integrated. Maximum allowable EC contribution

Participant n°	Participant short name	Number of researches to be integrated			Number of doctoral students to be integrated in the network			Maximum allowable EC contribution for project duration
		Female	Male	Total	Female	Male	Total	
1	QMUL	6	12	18	3		3	1,116,000.00
2	UNI KO-LD		6	6	1	2	3	396,000.00
3	JRS	1	4	5			3	336,000.00
4	CERTH		5	5	2	3	5	360,000.00
5	DCU		7	7	3		3	456,000.00
6	CWI	1	4	5	1		1	312,000.00
7	GET-ENST	2	4	6	1	1	2	384,000.00
8	INA		3	3	1	3	4	228,000.00
9	INSTITUT EURECOM	1	4	5	3	3	6	372,000.00
10	GU		6	6	1		1	372,000.00
11	DFKI	1	3	4	1		1	252,000.00
12	TUB		5	5		2	2	324,000.00
13	EPFL	1	4	5	1		1	312,000.00
14	UEP		5	5		3	3	336,000.00
Total		13	72	85	18	20	38	5,556,000.00

11 Ethical issues

K-Space partners are aware of ethical and societal issues concerning privacy of users, trustworthy relationships in the whole value chain of content creation, management, processing, distribution, and consumption, as well as accessibility.

11.1 Privacy

In order to facilitate content processing according to user preferences and context of use, usage research teams will need to keep user data with the related metadata. For testing of developed techniques in realistic scenarios the user model will keep a history of use for individual users and automatically learn the personal preferences from this. This could raise privacy issues. Individual data stored in digital format, even if anonymous, are subject to privacy regulations. In principle, this implies that data storage is to be restricted to what is necessary, that users have to be notified of this fact, that users have a right to inspect what is stored about them, and that their data is not to be transmitted to third parties and used for purposes other than those covered by the relationship the user has entered to the owner of the data. In this context K-Space will observe European legal regulations concerning privacy. This is at a policy level, and will be monitored and reinforced by the K-Space Administration Office and its legal department. At the technical level reasonable technical measures concerning data security of personal data will be applied. For instance transmission of personal data over open communication channels will be done in encrypted form only.

11.2 Trustworthiness

This is another important issue in multimedia delivery. K-Space will take the necessary measures to foster trust of users in the technology developed. The Network will deal with the policy aspects of trust, and it will recommend and apply existing technology to achieve and ensure security and trustworthiness. Observing a line of prudent concern, K-Space will make sure that by means of operational guidelines and procedures all user-specific information will reside in the users' terminal equipment and will only be exchanged to configure, perhaps dynamically, the communication link to be established. From a research point of view K-Space will also deal with trust issues by performing research on multimedia data authentication and copyright protection as described in the JRA plan, Activity WP3.4.

11.3 Accessibility

K-Space partners are also very aware of accessibility issues generated when new technologies are introduced and therefore special care must be taken to avoid the creation of barriers that put people off the new technologies. For this reason one of the main dissemination goals of the Network is to allow the non specialist citizen access to the outputs of the technology that is being developed. The reason for this is to establish at an early stage what is interesting to the user, what is helpful to the user, e.g. with different literacy skills and languages, and conversely what may be technologically interesting but either confusing or not addressing features that user, i.e. viewer, listener, or traveller needs. This will provide feedback on the targeted user centred research and the tools and techniques that are given attention. If this can be achieved it will contribute the success of the research and have wide societal implications.

The accessibility issue is not only about serving the community of differently-abled users, but also applies more generally to "abled" users in a "disabled" environment, for example driving an automobile makes a user "partially sighted". Including knowledge about the expressivity of different modalities in which information is and can be expressed will contribute to enabling creating output presentations appropriate for different users - whether abled or disabled. Many proposals have been made for minimum standards for access, and many organisations encourage content creators to follow these standards. One of the opportunities of K-Space is to express the underlying semantics of these explicitly in terms of standard Semantic Web languages. Publicising K-Space research will be subject to available guidelines such as those laid in:

<http://www.w3.org/WAI>

<http://www.w3.org/TR/WAI-WEBCONTENT>

<http://bobby.watchfire.com/bobby/html/en/index.jsp>

<http://www.stakes.fi/cost219/>

Additionally, K-Space activities will give special attention to accessibility and usability problems, mainly for people with different levels of disability.

Whenever new developments will not be compatible with existing standards and recommendations, K-Space will engage in overcoming specific problems and difficulties aiming at guaranteeing equivalent levels of accessibility and usability. More specifically, this will be achieved by setting guidelines, design

recommendations and dissemination of best practices. These concerns will be made in agreement with the standardisation efforts described in section B3.1.

The Network efforts to ensure accessibility to physically impaired people will aim at facilitating accessibility problems and reducing impact of physical disabilities on accessing the technologies produced by K-Space. These efforts include but are not limited to:

- Installing new plug-ins
- Defining good interfaces for other programs such as automatic voice-to-text converters
- Provide technical instructions and guidelines which reflect the procedural approach albeit the detailed technical aspects of resulting technologies.
- Expressing accessibility guidelines in Semantic Web languages so that these can be incorporated as rules in the generation of multimedia presentations within the project and used by others in explicit (Semantic) Web document processing beyond the timescales of the project.

Annex A: Consortium overview and contributions to the project

K-Space brings together a critical mass of 14 leading research institutions from 9 different countries across Europe. All K-Space partners are internationally renowned for their world-class research on areas relevant to the technical scope of the NoE. Each partner brings unique expertise and skills which overlap or complement to each other. The main strength of the consortium is the unification of the partners to build a Network focusing on research areas that partners believe will benefit from dedicated and strong integration efforts. The consortium expertise represents the know-how, commitment and competence that is absolutely necessary to undertake the technical, dissemination and further integration aspects of the NoE.

The Multimedia and Vision Lab at QMUL headed by Prof. E. Izquierdo is well recognized for its expertise in multimedia analysis. It is complemented by CERTH, DCU and TUB which have conducted close cooperation in several projects including IST SCHEMA, EU COST211 and QIMERA. The FP5 IST NoE “SCHEMA: Network of Excellence in Content-Based Semantic Scene Analysis and Information Retrieval”, focused on improving the systematic exchange of information by the forging of links between partners. SCHEMA was coordinated by Prof. M. Strintzis and Dr. Y. Kompatsiaris (CERTH) two main contributors in K-Space. Work carried out in these cooperative projects will be used as background for the developments envisaged in K-Space.

The European COST 292 Action (Semantic Multimodal Analysis of Digital Media) is another example of ongoing collaboration between K-Space partners. This action is coordinated by the Multimedia and Vision Lab at QMUL. Through it, QMUL, TUB, EPFL, CERH and DCU have participated in common research initiatives, exchange of information and joint software development in the area of knowledge-based multimedia analysis. DCU, QMUL and CERTH are currently developing and exchanging visual analysis software as part of the voluntary Qimera initiative (www.qimera.org) to produce a software test-bed for video object segmentation and tracking. This initiative is coordinated by Dr. Noel O’Connor from DCU. Work carried out in COST292 and QIMERA will be also taken as background for the developments envisaged in K-Space.

TUB and EPFL have been instrumental in the development of MPEG7, with contributions from most of the other consortium partners. Both institutions are among the leading world force regarding R&D in the domain of audio-visual analysis. Both labs combined comprise of more than 50 researchers active in the field. Prof. T. Sikora (TUB) and T. Ebrahimi (EPFL) have worked together very closely in the past and continue to do so today. This cooperation naturally covers the area of research where the two partners have conducted joint work for a very long time. This cooperation also extends to standardisation activities mainly within the ISO MPEG (Moving Pictures Experts Group) framework, where both partners are heavily involved. The links between these universities are not confined to research and related activities only. Every year, a large number of undergraduate students choose to take part in exchange programmes between the two schools, the best-known of which is ERASMUS.

CERTH, QMUL and GU work on dynamic thematic categorization as well as detection of events and composite objects from low- and medium-level content descriptions, based on semantic knowledge representations and ontologies. These partners expect to strengthen this jointly expertise by the developments on the the K-Space project. Main researchers of Uni Ko-Ld and DFKI have worked together in the area of semantic annotation since 1998. This cooperation will continue within K-Space. Uni Ko-Ld and CERTH have cooperated closely and successfully in the EU IST project aceMedia. Their common tool “OntoMat VDE” is a key cornerstone based on which knowledge extraction from multimedia may be built. This expertise is brought to the K-Space project. JRS with its strong link to broadcast archive institutions (e.g. from the already finished projects Presto and DIAMANT as well as the in the ongoing PrestoSpace project) has formerly worked together with TUB and INA. In the on-going project DIRECT-INFO, which is co ordinated by JRS, they also collaborate with DFKI. K-Space allows to broaden this collaboration and

strengthen the corresponding expertise. The Multimedia and Human-Computer Interaction group (INS2) at CWI has been working in the development of models and authoring systems for multimedia and hypermedia since the early 1990's. In that time the group has had an active exchange of ideas with institutions such as INA, DFKI and GU. In particular in recent years the complementarities with work done at Uni Ko-Ld became apparent.

INA and DCU have collaborated from 1998 to 2001 in the Diceman IST project. INA has also informal exchanges on relevant domains with GET, Eurecom and EPFL. The EURECOM has a strong record of national and international cooperation, in particular with industrial companies. EURECOM is also initiator and active in the organization of the CBMI international workshop. Its experience will be useful for future K-Space driven conferences and dissemination activities.

UEP's record of co-operation with current consortium mainly consists in jointly organised events. UEP (namely, Prof. P. Berka) co-operated with CWI in the organisation of collaborative effort in Knowledge Discovery in Databases (Discovery Challenge). Dr. V. Svátek from UEP and Dr. P. Buitelaar from DFKI co-organised an ECML/PKDD workshop on Knowledge Discovery and Ontologies (2004). Dr. V. Svátek from UEP and Prof. S. Staab from Uni Ko-Ld co-organise the 15th Int'l Conf. on Knowledge Engineering and Knowledge Management (EKAW 2006).

All partners expect to strengthen available links and foster cooperation while achieving the objectives set in the K-Space project

A.1 Partner contributions to the JPA

The following table summarises the main contributions that each partner bring to the network.

Partner	Contribution
QMUL	Coordinator, leader of WP1, design of efficient systems for semi-automatic annotation using inference rules and low-level descriptors. Automatic classification of visual information using low-level and medium-level descriptors. Knowledge acquisition from past experience through user interaction -relevance feedback- and adaptive learning.
Uni Ko-Ld	WP5 Leader. Contributor in semi-automatic annotation by human-computer interaction and learning from third re-sources (WWW, other data). Ontology-based heuristic inference rules for recognizing complex objects or events from low level features of multimedia sources.
JRS	Leader of WP3. Content structuring by multimodal analysis (video & audio shot boundary detection, camera movement, visual and acoustic scene classification), standardised content description and metadata profiles suitable for targeted application domains, content description and analysis infrastructure.
CERTH	Leader of WP4, carrying out research on knowledge extraction from multimedia documents using multimedia ontologies, content analysis algorithms and reasoning processes. Main contributions are semantic segmentation algorithms, construction of multimedia ontologies, development of multimedia descriptor management tools, and matching processes using intelligent algorithms and adaptive networks. Automatic recognition and labelling using specialised reasoning processes, context modelling, reasoning using context.
DCU	Leader of WP6. Semi-automatic content annotation using machine learning knowledge extraction techniques that leverage low-/mid-level audio-visual features. Content categorisation for dynamic archive organisation based on automatically extracted features. Object-based search and retrieval with relevance feedback for learning object classes. New user interface design paradigms for browsing and search and retrieval considering both content-based and non-content-based features for indexing as well as the user's context.
CWI	Coordinator of WP5.3, design of methods that facilitate semantic-based interaction with multimedia in various user and domain contexts. Establish relevant annotations for user-dependent presentation generation. Use of semantic annotations of media to enhance presentation of information to the user. Close connections with W3C (group collaborates with co-chair "Semantic Web Best Practices" group in 2 projects; head of W3C Benelux office and

	head of W3C offices are based at CWI.
GET	Participant in tasks on content-based multimedia analysis, audio/speech/image processing, 3D image indexing, multimodal techniques, high dimensionality reduction, low-level feature fusion, data mining, knowledge-assisted annotation of audiovisual content.
INA	INA brings its experience on cross-media indexing of large volumes, on manual and semi-automatic description, on designing description processes and tools adapted to uses, for content retrieval or publishing multiples versions of a same content intended to different people and/or media. INA is also a cross point between contents, users, producers, broadcasters and archivists.
EURECOM	WP8 Leader. It brings expertise is in Multimedia Indexing and Information Filtering. We contribute on video analysis, object extraction, probabilistic model construction, semantic classification and modelling.
GU	Leader of WP2 and the tasks on data mining. Context sensitive information retrieval- modelling context and knowledge acquisition from past experience through user interaction. Development of adaptive retrieval methods and user profiling techniques. Development of data mining techniques. Video segmentation, event detection and summarization techniques. Context sensitive and collaborative image retrieval. Theoretical approach to information retrieval.
DFKI	Leader of WP7. DFKI will mainly add expertise for integrating the results of semantic annotation of complementary sources to multimedia material. The main interest lies in the merging of descriptors for natural language, semantic web and multimedia descriptors.
TUB	Design of efficient systems for automatic and semiautomatic annotation of speech, audio, images and video information using low-level and medium-level descriptors, relevance feedback- and adaptive learning.
EPFL	Contribute to content-based multimedia analysis, low and medium-level signal processing, multimodal techniques, data fusion. Contribute to dissemination activities as well as MPEG and JPEG standards (MPEG-7, MPEG-21, JPSearch), development of new undergraduate/graduate teaching programs, short courses and technology transfer.
UEP	UEP will focus on mining complementary resources associated with multimedia. It will also contribute to multimedia ontology and metadata aspects of the project. As editor of the K-Space newsletter and leaflets, it will play an important role in result dissemination.

Table A.1: Main contributions per partner.

A.2 Partner profiles

Queen Mary, University of London, (QMUL): QMUL is the third largest constituent college of the University of London. It is a major research institution in the UK and committed to high quality teaching. Both the Multimedia and Vision Research Laboratory and the Intelligent Systems Laboratory enjoy a distinguished reputation for innovation and the use of imaging and multimedia techniques to real world applications, receiving direct funding from overseas organisations such as Nokia, the Department of Defence and the EU. The groups are also involved in the MPEG-7 activities. The Multimedia and Vision Research Laboratory is member of the steering group of the UK EPSRC Network on Multimedia Knowledge Management (MMKM)

Background work will be on the design of semiautomatic semantic annotation using inference rules and low-level descriptors as well as relevance feed-back for annotation. The exploitation of immune system mechanisms and evolutionary learning approaches to recognise and perform information synthesis and knowledge structuring.

Koblenz University, (Uni Ko-Ld): It has a track record of over 25 years of teaching and research in computer science. Koblenz University is well-known for its institutes of computational visualistics with a faculty of 6 professors focusing on the need to analyze and create multimedia as well as for its institute of informatics, with several renowned researchers investigating the possibilities of inferencing for means such as knowledge management, infrastructure services, information

retrieval, security – and knowledge extraction from multimedia. Much of the group's work has been in the context of national and European funding, such as: EU IST aceMedia, EU IST ASG, German BMBF Verisoft, German DFG KeY, DFG MoDeDok, or DFG Robolog.

Background work will be in the area of reasoning, semantic annotation, data mining of third-party resources (such as WWW) and knowledge extraction from low level multimedia descriptors.

Joanneum Research Forschungsgesellschaft mbH, (JRS): The digital media group at the JRS' Institute of Information Systems & Information Management is active in the field of content based multimedia-indexing since about 1997 when we proposed and co-ordinated the EC project VICAR (Video Indexing, Classification, Annotation and Retrieval). We have co-ordinated or participated in a number of similar projects with a focus of applying CBMI in audiovisual/broadcast archives and the media-industry. Our current research focus is on spatio-temporal video object segmentation, content based search & retrieval and video summaries. As metadata standard for our work we are relying on MPEG-7, where we are developing a MPEG-7 repository based on a full C++-implementation of the standard (relying on an automatic, configurable XML Schema (XSD) to C++ translator implemented in-house). Another application we have developed is the digital film restoration system DIAMANT which is also an excellent example of the application of content aware image processing.

Informatics and Telematics Institute (ITI) - Centre for Research and Technology Hellas (CERTH): ITI-CERTH was founded in 1998 as a non-profit organisation under the auspices of the General Secretariat of Research and Technology of Greece (GSRT), with its head office located in Thessaloniki, Greece. Since 10.3.2000 it has been a founding member of the Centre of Research and Technology Hellas (CERTH) also supervised by the GSRT. The most important related areas of R&D activities performed by ITI-CERTH include: image and video analysis, multimedia indexing and retrieval, informational retrieval and knowledge discovery for semantic-web applications, intelligent human computer interaction and intelligent agents, MPEG-7 and MPEG-21 standards. The Thessaloniki-based Information Processing Laboratory (IPL) of ITI-CERTH is participating in more than 20 EC IST projects and 43 National projects, and is the co-coordinator of four EC IST projects. Over the last five years, the ITI research team has authored over 85 publications in scientific journals and over 185 presentations to international conferences. Its Athens-based Image, Video and Multimedia Systems Lab (IVML) of the National Technical University of Athens (NTUA) will also collaborate in the project. It has, has authored more than 80 publications in scientific journals and over 180 in international conferences in the multimedia and knowledge technologies field.

Dublin City University, (DCU): The Centre for Digital Video Processing (CDVP) at Dublin City University is an inter disciplinary University Designated Research Centre which performs basic and applied research into the technologies necessary to support efficient management of large collections of multimedia information, specifically repositories of video information. The specialty of the CDVP/DCU has been audio-visual analysis for advanced feature extraction, which in turn supports content manipulation. This specific niche area has been targeted because the expertise of researchers in the CDVP covers A/V analysis on the one hand, and information management on the other. The CDVP also conducts research into browsing and search interfaces, video access from mobile platforms, video navigation for safety and security applications, 3-D and multi-modal imaging and design of low-powered mobile devices for video processing. The CDVP comprises 6 faculty, 7 post-doctoral researchers and over 20 graduate students. Members of the CDVP have worked on many framework projects, have assumed the roles of National representatives to ISO MPEG as well as being leading participants in the US NIST-funded TRECVID annual video IR benchmarking activities. A spin-off company, Aliope Ltd, has been created to commercialize the research outputs of the CDVP.

Centrum voor Wiskunde en Informatica, (CWI): CWI is the research institute for mathematics and computer science research in The Netherlands. CWI has an outstanding international reputation,

is an ERCIM member, and is also strongly embedded in Dutch university research. The Multimedia and Human-Computer Interaction group (INS2), part of the Information Systems cluster (INS), is renowned for its innovative work on all aspects of automated and semi-automated multimedia presentation authoring and presentation generation. Results of this work include the Amsterdam Hypermedia Model, contributions to the W3C SMIL 1.0, SMIL 2.0, and XHTML recommendations, the hypermedia authoring system GRiNS, and the CWI spin-off company Oratrix. Members of the group have been active in W3C's XHTML and SYMM Working Groups and ISO's MPEG7 DDL Working Group. Members of the group are currently participating in the W3C Semantic Web Best Practices group which aims to provide use-cases for developers of Semantic Web applications.

The group will work on mechanisms for the use and creation of semantic metadata at the user interface level. Here in particular aspects of manual and semi-automatic semantic annotation during the authoring and automatic generation of multimedia presentations will be investigated. Related to these issues is the work on semantic-based presentation of multimedia.

Groupe des Ecoles des Télécommunications, (GET): GET is made up of six major Graduate Schools of France in the field of Information Technology: Télécom Paris (ENST) - Ecole Nationale Supérieure des Télécommunications, ENST – Bretagne, INT – Evry, ENIC - in partnership with the University of Lille, EURECOM in partnership with EPFL, and IAAI - Institute of Advanced Applications of Internet, in collaboration with the Université d'Aix-Marseille. GET assembles around 50 laboratories addressing all issues related to the Information Society Technologies. GET research encompasses information theory, coding, modulation, detection, compression, classification, speech recognition and synthesis, audio signal processing and indexing, vision, biometry and software engineering, cognitive sciences, databases, data mining, and natural languages. Research conducted in the GET institutes contributes to most of the major European programme and initiatives in the ICT field, including Esprit, ACTS, IST, Eureka, and COST. GET has participated in more than 30 such projects or initiatives related to K-Space topics. To exemplify multidisciplinary research, GET is managing the "Mobile Campus Project" that federates various knowledge fields such as hardware and software infrastructures for mobile computing, communication and synchronization techniques, structured document and hypermedia, human-computer interfaces, pattern recognition and the evaluation of usages in which K-Space topics have a prominent role.

Institut National de l'Audiovisuel, (INA): INA is a public-owned industrial and commercial company. It is involved in many aspects of the audiovisual industry: commercial and patrimonial archiving, restoration, professional training, technical research, socio-economical studies, and experimental productions. INA Archives Department is responsible for collecting, restoring and communicating the French radio and television heritage, and for the commercial transfer of archive-related rights. It holds French radio material since 1933 and television material since 1949. Since a law was voted in 1992, radio and television programmes now fall within the compass of the legal deposit, this task having also been devoted to INA. Researchers, teachers and students may therefore have access to parts of INA's databases. INA's Research Laboratory is divided in two main teams, one working on audiovisual preservation, restoration and content protection (TTA), and the other one working on audiovisual content description (DCA) which is involved in K-Space. DCA is involved since 1998 in automatic audiovisual analysis and indexing of the audiovisual programmes as well as in metadata modelling, representation and management. It has participated and is participating in many research projects related to K-Space, funded by the European Commission and the French Ministry of Industry including ESPRIT DiVAN, ACTS DICEMAN, EURODELPHES, IST ECHO, OLIVE, CHAPERON, OPALES, etc.

Institut Eurecom, (EURECOM): Institut Eurecom, Sophia Antipolis, France, is a graduate education and research centre, funded by two schools: Telecom Paris and EPFL (Lausanne, Switzerland), with several academic and industrial members. Our research activity is organized in

three themes: mobile, corporate and multimedia communications. We have a very active collaboration program, and participate in many projects at the national and European level. Research at Eurecom includes in particular topics such as signal processing, information theory, speech processing, watermarking, biometry, multimedia analysis, information filtering. The quality of the research is often recognized internationally (the Institute has obtained 5 best paper awards in the last 2 years). The Institut Eurecom has been recently associated to the Consortium. Our group currently participates in the Trec Video experiments, where we apply our region classification approach to semantic feature extraction. We are the scientific coordinator for a national project (ARGOS) on evaluation of video analysis techniques that is being organized in 2005 and 2006.

University of Glasgow, (GU): The information retrieval group at the Department of Computer Science, University of Glasgow, Scotland is an international leader in the area. This group is involved in a number of national and international activities and is currently organising an IR festival in Glasgow bringing world leaders in IR to Glasgow. They are involved in the organisation of premium IR conferences (SIGIR, ECIR etc.) and participants of TREC and other activities. This group gets funding from UK funding bodies (EPSRC), EC and commercial companies (SHARP, Microsoft). The researchers have expertise in the following areas. IR models based on context logics and probability theory, situation theory, ostension and computational linguistics. Large scale IR experiments with text, multimedia. Usability and user-centred design. Evaluation methodologies for IR. Theoretical models for IR.

German Research Centre for Artificial Intelligence, (DFKI): The German Research Center for Artificial Intelligence Intelligence, founded in 1988, is one of the largest non-profit contract research institutes in the field of innovative software technology based on Artificial Intelligence (AI) methods. Research and development in language technology is carried out mainly at the Saarbrücken site in the LT Lab, whose director, Prof. Hans Uszkoreit, also holds a chair in Computational Linguistics at the University of the Saarland. The Language Technology Lab of the German Research Center for Artificial Intelligence Intelligence (DFKI), whose director Prof. Hans Uszkoreit, also holds a chair in Computational Linguistics at the University of the Saarland, has accrued much experience by successful coordination of and participation in various EU research projects, from which OLIVE, POP-EYE, TWENTYONE, MUMIS are particularly relevant for K-Space, since they were exploring the use of various language technologies for indexing and accessing multimedia content material. The LT-Lab also plays an active role in standardization activities, like for example in the ISO TC37/SC4 committee on language resources management. A main contribution of DFKI will lie in the use of knowledge extracted from complementary (language) sources for supporting the automated semantic annotation of multimedia material.

Technische Universität Berlin, (TUB): Technische Universität Berlin, (TUB): Technische Universität Berlin looks back over a long and distinguished tradition of teaching and research. In 1946, the university was re-established under the name of Technische Universität Berlin, or TU Berlin. The TU Berlin, with some 29,500 students, is one of the largest German Institutes of Technology. The Communication Systems Group (in German: Fachgebiet Nachrichtenuübertragung) as a part of the Faculty for Electrical Engineering and Computer Science is directed by Prof. Sikora and comprises of more than 25 researchers. Its teaching and research activities encompass most areas of digital signal processing for multimedia applications. The main research focus is on the content-based analysis, description, segmentation, classification as well as coding of speech, audio, and video data. The group was recently involved in an MPEG-7-based video annotation project and the NoE VISNET (FP6). Currently, the group participates in NoE 3DTV (FP6), and coordinates as main contributor the development of the MPEG-4 Audio Lossless Coding standard.

Ecole Polytechnique Fédérale de Lausanne, (EPFL): EPFL is one of the two Federal Institutes of Technology in Switzerland with main emphasis on teaching and research in Engineering Sciences and Technologies. EPFL participation to this project is from a research teams headed by Prof.

Touradj Ebrahimi and Prof. Sabine Suesstrunk respectively. The teams are active in research and teaching in the field of visual information processing and coding. Prof. Ebrahimi's team is made of 3 post-doc researchers, 6 graduate researchers pursuing PhD theses, and between 5 to 10 undergraduate students. The research topics span through three highly interconnected disciplines of imaging, namely, compression, processing, and security. The team is very active in MPEG and JPEG standardisation activities, where it contributes both at the technical and leadership levels. Prof. Suesstrunk's team is made of 1 post-doc researcher and 5 graduate researchers pursuing PhD theses. The team is primarily concerned with the capture, analysis and reproduction of natural color images.

University of Economics, Prague, (UEP): The knowledge engineering group at UEP is recognised for its research and educational activities in knowledge discovery from databases, web mining and knowledge-based systems. It recently participated as funded partner in two EU projects in the KDD area, one in medical informatics area, and one eContent project. Co-ordinator of several projects funded by the Czech Science Foundation. Member of multiple EU network projects such as KDnet, Knowledge Web, Ontoweb or EUNITE. UEP also has the leading role in organisation of the annual Czecho-Slovak knowledge technology conference (called Znalosti), and host/ed top-class knowledge technology events such as ECML (1997), PKDD (1999) or EKAW (2006).

Background work will be in the area of combining tabular data mining with knowledge extraction from text, and in tracking the context of multimedia handling.

A.3 Key Researchers and Availability

Partner	Name of Key (permanent) Researchers	Email	Availability in % of full time
QMUL	Ebroul Izquierdo Craig Stewart Alan Pearmain John Bigham	ebroul.izquierdo@elec.qmul.ac.uk craig.stewart@elec.qmul.ac.uk alan.pearmain@elec.qmul.ac.uk john.bigham@elec.qmul.ac.uk	25% 100% 10% 5%
Uni Ko-Ld	Dietrich Paulus Steffen Staab	paulus@uni-koblenz.de staab@uni-koblenz.de	25% 25%
JRS	Werner Haas Georg Thallinger Herwig Rehatschek Peter Schallauer Werner Bailer	Werner.Haas@joanneum.at Georg.Thallinger@joanneum.at Herwig.Rehatschek@joanneum.at Peter.Schallauer@joanneum.at Werner.Bailer@joanneum.at	5% 10% 10% 30% 10%
CERTH	Michael Strintzis Stefanos Kollias Ioannis Kompatsiaris Yannis Avrithis Vassilis Tzouvaras	strintzi@eng.auth.gr stefanos@cs.ntua.gr ikom@iti.gr iavr@image.ntua.gr tzouvaras@image.ntua.gr	15% 15% 20% 20% 35%
DCU	Noel O'Connor Alan Smeaton Edward Cooke Gareth Jones Hervé Le Borgne Cathal Gurrin	oconnorn@eeng.dcu.ie asmeaton@computing.dcu.ie ej.cooke@eeng.dcu.ie gareth.jones@computing.dcu.ie hborgne@eeng.dcu.ie cathal.gurrin@computing.dcu.ie	50% 50% 50% 50% 50% 50%
CWI	Lynda Hardman Jacco van Ossenbruggen Lloyd Rutledge Z. Huang R. Troncy	Lynda.Hardman@cwi.nl Jacco.van.Ossenbruggen@cwi.nl Lloyd.Rutledge@cwi.nl Z.Huang@cwi.nl R.Troncy@cwi.nl	10% 10% 20% 20% 40%
GET	Gaël Richard Bertrand David Marine Campedel Francis Schmitt Francois Yvon	Gael.Richard@enst.fr Bertrand.David@enst.fr Marine.Campedel@enst.fr Francis.Schmitt@enst.fr Francois.Yvon@enst.fr	35 % 25% 20% 25% 35%

Knowledge Space of Shared Technology and Integrative Research to Bridge the Semantic Gap

	Roland Badeau Yves Grenier	Roland.Badeau@enst.fr Yves.Grenier@enst.fr	25% 10%
INA	Daniel Teruggi Vincent Brunie Jean Carrive Laurent Vinet	dteruggi@ina.fr vbrunie@ina.fr jcarrive@ina.fr lvinet@ina.fr	50% 50% 50% 50%
EUREC OM	Bernard Merialdo Benoit Huet Dirk Slock	Bernard.Merialdo@eurecom.fr Benoit.Huet@eurecom.fr Dirk.Slock@eurecom.fr	30% 30% 15%
GU	Keith van Rijsbergen Joemon Jose	keith@dcs.gla.ac.uk jj@dcs.gla.ac.uk	5% 20%
DFKI	Thierry Declerck Paul Buitelaar Melanie Siegel Marc Schröder	declerck@dfki.de paulb@dfki.de siegel@dfki.de schroed@dfki.de	25% 10% 20% 10%
TUB	Thomas Sikora Peter Noll Ronald Glasberg Kai Clüver Tilman Liebchen Juan José Burred Andreas Cobet 20% Gunnar Eisenberg Lutz Goldmann Martin Haller Shan Jin Mustafa Karaman Amjad Samour Markus Schwab Wiryadi Jan Weil	sikora@nue.tu-berlin.de noll@nue.tu-berlin.de glasberg@nue.tu-berlin.de cluever@nue.tu-berlin.de liebchen@nue.tu-berlin.de burred@nue.tu-berlin.de cobet@nue.tu-berlin.de eisenberg@nue.tu-berlin.de goldmann@nue.tu-berlin.de haller@nue.tu-berlin.de shan@nue.tu-berlin.de karaman@nue.tu-berlin.de samour@nue.tu-berlin.de schwab@nue.tu-berlin.de wiryadi@nue.tu-berlin.de weil@nue.tu-berlin.de	10% 5% 20% 20% 20% 10% 20% 10% 20% 20% 20% 20% 20% 10% 20% 20% 10%
EPFL	Touradj Ebrahimi Sabine Suesstrunk Yousri Abdeljaoued Frederic Dufaux	Touradj.ebrahimi@epfl.ch Sabine.Susstrunk@epfl.ch Yousri.Abdeljaoued@epfl.ch Frederic.Dufaux@epfl.ch	25% 25% 10% 10%
UEP	Vojtěch Svátek Petr Berka Petr Strossa	svatek@vse.cz berka@vse.cz kizips@vse.cz	10% 8% 4%

Table A.2: Key investigators, email address and availability.

Annex B: Ethical issues checklist

Table B. Proposers are requested to fill in the following table

Does your proposed research raise sensitive ethical questions related to:	YES	NO
Human beings		✓
Human biological samples		✓
Personal data (whether identified by name or not)		✓
Genetic information		✓
Animals		✓

*If you answer “YES” to any of the above, please include in your proposal section B10.1 the more detailed version of Table A (“Crucial information”) obtained from:
http://europa.eu.int/comm/research/science-society/ethics/rules_en.html
 and also incorporate in section B.10.1 and in other appropriate parts of your proposal comments corresponding to the detailed instructions given in sections C-D at the above address*

Table B. Proposers are requested to confirm that the proposed research does not involve:

- Research activity aimed at human cloning for reproductive purposes,
- Research activity intended to modify the genetic heritage of human beings which could make such changes heritable²⁴
- Research activity intended to create human embryos solely for the purpose of research or for the purpose of stem cell procurement, including by means of somatic cell nuclear transfer.

	YES	NO
Confirmation : the proposed research involves none of the issues listed in Table B		✓

Further information on ethics requirements and rules are given at the science and ethics website at http://europa.eu.int/comm/research/science-society/ethics/ethics_en.html

²⁴ Research relating to cancer treatment of the gonads can be financed