Large-scale integrating project (IP) proposal

ICT Call 3

FP7-ICT-2007-3

Audio-Visual Discovery, Metadata and Next Generation Video Networks

ASIMOV

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Work programme topics addressed

Objective ICT-2007.4.4: Intelligent Content and Semantics

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Proposal abstract

The extreme cost reduction and wider access to video creation tools that emerged as a result of the general digitalisation of the production process has led to a plethora of video content. This resulted in the paradoxical situation that, considering the need for personalisation and effective search mechanism, the complexity of finding the appropriate content far outgrew the complexity of creating it.

In 1984, Nicholas Negroponte spoke at TED conference, outlining amongst others a vision of a new kind of book and its role in learning – using the recipe for a penguin as an instance:

> "Here again my favourite example is the cook book, the *Larousse gastronomique* […] that tells you how to do something like penguin and you get to the end of the recipe and it says ‚cook until done'. […] You might have to elaborate for me, or for somebody who isn't an expert ‚cook at 380 degrees for 45 minutes'. And then for real beginner you would go done even further and elaborate even more: ‚Open the oven, preheat, wait for the light to go out, open the door, don't leave it open too long, put the penguin in, shut the door' […]"

This is more than a visionary paradigm for the contextualization, personalization, and customization of content. It also shows the deficiencies of today's audiovisual content: There is no way to retrieve this video unless you know where to find it[1]. Even you had it in your memory as "the penguin talk" by Negroponte – there is no way a librarian would have put down "penguin" as a metadata to describe it.

The rationale behind ASIMOV is that not only video, but also audio content - old and new - will be open to the kind of query users are either used to conduct or would be executing intuitively, regardless of standardised query forms.

A new wave of tagging and annotating multimedia content will be triggered with the first users interactively enriching audio and video content according to the paradigm of ASIMOV. People will become more enthusiastic about making videos more exploitable and interactive beyond the wiki paradigm.

In the longer-term, as standards become developed and accepted, and with a community to exploit the technological opportunities, ASIMOV will contribute to audiovisual content being truly embedded in all the activities we today consider to be web-based - instead of being superimposed on it. As the classical web content is currently becoming ubiquitously available, the ASIMOV project will enable video content to follow the same unambiguous and easy, but also targeted access.

[1] You will actually find it at http://www.ted.com/index.php/talks/view/id/230; start at 09:47.

Table of contents

Section 1: Scientific and/or technical quality, relevant to the topics addressed by the call

1.1 Concept and objectives

1.1.1 Overall concept

The creation and consumption of audiovisual material is in transition mode, as new forms of interactive usage are being developed: Television becomes participatory; users become creators, authoring veers toward collective approaches – the environment is exciting and innovative, but also full of proprietary solutions that are not compatible. In such a new environment there is significant proliferation of newly created and newly resurfaced audio-video content, but there is a high risk that effort spent on developments which are not successful in the marketplace is wasted. The abundance of the content mandates all entities in the value chain to change their traditional behaviour in the way how the content is made available or consumed. For creators and content owners, the ability to discover and list their audio-visual content becomes, in the process of commercialising their work, the imperative almost as important as quality and creativity. On the other side, for end users, the ability to find the most applicable audiovisual information in their sphere of interest becomes one of the predominant selection criteria when choosing sources for the audiovisual content.

However, the availability and value of these scenarios remain restricted for the time being due to a number of deficiencies.

Audiovisual content is still unexploited in two dimensions: On the one hand, access to the actual content and its authoring is restricted to selected settings where content is being produced or processed with explicit regard to this requisite. Thus, solutions are self-contained in that they ask for proprietary systems, devices, technologies, or software to be used. In addition (and as a consequence of), usability has a high entry-threshold in that handling and authoring require experience, extensive knowledge, or even formal training. Thus, the technically possible utilization of existing features is restricted to experts and the advantages of interactive and collective usage as proven in the Web 2.0 paradigm, do not unfold their potential due to the critical mass not being attracted - acceptance is reduced by complex and non-standardized user interfaces or access to the specific technology. On the other hand, the temporal and the spatial dimension of audiovisual objects is not yet unfolded towards the users' end: While technological advances have made video manageable, it remains a monolith with regard to content, thus turning accessibility into an empty promise.

Overall, recent developments and projects have shown what is possible in proprietary and privileged environments. **ASIMOV will advance from the state-of-the-art towards a universal, standardized, and easy access to audiovisual material**.

The long-term perspective is for a content-based accessibility of audiovisual material to be achieved in standardized environments for users to be able to participate in an interactive and collective enhancement of objects, thus maximizing their value individually, but even more so collectively. Resulting networks will be content-based, semantically enhanced and collectively enriched by creators and users, thus going beyond mere collections of audiovisual objects as we see them today in that they provide for a customized user experience.

1.1.2 Technological objectives in ASIMOV

In order to achieve the above-mentioned goals, ASIMOV will focus on the following technological objectives and activities:

1. To consolidate, integrate, and upgrade technologies, standards, tools etc. that have been developed in European projects and elsewhere in recent years, especially with regard to automated and semantic metadata production;
2. To expand their scope of services with innovative developments in the range of:

2.1 Audiovisual data analysis;

2.2 Isochronous metadata annotation;

2.3 Semantic Multimedia Retrieval;

2.4 Standardization;

2.5 Interface Design and Visualization;

2.6 Identity, privacy, copyright issues and digital rights management;

2.7 Interoperability;

2.8 Long term preservation and accessibility;

2.9 Content Distribution: Mobile settings, devices, networks.

3. To provide an integrative solution to prove its functionality in a variety of use-cases and scenarios, reflecting the multifaceted expectations towards the technology. These use cases are:

3.1 E-learning in academia;

3.2 E-health;

3.3 Interactive TV;

3.4 Historical/political content (archives);

3.5 Corporate e-learning;

3.6 Mobile services.

In detail, ASIMOV will reach the specific objectives mentioned above as follows:

1. Reengineering existing technologies: Recent research efforts and results must be taken into account, especially with regard to the analysis of requirements. ASIMOV therefore will integrate, adapt, customize, and extend existing technologies and tools to automatically enrich audiovisual content to the specific qualities of isochronous multimedia objects. With regard to its multifaceted use cases, ASIMOV will specifically focus on the issues of scalability (e.g., number, size and speed) and usability, but will also have the foremost task of standardizing technologies.

2. Technological developments

2.1 Video and multimedia data analysis: With audiovisual objects (AVO) being the centre of its endeavours, ASIMOV will focus on isochronous metadata annotation. Besides traditional multimedia retrieval technology that evaluates physical properties to determine similarities or to identify and to trace individual objects, the following technologies are deployed to generate additional textual metadata:

- **Intelligent Character Recognition** (ICR) is able to identify rendered text segments within video data. In difference to standard character recognition, in video data text segments are difficult to identify and to recognize, because of video compression artefacts and misalignments of the text.
- **Automated Speech Recognition** (ASR) is deployed to achieve a textual transcript of the audio data within multimedia documents. Here, the challenge lies in the fact that an untrained system has to deal with different speakers and different languages. Keyterm spotting with a predefined vocabulary enables the generation of a reasonable time-based search index.
- **Collaborative Tagging** (CT) enlists the end user for additional manual video and multimedia analysis. Human perception and understanding enables the generation of high quality indexing data on a more complex semantic layer of abstraction than automated procedures.
- **Automated Video Segmentation** (AVS) splits video and multimedia data streams into single, self-contained segments that provide context for annotation data, which results from ICR, ASR, and CT.

2.2 Isochronous metadata annotation has to go beyond today's solutions to open up existing archives of multimedia or video content. Due to the isochronous nature of this data, all metadata annotation has

to be synchronized with the time-dependent origin data to enable content-based and pinpoint access to search results. This includes technical (addressing) as well as standardization issues (MPEG-7). Together, this will lead to an increase in manageability and handling of formerly monolithic entities, thus enabling cross-linking and collective creation of relations between relevant segments. Furthermore, the annotated multimedia objects will then be incorporated in an ontology-based semantic infrastructure to become full-fledged intelligent multimedia objects (IMO).

2.3 Semantic Multimedia Retrieval: By making use of the logical and conceptual dependency structure of the multimedia objects, search results will go beyond the lists of sequentially ordered documents provided by today's search engines. According to the personal preferences and needs of the user a **content-based semantic search** engine will present an overview of interdependent documents related to the requested topic. This enables the user to **arrange customized multimedia documents** that consist of single interrelated segments **according to personal information needs**. In combination with the possibilities of social networking, customized multimedia documents can be shared and exchanged across the community.

The combination of precise metadata with collaborative annotation and semantic search engines based on ontologies will augment audiovisual objects towards intelligent multimedia objects (IMO) for customized usage.

2.4 Standardisation: By subjecting and adapting objects to relevant standards, their value will increase significantly in the context of digital library (Dublin Core, MPEG-7), e-learning (LOM), and archival (DOI) applications. Standardization of copyright and access rights will help overcome obstacles in the distribution of audiovisual content (MPEG-21). ASIMOV will contribute significantly in the area of audiovisual metadata interoperability by bridging the ISO's MPEG standard family with those developed within the W3C Semantic Activity. We will build on previous work in this area (COMM - A Core Ontology for Multimedia) and will continue our existing close cooperation with W3C to ensure global uptake and dissemination. Especially URI-based addressing of spatio-temporal fragments of audiovisual web content will be a key issue for ASIMOV.

2.5 Interface Design and Visualisation: The **user interface** is at the heart of collective and interactive utilization of objects in that it provides all the tools and functionalities to easily edit and enrich audiovisual material. And adequate **interactive visualisation** is necessary to support new generations of search techniques in that the presentation of information will turn from dump to customized compilations. For the user interface design two major aspects pose a challenge. On the one hand user groups (pupils, students, scientists, private customers) and their needs and expectations are increasingly heterogeneous. Therefore, the user interface has to provide different ranges of functionality for searching, editing and annotation tasks and both, user guided and system guided interaction styles. **Adaptive and customisable concepts** need to be evaluated. On the other hand to provide for an ambient utilization of all features and to amplify the goal of customized solutions ASIMOV has to be optimized for the use with different types of devices (e.g., organizers, tablet PCs, smartphones and terminals) in an ubiquitous environment, what requires the development not only of a multi–platform system but also of a **multi–device user interface for multimedia content**.

2.6 Identity, Privacy, Copyright Issues and Digital Rights Management: Searching and providing audiovisual content that is subject to intellectual property issues with sophisticated access restrictions requires advanced and diligent implementations regarding usability as well as accessibility. While restricted material is also being searched, access has only to be granted, if requested credentials (or even payments) are provided. The proposed security architecture addresses human users as well as software agents.

2.7. Interoperability with legacy platforms: Through the SATMODE Application Service platform, ASIMOV will integrate the newly developed intelligent video search and navigation system with SES-Astra's existing linear digital broadcast portfolio. SATMODE Application Service will enable interactive viewers to seamlessly navigate from a wide choice of high-quality Direct-To-Home (DTH) content to more specific and community-oriented Internet audiovisual material and back. Large content producers will focus on high-quality programs appealing to wide audiences, whereas small producers and privates will enrich this basis with specific content that addresses community interests and niche markets. In particular the platform will enable intelligent video search in relation to linear content and

cross-referencing to non-linear content (e.g., you watch linear television, you see the Eiffel Tower and you want to explore other content related to it). Since intelligent audiovisual content search and reproduction will be available on various devices (PC to mobile phones), the usage of IMS (IP Multimedia Subsystem) platform is proposed. ASIMOV specific services (authentication, QoS, DRM) will be accessible by IMS's horizontal control services as external services. Thus, there is a need for achieving a certain defined level of interoperability between two concepts.

2.8. Content Distribution: Mobile settings, devices, networks: Information accessibility from everywhere becomes inevitable. The emergence of intelligent, interactive services (video, mobile access to speech-enabled services, push to talk) is already occurring, and along with it, user's expectations on Quality of Service (QoS) are rising. Features such as personalization, by matching the behavioural characteristics of the user, are already expected by users, and demand for such features will be even higher in the future. Not only do people want to be mobile and achieve seamless integration of the applications they are using, but they also want to utilize additional features that the devices might have (e.g. GPS). Users will want to be able to perform searches from their mobile phones or from their enhanced set-top-boxes, with the same quality of experience as they get from their desktop PCs.
In the future users will expect even higher availability of different types of services from everywhere.

- ASIMOV will analyze special requirements that are needed by particular terminal types such as display capabilities, bandwidth, processing capabilities;
- ASIMOV will propose standardization of the delivery component, if possible by using already existing standards, such as IMS;
- special care will be taken to utilize special features that are available on some devices (GPS, speech recognition, video acceleration, etc…).

3. Use Cases

3.1. E-learning: Universities across the globe are investing heavily to record lectures following the examples being set by Berkeley on YouTube, MIT's Open Course Ware and a number of American universities on iTunes U. However, the mere collection of recorded lectures fails to capture the total intellectual value of these academic assets. With the technologies to be developed in ASIMOV, universities will have the tools to open and unfold these assets by creating - and subsequently providing **- an academic knowledge pool that will be useful for - and advanced by - teachers, students, peers, and the general public**.
To achieve this environment, universities will have to:

- provide the domain-related ontologies to endorse the indexation;
- develop a didactical framework for the integration of intelligent multimedia objects into an interactive learning process;
- show the effectiveness of these scenarios.

3.2 E-Health: The aim of a healthcare institution is to promote within the population a health culture, by teaching behaviours that can contribute towards reducing illness risks; or spontaneously introducing a patient, whose symptoms can strongly influence the lifestyle of others. New technologies for multimedia contents development offer the possibility of an independent access to the available learning contents, anywhere and anytime. The health education topic concerns the whole population across all ages: an appropriate design of the message to be transferred and its translation into a language widely diffused and easy to be understood by the population is a reachable objective to encourage correct behaviours in adverse events and a healthy way of life. The use of digital video for teaching about health and sanitary education for the population is a modern solution in this sector. Some key players in this sector have already invested time and resources in defining formats and developing quality content to be shared within the sector. **The ASIMOV approach will assist and empower the investments, by offering the full set of advanced features to the services**. In addition, due to the current status of the ongoing process it will be possible to define and validate format and content standards more suitable for future developments. Rich isochronous metadata annotations, together with voice recognition and intelligent video segmentation, will empower healthcare video recordings.

Each digital video contains basic information about correct acts to perform in case of adverse events (road accident, home accident, heart pain, etc), or to promote a healthy life. A similar approach can be

used both for paramedic and administrative personnel working within the healthcare institution in order to provide not only medical information but even general background information (e.g. privacy policies, personal training, lifelong learning, pandemics, etc). The use of service oriented ontologies will ensure the availability of a powerful tool in order to support both doctors and paramedic personnel in their everyday activities. Sharing content is another of the useful objectives, in order to guarantee the economic sustainability of the initiative; this is the reason why the creation of **an ad hoc consortium for digital content sharing between healthcare institutions will be driven by ASIMOV**.

To achieve this objective, healthcare institutions will have to:

- provide the domain-related ontologies to endorse the indexation;
- develop a didactical framework (format) for the integration of intelligent multimedia objects into an interactive learning process addressing different user requirements;
- design and enable a specific "interaction model" in order to ensure the integration of the multimedia courses in the traditional workflow. This will mainly apply to internal courses and the way to enjoy them as part of the personnel.

3.3. Interactive TV: As a part of the Interactive TV (iTV) user scenario SES-Astra will focus on providing the necessary link between content available through ASIMOV platform and traditional linear content. The specific of the iTV environments including the limited user input mechanisms (remote control vs. keyboard) and specific display rendering capabilities will be assessed in an effort to provide the encompassing ASIMOV experience in a specific iTV environment.
User interaction in the context of iTV environment allows for individual user identification. This provides the necessary elements (identification, authentication, presence, location, etc.) for the inclusion of automated and user selectable feedback regarding the contextual search together with the personalization capabilities.
The commercial elements will be assessed through the implementation of a multiple provider Video-on-Demand (VoD) syndication service. This service will be based on an **ASIMOV enabled platform** that provides access to different providers of the non-linear content. **The service will use the power of ASIMOV contextual search and indexing with the combination of advanced iTV technology for VoD services.**

3.4 Historical/Political Content: To provide a user-friendly research and working environment for different user groups is a major challenge for historical digital audiovisual archives. On one hand, the search options that the archives offer, should allow the users to find specific audiovisual material (segments or complete audios/videos) for their special research purposes; on the other hand, the possibilities to 'work' with the audiovisual search results (e.g. through annotation, enrichment) should be extended in order to facilitate the research process and to support researchers, teachers, students, pupils, etc. to publish, to present and share their work with others.
Nowadays, **autonomous and cooperative working plays an important role in research and university or school teaching**. For supporting autonomous and cooperative working within historical digital audio-visual archives, the following features are necessary:

- easy access to source material, work results and learning materials through metadata;
- shared access to research and results;
- to be able to create results cooperatively in a group;
- to (re)combine results, furnished with annotations or enriched with further materials;
- to provide results for other users or user groups and make them available with search functions;
- to create one's own research and collect results with the help of a personalized access, and to access the results afterwards;
- to enable users to collect and combine results and make them available in presentations.

3.5 Corporate E-Learning: Building and using knowledge pools is a competitive advantage for any company. As is the case for universities, the intellectual effort put into digital (multimedia) objects may be lost if these are not captured, stored, and handled intelligently, whether these are recordings, patients´ records, dossiers, whitepapers or presentations. **The collaborative semantic annotation, ontology-based search and customized access that ASIMOV is proposing will benefit anyone looking for access to knowledge**. In designing E-Learning programs, videos are the most expensive media and were thus used only sparsely in the past. Due to the lowering of costs in the acquisition of graphic material, a multitude of such material is available today. Therefore video recordings of events,

lectures, or video pictures of special incidences recorded by video-ready mobile phones or video cameras are now almost indefinitely at our disposal. The use of such material for the purpose of studying or learning is - among other issues - dependent on the following factors:

- technical quality;
- quality of the content;
- rights;
- availability, access;
- didactic integration;
- content engineering.

These factors will be assessed and evaluated, according to their application purpose, the manufacturer's or producer's role, the addressed target group or users, as well as the desired didactic objective. The effect of these factors in light of the application of ASIMOV is to be considered within the development of the user scenarios and user requirements. ASIMOV results will be compatible with the "SCORM E-Learning Standard". SCORM, today's E-Learning standard, is a collection of specifications adapted from multiple sources to provide a comprehensive suite of E-Learning capabilities that enable interoperability, accessibility, and reusability of Web-based learning content.

3.6 Mobile Services: Mobile Services today are required to work on a multitude of different devices. This diversity demands that services must operate on mobile devices with different physical characteristics such as display sizes, processing power and available memory, and also be able to accept voice commands instead of inputs via a tactile interface. The integration of location and context awareness in the mobile device application but also intelligent searching and tagging algorithms for fast information retrieval on the server side are imperative for a new generation of appealing services. In the framework of ASIMOV, these services are situated in the mobile TV domain, in particular two-way mobile TV. This two-way feature allows the user to become actively involved in the content selection for consumption but also in the content contribution. In conjunction with an advanced services platform, a new way to access and present multimedia content will be developed. **At the centre of the service is the user** and not the technology. The technology will and shall remain only the mean for users to achieve their goals and objectives.

1.1.3 Addressing the Objectives of the FP7-ICT-2007-4.4 Call

The following paragraphs demonstrate how ASIMOV is perfectly in-line with the FP7-ICT-2007-4.4 call objectives.

Call Objective 1: Advanced authoring environments for the creation of novel forms of interactive and expressive content enabling multimodal experimentation and non-linear story-telling. These environments will ease content sharing and remixing, also by non-expert users, by automatically tagging content with semantic metadata and by using open standards to store it in networked repositories supporting symbolic and similarity-based indexing and search capabilities, for all content types.

How ASIMOV addresses Objective 1: With the use case of cultural-historic content, ASIMOV will demonstrate how technologies applied to audiovisual content will enable divers (students, pupils, researchers), but generally inexperienced users to work with large numbers and volumes of video entities, with "work" going beyond searching & finding: The goal is for users to (have the opportunity to) enrich the content for generations to come.

Call Objective 2: Collaborative automated workflow environments to manage the lifecycle of novel and legacy media and enterprise content assets, from the acquisition of reference materials to the versioning, packaging and repurposing of complex products, including their linguistic and cultural adaptation to target markets and user groups. Empirical results from the psychology of human perception and attention will be used to identify salient multimedia segments and apply summarisation and encoding schemes that will improve content storage and transmission without affecting its perceptual properties.

How ASIMOV addresses Objective 2: ASIMOV will develop search and (re)distribution technology to identify and provide access to media content assets. Automated content analysis techniques are combined with collaboration tools for semantic indexing, annotation and retrieval of multilingual media assets. ASIMOV directly leverages user behaviour and contextual information to improve indexing, retrieval and (re)distribution of multimedia content, starting from active user interaction with media assets to social collaboration among users on media assets made available via ASIMOV. The repurposing of the content is one of the biggest challenges for the processing of the existing video content. Repurposing includes both slicing and splicing of the existing video content as well as transcoding it to be available on different delivery mechanisms. This project will address both contextual video repurposing and multi channel delivery. ASIMOV will develop methods and technology that will enable "auto-indexing" of the content thus allowing easier adaptation and usage of video content in specific linguistic, cultural or target user communities.

Call Objective 3: Architectures and technologies for personalised distribution, presentation and consumption of self-aware, adaptive content. Detecting and exploiting emergent ambient intelligence they will use features embedded in content objects and rendering equipment to enable dynamic device adaptation, immersive multimodal experiences and contextual support of user goals and linguistic preferences. Privacy preserving learning algorithms will analyse user interactions with devices and other users so as to update and effectively serve those goals and preferences.

How ASIMOV addresses Objective 3: ASIMOV will develop adaptive systems that enable personalized consumption and redistribution of multimedia data. Ambient Intelligence is addressed by providing self-aware, multi-modal semantically enriched multimedia content that adapts to available device environments. The previous knowledge, the experience of the user is semantically modelled and continuously adapted by monitoring user interactions to enable personalized media access according to the user's individual information needs.

Call Objective 4: Actions geared towards community building, intended to stimulate cross-disciplinary approaches and a more effective user/supplier dialogue, and other measures, including field validation and standards, aimed at a faster uptake of research results. Usability and technology assessment studies, economic analyses and roadmaps to chart the democratisation of personal and community based multimedia production and management tools.

How ASIMOV addresses Objective 4: A key components in ASIMOV is the use of standards for the communication between the various elements of the value chain. The Internet standards clearly help to better integrate multimedia products in the broadcasting and user domains. In ASIMOV, the integration of collaborative information is integrated by relying on Internet standards at each stage of the life of the audio-visual object. In this project research results are really confronted to real video application with the objective to reach an industrialization process. The Internet standards act here as a glue to integrate research prototype with legacy video technologies. As the evolution and innovation must be continuous the project scenarios will provide a test ground for the integration between user, research and industries.

Call Objective 5: Semantic foundations: probabilistic, temporal and modal modelling and approximate reasoning through objective-driven research moving beyond current formalisms. Theoretical results will be matched by robust and scalable reference implementations. Usability and performance will be tested through large scale ontology mediated Web integration of heterogeneous, evolving and noisy or inconsistent data sources ranging from distributed multimedia repositories to data streams originating from ambient devices and sensors, supporting real time resolution of massive numbers of queries and the induction of scientific hypotheses or other forms of learning.

How ASIMOV addresses Objective 5: ASIMOV will address interoperability of audiovisual Web applications by contributing the development of an open metadata platform for temporal media. The Web-based platform will be ontology-mediated, based on Web-based standards and build upon previous work on bridging W3C and MPEG-7 related standards, which resulted in the core ontology for multimedia COMM[2]. Dissemination and standardization work will be in close cooperation with

[2] http://comm.semanticweb.org/. COMM was developed as part of the K-Space NoE and the X-Media IP.

upcoming W3C activities in this area[3] and address spatio-temporal addressing of audiovisual content fragments on the Web, metadata integration and media-specific metadata vocabulary.

Call Objective 6: Advanced knowledge management systems for information-bound organisations and communities, capable of extracting actionable meaning from structured and unstructured information and social interaction patterns, and of making it available for activities ranging from information search through conceptual mapping to decision making. Such systems will exploit semantics embedded in multimedia objects, data streams and ICT-based processes, and rely on formal policies to manage user access as well as audit trails in support of dynamic virtual organisations. Research advances will be embedded within end-to-end systems using computer-tractable knowledge in support of dynamic data and application integration, automation and interoperation of business processes, automated diagnosis and problem-solving in a variety of domains. Robustness, scalability and flexibility will be tested in real-life settings, together with interworking with legacy systems.

How ASIMOV addresses Objective 6: ASIMOV will develop systems for the management of audiovisual knowledge by supporting semantic search and annotation in rich and heterogeneous video collections. ASIMOV will extend the current state of the art[4] to supporting temporal media and collaborative annotation and tagging models, combining both human annotation and automatic content analysis. Low-barrier user interfaces prototypes for high quality tagging and ontology-based video annotation will be designed and evaluated in extensive field studies.

In general, ASIMOV is very much aware of the overall challenges of the ICT Work Programme in that it tackles the exploding number of audiovisual objects and provides the technologies and tools to channel the plethora, by combining content-related technologies to open and manage objects with user-centred power of editing and authoring.

1.2 Progress beyond the state-of-the-art

With the two-track approach of technology research and development on one side, and use-cases on the other, the consideration of previous work will follow a matching composition in that:

- relevant technological and scientific developments will be identified, and
- current solutions for the use-cases selected will be exposed.

In both cases, emphasis will be put on the aspects utilizable in ASIMOV, but also on the shortcomings of existing work - without any depreciation of these achievements.

1.2.1 Video and Multimedia Data Analysis

A number of European projects have contributed significantly in this area: **AMI** and **AMIDA**[5], whose technology has now been taken by an SME named Klewel[6], **CIMWOS**[7] dealing with metadata from text, speech, and image and following the MPEG-7 standard.[8], **SAPIR**[9], focussing multimedia objects with a different methodological and technological approach (similarity based search), and **aceMedia**[10], very much focused on visual descriptions of multimedia content, but produced an interesting approach towards a multimedia annotation tools (M-OntoMat-Annotizer). With SAPIR and aceMedia being very much limited to images, they offer only rudimental semantic analytic technologies; CIMWOS was evaluated by UASNW for its speech retrieval component and could be a point of reference for later developments in this domain. Klewel's features turn out to be limited in comparison to our own

[3] http://www.w3.org/2007/08/video/report.html.
[4] http://e-culture.multimedian.nl/news/iswc2006-press-release.html.
[5] http://www.amiproject.org/
[6] http://www.klewel.ch.
[7] http://www.xanthi.ilsp.gr/cimwos/default.htm
[8] Chang et al. 2001
[9] https://sysrun.haifa.il.ibm.com/sapir/tech_obj.html
[10] http://www.acemedia.org

achievements as consortium's partners have considerable experience in this field: **FSU** has developed YOVISTO[11], which provides automated annotation of recorded audiovisual content based on synchronization with auxiliary text-based sources (slides etc.).[12] **ETH** has integrated FSU's solution in its REPLAY project[13] as it considers YOVISTO technologies among the most advanced in this area. **HPI** has developed an automated lecture recording system (tele-TASK[14]) as well as a natural language processing (NLP) based approach for simple automated annotation of audiovisual recordings[15]; **UASNW** used NLP-tools on recorded videoconferencing meetings as a knowledge pool.

1.2.2 Isochronous Metadata Annotation

FSU Jena has developed a prototype for the synchronized collaborative annotation of audiovisual recordings that allows the synchronization of plain tags with audiovisual content to enable a content-based search.[16] ASIMOV's collaborative annotation facilities provide not only simple tagging of resources, but tags can be defined on different levels of semantic complexity, ranging from plain strings (as today) to time-dependent hypermedia documents and ontologies. Audiovisual content is not only annotated as a whole, but the tagging information is chronologically synchronized.

Synchronizing metadata with time-dependent multimedia data assumes segmentation of the time dependent data. Segmentation has to be considered in two dimensions: spatial and temporal. A number of European projects have contributed in this area:

- **MUSCLE**[17] Network of Excellence (Multimedia Understanding through Semantics, Computation, and Learning) is focussed on multimedia understanding and machine learning and includes tools for (semi-)automated video segmentation and object tracking.
- **REVEAL THIS**[18] is an EU-FP6 funded project on video and autio retrieval with the focus on utilization by the home user. The project included cross-media decision mechanisms for video segmentation, video indexing, video categorization and multimedia summarization.

Beyond video segmentation, as being addressed in MUSCLE and REVEAL THIS, **ASIMOV combines automated temporal segmentation of time-dependent multimedia data on different levels of abstraction with metadata annotation**, ranging from simple intersection point detection to the aggregation of coherent sequences, to enable individually customized media consumption. Temporal and spatial segmentation is endorsed by standardization of spatio-temporal addressing of time-dependent multimedia data based on fragment identification in close coordination with W3C. Social networking information in connection with semantically rich synchronized annotation enables cross-link detection, similarity-based search, and automated recommendations. Consortium's partners have considerable experience in this field: FSU has developed the academic video search engine YOVISTO, which provides automated annotation of recorded audiovisual content being synchronized with user-provided tags, comments, and discussions as well as with social networking information[19].

1.2.3 Semantic Multimedia Retrieval

To derive semantic annotation from collaborative metadata, tags and user comments have to be mapped to appropriate domain ontologies by making use of related task ontologies and supportive lexical resources (e.g. **WordNet**[20]). HPI has developed a prototype for manual semantic annotation of objects[21], which serves as a perfect basis for further development incorporating the results achieved by

[11] http://www.yovisto.com/
[12] Sack/Waitelonis 2006a
[13] http://www.replay.ethz.ch.
[14] http://www.tele-task.de/
[15] Repp/Meinel 2006
[16] Sack/Waitelonis 2006b
[17] http://www.muscle-noe.org/
[18] http://www.reveal-this.org/
[19] Sack/Waitelonis 2006a
[20] http://wordnet.princeton.edu/; Felbaum 1998
[21] Linckels et al. 2007; Linckels et al. 2006; Karam et al. 2007

NPBibSearch[22], a prototype semantic search engine for bibliographic search developed at FSU Jena. **Time-dependent semantically rich annotation of audiovisual content, as proposed in the ASIMOV project** (i.e. based on collaboration and automation) **does not currently exist**. By providing access to semantically annotated multimedia objects by means of a web-based search engine infrastructure ASIMOV provides a significant contribution to the emerging semantic web[23].

1.2.4 Standardisation

Compliance with acknowledged standards marks a significant step towards more accessible multimedia objects. However, no project has yet addressed the question of automatically as well as collectively meta-dating *and* standardizing multimedia recordings. ASIMOV will contribute significantly in the area of audiovisual metadata interoperability by bridging the ISO's MPEG standard family with those developed within the W3C Semantic Activity. We will build on previous work in this area (COMM - A Core Ontology for Multimedia) and will continue our existing close cooperation with W3C to ensure global uptake and dissemination. Especially URI-based addressing of spatio-temporal fragments of audiovisual web content will be a key issue for ASIMOV. Technological advancements in this area will also require development of consensus among the key vendors in the Web arena.

1.2.5 Visualisation and User Interface Design

In general ASIMOV provides for existing standards and guidelines in information visualization and user interface design. There are defined standards for 2D and 3D user interface design (Microsoft 2008) (Bowman 2005). Standards in ergonomics and human factors e.g. for multimedia interfaces are described in (Karwowski 2006). In the field of Information Visualization there are guidelines defined by Bertin (1967), Card et al. (1999), Spence (2006) and Chen (2004). Interactive visualizations have turned out to be a promising approach for complex and multi–variate data sets. Luo et al. (2006) describe different styles of ontology visualization for interactive video access. Nevertheless, these 2D and 2.5D visualizations are limited especially for presenting large sets of data and their semantical interrelation, especially for their use with multi–device interfaces.

The interplay of different types of technical settings and i/o devices (see 1.2.9), and the integration of Virtual Reality has great influence on the user interface design. Eason (1991) recommended to include the socio-technical system into the design of user interfaces. His three level model shows which factors affect human-computer interaction. And Doulis (2004) describes, that for the design of such user interfaces, it is increasingly important that the aspect of spatial context is taken into consideration to a greater extent than currently done.

There has been work done in the field of multi–platform and multi–device user interfaces (Oliveira and Rocha 2006). With *amalgamation* Doulis and Simon (2005) describe the interdependent connection between physical environment, input and output devices, interaction technique and representation in Virtual Environments. And with SpereViz (Soldati et al. 2007) have presented a 3D user interface for the visual exploration of multi–dimensional data sets in Virtual Reality, which we will build on in the ASIMOV project.

Although these works are quiet away from describing standards, they turn out that we have to break new ground for this broader approach in user interface design.

1.2.6 Identity, Privacy, Copyright Issues and DRM

The SATMODE Application Service platform, that will host ASIMOV's newly developed services, identifies subscribers by the terminal through which they are connected. This can be a SAT3PLAY terminal, DSL-enabled IPTV set-top-box or GPRS/UMTS enabled mobile phone. Information such as terminal connection time and traffic are kept private and secured on the SATMODE HUB for a limited period of time, in full compliance with European data protection laws. A single subscription can be shared by multiple users (e.g., a family) or can be strictly individual, depending on the application and privacy needs. Each user accesses SATMODE services and applications either anonymously or through

[22] http://www.osotis.com:8080/NPBibSearch/; Sack 2005; Sack et al. 2006
[23] Berners-Lee et al. 2001

their personal online identity. Some services do require user authentication (such as for online payment). Online identity is secured and centralized, implying individuals authenticate once per session and do not need to re-authenticate with each service provider. Access to online identity information by service providers and other community users is controlled and subject to user's authorization, in full compliance with European data protection laws. The user's ability to interact with content is subject to content rights. These rights are managed and enforced by the SATMODE Application Service platform. The actual content can be protected using the commercially available CAS or DRM systems allowing integration with existing broadcasting and content platforms. The platform controls the user's (and other provider's) ability to annotate, index, search and visualize content. Such control can be either generalized or tailored to the individual user, allowing content providers to monetize the additional interactivity granted to premium customers.

1.2.7 Interoperability

In the context of this proposal SES-Astra envisages to integrate the newly developed intelligent video search and navigation system with its existing linear digital content portfolio through the SATMODE Application Service platform. The SATMODE Application Service will enable interactive viewers to seamlessly navigate from a wide choice of high-quality DTH content to more specific and community-oriented Internet audiovisual material and back.

ASIMOV provides an opportunity for new business models to emerge that are compatible with the established TV industry as well as emerging Internet trends. Interactive community-developed content complements rather than compete with existing markets. This provides the foundation for the development of interactive services, reduces the negative economic and social impact of a cathartic transition from classic linear broadcasting to interactive multimedia services and encourages market leaders to adopt and endorse new technology standards.

As the ASIMOV project targets various set of devices, from desktop PCs to mobile phones, the use of IMS[24] (IP Multimedia Subsystem) concept to accomplish successful interactivity in this environment is proposed. IMS is a whole new way to deliver multimedia (voice, video, etc.) regardless of the device (mobile phone, fixed-line phone, cable, Internet, etc.) or the access medium (cellular, WiFi, Broadband, fixed-line, etc.) and is changing the way of interactivity with digital world. Its architecture defines a model that separates the services offered by various service providers (mobile, traditional telcos, triple-plays, etc.) from the access networks used to receive those services.

One of our objectives is to develop and integrate the *ASIMOV application module* as a part of the SATMODE Application Server into the service layer of IMS. The purpose of this module would be to act as a bridge between the ASIMOV intelligent audiovisual content exploring and IMS system, thus carrying out the integration and content deliverance between two concepts. All possibilities regarding ASIMOV audiovisual content search/explore/deliverance, defined in this proposal, will be supported by the *ASIMOV application module*. Hence, our vision is to reach the needed level of interoperability between ASIMOV and existing linear TV service model, satellite broadcasting, IPTV and IMS based systems.

1.2.8 Long term preservation and accessibility[25]

People used to believe (and many still do) that digital formats were the ultimate formats for storing information indefinitely. The idea that texts, images, videos and artefacts can be perpetuated by converting them into digital form is popular and widely supported/sponsored. As a result, a significant amount of our "content" or future heritage - our legacy to future generations - relies on digital technology. But is digital technology really suitable for long-term preservation?, and are electronic devices, which are required in order to experience information stored in digital formats, durable enough to guarantee future access to this information? If not, what can we do to overcome this problem?

The rapid evolution of technology makes the preservation of digital content a challenge. Storage media are subject to degradation; they are not designed to survive for long periods of time. In addition, they become obsolete as the devices capable of reading them become outdated. Old formats and standards

[24] E.g. http://www.ericsson.com/solutions/products/hp/Ericsson_IMS__IP_Multimedia_Subsystem__pa.shtml,
[25] http://www.salzburgresearch.at/fbi/digicult

are essentially shelved in favour of newer formats and standards. This even happens for software standards, because ways of coding information and the quality of the information stored are constantly improving. This situation holds for both electronic material that was converted from analogue form (paper, film, video, sound, etc.), and for material that was originally created in electronic form (e.g. digital video).

A comprehensive vision of electronic record management is provided by the US Department of Defense standard entitled the Design Criteria Standard for Electronic Records Management Software Applications (dod 5015.2 STD). In some way close to the previous topic we find mid- and long-term accessibility to digital resources, where accessibility means persistent identification of the digital object. This topic addresses the following issue: how can we create a "robust" reference that points to a digital object? We all know too well that any type of reference or link to a digital object is "fragile" information. Digital objects are often created - without conforming to any "publishing protocol" - and then copied and moved from one website to another. This means that digital references are often unreliable or "fragile". So how can we create robust digital object references? Physical objects are usually traced so that it is easy to find them. Paper-based documents are usually safely and systematically stored in archives or libraries, where they are easily retrieved by using the appropriate inventory. In addition, books, magazines, etc. are identified by information printed in the colophon and by a special code: the ISBN, ISSN, etc. ISBN is a global identification system that uses thirteen digits to identify any book printed on the planet.

Following this approach, the idea of associating a unique alphanumeric code with each digital object was borne. The European Commission eContent framework then converted this idea into reality, resulting in the DOI System[26]. The DOI (Digital Object Identifier) System allows "content objects" to be identified in the digital environment. A DOI® name is assigned to each entity used on the digital network.

1.2.9 Content Distribution: Mobile Settings, devices, networks

Users of ASIMOV need to be able to access the content available to them regardless of the devices (terminals) they choose to use. This implies the need for a unified multi-terminal content distribution system and a powerful and well accepted solution to satisfy it. Such a solution will allow ASIMOV to provide content to its clients via direct connection to various target terminal types. Each terminal type has different resource advantages and limitations. These limitations must be taken into account by content distribution system.

The targeted devices are:

- Desktop computers;
- Mobile phones;
- Set-Top Boxes (TV channels).

User interface across all devices should share a similar "look and feel" and provide the same functionality. As part of the **SATMODE**[27] demonstration platform, Amphinicy has designed and developed instant messaging, gaming and e-payment solutions for MHP-enabled Set Top Boxes as a terminal unit.

Today, most of the commercial solutions for video content distribution are using the advantages of proprietary solutions like **Adobe Flash**[28] and **Microsoft Silverlight**[29]. These solutions work acceptably for desktop computers but they are inefficient on sparse resource terminals.

Some of popular video content providers are:

- **YouTube**[30]: a video sharing website where users can upload, view and share video clips.

[26] www.doi.org

[27] http://telecom.esa.int/telecom/www/object/index.cfm?fobjectid=11843 - SATMODE is a joint program to develop a low-cost, two-way communication channel by satellite for satellite TV users.

[28] http://www.adobe.com

[29] http://www.microsoft.com/silverlight/default.aspx

[30] http://www.youtube.com/

- **Google Video**[31]: a free video sharing and video search engine service from Google that allows anyone to upload video clips to Google's web servers as well as make their own media available free of charge.
- **Joost**[32]: a system for distributing TV shows and other forms of video over the Web using peer-to-peer TV technology.

The telecom market is shifting towards integration solutions that will enable access agnostic availability of services. The most promising solution being IMS[33] (IP Multimedia Subsystem), it enables access to a service from any IMS compliant device. IMS is being standardized by several standardization bodies, where ETSI TISPAN, 3GPP, 3GPP2, OMA and IETF are the most active ones. Development of IMS compliant terminal devices for access to ASIMOV will enrich the range of devices and networks able to access ASIMOV.

1.2.10 Network

Innovation takes place at the edges of the network. The dominance of asymmetric and client-server networks adds more complexity to the edge of the networks. The Edge only exists if you have true end-to-end hosts and networks. The end-to-end model is disappearing from the Internet today as the IP address exhaustion has reached its lowest level with just 16% of IP address space is left as of March 2008. The end-to-end restoration is of paramount importance and will be only achieved with immediate deployment of IPv6, a proven and operational Internet Protocol. IPv6 will enable to have true innovation happening at the edge. Many innovations have been hampered in evolving to a large-scale innovation due to the lack of a fully end-to-end model.

User-empowering technologies and user-driven content are driving the Internet to go beyond where any other network has gone so far. 75% of the Internet traffic is peer-to-peer (P2P), so users have already empowered themselves in using the Internet for what it has been designed for. It is P2P traffic and not client/server traffic that dominates the Internet today. However, it cannot be considered to be a true P2P model until IPv6 is widely deployed. This next Internet innovation will have a greater impact to take the Internet across more sectors that have not yet embraced the Internet. The end-to-end model will allow symmetric and interactive two-way Internet which is vital to the ASIMOV model. Since the address exhaustion is imminent by 2010, ASIMOV is a timely project to support the transition and use of the new IP protocol in this multimedia sector, a sector dominated by proprietary products.

1.2.11 E-learning

As mentioned, academic institutions are intensifying their efforts in lecture recording. At the same time, leading universities are researching in accessibility of these recordings: MIT has launched the Lecture Browser[34], using semi-automated speech recognition to enable search and navigation in lectures. Berkeley is coordinating efforts of the Open Cast community[35], aiming at an integrated webcast solution, but also discussing metadata extraction and annotation issues; smaller initiatives show annotation in practice[36]. However, the overall situation shows no progress towards unlocking objects by opening them for interactive and collective enrichment in standardized ways - this is where **ASIMOV will contribute ground-breaking technology for ETH to realize a convincing use-case**.

1.2.12 E-Health

Healthcare institutions do not take full advantage from the use of recordings and video material already available. We can subdivide such kind of documents in two main branches, on one side the video recordings related to medical imagery (e.g. video endoscopy, etc.) and surgical videos, and on the other side educational interactive videos and recordings addressing the needs of paramedic and administrative personnel or citizens/patients. The first set of recordings has been collected for a long time feeding different projects and applications (e.g., G7 Project CARDIO), nowadays it may be reorganised starting

[31] http://video.google.com/
[32] http://www.joost.com/
[33] http://en.wikipedia.org/wiki/IP_Multimedia_Subsystem
[34] http://web.sls.csail.mit.edu/lectures/.
[35] http://confluence.media.berkeley.edu/confluence/display/WCTREQ/OpenCast+Community-+Home.
[36] http://www.oekonomie-und-bildung.de/2006_e_learning_glanz_und_elend_an_hochschulen.

from a specific healthcare oriented ontology providing the backbone structure in order to help doctors in discovering pathologies and define the proper care. The second set of recordings represents **a new tool-enabled care through popular technology such as Internet appliances, "iPods", smart phones and multimedia players**. On line "pocket" courses or even off line podcasting "pills" may contribute to better health conditions (first aid, road accidents, poisonous bites, etc).

1.2.13 Interactive TV

ASIMOV addresses the technological challenge of making linear television interactive. Enriching existing digital linear content with synchronized automated metadata annotations, is enabling every-day television to become truly interactive. New features are resulting in a more productive interaction between content producers and consumers. The 'push' of broadcast television will find a natural complement in the 'pull' of online services – 'personalized television', whereby the viewer can customize his or her experience, so that it is more relevant to his or her individual interest. By combining the advantages of linear IPTV and Internet Television, **ASIMOV will extend the interactive experience of the Internet to a wider broadcast audience, while making a large portion of the existing high-quality linear content available to the interactive user**. For advertisers, metadata coupled with anonymized user traffic information will allow to better target the viewer's interests, accurately proposing him or her relevant messages or products. New advertising models, combining the wide reach of television with the accountability of online advertisement, will emerge.

1.2.14 Historical/political content

The requirements for future-proofed solutions for historical audio-visual archives are complex and extensive. **The Visual History Archive** is the world's largest historical video archive. With the Archive one can view nearly 52,000 video testimonies and interviews with victims and witnesses of the Holocaust in 32 languages. The catalogue and index system consists of 50.000 key words and index terms. The archive gives direct access to all videos and provides the unique possibility to search for single video-segment. The **Archive „Memories of Forced Labour" contains** about 192 video and 391 audio interviews in 24 different languages. All interviews are transcripted. Because of multilingual audio-visual material with a wide range of languages both archives are of European and international interest. The archives contain reams of audio-visual objects, which are important for research and teaching as well as for the remembrance cultures of regions, countries or e.g. the European continent. But still the access to archive material and the possibilities to search and work within the archives could be enhanced in terms of usability (e.g. enhancement of search possibilities, multilingual user-interface, user-generated content). Therefore it is necessary to develop technological solutions for a user-friendly searching and working environment in order to meet the requirements of different user groups such as researchers, teachers, students, pupils, journalists etc.

1.2.15 Corporate e-learning

New economies produce new challenges and new training needs. Traditional ways of training like seminars or workshops are characterized by heavy investment in working hours by the customer. Industry workforces today need new learning paradigms, technologies and standards to help them develop their skills and competencies more effectively and efficiently and support their jobs at the pace made necessary by today's global challenges. Updating the knowledge & skills of employees is as equally important for a company as updating its equipment & technology, in order to remain efficient, competitive and profitable. Effective training is an investment in an organization's most valuable resource – its human resources. The adoption of innovative training methodologies, technologies and standards is becoming "essential" for those international organisations needing to compete and survive in today's knowledge society.

1.2.16 Mobile services

Today, the state of the art in the realm of mobile services it mostly dominated by different solutions for content distribution platforms. Following the Service Oriented Architecture (SOA) paradigm, platforms have been implemented using the Web Service or Agent Technology. Lot's of efforts went into solving issues such as service relocation, service description and discovery, and service composition. Also user

profiling, context awareness but also adaptive services, which adjust the content representation to the characteristics of the mobile device have been researched. Tremendous efforts have been dedicated to the study of existing and new protocols dealing better with the ad-hoc nature of the mobile network and their services. Interestingly there is an increase in research in the area of sociology. This stream analyses the sociological impact of services on the user, but also which services are interesting to for a user. This is in line with a general observation that social software, better known under its old-fashioned name "groupware", it gaining more momentum. While recording and uploading clips with mobile devices is commonly used today, the streaming video services are not yet widely accepted. Interestingly, services such as podcasts or mobisodes (mobile episodes: short clips of ~1-3 min take from TV episodes and enriched with un-shown material) are attracting more and more users.

1.3 S/T methodology and associated work plan

Overall approach to the implementation planning

Professional project management requires that a project structure is implemented, which provides transparency and unambiguous identification of tasks and responsibilities. The table below lists the allocation of partners per WP and Task.

	ASIMOV	**Partners**
WP1	**Project Management**	**SES**
T1.1	Establishing the project management procedures	Martel
T1.2	Performing the project management duties	SES, Martel
WP2	**Requirements Analysis**	**FSU**
T2.1	Recognition of the state-of-the-art	FSU, CWI, FUB
T2.2	Specific analytical techniques	FSU
T2.3	Interoperability with legacy platforms	SES, AMP
T2.4	Socio-economics	UL
T2.5	Scenarios (inc. requirements)	SES
T2.5.1	E-learning for education	ETH, FUB
T2.5.2	E-health	POLIMI
T2.5.3	Interactive TV	SES
T2.5.4	Historical/political content	FUB
T2.5.5	Corporate e-learning	MCCM, TI
T2.5.6	Mobile services (2-way TV)	SES, AMP
WP3	**Technology Architecture & Development**	**HPI**
T3.1	Video annotation, video metadata	CWI, FSU, ETH, HPI, AMP, FUB
T3.2	Addressing	CWI
T3.3	Analytical Filtering	FSU, HPI
T3.4	Collaborative Filtering	SES
T3.5	Multi-lingual aspects and Natural Language Processing	UASNW, ETH, FUB
T3.6	Visualization (presentation – user interface)	UASNW, FUB
T3.7	Video searching	FSU, HPI, CWI, AMP, ETH
T3.8	Identity, privacy, copyright, DRM	UL, FUB
T3.9	Content distribution (multi-terminals)	AMP
T3.10	Interoperability with legacy platforms	SES
T3.11	External Interface Integration and Content Syndication	UZ

T.3.12	Network & end-user security	UL, HPI
WP4	**User Scenario Trials & Documentation**	**POLIMI**
T4.1	Integrated Trials/Validation and Verification per scenario	POLIMI
T4.1.1	E-learning for academia	ETH
T4.1.2	E-health	POLIMI
T4.1.3	Interactive TV	SES, AMP
T4.1.4	Historical/political content	FUB
T4.1.5	Corporate e-learning	MCCM, TI
T4.1.6	Mobile services (2-way TV)	SES, AMP
T4.2	Integrated Demonstration	POLIMI, TI
T4.2.1	Life documentation	POLIMI, TI
T4.2.2	Online demonstration	POLIMI, TI
WP5	**Training**	**FUB**
T5.1	Training on the technology platform	FUB, UL
T5.2	Training user communities	FUB, UL
WP6	**Standardisation, Dissemination & Exploitation**	**UL**
T6.1	Standards	CWI
T6.2	Facilitative workshops and focus groups	CWI, UL
T6.3	DUP: Dissemination & Use Plan	UL
T6.4	Business planning for commercial exploitation	SES

Figure 1: Allocation of Partners per WP and Task

The overall management responsibility of the Consortium is assigned to WP1 of which SES is in charge (with assistance from Martel). Clear responsibilities are assigned to the leaders of WP2 through WP6 and the related tasks and sub-tasks. The responsibility of overall project implementation and status control is assigned to WP1 and the leaders of WP2 through WP6 are responsible for implementation and status control of all related tasks and sub-tasks. Further details are described in Section 2. As the detailed descriptions of each WP are contained in the WP charts later in this section, only a short introduction to each WP is given here.

1.3.1 WP1. Project Management

SES-Astra will perform the overall project management of the ASIMOV consortium. Mr. Alan Kuresevic is the Project Manager and is responsible for the management of the entire ASIMOV project. Since, as an IP, the ASIMOV project is large and relatively complex, SES-Astra will be supported by an organisation (Martel) that has specialised in the professional day-to-day management of EC projects for the past 20 years. Major functions and responsibilities of the overall ASIMOV project management are:

1. Performance monitoring and control of all tasks. Overall performance control will be performed on the basis of detailed WP descriptions by comparing the actual achievements with the Description of Work. Martel will analyze the reported status from the consortia members and provide the appropriate reports to the EC.
2. Coordination of interfaces between WPs. The Project Manager coordinates and controls the interfaces between the WPs.
3. Schedule planning and status control of all WPs ensuring the timely delivery of the results (milestones and deliverables). Each WP responsible of the consortia is required to conduct schedule planning and control, which includes control of items to be delivered. For any predicted delay a recovery action shall be identified in order to maintain overall schedule control.

4. Documentation and configuration control including change management. Martel will perform overall documentation and configuration control; submission of documents including technical and/or contractual changes.
5. Resource and finance control of the entire project. Each partner is required to control and report their manpower and other expenditures status which will be analysed by the Project Manager and Martel.
6. Risk identification and mitigation control. The Project Manager and WP Leaders shall identify all actual and potential risk areas and assign mitigation actions.
7. Meeting and conference coordination. In close cooperation with the partners, the Project Manager shall call for meetings and conferences required for the project.
8. The Project Manager is responsible for overall information exchange between members of the consortia and between the project and the EC. The Project Manager shall submit MPRs and QPRs to the project officer of the EC.

This WP comprises 2 tasks:

T1.1. Establishing the project management procedures: In this task we remind partners of the scheduling, resource allocation, responsibilities, etc., and perform the kick-off activities covering contractual and administrative issues, establishing of payment procedures, organisation of the kick-off meeting, e-mail lists, etc. During the kick-off meeting the organisation of the project structure will be finalised, including the managing bodies, i.e., the General Assembly and Technical Management Committee.

T1.2. Performing the project management duties: In this task the overall project management activities are performed. Details of the applicable management procedures are contained in Section 2.1.

1.3.2 WP2. Requirements Analysis

As new forms of interactive usage of digital audiovisual content arise, existing repositories have to open up in order to fulfil individual information needs as well as the production of new content has to include the generation of metadata on different levels of semantic abstraction. To enable customized and target-oriented access depends on the individual context of each use case. Nevertheless, all projected use cases share the concept of semantically annotated multimedia data to facilitate the emergence of **Intelligent Multimedia Objects (IMO)**. Due to the nature of audiovisual content, semantic metadata has to be timely synchronized, thus demanding the possibility of temporal as well as spatial identification and addressing of single coherent data fragments. Creators and owners of audio-visual content, in the process of commercialising their work, depend on the ability to discover, to list, and to compare this content. Likewise, for the end user, the ability to find the most applicable audio-visual content in their sphere of interest is probably their predominant selection criteria.

The point of origin for the projected requirements analysis will be the **recognition of state-of-the-art** for the creation of intelligent multimedia objects. Current methodologies still have deficiencies in two dimensions: On the one hand, access to the actual content and its authoring is restricted to selected settings, where content is being produced or processed with explicit regard to this requisite. Thus, solutions are self-contained in that they ask for proprietary systems, devices, technologies, or software to be used. On the other hand, temporal and spatial dimension of audiovisual objects is not yet unfolded towards the users' end.

To open up audiovisual content to become fully-fledged intelligent multimedia objects, appropriate semantically enriched metadata has to be provided for and synchronized with this content. ASIMOV will deploy **specific automated analytical techniques** to gain relevant metadata and endorse this metadata with user-provided and collaboratively obtained metadata. Due to this combination, metadata on different levels of abstraction and for different levels of media coherence can be obtained.

The large number of projected use cases also includes various different devices for media access, ranging from mobile cell phones with internet access over video home theatre to desktop personal computers. Besides appropriate visualization of media content or search results, to enable **interoperability with legacy platforms**, different device capabilities with regard to display facilities, infrastructure, or computing power have to be considered.

Requirement analysis also comprises **socio-economic studies** to evaluate the effects of widespread use of audio-visual search and discovery on underlying networks and services including mobile communication and infrastructure, the analysis of policy and measures on global metadata protocols with innovative discovery characteristics, the explanation of social aspects of a user's quality of experience, which reflects its degree of satisfaction with the quality of the system's response, as well as the clarification of future economic trends in video communication services.

WP2 comprises 5 tasks in total, with the scenarios described in T2.5.

T2.1. Recognition of the state-of-the-art: In this task all partners in the WP address recognition of the state-of-the-art for Collaborative Requirements Determination, Technology Progress Monitoring and its impact on Collaborative Requirements Determination. Monitor the progresses in the technology and see how they affect the project domain and consequently the requirements being gathered. Industry based use cases will be developed and alternative scenarios for search engines will be created. Also this task will explicitly address social / economical impact of the ASIMOV using empirical research methods. FUB will do research in the field of search solutions, use of metadata standards in historical digital audio-visual archives, use of transcripts, actual enrichment features (annotation, tagging, linking with other multi-media objects), actual publishing possibilities.

T2.2 Specific analytical techniques: FSU and all partners responsible for projected scenarios will apply specific analytical techniques involving numerous iterations to Resolve Conflict Classify, and Prioritise the Use Requirements, T2.1. Produce a System Requirements Specification (SRS) Document the format of which will follow some standards such as Volere Edition 8 and/or IEEE URC.

T2.3 Interoperability with legacy platforms: SES and AMP will analyze requirements for the interoperability of standard MPEG-2-encoded DVB linear programs with state-of-the-art interactive-TV and Internet-TV content. Investigate scenarios for the production, deployment, transmission and consumption of interactive-TV content that can complement and integrate existing linear digital programs. Analyze requirements for the integration of existing IPTV services and content with the audio-visual discovery services to be developed by this proposal. Investigate use-cases for the annotation, indexing, addressing and search of existing linear digital content using the technologies described by this proposal. Analyze requirements for the interoperability of the to-be-developed audio-visual discovery services with open standards supported by the SATMODE Application Service, such as MHP (Multimedia Home Platform) and IMS (IP Multimedia Subsystem). Explore business and accounting models that will support and monetize the development and maintenance of the additional infrastructure required to operate the newly introduced services.

T2.4 Socio-economics

T2.4.1 elucidates of social aspects of a user's quality of experience (QoE), which reflects its degree of satisfaction in accordance to quality of service (QoS) provided by the network and the search/discovery experience.

T2.4.2 looks at Mapping and adapting requirements of societal communities to communication services and infrastructure.

T2.5 Scenarios: The objectives of scenarios developed in this work package are threefold:

1. mapping of technology developed in this project to real-life commercial user scenarios
2. technology validation and end-to-end testing of the project deliverables
3. validation of targeted outcomes as defined in FP7-ICT-2007-4.4

ASIMOV will define the six distinct user scenarios as defined below. Each of the user scenario will address the specific objectives, while combined they will provide a mean to address all objectives as defined above. Besides involvement of the consortium members, the user scenarios will be developed and evaluated by other organisations that will benefit from the outcome of the ASIMOV project. Potential external partners have already been contacted and provided their endorsement for the project.

T2.5.1 E-learning for education: The use case for academia will be related to technology and objects on the one hand, e-learning scenarios on the other. The latter will be taken care of by the NET - Network for Educational Technology at ETH by compiling requirements and expectations from target groups (teachers, students) with respect to the utilization of video in e-learning. The former task is for

Multimedia Services to describe as-is state at ETH. In addition, FUB will evaluate the options of the user-scenario developed by ETH in the FU e-learning framework.

T2.5.2 E-health: POLIMI will carry out the task addressing the recognition of the state-of-the-art of digital services and mapping of existent video and multimedia content in the field of healthcare. This task will include the identification of different technological standards already in use (e.g. Macromedia Flash or Flex), search solutions (e.g. by keyword), use of metadata standards and specific ontologies in digital audio-visual archives, use of transcripts, actual enrichment features (annotation, tagging, linking with other multi-media objects), actual publishing possibilities including IPR and privacy issues. Technology progress monitoring in the specific sector and its impact on the project domain and consequently the requirements is being gathered. This specific task will explicitly address social / economical impact of the ASIMOV using empirical research methods. The deliverable will be an integrated report description of actual solutions in digital audio-visual archives devoted to healthcare institutions.

T2.5.3 Interactive TV: SES will work on the analysis and development of interactive television scenarios with regard to different viewer groups and with respect to the search engines and repositories at the centre of the ASIMOV developments. Feedback will be channelled into the ASIMOV project development. Different possibilities for the cross-linking of inter-media structures and content will be evaluated. User's needs and acceptance of the proposed search and navigation tools will be evaluated. Linear channel versus interactive channel content and personalized television will be defined.

T2.5.4 Historical/political content: FUB will work on scenarios for different use-cases (different user groups, different user scenarios), scenarios for searching, working and publishing environments. The deliverable will be a requirements catalogue for technological solutions for digital audio-visual archives.

T2.5.5 Corporate e-learning: MMCM will analyse the application of videos with the paradigm of learning platforms, as well as informal learning in enterprises. POLIMI will mainly focus on relevant corporate e-learning content and services in healthcare institutions, public administrations and SMEs. The survey will adequately take into account technological standards and infrastructure, workflow and policies. For that the functionality of ASIMOV next to the organizational and creative frame-work and guidelines of enterprises will play essential roles.

T2.5.6 Mobile services (2-way TV): In this task SES and AMP aim at analysis and development of a mobile 2-way TV services scenario taking into account the new features of the service platform. The outcome will be summarized in a report, which is a deliverable of these tasks. In addition a prototype of the mobile application will developed to verify the scenario. Special consideration will be given to the location based and presence services.

1.3.3 WP3. Technology Architecture and Development

This work package is the core of the proposal in that it has to prepare and make available the technologies and tools for the use cases to work with. This calls for coordination in two dimensions: One is the integration of various technological tasks to be fulfilled, the other is for the temporal coordination, especially towards WP4. Audiovisual objects (AVO) in their manifold appearance are very much integrated into our digital life when it comes to their consumption, especially where it is computer- and/or internet-based. If we look at the utilization and manageability of these objects, however, they still are very much different from other objects and formats we have integrated into our digital life: You cannot search them like you search a web page, you will hardly find them on the internet anyway, you cannot edit them the way you edit a Wiki, you can't easily rearrange them the way you do it with text or photos. This WP is about the technologies to change all of this - or most of it, at least.

To open up AVOs in the way depicted above the overall foundation lies in the annotation of multimedia data with isochronous metadata (**video annotation**). This metadata stems from auxiliary data such as data coming from production and distribution of AVOs, classical metadata from archival, additional material from authors and users such as abstracts, notes, comments, user tags as well as web-based content. Further metadata originate directly from the AVOs such as features, characteristics, and encoded text, which can be obtained with the help of special analytical techniques (video data mining, OCR, etc.).

WP3 comprises 11 tasks, which are briefly[37] described here:

T3.1 Video annotation, video metadata: As auxiliary data, we refer to information external to the audiovisual object itself. Due to the multifaceted qualities of the audiovisual material we will be dealing with, this takes very different forms:

- information from the production and distribution of AVO;
- classic metadata (library, archives);
- added material (notes, scripts etc.);
- related web-based content (forum, website etc.);
- collaborative metadata (tags, folksonomies etc.) semantic (ontology-mediated) metadata based on the above categories.

This material is being produced mainly to help manage AVO - but it is not integrated into these in most cases. The task therefore is to find standardized methods and techniques of linking these additional information into a bundle with AVO, with the specific form of this bundle depending on the characteristics of the former: It can either be added to the AVO as a whole (classic) or synchronized with it where the information does relate to time (isochronic).

In essence, the workload will be distributed as follows in this task: CWI will work on innovative and intelligent search paradigms based on meaningful relationships among audiovisual content, and on low-barrier user interfaces for ontology-mediated tagging of Web-based content. FSU and ETH will work on isochronous semantic annotation of multimedia data and on the design of semantic metadata for multimedia. HPI and AMP will implement APIs for manual video data annotation. FUB will work on annotation levels, personnel, group oriented, content driven, context driven, Tagging in video with respect to searching; the deliverable will be methods and specifications for Annotation and Tagging in video based material.

T3.2 Addressing: The Semantic Web family of RDF-related standards provides a rich set of technologies to describe and serialize metadata over de Web. The connection between Web-based metadata units and the fragment of the audiovisual object is, however, still an underdeveloped topic. On the Web, Uniform Resource Identifiers (URIs) are the only building block for making such a connection. Often, particular regions of an image or particular sequences of a video need to be localize and uniquely identified in order to be used as subject or object resource in an RDF annotation. However, the current Web architecture does not provide a means for uniquely identifying sub-parts of media assets, in the same way that the fragment identifier in the URI can refer to part of an HTML or XML document. Actually, for almost all other media types, the semantics of the fragment identifier has not yet been defined or is not commonly accepted. Providing an agreed upon way to localize sub-parts of multimedia objects (e.g. sub-regions of images, temporal sequences of videos or tracking moving objects in space and in time) is fundamental. ASIMOV will work in close cooperation with W3C to develop such a URI scheme in a platform, codec and medium-independent manner. Given such a URI scheme, ASIMOV will develop the required (indirect) metadata addressing schemes develop interoperable descriptions for both RDF-based and MPEG-based metadata applications. CWI will work in close cooperation with W3C on a URI-based scheme for addressing spatio-temporal fragments of audiovisual content on the Web.

T3.3 Analytical Filtering: In summary, this task focuses on working on analytical filter methods to extract textual metadata from video resources. Video data often contain textual messages such as headlines, comments, summaries etc. as part of the encoded video recording. Standard methods such as optical character recognition (OCR) are difficult to apply due to the often noisy video encoding and video compression artefacts. In this task, OCR methods will be adapted to the special requirements for video data to extract textual data as a source for video annotation.

T3.4 Collaborative Filtering: Information overload and increasing interactivity between users and IMOs demand for improved techniques to find, retrieve and (re)use multimedia content. Social collaboration and personalization play a key role to tackle these issues.

The SES Collaborative Filtering Contribution is composed on the following four key elements:

[37] The introductory text to WP3 is by nature longer than rest of the WP introductory texts, which is due to the fact that the most resources are allocated to this central RTD WP that plays a pivotal role at the core of ASIMOV.

- Collaborative filtering (based on collaborative tagging);
- User profiles generation;
- Personalization based on user profiles;
- Multi-dimensional rating and voting mechanisms.

Those four key elements rely on a research prototype platform jointly developed by SES and HPI[38]. The collaborative platform provides tools and interfaces to annotate and rate IMOs using standard Internet technologies. This serves as an excellent basis for further research and development in the ASIMOV context. The contribution will develop technology to collect user data and user feedback and methodologies to analyze and aggregate this data and add/transform it into user profiles and IMOs profiles. This information will be used within the ASIMOV project to improve search and retrieval quality and tailor ASIMOV to individual user needs by adding multi-dimensional rating and voting mechanisms to the collaborative and social aspects.

The four key elements described above are interrelated and highly depend on the research prototype platform of SES and HPI. Previous research and publications in the area of web search personalization and information filtering[39] carried out with said prototype provide valuable theoretical and practical knowledge and will serve as an optimal starting point for the integrating personalized access, search and distribution into ASIMOV. Personalization also plays an important role in the user perception of the "quality" of the overall system. Users perceive the system as a single, unified entity and consider any deficiency or efficiency as being part of the whole system. Information retrieval quality is a key part of this user perspective and must be accounted for. In order to ease the integration with the SES collaborative filtering platform in ASIMOV, SES will develop and extend the Application Programming Interfaces (APIs) to open its use to the partners. As the industrialization of the collaborative filtering platform is an important part for SES, the collaborative filtering platform APIs will follow Internet standards as published by the IETF or the W3C. To validate the APIs, ASIMOV will be used by the other partners to benefit from the services provided by the collaborative filtering platform like personalization or collaboratively driven IMOs access control (information filtering). POLIMI will edit exemplary audio-video transcripts from Italian to English and vice versa and from French to Italian and vice versa.

T3.5 Multi-lingual aspects and Natural Language Processing: The adoption of existing transcription technology will have to be realized against the background of very heterogeneous material in very differing scenarios. UASNW and ETH will implement solutions acknowledged in previous projects in light of the requirements analysis by different use cases. This process will be coordinated intensely with video metadata research (T3.1) and video search (T3.7). In addition, FUB will edit exemplary audio-video transcripts in English, German, Polish and Russian for testing purposes.

T3.6 Visualisation and User Interface Design: UASNW will work on an overall interface concept for all ASIMOV tools and features. Since the ASIMOV project addresses heterogeneous user groups the interface also has to provide different ranges of functionality for searching, editing and annotation tasks and both, user guided and system guided interaction styles. It also will develop designs for multi–device interfaces as well as visualization concepts for both, 2D and 3D interactive visualization. FUB will work on user interface conception, design, the deliverable will be the adoption of a test environment (i.e., search interface, annotation, tagging) for audio-visual archive users. POLIMI will contribute to the design of interaction addressing different users groups and different platforms.

T3.7 Video searching: One main goal of the ASIMOV project is the design, implementation, and deployment of an innovative semantically augmented search engine for IMOs. In contrast to today's search engines ASIMOV's search engine is not restricted to keyword queries producing ordered (flat) lists of search results. The two main differences are constituted in various levels of search granularity and in the identification of semantically interrelated IMOs.

Semantic Search: A typical search result may consist out of single IMOs, which are referenced by the user's query as a whole, or also out of fractions and rearranged sequences of single IMOs, if a finer level of search granularity is required. In the eLearning context as specified in WP2 (cf. T2.5.1 E-

[38] Noll/Meinel 2006
[39] Noll/Meinel 2007b

learning for Education and T2.5.5 Corporate E-Learning), plain and single IMOs are often not sufficient to satisfy the learner's information needs. A concept being subject to the user's query might be explained within a single IMO, while other concepts do occur within the given explanation, which also need to be explained. The semantic search process has to continue with those concepts that need further explanation. Therefore, to provide sufficient information, the results of the semantic search engine comprise semantically interrelated IMOs, again on different levels of granularity.

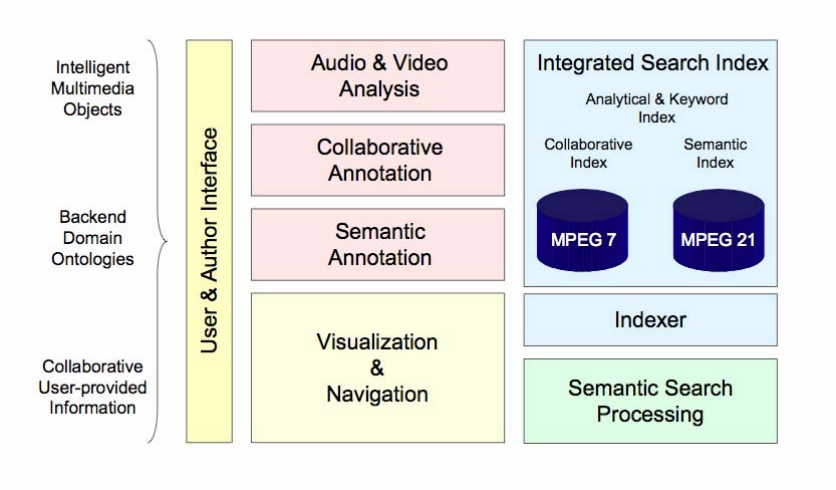

Figure 2: ASIMOV Search Engine Architecture

On the other hand, semantic annotation also provides synonyms to increase search recall and contextual information to increase search precision. In interplay with search result visualization (cf T3.6 Visualization) semantic metadata enable efficient navigation of the search space and allow the serendipitous discovery of related results. The envisioned efficient visualization has to be integrated into ASIMOV's semantic search engine search result visualization, navigation, and user interaction. Semantic search based on automated semantic annotation of IMOs has to be integrated together with an efficient and scalable architectural framework.

In contrast to traditional web search engines, semantic search in connection with the processing IMOs is consuming much more resources than the processing of customary web pages. In a pre-processing step IMOs have to be analyzed and automatically annotated with semantic metadata. IMOs in connection with timed semantic annotations are used to construct an efficient search engine index data structure that allows real-time search access for a large number of parallel user queries. Pre-processing and indexing have to be performed offline as a background process..The real-time provision of search results for a large number of users also requires to distribute the search process on a server cluster. The server cluster is managed by a routing server, which distributes incoming search queries to cluster members for load-balancing and maximum availability. Server cluster and computing cluster both rely on an efficient storage architecture. In the pre-processing step, the analysis of IMOs is rather storage consuming. Video data as being the most storage expensive IMOs have to be transferred, transcoded, analyzed and annotated.

Semantic search Integration: IMOs are semantically interrelated with each other. Individual IMOs often cover several different topics, which are not all related to the user's information needs. Automated semantic annotation provides means to identify fractions or sequences of IMOs with concepts related to them. These concepts can be semantically interrelated with the help of backend ontologies. The ASIMOV semantic search engine provides sets of interrelated IMOs as result to a user's query by reasoning over the available semantic metadata. Each user has different needs according to the level of complexity that the answer he/she is looking for should provide. In addition, every user has different previous knowledge. Thus, there is no single canonical result for a given query. User dependent determine the most sufficient answer. To accomplish a personalized semantic search as being proposed, the ASIMOV search engine has to provide means to gather information about the user's previous knowledge. This can be achieved by monitoring the user's actions, by providing possibilities for user feedback, and by designing a search process. In addition, the search results have to be ordered

according to their relevance. Traditional search engines apply ranking functions, as e.g., the Google PageRank[40]. For semantically interrelated IMOs an appropriate relevance function has to be developed, which takes into account how well an IMO relates to a given topic and how valuable its contribution really is also allowing for social networking information.

Social Search Integration: In addition to manually or automatically created semantic annotations, also collaborative annotations in the form of tags, comments, discussions or visual annotations, have to be integrated into the search process of ASIMOV. The user has the possibility to add his/her own metadata to IMOs. User metadata can have different levels of semantic complexity. User provided metadata are most useful for the user who has provided them[41] and thus, are required for obtaining a personalized search. The social networking component related to the process of collaborative annotation provides further information about the relationships among the users. These relationships have to be taken into account to integrate collaborative annotation into the traditional search process. The indexing process as well as the ranking function has to be adapted accordingly to provide the most appropriate personalized search result. Besides semantic annotation, also user feedback has to be taken into account for evaluating the quality – and thus, the relevance – of IMOs. The ASIMOV search engine has to provide means for enabling and analyzing user feedback as well as user recommendations such as ratings or votings. To make further use of collaborative annotations, the user must be able to get a quick overview about the annotations related to a given IMO as a whole. He/she must be able to identify his/her own annotations as well as the annotations of others according to their relationship among each other (cf T3.6).

Registration of IMO and Web Crawling: The ASIMOV search engine maintains an entire universe of semantically interrelated IMOs. These IMOs can be integrated into the search engine either manually by registration or can also be automatically discovered with the help of an automated crawling process. As being a large-scale web based search, the content being uploaded by the author has to be moderated to prevent malpractice. As for traditional search engines, ASIMOV also deploys a web crawling process to discover and to integrate new IMOs. In difference to traditional web crawlers, the ASIMOV crawling process has to provide sophisticated filtering of crawled objects for deciding whether an identified object really is an IMO. Besides feature analysis of identified objects, which enables identification by similarity, documents related to identified objects can give hints about being a suitable IMO.

T3.8 Identity, privacy, copyright and DRM: Most jurisdictions recognize copyright limitations, allowing "fair" exceptions to the creator's exclusivity of copyright, and giving users certain rights. The development of digital media and computer network technologies have prompted reinterpretation of these exceptions, introduced new difficulties in enforcing copyright, and inspired additional challenges to copyright law's philosophic basis. Simultaneously, businesses with great economic dependence upon copyright have advocated the extension and expansion of their copy rights, and sought additional legal and technological enforcement. The use of digital rights management has been controversial. Advocates argue it is necessary for copyright holders to prevent unauthorized duplication of their work to ensure continued revenue streams. Opponents, such as the Free Software Foundation, maintain that the use of the word "rights" is misleading and suggest that people instead use the term digital restrictions management. Their position is essentially that copyright holders are attempting to restrict use of copyrighted material in ways not covered by existing laws. The Electronic Frontier Foundation, and other opponents, also considers DRM systems to be anti-competitive practices. In practice, all widely used DRM systems have been defeated or circumvented when deployed to enough customers. Protection of audio and visual material is especially difficult due to the existence of the analog hole, and there are even suggestions that effective DRM is logically impossible for this reason. In addition, FUB will do research on historical audio-visual archive rules, personal rights and usage licenses. The deliverable provided by UL will be a description of commonly used digital rights for audio-visual archives and lecture materials. POLIMI will contribute to this task providing its expertise in the field of privacy and intellectual property right management.

T3.9 Content distribution (multi-terminals): In this task AMP will define the means by which content will be distributed to clients. This consists of defining the overall structure of the content

[40] Brin/Page 1998
[41] Golder/Hubermann 2006.

distribution system and addressing issues such as the technologies and protocols used, service interfaces, etc. Emphasis will be put on multi-terminal support, which lifts restraints on which devices and services can be used to access the content.

T3.10 Interoperability with legacy platforms: SES-ASTRA's SATMODE Application Service (SATMODE A.S) platform supports interactive applications by providing content producers with a vendor-neutral solution, based on open standards such as IPv6, MHP, OSGi and IMS. The SATMODE Application Service provides interactive applications with core services, such as Application Management and User Management, as well horizontal services, such as Messaging and Payment, upon which content and service producers can build interactive applications upon.
SES-ASTRA envisages extending the SATMODE Application Service platform to support ASIMOV services:

- Integrating intelligent video search and navigation as apart of the service of our Application Server (AS)
- Enabling profiling and personalization as a part of the AS
- Intelligent video search in relation to the linear content and cross-referencing to non-linear content (e.g. user watches linear TV, see Eiffel Tower and want to see other non-linear content related to it)
- Integration of IPTV based access schemes, accounting and subscriber profiling
- Multiple delivery channels
- Integration of location and presence in the indexing and search criteria

Development and integration of ASIMOV application module into the IMS service layer. Achieving the defined level of interoperability between ASIMOV intelligent audio-video content exploring, fetching and searching through ASIMOV application module. Implementation of audio-video content management and control by integrating ASIMOV management and control services together with IMS horizontal services on control layer level. Analyzing possibilities of making the base for extension applications, which will enable the interoperability with future systems that use ASIMOV.

T3.11 External Interface Integration and Content Syndication: In this task, UZ will define the method and service interface for integration between ASIMOV and different systems. Such systems include Content Management Systems, Learning Management Systems, Document Management Systems. The outcomes of this task will enable information exchange between various applications, based on Web services. Besides interface methods definitions, a user interface on an existing system, such as LMS, will be created. In addition, the support for including social networking features, such as tagging or commenting on different web sites, using mash-up enabled user interfaces (web sites, widgets, portlets, etc.) will be added in outcomes of this task.

T3.12 Network and End-user security: The introduction of IPv6 into the network of ASIMOV will add a new dimension of security in the project. The concept of end-to-end security will be researched especially in the combination of the SAT network and the mobile and location services planned. ASIMOV will research the benefits brought in by IPv6 in terms of end to end security as well seamless mobility using mobile IPv6. The impact on privacy will be studied when using SAT and mobile networks. UL will implement this task by researching IPv6 security on SAT network and mobile networks, as well as the impact of IPv6 on privacy.

1.3.4 WP4. User Scenario Trials and Demonstrations

In order to test the application on the field a set of user scenario trials will be identified and performed. The aim of the trials is to validate the proposed solution/s for each user scenario starting from a set of beta tests developed in cooperation with selected partners, collecting feedback and remarks. As a natural consequence we will tune and optimize the proposed solution/s taking into account the results of the validation step. After the completion of the trials phase we will start to demonstrate the proposed solution/s to a broader audience and extend to additional case study the research results.

T4.1: Integrated Trials/Validation and Verification per scenario: Following the general schema already provided a set of integrated trials/validation and verification test will be performed addressing each scenario: eLearning, eHealth, Interactive TV, Historical political content, Corporate eLearning and Mobile services. A detailed description of each validation / verification activity is provided in the

following paragraphs. The trial and validation activity will be subdivided in two different phases. The first one will mainly involve project partners and subcontractors providing content and performing tests. The second phase will be enlarged to a panel of interested parties performing more specific tests.

T4.1.1: E-learning in Academia: While the contribution to the use case's requirements (T.2.5.1) is a coordinated efforts of e-learning experts and Multimedia Services at ETH, the actual trial and validation is very much a task for the NET - Network for Educational Technology. The foremost and comprehensive task is to develop the **didactical framework** for the use case. The interactive and collective utilization of audiovisual objects on behalf of students and lecturers as described above is not a self-propelling scenario. Even though state-of-the-art didactics are all about activating students and collective learning, the (positive) experience from wiki-style cooperation have to be transferred to the specific characteristics of the recorded lecture as point of reference. As observed in the remarks on the state-of-the-art, the incorporation of recordings is uncommon, if any. Like other institutions, ETH offers lecture recordings, but their utilization is unstructured, not circumstantiated by statistics, and overall casual in nature. Therefore, there is no easy pre-ASIMOV - post-ASIMOV comparison. Instead, **comparison groups** will have to be established to incorporate recordings into their learning, thus contrasting traditional consumption of recorded lectures with ASIMOV-supported utilization.

Evaluation cannot and will not be restricted to quantifiable measures of learning outcome and exam results. With the setting being innovative, feedback from students and lecturers actually is more important. With the long-term goal of turning audiovisual recordings into learning objects also relevant in scientific work, any valuation will be future-oriented without actual verifiability. These settings are usually covered using the **Delphi method**. Lecturers and researchers will be interviewed with regard to their estimations to the incorporation of lecture recordings into scientific work.

In general terms, NET complies with the requirements of the matters at hand. Infrastructure on all technical levels (in coordination with Multimedia Services) as well as organizational disposition in coordination can be assumed due to prior experience in a multitude of projects similar in complexity, innovation and challenge. With the benefit of hindsight but also taking into account the unique perspectives of ASIMOV, the following aspects are crucial to the success of the use case:

- Integration of relevant **stakeholders**
- **Acceptance** on behalf of users: NET is providing e-learning scenarios in close consultation with lecturers and students to maximize usage from the outset.
- **Experience**: NET is the competence centre for e-learning at ETH and has a record of monitoring e-learning scenarios

T4.1.2: E-health: ASIMOV trials/validation and verification processes in the domain of healthcare will concern:

- different audiences (i.e., Administrative personnel, Doctors, Paramedic personnel, Patients, Citizens);
- different platforms (i.e., On line, broadband – wired, On line, broadband – wireless, On line, narrowband, Off line);
- different content (i.e., Already existing content, New content (ASIMOV standards compliant), Technical content, Educational content).

A specific evaluation questionnaire will be defined in order to collect on line remarks and contributions. More accurate analysis will be performed following the Delphi method involving targeted audiences. After the completion of a first round of tests an assessment phase will be started in order to improve quality and functionalities of the application.

A second round of tests will confirm the achievement of the goals. If negative a new evaluation cycle will be activated.

T4.1.3: Interactive TV: The objective of this task is to validate the scenario proposed and analyzed in WP2 and related services implemented in WP3. This validation will make use of the services implemented in the platform. Its aim is to test the features of the mobile application and its

performance. The outcome of this task is a trial report addressing scenario usability and performance elements.

T4.1.4: Historical/political content: Currently, the Visual History Archive offers search for researchers supported by FUB staff, workshops for schools on historical topics and assistance with the use of audio-visual material of the VHA. These use cases will be further developed within the project. The Freie Universität Berlin will implement a test environment for use cases. Questionnaires will be developed and user scenarios for different user groups will be subject of the evaluation. The evaluation will focus on topics like e.g. the usability of the interface, the editing and enrichment options, the search options, the personalized and shared access to search and work results, the publishing options etc.

T4.1.5: Corporate e-learning: ASIMOV trials/validation and verification processes in the domain of Corporate eLearning will concern:

- different corporations (i.e., public companies and institutions, and private such as Multinationals and SMEs);
- different audiences (i.e., Administrative personnel, Employees, Managers, Internal tutors
- different platforms (i.e, On line, broadband – wired, On line, broadband – wireless, On line, narrowband, Off line);
- different content (i.e., Already existing content, New content (ASIMOV standards compliant), Technical content, Educational content).

A specific evaluation questionnaire will be defined in order to collect on line remarks and contributions. After the completion of a first round of test an assessment phase will be started in order to improve quality and functionalities of the application.A second round of tests will confirm the achievement of the goals. If negative a new evaluation cycle will be activated.

T4.1.6: Mobile services (2-way TV): The aim of the validation task is to confirm that the prototype defined and prototyped in the scenario *Mobile Services* works in the real world. Results of this task shall help to improve the mobile application and the platform services. Following activities will be executed in the frame of this tasks:

- Transfer of the prototype applications to a real device.
- Validation of features and performance by using a WLAN connection
- Improvement of mobile service in terms of functionality and performance
- Feedback of validation results into platform development.

T4.2: Integrated Demonstration: Once performed and positively passed the set of trials and validations a demonstration phase will be activated. The aim of the present phase is to demonstrate the proposed solution/s to a broader audience and extend to additional case study the research results. Consequently an additional group of users will be identified in order to extend the demonstration process. The Consortium will provide them ad hoc credentials enabling on line use of the application. Two different and complementary actions will be set up: offline and on line integrated demonstrations.

T4.2.1: Live demonstrations: The first action consists of organizing public events due to illustrate specific applications of the solution, in consistency with target users and audience. The events will be set up in synergy with the dissemination phase (please refer to the proper section may you need further information).

T4.2.2: Online Integrated demonstrations: Some other on-line demonstrations will be available on line to registered and un-registered users in order to evaluate their effectiveness. Maximizing users awareness and as a result the evaluation of demonstrations usefulness represent essentially the main goal of the task.

1.3.5 WP5. Training

For the dissemination of the project results it is necessary to communicate the possibilities the technological solutions of the project offers. The development of concepts for training material and exemplary tutorials supports a user-friendly dissemination. To ensure the use of the technological features, different user groups need to be addressed and trained. Therefore concepts of training material will be developed. On the one hand it is necessary to show those people who are policy makers in the field of audio-visual archives the additional benefit of the technological solutions, on the other hand the users who want to search for and work with digital audio-visual material (annotation, enrichment) need to be trained in the use of the features the technological solutions provide.

WP5 will focus on two main tasks:

T5.1 Training on the technology platform

- Concepts of online training material will developed to train the use and to show the possibilities of the developed technology.
- Online training material for policy makers will be designed and produced.
- Furthermore a presentation of the training material will be provided on the platform

T5.2 Training the user communities

- Concepts of online training material will be developed to show different scenarios for working with the technological solutions.
- Tutorials with online self-training material for different usage scenarios and applications will be designed and produced.
- FAQs, tips and tricks will be provided.
- Demonstration workshops will be organized to introduce the project platform to possible users.

1.3.6 WP6. Standardisation, Dissemination, and Exploitation

T6.1: Standards: The requirement is to guarantee the compliance of multimedia objects according to ASIMOV with relevant standards for the integration into libraries, archives, and e-learning repositories. In close coordination with national and European bodies, this implies

- Involvement of W3C directly and thru CWI in the standardisation process
- Observance of established libraries' standards, especially Dublin Core, MPEG-7 and MPEG-21; clarification with the Open Access Initiative, especially "OAI Protocol for Metadata Harvesting"
- Compliance with open Web standards such as URI, XML, RDF, OWL; clarification of usage of other standards in a Web context.
- Compliance with archival standards, especially Digital Object Identifier (DOI) and possibly initiating the establishment of a national (CH) Handle Server
- Adaptation of standards in an e-learning environment such as LOM, SCORM and - potentially in coordination with CanCore – an overall rapprochement to IEEE Learning Object Metadata standard and the IMS Learning Resource Meta-data specification

T6.2: Facilitative workshops and focus groups: The lack of standardization is a further hindrance to the open exchange of content when it comes to audiovisual or multimedia objects in general. Standards are supposed to open the dissemination via and the exchange with established repositories such as search engines and e-learning repositories. As these can be considered to be established in the academic environment, the task is to adapt to their respective specifications and provide the resulting requests to R&D. Decisions in this area of work start with the identification of relevant standards (such as MPEG-7 and Dublin Core) and the development of best practices for applying existing standards to Web-based audiovisual content. Other developments such as the **Open Access Initiative** will have to be put to an

in-depth analysis for their potential, especially in consideration of the far-reaching implications as to the legal status of intellectual property.

Archives also have specific exigencies with regard to born digital material. The relevant standard is beyond formats and storage, as these stem from the individual IT infrastructure unique to each implementation and distributive services. In light of the challenge of accessibility, the vital question is concerned with longevity and preservation in an academic environment. In order to make recorded lectures, sequences from recorded lectures or newly assembled customized lectures objects to be worked with in teaching, learning, and researching, reference to them has to be "everlasting" for links and references not to be lost in the wake of technological changes (realignment of servers etc.) – a warranty traditionally known from libraries' ISBN or ISSN. With isochronous multimedia objects, the conservation of identification over time will be have to be guaranteed by **Digital Object Identifiers (DOI)**, also about to become relevant in the context of libraries.

Finally, **Intellectual Property rights and IT-Security** combine claims of open and secure access. With ETH providing an sophisticated IT-infrastructure including integration to the National **Authentication and Authorization Infrastructure** (AAI) already, the main challenge would be in user group management and especially sophisticated rights management/authorization. This goes beyond questions of differentiated access and involves the revision of all legal aspects. We consider **MPEG-21** to be an adequate standard for solving these problems. Again, these are questions about to be addressed by all universities engaged in recording lectures and therefore of particular interest in academia.

Please see **section 2** for detailed description of innovation management, dissemination, and exploitation. However we have to emphasize that in order to ensure maximum impact and manage innovation, ASIMOV will adopt a multi-channel dissemination approach. Every channel targets a particular aspect of the project and relevant community of users in a specific way. Dissemination channels are planed around the following components: 1) Domain (e.g., e-Learning communities and libraries), 2) Technology platforms (e.g., Ontology and Semantic Web communities) and 3) content creators and consumers (e.g. Search engines) for creation, manipulation, and exploitation of long tail content.

T6.3 Dissemination & Use Plan: UL together with its partners will organise a yearly ASIMOV Summit 2009-2010-2011 to get all Multimedia and mobile networks stakeholders into a general assembly meeting to foster knowledge and disseminate the results of the project to the targeted audiences of the project from industry and academia. ASIMOV partners will run a networking workshop at each annual IST conference and will liaise with the W3C consortium to further disseminate its results. Press and TV coverage will be organised by UL and the project coordinator in cooperation with the other partners in their countries.

T6.4 Exploitation Plan: All partners will contribute to the exploitation, according to the involvement of their organization;

- Universities and research institutes will publish the results of their studies in high profile academic conferences and journals, and the work will be incorporated into new course material.
- The commercial organizations in the Consortium (SES-ASTRA, TI,.) will ensure the exploitation of the results through the subsequent improvements of elements of the solution, complete systems, or to offer enhanced consulting services for their customers based on the results of ASIMOV
- The service providers (SES ASTRA,) will gain new opportunities to develop and sell new services, above the level of simple transmission capacity

All partners contribute to the development of an Open Source Software strategy to ensure sustainability of project results. The strategy includes legal as well as practical aspects such as maintenance, documentation, availability, etc.

1.3.7 Work package descriptions

WP1: Project Management

Work package number	**WP1**		**Start date or starting event:**		**Month 1**		
Work package title	**Project management**						
Work package leader	**SES**						
Activity type	MGT						
Participant number	**1**	2	3	4	5	6	7	8
Participant short name	**SES**	ETH	UL	FSU	UASNW	HPI	RSA	MCCM
Person-months per participant	**24**	0	0	0	0	0	0	0
Participant number	9	10	11	12	13	14	15	
Participant short name	FUB	UZ	AMP	CWI	PoliMi	TI	Martel	**Total**
Person-months per participant	0	0	0	0	0	0	12	**36**

Objectives

- To guarantee the successful project completion within the agreed time, costs and quality requirements.
- To ensure compliance with EC standards and procedures for project management and tracking,
- To create and maintain effective channels of communication among the consortium partners.
- To provide administrative and technical coordination, including financial, legal, contractual and ethical management of the consortium.
- To provide quality assurance within the lifecycle of the project.
- To maintain regular reporting and other communication with the EC

Description of work

T1.1 Establishing the project management procedures (task leader: Martel, contributing: SES) – in this initial task we shall remind partners of the project plan, including scheduling, resource allocation, responsibilities, etc., and perform the kick-off activities covering contractual and administrative issues, establishing of payment procedures, organisation of the kick-off meeting, e-mail lists, etc. During the kick-off meeting the organisation of the project structure will be finalised, including the managing bodies, i.e., the General Assembly and Technical Management Committee.

T1.2 Performing the project management duties (task leader: SES with assistance from Martel) – this task covers the overall project management activities, including:

- **Quality Assurance** (task leader: SES, contributing: Martel) – in this task we shall take define the quality control methodology based on ISO 9000, which will be then followed to monitor the quality throughout the entire project's lifetime. This methodology will define measures that must be implemented to allow us to reach the project objectives, and establish monitoring measures, follow-up actions, and corrective procedures.

- **Risk Management** (task leader: SES, contributing: Martel) – in this task we shall establish the risk management plan identifying the risks, and estimating their probabilities, and defining monitoring procedures, mitigation actions and responsibilities, and contingency plans.
- **Financial management** (task leader: SES, contributing: Martel) – in this task we shall establish and maintain financial records, coordinate, control and report annual cost claims and their audit certifications, and distribute payments from the EC to the consortium partners.
- **Administrative coordination** (task leader: Martel, contributing: SES) – collect and maintain contractual documents, reporting coordination (monthly, quarterly and yearly), information exchange logistics (procedure setting, web tool set-up).
- **Project plan update** (task leader SES: contributing: Martel) - the project's detailed Implementation Plan is updated every year for the next 18 months.
- **Organisation of periodic project meetings**,
- **Establishing and maintaining the communication** within the consortium, and between the consortium and European Commission,
- **Monitoring and evaluating the project progress** in terms of objectives, schedules, directions costs and resources,
- **Coordination, development and delivery** of project deliverables, administrative documents and reports.

Deliverables

D1.1	Periodic Activity Report	Delivery month: 12
D1.2	Periodic Activity Report	Delivery month: 24
D1.3	Final Activity Report	Delivery month: 36

WP2: Requirements Analysis

Work package number	**WP2**		**Start date or starting event:**		**Month 1**		
Work package title	**Requirements Analysis**						
Work package leader	**FSU**						
Activity type	RTD						
Participant number	1	2	3	**4**	5	6	7	8
Participant short name	SES	ETH	UL	**FSU**	UASNW	HPI	RSA	MCCM
Person-months per participant	4	12	7	**36**	0	0	0	8
Participant number	9	10	11	12	13	14	15	
Participant short name	FUB	UZ	AMP	CWI	PoliMi	TI	Martel	**Total**
Person-months per participant	16	3	36	18	8	8	0	**156**

Objectives

- To ensure the application of state-of-the-art methods regarding requirement, determination and technologies for search engines and monitor the progress particularly in technologies and their impact to arrive at a high quality and innovative set of user requirements. The latter include the required user training and facilitation of the process.
- To empirically collect data about and define use cases as well as scenarios and use those to study, analyze, model and refine features/functionality in order to ensure that complete, consistent and easy to understand requirements are gathered.
- To collect the requirements for the proposed system understood as a whole and to detect and resolve conflicts originating from gathering the requirements for single features. This objective will lead to produce a Software Requirements Specification documenting the user requirements.
- To define the User Validation and Verification of the ASIMOV framework, use cases and technologies against internal and external user requirements.

Description of work

T2.1: Recognition of the state-of-the-art

To transform raw multimedia data into intelligent multimedia objects, the mandatory point of origin lies in the task of **recognizing the current state-of-the-art** with respect to all essential technologies. Essential technologies for ASIMOV comprise the following:

- Analytical techniques related to **video retrieval**, which includes video content analysis, video structure parsing, video segmentation, object identification and tracking, and intelligent character recognition.
- Analytical techniques related **to audio retrieval**, which includes automatic speech recognition, keyterm spotting, and speaker identification.
- **Search engine technology** with special emphasis on **semantic search** and **social search**, which includes isochronous indexing, semantic multimedia annotation, spatio-temporal addressing, ranking algorithms, personalization, trust metrics, scalability, heterogeneous but related semantic data sources, and trust metrics".

- **Ambient intelligence** technologies, which includes adaptive interface design, innovative visualization of semantic AV search results, environment and infrastructural modelling, adaptive and reactive planning.
- **Networking technologies**, which includes multimedia content delivery, multicasting technologies, peer-2-peer networking, and interoperability.
- **Security related technologies**, which include digital rights management, intellectual property, web of trust, access control, and usability.

T2.2: Specific analytical techniques

To transform raw multimedia data into fully-fledged intelligent multimedia objects multimedia data has to be analyzed to get textual metadata for isochronous annotation. ASIMIOV will deploy existing state-of-the-art multimedia analysis technology and invest additional research and development into the following fields:

- **Content based video analysis technology**

  For isochronous annotation textual metadata has to be associated with specific fragments of the video data, which can be coherent segments of discrete points in time. While during production video segments can be easily identified and marked, existing archives offer self-contained video data, where coherent segments have to be identified by means of **video structure analysis**.

  Within the video data textual data often is already individually encoded in terms of titles, subtitles, or other textual material that can be used as a basis for content based video indexing. Due to the nature of video encoding and compression the analysis of textual data in the video is much more difficult compared to standard optical character recognition, because of its often low quality, noise, movement, or distortion. Thus**, intelligent character recognition** technologies have to be adapted to the special requirements of the video data of the projected use cases.

  Some ASIMOV use cases, as e.g. E-Health or E-Learning, offer the user the possibility to provide visual annotations within the video data such as marking or highlighting distinct objects being displayed. From the visual annotation coherent objects being associated with the annotation have to be identified and tracked over time within a video segment (**object identification and tracking**).

  To enable **similarity-based search** in video data features and characteristics of video data have to be extracted and aggregated to complement the textual index data. ASIMOV use cases demand individual adaption of similarity-based search for different scenarios.

- **Content based audio analysis technology**

  In addition to video analysis also the audio layer provides significant information for the generation of isochronous metadata. If the video data contains speech, **automated speech recognition** technologies can be applied to obtain a textual transcript can be used to complement isochronous metadata. To achieve results of sufficient quality automated speech recognition works best if the system is trained for a specific speaker, who speaks in a predefined language. The two issues, where ASIMOV invests research and development is automated speech recognition with untrained systems and multilingual scenarios. In both cases, **keyterm spotting** with predefined, restricted vocabularies provide promising results and will be adapted to the requirements of the ASIMOV use cases.

  On the other hand, audio data analysis can also support video structure analysis-

T2.3: Interoperability with legacy platforms

As a part of the interoperability assessment and development the following areas will be addressed:

Linear TV

As a part of this project we will analyze requirements for the interoperability of standard DVB based linear programs with state-of-the-art interactive-TV and Internet-TV content. The analysis will assume no prerequisite changes are necessary to the encoding or transmission of the existing DVB linear content. Interactive-TV and Internet-TV programs are to complement the existing portfolio of ASTRA's DTH broadcast solutions in a way that enriches and diversifies the viewer experience without requiring the modification of the transmission of standard audio-visual streams. Investigate use-cases for the annotation, indexing, addressing and search of existing linear digital content using the technologies described by this proposal. The analysis will consider the development of scenarios where the newly provided services form a basis for the development of commercial interactive programs that make use of viewer's online contributions for the generation of the actual content.

Interactive content

Furthermore, we will investigate scenarios for the production, deployment, transmission and consumption of interactive-TV content that can complement and integrate existing linear digital programs. Use cases will cover professional content production and distribution as well as amateur audio-visual contributions inspired by the YouTube service model. This material will provide a basis for bridging the gap between high-quality linear productions and Internet-TV low-cost initiatives. Interactive community scenarios will address how audio-visual discovery services will develop a market for interest-based programs and communities.

IPTV

Analyze requirements for the integration of existing IPTV services and content with the audio-visual discovery services to be developed in this project. The analysis will cover EPG (Electronic Program Guide), VoD (Video-on-Demand), PVR-like (Personal Video Recorder) control of streams and other state-of-the-art features of commercial IPTV systems. Use-cases for the interoperability of the newly proposed discovery services with interactive service features such as messaging, voting and purchasing on-line will also be addressed.

Service and Content Delivery Platforms

Analyze requirements for the interoperability of the to-be-developed audio-visual discovery services with open standards supported by the SATMODE Application Service, such as MHP (Multimedia Home Platform) and IMS (IP Multimedia Subsystem). .

Investigate the state of existing IMS implementations (vendors like Ericsson, NEC, Alcatel, etc.) with emphasize on integration of external services in control layer and audio-video media deliverance through all system layers.

Analyze the IMS possibilities based on following scenarios:

- User's request for exploration of available audio-video contents related to specific metadata
- User's request for exploration of available audio-video contents based on currently delivered/consumed one
- Request for fetching another audio-video content while consuming one (caching in the system) for later reproduction
- Request for consuming only parts of requested content (availability of portioning the content in IMS application layer)
- Getting audio-video content through usage from other IMS services (social network services, location based services)

Investigate use-cases related to service interaction through control layer:

- Relation between external and IMS internal horizontal services (authentication, billing, etc.)
- Impact of user's authentication and preferences on availability of audio-video content
- Impact of user's authentication and DRM on availability of audio-video content (relation between DRM and authentication)
- Impact of user's authentication and billing on availability of audio-video content (relation between billing and authentication)

T2.4: Socio-economics

The socio-economic research objectives and priorities in ASIMOV are:

1. Evaluation of the effects of widespread use of Audio-visual search and discovery on Networks and Services.
2. Analysis of policy & measures on global metadata protocols with new discovery characteristics.
3. Elucidation of social aspects of a user's quality of experience (QoE), which reflects its degree of satisfaction in accordance to the Quality of Response (QoR).
4. Mapping and adapting requirements of societal communities to mobile video communication services and infrastructure.
5. Clarification of future economic trends in video communication services and infrastructure.
6. Support for business strategy.

The socio-economic studies to be carried out in ASIMOV should be viewed as consisting of two levels, namely: user demands for advanced audio-visual discovery and context-aware video network services with guaranteed QoE (Quality of Experience), and the techno-impacts on distinguished groups of the selected

ASIMOV scenarios that deal or affected directly by dynamics of technological and application aspects.

T2.5: Scenarios

Complex systems implementing challenging concepts such as ASIMOV require a thorough analysis of stakeholder's motivations, industry expectations and consumer reactions. A careful understanding of why and how these tools may be considered and adopted in widespread contexts such as e-learning, e-health, e-archiving, interactive and mobile TV requires an in depth analysis by experts of each domain. Context-specific scenarios are required to understand how the developed technologies are to be modelled and presented in order to fulfil existing needs or create new ones. Functional illustrations of how the ASIMOV vision may be applied to each context will help finalizing requirements, defining prototypes and designing trials for realizing the goals of the ASIMOV project.

T2.5.1 E-learning for education

ETH invested into lecture recording at an early stage, developing PLAY as a solution to integrate classic audiovisual recordings with content-capture - the presentation was synchronized with audio and moving image from the lecturer. Today, REPLAY offers an integrated and automated solution to capture large numbers of lectures - thus confronting ETH with the challenge to develop solutions for this teaching knowledge to be taken to the next level.

The requirements for this are manifold: First, there is unfolding the actual content. Together with FSU and YOVISTO, ETH has implemented a first-generation character recognition to read text from slides, presentations and anything being captured as „content", processing it as isochronic metadata subsequently („**indexation**"). This technology has to be adapted to increase the quota of information being indexed. In addition, audio has to be indexed as essential information carrier. Here, FP6 projects have contributed significantly, for ASIMOV to adapt with regard to the characteristics of academic speakers (technical vocabulary, no training for speakers nor system) - cf. T3.4.

Second, academic utilization of audiovisual objects needs **new generation search methodologies**. With the content being unfolded, metadata-based searches are exposed in their narrowness, but still constitute part of the search environment to be created, especially as they can be upgraded by syndication and federation (administrative data, LMS etc.). New search methods will have to be integrative in that they can combine heterogeneous source of information.

Amongst these are, thirdly, information from the domain, i.e. the subject-matter of the actual audiovisual recording. These **ontologies** have to describe not only the information or content, but map the actual disciplinal structure. Here, the contribution from academia is to provide and further develop the ontologies - WP3 (T3.3) will have to provide the technology to enhance search methods on that basis.

In addition, **students will contribute interactively and collectively**: By tagging the video they watch, by adding comments or material to sections of the video or by discussing the video isochronically with the lecturer and fellow students, they enrich the audiovisual object towards a multimedia learning object as the data will be available for future uses and influence the overall intellectual properties of the object. In addition, their use patterns will also provide useful information about the further development of content (with lecturers adapting their teaching), about the significance in searching (with objects not being consumed for long being downgraded) and the overall acceptance of the opportunities. The foundations for this will have to be laid in T3.1.

The **user interface** will be the hub for this interaction: It must allow students the activities described. In return, students will be presented with an individual and customized surface for their learning needs: Search results will reflect their use and learning patterns, their previous knowledge and experience. Overall, the user interface is a key to success with students.

With the investment in REPLAY, ETH is among the leading universities when it comes to state-of-the-art lecture recording. However, with REPLAY being an open solution for everyone to share and with other universities now investing similarly, technology and infrastructure to automatically record hundreds of lectures each semester will disseminate to more and more institutions quickly. They therefore will soon face the situation ETH is facing today: How to exploit the full potential of these learning objects to-be. The scenario will showcase how this can be achieved in order for other universities to share this experience.

T2.5.2 E-health

ASIMOV will develop an e-Health scenario starting from the state of the art in this sector co-designing

together with selected healthcare institutions an innovative quality content delivery platform. In order to ensure quality content spreading and diffusion, e-contents will be available “cross platforms” on many devices, as mobile phone, iPod, internet, digital television. Content standards will be based on simple and actual didactical-communicative languages including 3D animations, video clips, audio and written text. The aim of such a multichannel solution is to better accessibility and make quality content available from any place in any moment.

Typical applications aim to teach to the citizens correct behaviours to perform in specific cases. Developed themes concerns emergency behaviours, correct behaviours to perform an healthy lifestyle, how waiting lists for health services work and how citizen can contribute to get these lists shorter and help the community wait less for sanitary performances.

Main goals to be achieved from the healthcare point of view are:

- Promote correct behaviours that can help people in case of adverse events
- Promote behaviours that can help sanitary aids
- Promote behaviours to have an healthy lifestyle And so reduce - illness causes - adverse events effects - time to wait to obtain a sanitary service
- Promote contents spreading through the population.

Main goals to be achieved from the technological/operational point of view:

- Define a standard interoperable format for content objects;
- Demonstrate the opportunity to share quality content cooperating for a common content ;repository;
- Define and ad hoc ontology addressing the needs of healthcare institutions;
- Define one or more workflow including the use of similar resources integrated in the medical process.

T2.5.3 Interactive TV

The term "interactive television" has been used to indicate very different kinds of interactivity, ranging from interacting with information cached on a set-top-box to interacting with the program being viewed such as in e-voting. The interactive-TV ASIMOV realizes is of the more challenging kind, breaking the linearity of today’s television and enriching its audio-visual content by enabling the interlinking between programs and other content, such as that provided by Internet today or by other content producers in the near future.

This task addresses the analysis and development of interactive television scenarios with respect to content producers and different viewer groups. How individuals, communities and commercial enterprises alike will interact in the creation, distribution and consumption of interactive television content. How the quality and ease-of-use of today’s television will integrate the creative potential and participative spirit of tomorrow’s interactive services.

The architectural analysis of the search engines and repositories, which are at the centre of ASIMOV development efforts, will provide an important insight into how such tools may shape or adapt to the requirements of the scenario actors. The exploitation of these results is key to the commercial realization of the ASIMOV’s concept.

This task will focus on the following activities:

- Detailed definition of scenarios in coordination with the platform development
- Evaluation of different inter-media cross-link possibilities
- Specification and design of an application prototype which considers both content production and community gathering aspects
- Definition of the relation between linear channels and personal television.

T2.5.4 Historical/political content (archives)

Because of the diversity of the user groups the Visual History Archive and the Archive „Memories of Forced Labor" need to meet a wide range of user requirements. Therefore the user scenarios can be used as a show case for other historical digital audio-visual archives as well as for a user-friendly provision of historical audio-visual documents like reports about political events, wars etc. in the future.

The **Visual History Archive (VHA)** is the world's largest historical digital video archive (see Bibliography pp. 106). The Freie Universität Berlin is the first university in Europe that provides access to the Visual History Archive for students, researchers and teachers. With the archive one can view nearly 52,000 video

testimonies and interviews with victims and witnesses of the Holocaust from 56 countries in 32 languages. In order to guarantee the privacy rights of the interviewees, the archive is available and accessible within the Freie Universität Campus Network. People or institutions outside the university who are interested in the use of the archive need an authorization by the Shoah Foundation Institute for Visual History and Education of the University of Southern California (USC).

The **Archive „Memories of Forced Labour“** contains about 192 video and 391 audio interviews in mother tongue, 27 countries with focus on Middle and Eastern Europe, 24 different languages. All interviews are transcripted (partly a literally transcription partly more an interpretation of the interview).

The “Visual History Archive” and the Archive “Memories of Forced Labour” aim mainly at the following archive user groups:

- universities: researchers and lecturers, Ph.D. students, students in general
- primary and secondary education: teachers, pupils
- other institutions within the educational context: museums, individuals and institutions in the field of political education,
- national and international cooperation between users (between researchers, teachers, schools, institutions) and in the field of Civic Education
- public sector: journalists, lawyers and legal practitioners (lawsuits, legal matters)
- individuals interested in the matter

To meet the requirements of the diverse user groups the archives need to address different user scenarios through support for research, for university and school teaching and for international projects.

For the development of user-friendly scenarios the development of the following features will be integrated:

- Speech recognition for different languages (e.g. German, English, Russian, Polish)
- Multilingual interface for both archives
- Improvement of search possibilities through full-text search, annotation, tagging
- To give personalized access to the archive combined with the possibility to search in the own material and search results.
- Shared access to search and work results
- The possibility of annotation and the attribution of metadata by users
  These users need to have the scientific competence to furnish the archive objects with meta data according to scientific standards.
- The possibility to perform tagging operations and thus to create new classifications and dynamically add new keywords and other metadata
- To recombine search results, enrich these results with annotations or further multimedia material (texts, pictures etc.) and save them as isochronous eLearning objects
- To publish scientific papers including video-interviews
- Transcriptions of the Visual History Archive interviews and synchronous allocation to video segments
- Isochronous presentation of transcripts/translations and segments of audiovisual material
- To develop a solution to automate the transcription of video-interviews and thus support the laborious manual transcription process.

T2.5.5 Corporate e-Learning

Corporate E-Learning conveys structured cognitive and affective learning contents within the paradigm of blended learning. For that, already established learning technology standards, such as SCORM, LOM, or AIC, as well as high-capacity learning platforms are now at our disposal. (Scenario 1)

Cooperative learning or ‘informal learning‘ is a new development that is based on Web 2.0 technologies, like, for example, Wikis, and makes for a mix between E-Learning and knowledge management. (Scenario 2).

Scenario 1 encompasses extensive film archives in various countries with different technological standards, each embracing different responsibilities and individual legal situations. Enterprises have the need to use these assets efficiently. To achieve that, videos have to be found by authorized people, and these people must be able to assess the material contentwise and technologically. Experience shows that video assets are often not provided with enough metadata in order to unlock the material’s contents efficiently.

Therefore the need exists to have extensive video archives automated in light of keywords and traceability. Large video archives are, for example, available in the automotive or aviation industries for service trainings or for product presentations. To support archive functions, it is to be checked how much leeway enterprises allow for the elaboration of video sequences via comments or metadata.

When reusing these 'found video sequences', further questions have to be addressed. Which basic conditions do enterprises set up in light of coordination and clearances? Which effects do the adherences to brand requirements such as CI/CD have on the production of new learning programs?

The following aspects will therefore take center stage in Scenario 1.

- Technology
- Video Standards
- Storage
- Data Security Guidelines
- Metadata and Archiving
- Assessment of Content Quality
- Form of Organization, Responsibilities and Processes within the Enterprise
- Rights

Scenario 2 will deploy videos within the framework of 'cooperative learning' and 'informal learning'. These forms, e.g., Wikis or Blogs, are given a chance and tested in enterprises today. The integration of videos in learning situations in this scenario will be essentially formed by the evaluation and editing of the videos.

The following questions are in focus here:

- What are the technological prerequisites and the availability of this technology at the place of work/learning?
- What content-wise query processes are there, i.e., how are queries actually carried out in enterprises?
- What changes in content will be made, i.e., which content-changing alterations will be made at all?
- In the organizational point of view, i.e., which possibilities in light of changes are wanted by the organization?
- In legal terms: Are the changes actually possible, i.e., which rights must be released by whom?
- It must also be determined to what extent the basic conditions in enterprises must be changed at all.

T.2.5.6 Mobile services

Mobile TV is seen a one of the most interesting and fast growing future markets for mobile applications. Today there exists already a significant number of web based TV channels which transfer their content to the mobile user. The content is either provided as a continuous stream or as mobile episodes, a so called Mobisodes. They are short video clips which have been created especially for mobile terminals while taking into account specifics of the display capabilities of the mobile devices and relatively short video consumption time on mobile devices.

The mobile services, as demonstrated in ASIMOV will provide the user with an application which is tailored to the services provide by the ASIMOV platform. This application shall give the user more flexibility at hand he usually has when using a standard media player or the web browser.

The focus of this task lies in following activities:

- Detailed definition of the scenario in coordination with the platform development
- Analysis of the communication protocols for the two way communication, as implemented in the platform.
- Specification and design of an application prototype.
- Implementation of a prototype on a standard computer to better evaluate functionality and performance by using a mobile terminal simulator.
- Integration of additional specific mobile functions like location based services and presence into the search parameterisation and automatic content tagging.

Scenario refinement and trial with an "early adopter" group consisting of representative users from different market segments (early adopters vs. conservative users, different age, gender and social groups).

Deliverables

D2.1.1	Metadata for Web-based audiovisual content: State of the art analysis document	Delivery month:	6
D2.1.2	Processing of Web-based audiovisual content: State of the art analysis document	Delivery month:	9
D2.1.3	Solutions in digital historical audio-visual archives: State-of-the-Art	Delivery month:	6
D2.2	Specific analytical techniques requirements document	Delivery month:	15
D2.3	Performance and interoperability requirements document	Delivery month:	18
D2.4	Report on socio-economic starting point	Delivery month:	24
D2.5.1	E-Learning Scenario requirements & documentation	Delivery month:	12
D2.5.2	E-Health user scenario requirements document	Delivery month:	12
D2.5.3	Interactive TV user scenario requirements document	Delivery month:	12
D2.5.4	Requirements catalogue for technological solutions for digital audio-visual archives	Delivery month:	12
D2.5.5	Corporate E-Learning user scenario document	Delivery month:	12
D2.5.6	Mobile Services user scenario document	Delivery month:	9
D2.5.7	Development of a prototype application for mobile services to verify the projected scenario	Delivery month:	18

WP3: Technology Architecture and Development

Work package number	**WP3**		**Start date or starting event:**		**Month 6**			
Work package title	**Technology Architecture & Development**							
Work package leader	**HPI**							
Activity type[42]	RTD							
Participant number	1	2	3	4	5	**6**	7	8
Participant short name	SES	ETH	UL	FSU	UASNW	**HPI**	RSA	MCCM
Person-months per participant	50	24	11	48	30	**60**	0	0
Participant number	9	10	11	12	13	14	15	
Participant short name	FUB	UZ	AMP	CWI	PoliMi	TI	Martel	**Total**
Person-months per participant	16	8	60	21	10	8	0	**346**

Objectives

- Provide means for manual and automated semantic annotation of video data to enable content-based access.
- Provide means for spatio-temporal addressing of video data fragments to enable pinpoint access.
- Development of a full-fledged content-based semantic video search engine integrating an analytical keyword index, a semantic index, and a collaborative index.
- Development of innovative visualization of large amounts of heterogeneous multimedia data for efficient access, navigation and decision making on heterogeneous devices.
- Provide means to analyze multilingual audio data for metadata generation, combining existing methods of automated speech recognition and keyterm spotting with controlled vocabularies.
- Develop and integrate Digital Rights Management for access controlled multimedia data in various different use cases.
- Provide means for interoperability, information integration and content syndication with legacy systems and web-based applications.

[42] Please indicate one activity per work package:
RTD = Research and technological development (including any activities to prepare for the dissemination and/or exploitation of project results, and coordination activities); DEM = Demonstration; MGT = Management of the consortium; OTHER = Other specific activities, if applicable in this call.

Description of work

T3.1 Video annotation, video metadata

CWI will work on innovative and intelligent search paradigms based on meaningful relationships among audiovisual content, and on low-barrier user interfaces for ontology-mediated tagging of Web-based content.

FSU and ETH will work on isochronous semantic annotation of multimedia data and on the design of semantic metadata for multimedia.

HPI and AMP will implement APIs for manual video data annotation.

FUB will work on annotation levels, personnel, group oriented, content driven, context driven, Tagging in video with respect to searching; the deliverable will be methods and specifications for Annotation and Tagging in video based material.

T3.2 Addressing

CWI will work in close cooperation with W3C on a URI-based scheme for addressing spatio-temporal fragments of audiovisual content on the Web.

T3.3 Analytical Filtering

HPI and FSU will work on analytical filter methods to extract textual metadata from video resources. Video data often contain textual messages such as headlines, comments, summaries etc. as part of the encoded video recording. Standard methods such as optical character recognition (OCR) are difficult to apply due to the often noisy video encoding and video compression artefacts. In this task, OCR methods will be adapted to the special requirements for video data to extract textual data as a source for video annotation.

T3.4 Collaborative Filtering

Information overload and increasing interactivity between users and IMOs demand for improved techniques to find, retrieve and (re)use multimedia content. Social collaboration and personalization play a key role to tackle these issues.

The SES Collaborative Filtering Contribution is composed on the following four key elements:

- Collaborative filtering (based on collaborative tagging)
- User profiles generation
- Personalization based on user profiles
- Multi-dimensional rating and voting mechanisms

Those four key elements rely on a research prototype platform jointly developed by SES and HPI[43]. The collaborative platform provides tools and interfaces to annotate and rate IMOs using standard Internet technologies. This serves as an excellent basis for further research and development in the ASIMOV context. The contribution will develop technology to collect user data and user feedback and methodologies to analyze and aggregate this data and add/transform it into user profiles and IMOs profiles. This information will be used within the ASIMOV project to improve search and retrieval quality and tailor ASIMOV to individual user needs by adding multi-dimensional rating and voting mechanisms to the collaborative and social aspects.

The four key elements described above are interrelated and highly depend on the research prototype platform of SES and HPI. Previous research and publications in the area of web search personalization and information filtering[44] carried out with said prototype provide valuable theoretical and practical knowledge and will serve as an optimal starting point for the integrating personalized access, search and distribution into ASIMOV.

Personalization also plays an important role in the user perception of the "quality" of the overall system. Users perceive the system as a single, unified entity and consider any deficiency or efficiency as being part of the whole system. Information retrieval quality is a key part of this user perspective and must be accounted for. In order to ease the integration with the SES collaborative filtering platform in ASIMOV, SES will develop and extend the Application Programming Interfaces (APIs) to open its use to the partners. As the industrialization of the collaborative filtering platform is an important part for SES, the collaborative filtering platform APIs will follow Internet standards as published by the IETF or the W3C. To validate the

[43] Noll/Meinel 2006
[44] Noll/Meinel 2007b

APIs, ASIMOV will be used by the other partners to benefit from the services provided by the collaborative filtering platform like personalization or collaboratively driven IMOs access control (information filtering). POLIMI will edit exemplary audio-video transcripts from Italian to English and vice versa and from French to Italian and vice versa.

T3.5 Multi-lingual aspects and Natural Language Processing

This task is very much reliant on previous work as NLP is not the actual focus of ASIMOV; it therefore refers to the integration, adaption, scaling, and further developing of speech recognition technologies from external sources (e.g. FP6 projects). In principal, implementation of this task will be based upon the experience the task leader UASNW has with similar procedures in its POLE project to transcribe recorded videoconferences.

To enrich the audiovisual object with as much data as possible we apply speech recognition to the audio stream and store it synchronized with the other multimedia tracks. This process, referred to as automatic transcription, automated speech recognition (ASR), natural language processing (NLR) or speech-to-text generation produces textual data and is spread continuously over the audio track as isochronic(al) data. It's known that today's speech recognition cannot replace manual transcription but combined with other semantic annotation it is very powerful.

Today's performance rates we will hardly achieve high-quality transcripts, but with fine tuning parameters and the extension of current algorithms we contribute towards a better recognition of semantically important words with Large Vocabulary Continuous Speech Recognition (LVCSR) systems. Tuning also means (re-) training of current large vocabularies to adapt to our multi-faceted environment. Furthermore, there is no need for a complete recognition as it is sufficient to recognize the main keywords that describe the content of a given section. These keywords relate to a domain ontology that will serve as basis for semantic annotation. Thus, term spotting will be sufficient to achieve this task.

With the development of a Lecture Browser[45], MIT has shown the functioning of this concept. ETH is in contact with MIT to implement the underlying technology in REPLAY and will take care of also incorporating it into ASIMOV.

The adoption of existing transcription technology will have to be realized against the background of very heterogeneous material in very differing scenarios. UASNW and ETH will implement solutions acknowledged in previous projects in light of the requirements analysis by different use cases. This process will be coordinated intensely with video metadata research (T3.1) and video search (T3.7). In addition, FUB will edit exemplary audio-video transcripts in English, German, Polish and Russian for testing purposes.

T3.6 Visualisation and User Interface Design

The ASIMOV search engine facilitates a personalized semantic search on multimedia objects. In contrast to today's search engines for audiovisual content the ASIMOV semantic search engine is not restricted to keyword queries resulting in ordered (flat) lists of single objects. It offers various levels of search granularity, i.e. not only objects as a whole, but also fractions or segments can be identified directly. ASIMOV provides different methods for automated and collaborative semantic annotation of multimedia objects, as well as the ability even to search within the multimedia data itself. The semantic search engine produces sets of semantically interrelated multimedia objects, with a multidimensional structure.

Information Visualization: Thus a major challenge in this task will be the **visualization** of a huge amount of multimedia objects, its ontology structure and data annotation, and the relationships between the objects. Following Shneiderman's Visual Information seeking Mantra [Shneiderman 1996] next to overview, zoom/filter and details–on–demand, the visualization should support viewing (1) relationships among different objects and sets of data, (2) a history of actions for progressive refinement and (3) extractions of sub–collections and query parameters.

Sets of semantically interrelated multimedia objects as they occur in search results as well as for an overview

[45] http://web.sls.csail.mit.edu/lectures/.
[46] Brin/Page 1998
[47] Golder/Hubermann 2006.

of the available data have to be presented comprehensible. The user also must be able to revise, extend, or refine his/her search query not only by adding keywords or boolean expressions to the keyword phrase, but also by graphical means to enable a more intuitive access to the available data.

Next to the general problem how to represent large repositories of audiovisual content avoiding bandwidth problems the relationships between the multimedia objects have to be shown adequately. The use of interactive visualizations has turned out to be a promising approach (Luo et al. 2006). Nevertheless, 2D and 2.5D visualization is limited especially for presenting large sets of data and their semantical interrelation. 3D technologies like Virtual Reality have some properties like stereoscopic 3D imaging in real-time, first person view or 3D interaction [Kalawsky, 1993] [Burdea and Coffet, 2003], that help users to search in large multi–dimensional data sets and to explore new correlations of the presented information. Since information provided by the interrelated multimedia objects can be described as multi–dimensional datasets, we will evaluate the use of Virtual Reality for the representation of the multimedia objects and their interrelations. With SpereViz Soldati et al. (2007) have presented a 3D user interface for the visual exploration of multi–dimensional data sets in Virtual Reality, which we will build on in the ASIMOV project.

User Interface Design: The main goals of the development of the user interface is to provide appropriate graphical visualization of the search results and application functionality as well as interaction techniques for a suitable use of the whole ASIMOV system. The user interface design has to care about the overall interaction concept for the ASIMOV features and their uniform look and feel. Therefore all user interface elements and interaction techniques have to be brought into line. Considering the different types of media and input and output devices the user interfaces have to support, an overall concept has to be developed taking this aspect into account.

Next to the consistency of the user interface two major aspects pose a challenge: On the one hand (1) the addressed user groups (pupils, students, scientists, private customers) and their needs and expectations are heterogeneous. Therefore, the user interface has to provide different ranges of functionality for searching, editing and annotation tasks and both, user guided and system guided interaction styles. Adaptive and customizable concepts need to be developed and evaluated. On the other hand, to provide for an ambient utilization of all features and to amplify the goal of customized solutions, (2) ASIMOV has to be optimized for the use with different types of devices (e.g., organizers, tablet PCs, smartphones and terminals) in an ubiquitous environment, which requires the development not only of a multi–platform system but also of a multi–device user interface for multimedia content. This also concerns the visualization of the multimedia objects and search results.

For the multi–device interfaces we plan to build on state of the art user interfaces of each device type and optimize them for the use in ASIMOV. The aim is to develop a tool for automatically generating adjusted user interfaces as described by Nichols and Myers (2003).

Interaction Techniques: Besides the representation of search queries, all other search engine components depend on an appropriate interface for efficient user interaction. This includes the manual semantic annotation process, the composition of new multimedia objects, and the process of collaborative annotation. Therefore, the user interface has to provide both, comprehensible navigation through the data as well as appropriate techniques for the actual search task.

Interaction techniques, therefore, have to be divided into two main tasks: (1) The interactive support of the visualization of the multimedia objects and the search results and (2) the techniques for controlling the application features and the entire ASIMOV system. After developing the conceptual description of the interaction processes, these tasks have to be implemented and evaluated for each visualization style and i/o device.

In this task, UASNW will work on an overall interface concept for all ASIMOV tools and features. Since the ASIMOV project addresses heterogeneous user groups the interface also has to provide different ranges of functionality for searching, editing and annotation tasks and both, user guided and system guided interaction styles. It also will develop designs for multi–device interfaces as well as visualization concepts for both, 2D and 3D interactive visualization. FUB will work on user interface conception, design, the deliverable will be the adoption of a test environment (search interface, annotation, tagging...) for audio-visual archive users. POLIMI will contribute to the design of interaction addressing different users groups and different platforms.

T3.7 Video searching

One main goal of the ASIMOV project is the design, implementation, and deployment of an innovative semantically augmented search engine for IMOs. In contrast to today's search engines ASIMOV's search engine is not restricted to keyword queries producing ordered (flat) lists of search results. The two main differences are constituted in various levels of search granularity and in the identification of semantically interrelated IMOs.

Semantic Search: A typical search result may consist out of single IMOs, which are referenced by the user's query as a whole, or also out of fractions and rearranged sequences of single IMOs, if a finer level of search granularity is required. In the eLearning context as specified in WP2 (cf. T2.5.1 E-learning for Education and T2.5.5 Corporate E-Learning), plain and single IMOs are often not sufficient to satisfy the learner's information needs. A concept being subject to the user's query might be explained within a single IMO, while other concepts do occur within the given explanation, which also need to be explained. The semantic search process has to continue with those concepts that need further explanation. Therefore, to provide sufficient information, the results of the semantic search engine comprise semantically interrelated IMOs, again on different levels of granularity.

On the other hand, semantic annotation also provides synonyms to increase search recall and contextual information to increase search precision. In interplay with search result visualization (cf T3.5 Visualization) semantic metadata enable efficient navigation of the search space and allow the serendipitous discovery of related results. The envisioned efficient visualization (as being developed and implemented in T3.5) has to be integrated into ASIMOV's semantic search engine search result visualization, navigation, and user interaction.

Semantic search based on automated semantic annotation of IMOs has to be integrated together with an efficient and scalable architectural framework. Architectural scalability is a very important issue for search engines being able to manage a huge and ever-growing set of heterogeneous IMOs as well as being able to provide sufficient results in real-time for a great number of parallel users.

The implementation of the ASIMOV semantic search engine has to be able to scale with an ever-growing number of searchable entities and users. In contrast to traditional web search engines, semantic search in connection with the processing IMOs is consuming much more resources than the processing of customary web pages. In a pre-processing step IMOs have to be analyzed and automatically annotated with semantic metadata. IMOs in connection with timed semantic annotations are used to construct an efficient search engine index data structure that allows real-time search access for a large number of parallel user queries. Pre-processing and indexing have to be performed offline as a background process. For being able to provide an up-to-date search engine index, the interval between two indexing processes has to be kept small. This requires the pre-processing and indexing processes to be parallelized in an distributed environment.

The real-time provision of search results for a large number of users also requires to distribute the search process on a server cluster. The server cluster is managed by a routing server, which distributes incoming search queries to cluster members for load-balancing and maximum availability. Server cluster and computing cluster both rely on an efficient storage architecture. In the pre-processing step, the analysis of IMOs is rather storage consuming. Video data as being the most storage expensive IMOs have to be transferred, transcoded, analyzed and annotated.

We distinguish between the deployment of the ASIMOV semantic search engine as a global web based search engine, which requires a highly reliable and high performance computing environment, and the deployment within a local intranet for searching within data that have to obey hard access restrictions, which requires a smaller scale computing environment. Nevertheless, the ASIMOV semantic search engine has to operate on both levels.

Semantic search Integration: IMOs are semantically interrelated with each other. Individual IMOs often cover several different topics, which are not all related to the user's information needs. Automated semantic annotation provides means to identify fractions or sequences of IMOs with concepts related to them. These concepts can be semantically interrelated with the help of backend ontologies. The ASIMOV semantic search engine provides sets of interrelated IMOs as result to a user's query by reasoning over the available

semantic metadata.

Each user has different needs according to the level of complexity that the answer he/she is looking for should provide. In addition, every user has different previous knowledge. Thus, there is no single canonical result for a given query. User dependent prerequisites as his/her afore mentioned previous knowledge and the desired level of information complexity determine the most sufficient answer. To accomplish a personalized semantic search as being proposed, the ASIMOV search engine has to provide means to gather information about the user's previous knowledge. This can be achieved by monitoring the user's actions, by providing possibilities for user feedback, and by designing a search process. For the ASIMOV search engine a fast semantic search index has to be developed that extends the concept of existing search indices.

In addition, the search results have to be ordered according to their relevance. Traditional search engines apply ranking functions, as e.g., the Google PageRank[46]. For semantically interrelated IMOs an appropriate relevance function has to be developed, which takes into account how well an IMO relates to a given topic and how valuable its contribution really is also allowing for social networking information.

To choose from the presented search results, the user must be able to grasp the content of a set of semantically interrelated IMOs and to decide, whether they are fitting to his/her information needs. Therefore, the ASIMOV search engine has to provide appropriate visualizations for semantically interrelated IMOs. Furthermore, the visualization (cf T3.5 Visualization and User Interface Design) can also be used to provide a hierarchical view upon the universe of available IMOs and their relationships to enable efficient navigation and interaction.

Social Search Integration: In addition to manually or automatically created semantic annotations, also collaborative annotations in the form of tags, comments, discussions or visual annotations, have to be integrated into the search process of ASIMOV. The user has the possibility to add his/her own metadata to IMOs. User metadata can have different levels of semantic complexity. User provided metadata are most useful for the user who has provided them[47] and thus, are required for obtaining a personalized search. The social networking component related to the process of collaborative annotation provides further information about the relationships among the users. Friends or users with a similar interest are more likely to provide useful information than complete strangers. Also IMO authors or designated experts are more likely to provide useful annotations than ordinary users. These relationships have to be taken into account to integrate collaborative annotation into the traditional search process. The indexing process as well as the ranking function has to be adapted accordingly to provide the most appropriate personalized search result.

Besides semantic annotation, also user feedback has to be taken into account for evaluating the quality – and thus, the relevance – of IMOs. The ASIMOV search engine has to provide means for enabling and analyzing user feedback as well as user recommendations such as ratings or votings. To make further use of collaborative annotations, the user must be able to get a quick overview about the annotations related to a given IMO as a whole. He/she must be able to identify his/her own annotations as well as the annotations of others according to their relationship among each other. T3.5 provides appropriate means for visualizing annotated IMOs that have to be integrated into the ASIMOV search engine.

Registration of IMO and Web Crawling: The ASIMOV search engine maintains an entire universe of semantically interrelated IMOs. These IMOs can be integrated into the search engine either manually by registration or can also be automatically discovered with the help of an automated crawling process. As being a large scale web based search, the content being uploaded by the author has to be moderated to prevent malpractice.

As for traditional search engines, ASIMOV also deploys a web crawling process to discover and to integrate new IMOs. In difference to traditional web crawlers, the ASIMOV crawling process has to provide sophisticated filtering of crawled objects for deciding whether an identified object really is an IMO. Besides feature analysis of identified objects, which enables identification by similarity, documents related to identified objects can give hints about being a suitable IMO. To improve the quality of the identification process, the crawling process has to be adaptive and must provide means to be guided by manual moderation.

In this taks, FSU, HPI, CWI, AMP, and ETH will provide a video search engine framework for pinpoint retrieval in video data repositories. The indexer will be the main component of the video search engine,

combining analytical & keyword index (T3.3) with semantic index (T3.1) and collaborative index (T3.4). The analytical index combines several filter mechanisms (NLP, OCR). In the semantic index, keywords from the analytical index relate to concepts. Concepts again respect various interdependencies, constraints, and rules among each other. The collaborative index combines user provided metadata such as tags, comments, ratings, or social network information. The integrated index in combination with collaborative filtering (T3.4) provides means for individually customized results (personalization) of spatio-temporal fragments (T3.2) of video resources. Ontology-augmented query processing operates on the integrated index and uses innovative visualization methods for search results (T3.6).

T3.8 Identity, privacy, copyright, DRM

The identity and privacy of users will be in the ASIMOV project handled through the integration of contextual based indexing and search services into the SATMODE Application Platform. The SATMODE platform has the inherit capability for identification and authentication of individual users or user groups. In addition the anonymous access to platform can be granted to certain services requiring protection of user privacy (like voting for specific content, ….). The SATMODE user management part will be integrated with the IMS HSS allowing the identification of users based on the device and access network used to access the content. This shall enable management of the content assess rights based n the user personalisation as well as on the geographical location. Knowing that most of the video content rights sold in Europe today are still linked to certain territories the integration of this functionality in the ASIMOV video content lifecycle is a prerequisite for the adoption of the system by content owners and its commercial success.

Today, in the commercial TV and broadcast environments the Conditional Access Systems (CAS) and Digital Rights Management (DRM) systems are used to protect linear and non-linear content. This project will look at the integration of the existing CAS and DRM systems into the ASIMOV framework through establishment of necessary contextual tags indicating the content rights. This shall enable the content search based not only on user’s preferences, but also on the individual user rights. The last thing user would like to see is a search results listing the content that is not accessible to her/him. This calls for the clever integration between content tagging, user profiles and CAS/DRM attributes, which will be explored as a part of this project.

Considering that ASIMOV services will be, besides other attributes, based on personalisation, location based services and presence, this will potentially expose the end user to the threat revealing much more privacy data than today. This question will be specially addressed through the implementation of rule based opt-in and opt-out functionality and possibility for user to have an ultimate control of her/his private data exposed to third parties. User privacy will be protected according to the applicable privacy protection laws. Assessment of specific mechanisms, like one-time tokens for access to third-party systems, as well as specific architectural consideration (centralized vs. distributed control and data storage) will be addressed in the frame of privacy protection mechanisms.

Most jurisdictions recognize copyright limitations, allowing "fair" exceptions to the creator's exclusivity of copyright, and giving users certain rights. The development of digital media and computer network technologies have prompted reinterpretation of these exceptions, introduced new difficulties in enforcing copyright, and inspired additional challenges to copyright law's philosophic basis. Simultaneously, businesses with great economic dependence upon copyright have advocated the extension and expansion of their copy rights, and sought additional legal and technological enforcement

The use of digital rights management has been controversial. Advocates argue it is necessary for copyright holders to prevent unauthorized duplication of their work to ensure continued revenue streams. Opponents, such as the Free Software Foundation, maintain that the use of the word "rights" is misleading and suggest that people instead use the term digital restrictions management. Their position is essentially that copyright holders are attempting to restrict use of copyrighted material in ways not covered by existing laws. The Electronic Frontier Foundation, and other opponents, also considers DRM systems to be anti-competitive practices.

In practice, all widely-used DRM systems have been defeated or circumvented when deployed to enough customers. Protection of audio and visual material is especially difficult due to the existence of the analog hole, and there are even suggestions that effective DRM is logically impossible for this reason.

In addition, FUB will do research on historical audio-visual archive rules, personal rights and usage licenses.

The deliverable provided by UL will be a description of commonly used digital rights for audio-visual archives and lecture materials.

POLIMI will contribute to this task providing its expertise in the field of privacy and intellectual property right management.

T3.9 Content distribution (multi-terminals)

Accessibility to ASIMOV from resource reduced devices will require special considerations.

User interface design: Mobile devices and Set-Top Boxes need to have special considerations on their user interface. They tend to have small display in case of mobile phones or to have limited resolution and colours displaying capabilities in case of Set-Top Box. Naturally user interface on these devices should follow as much as possible user interface presented to user when he is accessing ASIMOV from standard PC.

Personalization: Users want to be able to customize behaviour of the application to suit their needs. We will investigate best way to enable customization of user interface and application behaviour for each specific device. Wherever possible, customization should be agnostic to access device or network. Customized behaviour should be stored on the system and available across user's sessions.

Memory and Persistent storage: Streaming video content usually requires some buffering in order to compensate to possible (and probable) network congestion situations. This is a problem when memory on the device is limited. Storage of content on temporary file on persistent storage can suffer from the same problems. A special care needs to be taken to address this issue. We intent to investigate and utilize available solutions for each specific device type that will enable smooth streaming of video content regardless of device capabilities.

Network speed: Special devices can have limited available bandwidth. This can severely impact devices possibility to be a part of the video content distribution chain. For every type of the device, typical and worst-case scenario for network bandwidth needs to be analyzed. If bandwidth is not sufficient, an alternative solution should be proposed (reduced video quality with lower bandwidth requirements, alternative network access, transcoding of content to more appropriate format for specific target device….).

Special features: In some cases devices can have special features not available in ordinary PC-s (positioning, speech recognition, and similar features). System design should propose a way to utilize such additional possibilities. We will take special interest in location-based features available on mobile phones (GPS) and SATMODE enabled Set-Top Boxes (Zipmode).

In this task AMP will define the means by which content will be distributed to clients. This consists of defining the overall structure of the content distribution system and addressing issues such as the technologies and protocols used, service interfaces, etc. Emphasis will be put on multi-terminal support, which lifts restraints on which devices and services can be used to access the content.

T3.10 Interoperability with legacy platforms

Design and implement extensions to the SATMODE Application Server that will support the interoperability of standard MPEG-2-encoded DVB linear programs with state-of-the-art interactive-TV and Internet-TV content. These extensions will include the embedding of Internet-TV stream references into DVB linear programs. No prerequisite changes will be required to the encoding or transmission of the existing DVB linear content.

Design and implement extensions to the SATMODE Application Server that will support the deployment, transmission and consumption of interactive-TV content that can complement and integrate existing linear digital programs. These extensions will cover professional content production and distribution as well as amateur audio-visual contributions inspired by the YouTube service model. Authorized users will be able to publish audio-visual content and annotations that complement existing linear digital programs.

Integrate newly developed audio-visual discovery services and SES ASTRA IPTV services (such as Electronic Program Guide, Video-on-Demand, and Personal Video Recorder like control of streams) into a coherent middleware system. Integrate existing SATMODE Application Server interactive service features such as messaging, voting and purchasing on-line into the same architecture. The viewer will be presented with an intuitive user-friendly interface to access all available functionality.

Integrate newly developed tools for the annotation, indexing, addressing and search of interactive audio-visual content with SES-ASTRA's existing linear digital broadcast portfolio. The integration shall support the development of commercial interactive programs that make use of viewer's online contributions for the generation of the actual content.

Design and implement extensions to the SATMODE Application Server for the integration of the newly developed audio-visual discovery services. These extensions will be compatible and make use of open industry standards such as MHP (Multimedia Home Platform) and IMS (IP Multimedia Subsystem). These extensions will include currently supported device (e.g. TV, mobile, PC), transport (e.g. DVB-S/T/C, DVB-H/DMB, and DSL) and return channel (e.g. SAT3PLAY, GPRS/UMTS, and DSL) options of the SATMODE Application Server.

Design and implement extensions to the SATMODE Application Server for the billing and accounting of operations and transactions according to an appropriate business model designed to support and monetize the development and maintenance of the additional infrastructure required to operate the newly introduced services.

SES-ASTRA's SATMODE Application Service (SATMODE A.S) platform supports interactive applications by providing content producers with a vendor-neutral solution, based on open standards such as IPv6, MHP, OSGi and IMS. The SATMODE Application Service provides interactive applications with core services, such as Application Management and User Management, as well horizontal services, such as Messaging and Payment, upon which content and service producers can build interactive applications. SES-ASTRA envisages extending the SATMODE Application Service platform to support ASIMOV services:

- Integrating intelligent video search and navigation as apart of the service of our Application Server (AS);
- Enabling profiling and personalization as a part of the AS;
- Intelligent video search in relation to the linear content and cross-referencing to non-linear content (e.g. user watches linear TV, see Eiffel Tower and want to see other non-linear content related to it);
- Integration of IPTV based access schemes, accounting and subscriber profiling;
- Multiple delivery channels;
- Integration of location and presence in the indexing and search criteria.

Development and integration of ASIMOV application module into the IMS service layer. Achieving the defined level of interoperability between ASIMOV intelligent audio-video content exploring, fetching and searching through ASIMOV application module. Implementation of audio-video content management and control by integrating ASIMOV management and control services together with IMS horizontal services on control layer level. Analyzing possibilities of making the base for extension applications, which will enable the interoperability with future systems that use ASIMOV.

T3.11 External Interface Integration and Content Syndication

The fields of e-learning and content delivery are especially open to sharing information, either to all or to a preferred group of users with granted access. Therefore, a means of successful information exchange between systems should be defined and made available. Due to the nature and objectives of the ASIMOV project information exchange with Content Management Systems, Learning Management Systems and Document Management Systems based on a System Oriented Architecture (SOA) has to be provided. Web services will enable the content delivery directly to each system, respecting the user permissions and other requirements. Information exchange will be two-way directed including user provided data such as tagging data, comments or rating.

In addition, there is a tendency to syndicate different information and integrate it in other Web sites, with the help of mash-up technologies, which are usually client-side oriented. The Web 2.0, paradigm allows easy integration of user-provided content via suitable Application Programming Interfaces (APIs). Such information elements can be formed as portlets or widgets in other sites and easily added and personalized. In this way more concrete collaboration and social networking between users in various communities will be enabled, as users will be able to add or change content information originating from any Web site, which uses the ASIMOV mash-up API.

In this task, UZ will define the method and service interface for integration between ASIMOV and different systems. Such systems include Content Management Systems, Learning Management Systems, Document Management Systems. The outcomes of this task will enable information exchange between various applications, based on Web services. Besides interface methods definitions, a user interface on an existing system, such as LMS, will be created. In addition, the support for including social networking features, such as tagging or commenting on different web sites, using mash-up enabled user interfaces (web sites, widgets, portlets, etc.) will be added in outcomes of this task.

T3.12 Network and End-user security

The introduction of IPv6 into the network of ASIMOV will add a new dimension of security in the project. The concept of end to end security will be researched especially in the combination of the SAT network and the mobile and location services planned. ASIMOV will research the benefits brought in by IPv6 in terms of end to end security as well seamless mobility using mobile IPv6. The impact on privacy will be studied when using SAT and mobile networks. UL will implement this task by researching IPv6 security on SAT network and mobile networks, as well as the impact of IPv6 on privacy.

Deliverables

D3.1.1	Ontology for the representation of multimedia data	Delivery Month:	12
D3.1.2	API for manual multimedia annotation	Delivery Month:	15
D3.2	Document on concept and Implementation of spatio-temporal addressing based on URI fragment identifier	Delivery Month:	9
D3.3	API for OCR-based analytical indexing of video data	Delivery Month:	15
D3.4.1	Collaborative Filtering Framework: components for collecting and aggregating user annotations and ratings/votings for IMOs	Delivery Month:	15
D3.4.2	Collaborative Filtering Framework: components for creating user profiles and personalization of search results	Delivery Month:	28
D3.4.3	Development of full-fledged Collaborative Filtering Framework API	Delivery Month:	21
D3.5.1	Exemplary multilingual audio-video transcripts	Delivery Month:	12
D3.5.2	Domain specific vocabularies and auxiliary data for NLP	Delivery Month:	12
D3.5.3	API for NLP-based analytical indexing of video data	Delivery Month	15
D3.6.1	Overall ASIMOV interactive user interface concept	Delivery Month:	18
D3.6.2	Overall ASIMOV interactive user interface implementation	Delivery Month:	24
D3.7.1	Integrated indexer for Analytical & manual keyword index	Delivery Month:	18
D3.7.2	Indexer for Semantic index data	Delivery Month	24
D3.7.3	Indexer for Collaborative index data	Delivery Month	24
D3.7.4	Integrated Indexer for video data including analytical, collaborative, and semantic index data	Delivery Month	27
D3.7.5	Search Engine Framework for Video Search	Delivery Month:	30
D3.7.6	Evaluation, Validation, and Test of Video Search Engine and its Components	Delivery Month:	30
D3.8.1	Requirements catalogue for technological solutions for digital audio-visual archives	Delivery Month	21

D3.8.2	Integration of developed DRM concepts & methods in video search engine	Delivery Month	27
D3.9.1	Definition of content distribution system to clients	Delivery Month:	15
D3.9.2	Development and Implementation of content distribution system	Delivery Month:	27
D3.10.1	SATMODE Unit and Regression Test report	Delivery Month:	18
D3.10.2	SATMODE Performance and Interoperability Validation Test report	Delivery Month:	27
D3.11.1	Integration interfaces Definition Document	Delivery Month:	15
D3.11.2	Social networking features Definition Document	Delivery Month:	15
D3.11.3	LMS integration interface Prototype	Delivery Month:	18
D3.11.4	Social networking Mash-up API Prototype	Delivery Month:	18
D3.12	Report on Security and Privacy issues in ASIMOV	Delivery Month	6

WP4: User Scenario Trials and Demonstrations

Work package number	**WP4**		**Start date or starting event:**		**Month 6**		
Work package title	**User Scenario Trials and Demonstrations**						
Work package leader	**PoliMi**						
Activity type	RTD						
Participant number	1	2	3	4	5	6	7	8
Participant short name	SES	ETH	UL	FSU	UASNW	HPI	RSA	MCCM
Person-months per participant	8	20	9	4	0	4	20	8
Participant number	9	10	11	12	**13**	14	15	
Participant short name	FUB	UZ	AMP	CWI	**PoliMi**	TI	Martel	**Total**
Person-months per participant	18	6	24	12	**31**	14	0	**178**

Objectives

- Validate the proposed solution/s for each user scenario starting from a set of beta tests developed in cooperation with selected partners, collecting feedback and remarks.
- Tune and optimize the proposed solution/s taking into account the results of the validation step.
- Demonstrate the proposed solution/s to a broader audience and extend to additional case study the research results.

Description of work

T4.1: Integrated Trials/Validation and Verification per scenario

A set of integrated trials/validation and verification test will be performed addressing each scenario: eLearning, eHealth, Interactive TV, Historical political content, Corporate eLearning and Mobile services. The trial and validation activity will be subdivided in two different phases. The first one will mainly involve project partners and subcontractors providing content and performing tests. The second phase will be enlarged to a panel of interested parties performing more specific tests.

Each contributor to the work package will provide multi media digital content for the specific domain of application in order to setup the process. External contributors/interested parties (please refer to endorsement letters appended to this document) will provide their own support providing similar content.

An additional subdivision has to be outlined between the use of the ASIMOV set applications and tools managing monolithic movies and multimedia content (the process) and the use of the final result of such elaboration, a multimedia communication environment contextualising information (the result).

The work package activity will start at T0+8, one of the first tasks will be to prepare the evaluation questionnaires to be used later on to collect suggestion both from partner and external contributors.

External contributors / interested parties may simply provide their own contents and later on test the results (first scenario) or install a beta version of the solution and after a training phase use by themselves the application. In such a case they will be asked to fill up a different questionnaire including feedbacks on the application. On the occasion of the extended trials opened to interested parties a Delphi survey will be performed in order to consolidate the guidelines for product development.

After the completion of a first round of tests an assessment phase will be started in order to improve quality and functionalities of the application.

At the end of this cycle (T0+26) a preliminary trials report (E-learning for education, E-health, Interactive TV, Historical/political content, Corporate e-learning, Mobile services) will be issued.

A second round of tests will confirm the achievement of the goals. If negative a new evaluation cycle will be activated. At the end of this evaluation process (T0+30) a final trials report (E-learning for education, E-health, Interactive TV, Historical/political content, Corporate e-learning, Mobile services) will be issued.

Main milestones will be the issue of the questionnaires (T0+14), the activation of the trials (T0+18), the issue of the first report (T0+26) and the issue of the final report (T0+30).

T4.1.1 E-learning for Academia

ETH will implement ASIMOV technology on top of the existing REPLAY infrastructure to enhance recorded lectures. The main focus will be the development of a didactical framework on the one hand, the integration into existing e-learning activities with the main parameters being acceptance among the target groups (students, lecturers).

T4.1.2 E-Health

ASIMOV trials/validation and verification processes in the domain of healthcare will concern different audiences (administrative personnel, doctors, paramedic personnel, patients, citizens), platforms (on line, broadband – wired, on line, broadband – wireless, on line, narrowband, off line) and content (already existing content, new content (ASIMOV standards compliant), technical content, educational content.

T4.1.3 Interactive TV

This objective of this task is to validate the scenario proposed and defined in WP 2. These trials and demonstrations will make use of services and specific technology elements implemented in the platform in WP 3. Its aim is to test the features of the mobile application and its performance. The outcome of this task is a trial report.

T4.1.4 Historical/political content

FUB will implement a test environment for use cases and will evaluate the developed technological solutions for historical digital audio-visual archives.

FUB will develop questionnaires to evaluate the functionality and usability of:

- the user interface
- the search options
- the personalized and shared access to search and work results
- the editing and enrichment options
- the publishing options

The deliverable will be questionnaires and a description of the evaluation results.

T4.1.5 Corporate e-learning

In order to carry out an evaluation of all user requirements within the area of Corporate E-Learning, the ASIMOV software must be activated in enterprises to the extent that access to video assets is secured. With that the prerequisite for the evaluation either through the project participant or the enterprise itself is rendered possible. Within Trials and Demonstration the following questions are looked at:

- Requirements and needs of the enterprise
- Quality of query results - search for internationally distributed assets
- Technical and functional interaction with learning platforms
- Securing of compatibility with standards like SCORM
- Guidelines and requirements of enterprises for cooperations and clearances
- Legal restrictions
- Compatibility with technical video standards
- Processing and designing of new programs and clarification of rights

- Archiving standards
- Consideration of processes, clearings, CI/CD, etc.

These aspects will play a role in both scenarios to various extents.

More in detail ASIMOV trials/validation and verification processes in the domain of Corporate eLearning will concern: different corporations (public companies and institutions, private – Multinationals &SMEs), different audiences (administrative personnel, employees, managers, internal tutors), different platforms (on line, broadband – wired, on line, broadband – wireless, on line, narrowband, off line) and content (already existing content, new content (ASIMOV standards compliant), technical content, educational content.

T4.1.6 Mobile services (2-way TV)

This objective of this task is to validate the scenario defined in WP2. This validation will make use of the services implemented in the platform. Its aim is to test the features of the mobile application and its performance. The outcome of this task is a trial report

T4.2: Integrated Demonstration

The aim of the present phase is to demonstrate the proposed solution/s to a broader audience and extend to additional case study the research results. One of the first tasks care of the involved partners will be to define a demonstration strategy in detail accordingly with the calendar and upcoming relevant opportunities.

T4.2.1 Live demonstrations

The task consists of organizing public events, accordingly with the demonstration strategy, to illustrate specific applications of the solution, in consistency with target users and audience. Feedbacks will be collected on the occasion of live demonstrations in order to contribute, together with on line surveys, to the issue of the demonstration report.

T4.2.2 Online demonstrations

On-line demonstrations will be available on line to both registered and unregistered users. Registered users may have the opportunity to fill up an evaluation/suggestion on line form.

Deliverables

D4.1.1	Evaluation questionnaires preparatory docs for Delphi	Delivery Month:	14
D4.1.2	First trials report (E-learning for education, E-health, Interactive TV, Historical/political content, Corporate e-learning, Mobile services)	Delivery Month:	26
D4.1.3	Final trials report (E-learning for education, E-health, Interactive TV, Historical/political content, Corporate e-learning, Mobile services)	Delivery Month:	30
D4.2.1	Demonstrations Public Event (Live demonstrations)	Delivery Month:	30
D4.2.2	On line demonstrations	Delivery Month:	30
D4.2.3	Final report on Demonstrations	Delivery Month:	36

WP5: Training

Work package number	**WP5**		**Start date or starting event:**		**Month 13**			
Work package title	**Training**							
Work package leader	**FUB**							
Activity type[48]	OTHER							
Participant number	1	2	3	4	5	6	7	8
Participant short name	SES	ETH	UL	FSU	UASNW	HPI	RSA	MCCM
Person-months per participant	2	0	8	0	0	0	0	0
Participant number	**9**	10	11	12	13	14	15	
Participant short name	**FUB**	UZ	AMP	CWI	PoliMi	TI	Martel	**Total**
Person-months per participant	**8**	14	0	0	6	0	0	**38**

Objectives

- to ensure the dissemination and the use of the technological solutions the project offers the different user-groups
- to show policy makers in the field of audio-visual archives the additional benefit of the technological solutions
- to train the archive users who want to search for and to work with digital audio-visual material.

Description of work

To ensure the use of the technological features, different user groups need to be addressed and trained. Therefore concepts of training material will be developed. On the one hand it is necessary to show those people who are policy makers in the field of audio-visual archives the additional benefit of the technological solutions, on the other hand the users who want to search for and work with digital audio-visual material (annotation, enrichment) need to be trained in the use of the features the technological solutions provide.

T5.1 Training on the technology platform

T5.1.1 Development of concepts

Concepts of online training material will be developed to show the use of the developed technology for policy makers.

The development of concepts will follow the general process of conceptual design for digital e-learning / training material. It will start with a selection of the technological key features the training material shall present and train. Then a didactical concept will be developed. The conceptualization phases will include the project definition and the basic concept

[48] Please indicate one activity per work package:
RTD = Research and technological development (including any activities to prepare for the dissemination and/or exploitation of project results, and coordination activities); DEM = Demonstration; MGT = Management of the consortium; OTHER = Other specific activities, if applicable in this call.

Project definition and basic concept will address amongst others topics like didactical strategy, definition and analysis of the target group(s), definition of the objectives, definition of the structure of the training material.

T5.1.2 Development of tutorials

Online training material for policy makers will be designed and produced:

- The online training material will be designed and produced according to the definitions and concepts developed in T5.2.1.
- On the basis of the conceptualization phases 1. project definition and 2. basic concept a detailed concept will be developed.
- On the basis of the detailed concept storyboards for the training material will be developed.
- Different media like text, pictures, audio-visual material will be produced.
- Training material will be produced according to the developed storyboards including different media, a user-friendly navigation etc.

T5.1.3 Online presentation of training material

Presentation of the online training material will be provided on the platform:

- Web pages for the presentation and integration of the training material will be developed and created for the project platform.
- The training material will be integrated in and presented on the project platform and can be also used in different platforms, learning management systems of the partners

T5.2Training user communities

T5.2.1 Development of concepts

Concepts of online training material will be developed to show different user scenarios.

The development of concepts will follow the general process of conceptual design for digital e-learning / training material. It will start with a selection of different user scenarios in the fields of the partners (e.g. e-health, historical/political content, e-learning, universities etc.

Then a didactical concept will be developed. The conceptualization phases will include the project definition and the basic concept.

Project definition and basic concept will address amongst others topics like didactical strategy, definition and analysis of the target group(s), definition of the objectives, definition of the structure of the training material.

T5.2.2 Development of tutorials

Design and production of tutorials with online self-training material for different usage scenarios and applications.

- The online training material will be designed and produced according to the definitions and concepts developed in T5.2.1.
- On the basis of the conceptualization phases 1) project definition and 2) basic concept a detailed concept will be developed.
- On the basis of the detailed concept storyboards for the training material will be developed.
- Different media like text, pictures, audio-visual material will be produced.
- Training material will be produced according to the developed storyboards including different media, a user-friendly navigation etc.

T5.2.3 Provision of FAQs

FAQs, tips and tricks will be provided.

On the basis of the results of the evaluation in WP4, the trainings and the experiences of different user groups with the technological features the project offers a collection of FAQs will be provided on the platform. This collection will be extended according to the feedback of the users.

Furthermore a collection of tips and tricks will be developed for special use cases (e.g. searching strategies in different fields like e-health, historical/political content, e-learning, universities etc.)

T5.2.4 Demonstration Workshops

Demonstration workshops will be organized to introduce the project platform to possible users

The workshops will focus on different user-groups to show the possibilities the technological solutions of the project offer in the different field addressed in the project. The workshops will give the participants and possible future users of the technological features the opportunity to talk about the use of the technology directly with the project partners.

Deliverables

D5.1.1	Concepts of online training material (technological features)	Delivery Month:	18
D5.1.2	Online training material for policy makers	Delivery Month:	28
D5.1.3	Online presentation of training material	Delivery Month:	30
D5.2.1	Concepts of online training material (different user scenarios)	Delivery Month:	20
D5.2.2	Tutorials with self-training material for different usage scenarios and applications	Delivery Month:	30
D5.2.3	Provision of FAQs, tips and trick	Delivery Month:	30
D5.2.4	Demonstration Workshops	Delivery Month:	24-30

WP6: Standardisation, Dissemination and Exploitation

Work package number	**WP6**		**Start date or starting event: Start of project**		**Month 1**			
Work package title	**Standardisation, dissemination and Exploitation**							
Work package leader	**UL**							
Activity type[49]	RTD							
Participant number	1	2	**3**	4	5	6	7	8
Participant short name	SES	ETH	**UL**	FSU	UASNW	HPI	RSA	MCCM
Person-months per participant	2	6	**10**	6	2	6	10	3
Participant number	9	10	11	12	13	14	15	
Participant short name	FUB	UZ	AMP	CWI	PoliMi	TI	Martel	**Total**
Person-months per participant	4	9	3	6	6	4	6	**83**

Objectives

- To ensure the usability of ASIMOV in academia
- To open access for multimedia objects in libraries, archives, and e-learning repositories
- To provide for legally clarified and secure access
- Develop e-learning scenarios and provide feedback to the development in ASIMOV from these preliminary studies
- Provide for a use and show case for ASIMOV as to scalability, reliability, acceptance
- To continuously disseminate the project's outcomes to the communities of researchers and users.
- To establish a community of early adopters in search engines and e-learning domain.
- To plan and prepare commercial exploitation of the project's outcomes.

Description of work

T6.1 Standards

The requirement is to guarantee the compliance of multimedia objects according to ASIMOV with relevant standards for the integration into libraries, archives, and e-learning repositories. In close coordination with national and European bodies, this implies

- Work with W3C thru CWI since it is a major stakeholder at W3C
- Observance of established libraries' standards, especially Dublin Core, MPEG-7 and MPEG-21; clarification with the Open Access Initiative, especially "OAI Protocol for Metadata Harvesting"
- Compliance with open Web standards such as URI, XML, RDF, OWL; clarification of usage of

[49] Please indicate one activity per work package:
RTD = Research and technological development (including any activities to prepare for the dissemination and/or exploitation of project results, and coordination activities); DEM = Demonstration; MGT = Management of the consortium; OTHER = Other specific activities, if applicable in this call.

other standards in a Web context.

- Compliance with archival standards, especially Digital Object Identifier (DOI) and possibly initiating the establishment of a national (CH) Handle Server
- Adaptation of standards in an e-learning environment such as LOM, SCORM and - potentially in coordination with CanCore – an overall rapprochement to IEEE Learning Object Metadata standard and the IMS Learning Resource Meta-data specification

T6.2 Facilitative workshops and focus groups

ASIMOV results on the development of spatio-temporal URIs will be disseminated through regular W3C working group face-to-face meetings, and at least one of these international meetings will be hosted by an ASIMOV partner. Further dissemination of these results will be subjected to the W3C quality control process. In addition, ASIMOV will organize a workshop on semantic search in and semantic tagging of audiovisual web content (for example at the International World Wide Web Conference or at the International Semantic Web Conference series). These workshops will be set up to attract both academic and industrial partners, and both technology and content providers.

In this task, UZ will investigate the possibilities of system utilization as a part of education process. A pilot-project to demonstrate the use of ASIMOV in at least one university course will be carried out. ASIMOV results on the development of spatio-temporal URIs will be disseminated through regular W3C working group face-to-face meetings, and at least one of these international meetings will be hosted by an ASIMOV partner. Further dissemination of these results will be subjected to the W3C quality control process.

In addition, ASIMOV will organize a workshop on semantic search in and semantic tagging of audiovisual web content (for example at the International World Wide Web Conference or at the International Semantic Web Conference series). These workshops will be set up to attract both academic and industrial partners, and both technology and content providers.

T6.3 Dissemination & Use Plan

UL together with its partners will organise a yearly ASIMOV Summit 2009-2010-2011 to get all Multimedia and mobile networks stakeholders into a general assembly meeting to foster knowledge and disseminate the results of the project to the targeted audiences of the project from industry and academia.

ASIMOV partners will run a networking workshop at each annual IST conference and will liaise with the W3C consortium to further disseminate its results.

Press and TV coverage will be organised by UL and the project coordinator in cooperation with the other partners in their countries.

T6.4 Exploitation Plan

All partners will contribute to the exploitation, according to the involvement of their organization;

- Universities and research institutes will publish the results of their studies in high profile academic conferences and journals, and the work will be incorporated into new course material.
- The commercial organizations in the Consortium (SES-ASTRA, TI,.) will ensure the exploitation of the results through the subsequent improvements of elements of the solution, complete systems, or to offer enhanced consulting services for their customers based on the results of ASIMOV
- The service providers (SES ASTRA,) will gain new opportunities to develop and sell new services, above the level of simple transmission capacity
- All partners contribute to the development of an Open Source Software strategy to ensure sustainability of project results. The strategy includes legal as well as practical aspects such as maintenance, documentation, availability, etc.

Deliverables

D6.1.1 – D6.1.6	T6.1 Standards	Delivery Months:	12, 24, 36
D6.2	ASIMOV International semantic audiovisual search and annotation workshop	Delivery Month:	28
D6.3	ASIMOV Dissemination and Use Plan	Delivery Month:	12, 24, 36
D6.4	ASIMOV Deployment and Commercial Exploitation Plan	Delivery Month:	12, 24, 36

1.3.8 Summary of staff effort

The ASIMOV project duration is 36 months, with total 837 PMs of effort provided by all partners. SES is leader of the "Project Management" WP1, with assistance from Martel, FSU leads the "Requirements Analysis" WP2, HPI is in charge of the "Technology Architecture and Development" WP3, PoliMi is in charge of the "User Scenario Trials and Demonstrations" WP4, FUB will lead the "Training" WP5 and UL is WP6 leader for "Standardisation, Dissemination and Exploitation". The allocation of WP leaders has been based on the specific partner's knowledge and expertise in the field.

Participant Nr.	**Participant short name**	**WP1**	**WP2**	**WP3**	**WP4**	**WP5**	**WP6**	**Total MMs**
1	SES-Astra	24	4	50	8	2	2	**90**
2	ETH	0	12	24	20	0	6	**62**
3	UL	0	7	11	9	8	10	**45**
4	FSU	0	36	48	4	0	6	**94**
5	UASNW	0	0	30	0	0	2	**32**
6	HPI	0	0	60	4	0	6	**70**
7	RSA	0	0	0	20	0	10	**30**
8	MCCM	0	8	0	8	0	3	**19**
9	FUB	0	16	16	18	8	4	**62**
10	UZ	0	3	8	6	14	9	**40**
11	AMP	0	36	60	24	0	3	**123**
12	CWI	0	18	21	12	0	6	**57**
13	PoliMi	0	8	10	31	6	6	**61**
14	TI	0	8	8	14	0	4	**34**
15	Martel	12	0	0	0	0	6	**18**

Figure 3: Staff effort

1.3.9 ASIMOV GANTT Chart

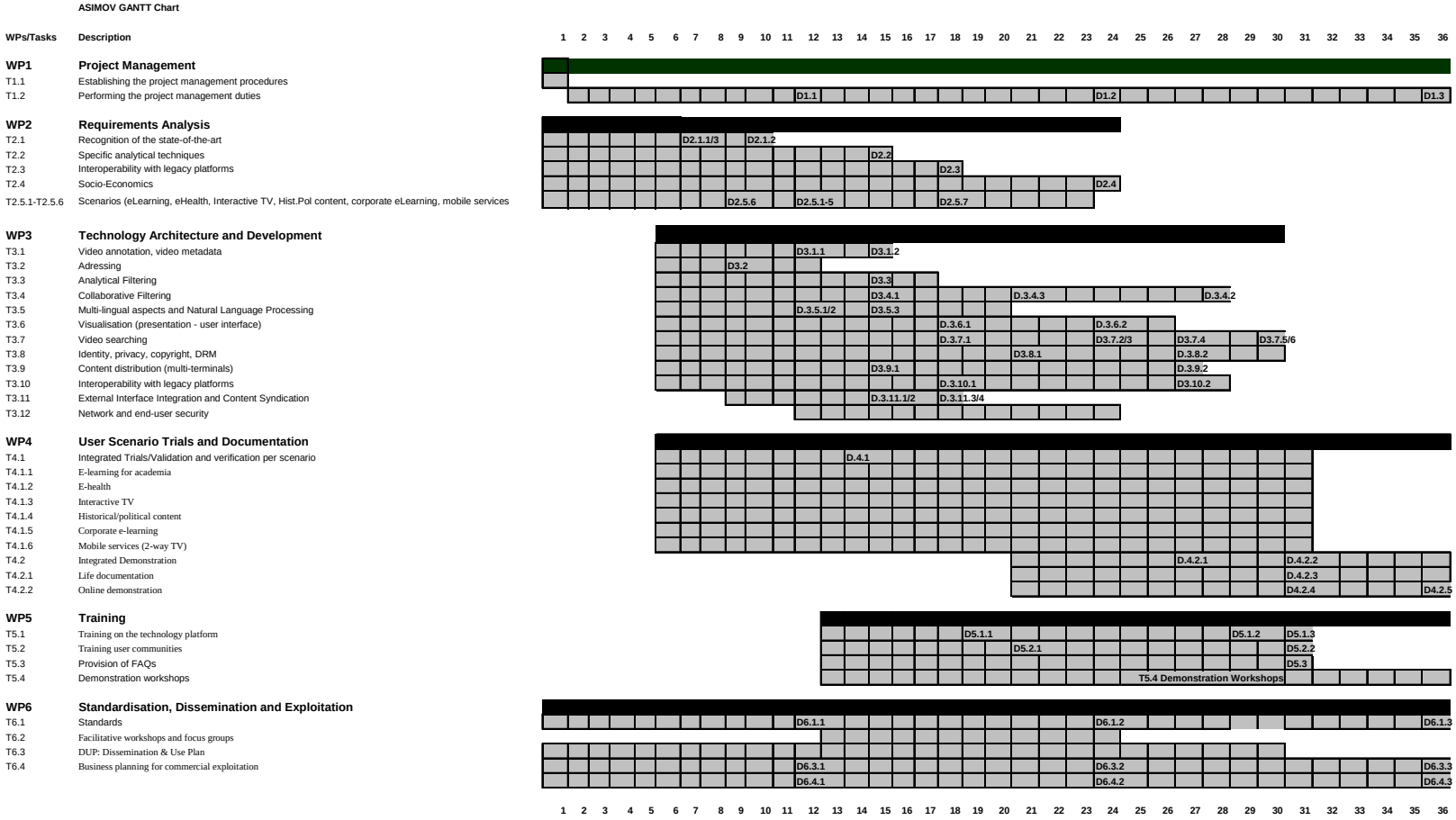

Figure 4: ASIMOV GANTT Chart

1.3.10 ASIMOV Pert Chart

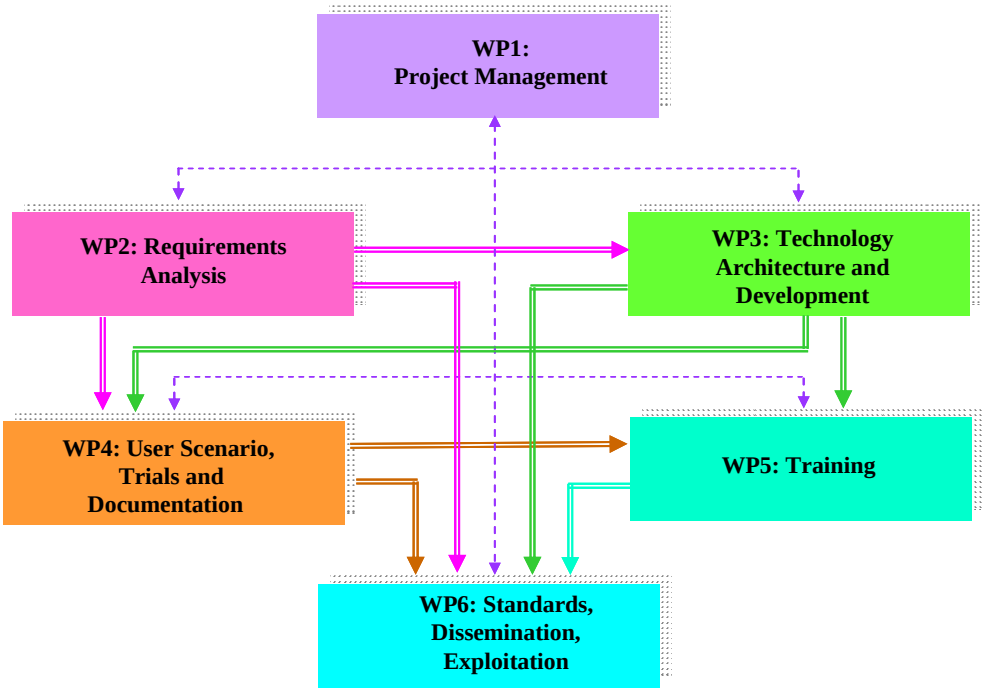

Figure 5: ASIMOV Pert Chart

1.3.11 Work package list

Work package No	Work package title	Type of activity[50]	Lead partic no.	Lead partic. short name	Person-months	Start month	End month
1	Project Management	MGT	1	SES	36	1	36
2	Requirements Analysis	RTD	4	FSU	156	1	24
3	Technology Architecture and Development	RTD	6	HPI	346	6	30
4	User Scenario Trials and Demonstrations	RTD	13	PoliMi	178	6	36
5	Training	RTD	9	FUB	38	13	36
6	Standardisation, Dissemination and Exploitation	RTD	3	UL	83	1	36
	TOTAL				**837**		

Figure 6: Work package list

50 Please indicate one activity per work package:
RTD = Research and technological development (including any activities to prepare for the dissemination and/or exploitation of project results, and coordination activities); DEM = Demonstration; MGT = Management of the consortium; OTHER = Other specific activities, if applicable in this call

1.3.12 Deliverables List

Del. no.	Deliverable name	WP no.	Nature	Dissemination level	Delivery date (Month)
D1.1	Periodic Activity Reports	WP1	R	RE	12
D1.2	Periodic Activity Reports	WP1	R	RE	24
D1.3	Final Activity Reports	WP1	R	RE	36
D2.1.1	Metadata for Web-based audiovisual content: State of the art analysis document	WP2	R	PU	3
D2.1.2	Processing of Web-based audiovisual content: State of the art analysis document	WP2	R	RE	9
D2.1.3	Solutions in digital historical audio-visual archives: State-of-the-Art	WP2	R	RE	6
D2.2	Specific analytical techniques requirements document	WP2	R	RE	15
D2.3	Performance and Interoperability Requirements document	WP2	O	PP	18
D2.4	Report on socio-economic starting point	WP2	R	RE	24
D2.5	E-Learning scenario requirements & documentation	WP2	R	PU	30
D2.5.1	E-Learning Scenario requirements & documentation	WP2	R	PU	12
D2.5.2	E-Health user scenario requirements document	WP2	R	PU	12
D2.5.3	Interactive TV user scenario requirements document	WP2	O	PP	12
D2.5.4	Requirements catalogue for technological solutions for digital audio-visual archives	WP2	R	PP	12
D2.5.5	Corporate E-Learning User Scenario document	WP2	O	PP	12
D2.5.6	Mobile Services User Scenario document	WP2	O	PP	9
D2.5.7	Development of a prototype application for mobile services to verify the projected scenario	WP2	O	PP	18
D3.3	API for OCR-based analytical indexing of video data	WP3	O	PP	15
D3.4.1	Collaborative Filtering Framework: components for collecting and aggregating user annotations and ratings/votings for IMOs	WP3	O	PP	15
D3.4.2	Collaborative Filtering Framework: components for creating user profiles and personalization of search results	WP3	O	PP	28

D3.4.3	Development of full-fledged Collaborative Filtering Framework API	WP3	O	PP	21
D3.5.1	Exemplary multilingual audio-video transcripts	WP3	O	PP	12
D3.5.2	Domain specific vocabularies and auxiliary data for NLP	WP3	O	PP	12
D3.5.3	API for NLP-based analytical indexing of video data	WP3	O	PP	15
D3.6.1	Overall ASIMOV interactive user interface concept	WP3	O	PP	18
D3.6.2	Overall ASIMOV interactive user interface implementation	WP3	O	PP	24
D3.7.1	Integrated indexer for Analytical & manual keyword index	WP3	O	PP	18
D3.7.2	Indexer for Semantic index data	WP3	O	PP	24
D3.7.3	Indexer for Collaborative index data	WP3	O	PP	24
D3.7.4	Integrated Indexer for video data including analytical, collaborative, and semantic index data	WP3	O	PP	27
D3.7.5	Search Engine Framework for Video Search	WP3	O	PP	30
D3.7.6	Evaluation, Validation, and Test of Video Search Engine and its Components	WP3	O	PP	30
D3.8.1	Requirements catalogue for technological solutions for digital audio-visual archives	WP3	O	PP	21
D3.8.2	Integration of developed DRM concepts & methods in video search engine	WP3	O	PP	27
D3.9.1	Definition of content distribution system to clients	WP3	O	PP	15
D3.9.2	Development and Implementation of content distribution system	WP3	O	PP	27
D3.10.1	SATMODE Unit and Regression Test report	WP3	O	PP	18
D3.10.2	SATMODE Performance and Interoperability Validation Test report	WP3	O	PP	27
D3.11.1	Integration interfaces Definition Document	WP3	O	PP	15
D3.11.2	Social networking features Definition Document	WP3	O	PP	15
D3.11.3	LMS integration interface Prototype	WP3	O	PP	18
D3.11.4	Social networking Mash-up API Prototype	WP3	O	PP	18
D3.12	Report on Network and User IPv4-IPv6 Security and Privacy issues in ASIMOV	WP3	O	PP	24
D4.1.1	Evaluation questionnaires preparatory documents for Delphi	WP4	R	CO	14

D4.1.2	First trials report (E-learning for education, E-health, Interactive TV, Historical/political content, Corporate e-learning, Mobile services)	WP4	R	CO	26
D4.1.3	Final trials report (E-learning for education, E-health, Interactive TV, Historical/political content, Corporate e-learning, Mobile services)	WP4	R	PP	30
D4.2.1	Demonstrations Public Event (Live demonstrations)	WP4	O	PU	30
D4.2.2	On line demonstrations	WP4	D	RE	30
D4.2.3	Final report on Demonstrations	WP4	R	PP	36
D5.1.1	Concepts of online training material (technological features)	WP5	R	PP	18
D5.1.2	Online training material for policy makers	WP5	R	PP	28
D5.1.3	Online presentation of training material	WP5	R	PP	30
D5.2.1	Concepts of online training material (different user scenarios)	WP5	R	PP	30
D5.2.2	Tutorials with online self-training material for different usage scenarios and applications	WP5	R	PP	30
D5.2.3	Provision of FAQs, tips and tricks	WP5	R	PP	30
D5.2.4	Demonstration Workshops	WP5	O	PP	24-30
D6.1.1 – D6.1.6	Face-to-face meeting of the (proposed) W3C Media Fragments Working Group	WP6	R	PP	6,12,18,24,30,36
D6.2	ASIMOV International semantic audiovisual search and annotation workshop	WP6	R	PP	28
D6.5	ASIMOV Dissemination Plan	WP6	R	PP	6
D6.6	ASIMOV Deployment and Commercial Exploitation Plan	WP6	R	PP	30

Figure 7: List of Deliverables

1.3.13 List of Milestones

Milestones are control points where decisions are needed with regard to the next stage of the project. For example, a milestone may occur when a major result has been achieved, if its successful attainment is a required for the next phase of work. Another example would be a point when the consortium must decide which of several technologies to adopt for further development. The following table contains all of the ASIMOV milestones.

Milestone no.	**Milestone name**	**WPs involved**	**Exp. Date**	**Means of verification[51]**
1.1	Project Management mechanisms, procedures and tools established	WP1	1	Successful Kick-off meeting
1.2	Successful completion of project review	WP1	13	Report published
1.3	Successful completion of project review	WP1	25	Report published
1.4	Successful completion of project review	WP1	36	Report published
2.1	User and Systems Requirements documents	WP2	18	Report published
2.2	Scenario Requirements documents	WP2	14	Report published
2.3	Successful completion of scenario requirements Review	WP2	18	Documents accepted
3.1	Successful completion of ontology for the representation of multimedia data	WP3	12	Report on ontologies published on public ASIMOV website
3.2	Successful completion of concept and Implementation of spatio-temporal addressing based on URI fragment identifier	WP3	15	Report published Concept and Implementation reviewed by W3C
3.3.1	Open source release of the ClioPatria[52] semantic search engine for audiovisual web content	WP3	12	Software downloadable from public ASIMOV website
3.3.2	Open source release of ontology-mediated video tagging interface	WP3	18	Software downloadable from public ASIMOV website

[51] Show how both the participants and the Commission can check that the milestone has been attained. Refer to indicators if appropriate.
[52] http://e-culture.multimedian.nl/software/ClioPatria.shtml

3.3.3	Report on semantic search and annotation field trials and evaluation studies	WP3	30	Peer-reviewed research paper published
3.3.4	Second release of the above based on feedback and lessons learned from field trials and evaluation studies	WP3	36	Software downloadable from public ASIMOV website
3.4	Successful completion of domain specific vocabularies for NLP and transcripts	WP3	15	Report published vocabularies published
3.5	Successful implementation of overall ASIMOV interactive user interface concept	WP3	24	Report published / peer-reviewed research paper published Software downloadable from public ASIMOV website
3.6	Overall ASIMOV user interface concept and implementation	WP3	24	Deliverable D3.6.1 and D3.6.2 submitted and accepted
3.7	IMS client implementation	WP3	30	Report published
3.8.1	SATMODE AP ASIMOV extension: implementation	WP3	18	Successful SATMODE regression and unit test execution
3.8.2	SATMODE AP ASIMOV extension: integration	WP3	27	Successful validation of Performance and Interoperability requirements
3.9.1	Report on Interface Integration and Social Networking features	WP3	15	Report published
3.9.2	Full working Interface and mesh-up API	WP3	27	Software downloadable from public ASIMOV website
3.10	SALT mode performance and interoperability test report	WP3	27	Submission and acceptance of Deliverables D3.10.1 and D3.10.2
3.11	DOC definition and integration	WP3	18	Submission and acceptance of Deliverables D3.11.1 – D3.11.4
3.12	Security and Privacy issues in ASIMOV	WP3	6	D3.12 Report on Security and Privacy issues in ASIMOV successfully submitted
4.1	Issue of evaluation questionnaires	WP4	14	Report published
4.2	Availability of trials versions of ASIMOV	WP4	18	Trial version available
4.3	Issue of the first Trial report	WP4	26	Report published
4.4	Issue of the final Trial report	WP4	30	Report published
4.5	Availability of Demo	WP4	30	Demo version available
4.6	Issue of the final report on	WP4	36	Report published

	Demonstrations			
5.1	Concepts of online training material (different user scenarios)	WP5	18	Submission of Deliverables D5.1.1, D5.1.2 and D5.1.3
5.2	Tutorials and concepts with online self-training material for different usage scenarios and applications	WP5	30	Submission of Deliverables D5.2.1, D5.2.2 and D5.2.3
5.3	Demonstration workshops	WP5	24-30	Successful implementation of workshops
6.1.1 – 6.1.6	Face-to-face meeting with the (proposed) W3C Media Fragments Working Group	WP6	6, 12, 18, 24, 30 and 36	Deliverables D6.1.1 – D6.1.6 successfully completed
6.2	ASIMOV International semantic audiovisual search and annotation workshop	WP6	28	D6.2 submitted
6.3	ASIMOV Dissemination and Use Plan	WP6	6	D6.3 submitted
6.4	ASIMOV Deployment and Commercial Exploitation Plan	WP6	30	D6.4 submitted

Figure 8: List of Milestones

Section 2: Implementation

2.1 Management structure and procedures

The management structure of the project is designed to handle its complexity, and to ensure timely delivering of the results. The overall project organisation encompasses both administrative and technical issues, including financial, legal, contractual, and ethical aspects.

The consortium management of ASIMOV is designated as *WP1- Project Management* and has the following objectives:

- To guarantee the successful project completion within the agreed time, costs and quality requirements.
- To ensure compliance with EC standards and procedures for project management and tracking.
- To create and maintain effective channels of communication among the consortium partners.
- To provide administrative and technical coordination, including financial, legal, contractual, and ethical management of the consortium.
- To provide quality assurance throughout the project.
- To be the point of contact towards the EC, and maintain a regular communication with the project officer.

All partners have one representative on the General Assembly. This is the only body, which can recommend (needs approval from the EC) to make changes to the contractual obligations of the project as defined in the Description of Work. Issues might include the work breakdown structure, partners, partner responsibilities, budget, IPR and confidentiality.

The day-to-day project management addresses two main areas:

1. External Management with the EC; i.e., ensuring the fulfilment of all the project's contractual commitments with the EC (e.g., deliverables, milestones, budgets, cost claims and payment distribution, reporting, contract amendments).

   Accordingly, two main roles have been assigned, in order to ensure the complete professional follow-up of the project activities, both administratively and technically:

   - The *project manager* will be in charge of controlling the operations, ensuring communication and implementing decisions, logistics for the coordination tasks, coordinating and supporting the production of reports, financial management, and encouraging the exploitation of the project results. He/she will be supported in this task by a professional company, with substantial experience in this field.
   - The *technical coordinator* will be in charge of ensuring that the technical work is achieved on schedule, within budget and that the corresponding deliverables are produced with high quality.

2. Internal Management with the partners; i.e., ensuring partners abide by the principles that have been agreed between them, regarding issues, which are not covered by the EC contract, but are necessary to make the project operational and viable. These principles will be formulated and formalised in the Consortium Agreement that will be signed before launching the project.

These principles include the procedures and degree of approval (majority or unanimous) needed to make changes affecting the project structure, partners, partner responsibilities, budget and funds distribution); IPR and confidentiality, etc.

The work will be evaluated internally according to the Project Quality Plan, to be prepared at the beginning of the project. The Project Quality Plan contains the descriptions of the milestones, the results (qualitative and quantitative), and the procedures to be implemented.

2.1.1Management Roles

The following roles will be assigned in the project:

- ***Project Manager*** (PM) is responsible for the overall project operation and communication with external bodies. The PM represents the project and the consortium, interfaces between the project and the EC, monitors the overall consortium performance, administers project resources, promotes the project visibility and promotes the dissemination of the project results. The PM is appointed by the Coordinating Partner. The PM is assisted by this task by a professional company, with substantial experience in the field of EC project management. This company will perform all of the day-to-day administrative tasks related to the production of the consortium agreement, deliverables and other reports, any contract amendments, planning the project reviews and other meetings, writing the minutes, handling questions from partners regarding EC procedures, eligible costs, budgets, etc.
- ***Technical Coordinator*** (TC) is responsible for auditing the technical performance of the project, ensuring that the technical objectives are being met on schedule and within the resources allocated, and that required information is exchanged among the different Work packages. The TC is appointed by the Work package Leaders (see below).
- ***Work package Leaders*** (WP Leaders) are responsible for each work package operation, including the effective coordination and cooperation between the tasks.
- ***Task Leaders*** are in charge of the realization of specific tasks. They will activate the partners assigned to the task, report to WP Leaders regarding the progress of specific work, and provide the necessary input to other inter-dependent tasks.

2.1.2 Decision-making Bodies and Mechanisms

The following bodies will be involved in the management of the project:

- ***General Assembly*** (GA) is the high-level representation and management body of the project, chaired by the PM, and composed of one representative from each partner. It is the only project body that can make decisions on contractual matters, such as the budget, timeline, deliverables, person-month shifts, adding/deleting partners. The GA will meet at least every 6 months. The GA will be ultimately responsible for the successful completion of the project and the exploitation of its result. It will be chaired by the PM and will support the PM in making administrative and technical decisions, in the evaluation and planning of the main areas of the project: the system architecture, the demonstrator definition, and the field trials.

  The aim of the project management is to always achieve consensus on consortium contractual issues. If this is not possible, decisions will be made by a vote taken within the GA. Issues that affect the (re-)allocation of duties or resources between partners will require a unanimous decision. For other decisions, a majority verdict will normally be sufficient. The details will be explained in the Consortium Agreement. The role of the GA will include the following:

- Management of resources in order to meet schedules and goals
- Ensuring the quality management of the project
- Tracking of costs related to budget
- Resolution of conflicts
- Ensuring compliance with any legal and ethical obligations

The above process will be further defined in the Consortium Agreement.

- ***ASIMOV Advisory Board*** (AAB): The ASIMOV core management team will attract high level experts in the fields of video content providers, TV sector (RTL, ZDF), government libraries (German Bundestag, EU parliament, Swiss Bundestag) and industry to form the ASIMOV Advisory Board (AAB). The goal is to attract a high-level user community with whom some high visibility trials will be undertaken. The prime objective of this board is to advise the consortium on the higher level issues and to make proper recommendations on the critical resources and user issues uncovered during the research work of the project. This board will meet once yearly and will be hosted and managed by the PM and/or appointed core management leaders. The first meeting will be scheduled 3 months into the ASIMOV project, in conjunction with a project meeting. The PM will brief the AAB about the project issues at stake and the areas where advice is needed. The minutes and recommendations will be compiled in a deliverable and submitted as part of the management report. The board members will be selected for their capacity to support ASIMOV achieving its objectives. Each board member will have a specific role to play either to inform the TC of new user or technology developments or more generally opportunities to help accessing information on services that may not be publicly available with the view to seamlessly integrate those services in the ASIMOV platform or to give an expert advice on issues such as free open source software for content design or management or to help disseminate ASIMOV results to their own networks.
- ***Technical Management Committee*** (TMC) is chaired by the TC, and includes all WP Leaders. The TMC is responsible for resolving and monitoring the project's technical progress, ensuring proper interrelation between the work packages, enforcing and guiding the execution of the Description of Work (Annex 1 to the Grant Agreement), and reporting to the GA. The TMC will meet at least once every 3 months.

As described in Section 1, the project is organised in 5 technical work packages (WPs 2 - 6), coordinated by a management work package (WP1). The project structure is represented by the diagram below, where management responsibilities exist at the project level (GA) and work package level (TMC).

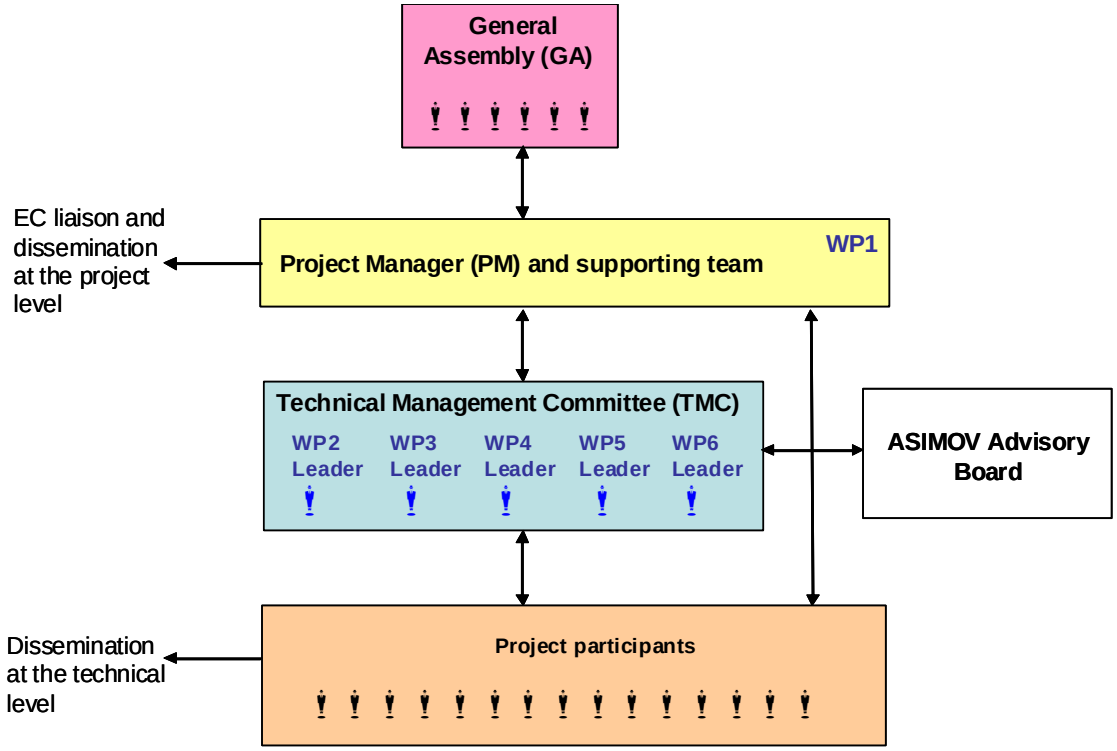

Figure 9: Project management structure

2.1.3 Reporting Mechanism

Internal Monthly Progress Reports (MPRs) will be produced by the WP Leaders for the PM, based on the information collected from the Task Leaders. The MPR will describe the present status of developments, and indicate the specific technical work undertaken in the corresponding period.

Quarterly Progress Reports (QPRs) will be produced by each of the consortium partners, and delivered to the management support team who will combine them into a unified QPR to be approved by the GA and delivered to the EC. The PM will check the reports in order to ensure consistency and completeness. The reports will encompass all project activities executed by the partners in the corresponding period, such as meetings and workshops, research and development activities, deliverables, equipment purchases and manpower expended. Any problems or potential deviations from the project plan will also be reported here.

The QPRs will be used as the basis for the (yearly) Periodic Activity Report and Periodic Management Report, to be produced for the annual project review.

All reports will be uploaded to a collaborative space allowing all partners to read them, and comment on them.

Project deliverables will be provided by the Task Leaders, revised by the WP Leaders, inspected by the TMC to ensure their consistency and completeness, and delivered to the EC by the PM in the agreed format.

2.1.4 Meetings, Conferencing and Communication Tools

Partners will meet regularly, either physically or virtually (through e-mail, videoconferencing, electronic discussion groups and fora). The project will be managed to ensure maximum interaction and exchange between the partners, but without incurring high travel costs. Partners have already established a collaborative and cohesive working relationship. Nonetheless, Plenary Meetings will be held at least in conjunction with the GA meetings (ie. twice per year) and more often if the need arises.

A collaborative working space will be organised in order to ensure maximal transparency, and keep track of the project activities, accumulated knowledge and deliverables. It will allow consortium partners to distribute, publish and share information.

2.1.5 Knowledge Management and IPR

Appropriate procedures will be defined in the consortium agreement in order to regulate and clarify the management of confidentiality, IPR and access to knowledge within the project. Background knowledge and existing intellectual property of the partners will be identified at the start of the project, and its protection will be ensured according to the mutually agreed procedures. Foreground rights will be defined and regulated in the consortium agreement, whose preparation and planning will be discussed, and decided by all consortium partners.

Once the IPR for the research outcomes have been protected, the technology will be offered for exploitation and licensing (see Section 3 for further details).

2.1.6 Quality Assurance, Risk Assessment and Contingency Plan

Quality Assurance (QA) measures, presented in Figure , will be put into practice by the consortium in order to ensure quality outputs from the project. A set of qualitative and quantitative indicators will be used to provide the evaluation of the performance towards meeting the project objectives. Likewise, aspects of cooperation between partners, as well as the actual commitment to the assigned tasks, which could jeopardise the success of the project, if not successfully executed, will be also monitored and assessed.

Indicator	**Quality Assurance measures**	**Corrective measure if indicator reflects weakness**
Timely release of deliverables with high-quality	A time schedule will be established for the release of intermediate versions, for collecting corresponding revisions, and for incorporating these into newer versions	Identify the causes and responsible partners for missing the established time schedule. Confront non-performing partners with the situation and request formal adequate commitment for future deliverables Analyse the proposed time schedule for the production of deliverables, and consider if the introduction of modifications could ease and improve the production process
Fulfilment of intermediate objectives by meeting the milestones	Internal reports will be produced every month by each of the Task Leaders, describing the present status	Remind non-performing partners and take disciplinary (including financial) actions if necessary Correct by increasing the manpower of

	of developments, and indicating major problems encountered	more active partners in the faltering WP
Publication of scientific articles in all research areas	Detailed Dissemination and Use Plan will be produced within the work package *WP1- Project Management* as part of the Periodic Activity Report	Identify areas and partners better positioned at the time to produce scientific manuscripts, nominate a responsible partner, and obtain their commitment Identify the major conferences and journals where to submit articles Perform a thorough review of written material before submission
Regular exchange of technical information and sharing of resources among tasks and work packages, and regular usage of the ASIMOV collaborative space to upload project documentation	WP Leaders will have the responsibility to promote and monitor the fluent communication across tasks and work packages. The collaborative space site will provide required functionalities and tools to facilitate the communication	Confront all involved partners with the situation. Identify causes and responsibilities Appoint new responsible if necessary Incorporate new tools into the collaborative space
Submission of independent and joint contributions to the various standardisation bodies	List of standardisation bodies to which the ASIMOV consortium is in grade to contribute has already been included in this proposal, and will be updated during the project lifetime if required	Identify additional standardisation bodies working in areas relevant to ASIMOV Identify partners better positioned to produce the contributions Involve also other partners that have active participation in those standardisation bodies

Figure 10: QA measures

The project will also ensure the implementation of a contingency plan based on the assessment of indicators and risks identified in Figure 11 below. In the event of unexpected performance of the project or the occurrence of a situation identified as a risk, a list of possible measures and actions, as the ones provided by, will be triggered by the EC and accordingly implemented by the consortium. The contingency plan will initiate with the actions indicated in Figure 11, and will be further elaborated during the first months of the project lifetime, and reviewed at the end of the first reporting period. It should be noted that in addition to the plans below, the Project Management team will ensure to implement a comprehensive risk management procedure (including technical and non technical issues) to address any unexpected risk in the project.

Risk	**Measure**	**Corrective action**
Withdrawal of consortium member	During the preparation of the proposal, the Description of Work, and the consortium agreement all consortium partners will be actively involved, and their contribution	Through discussion with the remaining consortium members, identify partners who are well-positioned to assume the role of the departing partner Re-assign effort allocation and

	will be requested. The precise role of each partner, their expected efforts and outcomes, as well as the resources allocated to each of them will be clarified in advance, and the full agreement and commitment to the project's objectives will be obtained	resources If necessary, consider the re-organisation of the project objectives, assuring that no compromise is made to the overall success of the project
Legal controversies among partners	Usage of individual foreground technology and knowledge will be regulated at the beginning of the project, and included in the consortium agreement	Confront the involved partners with the established procedures If necessary produce separate non-disclosure agreements
Lack of common objectives and understanding among partners	Care has been given towards the common understanding of the project objectives on behalf of all consortium partners during the preparation of the ASIMOV proposal, requiring the active involvement of all of them in the proposal preparation	The EC will analyse the situation, possibly with the help of external experts, and decide how to proceed after having reached an agreement through discussion, or democratic voting
Insufficient production of IMED objects for inferring sufficient and exhaustive answers	Contacts have been established providing for the exchange of potential IMED objects	Exchange with other institutions and projects is feasible due to the open exchange inherent to ASIMOV
Insufficient calculation of required hardware infrastructure for realizing a full-fledged scalable semantic multimedia search engine	ETH has been chosen aware in full recognition of the performance in IT infrastructure	ETH can use its close links to the Swiss NREN SWITCH to provide further infrastructure
Repercussions of amendments to copyright to intellectual property in academia	Clarification of judicial situation encompasses constant review of legal situation	With the legal situation constantly changing, clarification is never conclusive, but evolving - adaption is possible at any stage
Consequences of third-party decisions to integration, e.g. from commercial LMS provider	Standardization efforts are directed at counteracting this	The test bed at ETH provides for alternative, open source LMS solutions (ILIAS, moodle)

Figure 11: Risks and corrective measures

2.1.7 Conflict Management

Given the high diversity of stakeholders and their expertise, the potential for conflict is present in any such joint research project. We see conflict (should it occur) as part of the project setting, and it is therefore one goal of the consortium agreement to provide some basic guidelines for its management. The responsibility for conflict management will be with the Coordinating Partner,

assisted by the GA. We consider that the primary function of conflict management is to delicately balance the multitude of trade-offs, and in particular: (1) the tension between the individual stakeholders' organisational goals, on one hand, and the project goals, on the other, (2) the personality mix in the project team, and (3) potential disagreements regarding the project's schedules and priorities.

Accordingly, a three-point plan will be applied:

1. **Establish Responsibilities**. **–** The Coordinating Partner establishes responsibility for conflict management by making explicit that she/he will take charge of resolving/managing any conflict. It is, nevertheless, the responsibility of all partners to report any identified issues ASAP, but preferably before they become conflicts.
2. **Establish Group Dynamics Matrix for the project**. **–** At the kick-off meeting we shall establish a group dynamic matrix of all the stakeholders and the project specifics. This matrix will detail the motivation (organisational vs. the project goals), so that all partners are aware of what all organisations are also working on in parallel (to the extent that this is not confidential). Such ongoing work is potentially a rich source of added value that can be brought into the project throughout its lifetime. The project commitments (i.e. schedules and priorities for deliverables) will also be clearly presented in the kick-off meeting.
3. **Establish Conflict Management Strategy**. **–** This strategy is achieved through the following three key goals:
    - Discover and resolve issues before they become serious conflicts,
    - Create a climate of trust where partners feel free to exchange ideas, and
    - Encourage and engage partners to speak their minds, so that there are no "hidden agendas".

In practice, three actions will be taken:

1. Periodically, the Group Dynamics Matrix will be re-evaluated, in order to get consortium partners to realistically review their situation.
2. A "project memory" will be created, where all project issues are captured, and their status (e.g., "open", "under investigation", "deferred", "fixed", etc.) is recorded.
3. Issues will be monitored through an issue management process consisting of: detection, recording, analysing, prioritising, and allocating ownership of issues.

2.2 Individual participants

Participant 1: SES Astra Techcom (SES)

Role in project: SES Astra Techcom is the Coordinating Partner and will provide the Project Manager and Technical Coordinator. For the administrative and financial project management of the project, the Project Manager will be supported by Martel (Participant 15). In its development role, the major contribution of SES in collaborative filtering is composed of the technology providing large-scale collection, aggregation and analysis of semantic annotations. SES will provide the whole collaborative filtering (as described in the overall concept part) to the ASIMOV project. The contribution includes the adaptation to support the extended set of IMED objects targeted by ASIMOV. The specific requirements in the ASIMOV user-scenario will be evaluated to meet the requirements of the collaborative filtering platform. In order to ease the

integration with the collaborative filtering platform in ASIMOV, SES will develop and extend the Application Programming Interfaces (APIs) to open its use to the partners. **As the industrialization of the collaborative filtering platform is an important part for SES**, the collaborative filtering platform APIs will follow Internet standards as published by the IETF or the W3C. To validate the APIs, ASIMOV will be used by the other partners to benefit from the services provided by the collaborative filtering platform like personalization or collaborative access control. SES will also contribute through its competency in the research of user behaviour in a collaborative context like the scenarios defined in ASIMOV. The user behaviour will be collected, derived and analyzed from the information retrieval of the IMED objects. The collaborative filtering platform will be used as ground for large-scale processing of the information collected. SES will also evaluate the privacy and security implication of the collection and processing for the users' information in the collaborative filtering platform. Also, SES will be responsible for integrating the collaborative search services into the service delivery platform. This will be done based on the SATMODE Application Platform that allows deployment and management of interactive services though different deployment channels and networks. This integration will allow for the seamless deployment of the ASIMOV results in the future video and multimedia content delivery networks and platforms.

Expertise: SES provides effective and efficient broadband satellite communication solutions to Europe and beyond. Today SES-Astra transmits over 1,400 TV and radio channels, in analogue and digital formats, to over 102 million European homes on behalf of its customers, whose audiences have a huge choice of national and international channels in various languages. SES-Astra is also at the forefront of multimedia via satellite. The Astra2Connect platform enables IP-based content-rich data to be delivered at high-speed to PCs in businesses and homes across Europe. SES is currently developing the S-band satellite system that will enable delivery of video content directly to the mobile handheld terminals as well as the IPTV system that allowing deployment of linear and non-linear video content in satellite, terrestrial and/or hybrid networks. SES-Astra has a leading role in several ESA projects, amongst them "SATMODE" and "Mobile Ku-band Receive-Only Terminal". As a part of those projects SES-Astra had a important role of building the content and service delivery platforms. Those platforms and associate expertise will be used in the ASIMOV project as well.

Alan KURESEVIC is Vice President, Engineering at SES Astra Techcom. He has a 15 years experience in the satellite industry. He spends most of his recent career at SES Astra designing and implementing systems related to satellite payload measurements, digital television, Internet over satellite and interactive services. Alan holds the computer science and electrical engineering degree from University of Zagreb.

Raul GNAGA is Manager, Platform Solutions at SES Astra TechCom. Raul manages the inter-company team responsible for the technical implementation of IPTV services at SES-Astra. He is also involved in the technical specification and product development of Astra2Connect, SES-Astra's commercial SAT3PLAY service. Raul manages the team responsible for the implementation and development of SATMODE Application Services, which provide a platform for SES-Astra's interactive-TV prototype. His previous experience includes leading the development of unicast and multicast systems of one-way ASTRANet IP platform. Raul graduated (105/110) from the Information Technology, Physics & Math department of the Universitá degli Studi di Milano in 1996.

Romain CLOOS, started his career as systems engineer in Reuters and joined SES-Astra Communication Software Engineering in 1997. In 2000, he took over the lead of the Network Operation Measurement & Control System team, followed by the lead of the Broadcast Communication Solutions team in 2006. 2008 he changed to the management of the Ground Solution department of SES Astra TechCom. Romain has a Technical Engineer in Computer Science (Hardware/Software) from the Luxembourg University of Applied Sciences; an BSc and

MSc in Computer Science from University Louis-Pasteur–Strasbourg and an MBA from University Nancy II.

Frank Zimmer, Manager Satellite Solutions, joined SES-Astra more than 11 years ago. Throughout his career he was in involved in various projects in the realm of satellite testing and mobile satellite communications for instance the ESA Mobile Ku-Band Demonstrator. Currently Frank Zimmer is involved in national projects such as CARLINK, a CELTIC project and the Luxlaunch Study on the Role of Satellites in Car-2-Car-2-Enviroment communications. Mr. Zimmer graduated from the University of Applied Sciences Kaiserslautern, Kaiserslautern (D) in Electrical Engineering / Process Control and Automation in 1992 and from the Universidade de Vigo, Vigo (E) in Signal Theory and Communications in 2006

Dipl.-Wirt.Inf. **Michael G. Noll** received the diploma with distinction for the best diploma of the graduation year at the University of Trier in 2004. He worked from 2000-2003 as a scientific assistant at the Institute for Telematics in Trier, Germany, where he co-developed the patented IT security solution Lock-Keeper, which received the Inventors' Award of Rheinland-Pfalz/Germany in 2002 and the German IT Security Award in 2007. Michael also worked on several studies and technical reports; for example, "Firewalls and Intrusion Detection Systems" for the German Ministry of Science, Education, Research, and Culture. Since May 2004, Michael has joined SES-Astra as an industrial doctoral student in the LIASIT Cotutelle program (double doctoral degree scheme), supervised jointly by the Hasso-Plattner-Institute at the University of Potsdam, Germany, and the University of Luxembourg. He is the author of several publications in the fields of content classification, information filtering and the semantic/social web.

Alexandre Dulaunoy has joined SES-Astra as Information Technology Security Officer in 2004. Before joining SES-Astra, he was the CTO and cofounder of Conostix S.A., a startup working on Security Information Management. Previously, he was senior security consultant for Ubizen S.A., Luxembourg (now part of Cybertrust) dealing with information security in the financial and governmental sector. Alexandre is also an intermittent security researcher at the Computer Security Research and Response Team Luxembourg. He is also lecturer in software engineering and information security at the University Paul Verlaine in France, University of Luxembourg and various Research Centres in Europe. He is the author and co-author of publications and reports in the fields of information security, honeypot research and information society legal framework.

Gérard Wagener, Master in Computer Science, has studied at the University of Luxembourg applied computer science from 2002 until 2006 and received his industrial engineer degree in 2006. In 2006 he started his master studies in computer science in Nancy, France, and finished his master thesis about malware analysis in 2007. Gérard did also a security study in peer to peer networks dedicated for voice over IP for the Institut National de Recherche en Informatique et Automatique, INRIA, in France in 2007. Since November 2007, Gérard joined SES Astra S.A. as an industrial doctoral student in the LIASIT program. He has published his work in the journal of computer virology and has given various talks in international conferences, like the workshop on the theory of computer viruses and hack.lu.

Commitment: SES will provide two-way satellite communication equipment, the technical support to install these systems and the required satellite capacity. SES will also provide expert knowledge in the field of Internet safety and security.

Participant 2: ETH Zürich (ETH)

Role in project: ETH will cover the two domains closest to its core business: One is the research part in that it will coordinate efforts in "Technology Architecture & Development" with HPI, combining actual research activities in multimedia search and annotation with experience in system integration and the authority to manage and coordinate research activities. The other

domain is teaching and ETH will therefore lead the use case for e-learning continuing and expanding its outstanding activities in the utilization of audiovisual material in teaching.

Expertise: ETH Zürich is a science and technology University with an outstanding research record. It is the study, research and work place of 18,000 people from 80 nations. About 350 professors in 15 departments teach mainly in the engineering sciences and architecture, system-oriented sciences, mathematics and natural sciences areas and carry out research that is highly valued worldwide. Through a dedicated strategy for the use of ICT in education, research and services, ETH Zürich is setting out to position itself as one of the leading Universities worldwide in this domain.

Through the use of new technologies, ETH Zürich wishes to promote individual, flexible learning and ensure that students actively engage with the subject matter in self-directed learning. ICT resources are used wherever they provide added value for teaching and learning. The IT Services are the central organisation responsible for the ICT infrastructure, providing support for all members of ETH, and Multimedia Services are a core constituent in this service towards the teaching community.

Multimedia Services provide the infrastructure for an automated production, handling, archival, and distribution of audiovisual and/or multimedia objects asked for by the Multimedia Services' REPLAY system. It will aim at recording 150 lectures a week in 2010, thus producing (as well as archiving) 100 TByte p.a. and handling 1 TByte input/output per day. Multimedia Services have a history of producing lecture recordings and handling audiovisual material. The development of PLAY (now pursued by SWITCH) was a milestone for enriching Audio/Visual-material towards multimedia objects by synchronizing it with content, i.e. computer-based presentations. The ETH Podcast Portal is amongst the most prominent and largest repositories for up-to-date lecture recordings in Europe. Today, with REPLAY, they are moving towards an integrated handling of multimedia objects serving all relevant aspects of academic usage.

The **NET - Network for Educational Technology** is the e-learning centre of ETH Zürich providing comprehensive services to lecturers by supporting

- easy-to-use e-learning tools (ELBA),
- different Learning Management Systems (Blackboard, ILIAS, moodle),
- different Groupware and E-Collaboration Tools (BSCW, Marratech),
- the use of audiovisual technologies (video on demand, streaming, videoconferencing, teleteaching) in teaching.

The **ETH-Bibliothek** is the largest library in Switzerland and the main library of the Swiss Federal Institute of Technology. In addition, it functions as the Swiss centre for information on science and technology. The Library holds more than 6.7 million items, including maps, old prints, audiovisual materials, journals, databases and much more. Furthermore, the ETH Library is host of the NEBIS Network Office and the Headquarter of the Consortium of Swiss Academic Libraries. Special emphasis is given to the electronic resources accessible to the faculty, staff and students at ETH-Zürich and to innovative services.

Olaf A. Schulte is Head of Production and Distribution with the IT Services as well as e-learning consultant with the NET-Network for Educational Technology. His focus therefore is on the actual utilization of IT-based services for learning, showcased in the Podcast Portal of ETH Zürich. His academic record covers almost 20 publications in the area of e-learning and communication science.

Armin Brunner is Head of Multimedia Services at ETH Zürich. Being with IT Services for almost twenty years, he has a history of working in the networking group, leading the data communication group, the communication section and – today, the Multimedia Services. His

main field of work is the consolidation of A/V and IT infrastructure as can be seen best in the REPLAY project lead by him.

Konrad Osterwalder is Head of the NET - Network for Educational Technology at ETH Zurich. His fields of work include strategic development and integration of teaching and learning scenarios for Educational Technology at ETH Zurich. He is also responsible for the scientific peer review of innovation projects in teaching funded by ETH Zurich. As lecturer he teaches Didactics of Biology to gather first hand experience with Educational Technology.

Tobias Wunden is Chief Software Architect and Developer of REPLAY, the ETH Multimedia System. Having studied mechanical engineering and computer science at ETH, he did several projects designing and developing software for the web as well as for mobile devices, before he joined ETH World (an initiative for technology exploration) and finally Multimedia Services.

Commitment: For ETH, ASIMOV is the continuation of its considerable efforts in multimedia integration as seen in several projects (PLAY, Podcast Portal, REPLAY). ETH will incorporate the results of ASIMOV on top of the existing REPLAY infrastructure and market results all along the line of its international relations in academia. With ETH going for 150 recorded lectures per week in 2010, it faces all the problems described and is therefore not merely committed to, but, like many other Universities, dependent on the success of ASIMOV.

Participant 3: University of Luxembourg (UL)

Role in project: UL will support the project with its knowledge of Mobile IPv6 Networking. The dissemination effort of UL will also be substantial using the IPv6 Forum, which is based at the University since 2006.

Expertise: UL is one of the central government driven research institutions in Luxembourg. UL aims to drive and foster awareness of public safety issues among all relevant stakeholders from governments to First Responders to industry players and to final beneficiaries in this wide spectrum of emergency and crisis management fields. The strong and genuine Luxembourg government support in the public safety and security will be utilized to achieve the objectives of the ASIMOV project.

Prof Dr. Thomas Engel is speaker of the regional group Trier/Luxemburg of the German society for computer science and member of the scientific board and member of the management board of the Luxembourg Advanced Studies in Information Technology LIASIT, which focuses on the topics “Security, Reliability and Trust”. He is also a member of the European Security Research Advisory Board (ESRAB) at the EC in Brussels, advising the Commission in setting up the Security Research Programme in FP7 and is also a member of the European Preparatory Actions in Security Research (PASR) Task Force.

Latif Ladid is the Founder and current President of the IPv6 Forum (www.ipv6forum.com). He is also the chairman of the European IPv6 Task Force (www.ipv6.eu). He is a partner Member of the Security Task Force (www.securitytaskforce.org). He has been a researcher on multiple EC funded projects (6INIT, 6WINIT, Euro6IX, Eurov6, NGNi, SEINIT) and is currently working in the project u-2010. Ladid brings the Consortium extensive skills regarding IPv6 state-of-the-art insight and field deployment experience. The creation of the IPv6 Forum based in Luxembourg and the initiation of strategic IST research projects focused on the exploitation of IPv6 add substantial value to the European industry at large. Ladid will play a significant role in this project. His management and dissemination skills will play a fundamental role in the international co-operation and benchmarking of Europe in the public safety communication.

Commitment: UL is committed to make the ASIMOV project part of its chain of highly successful research projects and drive its results to a maximum level of awareness and adoption by other research projects and industry at large through its world class awareness platforms.

Participant 4: Friedrich-Schiller Universität Jena (FSU Jena)

Role in project: The major contribution of FSU Jena in the project will be the provision of manual, semi-automated, and automated methods to generate time-based semantic annotation for multimedia data in connection to the development of a scalable content-based search engine architecture. This will be achieved in close collaboration with CWI (semantic multimedia), HPI (security issues and search engine architecture) as well as University of Zagreb (implementation and integration of search engine architecture) and UASNWCH (user interfaces and data visualization).

Expertise: FSU Jena was founded in 1558 by Johann Friedrich I and is one of the most historic Universities in Germany, which is also reflected by its membership in the prestigious COIMBRA[53] group, a network of traditional European Universities. With "Innovation by Tradition" as its motto, FSU Jena is striving to become a leading research institution on a European and global scale. It has been successfully reorganized and modernized following German reunification and its 10 schools collectively offer approximately 120 degree programs and currently serve 20,000 students. Embedded in the Jena science and high-tech region, the University has become an important focal point and stimulus for the region's boom.

The FSU Jena Institute for Computer Science has close link with industry and it has strong orientation on the following research topics: mobile platform integration, grid computing, web services and SOA (with emphasis on automated usage of resources in heterogeneous, dynamic environments), as well as semantic web technology (with specific focus on knowledge engineering, distributed planning, and semantic search) and multimedia retrieval. It hosts the competence centre of Self-organized Integration of Computing and Information Systems. The institute for computer science has rich experience in semantic search engine technology and among other projects it has developed NPBibSearch, a bibliographical search engine that deploys semantic web technology for query analysis and refinement, visualization and navigation within the search results. Another project YOVISTO[54] is a video search engine funded by the ESF/BMWi that is based on MPEG-7 encoded automated annotation of lecture videos and enables the user not only to search for but also to search within lecture videos in combination with collaborative tagging.

Dr. rer. nat. Harald Sack is postdoctoral fellow (wissenschaftlicher Assistent) at FSU Jena. He received his diploma in computer science at the University of the Federal Forces Germany, Munich Campus in 1990. After working as application programmer, system manager, and project manager at the German Air Force Intelligence (1990-1997) he became associated member of the graduate program 'Mathematical Optimization' at the University of Trier, where he received his Ph.D. in computer science in 2002. He then focused his research interest onto web based technologies in particular multimedia information retrieval, knowledge representations, and semantic web. He was technical editor of the 'Electronic Colloquium on Computational Complexity' (1999-2002) and managing director of the 'Centre for Electronic Publishing' at the University of Trier (1999-2002), member of the German IPv6 Council, and speaker of the Special Interest Group ‘Multimedia and Hypermedia Systems’ of the German society of computer science (GI). His research resulted in over 30 publications in the field of formal verification, semantic search engines, multimedia information retrieval, and social semantic web.

[53] http://www.coimbra-group.be/
[54] http://www.yovisto.com/

Jörg Waitelonis received his diploma in computer science in 2006 at FSU Jena with a thesis on 'Automated Semantic Annotation and Search in Synchronized Multimedia Presentations'. Currently he is working on his Ph.D. in computer science in the field of semantic multimedia retrieval. He has participated in the ESF/BMWi funded project OSOTIS/YOVISTO with the objective to develop a video search engine for academic lecture recordings, which resulted in a university spin-off company.

Commitment: FSU Jena will provide expert knowledge in the area of multimedia retrieval, semantic multimedia annotation, and ontology engineering. With its experience and expertise in lecture recording, FSU is dependent on the outcomes of ASIMOV to further develop and exploit the content it has.

Participant 5: University of Applied Sciences Northwest Switzerland (UASNW)

UASNW is one of the leading institutions of tertiary education in Switzerland. It focuses on excellence in teaching, applied research and development and maintains close ties to industry. The UASNW with its approx. 6000 students is part of an international network of Universities and research institutions.

Role in project: The University's Institute of 4-D Technologies and Data Spaces (i4Ds) is part of the department of computer science. It specializes in the fields of interface design, collaboration tools and augmented media as well as visualisations of huge data spaces (astronomical projects). i4Ds also hosts the Project Oriented Learning Environment (POLE), a platform for learning and teaching with multidisciplinary and locally distributed teams of students originating from a series of international Universities. The library of the UASNW is actively involved in the Swiss University Library Consortium discussing and cooperating in all relevant aspects of e-collections and is entrusted with the topic of dissemination, accessibility, standardization, and e-archiving.

Expertise: UASNW brings profound experience in the fields of interface design and the handling and visualisation of huge data spaces. In recent years UASNW has become an internationally renowned expert in the sector of e-learning for multidisciplinary and distributed teams.

Christoph Holliger is a professor of physics at UASNW. He received MSc. degrees in physics from ETH Zürich and in bioengineering from Stanford University and his PhD at ETH Zürich (1980). He was then active as postdoctoral fellow and assistant professor at Stanford University where he conducted projects in the field of biomedical research, in particular renal and small intestinal physiology. His teaching was focused on fluid dynamics and rheology of blood flow. Holliger's research interests in recent years moved to multidisciplinary projects in education. He is the founding director of the Project Oriented Learning Environment POLE. He has published in the field of e-learning and project based learning - in particular on multidisciplinary co-operations of locally distributed international teams. Christoph Holliger also teaches as a guest professor at the School of Art & Design.

Mario Doulis is professor of Interface Design at the School of Engineering of UASNW and professor of New Media at Merz-Akademie Stuttgart. As industrial and interface designer he works in the field of 3D User Interface Design, Virtual Reality, and 3D-Interaction. He has several years of experience in research and development activities for Research Concerns, e.g. Fraunhofer Gesellschaft and GMD. He is member of the programme committee of the IEEE 3DUI symposium and the scientific committee of IEEE VR and Intuition EU-Network of Excellence. His actual research focuses on spatial representation and interaction concepts for visual archive mining and process management.

Manfred Vogel is professor for mathematics at UASNW and Head of the Institute of 4D– Technologies & DataSpaces. After his Bachelor in Electrical Engineering (1979) he obtained a Master's in mathematics from ETH Zürich (1985) and a Ph.D. in theoretical physics (1990). His

Ph.D. Thesis was awarded with the ETH–medal. He worked as a research assistant, Post Doc and Research Associate at the Institute of Astronomy of ETH Zürich, and he gained the first Hubble Fellowship from NASA in order to do research on astrophysical data obtained from the Hubble Space Telescope at the Space Telescope Science Institute, Baltimore. His research resulted in over 50 publications in the fields of solar physics, stellar physics and satellite technology, published with more than 25 different scientists from at least 12 different international institutions, partially done during research visits at Villafranca (Spain), Florence, La Silla (Chile), Boulder, Goddard Space Flight Centre, Greenbelt and Space Telescope Science Institute, Baltimore. He was Principal Investigator (PI) for over 15 successful research projects (International Ultraviolet Explorer, European Southern Observatory, Telescopio Infrarosso Gornergrat, Hubble Space Telescope, Infrared Space Telescope) and Co–Investigator of at least the same number of successful projects. Since 1999 Manfred Vogel changed his research interest to 4D–modelling (space and time) and ICT–methods developed for the AEC (Architecture Engineering Construction) industry.

Commitment: i4Ds will provide its Virtual Reality infrastructure and software system, as well as expert knowledge in user interface design, digital libraries, and process design patterns and optimization methods using genetic algorithms.

Participant 6: Hasso-Plattner Institute for IT Systems Engineering (HPI)

Role in project: The main contribution of HPI will be to lead the Technology Architecture together with ETH Zürich and the development of an adaptable security infrastructure for multimedia search and multimedia distribution with regards to usability. HPI also supports FSU Jena and CWI in the development and implementation of procedures for semantic multimedia annotation, including ontology engineering and search engine integration.

Expertise: HPI is associated with the University of Potsdam. It has been founded in 1998 and it is privately funded by Prof. Dr. Hasso Plattner, the co-founder and chairman of the supervisory board of SAP. It consists of a team of 50 professors and research or teaching assistants. The institute provides excellent research on national and international level. It participates in public funded projects (like the EU-funded Adaptive Services Grid project or the PESOA-project, which was funded by the German Federal Ministry for Education and Research) and privately funded projects (usually in cooperation with local SMEs or major enterprises like Schenker Logistics, German Telekom, Software AG or SAP). Co-operations with other Universities and institutes like the Stanford University in Palo Alto and the Massachusetts Institute of Technology in Cambridge are established. Furthermore, HPI chaired in 2006 the national IT-summit of the German federal government. HPI is well known for its integration of ongoing research results into lectures and teaching projects. It provides a M.Sc. and B.Sc. course of studies on IT Systems Engineering - a practical and engineering-science-oriented alternative to the usual computer sciences course of studies - currently studied by 400 students. HPI holds the fourth place regarding the studying possibilities and quality in the German-wide ranking of the centre for academia development (Centrum für Hochschul-Entwicklung). HPI has rich experience in e-learning, tele-lecturing, and semantic search technology. An out-of-the-box tele-lecturing system TELE-TASK has been developed, which is used to produce content for LECTURE-BUTLER, a semantic search engine specialized on e-learning. Based on the experiences with TELE-TASK, an on-the-flight editor for creating timed semantic annotations for video data with special emphasis on a most suitable user interface is currently developed.

Prof. Dr. sc. nat. Christoph Meinel is Scientific Director and CEO of HPI. He is a full professor (C4) for computer sciences at the University of Potsdam and visiting professor at LIASIT (Luxembourg International Advanced Studies in Information Technology) at the University of Luxembourg as well as at at the Computer Sciences Department of the Beijing University of Technology, China. He received his PhD degree in 1981 and his habilitation degree in 1988 with

a thesis about complexity theory that was published in the Springer Lecture Notes (Vol. 370). From 1992 to 2004 he worked as a full professor (C4) for computer science at the University of Trier. 2004 he accepted the call to become the director of the HPI at University of Potsdam. In 1996 he was a co-founder of the Institute für Techno- und Wirtschaftsmathematik (ITWM) in Trier. 1998, he founded the non-profit Institut für Telematik in Trier with special expertise in the fields of Internet Security, Electronic Publishing, E-Learning, and Telemedicine, and headed the institute as director from 1998 to 2002. His actual research interests and activities are in the field of Internet Technology and Systems, particularly in Trust and Security Engineering, Teleteaching, and Telemedicine Security. Christoph Meinel belongs to the directory board of the international conference and research centre for computer science IBFI Schloss Dagstuhl. He is the speaker of the Special Interest Group on Complexity of the German society of computer science (GI). Since 2006, he is member of board of the MINT-EC e.V., an excellence centre of German school and colleagues.

Commitment: HPI will provide expert knowledge in the area of security architectures as well as in video and multimedia analysis and retrieval, and ontology engineering.

Participant 7: Research Studios Austria (RSA)

Role in project: RSA will contribute to WP4 using its extensive multimedia facilities and will contribute to WP6 using its worldwide dissemination platforms and networks such as the World Summit Award and EUROPRIX.

Expertise: RSA is a division of Austrian Research Centers GmbH - the leading non-University research institution in Austria, and is comprised of individual studios acting as operative units. Furthermore, since January 2004, the Research Studios are a lead program of the Austrian Federal Ministry for Economics and Labour, recommended by the Austrian Council for Research and Technology Development, within the framework of the "Technology Offensive II" initiated by the Austrian government. http://www.researchstudio.at/org/org_en.html

Peter A. Bruck is the General Manager of RSA within the Austrian Research Centers and is the division head for e-technologies and smart media at the Austrian Research Centers GmbH. He is also the Honorary President of the International Center for New Media (ICNM), Salzburg, the Chairman of the Board of the European Academy of Digital Media-EADiM, Netherlands, and the Chairman of the Board of Directors of the World Summit Award (www.wsis-award.org).

Peter A. Bruck studied at the Universities of Vienna, Iowa and at McGill, Montreal, and holds doctorates in law and communications, and master degrees in sociology and economics. He has taught at Universities in Canada, US and Western Europe plus Israel and Poland and has over 25 years of experience in research and consulting in Austria, Switzerland, Germany, Poland, Portugal, the US and Canada.

He has received numerous awards and fellowships in Europe, the US and Canada and is listed in the Canadian and Austrian WHO'S WHO. He has founded the University of Applied Sciences in Salzburg and headed research institutes at Universities and national research organisations in Canada and Austria and has been senior partner in ICRA - International Communications Research Associates, Ottawa, Canada. From 2001 to 2002 Bruck was on the Board of Management and head of the Business Unit on Interactive Media of the Jet2Web Internet Services GmbH of the Austrian Telekom Group.

He is Chairman of the Advisory Committee on Media Diversity of the Council of Europe. Peter A. Bruck has initiated EUROPRIX, Europe’s leading multimedia award, the Prix MultiMediaAustria and a number of national best practice competitions and awards in Western and Eastern Europe. Within the framework of the UN World Summit on Information Society, Bruck has organised the World Summit Award in e-Content and creativity as a global event and process.

Peter A. Bruck has held competitive research grants from the leading social science and technology research funds and councils in the US, Canada and Austria, and has been principal researcher in numerous competitive projects in EC programs of such as RACE, ESPRIT, ACTS, INFO2000, IMPACT, IST in FP5 and FP 6, and the e-Content Program.

As a media producer, Bruck has worked in newspapers, radio, TV and digital interactive media. Among others, he was radio correspondent for the Austrian Broadcasting Corporation ORF in North America, a producer-announcer for the Canadian Broadcasting Corporation and its International Service in Montreal. In new media, Bruck has produced about 15 innovative CD-ROMs and DVDs, and numerous websites. His innovative products include "EUROPRIX 98" which was the first DVD-ROM produced in Europe in 1998 and "speed.at" the first broad band Internet TV news portal in Europe with a flash browser and media rich contents in 2001. He continues to produce a series of "Best of New Media Contents" both on a European and national Austrian level.

Commitment: RSA is committed to make ASIMOV one its most innovative multimedia projects as a proof of concept for mobile Multimedia and interactive two-way-Internet-based platform.

Participant 8: Media Consulting Communication Management (MCCM)

Role in Project: MCCM controls the formulation of user scenarios together with SES, and ensures the insertion of these user requirements into the overall project (WP4). In doing so, MCCM is in charge of the topic "Corporate E-Learning", in the development of the user scenario, as well as in Trials/Validation.
In addition, MCCM compiles the graphic design of the user interface on the basis of the specifications given in WP3 as component for the technical implementation within a two-stage process.

Expertise: MCCM develops information architectures, knowledge management systems, and communication management systems for industrial enterprises. Central questions hereby are: „which information is present?; how can this information be structured?; through which applications or communication channels can they be made available?; which contribution can distance learning, E-Learning, or Corporate TV make?; which role can distance learning, E-Learning, or Corporate TV play?; how can obtained knowledge, attitudes, or decision-making / responsibility be assessed and measured for the user or the addressed target groups? "
Within this paradigm, MCCM creates a collaborative process model, developing and structuring "enterprise knowledge", optimizing search engines on this basis, and developing "user interfaces" to make these results available.
The verification of output, outcome, and outgrowth of information and communication occurs within the framework of communication controlling on the basis of scorecard systematics. For that the entire spectrum of quantitative and qualitative market research is employed.

Horst Pütz is a managing director and partner at MCCM Consulting GmbH in Cologne, Germany. He possesses much experience within the field of communication controlling, thereby aligning communication to enterprise strategies as the basis for economic efficiency calculations and the controlling of communication with indices. Horst Pütz is also responsible for the development and establishing of the benchmark system "Index Interne Kommunikation®", which in 2006 received first price in the category "Value Creation through Communication" awarded by the DPRG. With this innovative concept, Horst Pütz has developed a new, compatible controlling system for internal and external communication.

Klaus Greiner is a managing director and partner. Klaus Greiner's qualifications are extensive with much experience in the conceptual design and realization of digital media offers, the visualization of complex systems and processes, as well as the illustration of digital business processes in online platforms. Also acting as co-founder and managing director of Berens in

Düsseldorf, he was responsible for the areas of customer consulting, customer support, and project realization. The business volume amounted to approx. €2m and included a staff of about 45 employees. At the University of Siegen, Klaus Greiner lectures in the fields of information architecture and usability in his capacity as associate lecturer. Klaus Greiner also performs active association work at the International Institute of Information Architecture (IIA) and at the Usability Professionals' Association (UPA).

Peter Keusen is the senior adviser and a permanent employee of MCCM. His activities are as far-reaching as project managements in digital media conceptual design, media consultation, and media realization. Kai-Peter Keusen managed the Internet re-launch for a large chemical concern with 25 different business branches in 14 countries. He coached the project management of that client, was responsible for around 1,500 Internet websites with regards to content migration, and the linking of databases. Mr. Keusen also has much experience in media and specialist counselling for the Verbraucherzentrale Bundesverband e.V.. Some of these projects included ELVIS, AIDA, FOKUS, as well as other KGB clients.

Alexander Felsenberg started his career in 1985 as editor and author for the Entertainment Department at the Bavarian TV Broadcasting Corporation, "BR-Bayerischen Rundfunk" with the producership of several TV shows. Mr. Felsenberg founded the German Multi-Media Association (dmmv) in Düsseldorf in 1995. The dmmv demanded, among other tasks, much lobbying for German and EU Internet-related laws to be drawn, including IuKDG, TKÜV, Distance-Selling Laws, EU EC-Legislation, Copyright Laws and the Broadcast Regulations Reform. In 2005 Alexander Felsenberg then pursued the consulting level, especially in corporate and business development, including strategy and communication. In terms of research and teaching, Mr. Felsenberg has also taught at the Universitäts-Gesamthochschule in Siegen as assistant professor or as scientific assistant at the German Research Center project on "Interactive Media Usage".

Sven Treide has been freelancing as senior adviser for MCCM since 2000 with focal points on online communication, user interface, and digital asset management. Mr. Treide has extensive experience in the conceptual design and realization of Internet platforms. He also worked on various Internet projects accompanying WDR and ARD radio and TV broadcasts, such as the wdr.de "Stem Cell Special", which was awarded the Grimme Online Award 2002 in the category TV. Another focus in Mr. Treide's career lies in the field of information structuring and quality assurance. He successfully implemented a content management system for the WDR intranet, and he optimized the e-branch of the Deutsche Post AG's online transaction platform.

Commitment: MCCM will bring into the project the coordination of user requirements and in particular the compilation of requirements and user scenarios of non-scientific users. The design of the user interfaces on the basis of mapped out requirements represents the second focal point of MCCM.

Participant 9: Freie Universität Berlin (FUB)

Role in project: FUB will do research on Audio/Visual-archive searching, metadata collection, metadata standards on archives, solutions for digital archives and recorded lectures. FUB will work on annotation levels, personnel, group oriented, content driven, context driven, Tagging in video with respect to searching; the deliverable will be methods and specifications for Annotation and Tagging in video based material. FUB will work on multi-lingual aspects in Polish and Russian. FUB will work on Conception, Design, Evaluation; the deliverable will be adoption of search-interface for archive usage. FUB will implement archive rules and personal rights; the deliverable will be XML representation of digital rights for archive and lecture materials. FUB will establish a lecture recording Infrastructure in cooperation with ETH, Implementation of video service; the deliverable will be Annotated Lecture recordings with additional materials (e.g. Powerpoint slides, scripts). FUB will also work on scenarios for different use-cases, slicing and

annotation, metadata; the deliverable will be the implementation of the developed methods in the Visual History Archive and the Archive of Forced Labour. FUB will also implement user cases through evaluations and questionnaires.

Expertise: FUB is a leading research institution. It is one of nine German Universities that met with success in all three funding lines in the federal and state Excellence Initiative, thereby receiving additional funding for its institutional future development strategy. FUB is a full University with 15 departments and central institutes (incl. Medicine) offering over 100 programs in all subject areas. Of its approximately 34,000 students 16 percent come from abroad. Without including the School of Medicine Freie Universitaet is currently lead University for eight collaborative research centres of the German Research Foundation DFG (Deutsche Forschungsgemeinschaft). Freie Universität cooperates also closely with international companies such as BMW, Schering, Siemens, Deutsche Telekom, and Pfizer. Freie Universität has several offices abroad, e.g., in New York, Beijing, Moscow and New Delhi that provide a platform for international cooperation.
The Center for Digital Systems - Competence Center e-Learning/Multimedia (CeDiS) disposes of wide experiences in conception, realization and service of IT infrastructures at FUB and in the creation of interactive teaching/ learning materials for education and advanced education. Development of multimedia learning systems for higher education following approved concepts and models CeDiS has to offer a wide range of IT-services based on innovative technologies.

Dr. Nicolas Apostolopoulos: PhD at the Dept. of Business Studies and Economics, Founder and Director of the Competence Center e-Learning/ Multimedia in 2002, management of a wide range of projects, for example: Digital Interactive Learning Modules (1997-2000), Learning Net (2001-2004), New Statistics (2001-2003, Development of e-Learning Material and Applications), e-Learning based MBA New Economy (2001-2004), Elisa (INTERREG IIIB CADSES, 2005 – 2007) ; development of an e-Learning infrastructure for the whole Freie Universität and integration of blended learning in higher education. Member of the Board of "Gesellschaft f. Neue Medien in der Wissenschaft", Member of „Gesellschaft für Informatik", Member of Greek Operations Research Society.

Dr. Harriet Hoffmann: Doctor (PhD) at the department of Philosophie and Humanities (FUB); working at CeDiS since 1999 in the fields of multimedia production, conception and development of e-Learning material and applications; consulting and training of teachers and professors in the development and use of e-learning scenarios in higher education. Coordination of a wide range of projects e.g. New Economy (2001- 2004, Funding: BMBF – Federal Ministry for Education and Research), Elisa (for CeDiS as partner of the EU consortium, INTERREG IIIB CADSES, 2005 – 2008).

Wolfram Lippert M.A.: studied history politics and islamic studies at the Albert Ludwigs Universität Freiburg; working in the areas of multimedia production and e-learning environments since 1996; main focus on the fields of further and higher education. Working at CeDiS since 2005; consulting and training teachers and professors in the development and use of e-learning scenarios in higher education; between 2006 and 2008 coordinating the Visual History Archive of the Shoah Foundation Institute (USC) at the Freie Universität Berlin; since 2008 coordinating and planning the project "Memories of Forced Labor", a cooperation between the "Stiftung Erinnerung Verantwortung und Zukunft", the "Freie Universität Berlin" and the "Deutsches Historisches Museum".

Jörg-Michael Baur: Graduated in theoretical physics from ETH Zürich, working at CeDiS since 2005 as application administrator and web application developer. In 2006 he gave technical support for the Visual History Archive Project of the Freie Universität Berlin. Since 2007 he has worked on the design and implementation of technical solutions for the project "Memories of Forced Labour".

Dr. Doris Tausendfreund: PhD at the department of History at the Technische Universität Berlin and Communications Degree at the Universität der Künste Berlin. Research Associate at the FUB/Center für Digitale Systeme (CeDiS) since 2006. Special responsibilities: Visual History Archive of the Shoah Foundation Institute at the University of Southern California (USC) and VHA-related project development. Previous experience (1999 – 2000) as senior manager for conceptual design and project management for Internet applications and companies' web presence.

Verena Lucia Nägel: studied Political Science at the Freie Universität Berlin; currently working on her PhD about contemporary antisemitism in Germany; since 2006 research associate at the Visual History Archive Project of the Freie Unversität Berlin and there responsible for the support of the academic usage of the Archive; responsible for the implementation of the Visual History Archive in research and teaching, experienced in teaching with Oral History video material, experience in concepting, developing and implementing multimedia e-learning applications.

Commitment: FUB will provide its expertise in the fields of historical digital audio-visual archives, development of user-friendly solutions and user scenarios for research and teaching purposes.

Participant 10: University of Zagreb, Faculty of Electrical Engineering and Computing (UZ)

Role in project: UZ will define method and service interface for integration between ASIMOV and different systems, such as Content Management Systems, Learning Management Systems, Document Management Systems, etc. As a proof of concept, user interface on an existing system, such as LMS, will be created. UZ will add support for including additional social features, such as tagging or commenting on different web sites, using mash-up technologies as well as enhance the social component of the project through mash-up enabled user interfaces (web sites, widgets, portlets, etc.). UZ will focus on e-learning scenarios in higher education with an emphasis on mixed-mode (blended) learning and integration of lectures with other student activities. UZ will provide training for content authors and users for Croatian Universities and abroad. The possibilities of system utilization as a part of education process will be investigated and a pilot-project to demonstrate the use of ASIMOV in at least one University course will be carried out.

Expertise: The UZ Faculty of Electrical Engineering and Computing (FER) is the leading ICT faculty in Croatia. In numbers, FER has: 270 members of scientific-educational staff responsible for education of 4400 undergraduate and graduate students, together with 300 PhD students. Besides education, faculty members are involved in Croatian and international research projects, ranging from electrical engineering through information systems to e-learning. Faculty cooperates on 74 international and 12 FP6 projects. In 2006, FER has obtained the accreditation for the bachelor and master study programs from the ASIIN agency (Akkreditierungsagentur für Studiengänge der Ingenieurwissenschaften, der Informatik, der Naturwissenschaften und der Mathematik). The accreditation is valid until September 30th 2011.

UZ comprises of 32 institutions (29 faculties and 3 academies) dedicated to education of over 65000 students, making it a scientific-educational centre of Croatia.

The Computer Engineering group at the Department of Control and Computer Engineering, together with FER Information Support Centre, puts a great emphasis on introducing, improving and supporting e-learning on the Faculty and Croatian higher education. The main research themes are:

- FER e-Campus, an integrated solution developed in-house, comprises of a Content Management System, Learning Management Systems, e-Library and e-Portfolio. The

system is used in many Croatian faculties, some organisations and companies, as well as Estonian national educational centre;

- Integration of different LMSs (such as Moodle, WebCT) with CMSs;
- Integration of CMS with other support systems – student information system, e-library and other systems needing e-learning and student information;
- Asynchronous multimedia presentations for distance education, created in SMIL format (Synchronized Multimedia Integration Language), with support for presentation indexing;
- Digital e-books based on XML, integrated with other education materials suitable for e-learning;
- Virtual and remote laboratories.

A lot of effort was put into integration of information support systems (CMS, LMS) with the requirements of Faculty's educational process and other in-house solutions. E-Campus is currently one of the core systems behind the Faculty's internationally recognized quality in education and research.

Mario Žagar is a tenure professor of computing at the University of Zagreb, Faculty of Electrical Engineering and Computing (FER) and also Head of FER Computing facilities Centre. His current professional interests include: e-learning, multimedia, Web technologies, open computing, embedded systems and ubiquitous/pervasive computing. Prof. Žagar currently leads several international projects in the field of software engineering. M. Žagar is author/co-author of 5 books and many scientific/professional journal and conference papers.

Commitment: UZ will use its expertise to contribute to the project in the fields of integration and social collaboration, as well as analyzing the usage of ASIMOV features in higher education.

Participant 11: Amphinicy d.o.o. (AMP)

Role in project: AMP will define and implement the manner in which content will be distributed to clients. The distribution will be implemented by achieving interoperability between an IMS platform and ASIMOV, thus supporting various types of terminals such as cell phones, personal computers and set-top boxes (TV channels). This will broaden the service availability of ASIMOV to its clients, and thus increase the market for this product.

Expertise: AMP is a premium provider of complex and technologically advanced software solutions. Our experts have been successfully designing sophisticated solutions for satellite machinery for more than a decade. Amongst its other many projects, AMP was extensively involved in the development of SATMODE, a revolutionary interactive satellite multimedia infrastructure. It provides generic services, such as weather forecast, messaging and payment services, and forms of multimedia distribution. AMP also has a vast knowledge base of Internet-based applications and services, as well as multimedia content and distribution techniques.

AMP believes that its experience in the above mentioned fields will help it to contribute to ASIMOV in a large scale, specifically with content distribution.

Marko Mrvelj is the technical director at AMP. He leads a team in charge of business support systems. His expertise is enterprise systems design and development. He is also involved in multimedia systems development. Other activities include project management, customer interfacing for project management, system specification and requirements gathering.

Takeshi Martinez is a software architect and Benelux manager at AMP. He has great experience and knowledge in Internet application development and Enterprise Java. Being a team player and best practices mentor, he leads small teams by example throughout the development cycle. He received his Master of Science Degree in Computer Science at the Imperial College, University of London.

Nenad Klipa is a senior software engineer at AMP. He is a confident team member with excellent communication, problem solving and teaching skills, with professional IT experience. Nenad holds PhD in physics. He has invaluable experience in software and system development.

Commitment: AMP will provide a multi-channel content distribution system.

Participant 12: The Centre for Mathematics and Computer Science (CWI)

Role in project: CWI will contribute to ASIMOV mainly through its expertise in developing and evaluating end-user interface technology for semantic multimedia applications. We will focus on demonstrating added value of semantic technology to end users by developing and evaluating prototype interfaces to access, query and explore large and heterogeneous multimedia data repositories. Our group has a proven track record in developing demonstrators based on open Web standards and has played a key role in W3C standardization activities in the area of semantic web and web-based multimedia.

Expertise: The Semantic Media Interfaces group at CWI carries out research on improving models and tools for presenting multimedia information to end-users on a variety of platforms. CWI is the research institute for mathematics and computer science research in the Netherlands. CWI's mission is twofold: to perform frontier research in mathematics and computer science, and to transfer new knowledge in these fields to society in general and trade and industry in particular. CWI has always been very successful in securing considerable participation in European research programs and has extensive experience in managing these international collaborative research efforts. CWI is also strongly embedded in Dutch University research: about twenty of its senior researchers hold part-time positions as University professors and several projects are carried out in cooperation with University research groups. In addition, CWI has strong links to the World Wide Web consortium, and houses the Benelux office. CWI has a staff of 210 fte (full time equivalent), 160 of whom are scientific staff. CWI operates on an annual budget of €13M.

Prof. Dr. Lynda Hardman is the head of the Semantic Media Interfaces group and part-time full professor at the Technical University of Eindhoven. She obtained her PhD from the University of Amsterdam in 1998, having graduated in Mathematics and Physics from Glasgow University in 1982. During her time in the software industry she was the development manager for Guide, the first hypertext authoring system for personal computers (1986). Her favourite chocolates are from Puccini, Amsterdam.

Dr. Jacco van Ossenbruggen is a senior researcher, having obtained his PhD from the Vrije Universiteit Amsterdam in 2001. He was a member of the W3C working group that developed the SMIL recommendation. He is currently active in the MultimediaN E-culture Project, which won the first prize at the Semantic Web Challenge at ISWC ’06. His current research interests include multimedia on the Semantic Web and the exploration of heterogeneous media repositories.

Dr. Raphaël Troncy is a researcher, having obtained his PhD from the University of Grenoble (INRIA/INA) in 2004. He selected as an ERCIM Post-Doctorate Research Associate 2004-2006. Raphaël Troncy was co-chair of the W3C Incubator Group on Multimedia Semantics. He is an expert in audiovisual metadata and in combining existing metadata standards (such as MPEG-7) with current Semantic Web technologies. He works closely with the IPTC standardization body on the relationship between the NewsML language family and Semantic Web technologies.

Commitment: CWI will develop and evaluate low-barrier user interfaces for Web-based annotated audiovisual data repositories.

Participant 13: The Fondazione Politecnico di Milano (PoliMi)

Role in project: PoliMi will provide competencies from three main sectors: e-Health, e-Learning for education and corporate e-Learning. They specialise in interaction design and long term preservation of digital content. Polimi´s main activities will be: the design of interaction, scenario requirements analysis, user scenario development and scenario validation, demonstration and dissemination.

Expertise: PoliMi is an agile and operational structure supported by the "Politecnico di Milano" Technical University and some important founders. The Politecnico di Milano was established in 1863 by a group of scholars and entrepreneurs belonging to prominent Milanese families. Its most eminent professors over the years have included the mathematician Francesco Brioschi (its first director), Luigi Cremona, and Giulio Natta (Nobel Prize in Chemistry in 1963). The Politecnico di Milano is now ranked as one of the most outstanding European Universities in Engineering, Architecture and Industrial Design, and in many disciplines is regarded as a leading research institution worldwide

Alfredo M. Ronchi developed specific competences in the field of lighting techniques, acting as a consultant or advisor for different leading companies in this sector (Sylvania, Thorn, Disano, Artemide Litech, SBP, Ilesa, General Electric) designing both computer aided test and computer aided design solutions addressed both to fittings design and lay-outs thanks to the computer graphic and expert systems background. Almost the same competences and skills were applied in a different field, computer aided site planning and design for medical systems (GE Medical Systems). From 1990 onward he transferred his own competences in computer graphics, virtual reality and Internet technology to the domain of culture and cultural heritage. He is active member of Keio University Excellence Network (J), Grande Albo dei Referee of the National Council of Research (CNR), EC Expert, Council of Europe Expert and Consultant. He is appointed by the Ministry of Research member of Italy / China cultural programme.

Carlo Mattia Ghezzi and **Michele Benedetti** have gathered significant project management experience at the Politecnico di Milano, which has helped them to develop their ability to manage activities and projects in complex and turbulent context with a considerable project team and several actors.

Guiliano Noci's main research fields are:

- *marketing*, where he investigated the role played by the experience in the consumers' purchasing process and suggested new models aimed at integrating the emotional dimension in the design of an effective value proposition addressed towards the target market;
- *business strategy and the environment*; in this field, he designed methods for considering sustainable development in product design, investment analysis, strategic management and performance measurement;
- *e-business*, where he investigated the implications of the Internet for supply chain management in the textile and mechanical industries;
- *e-government*, where I analyze the role of ICTs in fostering change management programs within governmental and local public institutions.

Commitment: PoliMi will provide expertise in requirements analysis, interaction and interface design; provide digital contents and develop user scenarios and trials. Training activity will be performed as well.

Participant 14: Telecom Italia (TI)

Role in project: TI will provide competencies from three main sectors: e-Learning for education, corporate e-Learning and mobile services. TI´s main activities will be scenario requirements analysis, user scenario development and scenario validation.

Expertise: The TI Group represents a major Italian enterprise, with leading companies in the strategic ICT sector which is among the main European groups. The Group operates through high profile brands such as Telecom Italia, Alice, TIM, Olivetti, La7, MTV and APcom, operating in fixed-line and mobile telephony, internet, media, and innovative business solutions and systems, and also in research and innovation.

TI confirmed that convergence between fixed, mobile telephony, broadband Internet and media content remains its strategic goal. The company's objective is maintaining its leadership with an offer of innovative services enabling the transmission of high definition television programmes, movies, music and video.

In the 6th Framework Programme, TI is involved in 14 projects and is coordinator for PASION (Psychologically Augmented Social Interaction Over Networks) and NOBEL (Next generation Optical network for Broadband in Europe). Telecom Italia Lab is also active in several standardisation bodies; among them: ETSI, FSAN, IETF, ISO/JTC1/MPEG, ITU-T, Parlay, OIF, SIP Forum, TM Forum, UMTS Forum, W3C, 3G.IP, 3GPP. Co-operation with other bodies is a fundamental part of Telecom Italia Lab's activities, since it fosters potential synergies and know-how integration aimed at widening the company's interest range

Fabrizio A. M. Davide, PhD, is a senior executive at Telecom Italia, one of the major telecom operators in the world. In Telecom Italia, Mr Davide is head of value-added ICT Services ("Servizi VAS ICT") for the Market Development department of the "Top Client" division. Since 2000, he has been an Adjoint Professor at Linköping University (Sweden). He has also served as co-ordinator for a number of R&D projects co-funded by the European Commission, the most recent ones being I-Learning and Angelo in Framework V's IST Program. He was technical manager in the Briteuram CIA project and has worked as a researcher in many applied-research projects with Universities and public research centres (e.g. the Italian National Council of Research, the Washington Technology Center and Massachussetts Institute of Technology in the USA, the University of Warwick in the UK, the University of Tübingen in Germany and the Swedish Research Center S-Sence).

Federico Morabito, PhD received his degree in Management Engineering from Rome's "Università Tor Vergata" (summa cum laude) in 2001. Since 2002, he has worked as a senior research consultant at TILS, where he has gained experience in agent-based modeling for complex IT systems (P2P networks, distributed services and knowledge management services). He has been involved in several EU and nationally funded projects including Neurobit (funded by EU in V Framework-FET Proactive Area). He is currently working on EU-VI Framework project Delis (Dynamically Evolving, Large-scale Information Systems) within the TILS Complex System Group. His work focuses on distributed applications in P2P overlay networks, especially data management, group notification and multicast in cooperative environments.

Commitment: Telecom Italia will provide digital contents and laboratories for user trials.

Participant 15: Martel GmbH (Martel)

Role in Project: In ASIMOV, Martel will provide assistance to the Project Manager in all administrative and contractual matters, the financial planning, and the general management and monitoring of the overall project.

Expertise: Martel is the coordinator for the FP7 project 6DEPLOY (IPv6 deployment and support) and is currently assisting Thomson in the management of the FP6 project Haggle (An innovative Paradigm for Autonomic Opportunistic Communication) and the FP7 project Nanodatacenters. The company is also helping the Italian NREN GARR to manage the FP7 project FEDERICA (Federated E-infrastructure Dedicated to European Researchers Innovating in Computing network Architectures). Support was also given recently to Telefonica for the management of the FP6 project EuQoS (End-to-end QoS across heterogeneous networks) and in FP5 to Cisco for managing 6NET (Large-scale International IPv6 Pilot Network).

Martel also has technical competence in a broad range of new technologies: Premium IP, IPv6, Mobile IP, WLAN, agent technologies, IP-over-optics. It has also performed consultancy for the European Space Agency in the area of on-board processing, and advised Kenya Telkom Ltd. on the upgrading of their telecommunications network.

Martel employees have taken responsibility in the past for many activities that have provided support for the Commission, for example as rapporteur for consultation meetings and other events (e.g., IST2006 in Helsinki).

In FP6, Martel provided the Chairman of the BB4All Cluster. Martel staff is regularly invited to make presentations, and take on chairmanship duties in prestigious conferences, such as Globecom, Supercomm, BBEurope, etc.

Martin Potts is the director of Martel. He has a degree in Electronic Engineering and has worked previously for Plessey (UK), British Telecom (UK) and Ascom (CH). In 1989, he participated in the RACE-I project R1022: Martin became the manager of the “follow-on” RACE-II project EXPLOIT (1992-1995) and the Chairman of the Project Line 8, in which all the projects active in the area of "Test Infrastructure and Interworking" were grouped. In the ACTS Programme, he was the Chairman of the Chain: "Global Network Interoperability", the Chain Group: "Network Level Interoperability and Management", and the Cluster of 8 IP/ATM projects. Martin managed the ACTS projects "EXPERT" and "DIANA", and the IST projects “CADENUS”, “SHUFFLE” and ADAMANT. Martin is a regular presenter on NGN and IP QoS topics in IST and commercial conferences, for example: BBEurope, IQPC, OpenNet, is the chairman of BB4All Cluster of IST projects and has been rapporteur for the FP7 consultation events: “Internet of Things” and the “Future Infrastructure for Research in Europe (FIRE)”.

Commitment: Martel is committed to providing assistance to the Project Manager in the financial planning, and the general management and monitoring of the overall project; these are all areas in which Martel has a proven record with projects comprising consortia of a similar size. This results in a win-win situation for ASIMOV, since the scientific partners can fully concentrate on reaching the technical objectives of the project, while the management aspects are handled separately by a professional project management organisation.

2.3 Consortium as a whole

2.3.1 Consortium as a whole

The consortium has been carefully selected to enable all the objectives to be met, whilst avoiding duplication of skills and activities.

In particular, partners will contribute to the common technical functions and features needed by the project, and/or impressive usage scenarios through which requirements are generated for the annotating, archiving and searching process, and the resulting developments are validated.

The table below summarises the composition of the consortium and the contribution of the partners.

Partner No.	Partner Name	Country	Organisation type	Role in the project
1 (Coordinator)	SES	Luxembourg	Industry	Project (technical) management. Development of collaborative filtering and integration with existing legacy systems (content and service delivery platforms)
2	ETH	Switzerland	University	Scenario: “E-learning”. WP3 co-leader with HPI
3	UL	Luxembourg	University	Mobile IPv6, networking, security, dissemination
4	FSU	Germany	University	FSU is leading the requirements analysis, and contributing to the analysis of the state-of-the-art and video searching
5	UASNW	Switzerland	University	UASNW leads the Visualisation and user interface design work package (WP3) and works together with ETH in Natural Language Processing
6	HPI	Germany	Research Institute	WP3 co-leader of (with ETH), with a focus on video- and search related technologies
7	RSA	Austria	Research Institute	Media production, dissemination
8	MCCM	Germany	Industry (SME)	Scenario: “Corporate e-Learning”
9	FUB	Germany	University	Scenario: “Historical digital audio-visual content”. WP5 leader
10	UZ	Croatia	University	External integration interfaces, content syndication for social networking Scenario: “E-learning in higher education” Training content authors; analyzing the usage of ASIMOV in the education process

Partner No.	Partner Name	Country	Organisation type	Role in the project
11	AMP	Croatia	Industry (SME)	Definition and implementation of the way in which content will be distributed to clients Interoperability between IMS platform and ASIMOV, thus supporting various types of terminals such as cell phones, personal computers and set-top boxes (TV channels)
12	CWI	The Netherlands	Research Institute	Contribute with its competence on web-based multimedia and semantic interfaces, and its established relationship with W3C
13	PoliMi	Italy	University / Foundation	Contribute competencies from three main sectors: e-Health, e-Learning for education, corporate e-Learning. They specialise in interaction design and long-term preservation of digital content Scenario requirements analysis, user scenario development and scenario validation, demonstration and dissemination Training
14	TI	Italy	Industry	Contribute competencies from 3 main sectors: e-Learning for education, corporate e-Learning and mobile services. Telecom Italia's main activities will be scenario requirements analysis, user scenario development and scenario validation
15	Martel	Switzerland	Industry (SME)	Consortium management (administrative and financial matters)

Figure 12: Consortium as a whole

From the profile of the individual participants we have matched the technical expertise of each partner in the consortium to the technical requirements of each work package. We are fortunate to have a good balance amongst the research and development team that benefits from a rich mixture of both academia and industry.

Clearly the producers and consumers are either Universities or those involved in archiving they are both producing content and wish to consume (make use) of this content in an accessible and flexible manner. Each University has as its central mission the production of course material in various forms and has as a central thread the use of e-Learning as a tool for enhancing and making more efficient the teaching and learning experience. The consortium benefits from the complimentarily amongst users as in the case of the Universities all having a similar mission but

at the same time is able to leverage the benefits of each of them having different types of content available as well as being in a different part of the EU. The diversity of content is further enhanced by the inclusion of FUB – who have archives of parliamentary material.

We will exploit to the full potential the benefit to the project of the synergy and opportunity that is afforded to us by the dual role that many partners play in that they are involved both as users (consumers and producers) and as researchers. Moreover, we strongly emphasise that the consortium in practice does not end with the partners alone indeed each of the users has a very large client base - in the case of the Universities the teachers and students- who will be used at the various critical stages of the project particularly in the formulation of requirements and the various evaluations of components developed.

2.3.2 Industrial exploitation of the project

By including industrial partners in the ASIMOV project, it will be well aligned to enable timely industrial exploitation. The project partners commit to apply the relevant results of this project in their activities or use them in order to enhance their worldwide competitiveness, to strengthen their product portfolios and to increase their network of customers (see Section 2.2). Some partners will expand their businesses by integrating the techniques, methods and standard practices in their commercial offers. For example, SES Astra Techcom will use result of the project to enhance their IPTV and mobile TV product and services. SES will use the project result to enhance its search and categorization engine offering to its core value chain.

ASIMOV technologies are set to be commercially valuable wherever knowledge and its efficient dissemination play an important role – which can be expected to apply for an increasing number of SMEs as well. With ASIMOV being adaptable to objects beyond recordings, the general advantages of ontology-based search engines for customized access of knowledge and the collaborative options will be applicable to every object considered a valuable knowledge object. Potential application areas are showcased in WP4.

Technology transfer plan

Technology transfer plan will address the process of converting the research and development from this project into the practical and commercially relevant applications and products. Appropriate technology transfer in essential in for upgrading the quality of design to the quality of the commercial product and ensure its stable high quality. The technology transfer plan will include, but it’s not limited, to protecting intellectual property right, maintaining the potential patent applications and negotiating license agreement. To facilitate the easier technology transfer the high importance will be given to the quality of design, implementation and testing documentation as vehicles for the successful technology transfer. Important elements including the validation of the end-user inputs and development of the business plan for the ASIMOV based business are integral part of the project and constitute the elementary building blocks for the technology transfer plan. As a part of the marketing activities relevant to the technology transfer plan, the technology elements of the project will be advertised though the project partner contacts, participation at conferences, publishing relevant paper and ASIMOV web site. The technology plan is not one-shot action and assumes continuous information exchange between involved parties.

i) Sub-contracting: TI will subcontract 120K€ to a firm called RadioLabs, a research consortium between University (University Tor Vergata, University of L'Aquila) and Industry (Selex and Telespazio). RadioLabs will help Telecom Italia for requirements analysis, trial and validation activities.

ii) Other countries: NA

iii) Additional partners: NA

2.4 Resources to be committed

2.4.1 Mobilisation of resources

A well-coordinated and closely managed cooperation is crucial for the success of the project. The consortium is balanced between academic and industrial partners. In total, there are 15 partners; 7 are academic partners, 3 major research centres, 2 large industrial institutions and 3 specialist SMEs. Also, the composition of partners consists of libraries, which showcase and pilot project deliverables. Partners are renounced research organizations, content owner/provider and developer in the areas of eLearning, Semantic Web, Multimedia based learning and grid computing.

It should be noted that the following consortium partners have already been working closely in their domain of expertise together: Martel, UL, SES, TI, ETH, FSU, HPI.

The total cost is estimated at **€8,711,952.--** for the 36 months duration and the requested grant is **€6,398,475.--.**

Equipment: The total equipment budget of the project is €209,340.--, of which the breakdown per partner is as follows (the figures in brackets are the unit prices):

- **SES:** 25K€ in total for 2 high end PC server for SDP platform (6K€), 2 high end PC server for IMS HSS (6K€), 5 IPTV development Set Top Boxes (4K€), 5 DTH development Set Top Boxes (4K€), 5 mobile phones (J2ME, GPS) (3K€), and SW development tool licenses (2K€);
- **UL:** 10K€ for 1 PC server for Application Hosting (3K€), 1 development workstation (2K€), 1 low-end client PC (1.5K€), 2 mobile phones (0.6K€), 1 set top boxes (0.8K€), 1 SW licence (1.5K€);
- **FSU:** 16K€ in total for 2 x High-End PC Server for Search Engine Development and Storage Management (3.5K€), 3 x High-End PCs for Software Development (2K€), 1 SW Development tool licenses (3K€);
- **UASNW:** 50K€ in total for a Cube 3D2 Projector (32K€), 2 PC Servers (with advanced graphic boards) (8K€), ART tracking system (8K€), Software licences (2K€);
- **HPI:** 16K€ for 2 x High-End PC Servers for Search Engine Development and Storage (7K€), 3 x High-End PCs for Software Development (6K€), SW Development tool licenses (3K€);
- **RSA:** 3K€ in total for 1 Workstation;
- **FUB:** 23.5K€ in total for 2 high-end PCs and storage (4.25K€), 2 notebooks (1.5K€), 1 software development tool licence (2K€);
- **UZ:** 60K€ in total for 2x PC server (7K€), 6x Workstation - development and content creation (6K€), 5x Notebook - development, content creation (10K€), Network equipment (2K€), 16x Notebook – training (16K€), 5x Mobile devices and handhelds (3.5K€), 5x Mobile connect cards (UMTS, GPRS, etc.) (3.5K€), 2x Projector (4K€), Software licences (2K€);
- **AMP:** 15.84K€ in total for 4 desktop PCs (0.7K€); 4 notebooks (1K€), 1 software development tool licence (3.5K€), 1 PC server for IMS HSS (2.5K€), 2 development set top boxes (0.75K€), 2 mobile smart phones (0.6K€), 2 mobile phones (J2ME) (0.12K€).

Other costs: TI will subcontract 120K€ to a firm called RadioLabs, a research consortium between University (University Tor Vergata, University of L'Aquila) and Industry (Selex and Telespazio). RadioLabs will help Telecom Italia for requirements analysis, trial and validation activities.

All projects require intensive interaction and information flow, but even though electronic communication is highly efficient, working meetings during which the participants meet in person are also required. Therefore, meetings will be held between the WP Leaders and their respective contractors on a regular basis. In addition to these work meetings, researchers will also travel to attend international conferences to disseminate the project results. Each partner has been allocated between 20K€ and 30K€ for travel, depending on their individual responsibilities within the project.

The graphic below represents the distribution (in person months) of the total project effort amongst the ASIMOV partners

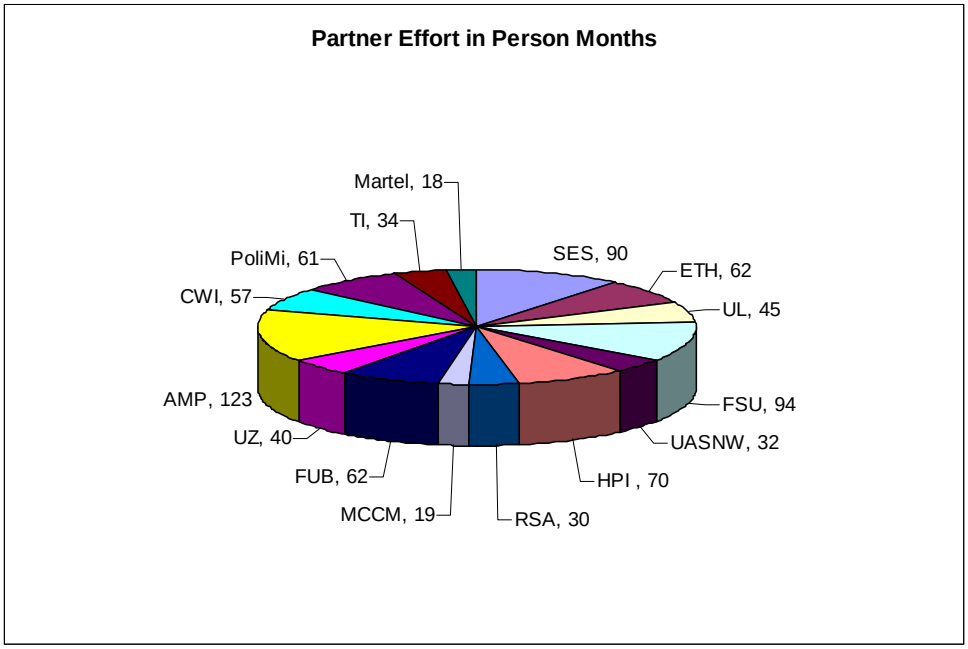

Figure 13: Efforts among partners (person months)

The following diagram depicts the distribution of RTD effort (92%) vs. management (4%) and training (5%) effort in the project.

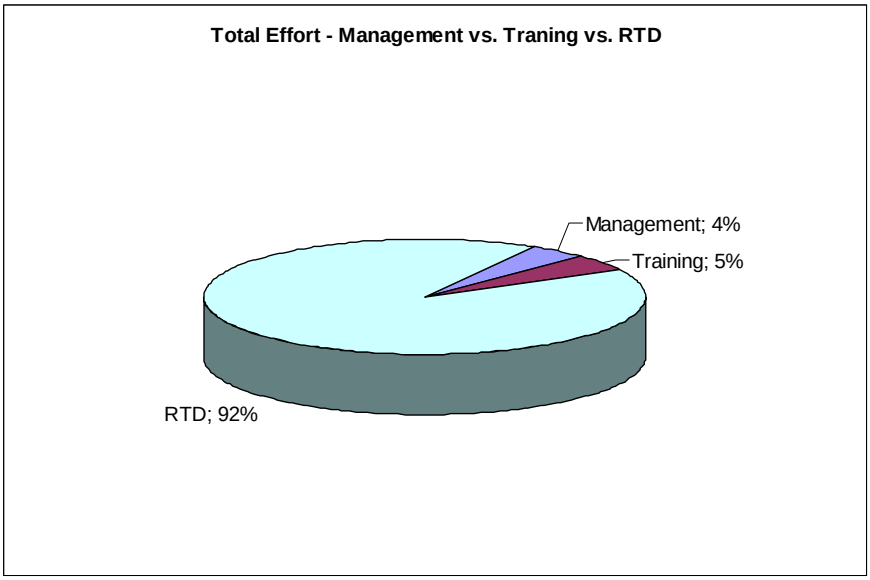

Figure 14: RTD vs. Management and Training Effort

Figure 15 shows the distribution of effort through different RTD and Innovation Related WPs. As can be clearly seen, the most resources (44%) are allocated to WP3, since this work package is the core of the proposal in that it has to prepare and make available the technologies and tools for the use cases to work with. This calls for coordination in two dimensions: one is the integration of various technological tasks to be fulfilled, the other is for the temporal coordination, especially towards WP4.

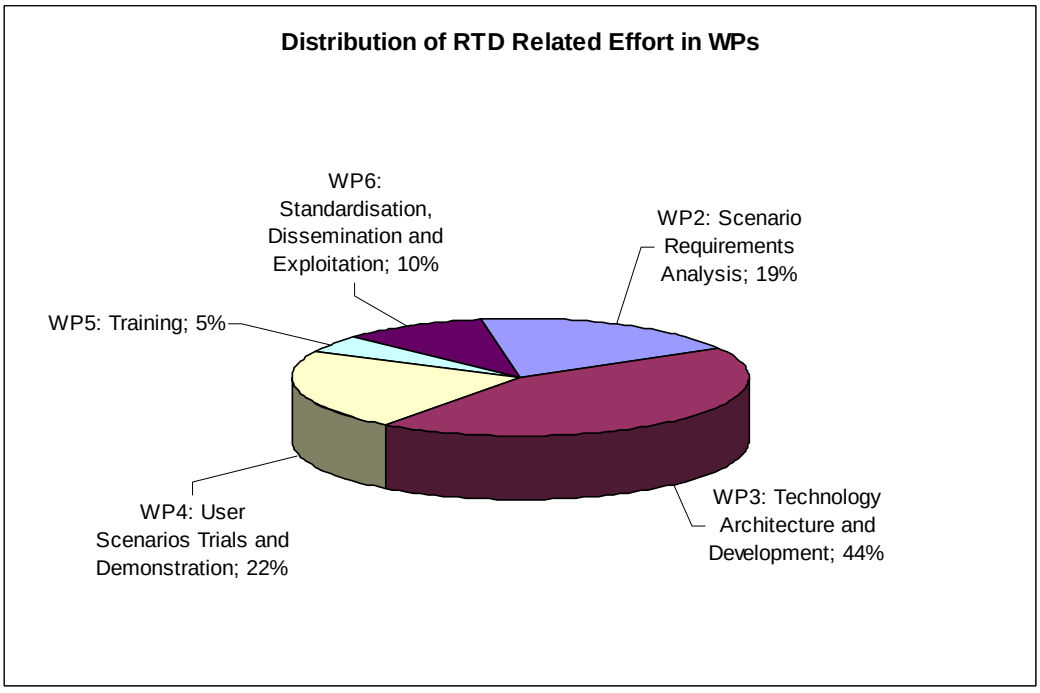

Figure 15: Distribution of effort in WP

Concerning the allocation of the budget, the graphic below shows the distribution of total project integrated costs amongst partners.

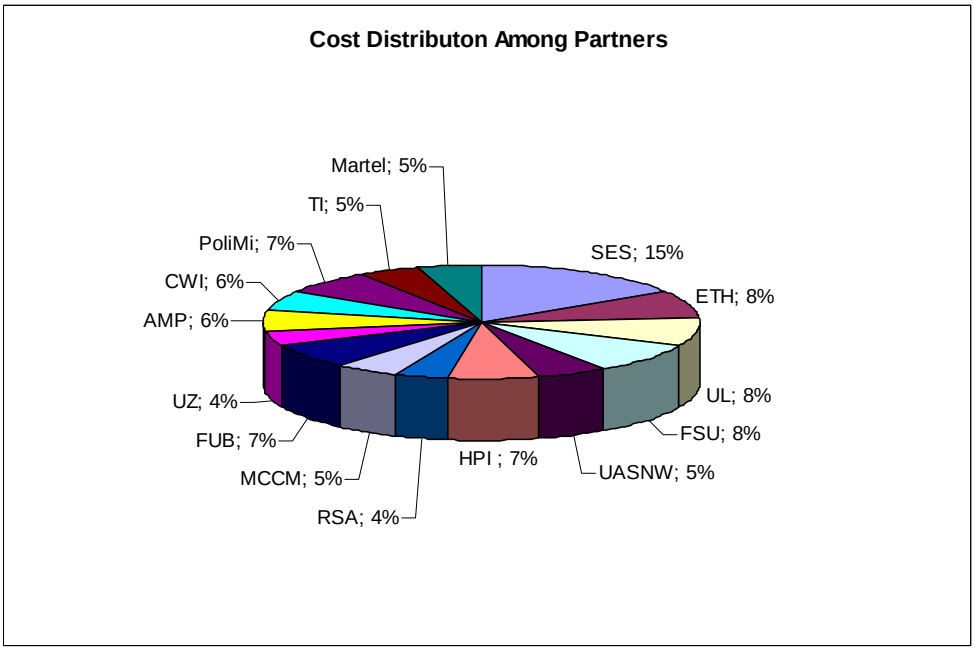

Figure 16: Distribution of costs amongst the partners

The chart on the following page contains the full ASIMOV budget, including the detailed partner costs and PMs per WP.

ASIMOV Budget

Partner	SES (RIC)	ETH (STFR)	UL (STFR)	FSU (STFR)	UASNW (STFR)	HPI (STFR)	RSA (FR)	MCCM (STFR)	FUB (STFR)	UZ (STFR)	AMP (FR)	CWI (RIC)	PoliMi (STFR)	TI (RIC)	Martel (STRF)	Total
WP																
WP1: Project Management	24	0	0	0	0	0	0	0	0	0	0	0	0	0	12	**36**
WP2: Scenario Requirements Analysis	4	12	7	36	0	0	0	8	16	3	36	18	8	8	0	**156**
WP3: Technology Architecture and Development	50	24	11	48	30	60	0	0	16	8	60	21	10	8	0	**346**
WP4: User Scenarios Trials and Demonstration	8	20	9	4	0	4	20	8	18	6	24	12	31	14	0	**178**
WP5: Training	2	0	8	0	0	0	0	0	8	14	0	0	6	0	0	**38**
WP6: Standardisation, Dissemination and Exploitation	2	6	10	6	2	6	10	3	4	9	3	6	6	4	6	**83**
Total PMs for Consortium Management	**24**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**12**	**36**
Total PMs for Training	**2**	**0**	**8**	**0**	**0**	**0**	**0**	**0**	**8**	**14**	**0**	**0**	**6**	**0**	**0**	**38**
Total PMs for RTD, Trials	**64**	**62**	**37**	**94**	**32**	**70**	**30**	**19**	**54**	**26**	**123**	**57**	**55**	**34**	**6**	**763**
Overall Total PMs	**90**	**62**	**45**	**94**	**32**	**70**	**30**	**19**	**62**	**40**	**123**	**57**	**61**	**34**	**18**	**837**
COSTS																
Funding Model (Real Indirect Costs (RIC), Special Transition FR (60%), FR (20%))	50%	60%	60%	60%	60%	60%	20%	60%	60%	60%	20%	99%	60%	66%	60%	
Overhead: RIC (Ind.) = x% of personnel; STFR (Uni; SME) = 60% of all costs; FR (Uni; SME) = 20% of all costs																
Management Personnel Cost in €s per PM	12768															
Training Personnel Cost in €s per PM	10277															
RTD Personnel Cost in €s per PM	10109	6355	8500	4500	6700	4500	8400	12000	5200	2350	3000	4010	5000	8000	10000	
Consortium Management																
Personnel costs	306432	0	0	0	0	0	0	0	0	0	0	0	0	0	120000	**426,432**
Travel	10000	0	0	0	0	0	0	0	0	0	0	0	0		20000	**30,000**
Overhead: RIC (Ind.) = x% of personnel; STFR (Uni; SME) = 60% of all costs; FR (Uni; SME) = 20% of all costs	153216	0	0	0	0	0	0	0	0	0	0	0	0	0	84000	**237,216**
Subcontracting (Financial Audit)	2500	2500	2500	2500	0	2500	0	0	2500	0	0	0	2500	0	0	**17,500**
Total Consortium Management Costs	472148	2500	2500	2500	0	2500	0	0	2500	0	0	0	2500	0	224000	**711,148**
Research & Technology Development (including Trials)																
Personnel costs	646944	394010	314500	423000	214400	315000	252000	228000	280800	61100	369000	228570	275000	272000	60000	**4,334,324**
Travel	10000	20000	20000	20000	20000	20000	20000	20000	20000	20000	20000	30000	20000	20000	0	**280,000**
Equipment	25000	0	10000	16000	50000	16000	3000	0	13500	60000	15840	0	0	0	0	**209,340**
Other	0	0	0	0	0	0	1000	0	8500	30000	5400	0	20000	120000	0	**184,900**
Overhead: RIC (Ind.) = x% of personnel; STFR (Uni; SME) = 60% of all costs; FR (Uni; SME) = 20% of all costs	323472	248406	206700	275400	170640	210600	55200	148800	193680	102660	82048	226284	189000	179520	36000	**2,648,410**
Total RTD and Trial Costs	1005416	662416	551200	734400	455040	561600	331200	396800	516480	273760	492288	484854	504000	591520	96000	**7,656,974**
Training																
Personnel costs	20553	0	68000	0	0	0	0	0	41600	32900	0	0	30000	0	0	**193,053**
Travel	5000		5000						5000	5000	0	0	5000	0	0	**25,000**
Overhead: RIC (Ind.) = x% of personnel; STFR (Uni; SME) = 60% of all costs; FR (Uni; SME) = 20% of all costs	10277	0	43800	0	0	0	0	0	27960	22740	0	0	21000	0	0	**125,777**
Total Training Costs	35830	0	116800	0	0	0	0	0	74560	60640	0	0	56000	0	0	**343,830**
Total Travel	25000	20000	25000	20000	20000	20000	20000	20000	25000	25000	20000	30000	25000	20000	20000	**335,000**
Total Costs	1513394	664916	670500	736900	455040	564100	331200	396800	593540	334400	492288	484854	562500	591520	320000	**8,711,952**
Total EC Contribution	1010685.6	499312	532700	553300	341280	423700	248400	297600	464420	265960	369216	363641	436500	295760	296000	**6,398,475**

Figure 17: The ASIMOV Budget

Section 3: Impact

3.1 Expected impacts listed in the work programme

Specific expected impacts for Objective ICT-2007.4.4: Intelligent Content and Semantics

Expected ICT-2007.4.4 impacts	How ASIMOV addresses these expected impacts
These activities will make digital resources that embody creativity and semantics easier and more cost-effective to produce, organize, search, personalise, distribute and (re)use, across the value chain.	Today most of the digital audio-visual content is tagged with the static metadata. That metadata describes the audio/video content as a monolithic entity missing the temporal, spatial and many other dimensions of the content. Such information does not allow automated search, slicing and splicing of the content on the more granular level. ASIMOV project aims at introducing new and missing annotations mechanisms, user and content profiling that shall enable automated and cost-effective way to produce, repurpose, organize, search and personalize the content across the value chain.
Creators will be able to design more participative and communicative forms of content. Publishers in creative industries, enterprises and professional sectors will increase their productivity with innovative content of greater complexity and ease of repurposing.	The ASIMOV project will introduce social and persistence annotation to the audiovisual content. Those annotations shall shift the paradigm of today's content annotations limited to the content to content association, towards the content to human association. Including presence information the actual social communities and individual users will be linked to the audiovisual content in the real-time fashion enabling the more engaging, participative and communicative form of content. Advanced search mechanisms that will be proposed in this project will make access, slicing and splicing of audio-visual content to migrate from the labour and expert intensive domain to the almost fully machine automated task. This will allow publishers in creative industries, enterprises and professional sectors to reduce efforts and cost related to the search and physical manipulation of audiovisual content, thus increasing their productivity with innovative content of greater complexity and ease of repurposing.
Organisations will be able to automate the collection and distribution of digital content and machine-tractable knowledge and share them with partner organisations in trusted collaborative environments.	Semantic metadata proposed in the ASIMOV project will allow organisations to automate the collection and distribution of digital content and machine-tractable knowledge.
Scientists will operate more efficiently by automating the link between data analysis, theory and experimental validation.	Next to the new annotation and search mechanisms, and the storage in both, dump and customized compilations, scientists are supported by the user interface, providing a work environment with appropriate visualization of content and functionality with high ease of use

Figure 18: ASIMOV Impacts in the Work Programme

3.1.1 Impact of ASIMOV to the targeted outcomes of the Call

ASIMOV is well-positioned between the target outcomes of the relevant objectives of the call, though it does not pretend to serve all purposes to the same degree and at the same level: Some challenges are taken into consideration within the R&D activities, some will be the result of a use case - and some will (only) be achieved by disseminating the results of ASIMOV.

ASIMOV is all about **collective authoring**, especially for ordinary users without prior knowledge as to the intricacies of editing, as ASIMOV at the same time relies on them to **enrich objects** and provides them with a **new experience of "consuming" audiovisual material** interactively. In doing so, it brings the prerogative and privilege of managing audiovisual content from few (producers, editors, and enthusiasts) to many - thus democratising the factual tenure upon content. Prerequisite *and* result of this process is a **customized utilization** with users having (almost) any opportunity to comment, re-edit, link, enrich or only consume "their" content - *and* receiving and consuming content that is shaped and customized to their needs, their interests, their previous knowledge etc. With these uses and gratifications working, it will be **content created by and for the community**, thus making it a richer content in the long run.

In detail, the technological and overall advancements in ASIMOV provide contributions to the following areas:

Targeted outcomes of FP7-ICT-2007-4.4	Impact of ASIMOV	Project objectives
Advanced authoring environments for the creation of novel forms of interactive and expressive content enabling multimodal experimentation and non-linear story-telling. These environments will ease content sharing and remixing, also by non-expert users, by automatically tagging content with semantic metadata and by using open standards to store it in networked repositories supporting symbolic and similarity-based indexing and search capabilities, for all content types.	With the use case of cultural-historic content, ASIMOV will demonstrate how technologies applied to audiovisual content will enable divers (students, pupils, researchers), but generally inexperienced users to work with large numbers and volumes of video entities, with "work" going beyond searching & finding: The goal is for users to (have the opportunity to) enrich the content for generations to come.	Provide tools for low-threshold interactive utilization of audiovisual content. Enrich audiovisual content semantically. Standardize procedures with regard to longevity.
Collaborative automated workflow environments to manage the lifecycle of novel and legacy media and enterprise content assets, from the acquisition of reference materials to the versioning, packaging and repurposing of complex products, including their linguistic and cultural adaptation to target markets and user groups. Empirical results from the psychology of human perception and attention will be used to identify salient multimedia segments and apply summarisation and encoding schemes that will improve content storage and transmission without affecting its perceptual properties	ASIMOV will develop search and (re)distribution technology to identify and provide access to media content assets. Automated content analysis techniques are combined with collaboration tools for semantic indexing, annotation and retrieval of multilingual media assets. ASIMOV directly leverages user behaviour and contextual information to improve indexing, retrieval and (re)distribution of multimedia content, starting from active user interaction with media assets to social collaboration among users on media assets made available via ASIMOV. The repurposing of the content is one of the biggest challenges for the processing of the existing video content. Repurposing includes both	Provide tools for automated indexing, analysis, retrieval and redistribution of multimedia assets. Combine automated tools with user collaboration and interaction tools for optimal results. Provide means to insert contextual user information into semantic indexing and search properties. Devise technology and methods allowing automated slicing and splicing of the video content.

	slicing and splicing of the existing video content as well as transcoding it to be available on different delivery mechanisms. This project will address both contextual video repurposing and multi channel delivery/=. Asimov will develop methods and technology that will enable "auto-indexing" of the content thus allowing easier adaptation and usage of video content in specific linguistic, cultural or target user communities.	Implement the indexing of the content based on the automatic processing of embedded (sound) or environmental (location, presence) information. Implement content search adaptation to match the capabilities of the targeted device or audience.
Architectures and technologies for personalised distribution, presentation and consumption of self-aware, adaptive content. Detecting and exploiting emergent ambient intelligence they will use features embedded in content objects and rendering equipment to enable dynamic device adaptation, immersive multimodal experiences and contextual support of user goals and linguistic preferences. Privacy preserving learning algorithms will analyse user interactions with devices and other users so as to update and effectively serve those goals and preferences.	ASIMOV will develop adaptive systems that enable personalized consumption and redistribution of multimedia data. Ambient Intelligence is addressed by providing self-aware, multi-modal semantically enriched multimedia content that adapts to available device environments. The previous knowledge, the experience of the user is semantically modelled and continuously adapted by monitoring user interactions to enable personalized media access according to the user's individual information needs.	Provide tools for gathering and integrating user feedback, logfile data, and environmental data. Develop set of rules to enable adaptive and customized media consumption. Unitize and annotate complex multimedia data to devise intelligent multimedia objects.
Actions geared towards community building, intended to stimulate cross-disciplinary approaches and a more effective user/supplier dialogue, and other measures, including field validation and standards, aimed at a faster uptake of research results. Usability and technology assessment studies, economic analyses and roadmaps to chart the democratisation of personal and community based multimedia production and management tools.	A key components in ASIMOV is the use of standards for the communication between the various element of the the value chain. The Internet standards clearly help to better integrate multimedia products in the broadcasting and user domains. In ASIMOV, the integration of collaborative information is integrated by relying on Internet standards at each stage of the life of the audio-visual object. In this project research results are really confronted to real video application with the objective to reach an industrialization process. The Internet standards act here as a glue to integrate research prototype with legacy video technologies. As the evolution and innovation must be continuous the project scenarios will provide a test ground for the integration between user, research and industries.	Provide solutions combining open Internet and Metadata standards from W3C and the Internet Engineering Task Force. Provide end to end mobility solutions to enable large scale deployment in terms of IP layer roaming on top of Layer 2 roaming. Provide transition mechanism to enable smooth transition from legacy systems to these new innovative solutions. Provide real showcase s using the different scenarios to demonstrate to industry and users the innovation and

		usability.
Semantic foundations: probabilistic, temporal and modal modelling and approximate reasoning through objective-driven research moving beyond current formalisms. Theoretical results will be matched by robust and scalable reference implementations. Usability and performance will be tested through large scale ontology mediated Web integration of heterogeneous, evolving and noisy or inconsistent data sources ranging from distributed multimedia repositories to data streams originating from ambient devices and sensors, supporting real time resolution of massive numbers of queries and the induction of scientific hypotheses or other forms of learning.	ASIMOV will address interoperability of audiovisual Web applications by contributing the development of an open metadata platform for temporal media. The Web-based platform will be ontology-mediated, based on Web-based standards and build upon previous work on bridging W3C and MPEG-7 related standards, which resulted in the core ontology for multimedia COMM[55]. Dissemination and standardization work will be in close cooperation with upcoming W3C activities in this area[56] and address spatio-temporal addressing of audiovisual content fragments on the Web, metadata integration and media-specific metadata vocabulary.	Develop ontology-mediated web-based open metadata platform for temporal media. Deploy and adapt multimedia ontology COMM. Support standardization of spatio-temporal addressing of audiovisual content fragments on the Web in close cooperation with W3C.
Advanced knowledge management systems for information-bound organisations and communities, capable of extracting actionable meaning from structured and unstructured information and social interaction patterns, and of making it available for activities ranging from information search through conceptual mapping to decision making. Such systems will exploit semantics embedded in multimedia objects, data streams and ICT-based processes, and rely on formal policies to manage user access as well as audit trails in support of dynamic virtual organisations. Research advances will be embedded within end-to-end systems using computer-tractable knowledge in support of dynamic data and application integration, automation and interoperation of business processes, automated diagnosis and problem-solving in a variety of domains. Robustness, scalability and flexibility will be tested in real-life settings, together with interworking with legacy systems.	ASIMOV will develop systems for the management of audiovisual knowledge by supporting semantic search and annotation in rich and heterogeneous video collections. ASIMOV will extend the current state of the art[57] to supporting temporal media and collaborative annotation and tagging models, combining both human annotation and automatic content analysis. Low-barrier user interfaces prototypes for high quality tagging and ontology-based video annotation will be designed and evaluated in extensive field studies.	Develop semantic search engine for time-dependent multimedia data. Integrate search indexes descending from automated media analysis and collaborative tagging to establish a uniform semantic search index.

Figure 19: Impact of ASIMOV to the targeted outcomes of the Call

As a matter of principle, ASIMOV is very much aware of the overall challenges of the ICT Work Programme in that it tackles the exploding number of audiovisual objects and provides the

[55] http://comm.semanticweb.org/. COMM was developed as part of the K-Space NoE and the X-Media IP.
[56] http://www.w3.org/2007/08/video/report.html.
[57] http://e-culture.multimedian.nl/news/iswc2006-press-release.html.

technologies and tools to canalize the plethora by combining content-related technologies to open and manage objects with user-centred power of editing and authoring.

With regard to the **Technological Impact**, ASIMOV will in summary have the following impacts on the social-, domain-, context- and economic levels:

Social Level

- The provision of digital copyright protected material at European level and the deployment of digital rights management (DRM) solutions.
- Establish personalized and customizable user interfaces for a nation-independent access of visualized information.
- Deepen the cultural understanding among the partner countries.
- Sharing knowledge will foster the economic, social and cultural development and the welfare of people.

Domain Level

- Digital libraries will become an effective base for the retrieval of content/know-how and as such a key issue for future EU businesses; complement national efforts with respect to migration of content for libraries, archives and museums.
- Make contributions towards establishing international standards for the sharing and exchange of data; establish knowledge and experience in the field of methodologies and the standardisation thereof.

Context Level

- Cooperative European solutions provide for a more efficient solution to the challenges of a knowledge society.
- Encourage the present academic community recognise the value of open access to research data and learning resources and to freely exchanged content for re-use purposes

Economic Level

- Accelerate the distribution and access to knowledge and competence and, thus, increase the competitiveness of European industries

3.2 Dissemination and/or exploitation of project results, and management of intellectual property

All partners in the project will submit papers for publication. It is a project goal that over the life of each partner should publish at least 2 peer-reviewed papers on international journals. It is expected that the majority of these publications will be concentrated in the second year of the project (when concrete research results first become available). Given the long lead times for many journals it is likely that some of the most important project publications will appear after the formal conclusion of the project. Based on the orientation of the project the following has been identified as potential platform:

Journals

- Information Retrieval (Springer)
- Journal of Information Retrieval (Kluwer Academic Publishers)
- Int. Journal of Information Processing & Management (Elsevier)
- Information Visualization (Palgrave Macmillan)
- Journal on Educational Resources in Computing (ACM)
- Interactions: New visions of human-computer interaction (ACM)

- Transactions on Information Systems (ACM)
- Transactions on the Web (ACM)
- Transactions on Multimedia Computing, Communications and Applications
- IEEE Transactions on Knowledge and Data Engineering
- IEEE Transactions on Multimedia
- IEEE Transactions on Visualization and Computer Graphics
- LNCS Journal on Data Semantics (Springer)
- Journal of Web Semantics (Elsevier)
- JIME - Journal of Interactive Media in Education
- e-learning and education Journal (eleed-Journal)
- Journal of digital information, University of Southampton

Conferences

- European Conference on Information Retrieval (ECIR)
- Annual ACM SIGIR Conference on Research and Development in Information Retrieval
- Conference on Information and Knowledge Management (CIKM)
- World Wide Web Conference (WWW)
- International Semantic Web Conference (ISWC)
- AACE ED-MEDIA
- AACE E-LEARN
- DIVERSE - Developing Innovative Video Resources for Students Everywhere
- Online EDUCA
- Historikertag
- Archivtag

Presence in international conferences: each partner will present the results of work carried out within the project at international conferences. In the first year, project presentations will concentrate on the project's goals and vision (and on the results obtained by Simplicity). Presentations of new research results will be concentrated in the last year.

In the first three months of the project, the project team will prepare detailed plans for reaching each of these audiences. These will be incorporated in a Dissemination and Use Plan (see WP8). Over the same period the project will design and implement a project web site, containing materials for each of the populations targeted by the project

The **Project Web Site** will include a special section dedicated to the needs of scientific and technical audiences. This section will include official publications of the project and internal research reports as well as pointers to other sites containing information of relevance to the project.

3.2.1 Management of knowledge and of Intellectual Property

The general principles relating to access rights are the following:

- Access rights shall be granted to any of the other partners upon written request. The granting of access rights may be made conditional on the conclusion of specific agreements aimed at ensuring that they are used only for the intended purpose, and of appropriate undertakings as to confidentiality. Partners may also conclude agreements with the purpose of granting additional or more favourable access rights, including access rights to third parties, in particular to enterprises associated with the partner(s), or specifying the requirements applicable to access rights, but not restricting the latter.

- The question of exclusion of background is dealt with in a simple way, leaving participants to "define the background needed" for the purpose of the project, and "where appropriate, exclude specific background". Positive lists and similar practices are therefore admitted, marking a significant difference with FP6

Access rights for execution of the project are the following:

- Partners shall enjoy access rights to the foreground and the background IPR, if that foreground or background IPR is needed to carry out their own work under that project. Access rights to foreground IPR shall be granted on a royalty-free basis. Access rights to background IPR shall be granted on a royalty-free basis, unless otherwise agreed before signature of the contract.
- Subject to its legitimate interests, the termination of the participation of a partner shall in no way affect its obligation to grant access rights to the other partners pursuant to the previous paragraph until the end of the project.

Access rights for use of foreground IPR is as follows:

- Partners shall enjoy access rights to foreground and to background IPR, if that foreground or background IPR is needed to use their own knowledge. Access rights for use purposes have to be granted *either* under fair and reasonable conditions *or* royalty-free (participants may choose). The period during which access rights for use may be requested is reduced in FP7 from 2 years to 1, unless the participants agree differently.

Exclusive licensing is expressly accepted (both for foreground and background) but is conditional on all participants waiving their access rights to the specific resource and confirming this in writing.

The following table summarises the situation.

		Access rights to background IPR	**Access rights to foreground IPR resulting from the project**
For carrying out the project	**Access**	Yes, if a partner needs them for carrying out it own work under the project	
	Terms	Royalty-free unless otherwise agreed before acceding to the grant agreement	Royalty-free
For use outside the project (exploitation or further research)	**Access**	Yes, if a partner needs them for carrying out its own work to exploit the results of the project	
	Terms	Either fair and reasonable conditions, or royalty free - to be agreed	

Figure 20: The provisions relating to IPR access rights

In addition, the partners may conclude any agreement aimed at granting additional or more favourable access rights (including to third parties, e.g. affiliates), or at specifying the requirements applicable to access rights (without restricting them). Such provisions will be included in the Consortium Agreement.

Once any patent has been applied for, the Project Manager will inform the other partners as to who will need to be contacted for licenses (subject to a patent being approved) when considering future commercial exploitation. The Project Manager will also contact the Commission-funded IPR support organisation to ensure that other EU projects and organisations world-wide are aware of new pending patents.

Where a partner does not wish to protect IPR it can offer the other partners the option of ownership before offering this to the Commission. It will also be possible for a partner to offer exclusive access rights to a third party if all the other partners agree to waive their rights to access.

If employees or other personnel working for a partner are entitled to claim rights to foreground, the partner must ensure that it is possible to exercise those rights in a manner compatible with its obligations under the grant agreement.

Where several partners have jointly carried out work generating foreground and where their respective share of the work cannot be ascertained, they shall have joint ownership of such foreground.

Where no joint ownership agreement has been concluded regarding the allocation and terms of exercising that joint ownership, each of the joint owners shall be entitled to grant non-exclusive licenses to third parties, based on prior notice and reasonable compensation.

The consortium is also aware of the services of the Commission's IPR Helpdesk.

Once any patent has been applied for, the Project Manager will inform the other partners (at latest via an entry in the Dissemination and Use Plan) as to who will need to be contacted for licenses (subject to a patent being approved) when considering future commercial exploitation.

The Project Manager will also contact the Commission-funded IPR support organisation to ensure that other EU projects and organisations world-wide are aware of the new pending patent.

3.2.2 Individual partners' dissemination and exploitation plan.

3.2.2.1 SES-Astra

SES Astra plans to use the integration of the ASIMOV technology into the Service Delivery and Application Provider platforms as a foundation of exposing the ASIMOV services to the existing and future content delivery channels.

SES Astra will seek at using the ASIMOV to enhance traditional linear broadcasting experience though establishing links between linear and non-linear content metadata and contextual video attributes.

The ASIMOV will be tested and demonstrated on multiple delivery channels (satellite broadcast, IPTV, DVB-SH…). This will allow SES Astra to offer same service on various delivery channel thus making ASIMOV and its results widely available and independent of the delivery network.

SES Astra Techcom will make outcomes of the ASIMOV project known to out media customers and partners and explaining them the potential business advantage in applying it in their service.

The ASIMOV project will be demonstrated through the group of SES companies. With SES group world wide service coverage, this will open a possibility of addressing a global market for the possible commercial deployment of developed technology.

3.2.2.2 ETH Zürich

ASIMOV will be the tool to augment the ETH Multimedia Portal System REPLAY[58], scheduled to produce, handle, and distribute 150 recordings a week in 2010. Without ASIMOV, this will remain an archive for multimedia objects, accessible orderly and/or through a limited set of manually added metadata – as it is the case for most archives these days. With ASIMOV, REPLAY will become the teaching knowledge pool of ETH by providing intelligent and customized access to recordings for learning purposes on a large scale. ETH considers ASIMOV to be a key to the success of REPLAY.

[58] http://www.replay.ethz.ch.

Furthermore, as ETH is dedicated to digital openness by board decision[59], the intellectual property, i.e. the technology in ASIMOV will be shared. ETH therefore considers itself to be in a position to provide a use case for other academic institutions. Based on a traditionally strong cooperation with the Swiss science network SWITCH, the next step will be the allocation on a national level: Considering the needs of smaller Universities with a narrow budget, the centralized resources for IT infrastructure would be a service potentially provided by SWITCH, as this is their business model with other activities (videoconferencing, lecture recording).
Internationally, ETH is closely coordinating its efforts with OpenCast, a Berkeley-lead initiative to promote an open webcast solution. Here, American and international Universities coordinate their efforts to produce and distribute the content they produce, mainly lecture recordings. As REPLAY will play a significant part in the further development of OpenCast, ETH Zürich commits itself to disseminating ASIMOV results towards this community. Finally, as ETH is actively engaged in European academic exchange (e.g. IDEA League[60]) it would consider this an appropriate framework for extending the scope of ASIMOV further.

3.2.2.3 UL

The University of Luxembourg is setting up a competence centre for Next Generation Networks to combine high-level research with real user requirements. ASIMOV will help to align the research direction within the University of Luxembourg with the user needs in a European perspective as well as create the necessary network of experts to synchronize research issues. ASIMOV will speed up the process of creating a critical mass for high level research in the domain of Next Generation Video Networks. University of Luxembourg will organize summits, to publish the overall project state together with the contributing partners. Further on, the University will propose project work in European and international conferences.

3.2.2.4 FSU

FSU plans for dissemination will be focussed on the knowledge transfer of results, findings and deliverables of the ASIMOV project to the academic and industrial community. In particular this includes participation in and presentation at scientific conferences, workshops, and seminars with in the semantic web community as well as in multimedia information retrieval linked with the publication of articles to international journals, to academic journals, conference proceedings and national publications. ASIMOV technology will be deployed in the framework of the Thuringian Digital Library (DBT, a virtual digital library integrating and providing lecture recordings and multimedia e-learning data of four universities: FSU Jena, Technical University Illmenau, University of Erfurt, University of Applied Sciences Jena) for searching their academic video lecture repository.

3.2.2.5 UASNW

ASIMOV tools will be integrated into the multimedia program and the libraries at the University of Applied Sciences Northwestern Switzerland for archiving augmented multimedia objects generated in lectures and project work. The products will in particular form a central part of the Project Oriented Learning Environment (POLE), the platform for interdisciplinary project co-operations of students originating from more than a dozen international Universities contributing from distributed locations. ASIMOV products will be used on a mandatory basis by all partner Universities as part of the POLE design process and, hence, be tested, improved and disseminated. POLE will, therefore, represent an optimal test bed for usability evaluations of ASIMOV products. The development of ASIMOV user interfaces at the University's Institute of 4-D Technologies and Data Spaces will create spin-offs for additional industry-driven applications and work environments also under development at the same institution.

[59] http://proto-open.ethz.ch/index_EN.
[60] http://www.idea.ethz.ch/.

3.2.2.6 HPI

HPI plans for dissemination are mainly focussed on participation in and presentation at scientific conferences, workshops, and seminars with in the semantic web community as well as in the networking security domain linked with the publication of articles to international journals, to academic journals, conference proceedings and national publications. Tele-TASK (tele-Teaching Anywhere Solution Kit) is an advanced system for the production of Internet streaming video featuring a new and drastically simplified technology. It was developed and is used at the Hasso-Plattner-Institute (HPI). In addition to smooth video images and sound, the system also delivers a simultaneous hi-resolution video feed of the instructor's computer's screen content. It even includes the mark-ups, animations and other content that take place during the presentation. Using an "electronic blackboard" and its corresponding "pens" to project his presentations, the instructor can use this feature to add remarks in handwriting. Yet another advantage of the tele-TASK system over other solutions is its highly simplified accessibility. Due to its size and mobility the system can be used everywhere it is needed, no matter if it's a lecture hall, a class room or an office. With tele-Task, HPI has gathered a digital archive with hundreds of lecture recordings. Within the scope of the ASIMOV project HPI wants to develop tools and methods which enable our users to search within these lecture recordings.

3.2.2.7 RSA

RSA will use it its world network dissemination platforms such as the World Summit Award www.wsis-award.org and EUROPRIX to make accessible the research results of ASIMOV to the more than 1000 worldwide eContent expert members.

RSA will use the work and results of ASIMOV in its Multimedia Research Studios as a proof of concept for mobile Multimedia and interactive two-way-Internet-based platform.

3.2.2.8 MCCM

The following status has currently been reached, and it can be assumed that it is attainable in the beginning of April:

- EADS – first talks have taken place
- ZDF – good possibility for integration into the project
- FWU – great possibility for participation
- INA – have shown interest

3.2.2.9 FUB

Asimov offers a real benefit for archives, memorials, museums, TV networks, publishing companies, transnational companies, Universities and schools. They all can profit from the technological solutions the project will provide. The dissemination and exploitation activities will focus on:

Universities: The extension of search options ameliorates the research process for scientists and students. Audio-visual archive materials can be integrated in courses on an e-learning platform. The enrichment of audio-visual material allows the development of educational material for different user scenarios. Furthermore it offers the possibility to integrate audio-visual material in online publications (Open Access). The shared access to research and work results supports the cooperation of researcher groups.

Archives/Memorials/Museums: A large number of archives want to attract more users to their collections. Therefore technological solutions for a better searching and working environment give them the opportunity to make their collections more public:

The offer of various search options allows to search vast collections of audio visual material. The activation of users through annotation makes it possible to extent/ enlarge the catalogue of keywords and enables the archives to update their keyword catalogues. In general the catalogues will be developed once and most of them will not be updated later on. The provision of multilingual functionalities address users and archives in different countries and support a European-wide usage of the technological solutions and of the archive materials. Cooperation with e.g. Memorial Ravensbrück, Memorial Buchenwald, Memorial Neuengamme, Holocaust Museum Warschau.

Publishing companies: Publishing Companies, especially education publishing companies, discover more and more the video-material for their purposes. The combination of video material with their educational material or with user generated content offers new perspectives for publishing and marketing

Schools: The possibilities to search and enrich audio-visual material allow preparing individual presentations as well as presentations by working groups.

Cooperation with e.g. German Federal Agency for Civic Education, State Institute for School and Media Berlin-Brandenburg (LISUM)

TV-networks: The possibility to search in historical film documents for special film segments supports the new film productions which are based on or integrate historical film documents.

3.2.2.10 UZ

University of Zagreb, Faculty of Electrical Engineering and Computing, plans to incorporate ASIMOV in a part of education process, to enable richer student's e-learning experience in some of the courses. The scenarios for exploitation will be analyzed and a pilot-project will be conducted in one or more University courses. If the system matches the needs of Croatian education system, an effort will be put to extend the usage to other Faculties of the University of Zagreb, and also to other Universities of Croatia.

3.2.2.11 AMP

Desktop computers are not the only way to access the internet anymore. Clients need to be able to access the content available to them regardless of the devices (terminals) they use on a daily basis. This implies the need for a unified multi-terminal content distribution system.

Amphinicy intends to use its expertise to implement a powerful and well accepted solution to satisfy these needs. This solution will allow ASIMOV to provide content to its clients via various different devices, i.e. from PCs to smart phones. Furthermore, Amphinicy plans to use its well established position in satellite technologies to encourage the use of ASIMOV services through set-top boxes.

During this project, Amphinicy plans to extend its, already well founded, knowledge base of multimedia content and distribution, which will additionally benefit its efforts for ASIMOV.

Interoperability between IMS platform and ASIMOV, thus supporting various types of terminals such as cell phones, personal computers and set-top boxes (TV channels). This will broaden the service availability of ASIMOV to its clients, and thus increase the market for this product

3.2.2.12 CWI

CWI has a strong track record in disseminating its research results by producing convincing Web demonstrators, releasing open source software and through W3C standardization activities. In ASIMOV, CWI intends to use the same strategies to disseminate results of its own results and that of cooperating partners by developing integrated demonstrators that combine the work of several partners.

3.2.2.13 PoliMi

Dissemination policy represents one of the most important issues concerning the effectiveness of project results. Furthermore a correct **dissemination strategy** is supposed to improve communication efficiency providing to build up a corporate image of the project. Project results will be actually disseminated in the form of reports, conference presentation, guidelines, workshops, newsletters, video clips etc.

First of all a communication design approach will be set up; it will consist of defining unique policies about creation and editing of logo, brochures, flyers, PowerPoint presentations and a dissemination kit including relevant and focused information, in a professional and proactive manner, to targeted audiences such as teachers and trainers, healthcare decision makers, public administration decision makers, service providers, politicians, the wider research community, citizens, etc.

In the light of these policies a calendar events planning will be outlined joining both local and European already existing public events and joining most relevant International event (e.g. WWW Conference, Global Forum, CeBIT, ONLINE EDUCA BERLIN) including biannual thematic meetings organised by EC.

Main actions will be the following:
- Exploitation and Dissemination Strategy definition;
- Exploitation and dissemination kit design and creation;
- Identification of relevant events (care of the ASIMOV members):
    - Key events to be joined for presentations or workshops;
    - Relevant national events to be joined for presentations or workshops;
    - Self organised events;

Networking activity and agreements with external partners in order to increase the number of institutional and educational participants, and potential users.

3.2.2.14 Telecom Italia

Telecom Italia is fully committed to ensuring the maximum possible dissemination of ASIMOV results. Telecom Italia will carry out such activities by using the wide networks of contacts and collaborating entities it has, as well as its involvement in major international forums. Telecom Italia will stimulate media and press coverage and visibility, using different strategies, including: use of traditional media (press, radio, TV) to stimulate public awareness; send awareness packages to media and opinion leaders; using its editorial service to promote the dissemination of information (e.g. publication of articles in magazines, web sites, etc.). Telecom Italia will be involved in articles, white paper, posters for conferences, and will participate (presentations, speakers, promotion) at the key European events.

3.2.2.1 Martel

Martel will gain new competences about the design, development and exploitation of new approaches video-search engine technologies. This increased knowledge is especially important for SMEs such as Martel, since their pool of persons with specialised knowledge is, by definition, smaller. As a consequence, each employee needs to have a wider appreciation of the whole business. The continued experience of helping to manage large collaborative projects will confirm the competence of Martel in this field. This will be of benefit not only for the company's involvement in future EU projects, but also for obtaining new commercial contracts of this type.

Martel will take part in dissemination activities that will support the exploitation process, by making other organisations and projects aware of the ASIMOV results. Martel will take part in whatever clustering and concertation mechanisms are established and will exchange information with projects working in related areas of FP7 (e.g., the Capacities Programme).

Section 4: Ethical Issues

This attribute may raise an ethical question of personal privacy because of possibility to track and localise persons. This aspect is already solved in EU telecom rules according to which the telecommunications operators are obliged to provide the receipt of calls via both fixed and mobile phones, caller location information to requesting services, if this is technically feasible. This is to ensure that public safety answering points receive the most accurate information available about the caller's location. To guide the Member States in implementing this requirement, the Commission issued a Recommendation in 2003. ASIMOV will take into account these security requirements.

At first glance it may seem that ASIMOV enters into privacy of end users and other persons and may threaten their identity. But there are some arguments that will ensure the privacy and enhance the safety of European citizens:

1) **The ASIMOV infrastructure will be used only for subscribed users, paying or for free especially during he trial period.**
2) **All data transmitted via the ASIMOV infrastructure are encrypted using strong algorithms.** This means that the content of communication and the identity of individual users are protected against tapping, misusing and other violations.
3) **The ASIMOV way of data protection is much stronger than in existing systems based on GSM or UMTS voice or data transmission.** Hence the information will only be accessible within strictly controlled groups of users, who can be authorised and authenticated at security levels in line with the most advanced systems existing today, rendering any misuse impossible.

The ASIMOV project is in accordance with Directive 2002/58/EC of the European Parliament and of the Council of 12 July 2002 concerning the processing of personal data and the protection of privacy in the electronic communications sector (Directive on privacy and electronic communications). The project itself does not solve the storing policy of end users but will prepare an interface supporting the strong privacy

The localisation or tracking of end users of ASIMOV infrastructure will be possible only in cases defined by law and will not give any opportunity to raise ethical questions about abuse of personal data.

Finally, all technology development and testing will be performed in accordance with the legislative requirements of the European Union and its member states, thus ensuring that ethical impact is neutral and cognisant of all reasonable criteria within this environment.

European Legislation Framework on Project Related Topics	ASIMOV compliance
Directive 2002/58/EC of the European Parliament and of the Council of 12 July 2002 concerning the processing of personal data and the protection of privacy in the electronic communications sector (Directive on privacy and electronic communications)	✓
Directive 95/46/EC of the European Parliament and Council of 24 October 1995 on the protection of individuals with regard to the processing of personal data and on the free movement of such data	✓

To a large degree, ASIMOV enables activities that fall outside the scope of Community law, such as operations concerning public security, defence or Member State security.

Ethical Issues Table

	YES	PAGE
Informed Consent		
• Does the proposal involve children?		
• Does the proposal involve patients or persons not able to give consent?		
• Does the proposal involve adult healthy volunteers?		
• Does the proposal involve Human Genetic Material?		
• Does the proposal involve Human biological samples?		
• Does the proposal involve Human data collection?		
Research on Human embryo/foetus		
• Does the proposal involve Human Embryos?		
• Does the proposal involve Human Foetal Tissue / Cells?		
• Does the proposal involve Human Embryonic Stem Cells?		
Privacy		
• Does the proposal involve processing of genetic information or personal data (e.g. health, sexual lifestyle, ethnicity, political opinion, religious or philosophical conviction)		
• Does the proposal involve tracking the location or observation of people?		
Research on Animals		
• Does the proposal involve research on animals?		
• Are those animals transgenic small laboratory animals?		
• Are those animals transgenic farm animals?		
• Are those animals cloned farm animals?		
• Are those animals non-human primates?		
Research Involving Developing Countries		
• Use of local resources (genetic, animal, plant etc)		
• Benefit to local community (capacity building i.e. access to healthcare, education etc)		
Dual Use		
• Research having direct military application		
• Research having the potential for terrorist abuse		
ICT Implants		
• Does the proposal involve clinical trials of ICT implants?		
I CONFIRM THAT NONE OF THE ABOVE ISSUES APPLY TO MY PROPOSAL	**YES**	

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Letters of Endorsement

One Laptop per Child

April 3, 2008

ASIMOV

"Audio-Visual Discovery, Metadata and Next Generation Video Networks"

Subject: Endorsement of the ASIMOV project

I wish to endorse the above-mentioned project **ASIMOV**, since its objectives and research work propose a highly innovative approach to the exploitation of audio-visual content. Since ASIMOV has a vision of revolutionizing the user experience that will also have a great impact on our own research activities, we wish to extend our collaboration and support during the full duration of the project to make it succeed.

One Laptop per Child is a non-profit association that aims to improve education for children around the world by designing, making and distributing very low-cost laptops to them. An important and integral part of its mission is to enable the availability of educational content for those laptops. **ASIMOV** can have a significant impact towards that goal since it will enable the creation of crucial metadata for audio and video content.

Sincerely,

Michail Bletsas
Chief Connectivity Officer
One Laptop per Child

One Laptop per Child

1 Cambridge Center, 10th Floor
Cambridge, Massachusetts
02142 USA

Telephone +1 617 452 5660
www.laptop.org

Vint Cerf

From Dr. Vint CERF – Honorary Chair IPv6 Forum

This is an email that was sent in 2012

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23 April 2012

To: Wolfgang@ETH.EDU.CH

From: Heinz@MesseGMBH.DE

Subject: Celebrations

Dear Wolfgang,

Today is my 50th birthday and to celebrate, I bought a new holographic camera with a 10 gigabit/second WiMax interface. Fortunately, the Internet made the deadline to have IPv6 in widespread operation by the beginning of this year! Billions of Internet-enabled devices have been manufactured in the last few years and after the original IPv4 address space finally ran out last year the only way to get on the Internet was with the new, larger address space. It's really very handy to have so many gadgets online. When I take images with the HOLO-10G, they are automatically uploaded to my home server on the Net and incorporated into my blog and my Picasa picture files.

There was a fair amount of talk about the "Internet of Things" around 2008 and many of the predictions are finally being realized. All of these programmable devices can communicate with each other and with servers and clients on the network. The consequence was a rapid evolution of services to manage these devices on behalf of users. Entertainment has certainly changed from what I remember growing up as a kid. Instead of a few television and radio channels, there are literally millions of sources of audio and video entertainment. The idea of scheduled broadcasts has given way to simply selecting what you want to see or hear through a web search or through listing services. An entertainment management service automatically downloads whatever you want to your home server and plays it to any suitable output device of your choice around the house, in the car, in the office or on your person. With personal digital devices operating at rates from megabits to gigabits per second, it is easy to deliver media files for playback or to stream them as needed.

My wife and I decided to make a risotto for dinner last Saturday and we did a quick Google search for recipes and then pulled up a YouTube video that we played on the Internet-enabled refrigerator screen and just followed along. I have trouble imagining how we got along even a decade ago without such conveniences! What has surprised me is how quickly we have adapted to having access to information whenever we need it, wherever we happen to be. In fact, geographic indexing of a great deal of information has really made a big difference. Last year, I was on vacation in America and we decided to rent a houseboat for a few days on Lake Powell in the state of Arizona. As we were driving into the little town of Page, we were discussing what things we should buy to make meals while on the lake and we decided it would be nice to make paella. My first thought was "where do we find saffron in this little town?" I was getting a good digital signal on my iPHONE so I did a search for "page Arizona grocery store saffron" and was

pointed to a web site that had the name and address of the store, a telephone number and a little map. I clicked on the telephone number and when a voice answered, I asked if they had any saffron. They checked and said “yes” so we followed the map to the store and bought the saffron we needed for our paella. Having the world’s information accessible on your hip or in your purse whenever you need it is really quite astonishing.

You know, Wolfgang, this Internet thing is getting to be pretty interesting. There are about 3 billion people online now, many of them using their mobiles and I understand that the European Space Agency, NASA, and other national space exploration agencies are deploying operational systems that link the Earth’s Internet with an increasing number of spacecraft now in use or that are planned for deployment. The Interplanetary Internet is finally starting to emerge in operational form. The original work on it started in 1998 when researchers at the American Jet Propulsion Laboratory conceived the idea of extending rich networking capability to deep space exploration. The Deep Space Network has been rebuilt with this new protocol architecture in mind and now it is quite possible to interact with spacecraft billions of miles away with the same convenience as web surfing. Of course, there are some delays resulting from the astronomical distances and the anemic speed of light!! New optical communication technology has increased the data rates for deep space communication to hundreds of megabits per second allowing space scientists to capture far more elaborate and detailed information than before. With the richer networking capability, it has been possible to design more complex missions in which multiple spacecraft interact with each other locally, between orbiting satellites and with equipment on the surface of the planets, or flying in tandem orbits for space-based interferometry for example. I am looking forward to seeing these new technologies in use for manned and robotic missions in the years and decades ahead.

Like the situation with IPv6, which was designed in the early 1990s but not seriously pressed into service until a few years ago, the Interplanetary network has taken more than a decade to begin to take shape. Persistence counts in these matters, I guess!

I will send you a URL to my photo archives to you can see some of the interesting 3D images from the HOLO-!0G, Wolfgang. Please keep in touch. I look forward to seeing you in two weeks when we meet in Beutelsbach for a reunion with our colleagues.

Mit herzlichen Gruessen,

Heinz

Cotrugli Business School

COTRUGLI
BUSINESS SCHOOL

Zagreb, 2008-04-07

To whom it may concern

Dear Madam or Sir,

I am writing to you on behalf of Cotrugli Business School in order to express my unreserved support to the ASIMOV project proposal for the FP7 call.

In only 5 years our institution became the centre of excellence and regional No. 1 institution for executive education. We have managed to achieve this because we set a high goal – to always be innovating and to offer our clients different advanced learning methods. Distance learning supported by modern technology was also one of them.

Our understanding is that ASIMOV project goes beyond this. We believe that ASIMOV project will truly revolutionize the learning experience and will create synergies never seen before! We have no doubts that the project consortium will be able to live to the promise of their proposal. We are looking forward to results of their work being available to business education institutions like ours.

For this reason Cotrugli Business School wishes to fully endorse the ASIMOV project.

With best regards

Drazen Kapusta
Principal
Cotrugli Business School
www.cotrugli.hr

COTRUGLI d.o.o.
Zagreb, Savska c. 129
MB 2120011

Broadcasting Center Europe

bce
broadcasting center europe

TO WHOM IT MAY CONCERN

We wish to endorse the project ASIMOV as its objectives and research work propose a highly innovative approach to exploitation of Audio-visual content with a vision of revolutionizing the user experience with a great impact on our own research activities and we wish to extend our collaboration and support during the project life-time to make it succeed.

Tun Van Rijswijck
COO

bce
broadcasting center europe

Luxembourg, March 2008

Broadcasting Center Europe société anonyme
45, boulevard Pierre Frieden L-1543 Luxembourg R.C.Luxembourg B 50802
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an RTL company

Camera di Commercio di Milano

CEDCAMERA CAMERA DI COMMERCIO di Milano

ASIMOV

"Audi-Visual Discovery, Metadata and Next Generation Video Networks"

7/4/2008

Subject: Endorsement of the ASIMOV project

Cedcamera wishes to endorse the above-mentioned project **ASIMOV**, since its objectives and research work propose a highly innovative approach to the exploitation of audi-visual content. Since ASIMOV has a vision of revolutionizing the user experience that will also have a great impact on our own research activities, we wish to extend our collaboration and support during the full duration of the project to make it succeed.

CEDCAMERA is a Special Agency property of the Milan Chamber of Commerce, established upon permission of Ministry of Industry. It provides Information Technology Services (including e-learning services) for the Chamber itself, for its Special Agencies, for other Government Institutions, for SMEs. The Chamber of Commerce of Milan is a public body that supplies a mix of services to support entrepreneurs, professionals and Associations; other relevant services are also the collection, processing and provisioning of legal and business information.

Sincerely,

Mauro Bonetto Gandolfi
Vice Director

Swiss Federal Parliament

ASIMOV

"Audi-Visual Discovery, Metadata and Next Generation Video Networks"

Bern, March 2008

Subject: Endorsement of the ASIMOV project

The Parliamentary Services wishes to endorse the project **ASIMOV** since its objectives and research work propose a highly innovative approach to the exploitation of audio-visual content. Since ASIMOV has a vision of revolutionizing the user experience that will also have a great impact on our own research activities, we wish to extend our collaboration and support during the full duration of the project to make it succeed.

The Parliamentary Services provide assistance for the Federal Assembly to fulfill its allotted tasks. They enable the members of parliament to concentrate calmly on their legislative work and keep them fully informed, as well as helping them to address the challenges posed by a constantly changing society. The tasks allotted to the Parliamentary Services include in particular:

- planning and organizing parliamentary sessions and committee meetings,
- carrying out secretarial work, translating and drawing up reports and minutes,
- collating documentation and managing the archives,
- advising members of parliament on technical or procedural questions.

The Parliamentary Services are directed by the Secretary-General of the Federal Assembly

Sincerely,

Andreas Sidler, CIO
Parliamentary Services of the Swiss Federal Parliament
Bern, Switzerland

Corporation ULSS 8 of Asolo

Regione del Veneto - **AZIENDA U.L.SS. N. 8 ASOLO**
direzione generale

Data 7.4.2008 | Protocollo n. 21604 | Allegati n.

Subject: Endorsement of the **ASIMOV** project: Audi-Visual Discovery, Metadata and Next Generation Video Networks.

Corporation ULSS 8 of Asolo wishes to endorse the above-mentioned project **ASIMOV**, since its objectives and research work propose a highly innovative approach to the exploitation of audi-visual content. Since ASIMOV has a vision of revolutionizing the user experience that will also have a great impact on our own research activities, we wish to extend our collaboration and support during the full duration of the project to make it succeed.

Realizing an organized plan of e-health, the Corporation ULSS 8 of Asolo, public healthcare organization of Veneto Region, achieved some best practices: the digital clinical Report File (depository) with 6 millions of case histories on line; a system of information's tracing RFID for sick person / trained nurse / drug; the self bringing of personal clinical history for each private citizen; the clinical reports are consulting on line from the private citizen; an evolved system of e-learning and of multimedia e-education; the financial management with digital signature. The ULSS of Asolo takes part to international actions on digital developments.

Sincerely,

The General Director
dr. Renato Mason

AZIENDA U.L.S.S. 8 N. REGIONE DEL VENETO

Azienda ULSS n. 8 - via Forestuzze, 41 - 31011 Asolo (TV) - tel. 0423/5241 - fax 0423/526508 - c.f. e p. i.v.a. 00496810264 - www.ulssasolo.ven.it
direzione amministrativa - via Forestuzze, 41 - 31011 Asolo (TV) - tel. 0423/526303 - fax 0423/526508 - e mail: dir.amministrativo@ulssasolo.ven.it

UC Berkley

ASIMOV

"Audi-Visual Discovery, Metadata and Next Generation Video Networks"

Apr. 4th, 2008

Subject: Endorsement of the ASIMOV project

UC Berkeley wishes to endorse the project **ASIMOV** since its objectives and research work propose a highly innovative approach to the exploitation of audio-visual content. Since ASIMOV has a vision of revolutionizing the user experience that will also have a great impact on our own research activities, we wish to extend our collaboration and support during the full duration of the project to make it succeed.

"The distinctive mission of the University is to serve society as a center of higher learning, providing long-term societal benefits through transmitting advanced knowledge, discovering new knowledge, and functioning as an active working repository of organized knowledge. That obligation, more specifically, includes undergraduate education, graduate and professional education, research, and other kinds of public service, which are shaped and bounded by the central pervasive mission of discovering and advancing knowledge."

Sincerely,

Adam Hochman
OpenCast Initiative Project Manager

Italian Carabinieri

Comando Generale dell'Arma dei Carabinieri

V Reparto - SM - Ufficio Pubblica Informazione -

ASIMOV

"Audi-Visual Discovery, Metadata and Next Generation Video Networks"

April 7, 2008

Subject: Endorsement of the ASIMOV project

"Arma dei Carabinieri" wishes to endorse the above-mentioned project **ASIMOV**, since its objectives and research work propose a highly innovative approach to the exploitation of audi-visual content. Since ASIMOV has a vision of revolutionizing the user experience that will also have a great impact on our own research activities, we wish to extend our collaboration and support during the full duration of the project to make it succeed.

As a result of the particular combination of Member of the Armed Forces and Police Authority, the Carabinieri Force has the following responsibilities:

a. Military
- defence of the nation, its institutions and resources in the case of a national disaster;
- participation in military operations in Italy and abroad, policing operations abroad, and through international mandates and agreements, reconstruction of local police forces in areas where peacekeeping forces are present;
- exclusive function of security and military police for the Armed Forces;
- functions of judicial military police for Military Justice bodies;
- the security of Italian diplomatic institutions including military institutions abroad;
- assistance to military personnel involved in institutional activities in the national territory;
- mobilization services.

b. Police
- functions of judicial and public order and security policing;
- national civilian protection structure guaranteeing continuity of service in disaster areas and aid to the local population.

Sincerely,

Colonel Pierangelo Iannotti
Head of Press Office

IL CAPO UFFICIO
Col. t.SSMI Pierangelo Iannotti

W3C

ASIMOV

"Audi-Visual Discovery, Metadata and Next Generation Video Networks"

April 8, 2008

Subject: Support of the ASIMOV project

World Wide Web Consortium wishes to support the above-mentioned project **ASIMOV**, since its objectives and research work propose a highly innovative approach to the exploitation of audi-visual content. Since ASIMOV has a vision of revolutionizing the user experience that will also have a great impact on our own research activities, we wish to extend our collaboration and support during the full duration of the project to make it succeed.

The World Wide Web Consortium **(W3C) is an international consortium developing protocols and guidelines that ensure long-term growth for the World Wide Web. Since 1994, W3C has published more than 110 such standards. W3C operations are jointly administered by the** MIT Computer Science and Artificial Intelligence Laboratory (CSAIL) **in the USA, the** European Research Consortium for Informatics and Mathematics (ERCIM) **headquartered in France and** Keio University **in Japan. W3C also has** World Offices **in many regions around the world. By publishing open (non-proprietary) standards for Web languages and protocols, W3C seeks to avoid market fragmentation and thus Web fragmentation.**

Sincerely,

Philippe Le Hégaret
W3C Architecture Domain Leader