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Audio-Visual Discovery, Metadata and Next Generation Video Networks

ASIMOV

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Project 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.

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 audio-visual 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.

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

1.1 Concept and objectives

1.1.1 Overall concept and Ideas and facts at the base of the proposal

The creation and consumption of audio-visual material is in transition mode, as new forms of interactive usage are being developed: Television becomes participatory; users become creators, authoring moves toward collective approaches – the environment is exciting and innovative. In such a new situation there is a significant proliferation of newly created and newly resurfaced audio-video content. However, the field is full of proprietary solutions that are not compatible and run a high risk that effort spent on developments will not be successful in the marketplace and is wasted. The abundance of 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 audio-visual information in their sphere of interest becomes one of the predominant selection criteria when choosing sources for the audio-visual content.

The availability and value of mechanisms for archiving and retrieving content has been severely restricted until now, due to the fact that **audio-visual content is totally unexploited** in two dimensions:

1. Access to the content and its authoring is restricted to settings that are selected at the time and place where the content is 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 utilisation 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 lack of critical mass** - acceptance is reduced by complex and non-standardised user interfaces or access to the specific technology.
2. The temporal and spatial dimensions of audio-visual objects have not yet been made available to the vast majority of end-users: While technological advances have made video manageable, it remains a monolith with regard to content, thus turning accessibility into an empty promise. 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, standardised, and easy access to audio-visual material**.

The long-term perspective is for a content-based accessibility of audio-visual material to be achieved in standardised environments for users to be able to participate in an interactive and collective enhancement of objects, thus maximising 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 audio-visual objects as we see them today in that they provide for a customised user experience.

1.1.2 The ASIMOV objectives

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 the scope of content archiving and retrieval services (c.f. Section 1.3: Progress beyond the state-of-the-art) with innovative developments in the areas of:
   - Video and multimedia data analysis
   - Isochronous metadata annotation
   - Semantic Multimedia Retrieval
   - Visualisation and User Interface Design
   - Identity, privacy, copyright issues and digital rights management
   - Long term preservation and accessibility
   - Content Distribution: Mobile settings, devices, networks
   - Standardisation
3. To provide an integrated solution to prove its functionality in the following carefully selected Digital Library use-cases, reflecting the multifaceted expectations towards the technology:

   3.1 Videolectures

   This use case is an e-learning-scenario, in which the video lectures that are freely available on the http://videolectures.net website will be used. The portal is managed by Jozef Stefan Institute (JSI) in Slovenia and currently hosts more than 5100 high quality scientific videos from different scientific disciplines. Videolectures.net is already developing several new services that are based on the semantically enhanced knowledge technologies, video mining and learning process definitions. Moreover, videolectures.net is involved in several activities that are aiming at video training content providers integration, content exchange, ICT resource management and rights management. This is why the support on interoperability, standardisation and IPR, royalties and rights management are one of the core topics in research and development.

   Therefore the videolectures.net use case will set the following objectives in ASIMOV:

   - Training video content distribution through advanced contextualised search and visualisation methods,
   - Semi-automatic knowledge objects definition and annotation. The aim is to define the context of the video and knowledge objects (scenes) inside the video,
   - Training video exchange and integration functionalities between different content owners and providers through the open content distribution network (Open CDN).
   - Automatic content enrichment by using external sources, formalised knowledge descriptions and collaborative filtering.

   Videolectures.net will provide to ASIMOV a real case study, content providers pilot network, dissemination channels to other providers, several advanced knowledge technologies based tools, techniques and prototypes that are being developed by JSI in several EU co-funded RTD projects (FP6 NEON IP, SEKT IP and PASCAL NoE, FP7 ACTIVE IP, COIN IP and EURIDICE IP and PACSAL II NoE) and industry applications.

   3.2 BELIEF-II

   This use case is oriented towards the validation of the ASIMOV services on the extensive BELIEF-II multimedia Digital Library, collecting material from a wealth of FP6 and FP7 projects, Networks of excellence and National Research and Education Networks on a wide array of thematic areas (see Appendix 1). The BELIEF-II DL will prove as a real-world testbed and also as a first step in the integration of the ASIMOV services with OpenDlib, a popular and open source Digital Library platform that serves as the basis for the BELIEF-II DL, and for many other important scientific archives.

Furthermore, this use case will showcase a concrete application of ASIMOV services concerning the definition, extension and preservation of digital rights policy models and formats for harvested video content.

3.3 SES-Astra SATMODE Application Service platform

SES-Astra will 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 audio-visual material and vice-versa.

As the ASIMOV project targets various set of devices, from desktop PCs to mobile phones, the use of IMS[1] (IP Multimedia Subsystem) concept to accomplish successful interactivity in this environment is proposed.

1.1.3 Addressing the INFRA-2008-1.2.2 Scientific Data Infrastructure call objectives

1.1.3.1 Supporting the Deployment of a Broad European Data Infrastructure

This objective aims to support the deployment of a broad European multidisciplinary scientific data infrastructure able to be easily federated with other knowledge infrastructures in other parts of the world, building upon the achievements of network and grid infrastructures and opening its benefits to other potential research areas such as e-health, e-learning, and others.

ASIMOV will contribute to achieving this objective of the Workprogramme by ensuring that data and audio-visual content stored in any of the federated Digital Libraries around the world (and using potentially proprietary archiving techniques) can be retrieved intelligently. Partners also address the related issues of identity, privacy, copyright and digital rights management.

1.1.3.2 Addressing the Rapidly Increasing Use of Digital Content in Research and Dissemination

This objective addresses the rapidly increasing use of digital content in research and in the generation and dissemination of scientific and technical knowledge. The increasing availability of primary sources of data in digital form (e.g. experimental raw data, social sciences data) has the potential to shift the balance away from research based on secondary sources (such as publications), thus positioning data as the central element in the scientific process.

ASIMOV has the ability to intuitively retrieve data and audio-visual content stored with or without metadata tags (in whatever form). It therefore enables to overcome the potential dilemma in locating and accessing knowledge when data in digital form (e.g. experimental raw data, social sciences data) becomes the main format in which the knowledge is stored, as opposed to more traditional publications.

1.1.3.3 Providing and Integrated Set of Services

This objective is to provide an integrated set of services exploiting the middleware and grid capabilities to federate data in an eco-system of digital resources. These services will enhance the ability of researchers to extract further meaning from masses of data stored in institutional, national, or community repositories, by supporting the deployment of standardised mechanisms to store, archive, authenticate, access, transfer, preserve, curate, certify, and interpret scientific data.

[1] E.g. http://www.ericsson.com/solutions/products/hp/Ericsson_IMS__IP_Multimedia_Subsystem__pa.shtml,

ASIMOV provides precisely the capability to *store, archive, authenticate, access, transfer, preserve, curate and certify* scientific data in whatever form (data and audio-visual). The *interpretation* of the scientific data for the purposes of archiving and retrieval is within the scope of ASIMOV, but the interpretation of the retrieved data is for the experts in that scientific field. Similarly, ASIMOV is not involved with the process of how the data is physically transferred (e.g. via Grids) to/from the various Digital Libraries, but will work with other projects responsible for the networking (e.g. GN3, EGEE) to ensure that an integrated set of services can be provided seamlessly to all the stakeholders.

1.1.3.4 Adapting the Infrastructure

The deployed scientific data infrastructure will require adaptation in cultures and new approaches and competences, given the intrinsic relation between data and associated software to read, interpret, and process it.

ASIMOV will meet this objective by minimising the complexity involved for archiving and retrievinbg audio-visual content. This will lead to the need to adapt cultures and apply new approaches, but will result on reaching the mass market of end users. 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, standardised, and easy access to audio-visual material.

1.2 Outline of the Project Structure

ASIMOV will follow the structure of I3 projects, drawing from the experience of GN2 (GEANT2), EGEE and FEDERICA.

The project structure consists of

- Two NAs (Networking Activities): NA1, NA2
- Two SAs (Service Activities): SA1, SA2
- Two JRAs (Joint Research Activities): JRA1, JRA2

These activities are outlined in the table below and described in detail in sub-sections 1.2.1 - 1.2.6.

Activities and Tasks		Partners
NA1	**Project Management**	**SES-Astra**
TNA1.1	Establishing the project management procedures	Martel
TNA1.2	Performing the project management duties	SES-Astra, Martel
NA2	**Standardisation, Dissemination & Exploitation**	**UL**
TNA2.1	Standards	CWI
TNA2.2	DUP: Dissemination & Use Plan	UL, JSI
TNA2.3	Business planning for commercial exploitation	SES-Astra
SA1	**User Scenario Trials, Validation and Verification in Digital Library Scenarios**	**FOPOLIMI**
TSA1.1	Integrated Trials/Validation and Verification per scenario	FOPOLIMI, ETH, Metaware, Video, Yovisto
TSA1.1.1	Videolectures User Scenario	JSI, ETH, Yovisto
TSA1.1.2	BELIEF-II User Scenario	FOPOLIMI, Metaware
TSA1.1.3	SES-Astra User Scenario	SES-Astra, AMP
SA2	**Training**	**FUB**
TSA2.1	Training on the technology platform	FUB, UL
TSA2.2	Training user communities	FUB, UL
JRA1	**Technical Analysis**	**Yovisto**
TJRA1.1	Recognition of the state-of-the-art	Yovisto, CWI, FUB
TJRA1.2	Specific analytical techniques	Yovisto, JSI
TJRA1.3	Interoperability with legacy platforms	SES-Astra, AMP
TJRA1.4	Socio-economics	UL
JRA2	**Technology Architecture & Development**	**HPI**
TJRA2.1	Video annotation, video metadata	CWI, Yovisto, ETH, HPI, AMP, FUB, JSI
TJRA2.2	Addressing	CWI

TJRA2.3	Analytical Filtering	Yovisto, HPI, JSI
TJRA2.4	Collaborative Filtering	SES-Astra, JSI
TJRA2.5	Multi-lingual aspects and Natural Language Processing	UASNW, ETH, FUB, JSI
TJRA2.6	Visualisation (presentation – user interface)	UASNW, FUB
TJRA2.7	Semantic searching	Yovisto, HPI, CWI, AMP, ETH, JSI
TJRA2.8	Identity, privacy, copyright, DRM	UL, FUB
TJRA2.9	Long term preservation and accessibility	FOPOLIMI
TJRA2.10	Content distribution (multi-terminals)	AMP
TJRA2.11	Interoperability with legacy platforms	SES-Astra, UZ, JSI
JTRA2.12	Network & end-user security	UL, HPI

1.2.1 NA1: Project Management

SES-Astra will perform the overall project management of the ASIMOV consortium. They will appoint a Project Manager who will be responsible for the management of the entire ASIMOV project. Being an I3 project, ASIMOV is large and relatively complex. Therefore, SES-Astra will be supported by an organisation (Martel) that has specialised in the professional day-to-day management of EC projects (including I3s) for the past 20 years.

The major functions and responsibilities of the ASIMOV project management are:

- Performance monitoring and control of all tasks.
  Overall performance control will be performed 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 Project Manager. The Project Manager shall submit all documentation to the Project Officer and the official "project mailbox".
- Coordination of interfaces between the Activities.
  The Project Manager will coordinate and control the interfaces between the Activities.
- Schedule planning and status control of all Activities
  This work will ensure the timely delivery of the results (milestones and deliverables). Each Activity Leader will be 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.
- Documentation and configuration control including change management.
  Martel will perform overall documentation and configuration control, including technical and/or contractual changes.
- Resource and finance control of the entire project.
  Each partner will be required to control and report their manpower and other expenditures status which will be analysed by the Project Manager and Martel.
- Risk identification and mitigation control.
  The Project Manager and Activity Leaders shall identify all actual and potential risk areas and assign mitigation actions.
- Meeting and conference coordination.
  In close cooperation with the partners, the Project Manager shall call for meetings and conference calls required for the project.

- The Project Manager will also be responsible for the overall information exchange between members of the consortia and between the project and the EC.

NA1 comprises 2 tasks:

TNA1.1. 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.

TNA1.2. 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.

1.2.2 NA2: Standardisation, Dissemination and Exploitation

NA2 comprises 3 tasks:

TNA2.1: Standards:

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

- Involvement through CWI in the **W3C** 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 Handle Server in Switzerland
- 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

The lack of standardisation is a current hindrance to the open exchange of content with respect to audio-visual and 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 audio-visual content. Other developments such as the Open Access Initiative will 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 digital material. The relevant standards go 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 customised 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.

Furthermore, **Intellectual Property rights and IT-Security** combine claims of open and secure access. With ETH providing a sophisticated IT-infrastructure including integration to the National **Authentication and Authorisation Infrastructure** (AAI) already, the main challenge would be in user group management and especially sophisticated rights management/authorisation. 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.

TNA2.2 Dissemination & Use Plan:

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.

UL together with its partners will organise a yearly ASIMOV Summit 2009-2010-2011 to bring together audio-visual and multimedia stakeholders to foster knowledge and disseminate the results of the project to the targeted audiences of the project from industry and academia. ASIMOV partners will also 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.

TNA2.3 Business planning for commercial exploitation:

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

- 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.
- SES-Astra 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. They 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.

1.2.3 SA1: User Scenario Trials, Validation and Verification in Digital Library Scenarios

In order to test the project developments in the field **a set of user scenario trials with Digital Libraries** has been identified. Partners from each Digital Library have been incorporated into the consortium to ensure the close collaboration. The aim of these trials is to validate the proposed solution/s for each user scenario starting from a set of tests developed in cooperation with selected partners, collecting feedback and remarks. As a natural consequence we will tune and optimise the proposed solution/s taking into account the results of the validation step.

SA1 comprises 1 task:

TSA1.1: Integrated Trials/Validation and Verification per scenario:

An outline description of each validation / verification activity is provided in the following paragraphs. The trial and validation activity will be subdivided in three phases. The first phase is a refinement and clarification of the requirements already collected from the Digital Libraries. The second phase will involve providing the content and performing the tests. The third phase will be enlarged to a panel of interested parties performing trials with real users. The validation and verification of Digital Library scenarios will be implemented in the following user scenario trials. Each of the user scenarios will address a number of specific objectives of the project and the Workprogramme.

TSA1.1.1: Videolectures User Scenario

The Videolectures user scenario is mainly based on the Technology Enhanced Learning (TEL) services that are supported via a content distribution network. Videolectures will provide to ASIMOV the platform, services and video content that is used for the self-learning purposes. Videolectures currently offers more than 5100 scientific videos (each week, an additional 40 are added) that are linked with the presentation slides and described according to the enhanced DC (Dublin Core) protocol. Each video is available in several formats, such as Flash video, WMV and Real Video. Videolectures will also provide services for curriculum and courses building as well as authoring tools and tools for video content, automatic content description and classification. Through the Department of Knowledge Technologies, additional tools and prototypes can be provided, such as contextual search (http://searchpoint.ijs.si), context enrichment tools, media mining, annotation tools, collaborative and analytical tools and techniques.

Technologically, there will be two streams of development activities. The first stream of activities will be focused on the development of the interoperable and heterogeneous platform that will enable a simple and effective setup and operation of the content distribution network. For this purpose, additional scientific video libraries at different sites will be included, such as the ones that already collaborates with videolectures.net in the PASCAL II Network of Excellence (http://www.pascal-network.org). The verification of this scenario will be made by the content providers at one side and the visitors on the other. Key performance indicators will be set beforehand.

The second stream of parallel activities will be the development of the advanced video access, management and authoring services that will be tested in the real videolectures.net environment. The tools that will be tested/implemented in this scenario are: intelligent (contextual) search and retrieval, video library visualization, content enrichment tools (external content, user generated content), content analysis and annotation, learning object detection and learning process contextualization and personalization (in relation to IMOs see Chapter 1.2.5).

New services will be tested and evaluated by using the regular users and already established evaluation mechanism in videolectures.net on the dedicated development address dev.videolectures.net. and by users behaviour analysis.

TSA1.1.2: BELIEF-II User Scenario

Metaware will provide an integration layer with the OpenDlib digital library platform, on which the Belief DL is currently based. This integration will allow to access the DL search & browse, metadata access and submission capabilities.

The integration with the OpenDlib platform will leverage the OAI-PMH and Qualified Dublin Core standards, and the OLP protocol.

On this technological basis, an advanced web-based video access service will be built, with the final objective of enriching the existing BELIEF-II digital library reach, enhancing access to eInfrastructure-related audio-visual material.

The integration of heterogeneous information sources collected in BELIEF-II digital library poses several interesting copyright-related scenarios, more related to the actual copyright attribution and usage license than to the “DRM” attached to the content. This scenario will investigate the issues related to the appropriate declaration of digital rights attached to the resources, and on the long-term access to such

digital rights in a preservation context, applying state-of-the-art results from existing digital preservation research projects, such as CASPAR, DPE, PLANETS and PRESTOSPACE.

TSA1.1.3: SES-Astra User Scenario

SES-Astra will 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 audio-visual material and vice-versa.

As the ASIMOV project targets various set of devices, from desktop PCs to mobile phones, the use of IMS[2] (IP Multimedia Subsystem) concept to accomplish successful interactivity in this environment will be addressed. 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 the 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 audio-visual content exploring and IMS system, thus carrying out the integration and content delivery between the two concepts. All possibilities regarding ASIMOV audio-visual 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.

1.2.4 SA2: Training

For the successful dissemination of the project results it is necessary to communicate widely the possibilities offered by the technological solutions of the project. 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.

SA2 comprises 2 tasks:

TSA2.1 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.
- A presentation of the training material will be provided, using the ASIMOV platform

TSA2.2 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 and tips will be provided.

[2] E.g. http://www.ericsson.com/solutions/products/hp/Ericsson_IMS__IP_Multimedia_Subsystem__pa.shtml,

- Demonstration workshops will be organised to introduce the project platform to communities that are already using the existing material, such as: the videolectures user community, COIN and ACTIVE learning communities, PASCAL scientific community, etc.

1.2.5 JRA1: Technical Analysis

As new forms of interactive usage of digital audio-visual 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 customised and target-oriented access depends on the individual context of each use case. All of the selected use cases share the concept of semantically annotated multimedia data to facilitate the emergence of **Intelligent Multimedia Objects (IMO)**. Due to the nature of audio-visual content, semantic metadata has to be synchronised, 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.

To open up audio-visual content to become fully-fledged IMOs, appropriate semantically enriched metadata has to be provided for and synchronised 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. Moreover, by implementing the context extraction tools, the audio-visual content can be enriched from the external relevant web-based content i.e. Wikipedia, Cyc ontology, New York Times archive, etc.

The projected use cases include various different devices for media access, ranging from mobile cell phones with internet access over video home theatre to desktop personal computers. Besides appropriate visualisation 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.

JRA1 comprises 4 tasks, which lead to the technical requirements to be met by JRA2, and which will be trialled in the 2 use case scenarios, described in SA1:

TJRA1.1. Recognition of the state-of-the-art:

All partners in this task address the recognition of the state-of-the-art. Industry-based use cases and alternative scenarios for search engines will be analysed and documented. Research will be made 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) and current publishing possibilities.

TJRA1.2 Specific analytical techniques:

Yovisto and the partners responsible for the use case scenarios will apply specific analytical techniques to ensure that the requirements passed to JRA2 will enable the use case scenarios to be implemented and validated. The outcome will be a System Requirements Specification document the format of which will follow standards such as Volere Edition 8 and/or IEEE URC.

TJRA1.3 Interoperability with legacy platforms:

SES-Astra 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. They will investigate scenarios for the production, deployment, transmission and consumption of interactive-TV content that can complement and integrate existing linear digital programs. They will also analyze requirements for the integration of existing IPTV services and content with the audio-visual discovery services to be developed by this project, and investigate use-cases for the annotation, indexing, addressing and search of existing linear digital content using the technologies described by this proposal. Partners will also analyze requirements for the interoperability of the to-be-developed audio-visual discovery services with infrastructure standards supported by the SATMODE Application Service, including MHP (Multimedia Home Platform) and IMS (IP Multimedia Subsystem). Finally, they will also analyse interoperability at the level of *processes* – learning process, authoring process, etc.

TJRA1.4 Socio-economics:

This task explicitly addresses the social / economical impact of the ASIMOV using empirical research methods. It has three main aspects:

- an elucidation of the social aspects of a user's Quality of Experience (QoE), which reflects its degree of satisfaction in accordance with the Quality of Service (QoS) provided by the network and the search/discovery experience
- an examination of the mapping and adapting requirements of societal communities to communication services and infrastructure
- an exploration of the business and accounting models that will support and monetise the development and maintenance of the additional infrastructure required to operate the newly introduced services

1.2.6 JRA2: Technology Architecture & Development

This Activity is the core of the proposal in that it has to prepare and make available the technologies and tools for trialling in the use case scenarios. This requires coordination in two dimensions: One is the integration of various technological tasks to be fulfilled; the other is for the temporal coordination, especially towards SA1.

Audio-Visual Objects (AVOs) 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 utilisation 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 Activity is about the technologies to change this.

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.). The method that is currently being developed and tested and is very promising in providing more search capabilities is the automatic transcription of spoken texts (please check http://web.sls.csail.mit.edu/lectures/).

JRA2 comprises 12 tasks, each representing a separate development, leading to the complete solution:

TJRA2.1 Video annotation, video metadata:

As auxiliary data, we refer to information external to the audio-visual object itself. Due to the multifaceted qualities of the audio-visual material we will be dealing with, this takes very different forms:

- information from the production and distribution of AVOs;
- 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 needed mainly to help manage an AVOs. The task is to find standardised methods and techniques of linking these additional information into a bundle with the 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 synchronised with it where the information does relate to time (isochronic).

The workload will be distributed as follows: CWI and JSI will work on innovative and intelligent search paradigms based on meaningful relationships among audio-visual content, and on low-barrier user interfaces for ontology-mediated tagging of Web-based content. Yovisto 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 and JSI 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.

TJRA2.2 Addressing:

The Semantic Web family of RDF-related standards provides a rich set of technologies to describe and serialise metadata over de Web. The connection between Web-based metadata units and the fragment of the audio-visual 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 localise 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 localise 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 and JSI will work on a URI-based scheme for addressing spatio-temporal fragments of audio-visual content on the Web.

TJRA2.3 Analytical Filtering:

This task focuses on analytical filter methods to extract textual metadata from video resources. Video data often contains 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. Also the automatic transcription method that is in development at JSI will be considered for the integration.

TJRA2.4 Collaborative Filtering:

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

This task will develop a Collaborative Filtering mechanism composed of the following four key elements:

- Collaborative filtering (based on collaborative tagging)

- User profiles generation
- Personalisation based on user profiles
- Multi-dimensional rating and voting mechanisms

These four key elements will rely on a prototype platform to be developed jointly by SES-Astra, HPI[3] and JSI[4] It will provide tools and interfaces to annotate and rate IMOs using standard Internet technologies to collect user data and user feedback. Methodologies will be included to analyze and aggregate this data and add/transform it into user profiles and IMOs profiles. This information will be used within ASIMOV to improve the 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-Astra, HPI and prototypes that were developed at JSI. Previous research and publications in the area of web search personalisation and information filtering[5] carried out with said prototype provide valuable theoretical and practical knowledge and will serve as an optimal starting point for the integrating personalised access, search and distribution into ASIMOV. Personalisation 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. The industrialisation of this collaborative filtering platform is an important goal for SES-Astra, and therefore the collaborative filtering platform APIs will follow Internet standards as published by the IETF or the W3C.

TJRA2.5 Multi-lingual aspects and Natural Language Processing:

The adoption of existing transcription technology will have to be realised against the background of very heterogeneous material. FUB will edit exemplary audio-video transcripts in English, German, Polish and Russian for testing purposes. FOPOLIMI will edit exemplary audio-video transcripts from Italian to English and vice versa and from French to Italian and vice versa. JSI will provide exemplary transcripts in Slovenian to English and vice versa and UZ from Croatian to English and vice versa.

TJRA2.6 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. They will also develop designs for multi–device interfaces as well as visualisation concepts for both, 2D and 3D interactive visualisation. 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. FOPOLIMI will contribute to the design of interaction addressing different users groups and different platforms.

The envisioned efficient visualisation will be integrated into ASIMOV's semantic search engine search result visualisation, navigation, and user interaction (c.f. TJRA2.7)

TJRA2.7 Semantic searching:

One of the main goals 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.

A typical search result may consist 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. For example, in the eLearning context (c.f. TSA1.1.1), plain and single IMOs are often not

[3] Noll/Meinel 2006
[4] Grcar/Mladenic/Grobelnik 2005
[5] Noll/Meinel 2007b

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 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.

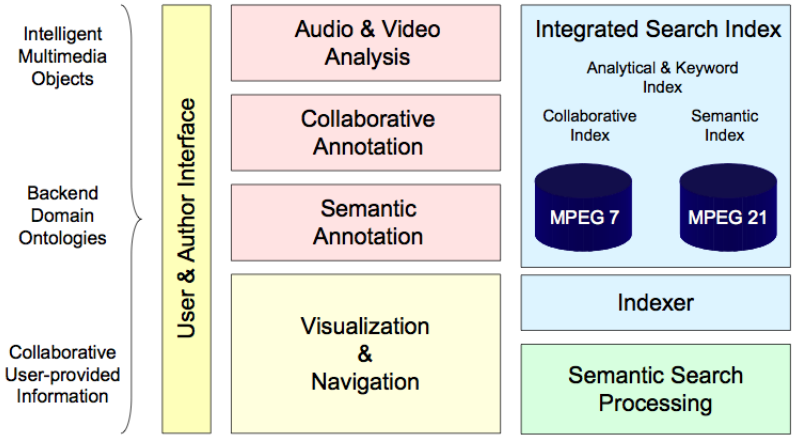

Figure 1: ASIMOV Search Engine Architecture

On the other hand, semantic annotation also provides synonyms to increase search recall and contextual information to increase search precision. In conjunction with search result visualisation (c.f. TJRA2.6), semantic metadata enable the efficient navigation of the search space and allow the serendipitous discovery of related results. 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 distributing 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 not all are 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 personalised 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[6]. 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[7] and thus, are required for obtaining a personalised 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 personalised 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.

Registration of IMO and Web Crawling:

The ASIMOV search engine maintains an entire collection 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. Being the potential result of large-scale web based searches, the content 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. Differently from 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.

TJRA2.8 Identity, privacy, copyright and DRM:

Most jurisdictions recognise 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 unauthorised 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. FOPOLIMI will contribute to this task providing its expertise in the field of privacy and intellectual property right management.

6 Brin/Page 1998

7 Golder/Hubermann 2006.

TJRA2.9 Long term preservation and accessibility:

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 are often 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 Defence standard entitled the Design Criteria Standard for Electronic Records Management Software Applications (dod 5015.2 STD).

Following the approach of ISBN numbers for published material, 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[8]. The DOI (Digital Object Identifier) System allows "content objects" to be identified in the digital environment.

TJRA2.10 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 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.

TJRA2.11 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 including 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 will extend the SATMODE Application Service platform to support ASIMOV services:

- Integrating intelligent video search and navigation as a part of the service of their Application Server (AS)
- Enabling profiling and personalisation as a part of the AS
- Intelligent video search in relation to the linear content and cross-referencing to non-linear content (e.g. a user watches linear TV, sees the 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

An ASIMOV application module will be developed and integrated into the IMS service layer, in order to achieve interoperability between ASIMOV's intelligent audio-video content exploring, fetching and searching, and emerging mobile services. Partners will also implement audio-video content management and control by integrating ASIMOV management and control services with IMS horizontal services at the control layer.

UZ will define the method and service interface for integration between ASIMOV and other systems such as Content Management Systems, Learning Management Systems and Document Management Systems. The outcomes of this task will enable information exchange between various applications, based on Web

[8] www.doi.org

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.

TJRA2.12 Network and End-user security:

Bearing in mind the federation of Digital Libraries and the fact that ASIMOV search results will be transported across communications networks, such as those provided to the research community by GEANT, IPv6 will be specifically considered from the point of view of securing the data. 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 Progress beyond the state-of-the-art

With the two-track approach of technology research and development on one side, and use case scenarios on the other, emphasis will be put on extending the current state-of-the-art in both areas, i.e:

- technological and scientific developments
- existing solutions being deployed for the selected use cases

The state-of-the-art in the following 10 important areas for ASIMOV has been evaluated, and the requirements and opportunities for enhancement have been identified:

1.3.1 Video and Multimedia Data Analysis

A number of European projects have contributed significantly in this area: **AMI** and **AMIDA**[9], whose technology has now been taken by an SME named Klewel[10], **CIMWOS**[11] dealing with metadata from text, speech, and image and following the MPEG-7 standard.[12], **SAPIR**[13], focusing on multimedia objects with a different methodological and technological approach (similarity based search), and **aceMedia**[14], very much focused on visual descriptions of multimedia content, but produced an interesting approach towards a multimedia annotation tools (M-OntoMat-Annotizer).

Since **SAPIR** and **aceMedia** are 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 achievements, as consortium partners have considerable experience in this field: Yovisto provides automated annotation of recorded audio-visual content based on synchronisation with auxiliary text-based sources (slides etc.).[15] ETH has integrated Yovisto's solution in its REPLAY project[16] as it considers Yovisto technologies among the most advanced in this area. HPI has developed an automated lecture recording system (tele-TASK[17]) as well as a natural language processing (NLP) based approach for simple automated annotation of audio-visual recordings[18]; UASNW used NLP-tools on recorded videoconferencing meetings as a knowledge pool.

With audio-visual 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 recognise, 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.

[9] http://www.amiproject.org/
[10] http://www.klewel.ch.
[11] http://www.xanthi.ilsp.gr/cimwos/default.htm
[12] Chang et al. 2001
[13] https://sysrun.haifa.il.ibm.com/sapir/tech_obj.html
[14] http://www.acemedia.org
[15] Sack/Waitelonis 2006a
[16] http://www.replay.ethz.ch.
[17] http://www.tele-task.de/
[18] Repp/Meinel 2006

- **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.

1.3.2 Isochronous Metadata Annotation

Synchronising 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, including:

- **MUSCLE**[19] 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**[20] is an EU-FP6 funded project on video and audio retrieval with the focus on utilisation by the home user. The project included cross-media decision mechanisms for video segmentation, video indexing, video categorisation and multimedia summarisation.

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 synchronised with the time-dependent origin data to enable content-based and pinpoint access to search results. This includes technical (addressing) as well as standardisation 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).

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 customised media consumption. Temporal and spatial segmentation is endorsed by standardisation 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 synchronised annotation enables cross-link detection, similarity-based search, and automated recommendations. Consortium's partners have considerable experience in this field: Yovisto has a prototype for the synchronised collaborative annotation of audio-visual recordings that allows the synchronisation of plain tags with audio-visual content to enable a content-based search.[21] ASIMOV's collaborative annotation facilities will 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. Audio-visual content is not only annotated as a whole, but the tagging information is chronologically synchronised. Yovisto also provides automated annotation of recorded audio-visual content being synchronised with user-provided tags, comments, and discussions as well as with social networking information[22].

1.3.3 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**[23]). HPI has developed a prototype for manual semantic annotation of objects[24], which serves as a perfect basis for further development incorporating the results achieved by NPBibSearch[25], a prototype semantic search engine for bibliographic search developed at FSU Jena. **Time-dependent semantically rich annotation of audio-visual content, as proposed in the ASIMOV project** (i.e. based

19 http://www.muscle-noe.org/
20 http://www.reveal-this.org/
21 Sack/Waitelonis 2006b
22 Sack/Waitelonis 2006a
23 http://wordnet.princeton.edu/; Felbaum 1998
24 Linckels et al. 2007; Linckels et al. 2006; Karam et al. 2007
25 http://www.osotis.com:8080/NPBibSearch/; Sack 2005; Sack et al. 2006

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[26].

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 the 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 customised multimedia documents that consist of single interrelated segments according to personal information needs. In combination with the possibilities of social networking, customised 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 audio-visual objects towards intelligent multimedia objects (IMO) for customised usage.

1.3.4 Visualisation and User Interface Design

The **user interface** is at the heart of collective and interactive utilisation of objects in that it provides all the tools and functionalities to easily edit and enrich audio-visual material. Also, adequate **interactive visualisation** is necessary to support new generations of search techniques in that the output will develop from a raw presentation of the results into customised 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 utilisation of all features and to amplify the goal of customised solutions ASIMOV has to be optimised for the use with different types of devices (e.g., organisers, 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**.

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 Visualisation there are guidelines defined by Bertin (1967), Card et al. (1999), Spence (2006) and Chen (2004). Interactive visualisations have turned out to be a promising approach for complex and multi–variate data sets. Luo et al. (2006) describe different styles of ontology visualisation for interactive video access. Nevertheless, these 2D and 2.5D visualisations 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, 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. Also, 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 is 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.

These developments will break new ground towards a new, broader approach in user interface design.

[26] Berners-Lee et al. 2001

1.3.5 Identity, Privacy, Copyright Issues and DRM

Searching and providing audio-visual 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.

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 their personal online identity. Some services do require user authentication (such as for online payment). Online identity is secured and centralised, 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 authorisation, 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 visualise content. Such control can be either generalised or tailored to the individual user, allowing content providers to monetise the additional interactivity granted to premium customers.

1.3.6 Long term preservation and accessibility[27]

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 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 Defence 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.

[27] http://www.salzburgresearch.at/fbi/digicult

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[28]. 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.

1.3.7 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 and their current location. 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)

ASIMOV will analyze special requirements that are needed by particular terminal types such as display capabilities, bandwidth, processing capabilities. Special care will be taken to utilise special features that are available on some devices (GPS, speech recognition, video acceleration, etc…).

User interface across all devices should share a similar "look and feel" and provide the same functionality. As part of the SATMODE[29] user scenario, Amphinicy will design and develop 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 proprietary solutions like Adobe Flash[30] and Microsoft Silverlight[31]. These solutions work acceptably for desktop computers but they are inefficient on sparse resource terminals.

Some of popular video content providers are:

- **YouTube**[32]: a video sharing website where users can upload, view and share video clips
- **Google Video**[33]: 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**[34]: 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 the integration of solutions that will enable the access-agnostic availability of services. The most promising solution being IMS[35] (IP Multimedia Subsystem), it enables access to a service from any IMS compliant device. IMS is being standardised by several standardisation bodies, where ETSI TISPAN, 3GPP, 3GPP2, OMA and IETF are the most active ones. The development of IMS compliant terminal devices for access to ASIMOV will enrich the range of devices and networks able to access ASIMOV.

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28 www.doi.org

29 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.

30 http://www.adobe.com

31 http://www.microsoft.com/silverlight/default.aspx

32 http://www.youtube.com/

33 http://video.google.com/

34 http://www.joost.com/

35 http://en.wikipedia.org/wiki/IP_Multimedia_Subsystem

1.3.8 Network

Innovation today 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 15% of IP address space is left as of September 2008. The end-to-end restoration is of paramount importance and will be only achieved with the 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.

1.3.9 Business models

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, and 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.

1.3.10 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* standardising multimedia recordings**. ASIMOV will contribute significantly in the area of audio-visual 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 audio-visual 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.

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. Standardisation of copyright and access rights will help overcome obstacles in the distribution of audio-visual content (MPEG-21).

1.4 Methodology to achieve the objectives of the project

ASIMOV will reach the specific objectives mentioned in Section 1.1 by integrating the developments identified in JRA2, incorporating the progress beyond the state-of-the-art mentioned in Section 1.3 and making the trials and validation through the use case scenarios in SA1.

The relationships and main interactions between the different activities is built such as to create a delivery chain between SA1, JRA1, JRA2 and back to SA1, with positive feedback between JRA2 and SA1 (via JRA1), through the validation process. It is fundamental that the JRAs rely on user feedback to steer their research and prototyping solutions. Those solutions will be handed over the SA1to be trialled and gain maturity.

The results and of the use of the development results and the use case scenarios feed the dissemination and standards interaction activities in NA2.

Recent research efforts and results will be taken into account, especially with regard to the analysis of the use case requirements (which, in turn, drive the JRA2 developments). ASIMOV will therefore integrate, adapt, customise, and extend existing technologies and tools to automatically enrich audio-visual content to the specific qualities of isochronous multimedia objects. With regard to its multifaceted use case scenarios, ASIMOV will address the issues of scalability (e.g., number, size and speed) and usability, but will also have a strong focus on standardising the technologies.

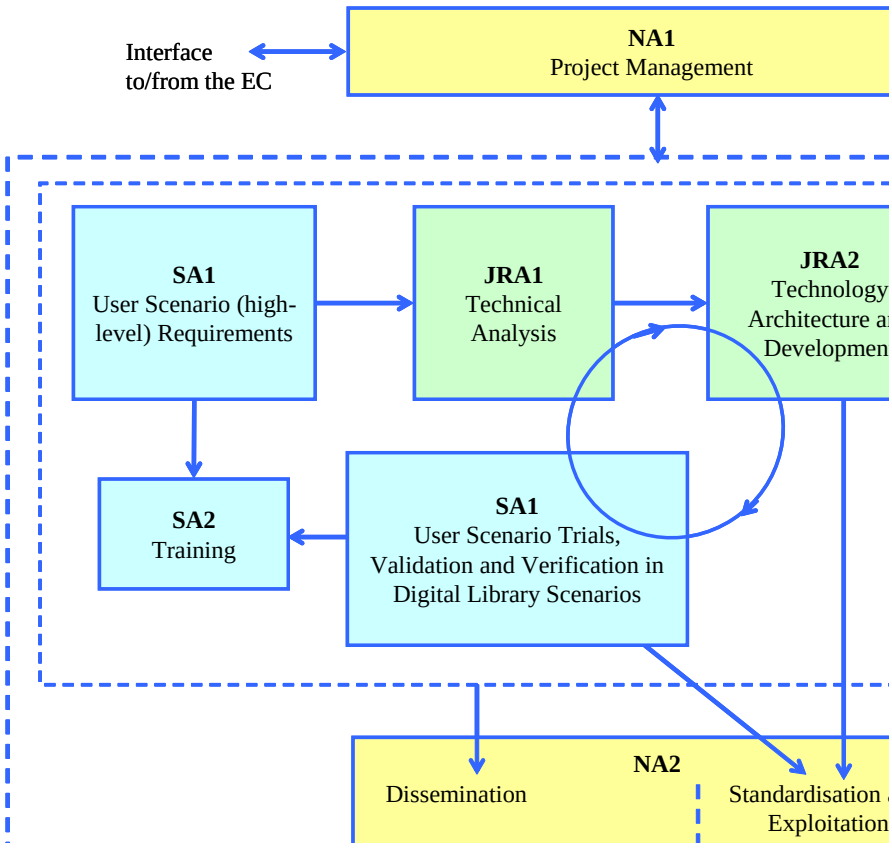


Figure 2: PERT Chart, showing the inter-relationships between the Activities

ASIMOV GANTT Chart

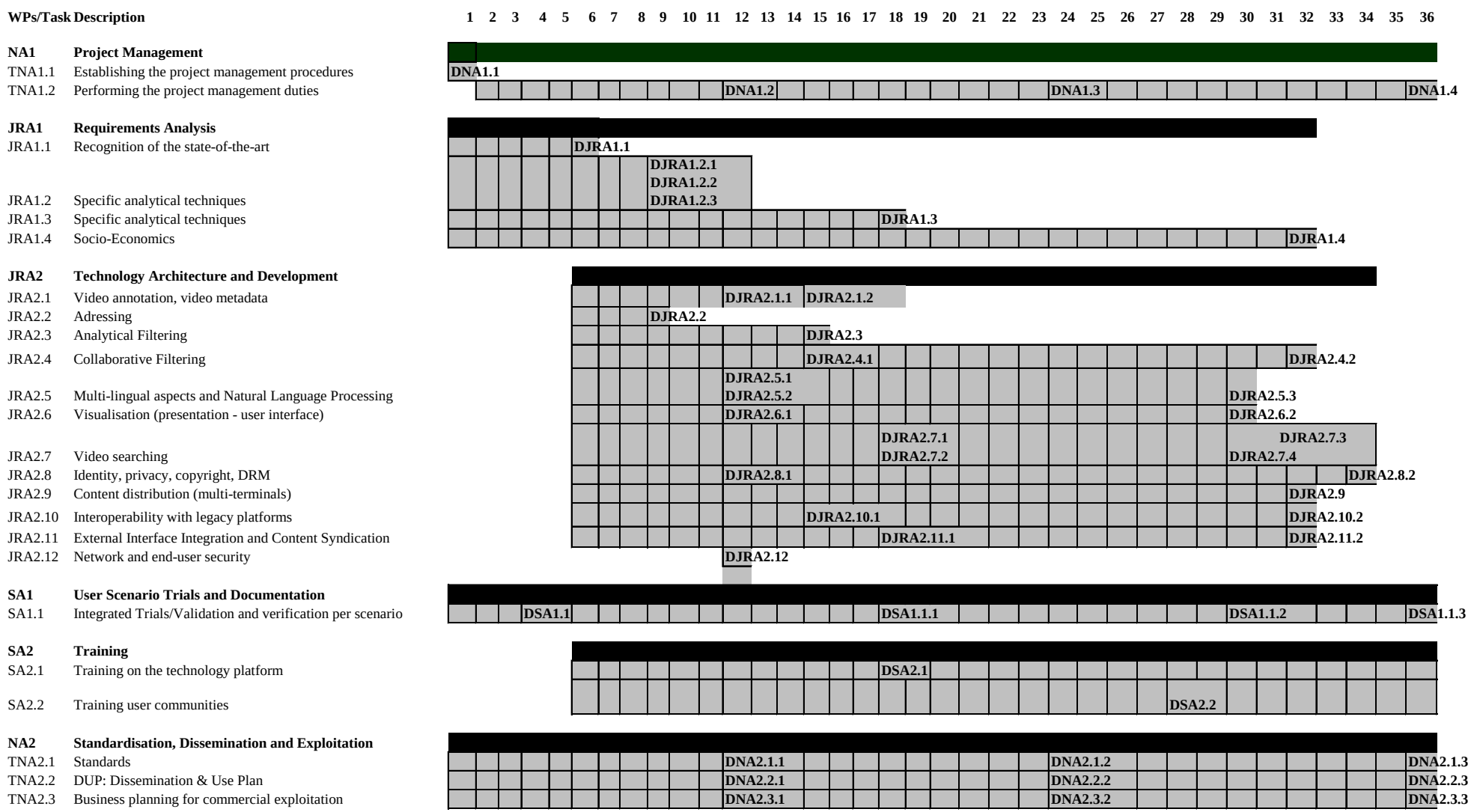


Figure 3: GANNT chart showing the timeline of the Activities

1.5 Work Breakdown Plan

The work breakdown in ASIMOV follows the structure of I3 projects, drawing from the experience of GN2 (GEANT2), EGEE and FEDERICA.

As seen from Figure 2, above, the project structure consists of

- Two NAs (Networking Activities): NA1, NA2
- Two SAs (Service Activities): SA1, SA2
- Two JRAs (Joint Research Activities): JRA1, JRA2

These activities were described in Section 1.2 and are summarised in the Activity description charts below

1.5.1 Networking Activities and associated work plan

The ***Networking Activities*** support the Project Management, standardisation and liaison activities, dissemination and concertation vis-à-vis user communities. Emphasis will be placed on providing input to standardisation bodies and interacting with similar activities in Europe and worldwide.

There are 2 Networking Activities in ASIMOV:

NA1: Project Management

- TNA1.1: 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.

- TNA1.2: 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

NA2: Standardisation, Dissemination and Exploitation

- TNA2.1: Standards

  The requirement is to guarantee the compliance of multimedia objects according to ASIMOV with the relevant standards for the integration into libraries, archives, and e-learning repositories

- TNA2.2: Dissemination and Use Plan

  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.

- TNA2.3: Business planning for commercial exploitation

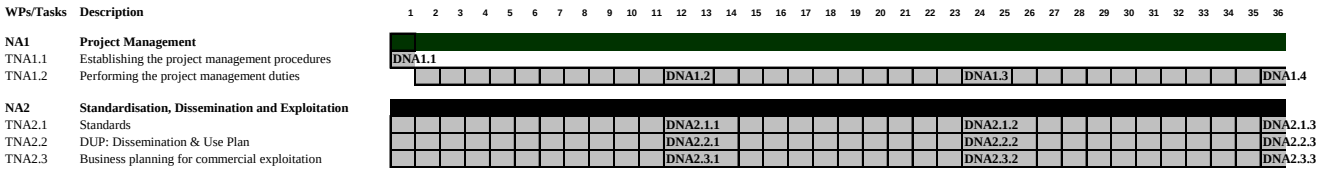
  All partners will contribute to the exploitation, according to the involvement of their organisation;

  - 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.
  - SES-Astra 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. They 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.

1.5.1.1 GANTT Chart



1.5.1.2 Activity list

Activity No	Activity title	Type of activity[36]	Lead partic no.[37]	Lead partic. Short name	Person-months [38]	Start month[39]	End month[68]
NA1	Project Management	MGT	1	SES	30	1	36
NA2	Standardisation, Dissemination and Exploitation	COORD	3	UL	84	1	36
	TOTAL				114		

[36] Please indicate one activity per Activity:
RTD = Research and technological development; COORD = Co-ordination; SUPP = Support; MGT = Management; SVC = Service activities

[37] Number of the participant leading the work in this Activity

[38] The total number of person-months allocated to each Activity.

[39] Measured in months from the project start date (month 1)

1.5.1.3 NA1 Activity Description: Project Management

Activity number	NA1		**Start date or starting event:**			Month 1			
Activity title	Project Management								
Activity type[40]	MGT								
Participant number	1	2	3	4	5	6	7	8	9
Participant short name	**SES**	ETH	UL	Yovisto	UASNW	HPI	RSA	FUB	UZ
Person-months per participant	**18**	…	…	…	…	…	…	…	…
Participant number	10	11	12	13	14	15			
Participant short name	AMP	CWI	FOPOLIMI	Martel	Metaware	JSI			**Total**
Person-months per participant	…	…	…	12	**..**	…			**30**

Objectives

- To perform the overall project management of the ASIMOV consortium, so that the contracted commitments are produced on time and within budget

Description of work

The major functions and responsibilities of the ASIMOV project management are:

- Performance monitoring and control of all tasks.
- Coordination of interfaces between the Activities.
- Schedule planning and status control of all Activities
- Documentation and configuration control including change management.
- Resource and finance control of the entire project.
- Risk identification and mitigation control.
- Meeting and conference coordination.

SES-Astra will appoint a Project Manager who will be responsible for the management of the entire ASIMOV project. Being an I3 project, ASIMOV is large and relatively complex. Therefore, SES-Astra will be supported by an organisation (Martel) that has specialised in the professional day-to-day management of EC projects (including I3s) for the past 20 years.

The work to be performed consists of the following 2 Tasks:

TNA1.1: 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

[40] Please indicate one activity per Activity: RTD = Research and technological development; COORD = Co-ordination; SUPP = Support; MGT = Management; SVC = Service activities

project structure will be finalised, including the managing bodies, i.e., the General Assembly and Technical Management Committee.

TNA1.2: 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.

Deliverables

DNA1.1	Project Presentation	Delivery month:	1
DNA1.2	1st Periodic Activity Report	Delivery month:	12
DNA1.3	2nd Periodic Activity Report	Delivery month	24
DNA1.4	3rd Periodic Activity Report	Delivery month:	36

1.5.1.4 NA2 Activity Description: Standardisation, Dissemination and Exploitation

Activity number	NA2			**Start date or starting event:**		Month 1			
Activity title	Standardisation, Dissemination and Exploitation								
Activity type[41]	COORD								
Participant number	1	2	3	4	5	6	7	8	9
Participant short name	SES	ETH	**UL**	Yovisto	UASNW	HPI	RSA	FUB	UZ
Person-months per participant	2	6	**10**	4	2	6	10	4	9
Participant number	10	11	12	13	14	15			
Participant short name	AMP	CWI	FoPoli Mi	Martel	Metaware	JSI			**Total**
Person-months per participant	3	6	6	6	6	4			**84**

Objectives

- To guarantee the compliance of multimedia objects according to ASIMOV with the relevant standards for the integration into libraries, archives, and e-learning repositories
- To disseminate the outputs widely
- To exploit the results through commercialisation

Description of work

The work to be performed consists of the following 3 Tasks:

TNA2.1 Standards

The lack of standardisation is a current hindrance to the open exchange of content with respect to audio-visual and 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.

In close coordination with national and European bodies, ASIMOV will standardise its results, through:

- Involvement via CWI in the **W3C** 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

[41] Please indicate one activity per Activity: RTD = Research and technological development; COORD = Co-ordination; SUPP = Support; MGT = Management; SVC = Service activities

.

- 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

TNA2.2 Dissemination & Use Plan

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.

UL together with its partners will organise a yearly ASIMOV Summit 2009-2010-2011 to bring together audio-visual and multimedia stakeholders to foster knowledge and disseminate the results of the project to the targeted audiences of the project from industry and academia. ASIMOV partners will also 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.

TNA2.3 Business planning for commercial exploitation

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

- 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.
- SES-Astra 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. They will gain new opportunities to develop and sell new services, above the level of simple transmission capacity.

Deliverables

DNA2.1.1 – 2.1.3	Standards Activities	Delivery Months:	12, 24, 36
DNA2.2.1 – 2.2.3	ASIMOV Dissemination and Use Plan	Delivery Month:	12, 24, 36
DNA2.3.1 – 2.3.3	ASIMOV Deployment and Commercial Exploitation Plan	Delivery Month:	12, 24, 36

1.5.1.5 Summary of effort for Networking Activities

Partic. No.	Partic. Short name	NA1	NA2	Total person months
1	SES-Astra	18	2	**20**
2	ETH		6	**6**
3	UL		10	**10**
4	Yovisto		4	**4**
5	UASNW		2	**2**
6	HPI		6	**6**
7	RSA		10	**10**

8	FUB		4	**4**
9	UZ		9	**9**
10	AMP		3	**3**
11	CWI		6	**6**
12	FOPOLIMI		6	**6**
13	Martel	12	6	**18**
14	Meta		6	**6**
15	JSI		4	**4**
Total		**30**	**84**	**114**

1.5.1.6 List of NA Deliverables

Del. No. [42]	**Deliverable name**	**Activity no.**	**Nature** [43]	**Dissemination level** [44]	**Delivery date**[45] **(proj. month)**
DNA1.1	Project Presentation	NA1	R	PU	01
DNA1.2	1st Periodic Activity Report	NA1	R	CO	12
DNA1.3	2nd Periodic Activity Report	NA1	R	CO	24
DNA1.4	3rd Periodic Activity Report	NA1	R	CO	36
DNA2.1.1-2.1.3	Standards Activities	NA2	R	PU	12, 24, 36
DNA2.2.1 - 2.2.3	ASIMOV Dissemination and Use Plan	NA2	R	PU	12, 24, 36
DNA2.3.1 – 2.3.3	ASIMOV Deployment and Commercial Exploitation Plan	NA2	R	PU	12, 24, 36

1.5.1.7 List of NA Milestones

Milestone no.	**Milestone name**	**Activities involved**	**Exp. Date**	**Means of verification**[46]
MNA1.1	Project Management mechanisms, procedures and tools established	NA1	1	Successful Kick-off meeting
MNA1.2	Successful completion of 1st project review	NA1	13	Report published
MNA1.3	Successful completion of 2nd project review	NA1	25	Report published
MNA1.4	Successful completion of 3rd project review	NA1	36	Report published
MNA2.1.1	Face-to-face meeting with the	NA2	6, 12, 18,	Deliverables DNA2.1.1 –

[42] Deliverable numbers in order of delivery dates. Please use the numbering convention <Activity number>.<number of deliverable within that Activity>. For example, deliverable DNA4.1.2 would be the second deliverable from Task TNA 4.1

[43] Please indicate the nature of the deliverable using one of the following codes:
R = Report, **P** = Prototype, **D** = Demonstrator, **O** = Other

[44] Please indicate the dissemination level using one of the following codes:
PU = Public
PP = Restricted to other programme participants (including the Commission Services).
RE = Restricted to a group specified by the consortium (including the Commission Services).
CO = Confidential, only for members of the consortium (including the Commission Services).

[45] Measured in months from the project start date (month 1)

[46] Show how both the participants and the Commission can check that the milestone has been attained. Refer to indicators if appropriate.

– 2.1.6	(proposed) W3C Media Fragments Working Group		24, 30 and 36	DNA2.1.3 successfully completed
MNA2.2	ASIMOV International semantic audio-visual search and annotation workshop	NA2	28	DNA2.2 submitted

1.5.2 Trans-national Access and/or Service Activities and associated work plan

The ***Service Activities*** (SAs) provide the initial (high-level) use case requirements to JRA1, then validate the results from JRA, through the scenario trials, and give training to the end users.

There are 2 Service Activities in ASIMOV:

SA1: User Scenario Trials, Validation and Verification in Digital Library Scenarios

In order to test the project developments in the field **a set of user scenario trials with Digital Libraries** has been identified. Partners from each Digital Library have been incorporated into the consortium to ensure the close collaboration. The aim of these trials is to validate the proposed solution/s for each user scenario starting from a set of (high-level) requirements. As a natural consequence we will tune and optimise the proposed solution/s taking into account the results of the validation step.

- TSA1.1: Integrated Trials/Validation and Verification per scenario:

  An outline description of each validation / verification activity is provided in the following paragraphs. The trial and validation activity will be subdivided in three phases. The first phase is a refinement and clarification of the requirements already collected from the Digital Libraries. The second phase will involve providing the content and performing the tests. The third phase will be enlarged to a panel of interested parties performing trials with real users. The validation and verification of Digital Library scenarios will be implemented in the following user scenario trials. Each of the user scenarios will address a number of specific objectives of the project and the Workprogramme.

  TSA1.1.1: Videolectures User Scenario

  The videolectures scenario will include the following tasks:

  - A detailed analysis of videolectures technical specification and requirements in relation to ASIMOV will be provided
  - A first release of videolectures.net CDN based on ASIMOV services
  - Validation and verification of the first release from the selected content providers involved in videolectures.net CDN
  - A second release of videolectures.net with advanced services provided by ASIMOV
  - Validation and verification of the second release by videolectures.net regular users including several learning communities
  - A final release of videolectures.net supported by ASIMOV services

  TSA1.1.2: BELIEF-II User Scenario

  The work on the BELIEF-II user scenario comprises:

  - A refined analysis of the OpenDlib integration requirements will be conducted as the basis of a first integration prototype.
  - On the basis of such analysis, an adapter will be delivered to access to the OpenDlib contents.
  - A first release of the BELIEF-II Video access service will be provided, based on the ASIMOV services
  - Further scenario prototypes will be delivered, focused on an effective, and attractive show case for the ASIMOV features, to be integrated in the BELIEF-II portal

TSA1.1.3: SES-Astra User Scenario

This scenario incorporates an intelligent video search and navigation system with the existing linear digital content portfolio through the SES-Astra SATMODE Application Service platform.

The use of IMS[47] (IP Multimedia Subsystem) concept to accomplish successful interactivity in this environment will be addressed. 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 goal 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 audio-visual content exploring and IMS system, thus carrying out the integration and content delivery between the two concepts.

SA2: Training

For the successful dissemination of the project results it is necessary to communicate widely the possibilities offered by the technological solutions of the project. 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.

- TSA2.1 Training on the technology platform

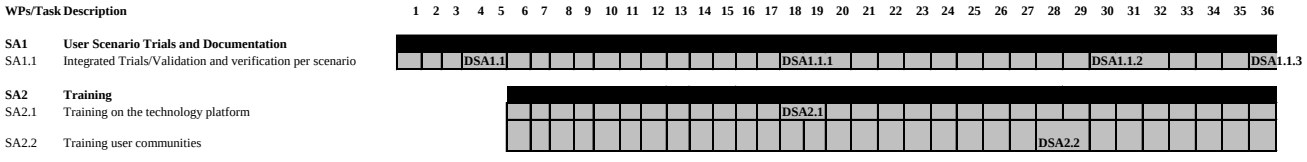
  The concepts of online training material will developed to train the user and to show the possibilities of the developed technology. The online training material for policy makers will be designed and produced, and a presentation of the training material will be provided, using the ASIMOV platform.

- TSA2.2 Training the user communities

  The 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, and FAQs and tips will be provided.

  Demonstration workshops will be organised to introduce the project platform to interested users.

1.5.2.1 GANTT Chart



[47] E.g. http://www.ericsson.com/solutions/products/hp/Ericsson_IMS__IP_Multimedia_Subsystem__pa.shtml,

1.5.2.2 Activity list

Activity No[48]	Activity title	Type of activity[49]	Lead partic no.[50]	Lead partic. Short name	Person-months [51]	Start month[52]	End month[68]
SA1	User Scenario Trials, Validation and Verification in Digital Library Scenarios	SVC	13	FOPOLIMI	195	1	36
SA2	Training	SVC	9	FUB	56	6	36
	TOTAL				251		

1.5.2.3 SA1 Activity Description: User Scenario Trials, Validation and Verification in Digital Library Scenarios

Activity number	SA1		**Start date or starting event:**		Month 1			
Activity title	User Scenario Trials, Validation and Verification in Digital Library Scenarios							
Activity type[53]	SVC							
Participant number	1	2	3	4	5	6	7	8	9
Participant short name	SES	ETH	UL	Yovisto	UASNW	HPI	RSA	FUB	UZ
Person-months per participant	8	20	9	3	2	4	20	18	6
Participant number	10	11	12	13	14	15			
Participant short name	AMP	CWI	**FOPOLIMI**	Martel	Metaware	JSI			**Total**
Person-months per participant	24	12	**31**	…	18	20			**195**

Objectives

- To provide the high-level use case scenarios, which drive the technical specifications and developments in JRA1 and JRA2
- To refine the set of user scenario trials with the chosen Digital Libraries

48 Activity number: Activity 1 – Activity n.
49 Please indicate one activity per Activity:
RTD = Research and technological development; COORD = Co-ordination; SUPP = Support; MGT = Management; SVC = Service activities
50 Number of the participant leading the work in this Activity
51 The total number of person-months allocated to each Activity.
52 Measured in months from the project start date (month 1)
53 Please indicate one activity per Activity: RTD = Research and technological development; COORD = Co-ordination; SUPP = Support; MGT = Management; SVC = Service activities

- To test and validate the project developments in the field
- To collect feedback and use the information to refine the developments in JRA2
- To evaluate the impact of the developed tools leveraging existing scientific and business networks

Description of work

Partners from each Digital Library have been incorporated into the consortium to ensure the close collaboration. The trials will validate the proposed solution/s for each user scenario starting from a set of requirements and test cases developed in cooperation with selected partners. Feedback will be collected and used to tune and optimise the solution/s taking into account the results of the validation step.

The work to be performed consists of one Task:

TSA1.1: Integrated Trials/Validation and Verification per scenario

The trial and validation activity will be subdivided in three phases. The first phase is a refinement and clarification of the requirements already collected from the Digital Libraries. The second phase will involve providing the content and performing the tests. The third phase will be enlarged to a panel of interested parties performing trials with real users. The validation and verification of Digital Library scenarios will be implemented in the following user scenario trials. Each of the user scenarios will address a number of specific objectives of the project and the Workprogramme.

The integration requirements for the ASIMOV services within the 3 use cases will be carefully identified, both on the technical and on the user level. A significant user group will be created, possibly including scientists, students and professionals for conducting interviews, collaborative design and evaluation sessions. Actual feedback received will be provided for the refinement of user expectations and requirements and for further improvement of the ASIMOV services.

The Task is subdivided into 3 parallel sub-Tasks; one for each scenario:

- TSA1.1.1 Videolectures User Scenario
- TSA1.1.2: BELIEF-II User Scenario
- TSA1.1.3: SES-Astra User Scenario

Additional trials/validation activity will be carried out on eGov (carabinieri), eHealth (ULSS8 Asolo) and eBiz (Milan Chamber of Commerce) video and audio content.

Deliverables

DSA1.1	High-level use case requirements	Delivery Month:	4
DSA1.1.1	First trials report	Delivery Month:	18
DSA1.1.2	Second trials report	Delivery Month:	30
DSA1.1.3	Report on Demonstrations	Delivery Month	36

1.5.2.4 SA2 Activity Description: Training

Activity number	SA2			**Start date or starting event:**		Month 6		
Activity title	Training							
Activity type[54]	SVC							
Participant number	1	2	3	4	5	6	7	8	9
Participant short name	SES	ETH	UL	Yovisto	UASNW	HPI	RSA	**FUB**	UZ
Person-months per participant	2	…	8	…	…	…	…	**18**	14
Participant number	10	11	12	13	14	15			
Participant short name	AMP	CWI	FOPO LIMI	Martel	Metaware	JSI			**Total**
Person-months per participant	…	…	6	…	4	4			**56**

Objectives

- To use training as one means of communicating widely the possibilities offered by the technological solutions of the project
- To develop concepts for training material and exemplary tutorials supports a user-friendly dissemination
- To give the training to end users

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.

The work to be performed consists of the following 2 Tasks.

TSA2.1 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.
- A presentation of the training material will be provided, using the ASIMOV platform

TSA2.2 Training the user communities

[54] Please indicate one activity per Activity: RTD = Research and technological development; COORD = Co-ordination; SUPP = Support; MGT = Management; SVC = Service activities

- 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.
- Training will be given to interested users

Deliverables

DSA2.1	Concepts of online training material (technological features) for all scenarios	Delivery Month:	18
DSA2.2	Tutorials with self-training material for different usage scenarios and applications	Delivery Month:	28

1.5.2.5 Summary of effort for Service Activities

Partic. No.	Partic. Short name	SA1	SA2	Total person months
1	SES-Astra	8	2	**10**
2	ETH	20		**20**
3	UL	9	8	**17**
4	Yovisto	3		**3**
5	UASNW	2		**2**
6	HPI	4		**4**
7	RSA	20		**20**
8	FUB	18	18	**36**
9	UZ	6	14	**20**
10	AMP	24		**24**
11	CWI	12		**12**
12	FOPOLIMI	31	6	**37**
13	Martel			
14	Metaware	18	4	**22**
15	JSI	20	4	**24**
Total		**195**	**56**	**251**

1.5.2.6 List of SA Deliverables

Del. No. [55]	Deliverable name	Activity no.	Nature [56]	Dissemination level [57]	Delivery date[58] (proj. month)
DSA1.1	High-level use case requirements	SA1	R	PU	4
DSA1.1.1	First trials report	SA1	R	RE	18
DSA1.1.2	Second trials report	SA1	R	PU	30
DSA1.1.3	Report on Demonstrations	SA1	R	PU	36
DSA2.1	Concepts of online training material (technological features) for all scenarios	SA2	R	PU	18
DSA2.2	Tutorials with self-training material for different usage scenarios and applications	SA2	R	PU	28

1.5.2.7 List of SA Milestones

Milestone no.	Milestone name	Activities involved	Exp. Date	Means of verification[59]
MSA1.1	Scenario Requirements documents	SA1	4	Deliverable DSA1.1
MSA1.3	Successful completion of 1st trials	SA1	18	Deliverable DSA1.2
MSA1.3	Successful completion of 2nd trials	SA1	30	Deliverable DSA1.3
MSA1.4	Demonstrations successfully completed	SA1	36	Successful implementation of workshops
MSA2.1	Concepts of online training material (different user scenarios)	SA2	18	Deliverable DSA2.1
MSA2.2	Tutorials and concepts with	SA2	28	Deliverable DSA2.2

[55] Deliverable numbers in order of delivery dates. Please use the numbering convention <Activity number>.<number of deliverable within that Activity>. For example, deliverable DNA4.1.2 would be the second deliverable from Task TNA 4.1

[56] Please indicate the nature of the deliverable using one of the following codes:
R = Report, **P** = Prototype, **D** = Demonstrator, **O** = Other

[57] Please indicate the dissemination level using one of the following codes:
PU = Public
PP = Restricted to other programme participants (including the Commission Services).
RE = Restricted to a group specified by the consortium (including the Commission Services).
CO = Confidential, only for members of the consortium (including the Commission Services).

[58] Measured in months from the project start date (month 1)

[59] Show how both the participants and the Commission can check that the milestone has been attained. Refer to indicators if appropriate.

	online self-training material for different usage scenarios and applications			
MSA2.3	Online presentation of training material	SA2	30	Successful implementation of training

1.5.3 Joint Research Activities and associated work plan

The ***Joint Research Activities*** in ASIMOV is where the specification, design and development of the new features are performed. JRA1 (Technical Analysis) analyses the high-level use case requirements from SA1 and converts these into technical specifications of the needed developments. JRA2 (Technology Architecture and Development) performs the software development. The output from JRA2 is a system that is able to satisfy the requirements from SA1, and which is returned to SA1 for validation. Feedback from the validation is passed to JRA1 and JRA2 for refining the results.

There are 2 Joint Research Activities in ASIMOV:

JRA1: Technical Analysis

JRA1 comprises 4 tasks, which lead to the technical requirements to be met by JRA2, and which will be trialled in the 3 use case scenarios, described in SA1:

- TJRA1.1. Recognition of the state-of-the-art

  This task addresses the recognition of the state-of-the-art. Industry-based use cases and alternative scenarios for search engines will be analysed and documented. Research will be made 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) and current publishing possibilities.

- TJRA1.2 Specific analytical techniques

  The partners responsible for the use case scenarios will apply specific analytical techniques to ensure that the requirements passed to JRA2 will enable the use case scenarios to be implemented and validated. The outcome will be a System Requirements Specification document.

- TJRA1.3 Interoperability with legacy platforms

  Requirements for the interoperability of standard MPEG-2-encoded DVB linear programs with state-of-the-art interactive-TV and Internet-TV content will be analysed in this Task. Scenarios will be investigated for the production, deployment, transmission and consumption of interactive-TV content that can complement and integrate existing linear digital programs and analyze requirements for the integration of existing IPTV services and content with the audio-visual discovery services to be developed by this project. Partners will also analyze requirements for the interoperability of the to-be-developed audio-visual discovery services with infrastructure standards supported by the SATMODE Application Service, including MHP (Multimedia Home Platform) and IMS (IP Multimedia Subsystem). Finally, they will also analyse interoperability at the level of *processes* – learning process, authoring process, etc..

- TJRA1.4 Socio-economics

  This task explicitly addresses the social / economical impact of the ASIMOV using empirical research methods. It has three main aspects:
  - an elucidation of the social aspects of a user's Quality of Experience (QoE), which reflects its degree of satisfaction in accordance with the Quality of Service (QoS) provided by the network and the search/discovery experience
  - an examination of the mapping and adapting requirements of societal communities to communication services and infrastructure
  - an exploration of the business and accounting models that will support and monetise the development and maintenance of the additional infrastructure required to operate the newly introduced services

JRA2: Technology Architecture & Development

This Activity is the core of the proposal in that it has to prepare and make available the technologies and tools for trialling in the use case scenarios.

JRA2 comprises 12 tasks, each representing a separate development, leading to a complete solution that satisfies all of the use case scenarios.

- TJRA2.1 Video annotation, video metadata

  This material is needed mainly to help manage an AVOs. The task is to find standardised methods and techniques of linking these additional information into a bundle with the 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 synchronised with it where the information does relate to time (isochronic).

  Due to the multifaceted qualities of the audio-visual material we will be dealing with, this takes very different forms:

  - information from the production and distribution of AVOs;
  - 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

  The workload will be distributed as follows: CWI and JSI will work on innovative and intelligent search paradigms based on meaningful relationships among audio-visual content, and on low-barrier user interfaces for ontology-mediated tagging of Web-based content. Yovisto 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 and JSI 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.

- TJRA2.2 Addressing

  The Semantic Web family of RDF-related standards provides a rich set of technologies to describe and serialise metadata over de Web. The connection between Web-based metadata units and the fragment of the audio-visual 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 localise 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. Currently, 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 localise 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 and JSI will work on a URI-based scheme for addressing spatio-temporal fragments of audio-visual content on the Web.

- TJRA2.3 Analytical Filtering

  This Task focuses on analytical filter methods to extract textual metadata from video resources. Video data often contains 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. Also the automatic transcription method that is in development at JSI will be considered for the integration.

- TJRA2.4 Collaborative Filtering

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

  This task will develop a Collaborative Filtering mechanism composed of the following four key elements:

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

  These four key elements will rely on a prototype platform to be developed jointly by SES-Astra, HPI[60] and JSP[61]. It will provide tools and interfaces to annotate and rate IMOs using standard Internet technologies to collect user data and user feedback. Methodologies will be included to analyze and aggregate this data and add/transform it into user profiles and IMOs profiles. This information will be used within ASIMOV to improve the 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-Astra, HPI and prototypes that were developed at JSI. Previous research and publications in the area of web search personalisation and information filtering[62] carried out with said prototype provide valuable theoretical and practical knowledge and will serve as an optimal starting point for the integrating personalised access, search and distribution into ASIMOV. Personalisation 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. The industrialisation of this collaborative filtering platform is an important goal for SES-Astra, and therefore the collaborative filtering platform APIs will follow Internet standards as published by the IETF or the W3C.

- TJRA2.5 Multi-lingual aspects and Natural Language Processing

  The adoption of existing transcription technology will have to be realised against the background of very heterogeneous material. FUB will edit exemplary audio-video transcripts in English, German, Polish and Russian for testing purposes. FOPOLIMI will edit exemplary audio-video transcripts from Italian to English and vice versa and from French to Italian and vice versa. JSI will provide exemplary transcripts in Slovenian to English and vice versa and from Croatian to English and vice versa.

- TJRA2.6 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. They will also develop designs for multi–device interfaces as well as visualisation concepts for both, 2D and 3D interactive visualisation. FUB will work on user interface conception, design, the deliverable will be the adoption of a test environment (i.e.,

[60] Noll/Meinel 2006
[61] Grcar/Mladenic/Grobelnik 2005
[62] Noll/Meinel 2007b

search interface, annotation, tagging) for audio-visual archive users. FOPOLIMI will contribute to the design of interaction addressing different users groups and different platforms.

The envisioned efficient visualisation will be integrated into ASIMOV's semantic search engine search result visualisation, navigation, and user interaction (c.f. TJRA2.7)

- TJRA2.7 Semantic searching

  One of the main goals 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.

  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 distributing 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.

- TJRA2.8 Identity, privacy, copyright and DRM

  Most jurisdictions recognise 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 unauthorised duplication of their work to ensure continued revenue streams.

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

- TJRA2.9 Long term preservation and accessibility

  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 are often 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).

  FOPOLIMI will follow up the approach of ISBN numbers for published material, whereby a unique alphanumeric code is associated with each digital object. The European Commission eContent framework has proposed the so-called DOI System[63]. The DOI (Digital Object Identifier) System allows "content objects" to be identified in the digital environment.

[63] www.doi.org

- TJRA2.10 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 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.

- TJRA2.11 Interoperability with legacy platforms

  This work will focus on the extension of the SES-Astra SATMODE Application Service platform to support ASIMOV services. i.e:

  - Integrating intelligent video search and navigation as a part of the service of their Application Server (AS)
  - Enabling profiling and personalisation as a part of the AS
  - Adding intelligent video search in relation to the linear content and cross-referencing to non-linear content
  - Integrating IPTV based access schemes, accounting and subscriber profiling
  - Enabling multiple delivery channels
  - Integrating location and presence in the indexing and search criteria

  An ASIMOV application module will be developed and integrated into the IMS service layer, in order to achieve interoperability between ASIMOV's intelligent audio-video content exploring, fetching and searching, and emerging mobile services. Partners will also implement audio-video content management and control by integrating ASIMOV management and control services with IMS horizontal services at the control layer.

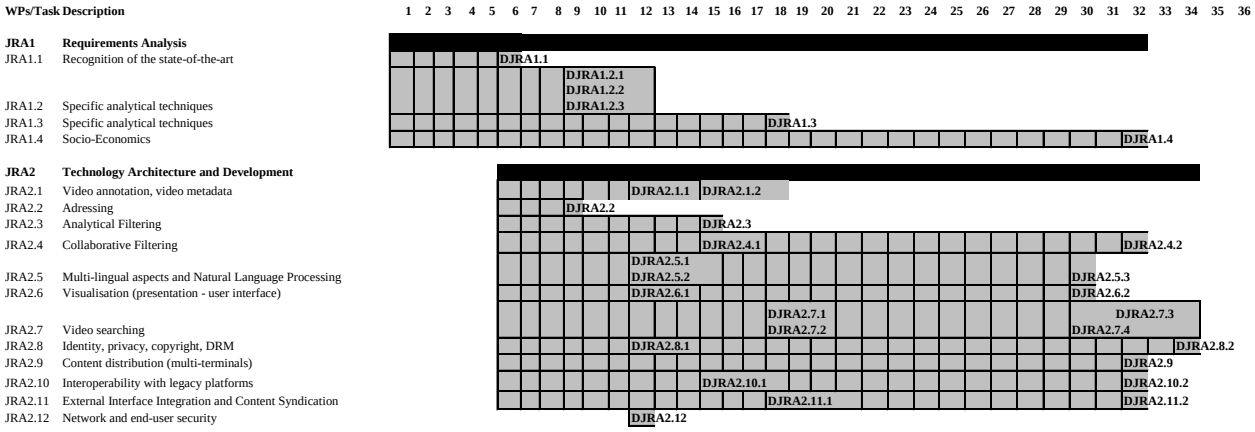
  UZ will define the method and service interface for integration between ASIMOV and other systems such as Content Management Systems, Learning Management Systems and Document Management Systems. The outcomes of this task will enable information exchange between various applications, based on Web services. 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.

- TJRA2.12 Network and End-user security

  Bearing in mind the federation of Digital Libraries and the fact that ASIMOV search results will be transported across communications networks, such as those provided to the research community by GEANT, IPv6 will be specifically considered from the point of view of securing the data. 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.

1.5.3.1 GANTT Chart



1.5.3.2 Activity list

Activity No[64]	Activity title	Type of activity[65]	Lead partic no.[66]	Lead partic. Short name	Person-months [67]	Start month[68]	End month[68]
JRA1	Technical Analysis	RTD	4	Yovisto	127	1	32
JRA2	Technology Architecture & Development	RTD	6	HPI	298	6	34
	TOTAL				425		

64 Activity number: Activity 1 – Activity n.

65 Please indicate one activity per Activity:
RTD = Research and technological development; COORD = Co-ordination; SUPP = Support; MGT = Management; SVC = Service activities

66 Number of the participant leading the work in this Activity

67 The total number of person-months allocated to each Activity.

68 Measured in months from the project start date (month 1)

1.5.3.3 JRA1 Activity Description: Technical Analysis

Activity number	JRA1			**Start date or starting event:**		Month 1		
Activity title	Technical Analysis							
Activity type[69]	RTD							
Participant number	1	2	3	4	5	6	7	8	9
Participant short name	SES	ETH	UL	**Yovisto**	UASNW	HPI	RSA	FUB	UZ
Person-months per participant	**4**	12	7	**19**	…	…	…	16	3
Participant number	10	11	12	13	14	15			
Participant short name	AMP	CWI	FOPO LIMI	Martel	Metaware	JSI			**Total**
Person-months per participant	24	18	8	…	8	8			**127**

Objectives

- To ensure partners are aware of the state-of-the-art
- To transform the high-level use case requirements from SA1 into technical specifications for JRA2
- To be compatible with legacy systems
- To evaluate the socio-economic aspects

Description of work

JRA1 comprises 4 tasks, which lead to the technical requirements to be met by JRA2, and which will be trialled in the 3 use case scenarios, described in SA1:

TJRA1.1: Recognition of the state-of-the-art

This task addresses the recognition of the state-of-the-art. Industry-based use cases and alternative scenarios for search engines will be analysed and documented. Research will be made 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) and current publishing possibilities.

TJRA1.2 Specific analytical techniques:

The partners responsible for the use case scenarios will apply specific analytical techniques to ensure that the requirements passed to JRA2 will enable the use case scenarios to be implemented and validated. The outcome will be a System Requirements Specification document.

TJRA1.3 Interoperability with legacy platforms:

Requirements for the interoperability of standard MPEG-2-encoded DVB linear programs with state-of-the-art interactive-TV and Internet-TV content will be analysed in this Task. Scenarios will be investigated for

[69] Please indicate one activity per Activity: RTD = Research and technological development; COORD = Co-ordination; SUPP = Support; MGT = Management; SVC = Service activities

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the production, deployment, transmission and consumption of interactive-TV content that can complement and integrate existing linear digital programs and analyze requirements for the integration of existing IPTV services and content with the audio-visual discovery services to be developed by this project. Partners will also analyze requirements for the interoperability of the to-be-developed audio-visual discovery services with infrastructure standards supported by the SATMODE Application Service, including MHP (Multimedia Home Platform) and IMS (IP Multimedia Subsystem). Finally, they will also analyse interoperability at the level of *processes* – learning process, authoring process, etc.

TJRA1.4 Socio-economics:

This task explicitly addresses the social / economical impact of the ASIMOV using empirical research methods. It has three main aspects:

- an elucidation of the social aspects of a user's Quality of Experience (QoE), which reflects its degree of satisfaction in accordance with the Quality of Service (QoS) provided by the network and the search/discovery experience
- an examination of the mapping and adapting requirements of societal communities to communication services and infrastructure
- an exploration of the business and accounting models that will support and monetise the development and maintenance of the additional infrastructure required to operate the newly introduced service

Deliverables

DJRA1.1	State-of-the-art in audio-visual content archiving: - Metadata for Web-based audio-visual content - Processing of Web-based audio-visual content - Solutions in digital historical audio-visual archives	Delivery month:	6
DJRA1.2.1	System Requirements Specification for use case 1	Delivery month:	9
DJRA1.2.2	System Requirements Specification for use case 2	Delivery month:	9
DJRA1.2.3	System Requirements Specification for use case 3	Delivery month:	9
DJRA1.3	Interoperability requirements for IMS	Delivery month:	18
DJRA1.4	Report on socio-economic aspects	Delivery month:	32

1.5.3.4 JRA2 Activity Description: Technology Architecture & Development

Activity number	JRA2			**Start date or starting event:**		Month 6		
Activity title	Technology Architecture and Development							
Activity type[70]	RTD							
Participant number	1	2	3	4	5	6	7	8	9
Participant short name	SES	ETH	UL	Yovisto	UASNW	**HPI**	RSA	FUB	UZ
Person-months per participant	**30**	24	11	22	30	**40**	…	16	8
Participant number	10	11	12	13	14	15			
Participant short name	AMP	CWI	FOPO LIMI	Martel	Metaware	JSI			**Total**
Person-months per participant	50	21	10	…	14	22			**298**

Objectives

- To open up existing repositories to fulfil individual information needs
- To generate metadata on different levels of semantic abstraction for accompanying the production of new content
- To develop the software to enable customised and target-oriented access
- To facilitate the emergence of **Intelligent Multimedia Objects (IMO)**

Description of work

This Activity is the core of the proposal in that it has to prepare and make available the technologies and tools for trialling in the use case scenarios. This requires coordination in two dimensions: One is the integration of various technological tasks to be fulfilled; the other is for the temporal coordination, especially towards SA1.

The work to be performed consists of the following 12 tasks. Each represents a separate development, leading to the complete solution

TJRA2.1 Video annotation, video metadata

- the production and distribution of AVOs, based on classic metadata (library, archives), added material (notes, scripts etc.) and related web-based content (fora, websites, etc.)
- the production of collaborative metadata (tags, folksonomies etc.)
- the production of semantic (ontology-mediated) metadata based on the above categories

TJRA2.2 Addressing

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

[70] Please indicate one activity per Activity: RTD = Research and technological development; COORD = Co-ordination; SUPP = Support; MGT = Management; SVC = Service activities

TJRA2.3 Analytical Filtering:

This task focuses on analytical filter methods to extract textual metadata from video resources.

TJRA2.4 Collaborative Filtering:

This task will develop a Collaborative Filtering mechanism composed of the following four key elements:

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

TJRA2.5 Multi-lingual aspects and Natural Language Processing:

The adoption of existing transcription technology will have to be realised against the background of very heterogeneous material.

TJRA2.6 Visualisation and User Interface Design:

UASNW will work on an overall interface concept for all ASIMOV tools and features.

TJRA2.7 Semantic searching:

One of the main goals 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 semantic search engine is not restricted to keyword queries producing ordered (flat) lists of search results.

TJRA2.8 Identity, privacy, copyright and DRM:

Most jurisdictions recognise 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.

TJRA2.9 Long term preservation and accessibility:

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 are often shelved in favour of newer formats and standards.

FOPOLIMI will follow up the approach of ISBN numbers for published material, whereby a unique alphanumeric code is associated with each digital object. The European Commission eContent framework has proposed the so-called DOI System[71]. The DOI (Digital Object Identifier) System allows "content objects" to be identified in the digital environment.

TJRA2.10 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 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.

TJRA2.11 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 including IPv6,

[71] www.doi.org

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.

TJRA2.12 Network and End-user security:

Bearing in mind the federation of Digital Libraries and the fact that ASIMOV search results will be transported across communications networks, such as those provided to the research community by GEANT, IPv6 will be specifically considered from the point of view of securing the data. 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.

Deliverables

DJRA2.1.1	Ontology for the representation of multimedia data	Delivery Month:	12
DJRA2.1.2	API for manual multimedia annotation	Delivery Month:	15
DJRA2.2	Document on concept and implementation of spatio-temporal addressing based on the URI fragment identifier	Delivery Month:	9
DJRA2.3	API for OCR-based analytical indexing of video data	Delivery Month:	15
DJRA2.4.1	Collaborative Filtering Framework: components for collecting and aggregating user annotations and ratings/votings for IMOs	Delivery Month:	15
DJRA2.4.2	Collaborative Filtering Framework: components for creating user profiles and personalisation of search results	Delivery Month:	32
DJRA2.5.1	Exemplary multilingual audio-video transcripts	Delivery Month:	12
DJRA2.5.2	Domain specific vocabularies and auxiliary data for NLP	Delivery Month:	12
DJRA2.5.3	API for NLP-based analytical indexing of video data	Delivery Month	30
DJRA2.6.1	ASIMOV interactive user interface concept	Delivery Month:	12
DJRA2.6.2	ASIMOV interactive user interface implementation	Delivery Month:	32
DJRA2.7.1	Indexer for Semantic index data	Delivery Month	18
DJRA2.7.2	Indexer for Collaborative index data	Delivery Month	18
DJRA2.7.3	Integrated Indexer for video data including analytical, collaborative, and semantic index data	Delivery Month	32
DJRA2.7.4	Search Engine Framework for Video Search	Delivery Month:	30
DJRA2.8.1	Initial report on DRM concepts & methods in video search engines	Delivery Month	12
DJRA2.8.2	Final report on DRM concepts & methods in video search engines	Delivery Month	34
DJRA2.9	Report on the long-term preservation and accessibility of audio-visual content	Delivery Month:	32
DJRA2.10.1	Definition of content distribution system for clients	Delivery Month:	15
DJRA2.10.2	Documentation of the content distribution system	Delivery Month:	32

DJRA2.11.1	SATMODE Unit and Regression Test report	Delivery Month:	18
DJRA2.11.2	SATMODE Performance and Interoperability Validation Test report	Delivery Month:	32
DJRA2.12	Report on Security and Privacy issues in ASIMOV	Delivery Month	12

1.5.3.5 Summary of effort for Joint Research Activities

Partic. No.	**Partic. Short name**	**JRA1**	**JRA2**	**Total person months**
1	SES-Astra	4	30	**34**
2	ETH	12	24	**36**
3	UL	7	11	**18**
4	Yovisto	19	22	**41**
5	UASNW		30	**30**
6	HPI		40	**40**
7	RSA			
8	FUB	16	16	**32**
9	UZ	3	8	**12**
10	AMP	24	50	**74**
11	CWI	18	21	**39**
12	FOPOLIMI	8	10	**18**
13	Martel			
14	Metaware	8	14	**22**
15	JSI	8	22	**30**
Total		**127**	**298**	**425**

1.5.3.6 List of JRA Deliverables

Del. No. [72]	**Deliverable name**	**Activity no.**	**Nature** [73]	**Dissemination level** [74]	**Delivery date**[75] **(proj. month)**
DJRA1.1	State-of-the-art in audio-visual content archiving: - Metadata for Web-based audio-visual content - Processing of Web-based audio-visual content - Solutions in digital historical audio-visual archives	JRA1	R	PU	6
DJRA1.2.1	System Requirements Specification for use case 1	JRA1	R	RE	9
DJRA1.2.2	System Requirements Specification for use case 2	JRA1	R	RE	9
DJRA1.2.3	System Requirements Specification for use case 3	JRA1	R	RE	9
DJRA1.3	Interoperability requirements for IMS	JRA1	R	PU	18
DJRA1.4	Report on socio-economic aspects	JRA1	R	PU	32
DJRA2.1.1	Ontology for the representation of multimedia data	JRA2	R	PU	12
DJRA2.1.2	API for manual multimedia annotation	JRA2	O	PP	15
DJRA2.2	Document on concept and implementation of spatio-temporal addressing based on the URI fragment identifier	JRA2	R	PU	9
DJRA2.3	API for OCR-based analytical indexing of video data	JRA2	O	PP	15
DJRA2.4.1	Collaborative Filtering Framework: components for collecting and aggregating user annotations and ratings/votings for IMOs	JRA2	O	PP	15

[72] Deliverable numbers in order of delivery dates. Please use the numbering convention <Activity number>.<number of deliverable within that Activity>. For example, deliverable DNA4.1.2 would be the second deliverable from Task TNA 4.1

[73] Please indicate the nature of the deliverable using one of the following codes:
R = Report, **P** = Prototype, **D** = Demonstrator, **O** = Other

[74] Please indicate the dissemination level using one of the following codes:
PU = Public
PP = Restricted to other programme participants (including the Commission Services).
RE = Restricted to a group specified by the consortium (including the Commission Services).
CO = Confidential, only for members of the consortium (including the Commission Services).

[75] Measured in months from the project start date (month 1)

DJRA2.4.2	Collaborative Filtering Framework: components for creating user profiles and personalisation of search results	JRA2	O	PP	32
DJRA2.5.1	Exemplary multilingual audio-video transcripts	JRA2	R	PU	12
DJRA2.5.2	Domain specific vocabularies and auxiliary data for NLP	JRA2	R	PU	12
DJRA2.5.3	API for NLP-based analytical indexing of video data	JRA2	O	PP	30
DJRA2.6.1	ASIMOV interactive user interface concept	JRA2	R	PU	12
DJRA2.6.2	ASIMOV interactive user interface implementation	JRA2	O	PP	32
DJRA2.7.1	Indexer for Semantic index data	JRA2	O	PP	18
DJRA2.7.2	Indexer for Collaborative index data	JRA2	O	PP	18
DJRA2.7.3	Integrated Indexer for video data including analytical, collaborative, and semantic index data	JRA2	O	PP	32
DJRA2.7.4	Search Engine Framework for Video Search	JRA2	O	PP	30
DJRA2.8.1	Initial report on DRM concepts & methods in video search engines	JRA2	R	PU	12
DJRA2.8.2	Final report on DRM concepts & methods in video search engines	JRA2	R	PU	34
DJRA2.9	Report on the long-term preservation and accessibility of audio-visual content	JRA2	R	PU	32
DJRA2.10.1	Definition of content distribution system for clients	JRA2	R	PU	15
DJRA2.10.2	Documentation of the content distribution system	JRA2	R	PU	32
DJRA2.11.1	SATMODE Unit and Regression Test report	JRA2	R	PU	18
DJRA2.11.2	SATMODE Performance and Interoperability Validation Test report	JRA2	R	PU	32
DJRA2.12	Report on Security and Privacy issues in ASIMOV	JRA2	R	PU	12

1.5.3.7 List of JRA Milestones

Milestone no.	Milestone name	Activities involved	Exp. Date	Means of verification[76]
MJRA1.1	System Requirements Specifications available	JRA1	9	Deliverables DJRA1.2.1 - 3
MJRA2.1	Successful completion of ontology for the representation of multimedia data	JRA2	12	Deliverable DJRA2.1.1
MJRA2.2	Successful completion of concept and implementation of spatio-temporal addressing based on URI fragment identifier	JRA2	9	Deliverable DJRA2.2 Concept and Implementation reviewed by W3C
MJRA2.3	Successful completion of domain specific vocabularies for NLP and transcripts	JRA2	15	Deliverable DJRA2.5.2
MJRA2.4	Successful implementation of ASIMOV interactive user interface concept	JRA2	24	Deliverable DJRA2.6.2 Software available from ASIMOV Website
MJRA2.5	SATMODE AP ASIMOV extension: IMS client implementation	JRA2	27	Deliverable DJRA2..11.2
MJRA2.6	ASIMOV semantic search engine for audio-visual web content	JRA2	36	Demonstration Software available from ASIMOV Website

[76] Show how both the participants and the Commission can check that the milestone has been attained. Refer to indicators if appropriate.

2 Implementation

2.1 Management structure and procedures

2.1.1 Project Structure

ASIMOV will follow the structure of I3 projects, drawing from the experience of GN2 (GEANT2) and EGEE and FEDERICA. It will consist of ***NAs (Networking Activities)***, ***SAs (Service Activities)*** and ***JRAs (Joint Research Activities)*** as described in Section 1.

The ASIMOV project will be based on a management structure tailored to the project context and the number of partners, in order to provide efficient and effective project management and ensure that all project objectives are achieved within time, cost and resource constraints. The project management will use tried and tested project management procedures and techniques that have been successfully developed over many years of project management experience by the organizations involved in the project.

In order to achieve a clear and efficient management of both the administrative and technical aspects of ASIMOV, it is decided to clearly distinguish between the administrative management of the Consortium and the technical management of the project. In particular, the former is the mandate of the *General Assembly (GA)*, chaired by the Project Manager, while the latter is the mandate of the *Technical Executive Committee (TEC)*, chaired by the Technical Coordinator.

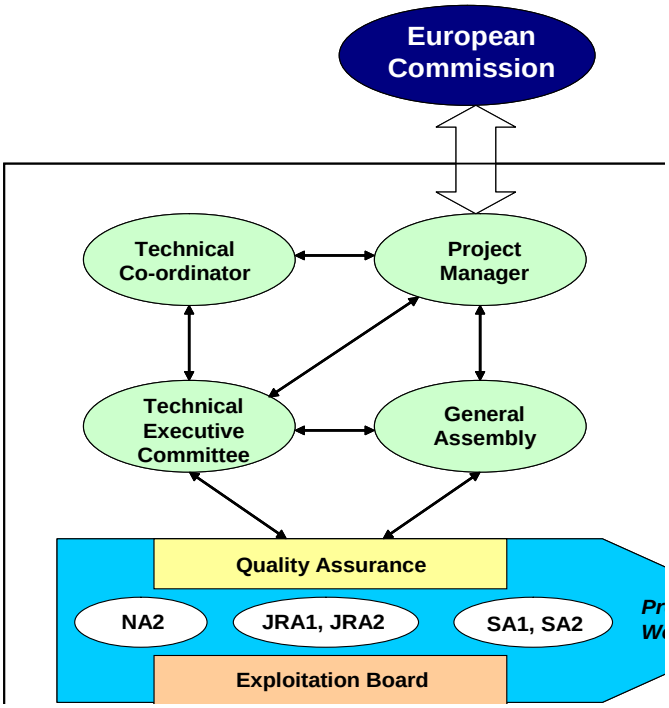


Figure 4: Project Management Structure

The overall project guidance is the responsibility of the GA, consisting of representatives of all partners. The GA will meet at least every 4 months and will decide on major issues concerning resource allocations, partner changes and/or project deliverable planning. The GA is the only project body that can make decisions on contractual matters, such as the budget, timeline, shifting resources between partners, adding/deleting partners. It will meet physically at least once every 4 months. The Project Manager chairs the GA.

Each Activity will be managed by an ***Activity Leader***, who oversees and coordinates the ***Tasks*** within each Activity. All the 6 Activity Leaders (NA1-2, SA1-2 and JRA1-2) form the TEC. Its main task is to ensure cohesion, maintain effort synchronisation, facilitate the distribution of the results, identify timely issues and avoid overlaps between activities. A key responsibility of the TEC will be to assess progress, suggest changes in specific goals and promote JRAs into SAs as the former mature. TEC meetings will be held at least every 4 months. Interim Activity meetings will be arranged independently.

All partners will nominate an Exploitation Representative who will participate to the project *Exploitation Board* and represent his organization as far as exploitation matters. The goals of the Exploitation Board include monitoring market evolution and steering the general dissemination and exploitation actions accordingly, in order to maximize the exploitation potentials for project results. Exploitation representatives can also be invited to attend the GA meetings. The activities of the Exploitation Board will be reported in the Dissemination and Use Plan updates.

2.1.2 Project Management

Management responsibilities exist at the ***consortium*** (Co-ordinating partner, project manager and GA), ***technical*** (TEC) and ***financial*** levels.

The Co-ordinating Partner (SES-Astra) is the unique point of contact with the Commission and also provides the overall technical project manager. Consortium management duties include:

- ensuring a smooth operation of the project, and fulfilling the contractual obligations on schedule and within budget
- administrative matters (e.g. contract, consortium agreement, maintaining the Description of Work and CPF, IPR, access rights)
- financial matters (egg. receipt and distribution of all payments, cost claims, independent financial audits, maintaining the status of payments made to each partner)
- monitoring progress and the production of the regular reports of progress and resource expenditure for the EC (especially all the official documentation needed for the project Review: *Project Activity Report*, *Project Management Report* and the *Detailed Plan for the Next 18 Months*). At the Activity level, the TEC is responsible for the overall technical co-ordination of the project, including:
  - the achievement of the project's technical progress
  - the recommendation of corrective actions, if needed (in conjunction with the project manager and the GA)
- the organisation and chairing of the GA meetings
- the final approval of deliverables

SES-Astra will be assisted in the Consortium Management task by Martel. Martel is well suited to this role. Martel employees have taken responsibility in the past for giving such support for organisations, such as France Telecom, Cisco, Thomson and Telefónica. Martel has a good relationship with the Commission, being an active and willing representative. Its staff have accompanied Commission representatives on missions to Japan and Canada, represented them in various conferences and performed rapporteuring duties in consultation committees. They recently provided the chairman for the *Broadband for All* Cluster.

2.1.3 Decision Process

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 General Assembly (GA). The GA comprises one representative from each partner and is the only project body that can make decisions on contractual matters, such as the budget, timeline, shifting resources between partners, adding/deleting

partners. A majority verdict will be sufficient to carry some decisions; other will require the unanimous agreement of all partners (the distinctions will be listed in the Consortium Agreement).

Technical issues will be decided by the Technical Executive Committee (TEC), which comprises the Activity leaders.

SES-Astra chairs the GA. ETH-Z is the technical manager and chairs the TEC.

2.1.4 Information Flow

The information that is exchanged inside the project or towards external bodies is:

- project planning and control information,
- technical information and deliverables,
- contributions to standardisation bodies and/or FP7 co-ordination groups.

The tools the project intends to use to circulate such information are:

- planning and reporting documents,
- technical contributions originated by the partners and deliverables,
- the Website (including public and private areas):
  - the machine will be hosted at UL
  - e-mail distribution lists will be maintained by UL
  - a Wiki will be set up by UL, so that all partners can update their related information
  - all public deliverables will be placed on the Website
  - a private area of the Website will allow partners to store and retrieve documents and therefore work collaboratively on (for examples) deliverables
- video-conferencing and collaborative working tools will be used (such facilities already exist in the NRENs – that can be shared by all partners). These facilities are part of the standard services provided by the NREN on the production IP network and should be free-of-charge for the majority of the partners, including multi-partner videoconferencing.

2.1.5 Planning and Reporting

Project planning and progress are documented in regular *Management Reports* and summarised in a *Periodic Activity Report* and *Periodic Management Report* that will be written prior to every Review. These documents are produced by the Project Manager, and compiled from inputs from the individual partners. The *Management Reports* contains information on the achievements and the corresponding resources used.

An update to the Description of Work will also be produced prior to the project review, in terms of a *Detailed Plan for the Next 18 Months*.

2.1.6 Deliverables Handling

Deliverables are the official outputs of the project. Their production is the responsibility of the Activity leaders. Martel will give all the deliverables a final check for consistency, readability, and to check that the output is in-line with the general requirements of the project.

Quality assurance of project outputs is a very important concern of both the GA and the TEC. The TEC will guarantee a consistent quality for all project results by evaluating them following a procedure that will be outlined in a reference document for the project (Quality Assurance Manual). The TEC will assign *review teams* for each external report and project output. These teams will produce a *quality report* on each project output. The quality assurance activity is included in the Activity NA1 Project Management. The quality report from the review teams will be approved by the GA, together with its respective deliverable.

2.1.7 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 5: 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.

2.1.8 Risk Management

Risk Management will be adopted to manage project issues and conflicts. During the initial start-up of the project, a risk assessment will be conducted to identify risks associated with both the business and technical aspect of the research. The programme management office, GA and TEC leaders will be involved in the assessment. This will establish a central risk register.

Risks will be assessed for their impact on the project and the probability of the risk materializing. The team will establish risk mitigation plans to reduce the impact and likelihood of the risk occurring, as well as action plans to manage the risk should it arise. This integrated approach to risk management will enable the programme office effectively control business, intellectual property, technology, people, management, environment and other implementation risks that may arise.

Unresolved issues or conflicts impacting the project plan will be escalated to the appropriate body, project co-ordinator and then if required to the GA. Should the need arise the GA will be convened to vote on the issue or dispute in question

Individual participants

2.1.1 Participant 1: SES Astra Techcom (SES-Astra)

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-Astra in collaborative filtering is composed of the technology providing large-scale collection, aggregation and analysis of semantic annotations. SES-Astra 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-Astra will develop and extend the Application Programming Interfaces (APIs) to open its use to the partners. As the industrialisation of the collaborative filtering platform is an important part for SES-Astra, 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 personalisation or collaborative access control. SES-Astra 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-Astra will also evaluate the privacy and security implication of the collection and processing for the users' information in the collaborative filtering platform. Also, SES-Astra 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-Astra 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-Astra 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 Techcom 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-Astra will provide two-way satellite communication equipment, the technical support to install these systems and the required satellite capacity. SES-Astra will also provide expert knowledge in the field of Internet safety and security.

2.1.2 Participant 2: ETH Zürich (ETH)

Role in project: ETH will cover the two domains closest to its core business: One is research, in that it will take a lead in the technology architecture and development together with HPI, combining actual research activities in multimedia search and annotation with the perspective towards the actual provision of services in this area. The other domain is teaching and ETH will therefore participate in the use case for e-learning with videolectures.net as an exchange platform for academic content, thus continuing and expanding its outstanding activities in the utilisation of audio-visual material from 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 audio-visual and/or multimedia objects asked for by the Multimedia Services' REPLAY system. It will aim at recording 150 lectures a week in 2010. Multimedia Services have a history of producing lecture recordings and handling audio-visual material. The development of PLAY (now pursued by the Swiss NREN SWITCH) was a milestone for enriching Audio/Visual-material towards multimedia objects by synchronising 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.

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 utilisation 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.

2.1.3 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 utilised 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.

2.1.4 Participant 4: Yovisto

Role in project: The major contribution of Yovisto 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 visualisation).

Expertise: Yovisto GbR Waitelonis & Sack was founded as a university spin off at Friedrich-Schiller-University, Jena. Yovisto initially was funded as OSOTIS within the Exist-Seed program of the European Social Fund (ESF) and the German Ministry of Commerce (BMWi) and has developed a sophisticated and innovative video search engine implementing a pinpoint search within academic video material (www.yovisto.com). Yovisto brings profound expertise in video analysis technology, isochronous and semantic annotation of multimedia data, metadata standards, and semantic technologies.

Dr. rer. nat. Harald Sack is co-founder and CIO of Yovisto. 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 Optimisation' 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). He was postdoctoral fellow at Friedrich-Schiller-University, Jena (2002-2007) and is visiting lecturer at Hasso-Plattner-Institut, Potsdam (2008-now). He is 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.

Jörg Waitelonis received his diploma in computer science in 2006 at FSU Jena with a thesis on 'Automated Semantic Annotation and Search in Synchronised 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 the university spin-off company Yovisto. He is the developer of the video search engine www.yovisto.com .

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

2.1.5 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 specialises 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, standardisation, 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 optimisation methods using genetic algorithms.

2.1.6 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 Yovisto 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 specialised 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.

2.1.7 Participant 7: Research Studios Austria (RSA)

Role in project: RSA will contribute to SA1 using its extensive multimedia facilities and will contribute to NA2 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.

2.1.8 Participant 8: 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, realisation 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.

2.1.9 Participant 9: 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 utilisation 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 recognised 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.

2.1.10 Participant 10: 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.

2.1.11 Participant 11: 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 standardisation 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 audio-visual metadata and in combining existing metadata standards (such as MPEG-7) with current Semantic Web technologies. He works closely with the IPTC standardisation 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 audio-visual data repositories.

2.1.12 Participant 12: The Fondazione Politecnico di Milano (FOPOLIMI)

Role in project: FOPOLIMI 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 and IPR management. FOPOLIMI´s main activities will be: the design of interaction, scenario requirements analysis, user scenario development and scenario validation, demonstration and dissemination.

Expertise: FOPOLIMI is an agile and operational structure supported by the "Fondazione Politecnico di Milano" Technical University and some important founders. The Fondazione 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 Fondazione 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 Fondazione 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: FOPOLIMI will provide expertise in requirements analysis, interaction and interface design, IPR management, long term preservation; provide digital contents and develop user scenarios and trials. Training activity will be performed as well.

2.1.13 Participant 13: 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.

2.1.14 Participant 14: Metaware (Meta)

Role in project:

Metaware´s role in the project will include the integration of the BELIEF-II Digital Library repository, creation of an advanced audiovisual access interface for the BELIEF-II DL, the validation of DRM functionalities and integration with an OAIS-based repository solution.

Furthermore, Metaware will support the project networking activities, providing direct access not only to the BELIEF-II community, along with the participating networks and institutions, but also to a vast networks of contacts in the academia, public institutions and companies built during several years in the field.

Expertise:

Metaware has been active during last years in EU networking and research projects in many topics, including digital libraries, digital rights management and digital preservation, business intelligence, digital security, distributed infrastructures and semantic technologies. (MONSOON, EUSEA2006(BASIC project), BRICKS, CASPAR, CALLAS, PHAROS, EU-IndiaGrid, EGEE-II, 3S, BELIEF-I, BELIEF-II,BRITE, MUSING, DIVINO).

The company focuses both on creating awareness around such topics and on the technical development of software and solutions. As an example, in the BRICKS project the company developed an open-source trust and security management infrastructure and digital rights management framework based on XACML and MPEG-21 REL, while in the CASPAR project Metaware is currently working on the long-term digital preservation of digital rights and access control policies within the project's OAIS standard implementation and collaborating for adding the notion of digital rights into the standard's upcoming revision.

Among different expertise areas, Metaware will contribute in ASIMOV the following:

- definition, extension and standardisation of digital rights policy models and formats
- state-of-the art research on the existing digital rights management solutions and standards
- integration and access to Open-Dlib based repositories
- integration and access of OAIS-based repositories
- rich client applications for value added service access

Due to its significant involvement in EU funded programmes, Metaware is also strongly involved in the organisation of international events across the EU member States, candidate Countries as well as in many of the emerging economies, which may be considered interesting opportunities for the dissemination of the project results and the identification of exploitation opportunities.

Commitment:

Metaware will provide full commitment for the integration and trial evaluation of the project’s results into the BELIEF Digital Library, and for the dissemination of the project results through all the available channels, including events and support. Metaware will also actively participate to the project’s exploitation planning activities, providing business development cases based on actual customer requirements from public bodies and private companies.

2.1.15 Participant 15: Jozef Stefan Institute (JSI)

Role in project:

JSI wil take to roles in the project. Through its project/portal videolectures.net that is operated by the Center for Knowledge Transfer it will provide the use case scenario and the testing environment. JSI will also be involved in the research and development activities by providing novel knowledge, semantic and context technologies that are being developed in Department of Knowledge Technologies. Furthermore JSI will provide support in the dissemination and training activities.

Expertise:

Jožef Stefan Institute (JSI) is the central research institution for natural sciences in Slovenia. It consists of over 800 researchers within 25 departments working in the areas of computer science, physics, chemistry and biology.

The Centre for Knowledge Transfer, consists from 10 researchers and technical staff working in the areas of research results dissemination and e-learning. In particular, the centre is well known by the portal http://videolectures.net with multimedia materials of numerous scientific events, on-line training materials, and collection of tutorials on different scientific fields. The centre is involved in training and dissemination activities for many FP6 and FP7 projects.

The Department of Knowledge Technologies also participating in ASIMOV is one of the largest European research groups working in the areas of machine learning and data mining. It has approx. 40 researchers covering different aspects of data analysis with special emphasis on textual data, social networks/graphs, complex data visualization, cross modal analysis, temporal (stream) data and in particular on scalability of approaches and deployability of research results in real life environments. In the recent years the research shifted towards semantic technologies, where the main goal is to combine modern statistical data analytic techniques with more traditional logic based knowledge representations and reasoning techniques. The department developed several software tools, among others: Text-Garden suite of text mining tools, OntoGen system for ontology learning, Document-Atlas for complex visualization.

Both the Centre for Knowledge Transfer and Department of Knowledge Technologies participate in several European projects – the most relevant for the work on ASIMOV are from the three areas: Semantic & Knowledge Technologies (ACTIVE-IP, SEKT-IP, NEON-IP, ALVIS-STREP, TAO-STREP), Knowledge management and learning for Networked Organizations (COIN-IP, ECOLEAD-IP, E4-STREP), and Cognitive Systems (PASCALII-NoE, SMART-STREP).

Key Personnel

Mitja Jermol is a head of the Centre for knowledge Transfer at JSI working in the area of e-learning and dissemination and promotion of research results. His main research area is Knowledge Management enriched with the modern analytic techniques in the context of improved business processes for (networked) organizations. Among others, he is JSI's representative in the leading FP7 ACTIVE-IP, FP7 COIN-IP, FP7 EURIDICE-IP and FP6 ECOLEAD-IP where he is responsible for training activities. Before joining JSI, Mitja was heading the research group for distance education and e-learning at Slovenian major publishing house.

Marko Grobelnik is researcher and manager of research group of 15 people at the department of Knowledge Department working primarily in the areas of text-mining and social network analysis. He is coauthor of several books and numerous scientific papers. Marko is a technical director of FP6 IST World project on analysis of European research, a member of management board of several FP6 & FP7 projects (FP6 SEKT-IP, FP6 NEON-IP, FP7 ACTIVE-IP) and participates in W3C standardizing committees. He co-organized over 10 international workshops and tutorials on text mining and link analysis at prominent conferences like IJCAI, ACM-KDD, IEEE-ICDM. Marko also closely collaborates on research projects with Microsoft Research, New York Times, Carnegie Mellon University, Cornell University.

Dr. Dunja Mladenič is a researcher, project manager and deputy head of the Department of Knowledge Technologies. She is active researcher in the area of machine learning and text mining. She is co-author of several books and papers on machine learning, datamining and text mining, she is program chair of European Machine Learning Conference and one of the major contributors to Text-Garden and OntoGen software tools. In FP5 she was coordinating R&D project SolEuNet on "Data-Mining and Decision Support for Business Competitiveness: A European Virtual Enterprise" (3.5M euro, 12 partners). Dunja is JSI's representative for FP6 and FP7 projects FP6 SWING-STREP, FP6 PASCAL-NoE, FP7 EURIDICE-IP, FP7 PASCAL2-NoE. Dunja was a visiting faculty member in the School of Computer Science at Carnegie Mellon University USA, in 1997 and in 2001.

Commitment:

Metaware will provide full commitment for the integration and trial evaluation of the project's results into the videolectures.net video training platform thus providing a test-case, training and dissemination chanels and already established communities of users. JSI will also actively participate in the RTD activities with its long-term experience in semantic technologies and solutions in the area of : machine learning, data &

text mining, social network analysis, language technologies, cross-modal technologies, scalable algorithms.

2.2 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-Astra	Luxembourg	Industry	Project (technical) management. Development of collaborative filtering and integration with existing legacy systems (content and service delivery platforms)
2	ETH	Switzerland	University	JRA2 co-leader with HPI
3	UL	Luxembourg	University	Mobile IPv6, networking, security, dissemination
4	Yovisto	Germany	University	Yovisto 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 Activity (JRA2) and works together with ETH in Natural Language Processing
6	HPI	Germany	Research Institute	JRA2 co-leader of (with ETH), with a focus on video- and search related technologies
7	RSA	Austria	Research Institute	Media production, dissemination
8	FUB	Germany	University	SA2 leader
9	UZ	Croatia	University	External integration interfaces, content syndication for social networking Training content authors; analyzing the usage of ASIMOV in the education process

Partner No.	Partner Name	Country	Organisation type	Role in the project
10	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)
11	CWI	The Netherlands	Research Institute	Contribute with its competence on web-based multimedia and semantic interfaces, and its established relationship with W3C
12	FOPOLIMI	Italy	University / Foundation	They specialise in interaction design and long-term preservation of digital content Collaboration with Metaware from BELIEF-II with regard to setting up a test bed scenario in which ASIMOV can harvest video content from the BELIEF-II Digital Library. In addition FoPoliMi will provide additional use case related to eHealth, eGov and eBiz. Scenario requirements analysis, user scenario development and scenario validation, demonstration and dissemination Training
13	Martel	Switzerland	Industry (SME)	Consortium management (administrative and financial matters)
14	Metaware	Italy	Industry	Integration of the BELIEF-II Digital Library repository, creation of an advanced audiovisual access service for the DL, validation of DRM functionalities and integration with an OAIS-based repository solution.

Partner No.	Partner Name	Country	Organisation type	Role in the project
15	JSI	Slovenia	Research Institute	Testbed on the videolectures.net. Integration of ASIMOV architecture and advanced tools, validation and CDN network users. Advanced knowledge, context and semantic technologies, text and video mining, transcription prototype.

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 Activity. We have selected the consortium 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.

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. 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-Astra will use the project result to enhance its search and categorisation 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 customised access of knowledge and the collaborative options will be applicable to every object considered a valuable knowledge object. Potential application areas are showcased in SA1.

2.2.1 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.

2.2.2 Sub-contracting

FoPoliMi: Contribution to Carabinieri, ULSS8 Asolo (Medical Unit), Milan Chamber of Commerce

2.2.3 Other countries

NA

2.2.4 Additional partners

NA

2.3 Resources to be committed

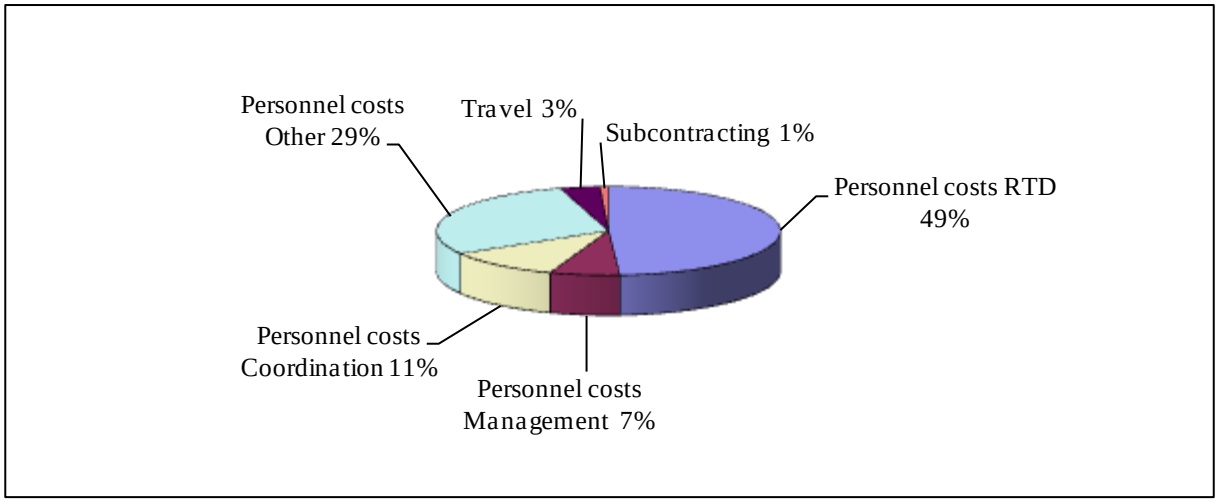
The detailed breakdown of the PMs and associated costs per partner in each of the Activities is shown on the sheet at the end of this sub-section.

The overall budget figures are as follows:
Total Cost = € 7'017'990.96
EC Contribution requested = € 5'817'391.41 (82% of the total cost)

(rounding to whole numbers on the Form A3.2, leads to a very small difference on that form)

€7'017'990.96 is for personnel costs, travel and equipment (including overheads, where appropriate, according to the funding model) and the independent financial audit costs.

The following diagram shows the distribution of the costs:



Particular features explained below are:

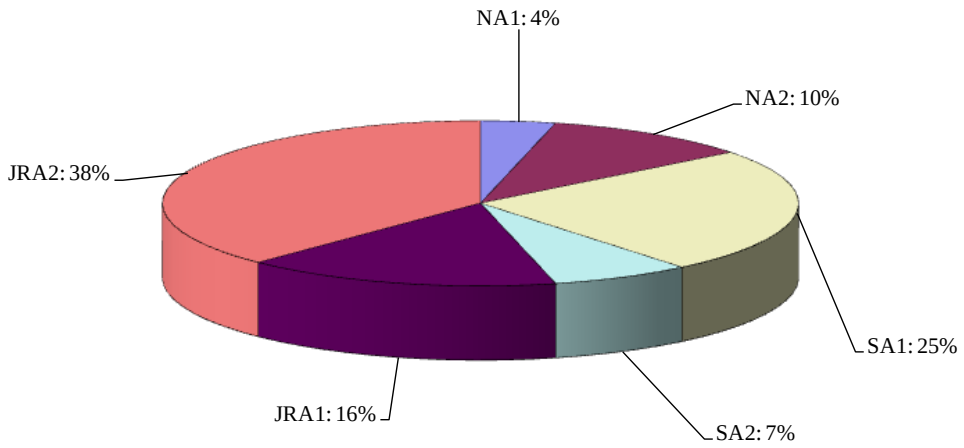
1) The relative expenditures in each of the Activities (NA, SA, JRA)
2) The consortium management proportion of the whole project cost
3) Travel costs

In accordance with the reimbursement rates in FP7, the EC contribution has been calculated on the basis that:

- NA1 (MGT) is reimbursed at 100%
- NA2 (COORD) is reimbursed at 100% (but the Indirect Costs are limited to 7%)
- All SAs (SVC) are reimbursed at 100%
- All JRAs (RTD) are reimbursed at 50% for large non-public organisations, and at 75% for
  - non-profit public bodies,
  - secondary and higher education establishments,
  - research organisations,
  - SMEs

1) The relative expenditures in each of the Activities (NA, SA, JRA)

The allocation of PMs to the NAs, SAs and JRAs is shown below:



This demonstrates that the largest percentage (54%) of the effort is allocated to the JRAs, for requirement analysis and technology architecture & development.

251 PMs are carried out in the SAs. This work represents 32% of the total project resources in terms of PMs. The remaining 14% of the person-months is spent on Networking Activities (NAs), such as managing the project, collecting and analysing the user requirements, consolidating the user communities, liaison, dissemination, standardisation and training. Many of the partners have already worked together in similar projects and are therefore familiar with the procedures and working practices.

2) The consortium management proportion of the whole project cost

The consortium management is carried out in NA1. From the previous figure, it can be seen that, in terms of PMs, this effort represents 4% of the project total PMs.

In terms of EC Contribution, NA1 accounts for €343099 (including travel, but excluding the costs for the independent financial audits[77]). This is 4.8 % of the total EC Contribution.

3) Travel costs

Travel costs have been minimised (3% of the total project costs) through the anticipated use of conference calls (ideally videoconferencing), and the exploitation of meeting in conjunction with other events where several of the partners will be participating anyway.

[77] Audit certificates will be required from partners whose funding reaches €375,000 at the time their funding reaches this level. Partners whose funding never reaches this level are required to produce one only at the end. It is currently planned that these fees will be claimed under "Subcontracting" (ie. at 100%, but without the addition of any Indirect Costs).

		Defaults		SES	ETH	UL	Yovisto	UASNW	HPI	RSA	FUB	UZ	AMP	CWI	FoPoliMi	Martel	Metaware	JSI	
	Activity		**total**																
NA	**NA1: Project Management**		**30**	18	0	0	0	0	0	0	0	0	0	0	0	12	0	0	
	NA2: Standardisation, Dissemination and Exploitation		**84**	2	6	10	4	2	6	10	4	9	3	6	6	6	6	4	
SA	**SA1: User Scenario Trials, Validation and Verification in Digital Library Scenarios**		**195**	8	20	9	3	2	4	20	18	6	24	12	31	0	18	20	
	SA2: Training		**56**	2	0	8	0	0	0	0	18	14	0	0	6	0	4	4	
JRA	**JRA1: Requirements Analysis**		**127**	4	12	7	19	0	0	0	16	3	24	18	8	0	8	8	
	JRA2: Technology Architecture & Development		**298**	30	24	11	22	30	40	0	16	8	50	21	10	0	14	22	
	Total PMs NA	0	**104**	20	6	10	4	2	6	10	4	9	3	6	6	18	0	0	
	Total PMs for SA	0	**251**	10	20	17	3	2	4	20	36	20	24	12	37	0	22	24	
	Total PMs for JRA	0	**425**	34	36	18	41	30	40	0	32	11	74	39	18	0	22	30	
			780																
	COSTS																		
	Funding Model (Real Indirect Costs (50%), Special Transition Flat Rate (60%), or Flat Rate (20%)			RIC	STFR	STFR	STFR	STFR	STFR	FR	STFR	STFR	FR	RIC	STFR	STFR	RIC	RIC	
	Personnel Cost per PM (without overhead)	5000		10109	6355	8500	6000	6700	4500	8400	5200	2350	3000	4010	5000	10000	4000	5000	
	NA																		
	Personnel costs in NA1		**301962**	181962	0	0	0	0	0	0	0	0	0	0	0	120000	0	0	
	Personnel costs in NA2		**500758**	20218	38130	85000	24000	13400	27000	84000	20800	21150	9000	24060	30000	60000	24000	20000	
	Travel+Consumables	2400	58800	10000	2400	2400	2400	2400	2400	2400	2400	10000	2400	2400	2400	10000	2400	2400	
	NA1:Overhead (Univ + SME = 20 / 60% of all, or x% of personnel. Company = x% of personnel cost); NA2: 7% on all eligible costs			92396	2669	5950	1680	938	1890	5880	1456	1481	630	1684	2100	76200	1680	1400	
	Subcontracting (Financial Audit)	2500		2500	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500	
	Total NA			307076.3	45699	95850	30580	19238	33790	94780	27156	35130.5	14530	30644.2	37000	268700	30580	26300	
	SA																		
	Personnel costs		**1337410**	101090	127100	144500	18000	13400	18000	168000	187200	47000	72000	48120	185000	0	88000	120000	
	Travel+Consumables	3000		3000	3000	3000	3000	3000	3000	3000	3000	15000	3000	3000	3000	3000	3000	3000	
	Equipment (depreciation)			20000	0	10000		10000	10000	10000	10000	60000	10000						
	Overhead (Univ + SME = 20 / 60% of all, or x% of personnel. Company = x% of personnel cost)			50545	78060	94500	12600	15840	18600	36200	120120	73200	17000	47639	112800	1800	35200	72000	
	Total SA			174635	208160	252000	33600	42240	49600	217200	320320	195200	102000	98758.8	300800	4800	126200	195000	
	JRA																		
	Personnel costs		**2251126**	343706	228780	153000	246000	201000	180000	0	166400	25850	222000	156390	90000	0	88000	150000	
	Travel+Consumables	3000		3000	3000	3000	3000	3000	3000	3000	3000	13000	3000	3000	3000	3000	3000	3000	
	Overhead (Univ + SME = 20 / 60% of all, or x% of personnel. Company = x% of personnel cost)			171853	139068	93600	149400	122400	109800	600	101640	23310	45000	154826	55800	1800	35200	90000	
	Total JRA			518559	370848	249600	398400	326400	292800	3600	271040	62160	270000	314216	148800	4800	126200	243000	
	Total Personnel Cost		**4391256**																
	Total Costs			1000270	624707	597450	462580	387878	376190	315580	618516	292490.5	386530	443619	486600	278300	282980	464300	7'017'990.96
	Total EC Contribution			740990.8	531995	535050	362980	306278	302990	314680	550756	276950.5	319030	286511	449400	277100	219880	342800	5'817'391.41

3 Impact

3.1 Impact of ASIMOV to the targeted outcomes of the Call

According to the FP7 Capacities Work Programme for Infrastructures, the expected impact for this call will be to "... ***increase the scale of federation and interoperation of digital repositorie****s, consolidating synergies with the underlying e-infrastructures. The widespread implementation of* ***strategies for curation and preservation*** *will lead to more robust data infrastructures profiting from the interconnection and access to distributed and high-end computing and storage resources. The* ***adoption of common management strategies*** *will reduce costs, increase users base and bridge across multidisciplinary communities, enabling cross-fertilisation of scientific results favouring innovation.*"

ASIMOV is perfectly addressing the highlighted target outcomes of the call, though it does not pretend to serve all purposes to the same degree and at the same level. The focus of ASIMOV is on a new approach for archiving and retrieving audio-visual content, which is more intuitive and intelligent, and which overcomes the barriers caused by the use of current proprietary metadata systems. ASIMOV therefore enables *federation* in terms of being able to access global audio-visual content. In terms of *infrastructure federation*, ASIMOV will demonstrate that it can operate over the eInfrastructures to which the current digital libraries are connected (e.g. GEANT) and also interoperability with IMS (as access to data whilst roaming is important). However, research on network infrastructure federation is *not* part of the ASIMOV scope; there are other projects that specialise in this field (PII, OneLab2, FEDERICA). Rather than duplicate their efforts, we will *collaborate* with projects working in that area for the demonstrations.

The impact of ASIMOV in the selected areas is addressed in sub-sections 3.1.1 - 3.1.3, below:

3.1.1 Increasing the scale of federation and interoperation

Digital audio-visual content that is produced today is tagged with static - and often proprietary - metadata. That metadata describes the audio/video content as a monolithic entity, but omits the temporal, spatial and many other dimensions of the content. Such a process does not allow automated search, slicing and splicing of the content on the more granular level. It also restricts federation, since the metadata is not consistent between all digital libraries.

The goal of ASIMOV is to introduce new and missing annotation mechanisms, user and content profiling that shall enable an intelligent, automated and cost-effective way to produce, repurpose, organise, search and personalise the content across the value chain. Content will be indexed based on the *automatic* processing of embedded sound or environmental (location, presence) information. Furthermore, the content search process will be adapted to match the capabilities of the targeted device or audience. Note that the retrieval mechanism can be applied (if less effectively) to the vast amount of older content, already archived without metadata tags.

The semantic metadata approach in the ASIMOV project will allow organisations to automate the collection and distribution of digital content and machine-tractable knowledge. The advanced search mechanisms will make it possible to migrate the access, slicing and splicing of audio-visual content from the labour- and expert- intensive domain to become an almost fully machine-automated task. This will allow publishers in creative industries, enterprises and professional sectors to reduce efforts and costs related to the search and physical manipulation of audio-visual content. This not only brings efficiencies for professional organisations, but also enables and encourages a massive increase in the scale of federation, to include not only companies specialising in this area, but also every citizen.

3.1.2 Implementing strategies for curation and preservation

The rapid evolution of technology makes the preservation of digital content a challenge. Storage media are subject to degradation; they are generally 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 are often 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).

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.

In terms of identification (just one aspect of curation and preservation), the DOI[78] (Digital Object Identifier) approach from the EC eContent framework will be followed. This method proposes a scheme similar to ISBN numbers for published material, in which a unique alphanumeric code is associated with each digital object.

3.1.3 Adopting common management strategies

ASIMOV is 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" audio-visual material interactively. In doing so, it brings the prerogative and privilege of **managing audio-visual content** from few (producers, editors, and enthusiasts) to many - thus democratising the factual tenure upon content.

A prerequisite *and* result of this process is a customised utilisation 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 customised to their needs, their interests, their previous knowledge etc. With this "virtuous circle", it will be content created by and for the community, thus making it a richer content in the long run.

Standardisation work, towards a common strategy, will be done through an active participation in W3C. The goals include a common ontology, uniform semantic search index, the standardisation of spatio-temporal addressing of audiovisual content fragments on the Web, and standardised procedures with regard to longevity.

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

3.2 Socio-economic impact

With regard to the **socio-economic impact**, ASIMOV will have the following impacts on the social-, domain-, context- and economic levels:

3.2.1 Social Level

- The provision of digital copyright protected material at European level and the deployment of digital rights management (DRM) solutions
- ASIMOV will:
  - establish personalised and customisable user interfaces for a nation-independent access of visualised information
  - deepen the cultural understanding among the partner countries
- Sharing knowledge will foster the economic, social and cultural development and the welfare of people

[78] www.doi.org

3.2.2 DL 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
- ASIMOV will 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

3.2.3 Context Level

- Cooperative European solutions provide for a more efficient solution to the challenges of a knowledge society
- ASIMOV will 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

3.2.4 Economic Level

- ASIMOV provides an opportunity for new business models to emerge that are compatible with the established TV industry as well as emerging Internet trends.
- ASIMIOV enables interactive community-developed content to complement - rather than compete with - existing markets. This provides the foundation for the development of interactive services, and 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
- ASIMOV will accelerate the distribution and access to knowledge and competence and, thus, increase the competitiveness of European industries

3.3 Technical impact

ASIMOV will have important technical impacts in all of the areas in which it extends the current state-of-the-art, i.e:

3.3.1 Video and Multimedia Data Analysis

ASIMOV provides the automated annotation of recorded audio-visual content based on synchronisation with auxiliary text-based sources (slides etc.), and (through Yvisto) has some of the most advanced technologies in this area. An automated lecture recording system as well as a natural language processing (NLP) based approach for the automated annotation of audio-visual recordings are also developments that will have an enormous impact in this field.

3.3.2 Isochronous Metadata Annotation

With audio-visual 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, technologies such as Intelligent Character Recognition (ICR), Automated Speech Recognition (ASR), Collaborative Tagging (CT) and Automated Video Segmentation (AVS) will be exploited in addition to textual metadata

ASIMOV’s isochronous metadata annotation will go beyond today's solutions and open up existing archives of multimedia or audio-visual content. This has an impact on the ability to retrieve existing content. Furthermore, the annotated multimedia objects will then be incorporated in an ontology-based semantic infrastructure to become full-fledged intelligent multimedia objects (IMO).

ASIMOV combines automated temporal segmentation of time-dependent multimedia data on different levels of abstraction with metadata annotation; audio-visual content is not only annotated as a whole,

but the tagging information is chronologically synchronised. This impacts the ability to enable individually customised media consumption. This work will be done in close coordination with W3C, leading also to an impact on the standards.

3.3.3 Semantic Multimedia Retrieval

To derive semantic annotation from collaborative metadata, tags and user comments will be mapped to appropriate domain ontologies by making use of related task ontologies and supportive lexical resources. Time-dependent semantically rich annotation of audio-visual content, as proposed in the ASIMOV project (i.e. based on collaboration and automation) does not currently exist. Therefore, providing access to semantically annotated multimedia objects by means of a web-based search engine infrastructure provides a significant contribution to the emerging semantic web.

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 the 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 customised multimedia documents that consist of single interrelated segments according to personal information needs. In combination with the possibilities of social networking, customised multimedia documents can be shared and exchanged across the community.

3.3.4 Visualisation and User Interface Design

ASIMOV will also have technological impact in the area of interactive visualisation. I**nteractive visualisation** is necessary to support new generations of search techniques in that the output will develop from a raw presentation of the results into customised compilations. The new user interface will provide different ranges of functionality for searching, editing and annotation tasks and both, user guided and system guided interaction styles; also taking into account the type of user device (e.g., organisers, tablet PCs, smartphones and terminals).

The interplay of different types of technical settings and i/o devices, and the integration of Virtual Reality will have a great influence on the user interface design. It is increasingly important that the aspect of spatial context is taken into consideration to a greater extent than is currently done.

These developments will break new ground towards a new, broader approach in user interface design.

3.3.5 Identity, Privacy, Copyright Issues and DRM

Searching and providing audio-visual 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.

It will be shown that online identity is secured and centralised, 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 authorisation, 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 within ASIMOV. 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 visualise content. Such control can be either generalised or tailored to the individual user, allowing content providers to monetise the additional interactivity granted to premium customers.

3.3.6 Long term preservation and accessibility[79]

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,

[79] http://www.salzburgresearch.at/fbi/digicult

they become obsolete as the devices capable of reading them become outdated. Old formats and standards 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).

Following on from the ISBN approach for content published on paper, the EC eContent framework converted this idea into reality, resulting in the DOI System[80]. 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.

ASIMOV will include this system in its system, thereby extending the impact of the eContent framework.

3.3.7 Content distribution: Mobile settings, devices, networks

A further technological impact of ASIMOV is the ability to access the content from any device (terminal) and its current location. 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 clients to receive content via a direct connection to various target terminal types, including:

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

Today, most of the commercial solutions for video content distribution are using proprietary solutions like Adobe Flash[81] and Microsoft Silverlight[82]. These solutions work acceptably for desktop computers but they are inefficient on sparse resource terminals.

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

3.3.8 Network

Innovation today 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 15% of IP address space is left as of September 2008. The end-to-end restoration is of paramount importance and will be only achieved with the immediate deployment of IPv6, a proven and operational Internet Protocol. IPv6 will enable to have true innovation happening at the edge. 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.

3.3.9 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* standardising multimedia recordings**. ASIMOV will contribute significantly in the area of audio-visual metadata interoperability by bridging the ISO's MPEG

[80] www.doi.org
[81] http://www.adobe.com
[82] http://www.microsoft.com/silverlight/default.aspx

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 audio-visual 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.

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. Standardisation of copyright and access rights will help overcome obstacles in the distribution of audio-visual content (MPEG-21).

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

Most partners in the project will submit papers for publication. It is a project goal that the scientific partners 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 possible 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 platforms for dissemination:

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

Partners 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 NA2). 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.

3.4.1 Individual partners' dissemination and exploitation plan.

3.4.1.1 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 use the ASIMOV to enhance traditional linear broadcasting experience though establishing links between linear and non-linear content metadata and contextual video attributes.

The ASIMOV results 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. Given the world wide coverage of the SES Group, this will open a possibility of addressing a global market for the possible commercial deployment of developed technology.

3.4.1.2 ETH Zürich

ASIMOV will be the tool to augment the ETH Multimedia Portal System REPLAY[83], 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 customised access to recordings for learning purposes on a large scale. ETH considers ASIMOV to be a key to the success of REPLAY.

Furthermore, as ETH is dedicated to digital openness by board decision[84], 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 centralised resources for IT infrastructure would be a service potentially provided by SWITCH, as this is their business model with other activities (videoconferencing, lecture recording).

[83] http://www.replay.ethz.ch.
[84] http://proto-open.ethz.ch/index_EN.

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[85]) it would consider this an appropriate framework for extending the scope of ASIMOV further.

3.4.1.3 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 synchronise 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 organise 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.

3.4.1.4 Yovisto

Yovisto plans for dissemination will be focussed on the knowledge and technology transfer of results, findings and deliverables of the ASIMOV project with regard to video analysis, video annotation, semantic multimedia, and semantic search to be deployed within the Yovisto search engine infrastructure. ASOMOV technology and products will improve the web-based demonstrator search engine for academic video (www.yovisto.com) as well as it will complement the yovisto search technology product line for possible commercial deployment.

3.4.1.5 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.

3.4.1.6 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

[85] http://www.idea.ethz.ch/.

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.

3.4.1.7 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.

3.4.1.8 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.

3.4.1.9 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.

3.4.1.10 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

3.4.1.11 CWI

CWI has a strong track record in disseminating its research results by producing convincing Web demonstrators, releasing open source software and through W3C standardisation 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.

3.4.1.12 FOPOLIMI

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.

3.4.1.13 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).

3.4.1.14 Metaware

As part of the commitment to ASIMOV objectives, Metaware will focus on disseminating the project at events organized by the company, to press and media contacts, and to a significant number of partners in the European research, public and business sectors. This activity, aimed at showcasing the integration of the BELIEF II DL with ASIMOV search services and the ASIMOV technology, will be attracting potential early-adopters but also creating awareness on the research results of the project. The public video search service integrated in the BELIEF II portal will also prove a significant communication channel towards the BELIEF II community. As a further step, Metaware will organize "Technology days" targeted at showcasing and demonstrating the ASIMOV results involving local and international researchers, decision makers and businesses collaborating with the company.

E-government services, one of Metaware's reference markets, is becoming mature for the adoption advanced audio-visual solutions. Such interest is demonstrated by the creation of web 2.0 communities at a local level in many European cities, as well as the widespread adoption of web 2.0 media channels by businesses at all levels. For this reason, Metaware intends to exploit the project results in terms of know-how, technological tools and networking as the basis for growing the existing One-stop-shop service offer with new web 2.0 citizen services, where audio-visual content will play a major role, when coupled with the growing availability of smart mobile devices.

3.4.1.15 JSI

JSI expects that the ASIMOV project prototypes and implementations will increase videolectures.net portal usability and optimise and speed the video content management. By extending the current portal functionalities with ASIMOV services the videolectures.net portal will gain significant advantage towards other similar and competitive web portals around the world. It is expected that by applying ASIMOV solution the portal will become the most advanced training video portal in the world.

Videolectures.net wishes to offer to its community not only high quality materials but also advanced reliable services for searching, exploring and custom look and feel functionalities that supports the personalised learning.

Furthermore, by solving the interoperability and connectivity issues videolectures.net will follow its plans to support the the open training network of top world educational and research institutions that are committed to offer free and open access to their training materials. By applying ASIMOV results Europe can take the lead in offering free and open access to knowledge to everyone.

On the other hand, JSI will integrate their advanced tools and services into one platform that can be used by many institutions around the world. This is how the JSI software solutions that are available under LGPL license can be efficiently promoted and hopefully used for the research at the research institutions.

JSI will use their well established dissemination channels, RTD project consortia and learning communities to promote the results of ASIMOV. Every update on the development part of the videloectures.net is usually communicated to videolectures users and all supported learning communities like ECOLEAD learning community, COIN learning community, PASCAL learning community, ACTIVE learning community, EURIDICE learning community, Industry clusters learning community, etc . Moreover, all authors (currently 3264) that are mainly distinguished professors, business decision makers, and top researchers from all around the world are automatically informed about novelties on the portal. Since the users (currently 2500 to 3000 per day) are mainly coming from the domains related tightly to the information and computer science the impact of this dissemination channel can be significant.

In addition, JSI is also planning to promote ASIMOV results on many main world scale conferences and training events (i.e. summer schools, workshops) that we are organising.

4 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.

4.1 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**	

References

Advanced Distributed Learning (ADL): Sharable Content Object Reference Model (SCORM) Documentation, available at http://www.adlnet.org/, 2004.

Barricelli, M.: Per Video zugeschaltet. Periphere Gedanken zum Potenzial des "Visual Histo-ry Archive" der Shoah Foundation im Geschichtsunterricht. In: Martin, Judith; Hamann, Christoph (Hrsg.): Geschichte – Friedensgeschichte – Lebensgeschichte (Fs. Peter Schulz-Hageleit). Herbolzheim 2007, S. 234-252.

Beier, R.: Geschichte, Erinnerung und neue Medien. Überlegungen am Beispiel des Holo-caust, in : Dies. (Hrsg. für das Deutsche Historische Museum): Geschichtskultur in der zweiten Moderne, Frankfurt a. Main 2000, S. 299 – 324.Berners-Lee, T.; Hendler, J. & Lassila, O.: The Semantic Web, in Scientific American 284, pp. 34-43, May 2001.

Bertin, J. (1967). *Sémiologie Graphique*: les diagrammes, les réseaux, les cartes, Editions Gauthier-Villars

Brin, S.; Page, L.: The anatomy of a large-scale hypertextual search engine, in Computer Networks and ISDN Systems 30, pp. 107—117, 1998.

Bowman, D. A., Kruijff, E., LaViola, J., and Poupyrev, I. (2005). 3D user interfaces: theory and practice, Adison-Wesley

Burdea, G. and Coffet, P. (2003). Virtual Reality Technology, Second Edition. Wiley-IEEE Press.

Card, S., Mackinlay, J., Shneiderman, B. (1999). Readings in Information Visualisation - Using Vision to Think, Morgan Kaufmann

Chen, C. (2004). Information Visualisation - Beyond the Horizon, Springer

Chang, S.F.; Sikora, T. & Puri, A.: Overview of the MPEG-7 standard, in IEEE Trans. Circuits and Systems for Video Technology 11, pp. 688—695, 2001.

Doulis, M. (2004). Space as Interface, Final Degree Annual 2004, FH Aargau, Aarau, CH

Doulis, M., Simon, A. (2005). The Amalgamation – Product Design Aspects for the Development of Immersive Virtual Environments, Bullinger, A., Wiederhold B., Meise, U. and Mueller-Spahn (Eds.), Applied Technologies in Medicine and Neuroscience, Verlag Integrative Psychatrie, Innsbruck, Austria, pp. 51-58

Dörner, D.: The logic of failure: recognising and avoiding error in complex situations. Cambridge, Mass.: Perseus Books. 2001.

Eason, K. D. (1991). Ergonomic perspectives on advances in human-computer interaction, ERGONOMICS, Vol. 34, No. 6, pp. 721-741

Felbaum, C.: Wordnet – An Electronic Lexical Database, MIT Press, Sumerset (NJ), USA, 1998.

Friedland, G.; Knipping, L.; Schulte, J.; Tapia, E.: E-Chalk: A Lecture Recording System using the Chalkboard Metaphor, in International Journal of Interactive Technology and Smart Education (ITSE), 1(1), pp. 9-20, 2004.

Fujii, K.; Suda, T.: Dynamic Service Composition Using Semantic Information, Proc. of the 2nd ACM International Conference on Service Oriented Computing (ICSOC '04), November 2004. http://netresearch.ics.uci.edu/kfujii/dsc/publications/ICSOC04.pdf, 2004.

Golder, S.A.; Hubermann, B.A.: Usage Patterns of Collaborative Tagging Systems, in Journal of Information Science, 32(2), pp.198-208, 2006.

Grcar, M; Mladenic, D; Grobelnik, M; Applying collaborative filtering to real0life corporate data, Pascal EPrints, UK, 2005

Grcar, M; Mladenic, D; Grobelnik, M; User profiling for the web, Pascal EPrints, UK, 2007

Fortuna, B; Rupnik, J; Pajntar, B; Grobelnik, M; Mladenic, D; Cross-lingual search over 22 european languages. SIGIR 2008

Grobelnik, M; Mladenic, D; Fortuna, B; Text mining and link analysis for web and semantic web, KDD '07: Proceedings of the 13th ACM SIGKDD international conference on Knowledge discovery and data mining August 2007

Holocaust Memorial Museum: http://www.ushmm.org/research/library/books/detail.php?content=uscshoahKalawsky, R. S. (1993). The Science of Virtual Reality and Virtual Environments: A Technical, Scientific and Engineering Reference on Virtual Environments, Addison-Wesley, Wokingham, England ; Reading, Mass.

Karam, N.; Linckels, S.; Meinel, C.: Semantic Composition of Lecture Subparts for a Personalized e-Learning, Proc. of ESCW 2007, Innsbruck, Austria, (to appear) 2007.

Karwowski, W. editor (2006). Handbook of Standards and Guidelines in Ergonomics and Human Factors, Lawrence Erlbaum Associates

Linckels, S.; Repp, S.; Karam, N. & Meinel, C.: The Virtual Tele-TASK Professor---Semantic Search in Recorded Lectures, in Proc. of ACM SIGCSE'07, Covington, Kentucky, USA, pp. 50 - 54, 2007.

Linckels, S.; Dording, C.; Meinel, C.: Better Results in Mathematics Lessons with a Virtual Personal Teacher, in Proc. of ACM SIGUCCS'06 Fall Conference, Edmonton, Alberta, Canada, pp. 201 - 209, 2006.

Luo, H., Fan, J., Yang, J., Ribarsky, W., Satoh, S. (2006). Exploring large-scale video news via interactive visualisation, VAST 2006, Baltimore, MD, Oct. 31 - Nov. 2, pp 75–82.

Mertens, R.; Rolf, R.: Automation Techniques for Broadcasting and Recording Lectures and Seminars, in eProceedings of SINN03, Third International Technical Workshop and Conference, 17.-19.09.2003. Oldenburg: Universität, Institute for Science Networking Oldenburg.

Microsoft, Microsoft Developer Network, link visited 28.03.2008, http://msdn2.microsoft.com/en-us/library/aa286531.aspx

Nichols, J., Myers, Brad A., (2003). Automatically Generating Interfaces for Multi-Device Environments, Ubicomp 2003 Workshop on Multi-Device Interfaces for UbiquitousPeripheral Interaction, Seattle, 12. October 2003.

Noll, M., Meinel, C. (2006) Design and Anatomy of a Social Web Filtering Service. Proceedings of 4th International Conference on Cooperative Internet Computing (CIC), Hong Kong, October 2006, pp. 35-44, ISBN 962-367-541-0

Noll, M., Meinel, C. (2007a). Authors vs. Readers: A Comparative Study of Document Metadata and Content in the WWW. Proceedings of 7th International ACM Symposium on Document Engineering (ACM DocEng), Winnipeg, Canada, August 2007, pp. 177-186, ISBN 978-1-59593-776-6

Noll, M., Meinel, C. (2007b). Web Search Personalisation via Social Bookmarking and Tagging. Proceedings of 6th International Semantic Web Conference (ISWC) & 2nd Asian Semantic Web Conference (ASWC), Springer LNCS 4825, Busan, South Korea, November 2007, pp. 367-380, ISBN 978-3-540-76297-3

OLIVEIRA, R.; ROCHA, H. (2006). Mobile Access to Web Systems Using a Multi-Device Interface Design Approach. In Proceedings of the 2006 International Conference on Pervasive Systems and Computing (PSC'06). Las Vegas, USA

Projekt der Siftung EVZ mit dem Bundesarchiv http://www.bundesarchiv.de/zwangsarbeit/projekt/index.htmlRepp, S.; Meinel, C.: Segmenting of Recorded Lecture Videos - The Algorithm VoiceSeg, in Proc. of Signal Processing and Multimedia Applications (SIGMAP 2006), Setubal, Portugal, pp. 317 – 322, 2006.

Sack, H.: NPBibSearch: An Ontology Augmented Bibliographic Search in Proceedings of SWAP 2005, the 2nd Italian Semantic Web Workshop, Trento, Italy, December 14-16, 2005.

Sack, H.; Krüger, U. & Dom, M.:A Knowledge Base on NP-complete Decision Problems and its Application in Bibliographic Search, XML-Tage 2006, Berlin, September 2006.

Sack, H.; Waitelonis, J.: Automated Annotations of Synchronized Multimedia Presentations, in Proceedings of Mastering the Gap: From Information Extraction to Semantic Representation (MTG06 / ESWC2006), Budva, Montenegro, June 12, 2006.

Sack, H.; Waitelonis, J.: Integrating Social Tagging and Document Annotation for Content-Based Search in Multimedia Data, in Proc. of the 1st Semantic Authoring and Annotation Workshop (SAAW2006), Athens (GA), USA, 2006.

Schneiderman, B., (1996). The eyes have it: A task by data type taxonomy for information visualisations, Proc. 1996 IEEE, Visual Languages, Boulder, CO, Sept.3-6,1996, pp. 336-343

Soldati, M., Doulis, M., Csillaghy, A. (2007) SphereViz - Data Exploration in a Virtual Reality Environment, IV'07, Zürich, CH, July 4–6 2007, pp. 680-683

Spoerer, M.(2001): Zwangsarbeit unter dem Hakenkreuz Ausländische Zivilarbeiter, Kriegs-gefangene und Häftlinge im Dritten Reich und im besetzten Europa. Deutsche Verlags-Anstalt, Stuttgart – München.

Stiftung Mahnmal für die ermordeten Juden: Aufbereitung und Bereitstellung von 1,000 Video-Interviews des Fortunoff Archivs durch die Stiftung Denkmal für die ermordeten Juden Europas, http://www.stiftung-denkmal.de/projekte/interviews/Petridis, K.; Anastasopoulos, D.; Saathoff, C.; Timmermann, N.; Kompatsiaris, Y & Staab, S.: M-OntoMat-Annotizer: Image Annotation Linking Ontologies and Multimedia Low-Level Features, in Proc. of Knowledge-Based Intelligent Information and Engineering Systems, 10th International Conference (KES 2006), Bournemouth, UK, LNCS 4253, pp. 633-640, 2006.

Spence, R. (2006). Information Visualisation - Design for Interaction (2nd Edition), Pearson Education

Sprung, G.; Galler, R.: Annotated Lecture-on-Demand: Instant Production of Multimedia-Based Learning Applications, in Proceedings of MApEC 2006, http://www.mapec.at/docs/MApEC2006_Proceedings.pdf, pp. 56-61, 2006.

Visual History Archive (USC): http://college.usc.edu/vhi/pr/DukeNCSI2_June2007.php

Interaction Design

D.A. Norman (1988) The psychology of everyday things. Basic Books, Inc., New York

D.A. Norman (1994) Things that make us smart: Defending human attributes in the age of the machine. Addison Wesley, Reading, MA (ISBN 0-201-58129-9)

D.A. Norman (1998) The design of everyday things. Basic Books, Inc., New York (ISBN-978-0-262-64037-4)

D.A. Norman (2007) The design of future things. Basic Books, Inc., New York

Bill Moggridge, Designing Interactions, MIT Press, 2007, ISBN 0-262-13474-8

Jakob Nielsen: Usability Engineering. Academic Press, Boston 1993 ISBN 0-12-518405-0

Ben Shneiderman and Catherine Plaisant: Designing the User Interface: Strategies for Effective Human–Computer Interaction. 4th ed. Addison Wesley, 2004 ISBN 0-321-19786-0

Jef Raskin: The humane interface. New directions for designing interactive systems. Addison-Wesley, Boston 2000 ISBN 0-201-37937-6

Long-Term Preservation of Digital Archives

D. Bearman (1999) Reality and chimeras in the preservation of electronic records. D-Lib Magazine 5(4) (see http://www.dlib.org/dlib/april99/bearman/bearman-notes.html)

D. Bearman, K. Sochats (1996) Metadata requirements for evidence. University of Pittsburgh, PA see (http://web.archive.org/web/20000819132426/www.sis.pitt.edu/~nhprc/BACartic.html)

Consultative Committee for Space Data Systems (2001) Reference model for an open archival information system (OAIS). CCSDS, Reston, VA (see http://public.ccsds.org/publications/archive/650x0b1.pdf or http://public.ccsds.org/publications/RefModel.aspx)

L. Duranti, K. Eastwood (2002) The preservation of the integrity of electronic records. Kluwer, Dordrecht (see http://www.interpares.org/UBCProject/index.htm)

EC (2002) DigiCULT Report: Technological landscapes for tomorrow's cultural economy: Unlocking the value of cultural heritage. Office for Official Publications of the European Communities, Luxemboug, ISBN 92-828-6265-8 (see http://www.salzburgresearch.at/fbi/digicult)

Ernst & Young (1996) Keeping electronic records forever: Records management; Vision development. Public Record Office Victoria, North Melbourne (see http://www.prov.vic.gov.au/vers/pdf/kerf.pdf)

Ernst & Young/CSIRO (1998) Victorian electronic record strategy (final report). Public Record Office Victoria, North Melbourne, ISBN 0-7311-5520-3 (see http://www.prov.vic.gov.au/vers/pdf/final.pdf)

Ernst & Young/CSIRO/Public Record Office Victoria (2007) Management of electronic records, Public Record Office Standard (PROS) 99/007. Public Record Office Victoria, North Melbourne (see http://www.prov.vic.gov.au/vers/standard/)

Functional requirements for evidence in recordkeeping. School of Information Sciences, University of Pittsburgh, PA (see http://www.archimuse.com/papers/nhprc/

S. Granger (2000) Emulation as a digital preservation strategy. D-Lib Magazine, October 2000 (see http://www.dlib.org/dlib/october00/granger/10granger.html)

M. Guercio (2004) La conservazione a lungo termine dei documenti elettronici: normativa italiana e progetti internazionali. In: Proc. 3 Conf. Organizz. Arch. Univ. Italiane, Padova, Italy, 5–6 April 2001 (see http://www.unipd.it/archivio/conferenze/3conferenza/3%20Conf%20-%20Mariella%20Guercio.pdf)

M. Hedstrom (1997) Research Issues in Migration and Long-Term Preservation, Archives and Museum Informatics, 1042-1467 (Print) 1573-7500 (Online) Volume 11, Numbers 3-4 / September, 1997 Springer available on line http://www.springerlink.com/content/w4624u883j075261/

A.R. Heminger, S.B. Robertson (2000) The digital Rosetta Stone: a model for maintaining long-term access to static digital documents. Commun. Assoc. Inform. Syst. 3:2

B. Lavoie (2000) Meeting the challenges of digital preservation: The OAIS reference model. OCLC Newsletter, January/February 2000:26–30

D. Levy (1998) Heroic measures: Reflections on the possibility and purpose of digital preservation. In: Proc. 3rd ACM Conf. on Digital Libraries, Pittsburgh, PA, 23–26 June 1998, pp 152–161

R.A. Lorie (2001) Long term preservation of digital information. In: Proc. 1st ACM/IEEE-CS Joint Conf. on Digital Libraries, Roanoke, VA, January 2001, pp 346–352

C. Lynch (1999) Canonicalisation: A fundamental tool to facilitate preservation and management of digital information. D-Lib Magazine, September 1999 (see http://www.dlib.org/dlib/september99/09lynch.html)

National Archives of Australia and Office for Government Online (1999) The Australian Government Locator Service (AGLS) Manual for Users, Version 1.1. National Archives of Australia and Office for Government Online, Canberra (see http://www.naa.gov.au/records-management/create-capture-describe/describe/AGLS/index.aspx or http://www.naa.gov.au/records-management/publications/AGLS-Element.aspx)

National Archives of Australia (1995) Keeping electronic records (policy for electronic recordkeeping in the Commonwealth Government). National Archives of Australia, Canberra (see http://www.naa.gov.au/images/digital-recordkeeping-guidelines_tcm2-920.pdf)

National Archives of Australia (1999) Recordkeeping Metadata Standard for Commonwealth Agencies, version 1.0. National Archives of Australia, Canberra (see http://www.naa.gov.au/images/rkms_pt1_2_tcm2-1036.pdf)

National Library of Australia (1999b) Preservation metadata for digital collections. National Library of Australia, Canberra (see http://www.nla.gov.au/preserve/pmeta.html)

National Research Council (1995) Study on the long-term retention of selected scientific and technical records of the Federal Government Working Papers. National Academy Press, Washington, DC

Networked European Deposit Library (2000) Metadata for long term preservation. NEDLIB, The Hague, The Netherlands (see http://nedlib.kb.nl/results/NEDLIBmetadata.pdf)

OCLC/RLG Working Group on Preservation Metadata (2001) A recommendation for content information. OCLC, Dublin, OH (see www.oclc.org/research/projects/pmwg/pm_framework.pdf)

V. Reich, D.S.H. Rosenthal (2001) LOCKSS: A permanent web publishing and access system. D-Lib Magazine, June 2001 (see http://www.dlib.org/dlib/june01/reich/06reich.html)

Research Library Group (1998) RLG REACH element set for shared description of museum objects. RLG/OCLC, Dublin, OH (see http://www.oclc.org/programs/ourwork/past/museumresources/reach.htm)

RLG-OCLC Working Group (2001) Attributes of a trusted digital repository: Meeting the needs of research resources (report; draft for public comment). OCLC, Dublin, OH (see http://www.oclc.org/programs/ourwork/past/trustedrep/attributes01.pdf)

A.M. Ronchi, From Hammurabi Codex to Rosetta Stone Long term preservation of digital archives, proceedings CIDOC 2004 St.Petersburg available on line at http://confifap.cpic.ru/upload/spb2004/reports/dokladEn_172.doc

A.M. Ronchi, Long term preservation of digital content, proceedings Asolo Symposium 2006, Asolo Italy

J. Rothenberg (1995) Ensuring the longevity of digital documents. Sci. Am. 272(1):24–29

J. Rothenberg (1999) Avoiding technological quicksand: Finding a viable technical foundation for digital preservation. Council on Library and Information Resources, Washington, DC, ISBN 1-887334-63-7 (see http://www.clir.org/pubs/reports)

T. Shepard, D. MacCarn (1998) The Universal Preservation Format: Background and fundamentals. In: Sixth DELOS Workshop: Preservation of Digital Information, Tomar, Portugal, 17–19 June 1998 (see http:/www.ercim.org/publication/ws-proceedings/DELOS6/upf.pdf)

Standards Australia (1996) Australian standard on records management, AS4390-1996. Standards Australia, Homebush, NSW, ISBN 0-7337-0306-2

State Records NSW (1995) Documenting the future (policy and strategies for electronic recordkeeping in the New South Wales public sector). State Records NSW, Kingswood, ISBN 07310-5038-X (see http://www.records.nsw.gov.au/recordkeeping/policy_on_electronic_recordkeeping_6879.asp or http://www.records.nsw.gov.au/recordkeeping/docs%5CPolicy%20on%20Electronic%20Recordkeeping.pdf)

Task Force on Archiving of Digital Information (1996) Preserving digital information (report). Commission on Preservation and Access and The Research Libraries Group, Inc., Washington, DC (see http://www.oclc.org/programs/ourwork/past/digpresstudy/final-report.pdf)

A. Waugh, R. Wilkinson, B. Hills, J. Dell'oro (2000) Preserving digital information forever. CSIRO CMIS Tech. Rep. (forthcoming).

S. Weibel, J. Kunze, C. Lagoze, M. Wolfe (1998) Dublin Core metadata for resource discovery. RFC 2413 (see ftp://ftp.isi.edu/in-notes/rfc2413.txt)

P. Wheatley (2001) Migration: a CAMiLEON discussion paper. Ariadne 29 (see http://www.ariadne.ac.uk/issue29/camileon/)

F. Yergeau (1998) UTF-8, a transformation format of ISO 10646. RFC 2279 (see http://www.ietf.org/rfc/rfc2279.txt)

National Archives Washington and San Diego Supercomputer Center: http://www.npaci.edu/

OAIS standard: http://public.ccsds.org/publications/archive/650x0b1.pdf

Resource Description Framework (RDF) model and syntax specification: http://www.w3.org/RDF/

US Department of Defense Standard 5015.2 (Design Criteria Standard For Electronic Records Management Software Applications): shttp://jitc.fhu.disa.mil/recmgt/

Future Trends

AGCOM: "Il sistema delle comunicazioni - Relazione annuale", 2007

Europe and the global information society Recommendations to the European Council (Bangeman Report, Dec 2003): http://ec.europa.eu/archives/ISPO/infosoc/backg/bangeman.html and or http://www.medicif.org/Dig_library/ECdocs/reports/Bangemann.htm.

Gilles Bertrand (Coord.), Anna Michalski, Lucio R. Pench, Scenarios Europe 2010 Five Possible Futures For Europe, European Commission working paper, July 1999. Available on line at http://ec.europa.eu/comm/cdp/scenario/scenarios_en.pdf

"eEurope – An Information Society for all' was launched by the European Commission on 8 December 1999. Available on line at http://portal.etsi.org/eEurope/

e-Europe 2005 available on line at http://ec.europa.eu/information_society/eeurope/2005/index_en.htm

European Commission,: "i2010 Annual Reports", available on line at http://ec.europa.eu/information_society/eeurope/i2010/key_documents/index_en.htm

EITO: "European Information Technology Observatory - Annual Report", 2004,5,6,7 available on line at http://www.eito.com/start.html

Jeffrey Liss (ed), Vital Links for a Knowledge Culture: Public Access to New Information and Communication Technologies, Council of Europe Publishing 2001. Available on line at http://book.coe.int/EN/ficheouvrage.php?PAGEID=36&lang=EN&produit_aliasid=518

FEDERCOMIN: "Evoluzione dell'innovazione in Italia secondo i parametri eEurope 2005 - Internet. accesso e utilizzo", 2005 Available on line at http://www.federcomin.it/sviluppo/Produzio.nsf/7c1dcc3598966887c125696e0034e51e/3855b3f24ca63d85c12570c100456fcb/$FILE/oss3_cap01_intro.pdf

FEDERCOMIN: "e-Content 2006 - 2° Rapporto sul Mercato dei Contenuti Digitali in Italia", 2006 available on line at http://www.federcomin.it/home.html or http://www.federcomin.it/sviluppo/Produzio.nsf/all/0D42A9738F91C1F4C12571A800634C0E/$file/Capitani+eContent_roma+27+giugno.pdf

ISTAG: "Scenarios for Ambient Intelligence in 2010 - Final Report", IPTS, Seville, 2001 availlable on line at http://cordis.europa.eu/search/index.cfm?fuseaction=lib.resultList&page=1&perPage=10&q=C12F01682C37800F78C050E35EF3E0D0&type=sim

ITU: "Digital.life - Internet Report", Geneva Net Dialogue, 2006 avaialble on line http://www.itu.int/dms_pub/itu-s/opb/pol/S-POL-IR.DL-2-2006-R1-SUM-PDF-E.pdf

OECD: "Information and Communications Technologies - OECD Key ICT Indicators ", available on line at http://www.oecd.org/document/23/0,3343,en_2649_34223_33987543_1_1_1_1,00.html

UNESCO: "Ethical Implications of Emerging Technologies: A Survey", Geneva Net Dialogue, Paris, 2007 available on line at http://unesdoc.unesco.org/images/0014/001499/149992E.pdf

Hamlet on the Holodeck: The future of narrative in cyberspace. Free Press, New York

D. Deutsch (1997) The Fabric of Reality: The Science of Parallel Universes and Its Implications — La trama della realtà. Einaudi, Torino

Appendix 1: The BELIEF-II Digital Library

The BELIEF-II multimedia Digital Library collects material from the following FP6 and FP7 projects, Networks of excellence and National Research and Education Networks

FP7 Projects

1. BSI (Black Sea Interconnection)
   http://www.blacksea-net.org/

1. D4Science Project (DIgital Library Infrastructure on Grid ENabled Technology for Science)
   http://www.d4science.eu

2. DRIVER-II Project (Digital Repository Infrastructure Vision for European Research – Phase II)
   http://www.driver-repository.eu/

3. GLOBAL (Global Linkage Over BroadbAnd Links)
   http://www.global-project.eu/

4. GridTalk Project
   http://www.gridtalk.org/

5. SEE-GRID-SCI (SEE-GRID eInfrastructure for regional eScience)
   http://www.see-grid-sci.eu/

6. ACTIVE Integrated Project (Knowledge powered Enterprise)
   http://www.active-project.eu

7. COIN Integrated Project (Collaboration and Interoperability)
   http://www.coin-ip.eu/

8. PASCALII Network of Excellence (Pattern Analysis, Statistical Modelling and Computational Learning)
   (http://www.pascal-network.org)

Initiatives and Organisations

1. OASIS Organisation (Organisation for the Advancement of Structured Information Standards)
   http://www.oasis-open.org

2. OGF Organisation (Open Grid Forum)
   http://www.ogf.org

3. W3C Organisation (World Wide Web Consortium)
   http://www.w3.org

Information Sources integrated by BELIEF-I

The following Information Sources were included in the BELIEF DL during the first project's lifespan (2005-2007):

FP6 Projects

1. 6DISS Project (IPv6DISSemination and Exploitation)
   http://www.6diss.org/

2. BIOINFOGRID Project (Bioinformatics Grid Application for life science)
   http://www.bioinfogrid.eu/

3. CONDOR Project
   http://www.cs.wisc.edu/condor

4. DANTE Organisation (Delivery of Advanced Network Technology to Europe)
   http://www.dante.net which includes:
   a. ALICE Project (America Latina Interconectada Con Europa)
      http://alice.dante.net
   b. EUMEDCONNECT Project (EUro-MEDiterranean CONNECTion)
      http://www.eumedconnect.net
   c. GEANT Project
      http://www.geant.net/
   d. GEANT2 Project
      http://www.geant2.net
   e. TEIN2 Project (Trans-Eurasia Information Network)
      http://www.tein2.net

5. DILIGENT Project (DIgital Library Infrastructure on Grid ENabled Technology)
   http://www.diligentproject.org

6. DRIVER Project (Digital Repository Infrastructure Vision for European Research)
   http://www.driver-repository.eu/

7. e-IRG Organisation and e-IRGSP Project (e-Infrastructure Reflection Group)
   http://www.e-irg.org/

8. EGEE Project (Enabling Grids for E-sciencE)
   http://www.eu-egee.org/

9. EGEE Library (New Training Repository)
   http://egee.lib.ed.ac.uk/

10. EELA Project (E-Infrastructure shared between Europe and Latin America)
    http://www.eu-eela.org/

11. ETICS Project (eInfrastructure for Testing, Integration and Configuration of Software)
    http://etics.web.cern.ch/etics/

12. EUChinaGRID Project

http://www.euchinagrid.org/

13. EUIndiaGRID Project
http://www.euindiagrid.eu/

14. EUMEDGRID Project
http://www.eumedgrid.org/

15. EuQoS Project (End-to-end Quality of Service support over heterogeneous networks)
http://www.euqos.org/

16. Grid@Asia Project (Advanced Grid Research Workshops through European and Asian Co-operation)
http://www.gridatasia.net/

17. GRIDCC Project (Grid Enabled Remote Instrumentation with Distributed Control and Computation)
http://www.gridcc.org/

18. ICEAGE Project (The International Collaboration to Extend and Advance Grid Education)
http://www.iceage-eu.org/ and http://baillie.lib.ed.ac.uk/ (the training library)

19. int.eu.grid Project (Multi Partner European Testbeds for Research Networking)
http://www.interactive-grid.eu/

20. ISSeG Project (Integrated Site Security for Grids)
http://isseg.web.cern.ch/ISSeG/

21. LOBSTER Project (Large-scale Monitoring of Broadband Internet Infrastructures)
http://www.ist-lobster.org/

22. MUPBED Project (Multi Partner European Testbeds for Research Networking)
http://www.ist-mupbed.org/

23. SEE-GRID Project and SEE-GRID-2 Project (South Eastern European GRid-enabled eInfrastructure Development)
http://www.see-grid.eu/

24. SEEREN2 Project (South Eastern European Research & Education Network)
http://www.seeren.org/

25. SEKT Integrated project (Semantically enhanced knowledge technologies)
(http://www.sekt-project.org)

Initiatives and Organisations

1. eConcertation Initiative
http://www.geant2.net (as far as the 2nd eConcertation Workshop is concerned)

2. iSGTW Organisation weekly e-newsletter (International Science Grid This Week)
http://www.isgtw.org/

3. Research Infrastructure Unit Initiative
   http://cordis.europa.eu/infrastructures/home.html

NoEs - Networks of Excellence

1. AIM@SHAPE (Advanced and Innovative Models And Tools for the development of Semantic-based systems for Handling, Acquiring, and Processing knowledge Embedded in multidimensional digital objects)
   http://www.aimatshape.net/
2. DELOS (Network of Excellence on Digital Libraries)
   http://www.delos.info/

Appendix 2: Letters of Endorsement

One Laptop per Child

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
Adresse postale L-2850 Luxembourg Téléphone: (352) 2480-7004 Téléfax: (352) 2480-7009 www.bce.lu
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 ULSS. n. 8 - via Forcellazze, 41 - 31011 Asolo (TV) - tel. 0423/5241 - fax 0423/526308 - c.f. e p. i.v.a. 00488818261 - www.ulssasolo.ven.it
direzione amministrativa - via Forcellazze, 41 - 31011 Asolo (TV) - tel. 0423/526303 - fax 0423/526308 - 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.ISSMI 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