Realising an Applied Gaming Eco-system

Research and Innovation Action

Grant agreement no.: 644187

D6.6 – Summary, Analysis, Road-mapping and Production of Training materials (intermediate version of D6.2, which is due M48)

RAGE – WP6 – D6.6

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EXECUTIVE SUMMARY

The objectives of D6.2 are the Summary, Analysis, Roadmapping and Production of Training materials. It will focus on the information and knowledge sharing elements of the RAGE Ecosystem portal. This deliverable D6.6 is an intermediate version of D6.2 in month 17 of the RAGE project, giving an overview of the remaining work in Task 6.2 to come and the current status, preceding the final version in month 48. It will summarize, validate and explain the purpose and concept behind the knowledge and innovation management platform as a self-sustainable Ecosystem, supporting innovation processes in the Applied Gaming (AG) industry.

The Ecosystem portal will be developed with particular consideration of the demand and requirements of small and medium sized game developing companies, education providers and related stakeholders like AG researchers and AG end-users. The AG industry should thereby get the best support to connect, communicate and create new effective technology based assets in order to build new exceptional learning games. Thus, the environment will help to encounter defragmentation of resources, promote knowledge exchange and merge heterogeneous communities with different interests and capabilities. The overall goal is to create an added value for the entire AG sector and to increase the potentials of sales and revenue.

The Ecosystem portal will serve as an interactive information, knowledge, content and community management platform and provide a diverse set of services across the knowledge value chain. The platform is extensively dealing with incoming needs and demand, information and knowledge processes. The relevant stakeholder and user communities, like researchers, developers, gaming companies but also education and training providers and end-users, will be involved in the construction process and furthermore in the process of collecting content respectively technology and media resources of various types to build up a user-centered and demand-driven knowledge portal.

The deliverable will outline the concepts, methodology and planning of the knowledge and training activities, the content submission and standard collection procedures, the requirements for different content types and the material submission metadata. The management of content and in particular knowledge resources will lead to the RAGE Taxonomy establishment, a first validation and alignment with existing taxonomies, especially the interaction between the ACM (Association for Computing Machinery) and the RAGE Taxonomy. Furthermore, we have added the results of the initial evaluation of the Ecosystem portal and the implications on the further development. In addition the deliverable will explain the approach of analysis and survey of documentation and training material, to provide an outlook on provision of specific courses, training curriculum and an approach used for continuing professional development in the communities addressed by the project.

The innovation potential of the new platform underlies the following factors: a huge, mostly entire collection of community specific knowledge (e.g., content like media objects, software components and best practices), a structured approach of knowledge access, search and browse, collaboration tools as well as social network analysis tools to foster efficient knowledge creation and transformation processes into marketable technology assets.
1 INTRODUCTION

The Applied Gaming (AG) sector as an upcoming business market is at present characterized by weak interconnectedness, limited knowledge exchange, absence of harmonising standards, limited specialisations, limited division of labour, and insufficient evidence of the products’ efficacies. The industry is scattered over a large number of small, diverse, independent players, niche products and of course specialists. Because of limited collaborations of industries and limited interconnections between industry and research, AG companies display insufficient innovation power and size to open up new markets (e.g. schools, business, governments) (Stewart et al., 2013; “RAGE Description of Action,” 2015). To support the development and growth of this branch the RAGE project is focusing on the amplification of collaborative innovation processes across the value chain.

Other initiatives have already started the defragmentation of the AG landscape and have pioneered the creation of a unique gateway for optimizing the access and reusability of structured AG resources, like the GALA Serious Games Reusability Reference Point (SGREF) and the Serious Game Web services catalogue. The RAGE Ecosystem portal will go beyond the existing initiatives fostering the merging of the heterogeneous AG communities by providing an effective knowledge and innovation management service tool. The Ecosystem portal will serve as an interactive information, knowledge and content management platform and provide a diverse set of services across the knowledge value chain (Salman et al., 2015). Therefore it will bring the defragmentation process one step further by providing innovation elements especially focusing on the training offer including courses, training materials and multimedia resources, besides assets. For example the development of sharable education resources and technologies provides a valuable context for collaborative education in a field characterized by rapid technological developments and changes.

Looking at AG the industry constitutes an enormous challenge. They need strategies to have the first reliable outcomes of the current document is an early version in month 17 of the RAGE project to address the main topics of the deliverable, set the concepts, instruments, methodology and planning of the activities. It will summarize and explain the purpose and concept behind the knowledge and innovation management platform and the process of collecting content respectively technology and media resources of various types. It will outline the requirements for different content types and the management of content and knowledge resources. The management of content and in particular knowledge resources will lead to the RAGE Taxonomy establishment, a first validation and alignment with existing taxonomies. Furthermore we have added the results of the initial evaluation of the Ecosystem portal and the implications on the further development. In addition it will explain the approach of analysis and survey of documentation and training material, to provide an outlook on provision of specific courses, training curriculum and an approach used for continuing professional development in the communities addressed by the project. The Roadmapping of the AG branch including the considerations of the GALA Roadmap and the achievements of the RAGE project can just take place after the first reliable outcomes of the asset -, pilot - and training material production.

2 INFORMATION AND KNOWLEDGE SHARING SYSTEM

2.1 Purpose of the system

The increase of global competition combined with limited budgets affects the frequency and quality of realizing innovations today. Under these conditions the launch of innovative products for SMEs of the AG industry constitutes an enormous challenge. They need strategies to have the crucial competitive advantage of being faster than others. Accelerating the discovery of new (scientific) findings, the technical realization and the market launch (Grupp, 1997; Haß, 1983) is
increasingly dependent on the use of advanced information and knowledge technology for building environments that support the innovation process systematically and efficiently (Specht et al., 2002). Such environments depend on a number of advanced Knowledge Management technologies and processes and have to adapt to a wide variety of innovative practices, cultures, organizational context and application areas, where innovation takes place. Independent of the domain, innovation is a knowledge-intensive process. (Paukert et al., 2011) To support innovation RAGE will make software assets for development of applied games and additionally a large volume of high-quality knowledge resources available through a self-sustainable Ecosystem portal, serving as a single entry point and social space for the AG communities connecting research, gaming industries, intermediaries, education providers, policy makers and end-users. The RAGE Ecosystem portal will act as a Virtual Centre of Excellence in the AG domain. Fueled by the “good stuff” and the “good expertise” that will be made available the RAGE Ecosystem portal will become the major European hotspot for applied game development. The RAGE Ecosystem portal reflects the genesis of an open, flexible and dynamic hub in which innovators are inspired and stimulated. (Hollins et al., 2015) provide a more in depth analysis of the approach.

RAGE will arrange a well-managed and structured asset respectively software repository, digital library, and media archive system (cf. D6.1, available in month 12 and D6.4, available in month 36). The resulting material, particularly the textual resources, will be semantically annotated to support searching and access (cf. D6.3, available in month 20). Besides this, the Ecosystem portal will provide opportunities to arrange workshops and offer training courses on an online training portal, covering training for developers and educators in order to amplify AG uptake (cf. D6.4, available in month 36). The aim will be to support the self-sustainable production of assets and documentation, training material, workshops and collaboration activities. The social dimension of the RAGE Ecosystem portal is and will be supported by community tools for collaboration, annotation, creativity, profiling, knowledge dating, recommender services, user-posted products and assets, the formation of alliances and matching the users’ supplies and demands, if not trade. The Ecosystem portal will also make available a set of asset creation aids that allow its visitors (viz. technology providers, game developers, game industries, researchers) to create their own assets, documentation, training material, workshops and collaboration activities and post them to the Ecosystem’s repository (cf. D6.5, available in month 40).

### 2.2 Concept

The concept of the Ecosystem portal is an extension of a supporting tool for innovation processes. The environment is located in the domain of AG and the corresponding communities. Each community or domain is assumed to have its own shared context. Even in the field of AG the different perspectives or “languages” across communities have an impact on the performance of the Ecosystem requirements and processes (cf. Paukert et al., 2003).

In order to find empirical support for success chances of the RAGE project as an AG Ecosystem comparable Ecosystems and theirs platforms can be inspected that are not specifically focused on the domain of AG. An example of such an Ecosystem is GitHub\(^1\). GitHub is a software development Ecosystem which currently has over 10 million users. Users can upload or start a software project on GitHub and collaborate on its development with other users in the community (Dabbish et al., 2012). Currently active and past projects are retained and can be used as examples and sources of knowledge. GitHub demonstrates that an Ecosystem with a partial overlap of features to the RAGE Ecosystem portal but with a different domain can be successfully adopted as collaboration environments.

Another example for empirically supporting the potential of the RAGE Ecosystem is the GALA project. The GALA project involves 31 European institutions and facilitates the cultivation and dissemination of academic applied games knowledge (de Gloria and Roceanu, 2010). The GALA project resulted in a successful conference; a scholar.google search reveals 37 publications for 2014 as well as a host of GALA related research. One of the relevant differences between RAGE and GALA is that RAGE aims to facilitate the business market rather than the academic community. However, both RAGE and GALA have overlap in residing in the domain of AG.

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\(^1\) [https://github.com/](https://github.com/)
Mapping the ideas of the SECI (cf. Nonaka and Takeuchi, 1995) and IKLC (cf. Paukert et al., 2003) models onto knowledge management within the RAGE Ecosystem reveals the following.

Driven by the need for competitive products and services, responsive to the customers fast changing requirements the AG industry indicates a high demand of innovation. To establish an appropriate environment and kind of a knowledge baseline the Ecosystem portal will collect and systematize software and media resources as well as documentation, training material, and best practices from the heterogeneous and dispersed AG landscape to provide relevant communities the opportunity to participate, to share, and to benefit from these resources and to create new outcomes.

To deal with resources of explicit knowledge and tacit knowledge in a technology-based infrastructure, they must be made available in machine-readable shape. AG users or user groups from a corresponding Serious Gaming or Game-based Learning community have to externalize their tacit needs, requirements, information, and experiences into explicit digital content and knowledge objects (text, image, video, recorded speech, …) and provide them to the related AG communities (compare Figure 1). The RAGE Ecosystem environment will serve as a platform for this kind of externalization and social sharing. In the next step a combination process of merging existing, explicit knowledge from different domains (e.g., Research, Development, Education) generates new information in the context of AG. Thus, knowledge will continuously be converted and created, a flow will be generated assisting the RAGE innovation process.

As one of the features of this system, the digital content objects will be annotated with semantic representations of knowledge objects, as e.g., taxonomies. This means an enrichment of objects with a common framework of understanding of externalized knowledge either implicitly or explicitly contained in digital content, to solve problems of different perspectives or understanding.

As a result a systematic search and analysis of content objects and knowledge resources will be possible. Thus, the Ecosystem portal supports its users to find content arose from tacit and explicit knowledge with explicitly annotated semantic representations and to adapt, extend and link it to internalize this knowledge. This step is called cognitive value creation or the generation of knowledge (Vogel, 2012).

Connecting to this process the attached Online Training Portal offers internalization resp. knowledge transfer in the sense of a learning management process. The Online Training Portal serves as a huge knowledge library or database. The learning objectives of users’ could be annotated, based on their profile, so that this annotations will be available as knowledge in the system additionally. Furthermore a test or exam could then decide what content needs to be learned in order to achieve the learning objectives and which competences already exist and may be assigned to the users’ profile. By working on the solutions experiences will be influencing the results and will appear as results out of the process. This kind of knowledge will complete the working knowledge and the knowledge cycle in accordance to IKLC.
The further work in this area will address various questions within the constraints of the efforts of the project, e.g. about scale, who will be creating the tests, how to validate these, formal certification.

2.3 Stakeholder and user communities

The stakeholders of the Ecosystem portal are different user groups and communities who will be affected by and will be using the services and possibilities of the system developed and provided during the project. The main Ecosystem related target groups are given by:

- researcher (groups) and experts,
- asset developers,
- gaming companies and developers,
- training providers (educational providers, intermediary organizations), and
- end users (learners) in application scenarios (industrial and institutional sectors)

coming from within or (mainly) from outside the project consortium. While researchers and experts can provide the first important input on AG content and knowledge to be imported into the Ecosystem portal, game and asset developers represent the game development and industrial perspective on Applied Games and provide information and software assets with related material; training providers and learners together embody the educational and learning perspective on Applied Games and will probably not be the main users of the Ecosystem.

2.4 Information and content collection process

Inspired by the development process of the Ecosystem portal as described in D6.1, the information and content collection process is following an agile phase-oriented user-centred methodology.

In each phase RAGE increases the user groups to be addressed which contribute new content and requirements to the process and system. Each phase has the goal to progressively enrich the Digital Library, Media Archive and the Software Repository and particularly improve the underlying taxonomy and usability.

**Phase 1:** In the first step the academic researchers and experts out of the RAGE consortium will be requested to test the import of asset and knowledge resources via stable non-experimental user-interfaces. The content will build the baseline of the corpus of material (e.g. document corpus) to be available within the Ecosystem repository. Textual documents and slides respectively their references will be complemented by software assets generated by the project (WP2 and WP3) together with accompanying documents, such as documentation, tutorials, presentations and publications.

**Phase 2:** The game development companies of the consortium will be involved. Out of their work on applied game design, development and support for the application scenario pilots they will be asked to add exemplary integration and exploitation supporting documents and reports to assist other game developers and a variety of non-leisure domain. Along the needs of the industrial partners, based on their feedback, the further work will be steered.

**Phase 3:** The application partners will be involved to improve the system. As RAGE is having 6 different application scenarios with different end-users and intermediary organizations and several contexts, the related consortium partners could contribute by complementing documents, publications, presentations and reports on detailed requirements on design and development of the games and the user best practice perspective to support future Ecosystem portal users.

Using these different so called user stereotypes with different interests, experiences and skills, the Ecosystem portal will be populated with community specific content and will be evaluated during the development process in cooperation with WP8 (cf. chapter 5).

Subsequently there will be further phases for harvesting external resources beyond the end of the project.
3 CONTENT MANAGEMENT

The Digital Library (DL) and Media Archive (MA) as well as the Software Repository (SR) are the sub-systems of the Ecosystem portal realizing the management of content. Textual documents, slides and software assets together with accompanying documents, such as documentation, tutorials, presentations and publications, are foreseen or partly realized at present. On request of the AG experts of the RAGE consortium, the following tools are currently ready to use. The Mendeley ingest tool is providing the import of a large volume of publications and their metadata from the social research and library management platform Mendeley. The Slideshare ingest provides to import a large volume of presentations and their metadata from the Slideshare collections. In order to ensure smooth and efficient content collection, the procedures reflect a standard workflow. (Heutelbeck et al., 2016)

D6.1 outlines the actual implementation of these processes as different scenarios and describes the integration regarding the securing of interoperability between the management content sub-systems and the software repository. In this context it needs to be considered how persistent identifiers could be used in the Ecosystem portal after the end of the project, e.g. universally unique identifier (UUID), which is standard used in software construction.

The evaluation process (WP8) will validate the functionalities during the project runtime and will contribute, in parallel to the iterative development process, to improve the Ecosystem portal and its functionalities. The initial evaluation focused the import functionalities as described in chapter 5 and ANNEX II.

3.1 Definitions

- A Content Object is a distinct element of Digital Content, uniquely distinguishable within the application. Examples for Content Objects are presentations, conference abstracts, or software assets. Content Objects can be atomic (in the sense of not further separable) or compound (composed from a number of different files). Typical single content objects are posters that consist of one Adobe PDF file, whereas software assets produced in RAGE often comprise a tutorial file, a code file and more supplementary files.

- A Material Collection is an associated set of Content Objects. Examples for Material Collections are all presentations from a scientific workshop or a selection of posters of a given conference.

- The Provider offers the RAGE Ecosystem portal to the public or target audiences, respectively.

- A User of the Ecosystem portal has got access rights and is able to import, edit, delete and assign categories for the content. A User can be
  - A Contributor: an organization, in most cases RAGE consortium members, contributing content to the system.
  - A Producer: a person or organization responsible for providing or producing content and deliver to the Contributor, adhering to the requirements for integration of digital material. In many cases, for example for the most RAGE assets, Producer and Contributor are the same instance.

- The Operator hosts the RAGE Ecosystem portal and may provide further services in the area of content collection, annotation, etc..

3.2 Submission and Standard Collection Procedures

1. Announcement: In advance, the User announces upcoming submissions. The content is referenced by its title and few key data helping distinguish the content.

2. Information provision: The User provides further information (and documents if needed) about the content. In case of presentations captured during a congress or

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workshop, the material should include the event program, the event web page and contribution abstracts. The material and information is determined to enrich the content on the RAGE Ecosystem portal. The Provider takes for granted that the Contributor possesses the required distribution rights.

3. **Access constraints specification (optional):** The User informs the Operator about conditions for accessing the content object on the portal.

4. **Submission:** The User imports the content via uploading, adhering to the ingest requirements for integration of digital material. For efficient processing, submission should incur only once. The submitted content should be error-free and complete, it can be edited or deleted. The User should possess the required distribution rights.

5. **Ingest:** Complete and correct media together with their metadata get integrated into system.

6. **Edit or Delete:** The User edit or deletes an existing content object

7. **Enrichment:** The User adds appropriate metadata.

8. **Categorization:** The User assigning categories to the single content objects within the RAGE Ecosystem taxonomy.

9. **Access control (optional):** The Operator applies constraints for access to the content on RAGE Ecosystem portal as previously specified by the User. (At this stage in the project the discussion about access control is ongoing.)

### 3.3 Content Types and Data Formats

Within the Ecosystem portal the following content types and data formats could be realized:

- **Posters:** Electronic versions of traditional posters. Submission formats: Microsoft DOC/DOCX, Adobe PDF, Microsoft PPT/PPTX. Dissemination format: Adobe PDF (in-browser display, download), JPG
- **Publication:** A publication. Submission formats: Microsoft DOC/DOCX, Adobe PDF. Dissemination format: Adobe PDF (in-browser display, download)
- **Full paper publication:** Articles in a series. Submission formats: Microsoft Word, Adobe PDF. Dissemination formats: Adobe PDF (in-browser display, download)
- **Abstract publication:** Structured text without supplementary media, normally in a series. Submission formats: Markup text. Dissemination formats: HTML (in-browser display)
- **Online course:** Complete online courses or parts thereof including learning objectives, course summary, learning resources, activities, conditional progress control, exams, and certificate. Submission formats: Moodle course, Ecosystem content objects. Dissemination format: HTML/ (in-browser)
- **Software Assets:** Complete Asset Archives containing source code and supplementary content types

Instead of local copies of content object media, external sources can be referenced. All content objects are to be accompanied by material metadata adhering to the ingest resp. harvesting specifications.

### 3.4 Ingest Requirements

The following requirements must be matched by a material collection to be ingested into the OTP digital library and media archive using standardized procedures. Material not complying with one or more of these requirements cause additional efforts an post-production and coordination and are likely to get rejected. To resolve IPR, ideally a CC license would be needed. If this is not possible, some similar license would be needed.
1. **Discrete, independent Content Objects:** Content Objects must be uniquely marked (e.g. with an identifier) and must not share any files. With compound Content Objects, all associated files of every compound object must be located in a separate subdirectory. Every compound Content Object must have a designated file, which can be used to “start” or “view” the object. In the example case of a Webcast collection, this means that every Webcast needs to reside in its own subdirectory and runnable directly within that directory without being dependent on files in other directories and without being dependent of resources not contained in the submitted material but accessed from elsewhere in the Internet or the Worldwide Web (as referred to as “Independence of External Resources and Services” in the next paragraph).

2. **Independence of External Resources and Services:** All Content Objects must be handed over complete. Processing, storage, and viewing of all Content Objects must be possible independent of further resources and services. For example, a HTML page must not reference any images, which are not included in the delivery. For example, a collection of electronic posters needs to be displayable without the images or metadata residing in some other place.

3. **All documents must be transformable to PDF:** In addition to rendered formats, any submitted documents can be delivered in their original format, e.g. Microsoft Word or PowerPoint. However, all fonts needed to produce a PDF from these original formats need to be included, such that the document can be generated independently of the operating system environment and the fonts installed by the current user.

4. **Other Internet enabled media formats:** The file formats necessary for viewing content must be suited for viewing within all major Web-browsers in their current versions (at time of submission, which are at time of production of this document, e.g., Microsoft Internet Explorer 11, Google Chrome 47, Mozilla Firefox 42, and Apple Safari 5) as well as suited for embedding into HTML pages without dependency on third party browser extensions or plug-ins (see also “Independence from external resources and services”). All content should therefore be HTML5 compliant.

5. **High resolution original media:** All media used by content objects must be delivered in a finally produced state and in high original resolution. Particularly, this includes images.

6. **No digital rights management and no encryption:** All files must be completely free of any technical method for control and enforcement of dissemination and usage rights. All files must not be encrypted.

7. **Adaptability of display size:** All Content Objects must allow for a viewing adaption of their display size.

8. **Structured metadata for content objects compliant to a given data-schema provided as XLS or XML:** For all Content Objects the complete set of metadata must be provided within a given structure and a given format (handed over separately, cf. section 3.5).

9. **Further integration after ingest:** After a content object has been ingested, a further integration through usage of existing portal tools will be performed. This needs to be done by the User. It particularly includes a manual categorization of content along the current browsing taxonomy.

10. **No malware:** All files, particularly the macro-enabled document formats like Microsoft Excel must be completely free of malware, spyware, and adware.

11. **Homogeneity of data:** All content objects of a material collection must be of the same type. For example a set of presentation slides containing PDF and Microsoft PowerPoint slides is not acceptable.

**3.5 Material Submission Metadata**

Metadata must be provided necessarily for all Content Objects. To find an appropriate standard for the document corpus an internet research was performed with the following result.
The Corpus Encoding Standard (CES)\(^3\) describes metadata for a document corpus used by the research field of corpus linguistic. The last update of this standard was in 2000. There was no indication found neither that the standard is updated on a regular basis nor that there is an active user group for it. The usage might not be state-of-the-art.

A second standard which was found is the Text Encoding Initiative (TEI)\(^4\), which seems to be very generic and not limited for descriptions of document corpora. The standard seems to be maintained actively. On the other hand this standard is not very well supported for example by standard tools like citavi. Also the content of the standard is similar to what is included in the BibTex standard. The additional value compared to BibTex is questionable.

The conclusion was that there is no real metadata standard for the description of document corpora. The usage of BibTex file to describe the documents included in an corpora might be sufficient. Additionally a couple of very generic data like creation date, sources, language of the corpus, author, number of documents, and publishing years (of the documents) covered by the corpus can be provided separately to describe the corpus.

Thus, the Ecosystem portal provides two options of metadata schema that have been selected as examples of protocols representing de facto standards. To describe documents (text, slides, e.g. from Mendeley or Slideshare...) enriched BibTex metadata will be used and to describe software assets OAI-PMH will be applied. These options have been explicitly required by the research community in WP3.

### 3.5.1 BibTeX

One opportunity is the BibTeX mass import tool that allows users’ to import a large volume of publications and their metadata (cf. D6.1 ((Heutelbeck et al., 2016))). To create a BibTeX-text file the user could fill in a provided Excel spreadsheet (available in addition to this deliverable) or following an online description from OpenOffice\(^5\) or NWalsh\(^6\) for example.

In the spreadsheet, each row contains the metadata of exactly one Content Object of the Material Collection delivered, be that Content Object atomic or a compound. The official minimum of fields for the different BibTeX types are listed in Figure 2.

<table>
<thead>
<tr>
<th>BibTeX entry type</th>
<th>description</th>
<th>required fields</th>
<th>optional fields</th>
</tr>
</thead>
<tbody>
<tr>
<td>article</td>
<td>An article from a journal or magazine</td>
<td>author, title, journal, year</td>
<td>volume, number, pages, month, note</td>
</tr>
<tr>
<td>book</td>
<td>A book with an explicit publisher</td>
<td>author OR editor, title, publisher, year</td>
<td>volume OR number, series, address, edition, month, note, isbn</td>
</tr>
<tr>
<td>booklet</td>
<td>A work that is printed and bound, but without a named publisher or sponsoring institution</td>
<td>title</td>
<td>author, howpublished, address, month, year, note</td>
</tr>
<tr>
<td>conference</td>
<td>An article in a conference proceedings. The same as INPROCEEDINGS, included for Scribe compatibility</td>
<td>author, title, booktitle, year</td>
<td>editor, volume OR number, series, pages, address, month, organization, publisher, note</td>
</tr>
<tr>
<td>inbook</td>
<td>A part of a book, which may be a chapter (or section or whatever) and/or a range of pages</td>
<td>author OR editor, title, chapter AND/OR pages, publisher, year</td>
<td>volume OR number, series, type, address, edition, month, note</td>
</tr>
<tr>
<td>incollection</td>
<td>A part of a book having its own title. Required fields</td>
<td>author, title, booktitle, publisher, year</td>
<td>editor, volume OR number, series, type, chapter, pages, address, edition, month, note</td>
</tr>
</tbody>
</table>

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\(^3\) http://www.cs.vassar.edu/CES/

\(^4\) http://www.tei-c.org/index.xml

\(^5\) http://www.openoffice.org/bibliographic/bibtex-defs.html

\(^6\) http://nwalsh.com/tex/texhelp/bibtx-7.html
3.5.2 OAI-PMH

The second opportunity, especially for integrating software assets, is represented by a mass import from external systems via OAI-PMH. It enables the import of the RAGE asset metadata as well as generic OAI-PMH endpoints. For the import of software assets, the import uses the metadata schemata as defined by WP1 (Excel spreadsheet available in addition to this deliverable) (cf. D6.1 ((Heutelbeck et al., 2016)).

This RAGE metadata model is also defined as a baseline of an XML schema, which will be implemented (and if needed extended) in all the RAGE tools that require the processing of these metadata, e.g., a metadata editor, the asset repository, asset installation widgets. RAGE will use a core subset of RAS and extend it with elements from ADMS, IEEE LOM and metadata related to the applied games domain.

4 KNOWLEDGE MANAGEMENT

The knowledge management part has not been part of the requirements analysis of WP1. Therefore a “phase-oriented technology push” approach will be used, compared to the development process described in D6.1.

Iteration 1 (M1 – M12) - Integration and Availability: As described in detail in D6.1, the core components of the Ecosystem portal are integrated and available already. One of the core components for Knowledge Management, the taxonomy, is still in under development. Section 4.1 and the following will describe the phases of building the taxonomy.

Iteration 2 (M13 – M24) - Asset Collection, Initial Evaluation and Testing: The phase is still ongoing. The collection of assets and accompanying documents will be expanded in the next month. WP8 completed the first qualitative evaluation just right now and will realize additional validations in the next month. The first results are summarized in chapter 5 and more details are shown in ANNEX II.

Iteration 3 (M25 – M40) - Business Model driven refinement and Iteration 4 (M41 – M48) - Preparation for sustained availability, as a continuation of WP1, will follow afterwards.

As one of the features of the Ecosystem portal, the digital content objects (like documents, slides or software assets) will be annotated with semantic representations of knowledge objects, as e.g., taxonomies. This means an enrichment of objects with a common framework of understanding to solve problems of different perspectives or understanding. As a result a
systematic search and analysis of content objects and knowledge resources will be possible (cf. (“RAGE Description of Action,” 2015), p7). Thus, the Ecosystem supports the users to find content with explicitly annotated semantic representations and to adapt, extend and link it to internalize this knowledge. (cf. chapter 2)

Figure 3: Exploration with search term and taxonomy filter

In addition to keyword-based search, RAGE resources in the Ecosystem repository can also be explored semantically through applying taxonomy filters. Figure 3 illustrates this through a screenshot of Ecosystem portal prototype. Different approaches have been considered to build the new taxonomy, to structure the Ecosystem resources and services upon them.

4.1 Taxonomy Progression

Corresponding to the dynamic development and population process of the RAGE Ecosystem portal, the underlying taxonomy will be constructed as a dynamic or facetted taxonomy (Sacco and Tzitzikas, 2009). This taxonomy consists of a set of orthogonal taxonomies (facets) that describe the domain from different angles. The taxonomy is multidimensional and extensible.

Based on a basic structure or so called seed-taxonomy, different, already existing, taxonomies will be complemented to this first taxonomy, using common anchor points (cf. section 4.4.1). The consortium is focusing discussions mainly on ACM classification and the GALA taxonomy. It is not yet decided, if GALA should be used or not. Therefore we will concentrate on ACM and the asset classification from the RAGE proposal to expand the taxonomy in a first step. Additionally we have installed a validation of the seed-taxonomy and collected additional recommendations to expand the taxonomy.

The methodology of taxonomy building will be the following:
1. Definition of a seed-taxonomy as a starting point (cf. section 4.2)
2. Assessment of seed-taxonomy quality (cf. section 4.3)
3. Extension according to the assessment results (cf. section 4.4)
4. Integration into the Ecosystem portal, where it can be utilized for categorizations and be extended upon (cf. section 4.4 and the following deliverables)

### 4.2 Starting Points

Within WP1, existing frameworks/taxonomies related to gaming, pedagogy/technology-enhanced learning, skill sets, and software engineering were surveyed for developing a shared nomenclature for RAGE key concepts, e.g. the RAGE Taxonomy and associated metadata model (cf. (Stefano, K. et al., 2015)). The RAGE Taxonomy will serve on the one hand as structured hierarchy of classifications for any object (assets, documents, media files, courses, …) managed by the Ecosystem portal and on the other hand as an integrating model for describing the entities of all the Ecosystem portal sub-components. Thus, software assets will be managed in the same way as other contents (e.g. training materials) within the Ecosystem portal.

#### 4.2.1 The Preliminary Ecosystem Taxonomy

While the development of the RAGE Taxonomy and metadata model is ongoing, the overview of RAGE AG assets from the Description of Action represents one feasible starting point for the formal characterization of applied game development, focusing on user data and pedagogically-informed strategic and social interventions. Figure 4 illustrates the resulting (hierarchical) taxonomy structure.

![Diagram of RAGE AG asset structure](image)

**Figure 4:** RAGE AG asset structure (derived from (RAGE Description of Action, 2015), Figure 2.1, p7)
This categorization has been integrated as a placeholder in the first version of the Ecosystem portal and will be used for the classification of the first resources until a new specific taxonomy has been developed and agreed. Figure 5 is showing the categories catalogue in the process of creating a new publication. The user can easily assign items from the provided dropdown list to his publications or other resources.

![Edit Publication]

**Figure 5: First Ecosystem portal categories**

### 4.2.2 The 2012 ACM Computing Classification System

The ACM Computing Classification System (CCS) is a subject classification system for computing devised by the Association for Computing Machinery which is widely used for categorizing computer science resources. Within the RAGE context, it is assumed that ACM CCS represents a suitable starting point for subject-classification of resources. Eligible ACM CCS classification facets are to be further extended by sub-trees of the RAGE Taxonomy (later: RAGE metadata model and vocabulary).

“The 2012 ACM Computing Classification System has been developed as a poly-hierarchical ontology that can be utilized in semantic web applications. [...] It relies on a semantic vocabulary as the single source of categories and concepts that reflect the state of the art of the computing discipline and is receptive to structural change as it evolves in the future. [...] The full CCS classification tree is freely available for educational and research purposes in these downloadable formats: SKOS (xml), Word, and HTML.” (Association for Computing Machinery, 2016)
4.2.3 Literature research

Another option to create a preliminary taxonomy is literature research. Although the field of AG research is still very young, there are already different categorization approaches and taxonomies existent. Covering one, two and more dimensional taxonomies from e.g (Breuer and Bente, 2010; Djaouti et al., 2011; Ritterfeld et al., 2009), the following taxonomy was the first result (Hoffmann, 2016):

- **target groups**
  - **supply side**
    - research institutions
    - industry participants
  - **demand side**
    - intermediary organisations
    - end-users
      - children
        - preschool
        - elementary school
        - secondary school
      - adults
        - college

![Figure 6: Excerpt 2012 ACM Computing Classification System](image-url)
• vocational school
• unemployed
• policemen
• temporary workers
  o seniors
  o other user groups
    • general sports-related

• teaching principles
  • diagnosis
    • learning assessment
    • learning analytics
  • intervention
    • balancing gaming & learning
    • dialogues & reasoning
    • conversational sparring & tutoring

• platforms
  • pcs
  • macs
  • consoles
  • smartphones
  • tablets

• markets
  • government
  • military
  • healthcare
  • education
  • corporate
  • religious
  • culture
  • ecology
  • policies
  • humanitarian
  • advertising
  • scientific research
  • entertainment

• skills
  • cognitive skills
    • remembering
    • understanding
    • applying
    • analysing
    • evaluating
    • creating
  • psycho-motorial skills
    • perception
    • set
    • guided response
    • mechanism
    • complex overt response
    • adaptation
    • origination
  • affective skills
    • receiving phenomena
    • responding to phenomena
    • valuing
    • organization
    • internalizing values
  • soft skills
4.3 Assessment

The taxonomy described in 4.2.3 was taken as an optional starting point compared to the asset concepts described in 4.2.1. To assess the quality of this taxonomy approach, interviews with 4 experts of the consortium have been performed. The full process is described in ANNEX I.

The interviewees were asked to assess the quality of the taxonomy in the following dimensions that were based on the checklist of (Weise, 2013). To do so, they were tasked to assign numerical indicators ranging from 1 for not at all to 5 for very much fulfilling the dimension. Additionally, the interviewees were asked to identify ACM CCS 2012 concepts that could potentially be added to the preliminary taxonomy. The dimensions were intuitiveness, unambiguousness, hospitality / extensibility, consistency and predictability of design, relevance and parsimony.

The taxonomy scored best in hospitality / extendibility with an average of 4.25 out of 5. It scored lowest in parsimony as necessary categories were missing.

The results led to the following: The vast majority of the taxonomy is relevant, but the balance of the subcategories has to be improved. The preliminary taxonomy is lacking of (applied) gaming categories and certain relevant additions were identified by the interviewees, as well as existing concepts and taxonomies that can be used to extend the taxonomy.

This leads to the conclusion that the taxonomy will be extended with the concepts identified in the feedback, like e.g. game genres, game styles, copyright, privacy and ethics, in the next step. Also the mentioned ACM CCS concepts are going to be used to extend the taxonomy.

4.4 Taxonomy Extension

4.4.1 ACM alignment

The alignment of 2012 ACM CCS and the RAGE Taxonomy assumes i) the existence of ACM 2012 CCS classification facets which are relevant for RAGE, and ii) the identification of semantically consistent links, which would allow for expansion of 2012 ACM CCS through embedding of RAGE Taxonomy sub-trees.
Example links for embedding RAGE Taxonomy sub-trees in 2012 ACM CCS are shown in Figure 7, e.g., “Software and its engineering” => “Software organization and properties” => “Contextual software domains” => “Virtual worlds software” => “Interactive games” / “Virtual worlds training simulations”, “Applied Computing” => “Computers in other domains” => “Personal computers and PC applications” => “Computer games” (not shown in Figure 7 above), or “Applied computing” => “Education” => “E-Learning” are be feasible candidates. Non-relevant 2012 ACM CCS classification facets might be hidden in the Ecosystem portal.

More examples are given in the qualitative results of the taxonomy interview in ANNEX I, section 8.1.3.2.
The taxonomy will be expanded based on these findings and will be integrated into the Ecosystem portal in the next month to be utilized for categorizations.

4.4.2 Prospective Extensions / Taxonomy Management

Once the first revised taxonomy will be implemented into the Ecosystem portal, there will be two ways to further strengthen the taxonomy. Both ways contribute to the collection of documents forming the corpus for a content-oriented feature extraction process based on natural language technology (NLP – natural language processing).

This analysing tool will be considered in detail in D6.3. It will extract new knowledge out of this documents to expand the taxonomy semi automatically.

1. Community-driven approach

As described in section 2.4 Information and content collection process, the RAGE partners will be asked to populate the Ecosystem portal with documentations, slides, media objects and accompanying resources, mainly from Mendeley and Slideshare at the moment.

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7 Omitted in Figure 7...
We have already started with the asset developers to test and populate the system, but the amount of documents is currently not large enough to start with NLP.

2. Event-driven approach

To bridge the instantiation and extend the corpus we have started to analyse relevant AG conferences and their papers, in consideration of IPR. However, this approach needs a lot of capacity and would need a lot of work to maintain the corpus up to date in the long run.

As the Ecosystem portal will serve as a “living” platform, the repositories of resources will be growing over time. Each user, who will upload new documents, will enrich the system, gain visibility and promote the expansion of RAGE taxonomy. Therefore the community-driven approach will be followed in the long term.

4.5 Semantic Annotation of RAGE Resources

Once configured, taxonomy concepts can be used for semantically annotating RAGE resources, i.e. the assignment of pre-defined categories to content. Once an accepted version of the RAGE Taxonomy will exist, it will be used and enriched to cover all the contents managed within the Ecosystem portal.

Above, Figure 8 exemplarily illustrates (again, screenshot taken from early Ecosystem portal prototypel) the assignment of RAGE Taxonomy concepts “Assessment” => “Assignment dashboard and analysis” and “Decision-making and socio-emotional behavior” => “Emotional behaviour” to a PDF document.

5 INITIAL EVALUATION OF THE ECOSYSTEM PORTAL

To ensure an Ecosystem portal development, that is fulfilling the requirements and expectations of the corresponding AG communities (cf. section 2.3), WP 6 is working in close coordination with the evaluation work package WP8. As no detailed requirements analysis specifically on the Ecosystem portal was intended in the work plan, the goal of the evaluation was to validate the
user requirements a posteriori. The evaluation of the Ecosystem portal is done in a phased approach aligned with iterative approach of Ecosystem portal development (cf. D6.1, section 1.2 and D8.1 ((Steiner et al., 2016), section 6.2.1).

The first formative evaluation corresponds to a pre-testing and qualitative validation of the functionality and usability of the basic system version (M12) – i.e. gathering feedback on initial features and functionality.

With the availability of the Ecosystem portal a first important step is to feed it with resources. Therefore researchers and experts from the consortium were requested to provide their input on AG content and knowledge to be imported into the system.

The evaluation focused on the ingestion process of resources and the related features (i.e. the Content Manager tab), what doesn't required a large quantity of uploaded resources.

The second evaluation will then correspond to a quantitative validation based on bulk upload and testing of additional functionalities.

The whole evaluation process can be found in the internal documentation of WP8 (Steiner, 2016). We will keep it short in this chapter and provide more summarized data in ANNEX II.

The testing and evaluation took place in May 2016. The evaluation was based on a short questionnaire and a detailed interview. It has been performed with researchers and experts of the consortium. All partner institutions involved in asset development have been requested to take part in the testing and evaluation phase and to upload their resources to the Ecosystem portal (i.e. UCM, INESC, OUNL, UU, UPB, TUGRAZ). They were provided with a tutorial (prepared by WP6, cf. ANNEX III) describing the features and steps of content management that users were requested to try out. While more users trialled the system, in total 6 asset developers took part in the evaluation interviews – one representative of each partner institution.

The results were the following: Users in general appreciate the approach taken by the Ecosystem and the possibility to aggregate and link different kinds of resources usually stored in a distributed manner. However, they acknowledge that the system is in an early stage of development and that further improvements are needed for a better user experience and workflow. The usability has to be enhanced and complexity, mainly of the metadata information to be filled in, has to be reduced. The available importing features were considered as highly desirable and useful by participants. The assigning of semantic categories to resources was evaluated as easy and straightforward, but the existing categories were rated as very focused on RAGE, which might be an issue for broader and future use of the system. The concept of an asset and definition of asset sets seemed not totally clear for participants and would be desired to be better explained and structured in the next system version. Participants also tested the search and filter functionalities of the system and found the filters generally useful. A larger part of the participants highlighted that the resource types for exploration differ from those in the content manager and would have preferred an alignment of terms. The tutorial was consistently perceived as highly appropriate and useful.

All in all, this first evaluation provided a useful source of information for further development work in WP6.

The usability and therefore the efficiency will be adjusted and improved in the next months and the currently integrated categories, the basic classification of assets provided in the RAGE proposal, will be replaced by the first taxonomy as described in chapter 4.

The Content Manager will be improved and the Taxonomy Manager will be expanded (until the next evaluation phase, scheduled for end of 2016). The Upload functionalities will be extended to a simple/beginners and an expert version until the end of the project.

After realizing the first adjustments, the same partners and optionally further more partners will be requested to test the upload of a bulk of resources and participate in a comprehensive evaluation again.
6 ANALYSIS AND SURVEY OF DOCUMENTATION AND TRAINING MATERIAL

The aim of this chapter is to present the methodology for the design and development of training offerings within RAGE. To determine the main priorities framing and guiding training in applied games development, available documentation and training material will be surveyed and analyzed, gaps (related to specific topics) in the current training provisioning will be elicited, and recommendations for alleviating those gaps will be put forward, e.g. through the development of appropriate training offerings and the organization of corresponding training events/workshops in the course of the RAGE project. At the time of writing, the methodology has been specified and an initial set of activities and resources (such as those inherited from GALA) are under assessment process.

The following sections describe the types of surveys which are in the planning.

6.1 Survey and analysis of training activities, documentation and training material

The identification and description of instances of best practices, specific courses, training curricula, and approaches used for continuing professional development in the communities addressed by the project is structured into three phases:

- Surveying, as far as possible, the range of applied games training activities and associated resources (technology, media resources, documentation and training material) by desk based research to determine the range of topics and extents of audiences addressed.
- Analyzing subjective assessments of a cross section of activities, i.e. interviewing RAGE partners who participated in one or more of the above events.
- Discussing topical coverage of activities/resources within stakeholder focus groups, eliciting gaps to be addressed by RAGE.

Each phase draws on smaller and smaller samples and each phase provides subtly different, more detailed insights. The findings of this survey provide a detailed and current assessment of the provision of applied games topics and their integration within a broader thematic context of education. This approach enables a genuine range of views to surface without having to recourse to a wide but shallow questionnaire of training needs. Such questionnaires are increasingly problematic given the ‘survey fatigue’ articulated on numerous occasions by likely participants, the very great effort which is required to obtain a representative sample, and the desire to make best possible use of available resources. The findings here will be further tested to which extent the practice that these training resources point towards can be considered best practice.

The GALA website provides a (preliminary) list of classified sources of information to be further investigated: “Spreading knowledge on SGs”, “SG analysis and design support”, “Blog and community”, “Learning on and with SGs”.

6.1.1 Preliminary considerations

Initially, the survey focus will be set upon the following types of applied games training activities:

- Training programs are defined as formal thematic training events with clearly defined goals, learning outcomes, teaching methods and training modules that sometimes confirm qualifications and skills by an appropriate certificate.
- Workshops are defined as short training events covering some facet of knowledge or skill; participants may require pre-defined skills and may get a certificate; the speaker’s goal is to impart knowledge of the topic, and he or she typically uses a combination of lecture, visual aids, interaction with participants, and hands-on exercises.
- Online tutorials are more interactive and specific than a workshop. Depending on the context a tutorial can take one of many forms, ranging from a set of instructions to

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8 http://www.galanoe.eu/
complete a task to an interactive problem solving session. From the research findings, only one web-based tutorial has been found: it was in the form of presentations of content, with examples, broken up into discrete modules or sections, with screen recording, written documents (either online or downloadable), and audio files.

- Online courses cover “webinars”, (Web-based Seminars) in the form of presentations, lectures, workshops or seminars transmitted over the Web. Webinars may be collaborative and include polling and question & answer sessions to allow full participation between the audience and the presenter. Depending upon the provider, webinars may provide hidden or anonymous participant functionality, making participants unaware of other participants in the same meeting.

The survey will be limited to gathering data available online: only events available on the Web will be investigated. It will necessarily have to exclude data which does not provide detailed information on the required topics. Furthermore, investigations will be biased towards languages which are represented within the RAGE consortium. Initially, geographic coverage will be focused on European initiatives and resources, possibly, resources permitting, extended to the English-speaking world.

The initial set of variables for capturing information is composed of Title, Organizer, Country, Language, Date/Repetition, URL, Description, Format, Credits/Qualification earned, Sector, Target audience, Prerequisites, Key topics, Reference standards, Learning objectives, and Additional remarks.

6.2 Development of RAGE training offerings

The Ecosystem will arrange workshops and provide the infrastructure to offer training courses on an online training portal, covering training for both developers and educators in order to amplify AG uptake. A number of workshops and events to support the production of training material will be run during the lifetime of the project but the aim will be to make these activities self-sustainable by the end of RAGE. Re-use of available open resources (such as MOOCs - Massive open online courses, SlideShare, …) will be prioritized. However, the project will also try to develop an agreement among the university partners to share further educational content related to AG.

While the recommendations for the alleviation of gaps elicited in the survey will determine the overall demand-driven scope, the topical focus of RAGE training offerings will be laid upon addressing technical issues related to the re-use of assets within diverse validation settings. In addition to supplementary documentation and examples which are deposited as part of the respective asset archives, further RAGE-specific training material related to general conceptual/practical organization and implementation/integration issues (WP4: game design, development, and support) will be developed by the respective game developers and asset holders as they identify a specific demand for this material.

Based on elicited gaps in topical coverage of surveyed applied games resources, additional training content will need to be prepared (resources permitting). Furthermore, identified suitable material (internal, external) will be tailored (“arranged and conceptualized”) for meeting specific needs of the target stakeholder groups identified in WP7.

By design, RAGE training material will be organized as thematic modules which can be either used complementary or arranged as (constituents of) customized training programs.

6.3 Organization of training workshops and corresponding information event channels

RAGE training offerings will be conducted face-to-face (training programmes, workshops) as well as online (tutorials, webinars, e-learning courses). Corresponding online training facilities will be provided as part of the RAGE Ecosystem. The specific range of offerings and their targeted user segments will be defined in alignment with WP7 and WP9.

RAGE training events will be promoted through relevant information (event) channels coordinated by WP9 (such as mailing lists, the RAGE website, the newsletter, social media and on relevant external websites and events calendars). The training events themselves will, at least in part, provide a platform for supporting the dissemination of RAGE’s messages and
ideas as well as relevant know-how, providing participants with both theory and training on practical implementation.

6.4 Alignment with GALA

According to the RAGE Description of Action, the work in T6.2 will base parts of its work on and connect to early harmonising efforts and curriculum designs of the GALA Serious Games Academy.

The GALA project was an EU funded Network of Excellence for Serious Games from 2010 to 2014\(^9\). As one result they established the so call European Academy of Serious Games\(^10\) as part of the European Serious Games Society and developed a Masters in Serious Games Curriculum Framework (Thin et al., 2013). Within this context they have planned to organize educational activities with the main target groups of M.Sc. students (of all relevant disciplines), PhD students, (young) researchers and (young) professionals who, for instance, are working in universities or applied research institutes or consultancy organizations. The objective was to coordinate, promote and improve the academic-professional education and training of (young) researchers and professionals through various educational and networking initiatives. (Mayer, 2013)

The Masters Curriculum Framework is intended as generic for adoption or adaptation by universities to ensure Serious Games students are well equipped to meet the challenges and opportunities of the future. It is pointed out that modernizing the way in which game studies are conducted is ambitious work. It must also be recognised that proposing and running a new Masters Programme requires a business model that is acceptable to the Institution and its immediate agendas. The European Qualifications Framework for Lifelong Learning outcomes (LO’s) has been utilised in the design of all course components (core, specialist, and research).

The following are the core modules proposed for the Masters:
- Nature of Serious Games
- Serious Games in Society
- Professional Skills
- Serious Games Design Core
- Serious Games Design Specialist
- Serious Games Programming Core
- Serious Games Programming Specialist
- Visual and Audio Design for Serious Games Core
- Serious Games Video Design Specialist
- Serious Games Audio Design Specialist
- Narrative in Serious Games Core
- Serious Games Production Core
- Serious Games Production Specialist
- Business of Serious Games Core
- Business of Serious Games Specialist
- Application Field Case Studies
- Individual Project
- Interdisciplinary Group Project

RAGE will not create a new master. The discussion about additional courses and training material will be very much focused and demand driven according to the results of the corresponding asset and application scenario activities.

Following up on this achievements for the academic education of AG developers and researchers RAGE will complement strategies respectively opportunities for the continuing professional development for the relevant communities, to enable practitioners, mostly working in commercial organizations involved in design, development, publishing, distribution and sales of Applied Games, to continue and extend their education, skills and competencies in line with

\(^9\) http://www.galanoe.eu/
\(^10\) http://academy.seriousgamessociety.org/
the upcoming and ongoing progression, for example regarding reusable software components to be used for future game development.
The service of providing online training material at the Ecosystem portal is expected to enable students as well as professionals to spot qualification and training opportunities meeting their competence profile and subject fields and to study single topics by self-directed learning on a basic level.

6.5 Training plan considerations

The production of training material and training courses will have a focus on the reusable assets to be developed in WP2 and WP3 during the project lifetime. In addition basic offerings will be discussed regarding the handling of the Ecosystem portal and its subsystems. For example a course could impart how to register, how to upload material, how to search and browse or how to import an asset and the relevant documentation and metadata.

Furthermore the outcomes of WP4 regarding applied game design, (asset based) game development and support, functionalities and concepts could provide opportunities for training material and workshops. However, this demand has to be explicitly required by WP4.

Even the outcomes and experiences of the WP5 application scenario providers including agreements with game studios, documents for acceptance, arrangements for game distribution and user management, and arrangements for technical support will be reviewed during the project run-time and could provide input for the production of training material, workshops or courses. The demand has to be explicitly required by the experts of WP5.

The planning currently foresees training offerings concerning the following asset related topics (discussion ongoing and asset drafts excepted) (cf. WP2 "Asset" Catalogue and WP3 "Asset" Catalogue). This could be, e.g. installation and integration manuals.

- Interaction data exchange and storage
  - Client-side interaction tracking asset
  - Server-side interaction storage and analytics asset
- Interaction assessment data exchange and storage
  - Real-time assessment asset
  - Server-side Competence-focused Analytics Asset
- Emotion detection
  - Real-time emotion recognition asset
  - Server-side Motivation Assessment Asset
- Dashboard and analysis
  - Player model asset
  - Server-side Dashboard and Analysis Asset
- Decision-Making and Socio-Emotional Behaviour
  - Emotion Appraisal Module
  - Emotion Decision Making
  - Computational Emotional Decision
  - Identity Driven Agents
  - Social Importance Dynamics
- Embodiment and Physical Interaction
  - Motion Builder Asset
  - Multi-Party Interaction Asset
  - Skene
  - Thalamus
  - Nutty Tracks
Natural Language
- Semantic Models and Topic Mining
- Automated Essay Grading
- Automated Assessment of Participation and Collaboration in CSCL Conversations
- Sentiment Analysis on Texts
- Automated Identification of Reading Strategies
- Communication Scenario Editor and Player
- Dialogue Planner
- Natural Language Understanding (NLU) Asset
- Speech to Text Client Asset
- Speech to Text Server Asset
- Text to Speech Client Asset
- Text to Speech Server Asset
- Speech Act Identification Asset

Game Balancing and Personalized Learning
- COMPOD Services
- ProNIFA Log Analysis
- ProNIFA Configuration Interface
- Motivational Identification Services (MIS)

Roleplaying Virtual Characters
- Role-Play Virtual Character

Social Gamification
- Social Gamification Assets Bundle (Social Challenge / Reward / Progression)

Interactive Storytelling
- Authorial Agents
- Integrated Authoring Tool

For instance, the first specification, use cases and prototypes of the core assets (server-side and client-side) by WP2 are expected in month 17, the final assets and documentation in month 31. Dashboard components will be available in month 38. The final integrated bundle of core social agency assets by WP3 will be available in month 24, the storytelling framework and corresponding documentation in month 34 and the gamification assets in 36.

Corresponding to the completion of these materials and the interim results of WP4 and WP5, WP6 with its AG university and game development experts will adjust the training material collection and the planning on workshops and courses.
7 SUMMARY AND CONCLUSIONS

The deliverable 6.6 (preliminary version of D6.2) has introduced the purpose and concept of the information and knowledge sharing system and the affected user communities.

These results will help (targeted readers) to strengthen the power of innovation in the AG market. The Ecosystem will provide the opportunity to communicate and interact on a centralized platform, to participate, to share, and to benefit from knowledge and software asset resources and to collaborate and create new outcomes leading to innovative products and services.

Additionally the agile phase-oriented user-centered methodology will help the related Ecosystem stakeholders to fill up the archives with the relevant material and resources.

Therefore various consortium partners will be involved step by step to engage different user stereotypes with different interests, experiences and skills. The first phase will integrate the academic researchers and experts, the next one will involve the game developers and the application partners will be integrated in the third phase. Each phase has the goal to expand the Digital Library, Media Archive and the Software Repository and particularly improve the underlying taxonomy and usability.

In order to ensure a smooth and efficient content collection, the procedures following a standard workflow. Meta data will be implemented via BibTeX and via OAI-PMH. To support the users to find, adapt, extend and link the artefacts to internalize knowledge, the knowledge management functionalities will ensure that the artefacts will be annotated with semantic representations of knowledge objects, as e.g., taxonomies. The enrichment with a common framework of understanding will result to the functionalities of systematic search and the analysis of content objects and knowledge resources.

The corresponding RAGE Taxonomy will be developed by analyzing and assessing the 2012 ACM CCS classification and some other related taxonomies. While the development of the RAGE Taxonomy and metadata model is ongoing, the first version of the RAGE AG assets represents a feasible starting point for the formal characterization of applied game development, focusing on user data and pedagogically-informed strategic and social interventions. To incorporate the RAGE Taxonomy structure into the ACM CCS classification, semantically consistent links will be needed to allow for expansion of the existing classification facets through embedding of RAGE Taxonomy sub-trees.

A first qualitative evaluation of the Ecosystem portal was performed in cooperation with WP8. The further development will have to enhance the usability and reduce the complexity. Afterwards additional evaluation interviews will specify the matching of community needs and expectations and the further functionalities.

Besides this knowledge management will be extended through an Educational Portal. It will offer internalization respectively knowledge transfer in the sense of learning management processes. To prioritize the framing of training in AG development a survey will determine the range of topics, activities and extents of audiences. An assessment with the RAGE consortium partners and stakeholder focus groups will work out the gaps and needs to be addressed by RAGE as well as accreditation and certification requirements. It will provide demand driven and explicitly recommendations for required training offerings to be developed and for the organization of corresponding training workshops.

A number of workshops and events will be running during the lifetime of the project but the aim will be to make these activities self-sustainable by the end of the project. The production of training material and training courses will have a focus on technical issues related to the re-use of assets within diverse validation settings. Corresponding to the completion of the RAGE assets and the interim results of game development and application scenarios, the training material collection and production will be adjusted with the expertise of the RAGE AG experts.

Consequently this deliverable, has given an overview of the future work in WP6 and the current status. The next steps will be to collect the subjective assessment from partners (e.g. by online
survey or face to face interview), to clarify when and how it is reasonable to organize focus groups, workshops and webinars and who and how many participants will be involved.

It has been pointed out that the further work on building up the Ecosystem and its services will be focused on the requirements and demand of the community and its experts and therefore will need much input from the consortium partners related to their progress of work in WP2, 3, 4 and 5. The support of interconnectedness, knowledge exchange and harmonization will raise the innovation potential of the Ecosystem portal. The mostly entire collection of community specific knowledge (e.g., media objects, assets and best practices), a structured approach of knowledge access, search and browse, collaboration tools as well as social network analysis tools will foster efficient knowledge creation and transformation processes into marketable technology assets.
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8 ANNEX I: RAGE TAXONOMY EVALUATION RESULTS

8.1 Evaluated taxonomy

To create a solid starting point a preliminary taxonomy for electronic documents and self-contained gaming assets in context of the RAGE project was developed from literature sources. This taxonomy was intended as first step to be extended upon by AG experts. It consisted out of the following categories / concepts:

- **target groups**
  - supply side
    - research institutions
    - industry participants
  - demand side
    - intermediary organisations
    - end-users
      - children
        - preschool
        - elementary school
        - secondary school
      - adults
        - college
        - vocational school
        - unemployed
        - policemen
        - temporary workers
      - seniors
    - other user groups
      - general sports-related

- **teaching principles**
  - diagnosis
  - learning assessment
  - learning analytics
  - intervention
    - balancing gaming & learning
    - dialogues & reasoning
    - conversational sparring & tutoring

- **platforms**
  - pcs
  - macs
  - consoles
  - smartphones
  - tablets

- **markets**
  - government
  - military
  - healthcare
  - education
  - corporate
  - religious
  - culture
  - ecology
  - policies
  - humanitarian
  - advertising
  - scientific research
  - entertainment
8.1.1 Methodology

The interviewees were asked to assess the quality of the taxonomy in the following dimensions that were based on the checklist of (Weise, 2013). To do so, they were tasked to assign numerical indicators ranging from 1 for not at all to 5 for very much fulfilling the dimension. Additionally, the interviewees were asked to identify ACM CCS 2012 concepts that could potentially be added to the preliminary taxonomy.

The questions were:

These are the questions we will cover in the interviews:

1. How intuitive is the taxonomy in your opinion? Is the user able to find contents intuitively (1 non intuitive at all - 5 very intuitive) If 1 or 2: Please give examples for non intuitive categories.

2. Is the taxonomy unambiguous? Is there a clear distinction between the categories so that the user can clearly decide how to categorize. (1 non unambiguous at all - 5 very unambiguous) If 1 or 2: Please give examples of ambiguous categories.

3. Do you think the taxonomy is hospitable / extensible / durable? Hospitalbe in this case means, how easy it is to maintain the taxonomy, e.g. adding or removing features. (1 non hospitable at all - 5 very hospitable)

4. Is the taxonomy design consistent and predictable? (Is it clear how the taxonomy is structured e.g. alphabetically, is it clear how many levels exist, are they consistent?) (1 non consistent and predictable at all - 5 very consistent and predictable ) If 1 or 2: Please give examples of non consistent and predictable parts of the taxonomy.

5. Is the taxonomy relevant for the domain of applied gaming? (1 not relevant at all - 5 very relevant) If 1 or 2: Please specify why

6. Is the taxonomy parsimonious? Are all categories necessary categories represented or are categories missing. (1 non parsimonious at all - 5 very parsimonious) If 1 or 2: Please give examples what is missing / unnecessary.
7. Are there sub-trees of the ACM CSS\(^{11}\) that you would deem relevant to integrate into the preliminary taxonomy? If one such sub-tree should be added, where in the preliminary taxonomy should it be integrated?

### 8.1.2 Interviewees

Interviewees from the RAGE project were:
1. Enkhbold Nyamsuren, Open University, Netherlands
2. Wim Westera, Open University, Netherlands
3. Samuel Mascarenhas, Universidade Técnica de Lisboa, Portugal
4. Mihai Dascalu, University Politehnica of Bucharest, Romania

### 8.1.3 Results

#### 8.1.3.1 Quantitative results

<table>
<thead>
<tr>
<th>Question</th>
<th>Enkhbold</th>
<th>Wim</th>
<th>Mihai</th>
<th>Samuel</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. How intuitive is the taxonomy in your opinion? Is the user able to find contents intuitively?</td>
<td>4</td>
<td>2</td>
<td>4</td>
<td>3</td>
<td>3.25</td>
</tr>
<tr>
<td>2. Is the taxonomy unambiguous? Is there a clear distinction between the categories so that the user can clearly decide how to categorize.</td>
<td>3</td>
<td>2</td>
<td>4</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>3. Do you think the taxonomy is hospitable / extensible / durable? Hospitalbe in this case means, how easy it is to maintain the taxonomy, e.g. adding or removing features.</td>
<td>5</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>4.25</td>
</tr>
</tbody>
</table>

\(^{11}\) http://dl.acm.org/ft_gateway.cfm?id=2371137&ftid=1290923&dwn=1
<table>
<thead>
<tr>
<th>4. Is the taxonomy design consistent and predictable? (Is it clear how the taxonomy is structured e.g. alphabetically, is it clear how many levels exist, are they consistent?)</th>
<th>5</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>3.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>3.5</td>
<td></td>
</tr>
<tr>
<td>3.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.75</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td>3.83333333</td>
<td>2.16666667</td>
<td>3.66666667</td>
<td>3.66666667</td>
<td>3.33333333</td>
</tr>
</tbody>
</table>

The taxonomy scored best in hospitality / extendibility with an average of 4.25 out of 5. It scored lowest in parsimony as necessary categories were missing. See more about this in the following subchapter.

8.1.3.2 Qualitative results

**Enkhbold’s feedback:**

Intuitivity: The existing categories are quite clear.
Unambiguity: The individual categories could use a description including some examples.
Hospitability: The taxonomy is hospitable enough to cause no problems in future extension.
Predictability: No categories cause a “why is it there?” response. It is therefore quite predictable.
Relevance: There is not a single category that is unique for the applied gaming domain. The same taxonomy could be used for intelligent tutoring systems. There should be concepts for types of games, game mechanics and gaming technology.

Parsimony: The taxonomy seems incomplete. In general, subject domains like teaching applied games teaching physics, computer science, chemistry e.g. are missing.

ACM CCS integration: ACM concepts are too specific for the intended audience of the EP ecosystem portal. Concepts therefore shouldn’t be integrated without simplifying them. Concepts from the hardware section and concepts regarding game genres like MMORPG would well fit in.

**Wim’s feedback:**
Intuitivity: High level categories are pretty clear. The teaching principles/skills section is unintuitive.

Unambiguity: The taxonomy is inconsistent in terms of level of details. Skills are very detailed while teaching principles are empty. Soft skills seem to be a cross-sector of the categories above.

Hospitability: Depends on how the inconsistencies are handled. As inconsistent as it is, the taxonomy is not hospitable. As it is difficult to foresee the concepts with which the taxonomy is to be extended, having a good structure of non-overlapping concepts in an evenly distributed taxonomy would support hospitality.

Consistency: See unambiguity.

Relevance: Attributes of games are missing in the taxonomy. Like there are no game genres albeit nobody ever clearly defined gaming genres. The same is true for game styles like Shooters, Quizames, 2D, 3D, Puzzles, Strategy games and many more. Even if the categories are not used right away, they need to be in the taxonomy but are not. Additionally, issues like copyright, other legal issues, privacy and ethics need to be added. Essentially everything in the taxonomy is relevant but concepts essentially to applied gaming are missing.

Parsimony: See relevance.

ACM CCS integration: Concepts of human computer interaction, artificial intelligence (functionality of a game), virtual worlds, software architecture (which however is too general), distributed systems (which is again to general), games as well as typical software quality assurance concepts.

Overall feedback: The available categories are very general and not applied gaming specific. References to games are missing. There is nothing about game narratives. Where is the sense in copying a publisher like the ACM?

**Mihai’s feedback:**

Intuitivity: It seems that certain concepts are missing making it difficult to find points to connect to different ontologies or taxonomies in a sense of ontology alignment.

Unambiguity: No remarks.

Hospitability: The categories are quite independent and not overlapping. It therefore should be quite hospitable.

Consistency: The first level is great. The second level is quite unbalanced with certain categories having vastly more subconcepts than others. This is however no major problem. It is a little weird, that there is only one entry in other user groups.

Relevance: What is there is relevant. Gaming concepts are missing.

Parsimony: Game genres like puzzle, open answers, open questions, massively online multiplayer e.g. are missing. It is not so much about gaming itself.

ACM CCS Integration: Results of (Swoboda et al., 2016) with .62 minimum threshold. Also: Virtual worlds, software, interactive games, multimedia information systems, information systems applications, mobile computing, computers in other domains / … / computer games.

Overall feedback: The existing taxonomy can be augmented with the following gaming ontologies:

- [https://www.mindmeister.com/de/324669511/game-ontology-project](https://www.mindmeister.com/de/324669511/game-ontology-project)
- [http://dbpedia.org/page/Serious_game](http://dbpedia.org/page/Serious_game)
- [http://dbpedia.org/ontology/VideoGame](http://dbpedia.org/ontology/VideoGame)

**Samuel’s feedback:**

Intuitivity: It is mostly fine but there are certain unintuitive aspects in the taxonomy. Teaching principles - what's the difference between learning assessment and learning analytics? Target groups: A bit strange that policemen & general sports related have special mentioning. Why not fireman or nurse? Any kind of other working group is missing. Regarding Markets: Some make sense but for some it's hard to actually pinpoint what they would be. There is also redundancy like in Government and Military (Military being subset of government). Or maybe for private military / soldiers of fortune? There are applied games for advertising, but this is not a very common market.

Unambiguity: Again mostly fine. Platforms with PCs and Macs would be better with Windows. Either use hardware or better operating systems here. The subcategories of skills are difficult to distinguish.
Summary, Analysis, Road-mapping and Production of Training materials

Hospitability: The taxonomy seems easy to extend thus hospitable.
Consistency: The taxonomy seems well structured. The top level division is good.
Relevance: What is there is relevant. Some subsections in skills are too broad and should be narrowed down. Teamwork & leadership should be added to softskills.
Parsimony: Language learning is missing in markets. Reporting, teamwork, trust and empathy is missing in the softskill area. Browsers are missing as platform.
ACM CCS Integration: The following concepts are worth adding:

- Human computer interaction (HCI)
  - Interaction paradigms
    - Hypertext / hypermedia
    - Mixed / augmented reality
    - Command line interfaces
    - Graphical user interfaces
    - Virtual reality
    - Web-based interaction
    - Natural language interfaces
    - Collaborative interaction
  - Interaction devices
    - Graphics input devices
    - Displays and imagers
    - Sound-based input / output
    - Keyboards
    - Pointing devices
    - Touch screens
    - Haptic devices

Collaborative and social computing

- Collaborative and social computing theory, concepts and paradigms
  - Social content sharing
  - Collaborative content creation
  - Collaborative filtering
  - Social recommendation
  - Social networks
  - Social tagging
  - Computer supported cooperative work
  - Social engineering (social sciences)
  - Social navigation
  - Social media

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  - Social recommendation
  - Social networks
  - Social tagging
  - Computer supported cooperative work
  - Social engineering (social sciences)
  - Social navigation
  - Social media

8.2 Feedback summary

Overall the vast majority of the taxonomy is relevant for this knowledge domain. The balance of the subcategories are to be improved. The biggest flaw of the preliminary taxonomy is it’s lack of (applied) gaming categories. Certain were identified in the feedback. As well as existing concepts and taxonomies that can be used to extend the taxonomy.

8.2.1 Next steps

The taxonomy is to be extended with the concepts identified in the feedback. Also the mentioned ACM CCS concepts and gaming taxonomies / ontologies are going to be used to extend the taxonomy.
It will then be integrated in the EP ecosystem portal where it can be utilized for categorizations and be extended upon.

9 ANNEX II: INITIAL FORMATIVE EVALUATION OF THE ECOSYSTEM

The evaluation of the Ecosystem is done in a phased approach aligned with iterative approach of Ecosystem development (cf. D6.1 and D8.1). The goal of the first formative evaluation of the Ecosystem is to evaluate the functionality of the basic system version (M12) – i.e. gathering feedback on initial features and functionality. With the availability of the Ecosystem portal a first important step is to feed it with resources – therefore researchers and experts from the consortium will be requested to provide their input on applied gaming content and knowledge to be imported into the system. The evaluation will focus on the ingestion process of resources and the related features (i.e. the Content Manager tab).

9.1 Ecosystem features to be evaluated

- Login procedure (quick check about any issues when logging in)
- Content manager → menu item that is used for ingesting, editing and managing different kinds of resources into the Ecosystem
  - Managing Asset Collections
    - Creating and editing asset collection, incl. definition of metadata (title, description, keywords, date)
    - Assignment of semantic categories
    - Creating and defining authors and authors organisations
    - Assignment of material to asset collection
  - Upload material to asset collection
  - Software
    - Creation and editing of software item and metadata (title, description etc.)
    - Creating and defining authors
    - Assignment of semantic categories
    - Adding software repository link
  - Publication
    - Creation and editing of publication item and metadata
    - Definition of identifiers, authors, organisations, publishers, …
    - Assignment of semantic categories
    - Uploading document or adding URL
  - Presentation
    - Creation and editing of presentation item and metadata
    - Definition of identifiers, authors, organisations, conference, …
    - Assignment of semantic categories
    - Uploading document or adding URL
- Browsing and searching resources
  - After having added resources, users will likely test these features to check whether their resources can be found → although evaluation of the search and browse functionalities is not in the focus of this evaluation, in the
interviews it may be checked whether these functions were used and, if yes, to get some feedback how these features worked and how they were experienced.

The following features will be addressed (in more detail) in later evaluations (i.e. they are either not yet available or no explicit request to partners to use them is made):

- Browsing and searching resources (search, browse, display content + metadata)
  - Text search
  - Faceted search
- Import
  - From Bibtext, OAI-PMH, Mendeley, Slideshare, Import wrapper
- Content/category display
- Taxonomy management
  - (Note: the first version of the RAGE taxonomy is currently being evaluated separately by FTK in expert interviews.)
- Account management (registration, user profile, user & group management administration, …)
- Semantic annotation features
- ...

### 9.2 Evaluation goal/questions

- Gather initial feedback on evaluation variables for Ecosystem as defined in D8.1 (section 6.1)
  1. Usability (E1)
  2. User acceptance (E2)
  3. System performance (E4)
  4. User contribution (E6)
  5. Expectations on added value (E7)
- Validate that the features provided by the Ecosystem meet the needs of users
  - No detailed requirements analysis specifically on the Ecosystem has been carried out; the goal now is to validate the user requirements a posteriori
- Gather feedback on the quality of the tutorial
  - Identifying appropriateness and suggestions for incorporation in future tutorials/Ecosystem manual

- **Participants**: researchers and experts from the RAGE consortium – WP2 and WP3 leaders and potentially other asset developers

- **Evaluation instruments**
  - Questionnaire
    - To gather general assessment on evaluation variables; the obtained scores can be used for later comparison with results from upcoming evaluations
    - Prepared and administered as online survey
    - Should be rather short for this evaluation, to keep evaluation load for experts low and since we want to focus on qualitative data collection (see below)
  - Interviews
    - for gathering more in-depth qualitative feedback on evaluation variables and questions
- how was the system/ingestion process experienced, what did work well, what did not work, what are critical issues, what is missing/what else would you expect…?
  - carried out via skype
- Usage data
  - Information about the number of types of resources uploaded (per participant) to measure (4) user contribution
  - Can at this stage easily be retrieved via the explore tab – total number of resources per type is indicated (not sure about contributions per participant)
  - (Note: A more detailed analysis of log data is planned for later evaluation rounds, after the evaluation tool from TUGraz has been integrated with the Ecosystem.)

### 9.3 Method

The detailed methodology, including scoring, will be provided in the deliverables of WP8 and can be requested beforehand in form of the internal evaluation report (Steiner, 2016).

#### 9.3.1 Questionnaire

Thank you for sharing your feedback on the Ecosystem with us. Please answer the questions below based on your experience of and interaction with the Ecosystem during the process of ingesting resources.

<table>
<thead>
<tr>
<th>Evaluation variable</th>
<th>Item ID</th>
<th>strongly disagree</th>
<th>strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>Usability</td>
<td>Usab1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>* Us</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>* Usab4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Usefulness</td>
<td>Usef1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Usef2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Usef3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Usef4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Usef5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Usef6</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Usef7</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Usef8</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- This system’s capabilities meet my requirements.
- Using this system is a frustrating experience.
- This system is easy to use.
- I have to spend too much time correcting things with this system.
- It helps me be more effective.
- It helps me be more productive.
- It is useful.
- It gives me more control over the activities in my life/work.
- It makes the things I want to accomplish easier to get done.
- It saves me time when I use it.
- It meets my needs.
- It does everything I would expect it to do.
### System performance

<table>
<thead>
<tr>
<th><strong>SP1</strong></th>
<th>How long did it take for your actions to be applied in the system?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Very long</strong></td>
</tr>
<tr>
<td></td>
<td>1 2 3 4 5 6 7</td>
</tr>
<tr>
<td>*</td>
<td>Not at all confident</td>
</tr>
<tr>
<td></td>
<td>1 2 3 4 5 6 7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>SP2</strong></th>
<th>Did you feel confident with the performance of the system?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Very</strong></td>
</tr>
<tr>
<td></td>
<td>1 2 3 4 5 6 7</td>
</tr>
</tbody>
</table>

### Added value

<table>
<thead>
<tr>
<th><strong>AV1</strong></th>
<th>How much added value do you think the RAGE Ecosystem has compared to available systems?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Very</strong></td>
</tr>
<tr>
<td></td>
<td>1 2 3 4 5 6 7</td>
</tr>
</tbody>
</table>

### Tutorial quality

<table>
<thead>
<tr>
<th><strong>Tut1</strong></th>
<th>The tutorial was understandable.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Strongly</strong></td>
</tr>
<tr>
<td></td>
<td>1 2 3 4 5 6 7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Tut2</strong></th>
<th>The tutorial had a clear focus on the task to be accomplished.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Strongly</strong></td>
</tr>
<tr>
<td></td>
<td>1 2 3 4 5 6 7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Tut3</strong></th>
<th>I had some difficulties in understanding the tutorial.</th>
</tr>
</thead>
<tbody>
<tr>
<td>*</td>
<td><strong>Strongly</strong></td>
</tr>
<tr>
<td></td>
<td>1 2 3 4 5 6 7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Tut4</strong></th>
<th>The tutorial was a helpful preparation for the task.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Strongly</strong></td>
</tr>
<tr>
<td></td>
<td>1 2 3 4 5 6 7</td>
</tr>
</tbody>
</table>

*Note: Items marked with * are negatively poled; responses given to them will be reversed before score calculation*


### 9.3.2 Interview questions

1. Did you experience any problems when logging in to or logging out from the Ecosystem?
2. How did you use the Ecosystem?
   a) How long did and when you work with the Ecosystem? (estimated time in hours/minutes; one continuous or several shorter sessions?) And when? (very recently before the interview or already some time ago)
   b) What kind of resources did you upload?
   c) How many resources did you upload approximately?
3. How did you experience the process of ingesting resources?
   a) What did work particularly well? (for specific kinds of resources?)
   b) What did not work properly, which kind if issues did you experience? Can you report about any particular issues for a certain type of resource? (check explicitly for publications, presentations, software, asset collection)
   c) Did you miss anything that should be added in future versions?
   d) Did you come across any feature/option that seemed superfluous to you? If yes, which?
e) Can you think of any additional type of resource/material that you would like to upload to the Ecosystem?
f) Do you think that the metadata fields for the different kinds of resources are appropriate and sufficient, or is there anything missing?

4. What do you think about the semantic categorization of resources?
   a) Did you use it?
   b) Did it work well?
   c) What could be improved?
   d) Did the categories provided work out well for you?

5. Creation of asset collections/packages
   a) Did you define asset sets (i.e. assign documents/publications, software to the asset)?
   b) How useful do you think is the possibility of creating asset collections/packages? And did you experience any issues?

6. Browse and search features
   a) After uploading your resources, did you also try the browse and search features (to check whether your resources can be found)?
   b) Did these features work well or did you experience any issues?

7. What do you think is (or could be) the specific advantage/added value of the Ecosystem in comparison to other kinds of repositories?

8. What do you think about the tutorial provided together with the request to work with the Ecosystem? Was it needed, appropriate/clear (in terms of content, length), helpful?

9. Do you have any additional specific comments on the Ecosystem?

10. What is your overall impression of the current version of the Ecosystem? (1-sentence take home message)

Besides these guiding questions, any specific observations made by the interviewer during an interview will also be recorded.

9.4 Results

The testing and evaluation took place in May 2016. Asset developers from all partner institutions involved in asset development have been requested to take part in the testing and evaluation phase and to upload their resources to the Ecosystem (i.e. UCM, INESC, OUNL, UU, UPB, TUGRAZ). They were provided with a tutorial prepared by WP6 describing the features and steps of content management that users were requested to try out.

While more users trialled the system, in total 6 asset developers took part in the evaluation interviews – one representative of each partner institution. This is because each partner had either assigned one person to take part in the testing and evaluation phase, or one person was in charge of collecting and providing the combined feedback from multiple users from the team. At the beginning of each interview session the interviewee was requested to respond to the online questionnaire. Subsequently the interview was carried out in a semi-structured way, following the topics of the pre-defined interview questions. An interview approximately took 40 minutes to an hour.

9.4.1 Interview Results

1. Problems with login or logout
   - 4 participants did not experience any problems
   - 1 participant had problems with logging in – login worked not for Edge; contacted FTK team and gave directions where to look at
- 1 participant experienced a 404 error and the message that the user was logged out when clicking ‘My account’, while in fact still being logged on (security issue)

2. **Usage of the Ecosystem**
   
   a) **Duration of use**
   - 5 participants used the system around one hour in total
   - one user used the system about 4 hours (Note: this participant actually not only tested the resource ingestion (content manager), but tried to systematically have a look at all features available

   b) **Resources uploaded**
   - All participants did only examples to test the resource ingestion; no user massively uploaded a larger amount of material
   - No participant tried all resource types – mainly because e.g. no suitable item of a certain resource type was available
   - one user uploaded solely publications
   - one participant tested some resource types, but without actually saving them
   - 5 participants created an asset
   - 4 participants uploaded/linked software
   - 4 participants uploaded publications
   - only one participant uploaded a presentation (however not a ppt, but only a document)
   - 3 participants indicated that they had also tried the import features

   c) **Number of resources**
   - All participants only uploaded 1 (4 users) or 2 (2 users) examples of the respective resource types that they had tested
   - One participant explicitly indicated that he had available 10 publications for upload, but after experiencing some problems he stopped and first wanted to provide feedback

3. **Resource ingestion**
   
   a) **Things that worked well**
   - 2 participants explicitly pointed out that the resource ingestion worked nicely
   - 2 participants especially liked the UI design
   - 2 participants pointed to the usefulness of the import features, even if not yet totally ready
   - 1 participant highlighted that the tabs are useful in entering the information

   b) **Thing that did not work, issues experienced**
   - The ingestion process was perceived as rather cumbersome and tedious, in particular with respect to the ingestion of publications (3 participants)
   - the information requested to be filled in in the metadata fields was perceived as too much (4 participants) and the meaning of some metadata fields was unclear (4 participants)
   - Participants particularly had issues with the definition of authors and organisations for resources
     - these have to be reentered for each resource (4 participants)
the order of adding this information is not intuitive – while first an organization needs to be added to be able to then select it for an author, ‘add organization’ can be found only below ‘add author’ (3 participants)
- it was also pointed out that adding resources within an asset should be possible (3 users) and that ‘asset’ in the content manager should be on a different level, since it is understood as a collection of other resource types (2 users)
- 2 participants would have liked to link resources to an asset, but could not figure out how to do this
  - for further details see Table

### 3b) things that did not work, issues experienced

<table>
<thead>
<tr>
<th>Issue</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>(too) many fields, too complex and detailed</td>
<td>4</td>
</tr>
<tr>
<td>authors and organisations have to be re-entered for each new resource should be saved to be available (picklist) when new resource is added</td>
<td>4</td>
</tr>
<tr>
<td>unclear what to enter in metadata fields</td>
<td>4</td>
</tr>
<tr>
<td>unclear what the 'identifiers' tab/fields means</td>
<td>2</td>
</tr>
<tr>
<td>unclear what 'text raw' and 'text full plain' fields in publication mean</td>
<td>2</td>
</tr>
<tr>
<td>unclear what the date field means</td>
<td>1</td>
</tr>
<tr>
<td>ingestion process is cumbersome (esp. for publications)</td>
<td>3</td>
</tr>
<tr>
<td>uploading material within an asset should also be possible</td>
<td>3</td>
</tr>
<tr>
<td>adding authors and organisation: cannot be entered at the same time; order is not intuitive</td>
<td>3</td>
</tr>
<tr>
<td>spelling errors/multiple instances due to the fact that names have to be re-entered for each resource</td>
<td>2</td>
</tr>
<tr>
<td>asset should be on a different level - as a collection of other resource types</td>
<td>2</td>
</tr>
<tr>
<td>missed possibility to link resources to an asset</td>
<td>2</td>
</tr>
<tr>
<td>asset should also have field to enter repository link</td>
<td>2</td>
</tr>
<tr>
<td>distinction between asset and software - need to duplicate information</td>
<td>1</td>
</tr>
<tr>
<td>authors of an asset could be automatically defined - should be all authors of the assigned material</td>
<td>1</td>
</tr>
<tr>
<td>unclear what is meant with the different resource types and what is expected to be uploaded for each of these</td>
<td>1</td>
</tr>
<tr>
<td>metainformation should be copyable to other resource</td>
<td>1</td>
</tr>
<tr>
<td>Saving changes does not lead to exit edit mode</td>
<td>1</td>
</tr>
<tr>
<td>need to save information in each tab is cumbersome</td>
<td>1</td>
</tr>
<tr>
<td>richer text editor should be used - allowing rendering of hyperlinks, layouting</td>
<td>1</td>
</tr>
<tr>
<td>search in the list of resources (in content manager) is only possible with words from the title (not e.g. authors)</td>
<td>1</td>
</tr>
<tr>
<td>keywords should be saved to be available (picklist) when new resource is added</td>
<td>1</td>
</tr>
<tr>
<td>too much information on authors needs to be filled in, while actually only 'full name' field is used</td>
<td>1</td>
</tr>
<tr>
<td>media as most important tab (for actual upload) is last one - user might never go that far</td>
<td>1</td>
</tr>
<tr>
<td>uploading publications is doubled, as publications are already stored somewhere else (e.g. DSpace)</td>
<td>1</td>
</tr>
</tbody>
</table>
not all publications are open access | 1
selecting conference date is cumbersome (for past years) - dropdown would be preferred | 1
redirect to first tab after saving added/edited author/organisation | 1

c) **Missing things**
- From the issues identified above it also becomes clear that users missed the possibility to re-use/copy metainformation, especially w.r.t. authors and organisations.
- In terms of things missing 4 participants pointed to the import functionalities.
- 2 participants would have wished to get a better overview of resources available.
- Further features that were indicated as missing or desirable (by 1 participant each) were:
  - social media features
  - dynamic pages (enter multiple tabs without saving)
  - possibility to upload videos
  - the automated semantic categorisation of resources
  - possibility to change order of authors

d) **Superfluous things**
- From the features provided nothing was perceived as superfluous – apart from the too high number of metadata fields (see 3f)

e) **Other resource types**
- The most relevant additional resource type mentioned was videos (4 participants).
- 3 participants mentioned other kinds of (asset-related) documents.
- 2 users highlighted that different categories of documents should be defined (without the need of adding a new type).
- 1 participant mentioned the need to basically distinguish between uploaded and externally hosted material.

f) **Metadata fields**
- With respect to the metadata fields, most participants (5 users) felt that there were too many fields and too much information requested - they critically mentioned the effort required for filling in this fields and were not sure whether all this information is actually needed.
- 2 participants felt that the metadata fields were appropriate, but 1 of them didn’t check for publications and one nevertheless pointing that it might be quite challenging to fill all the fields if the information is not available.
- 1 participant suggested to distinguish between important mandatory fields and optional additional fields.
- 1 participant thought that the metadata fields for asset should be extended and aligned with those of software.
- 1 participant would have liked an additional field for assets, to indicate where the asset has already been integrated/applied.

4. **Semantic categorisation**
   a) **Use of semantic categorisation**
   - 5 participants assigned categories to their resources
   - 1 participant did not use the semantic categorisation
   
   b) **How did it work**
   - The categorisation was perceived as nice and easy (3 participants).
An issue reported by 2 participants was that assigned categories are lost when switching to another taxonomy
- 1 participant highlighted that he liked the multi-taxonomy approach
- further issues mentioned (by 1 participant each) were:
  - the ‘assign categories’ button might be overlooked
  - it is confusing that when clicking a detailed category marks also the top category, while clicking the top category does not mark all subcategories
  - it is annoying that the categorisation has to be done for each resource again
  - automated categorisation through the system was expected

c) What could be improved
- 1 participant suggested to have categories automatically preselected by default when uploading a resource within an asset
- 1 participant suggested to have an expandable tree structure of categories, as a more extensive taxonomy might become too long
- 1 participant highlighted that it should be made clear whether one or several taxonomies should be used for categorisation
- 1 participant mentioned that social tagging could be useful in addition to the fixed categories from the taxonomy

d) Categories provided
- 3 participants indicated that the categories provided were heavily bound to the RAGE project and they were not sure about its use and appropriateness beyond the scope of RAGE
- for 2 participants the categories worked fine
- 1 participant thought the categories should be more based on educational aspects

5. Asset packages
a) Asset sets defined
- 3 participants assigned resources to artefacts, one of them only after getting a hint from a colleague
- 3 participants did not define asset sets

b) Usefulness of asset sets, issues
- 2 participants highlighted the possibility to define asset sets as useful
- it was, however, perceived as not self-explaining and obvious and further explanation (e.g. in the asset set tab) would be needed (3 participants)
- in line with question 3b) users pointed to the fact that resource upload should be possible within an asset and that the superordinate level of an asset should be visible (3 participants)
- vice versa, 2 participants also suggested to add the possibility to directly link a resource to an asset, when creating the resource
- the problem that resources with the same name cannot be distinguished in the dropdown list (2 users)
- in 2 cases the assignment of material did not work properly – after searching and selecting a resource, it was not listed as assigned to the asset set
- further suggestions and issues mentioned (by 1 participant each):
  - instead of having to search for material it would be nice to see recently uploaded content
  - it might be problematic that only one’s own resources can be assigned (e.g. if I want to assign a publication that has been uploaded by a colleague)
  - ‘(related) artifacts’ is suggested instead of ‘set’
6. **Browse and search features**
   
   **a) Use of explore tab**
   - Most (5) of the participants also tried the browse and search features in the explore tab
   - Only one person did not try the related functionality
   
   **b) How did it work, specific comments**
   - The explore features and filters were perceived positively (4 participants)
   - However, 3 participants also pointed to the fact that the use of filters might not be clear to users from the start (one user highlighted that a cross might also be understood as the topic being excluded and checkboxes would be preferable)
   - 4 users pointed to the issue that the categories of resource types under ‘explore’ are not the same as in the content manager and that these probably should be aligned
   - 2 participants mentioned that they would like to select more than one aspect (of a category) for filtering – e.g. two resource types
   
   Further comments made (by 1 participant each) were:
   - it is unusual that a new browser tab is opened each time
   - icons for the resource types were perceived a bit strange and icons with a more obvious/clear meaning should be chosen
   - it would be nice to have everything clickable for filtering (authors, organisations, keywords)
   - filter categories should be expandable for reasons of screen space/scalability
   - it should be made clear which keyword separator to use for searches
   - sorting by date acted a bit strange (only sorting by year, not by exact date)
   - it would be useful to see the most recently uploaded resources
   - the recommendation of similar content was perceived as a useful feature, however the scoring was not clear

7. **Advantage/added value of the Ecosystem**
   - When asked for the added value of the current version of the Ecosystem, 5 participants pointed to the fact that it allows to combine different kinds of material spread over multiple sources – 1 participant clarified that this added value is given for search and exploration of resources, but currently not for the upload of resources
   - 1 participant did not see an added value of the system in its current status
   - 2 participants highlighted that the added value of the Ecosystem would be expanded by additional or improvement of existing features – additional features mentioned were extension of filtering (everything clickable) and inclusion of discussion forums for the assets

8. **Tutorial**
   - All 6 participants found the tutorial appropriate and clear
   - 5 participants actually used the tutorial, 1 user did not use it but only had a look at it during the interview
   - 3 participants highlighted that the tutorial was detailed, 1 of them wondering whether some level of detail could even be reduced
- 1 other participant, however, pointed to some things that were not described in the tutorial, like the registration process or further information/explanation on the metadata field (e.g. ‘identifiers’)

9. Additional specific comments
- From the additional comments collected it became clear that all participants think that further improvements are needed to the system
- 2 participants highlighted that they would like to test and improved version of the system and would be willing to upload additional/more resources then
- 3 participants made specific comments on the import functionalities (see Table below)
- 2 participants underlined that a better overview of the assets and resources provided would be needed
- 2 participants mentioned that game developers as end users should be considered in the design of the user interface, and also 2 participants mentioned the Unity asset store as a possible reference
- 2 users suggested to include screenshots and pictures
- 1 participant mentioned that the profile at the moment is very limited and a more detailed profile for the user and the author would be desirable (when adding oneself as an author, information from Slideshare, ResearchGate etc. could be used)
- 1 participant reported a bug: when going to my account and then back to the content manager not all resource types are listed any more

<table>
<thead>
<tr>
<th>Specific comments on import:</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>concerned that password (e.g. for Slideshare) was requested</td>
<td>1</td>
</tr>
<tr>
<td>Slideshare import did not work</td>
<td>1</td>
</tr>
<tr>
<td>Bibtex import worked fine</td>
<td>1</td>
</tr>
<tr>
<td>Bibtex imports should also be visible in list of my publication in content manager</td>
<td>1</td>
</tr>
<tr>
<td>would like to have the possibility to edit information after Bibtex import</td>
<td>1</td>
</tr>
<tr>
<td>import of list of papers from Mendeley worked, but number of papers seems to be limited</td>
<td>1</td>
</tr>
<tr>
<td>would be nice to show only my own papers from Mendeley</td>
<td>1</td>
</tr>
<tr>
<td>import article from Mendeley did not work</td>
<td>1</td>
</tr>
<tr>
<td>Import Wrappers not clear</td>
<td>1</td>
</tr>
<tr>
<td>OAI import not clear</td>
<td>1</td>
</tr>
</tbody>
</table>

10. Overall impression, take home message
Participants were asked for a final 1-sentence take home message to describe their overall impression and evaluation of the system.
- “It’s a nice concept but still needs improvements to make it less cumbersome to use.“
- “For a start it is okay, but still more work has to be done to make it more user friendly and more browsable.“
- “A nice platform to aggregate and manage all your documents and resources for your project.”
- “The system is in an early state; I would prefer a better overview of the assets and their related resources, and not to have to insert so many information.”
- “Handy to have all artifacts related to an asset in one place – and there is a lot of work that needs to be done to have a good overview.”
- “Nice functionality, nice application, too cumbersome.”

9.4.2 Interviewer observations, additional notes
- All but one participants tested also Ecosystem features beyond the content manager – in particular the Explore as well as the import features; one participant very extensively tested the system and systematically went through all features
- In three cases the concept of an asset set seemed not to be totally clear for the interviewees; in particular the distinction between asset and software seemed slightly unclear
- Two interviewees explicitly expressed interest in participating in another testing round with an improved version of the system and declared their willingness to upload further resources then
- Two participants had provided additional written feedback with detailed comments – the main issues reported in there have been summarised and recapitulated in the interviews (the written feedback itself has not been explicitly included in the results reported herein)

9.4.3 Questionnaire Results
The table and diagram below provide an overview on the results obtained from the questionnaire.

<table>
<thead>
<tr>
<th>Interviewee ID</th>
<th>Usefulness</th>
<th>System performance</th>
<th>Tutorial quality</th>
<th>Usability</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2,63</td>
<td>5,50</td>
<td>6,75</td>
<td>41,67</td>
</tr>
<tr>
<td>2</td>
<td>4,50</td>
<td>4,50</td>
<td>5,25</td>
<td>54,17</td>
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<td>3</td>
<td>2,13</td>
<td>4,00</td>
<td>5,75</td>
<td>37,50</td>
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<tr>
<td>4</td>
<td>2,75</td>
<td>3,00</td>
<td>6,00</td>
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<td>4,00</td>
<td>5,50</td>
<td>45,83</td>
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<td>4,25</td>
<td>4,50</td>
<td>7,00</td>
<td>58,33</td>
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<tr>
<td>Mean</td>
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<td>6,04</td>
<td>50,69</td>
</tr>
<tr>
<td>Std</td>
<td>1,15</td>
<td>0,91</td>
<td>0,58</td>
<td>11,56</td>
</tr>
</tbody>
</table>
Usability of this first version of the Ecosystem was in general assessed moderately (M = 50.69), indicating that there is still room for improvement. Three users assigned usability scores of >50; responses from the other three respondents resulted in scores <50.

Usefulness was assessed quite diversely – three participants perceived the system as rather useful (scores >4), while the other three judged the usefulness of the system in its current status as rather low (scores <3).

System performance was perceived as moderate to good by most of the participants (5 out of 6); one user had some concerns about system performance – in particular, this person perceived the response time of the system as particularly long (item SP1).

The tutorial was consistently judged of high quality and perceived as useful and understandable.

9.5 Summary and Conclusion

Six asset developers from different consortium partner institutions took part in this first evaluation of the Ecosystem and provided their feedback. Most participants tested the system about 1 hour in total; all of them uploaded a small number of examples of different resource types to test the features of the content manager.

Overall, the feedback gathered shows that participants in general appreciate the approach taken by the Ecosystem and the possibility to aggregate and link different kinds of resources usually stored in a distributed manner. However, they acknowledge that the system is in an early stage of development and that further improvements are needed for a better user experience and workflow. In particular, usability issues were reported that currently make the process of uploading resources perceived as rather cumbersome and complex. This is also mirrored by moderate usability assessment via questionnaire and a divided opinion of the system’s usefulness in its current state. Main issues experiences was the large amount of metadata information requested when uploading a resource and the lacking possibility to take over metadata information across resources. The importing features, which were not fully ready
for this testing cycle, were considered as highly desirable and useful by participants. Participants found the process of assigning semantic categories to resources as easy and straightforward but thought that the existing categories/taxonomy is very focused on RAGE, which might be an issue for broader and future use of the System. The concept of an asset and definition of asset sets seemed not totally clear for participants and would be desired to be better explained and structured in the next system version. Participants also tested the search and filter functionalities of the system and found the filters generally useful. A larger part of the participants highlighted that the resource types for exploration differ from those in the content manager and would have preferred an alignment of terms. The tutorial was consistently perceived as highly appropriate and useful, which is also illustrated by a very positive questionnaire assessment.

All in all, a number of valuable and largely consistent comments could be gathered through this first evaluation and provide a useful source of information for further development work in WP6.
10 ANNEX III: ECOSYSTEM TUTORIAL

10.1 Ecosystem Portal – Upload of Asset Supplementary Material

In the RAGE project assets are advanced game technology modules (software), enriched and transformed to support applied games development. RAGE Assets are self-contained solutions that demonstrate economic value potential, based on advanced technologies related to computer games, and intended to be reused in a variety of game platforms and scenarios. Each RAGE asset includes one or more software components working together on a dedicated task that adds pedagogical value to applied games. It can work together with other assets, target game platforms and external services/software. Assets can be packaged for distribution together with scientific data, manuals, examples of use, content authoring tools and a wide range of additional resources.

This tutorial provides an illustrated walkthrough to uploading asset supplementary material (supporting documentation such as manuals, or related scientific publications).

Target Audience

The stakeholders of the Ecosystem are different user groups and communities who will be affected by and will be using the services and possibilities of the system developed and provided during the project. The main Ecosystem related target groups are given by:

- researcher (groups) and experts,
- asset developers,
- gaming companies and developers,
- training providers (educational providers, intermediary organizations), and
- end users (learners) in application scenarios (industrial and institutional sectors) coming from within or (mainly) from outside the project consortium.

While researchers and experts can provide the first important input on Applied Gaming content and knowledge to be imported into the Ecosystem, game and asset developers represent the game development and industrial perspective on Applied Games and provide information and software assets with related material; training providers and learners together embody the educational and learning perspective on Applied Games and will probably most likely not search for assets but may be interested in publications and other media objects.

Prerequisites

- Recent web browser – Mozilla Firefox, Google Chrome, ... (Microsoft Edge currently not supported)
- Ecosystem portal account (please send E-Mail to jbecker@ftk.de)
- Ecosystem portal URL (Test Environment): http://rage.deploy.ftk.de/

Contact

Please contact ragesupport@ftk.de for bug reports and support.

10.2 Login

Point your web browser to the RAGE Ecosystem portal URL http://rage.deploy.ftk.de/ and click “Login” in the upper right hand corner.

Please enter the RAGE credentials provided (login, password) in the corresponding form fields and press the “Login” button below.
The Ecosystem portal dashboard should then look similar to the following screenshot.

You will find a menubar with the functions Explore, to search and browse the Ecosystem, Import, to import external data from Bibtex, OAI-PMH, Mendeley and Slideshare into the Repository, Content Manager, to manage your own content, create Assets, Publications, Presentations and Software and assign material to asset collections, My Account, to edit your account data, and Logout.

This tutorial will concentrate on the Content Manager and its functionalities. We will show you how to create a new collection of asset supplementary material. Therefore you will create single resources, e.g. a general paper on applied games, in a first step and assign them to an existing asset collection in a second step. It is not mandatory, that resources be part of a collection, but very useful to set them in a context and to enrich assets with additional information.

### 10.3 Create Asset Collection

To create a new collection of asset supplementary material, select “Content Manager » Asset” from the dashboard menu.
In the following screen, please select "+ New Content Set" for creating a new collection for an asset.

Consequently, the metadata for the new asset collection can be entered in the forms depicted below.
The forms in the “Metadata” tab correspond to the “Title” of the asset which defines the collection, a short “Description” of the asset, a set of free “Keywords” and the creation “Date”. We use the Emotion Appraisal Module asset as example for this walkthrough. The tabs “Authors” and “Set” are inactive at this stage. Please click “Create New” to create the asset collection for Emotion Appraisal Module. Clicking “Create New” stores the new asset collection, as confirmed in the next screenshot.
After the asset collection has been saved, semantic categories can be assigned now (“Assign Categories” on the right hand side) or later (cf. Section Categorization of Asset Collection).

Selecting the “Authors” tab now enables the assignment of “Author” and “Author’s Organisation” to the asset collection. More than one author/organisation can be assigned to a particular asset collection. In the following, new author Holger Brocks is created. The (unnamed) drop-down box below “Author Names” is still empty, as no organisations have been created so far. Clicking “Create new” generates the corresponding author record and returns to the main asset view.

Author’s organisations are entered clicking “+ New Author’s Organisation”.
Available organisations can be assigned to new/existing authors.

Selecting “Edit” for author Holger Brocks now allows to associate him with FTK e.V. via the drop-down box, which is stored by clicking “Save”.
The newly created asset collection is now listed (Menu "Content Manager » Asset").

**10.4 Categorization of Asset Collection**

The grey "Status" box indicates that no semantic categories have been assigned to the *Emotion Appraisal Module* asset collection so far. Clicking “Edit” opens the main asset view and categories can be assigned on the right hand side. The taxonomy to be used for semantic categorization can be selected by the drop-down box, resulting in corresponding change of categories displayed (organized as hierarchical trees).
Here, we navigate to the Decision-making and socio-emotional behaviour subtree and select “Emotional behaviour” as semantic category. Please note that appropriate super-categories are marked automatically. Clicking “Assign Categories” on the lower right hand side saves the semantic categories which are now associated with the asset collection. With categories assigned, the “Status” box is now green.

10.5 Upload Material - Software

Eligible material to be uploaded currently comprises “Publication”, “Presentation”, and “Software”. The corresponding upload forms can be accessed via the “Content Manager” menu. Clicking “Content Manager » Software” opens the following form.
Clicking “Create new” saves the metadata for new software. The “Authors” tab now allows to enter “+New Contact” persons for the software, shown below.

Again, information is stored by clicking “Create new”.
After the software contacts (“Authors”) have been created, they can be assigned as “Creators”, “Publishers”, and/or “Owners” via drop-down boxes.

Clicking “Save” stores the above assignments. The “Media” tab allows to enter one or more URLs pointing to software repositories.
Like above, semantic categories can be assigned with software as well.

### 10.6 Upload Material - Publication

Clicking “Content Manager » Publication” opens the (currently empty) listing of publications.

New publications can be entered by clicking “+ New Publication”, yielding the following form with bibliographic metadata fields.
Clicking “Create new” saves the publication metadata and enables the remaining tabs “Identifiers”, “Authors”, “Publisher”, “Editors”, “Serial”, “Conference”, and “Media”. The screenshot above depicts a paper which was published as part of workshop proceedings. The “Authors” tab allows to enter publication authors (“+ New Author”) and authors’ organisations (“+ New Author’s Organisation”). The (optional) “Publication” author metadata fields differ from “Asset”, “Software”, and “Presentation”.
Selecting the “Media” tab finally allows to upload the actual document, either by URL or from the local file system. Clicking “Save” stores/updates the publication record. RAGE categories can also be assigned to a publication, similar to above.

As this example deals with a scientific publication, we additionally select the ACM 2012 taxonomy (via “Assign Categories” drop-down box on the upper right hand side) and assign
category Computing methodologies » Artificial intelligence » Distributed artificial intelligence » Intelligent agents.

10.7 Upload Material - Presentation

Clicking “Content Manager » Presentation” opens the (currently empty) listing of presentations, similar to the publications process.

New presentations can be entered by clicking “+ New Presentation”, yielding the same form with bibliographic metadata fields as shown in the Publication process (cf. Section Upload Material - Publication).

Clicking “Create new” saves the presentation metadata and enables the remaining tabs “Identifiers”, “Authors”, “Publisher”, “Editors”, “Serial”, “Conference”, and “Media”.

The following process is similar to the creation of publications.
10.8 Assign Material to Asset Collection

Selecting “Content Manager » Asset” from the menu brings up the asset listing. “Edit” opens the asset view, here for the Emotion Appraisal Module asset. The “Set” tab allows for searching uploaded material (i.e. publications, presentations previously stored) by title.

Searching for “fatima” brings up the publication uploaded above, which can be selected by either clicking or pressing return.

Clicking “Save” stores the association between asset collection and publication. Please note that publications/presentations can be contained in more than one asset collection.
You can further edit or delete your asset collection or single material by clicking on Content Manager again. You will find a listing of your created material under the corresponding topics Asset, Publication, Presentation or Software.
Finally a logout can be performed with the Logout button.