Compendium Use Case Requirements Analysis

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Introduction

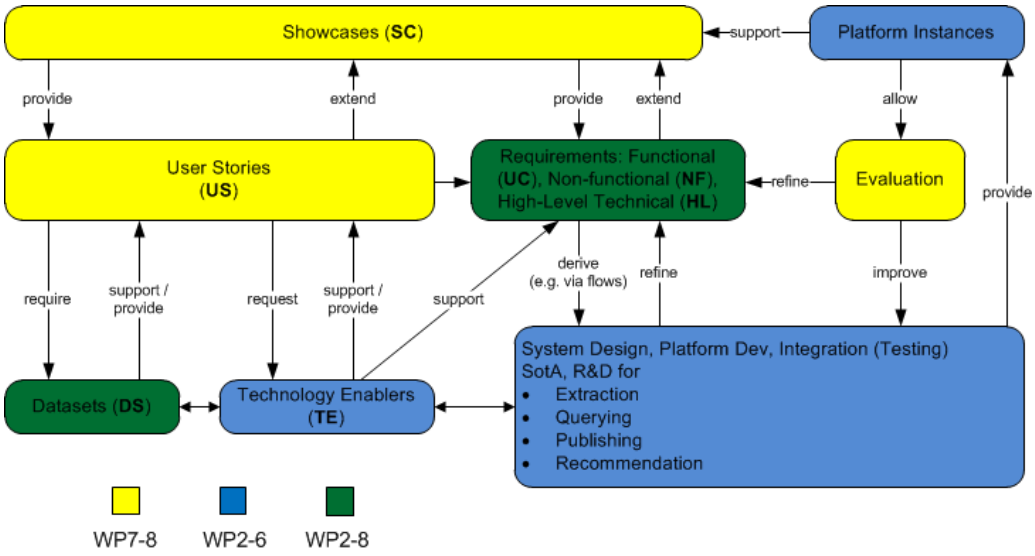
The following document summarizes the MICO requirements analysis methodology, including a description of how “targets” for the further project process were selected, and how requirements analysis and system design / architecture are connected. Moreover, it describes the background, technical platform, current and future projects (“showcases”) of the MICO UC partners InsideOut10 and Zooniverse, and their respective high-level requirements (“user stories”) and available content (“datasets”).

MICO requirements analysis methodology

Responsible Partner / Author: FHG (Patrick Aichroth)

As for many other projects, MICO faces the challenge of identifying requirements, filtering and streamlining them in an interactive process between use case partners and technical partners, and breaking them down into actionable items that can be used for all R&D work in the project - in a sense, linking requirements to system design and integration.

The approach that was chosen is described in the diagram below:



The relevant entities showcases (SC), user stories (US), datasets (DS), technology enablers (TE), and requirements (UC, NF, HL) depicted here will be discussed in the following sections, thereby outlining the specific methodology for the MICO project. As will become clear, the approach is combining “top-down” (abstract, high-level requirements are derived into technical

requirements) and well as “bottom-up” aspects (e.g. feedback regarding technical feasibility leads to the modification of high-level requirements).

Showcases (SC)

The main starting point for requirements analysis are ***showcases (SC)***. While not representing requirements as such, MICO showcases represent current or planned projects of Zooniverse (ZOO) and InsideOut (IO), thereby providing the context for all further requirements. They represent at least slightly different combinations of goals, content sets, and user communities involved. After brainstorming and thorough discussions within the MICO consortium, a set of 18 possible showcases was identified. This set was filtered considering technical feasibility, impact and availability of datasets, ending up with 9 showcases as potential “targets” for the MICO project. These were further scheduled / prioritized into groups (A and B) considering

- expected impact and business / science / societal value
- richness and amount of cross-media content
- existence of “MICO aspects”, e.g. potential of accuracy and robustness improvements due to cross-modal analysis
- technical feasibility regarding availability of textual and audio-visual media extraction, publishing, querying, and recommendation technologies, and cross-cutting technical platform requirements.

Group A will be considered for a first iteration, while expecting that some of them might have to be dropped during the further process considering the R&D risks involved:

1. SC-02 News Videos [IO]
2. SC-10 Plankton Portal [ZOO]
3. SC-14 Galaxy Zoo [ZOO]
4. SC-16 Snapshot Serengeti [ZOO]
5. SC-01 Music Promotion [IO]

Group B provides “backup” showcases that might or might not be used in the further process:

6. SC-11 Worm Watch Lab [ZOO]
7. SC-05 Whale FM [ZOO]
8. SC-15 Asteroid Zoo [ZOO]
9. SC-17 Crises Response [ZOO]

These 9 showcases will be further described in the following main chapters for D.7.1.1 (Zooniverse) and D8.1.1 (InsideOut).

User Stories (US)

Starting from showcases, ***user stories (US)*** are derived. At the same time, new user stories extend (existing) showcases. User stories serve as a starting point for requirement analysis,

capturing requirements on a very high level and are essentially technology-free, in the following form:

```
As a <role>, I want <goal/desire> (so that <benefit>), e.g.
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- "As a user, I want to search for my customers by their first and last names."
- "As a non-administrative user, I want to modify my own schedules but not the schedules of other users."
- "As a user closing the application, I want to be prompted to save if I have made any change in my data since the last save."

The advantage of such a high-level approach is that there is almost no effort in formulating. At the same time, a lot of information can be derived in the further requirements analysis process. However, at least in the case of MICO, such richness *only* emerges if the respective context, the showcase description, is given to a user story, which is why all user stories are tied to at least one showcase. If they are common user stories tied to several showcases, they will appear on the level of Zooniverse, or InsideOut overall descriptions. If they are specific to a certain showcase, they will of course only appear on the level of specific showcases underneath the UC partner descriptions.

User stories will not just be used as “throwaway” tools to derive requirements. As they can always be tied back to these specific “demands” from a user perspective, they can be used to align all downstream development work: By keeping a scheduled, sanitized and prioritized list of user stories (which does not require much effort, thanks to their brevity), which is then to be aligned and cross-checked with technology enablers and datasets, detailed into one or several system use cases (for all: see next subchapters), it can be ensured that all related R&D work serves a defined purpose, thus avoiding misunderstandings between user and technical perspective.

Technology Enablers (TE)

Technology enablers (TE) are the technical counterpart to user stories: They are used to have a first basic understanding of whether and which user stories can be supported using *existing* components/technologies.

Datasets (DS)

Datasets (DS) are crucial not only to support user stories / use cases and hence showcases, but also for training and testing purposes. Apart from supporting a showcase as such, content is crucial to train, and in case, develop textual and audio-visual extractors for the specific demands of a showcase. Datasets can even trigger new ideas regarding specific media extractor, publishing, querying and recommendation approaches.

Requirements (UC, NF, HL) as links to system design / architecture

For further development purposes, MICO uses the following types of ***requirements*** for the system:

1. Functional requirements aka System ***Use Cases (UC)***: Use Cases catch the functional requirements to a system and serve as the core starting point for system design and implementation, for instance by providing basic flows which will then be detailed into UML sequence diagrams, which specify interactions between actors / components, thereby also helping to identify component roles and descriptions, APIs/interfaces, etc. They also provide a main reference for system evaluation. In contrast to User Stories (US), they can and probably will include technology implications, e.g. imply that certain components or subsystems do exist.
2. **Non-functional requirements (NF)**: Non-functionalities can be specific to a specific Use Case (hence the entry on non-functional requirements in the use case tables below), but in most cases, they are more generic, applying to subsystems or the whole system. Examples: Usability, Testability, Performance, Scalability, Security, Privacy, Portability, Interoperability, Maintainability, Modifiability, Integrability, Extensibility.

In addition, **High-Level technical requirements (HL)** are provided by the technical partners, identifying challenges that appear obvious for strategic reasons, from experience, or because of limitations of the existing technologies experiences during the first tests (e.g. during the hackathon).

Hence, these requirements provide the glue to get from requirements to system design and architecture, and respective aspects will be picked up in D6.1.1.

MICO Showcases - Zooniverse

Status

Background of UC partner(s)

Zooniverse is the largest and most popular online citizen science platform. The team is based in the astrophysics department at the University of Oxford and the Adler Planetarium in Chicago. It started in 2007 with the Galaxy Zoo project and now operates over 20 separate projects across many fields of research such as astrophysics, climatology, ecology, biology and history. Each project is built around the idea that volunteers can access the website and classify data (images, video, audio) by performing basic recognition tasks that cannot be easily performed automatically by computers. The form of the task and size of the dataset is unique to each project so they normally take between six months and one year to to build. Zooniverse receives 30-40 proposals for new projects every year but at the moment we are only able to build a small fraction of them.

Current status of project(s)

The are currently 22 active projects running on the Zooniverse platform, with a further 5 at various stages of production. To-date 1.1 million people have registered accounts with the Zooniverse, however we do not require that our volunteers registers an account to be able to take part in our projects.

Market segments

Zooniverse is focused on validating MICO results within the context of citizen science platforms and the scientific research community.

Overall goals and issues for MICO

By definition Zooniverse projects have large amounts of data which require many volunteers to analyse. Anything that can refine the process is extremely useful as it will lead to the science goals being met faster. MICO technologies should be able to help in various ways

- pre-filtering and removing files that do not need to be viewed by the volunteers
- image/video/audio/textual analysis on the data, metadata and associated text comments to retrieve information that will contribute to the classifications
- grouping of files that will allow certain types to be delivered to specific volunteers.

The main goals are to increase the speed, accuracy and efficiency of the analysis and also to create a system that will stimulate higher levels of motivation among volunteers.

User roles

- *Zooniverse Administrators*: are the IT managers with complete access to the solutions.
- *Volunteers*: are the final end-users, i.e. the people who are classifying the data on the various Zooniverse project websites.

Zooniverse Showcase - Generic issues

Responsible Partner / Author: UOX (Grant Miller)

Description

There are many issues that the MICO technologies can attempt address which are not specific to any individual Zooniverse project but can instead be applied across all of the Zooniverse showcases.

User Stories

Legend	
ID	US-xx (xx: unique increment number)
PP	Partner and person responsible for the user story description

ID	PP	Description
US-27	UOX	As a Zooniverse admin I would like to be able to assess how interesting / appealing / complex a picture is based on automated analysis, citizen annotations, and comments on 'Talk'
US-28	UOX	As a Zooniverse admin I would like to be able to detect when a scientist should be prompted to look at a subject, based on annotations and information from 'Talk' comments
US-29	UOX	As a Zooniverse admin I would like to identify volunteer types
US-43	UOX	I'd like to know when I should interrupt a volunteer
US-44	UOX	I'd like to know whether I should interrupt a volunteer with text, an image, or a video
US-45	UOX	I'd like to know when I should educate a volunteer
US-46	UOX	I'd like to know whether I should educate a volunteer with text, an image, or a video

US-47	UOX	I'd like to know which piece of education I should give to a voluntee
US-48	UOX	I'd like to know when a volunteer has made an interesting commen on a subject
US-49	UOX	I'd like to know when Zoonibot (our bot that interacts with our volunteers in the 'talk' areas of the projects) should comment on a subject
US-50	UOX	I'd like to know when Zoonibot should give an explanation
US-51	UOX	I'd like to know what Zoonibot should say to a volunteer

Dataset

ID	DS-04
Partner/Person	Zooniverse / Grant Miller
Description	Data is provided in the form of a MongoDB dump for each use case. The entry for each file in the database contains the metadata associated with it and an AWS url link for the actual file itself. The files for all use cases are JPG images, except the Worm Watch Lab and Whale FM use cases which are MP4 video and MP3 audio files respectively.
Formats	JPG, MP4, MP3

Zooniverse showcase - Galaxy Zoo [SC-14]

Description

The task involves classifying the morphology of galaxies in images from various ground and space-based telescopes. Help scientists better understand the evolution of galaxies and our Universe. Volunteers are presented with an image containing a galaxy at its centre and then follow a decision tree by clicking on-screen buttons to classify the galaxy.

There are some existing publications / previous work on automated analysis of Galaxy Zoo data
- http://labs.adsabs.harvard.edu/adsabs/abs/2012MNRAS.421.2277L/
- http://labs.adsabs.harvard.edu/adsabs/abs/2011A%26A...532A..74B/
- http://labs.adsabs.harvard.edu/adsabs/abs/2005ApJ...635L..29P/
- http://labs.adsabs.harvard.edu/adsabs/abs/2010ApJS..186..427N/

Kaggle recently ran a challenge with a prize for the best algorithm for image analysis of older Galaxy Zoo data - http://www.kaggle.com/c/galaxy-zoo-the-galaxy-challenge

User Stories

Legend	
ID	US-xx (xx: unique increment number)
PP	Partner and person responsible for the user story description

ID	PP	Description
US-30	UOX	As a Zooniverse admin I would like to be able to detect when a scientist should be prompted to look at an image, based on annotations and information from 'Galaxy Zoo Talk' comments
US-31	UOX	As a Zooniverse admin I would like to be able to pre-classify Galax Zoo images using simple low-level image features (brightness, size, symmetry, concentration, spirality, number of objects, clumpiness of the galaxy))

Dataset

ID	DS-05
Partner/Person	Zooniverse / Grant Miller
Description	Data is provided in the form of a MongoDB dump. The entry for each file in the database contains the metadata associated with it and an AWS url link for the actual file itself. There are 365,000 individual images.
Formats	JPG

Zooniverse showcase - Snapshot Serengeti [SC-16]

Description

The task involves identifying various animals and their behaviour from camera trap images in the Serengeti National Park. Helping scientists better understand how the species interact with each other. Volunteers have to identify the animals from a list of 48 species and give information of their numbers and activities.

User Stories

Legend	
ID	US-xx (xx: unique increment number)
PP	Partner and person responsible for the user story description

ID	PP	Description
US-32	UOX	As a Zooniverse admin I would like to be able to automatically detect Snapshot Serengeti images with no classifiable animals in them
US-33	UOX	As a Zooniverse admin I would like to be able to perform automatic image series detection for the case of timestamping malfunction in Snapshot Serengeti images
US-34	UOX	As a Zooniverse admin I would like to be able to perform automatic animal species pre-classification in Snapshot Serengeti (48 species)
US-35	UOX	As a Zooniverse admin I would like to be able to perform automatic animal attribute pre-classification in Snapshot Serengeti
US-36	UOX	As a Zooniverse admin I would like to be able to perform automatic animal number detection in Snapshot Serengeti

Dataset

ID	DS-06
Partner/Person	Zooniverse / Grant Miller
Description	Data is provided in the form of a MongoDB dump. The entry for each file in the database contains the metadata associated with it and an AWS url link for the actual file itself. There are 1.5 million images available.
Formats	JPG

Zooniverse showcase - Plankton Portal [SC-10]

Description

The task involves classifying small sea creatures by species, size and orientation in images taken at different depths in the ocean. Helping scientists measure the health of the ocean. Volunteers have to measure the dimensions of any creature they see in the image and then identify the species with help from a decision tree. There are 23 possible species to choose from.

User Stories

Legend	
ID	US-xx (xx: unique increment number)
PP	Partner and person responsible for the user story description

ID	PP	Description
US-37	UOX	As a Zooniverse admin I would like to be able to perform automatic segmentation / localization of plankton (for manual classification) in Plankton Portal
US-38	UOX	As a Zooniverse admin I would like to be able to automatically detect Plankton Portal images with no classifiable plankton in them

US-39	UOX	As a Zooniverse admin I would like to be able to perform automatic detection of plankton size / orientation in Plankton Portal images
US-40	UOX	As a Zooniverse admin I would like to be able to perform automatic pre-classification of plankton species (23 species) in Plankton Portal images

Dataset

ID	DS-07
Partner/Person	Zooniverse / Grant Miller
Description	Data is provided in the form of a MongoDB dump. The entry for each file in the database contains the metadata associated with it and an AWS url link for the actual file itself. There are 338,000 images available.
Formats	JPG

Zooniverse showcase - Worm Watch Lab [SC-11]

Description

The task involves watching videos of nematode worms and marking when in the video they lay an egg. Data gathered helps scientists better understand how genes work. The volunteer has to watch a 30 second video of a single worm and press the z-button on their keyboard when they see an egg appear.

The videos are long and often nothing interesting happens. If the MICO technologies could be used to identify interesting segments and only show these parts to the volunteers it would save time and possible increase motivation to take part in the project.

User Stories

Legend	
ID	US-xx (xx: unique increment number)
PP	Partner and person responsible for the user story description

ID	PP	Description
US-41	UOX	As a Zooniverse admin I would like to be able to perform automatic worm motion analysis to reduce video duration in Worm Watch Lab
US-42	UOX	As a Zooniverse admin I would like to be able to automatically detect the time in a Worm Watch Lab video where the worm lays an egg

Dataset

ID	DS-08
Partner/Person	Zooniverse / Grant Miller
Description	Data is provided in the form of a MongoDB dump. The entry for each file in the database contains the metadata associated with it and an AWS url link for the actual file itself. There are 74,000 videos available.
Formats	MP4

Zooniverse showcase - Crisis Response [SC-17]

Description

The task will involve looking through satellite image data in close to real-time in the aftermath of a humanitarian crisis (such as a major flood or earthquake) to identify any features that will aid the rescue efforts. Features could include things such as blocked roads, fires, temporary shelters, groups of people. The annotations made by the volunteers will be rapidly assessed for probability and that information will be passed onto the emergency services (and possible through other avenues like social media) as soon as possible.

User Stories

Legend	
ID	US-xx (xx: unique increment number)
PP	Partner and person responsible for the user story description

ID	PP	Description
US-52	UOX	As a Zooniverse admin I would like to detect important features such as areas of flooding, damage, temporary shelters, blocked roads etc. in the satellite images
US-53	UOX	As a Zooniverse admin I would like to be able to assess the probability/weight of a volunteer's classification based on their experience

Dataset

ID	DS-09
Partner/Person	Zooniverse / Grant Miller
Description	Data will be in the form of satellite imagery.
Formats	JPG

Zooniverse showcase - Asteroid Zoo [SC-15]

Description

The task involves searching through optical images to discover and track near-Earth asteroids. Volunteers look at multiple images of the same part of the sky taken minutes apart and are asked to identify anything that is moving with respect to the fixed stars.

User Stories

Legend	
ID	US-xx (xx: unique increment number)
PP	Partner and person responsible for the user story description

ID	PP	Description
US-54	UOX	As a Zooniverse admin I would like to be able to perform pre-filtering of the images to remove artefacts such as bright stars and camera read errors
US-55	UOX	As a Zooniverse admin I would like to be able to detect moving and transient objects in the images

Dataset

ID	DS-10
Partner/Person	Zooniverse / Grant Miller
Description	Data is provided in the form of a MongoDB dump. The entry for each file in the database contains the metadata associated with it and an AWS url link for the actual file itself. There will be millions of images available.
Formats	JPG

Zooniverse showcase - Whale FM [SC-05]

Description

The task involves listening to recordings and look at frequency graphs of whale sounds and match them by similarity. Trying to understand whale 'dialect'. Volunteers listen to a short sound clip, for which they can also see a graph of frequency, and are asked to match it to the most similar clip from a list of 36 that a computer algorithm has identified as being the most similar.

User Stories

Legend	
ID	US-xx (xx: unique increment number)
PP	Partner and person responsible for the user story description

ID	PP	Description
US-56	UOX	As a Zooniverse admin I would like to be able to remove background noise and distracting sounds from the audio files
US-57	UOX	As a Zooniverse admin I would like to be able to group whale calls that are similar
US-58	UOX	As a Zooniverse admin I would like to be able to identify the numbe of whales heard in a single audio file

Dataset

ID	DS-11
Partner/Person	Zooniverse / Grant Miller
Description	Data is provided in the form of a MongoDB dump. The entry for each file in the database contains the metadata associated with it and an AWS url link for the actual file itself. There are 16,000 audio files available.
Formats	MP3, WAV

MICO Showcases - InsideOut10

Responsible Partner / Author: IO10 (Andrea Volpini, David Riccitelli)

Status

Background of UC partner(s)

InsideOut10 is an Italian start-up and consulting firm with an extensive experience on web publishing and media delivery platforms.

InsideOut10 is major shareholder of Interact Egypt L.L.C. (soon to be Insideout.Today) a start-up based in Cairo, Egypt and focused on content management solutions for broadband and mobile networks.

The intrinsic mix of Internet technologies and communication skills is at the very base of the projects carried out by InsideOut10 for a wide range of clients in Europe, US and the Middle East.

InsideOut10 client-base include mobile operators, ISPs, broadcasters, media companies, energy utilities and content providers as well as education & research bodies and here follows a selection of clients interested in the development of the MICO platform:

1. **Mobile Operators & TLC sector**
    a. Wind (Italy)
    b. A1 (Austria)
    c. Mobinil (Egypt)
    d. LinkDotNet (Egypt)
    e. Tunisiana (Tunisia)
    f. Djezzy (Algeria)
    g. Mobilink (Pakistan)
    h. Mobily (Saudi Arabia)
    i. FastTelco (major ISP in Kuwait)
2. **Media**
    a. 5FM Radio (South Africa)
    b. Kuwait National Radio & Television (Kuwait)
    c. Melody TV (Egypt)
    d. West African Content (Ghana)
    e. Saudi Research and Marketing Group (Saudi Arabia)
    f. Digital Media Co. (Egypt)
3. **Marketing & Advertising**
    a. AirMob (Ghana)
    b. JWT (Ghana)
4. **Energy** Enel (Italy)

5. **Sports** Al-Hilal club (Saudi Arabia)
6. **Education**
    a. German University in Cairo
    b. Berlitz
    c. Università La Sapienza
7. **Tourism** Savoy hotels
8. **Technology**
    a. RealNetworks (US)

InsideOut10 is active in the Research and Development with joint programmes developed in partnership with Sapienza Innovazione (Università La Sapienza), the Italian Council for Research (CNR) and the Department of Information Engineering, Computer Science and Mathematics at Università degli Studi dell'Aquila (DISIM UNIVAQ).

InsideOut10 main competencies include:

- Development of digital asset management solutions,
- Dynamic Semantic Publishing,
- Linked Data publishing,
- Design, planning and development of strategic online positioning for brands.

InsideOut10 as Mico's industry partner will validate the project's results on his products and solution: Helix Cloud (video middleware developed in partnership with RealNetworks), WordLift (a semantic plug-in for WordPress) and a mobile instant video recording application for user generated content being developed by the Egyptian team and named "شوف" (it means "Look here" in arabic and it is pronounced "*Shoof*").

Current status of project(s)

InsideOut10 created Helix Cloud in partnership with RealNetworks Inc., a middleware platform to benefit existing and new audio/video operators that need to exploit the value of their content with streaming media. Helix Cloud integrates with video servers and exposes APIs to fully automate user management, content ingestion, content publication, channel management, conditional access and reporting[1].

InsideOut10 also created WordLift, a software bringing semantic web capabilities to WordPress (one of the World's largest Open Source WCM), fully integrated with the CMS visual editor, posts management and authorships metadata. WordLift adds a new entity management section and integrates with cloud RDF Triple Stores to expose the site content as Linked Open Data. WordLift provides content discovery functionalities that leverages on the LOD cloud and embeds microdata in WordPress managed web sites.

[1] An online presentation of Helix Cloud is available on SlideShare:
http://slideshare.net/davidriccitelli/helixcloud-showcase

InsideOut10 also created WordLift to provide on WordPress (one of the World's largest Open Source WCM) a uniform access infrastructure for data using the Semantic Web stack and Linked Data principles[2]. The goal of WordLift is to make content available for consumption by humans and machines using standardized formats and access mechanisms, providing re-use of open data easy and unified. WordLift connects different sources (both internal and external) providing interoperable data, forming a global graph that can be traversed by clients to discover new information. WordLift provides entity management facilities and integration with external rdf triple stores to expose the site contents as Linked Open Data. Content discovery functionalities are provided by interacting with the global graph and embedded microdata is added for search engine optimisation using schema.org.

The hereby described use cases are formed by the experience gathered on large clients (mainly telecom operators providing value added services over broadband and mobile networks) and mid-sized organisations producing vast amount of contents on the Web using open source web content management systems. The general aim is to extend the capabilities of semantic analysis, currently limited in WordLift to textual contents, to audio/visual media and to complete the Helix Cloud platform with advanced semantic capabilities, extending the existing workflow of content analysis, publication, search and discovery.

An high-level flow of data is therefore the following:

The ingestion and publication stages take place inside the respective platforms. The other stages, analysis, search and discovery, see the integration of the platforms with the MICO platform.

The same flow applies to the user-generated content (UGC) application (Shoof) with the main difference that it relates with users on the ground capturing short video clips with their handsets and publishing these videos using Helix Cloud. In this context it becomes crucial to introduce video-quality assessment functionalities, nudity detection and above all cross-referencing news contents to determine content relevance based on the geo-localization of the UGC clips.

Business approach

With platform installations featuring terabytes of contents and millions of views per month, operators and organisations have an increasing need for boosting revenues by promoting content to a variety of users. They need to establish discovery patterns that engage casual/indifferent users leveraging on context knowledge, therefore matching the best content according to the user profiles and content similarity.

[2] Linked Data on the W3C website: http://www.w3.org/standards/semanticweb/data

The pervasiveness of communication, massive shift towards mobile devices, requires the creation of intuitive natural user interfaces for content consumption which increase the use of offered media through simple actions related to natural, everyday human behaviors.

The current status quo where content is locked in different platform (silos) needs to evolve and content offerings shall be made seamlessly accessible across different channels.

The ability to analyse ingested content, providing metadata, categorization and complementary information, will enable an holistic access to media that is currently missing.

Enriched metadata can be combined with profiling data to further customize the user experience and extend content consumption by repurposing matching content.

Market segments

InsideOut10 is focused on validating MICO results within the context of telecom operators, media broadcasters and web content publishers.

Overall goals and issues for MICO

Solutions such as WordLift and Helix Cloud or UGC applications like Shoof traverse different market segments ranging from large network operators (both mobile and broadband) - that need to keep media contents within their datacenters - to web publishers and start-ups looking for a more flexible and a scalable approach and generally favorable to cloud-base solutions.

The MICO platform must be therefore modular and provide the ability to install “satellite” components on-premises. These components will allow content to be analyzed / annotated in the provider domain (hosted by the provider).

The information resulting from the content analysis shall be made available to the content provider in order to review the metadata, fine tune it and eventually integrate it.

Here is an high level overview of the goals and issues we can foresee at this stage:

- Platform scalability: content shall be analyzed and annotated in a distributed manner using on-premises “satellite” components to avoid transferring large files and to secure media contents; the general platform architecture shall make it possible to add additional nodes according to the platform load, with particular reference to the media processing nodes which might have a major load on the platform itself.
- Content annotation: the platform shall support (semi-)automatic analysis enabling content editors intervention to enrich metadata and interlink content; therefore content annotation is either automatic as a result of the analysis provided by the platform components, or

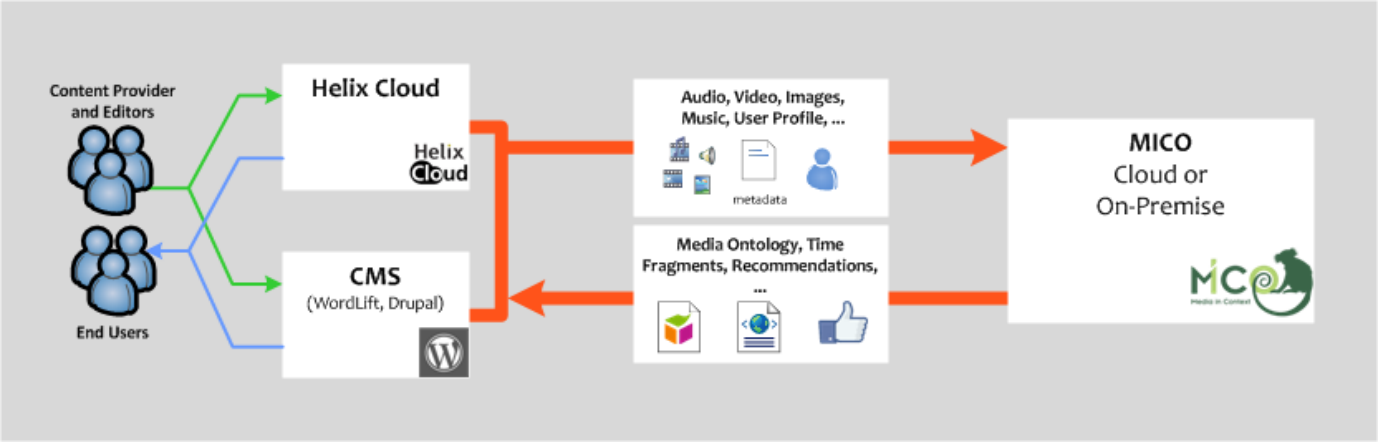
manual as a result of editors describing the entity annotations on the media contents, or a combination of the two.

- Content recommendation: the platform shall discover and purpose content using content analysis and item similarity (item similarity shall include both the analysis of the metadata and the analysis of the actual media). Recommendation shall also be based on user profile (user similarity using the following parameters: gender, age, occupation and location).

High Level Application Flow

As an example we represents here a high-level application flow for Helix Cloud.

On the left side there are Content Providers and Content Editors ingesting content to the Helix Cloud platform. Helix Cloud integrates with MICO providing content analysis, search and discovery capabilities.
The semantic data is stored in the CMS data-store according to the specific CMS architecture and formats for presentation and consumption by the editors and the end-users.



InsideOut10 Music Showcase

User roles

Several user roles are defined within the Helix Cloud solution. They are used throughout the following user stories. This is the list of roles:

- *Administrators*: are the IT managers which complete access to the solution, they can create new organization accounts and new users, and assign roles,
- *Content Providers*: they participate in organization groups sharing the same disk quota and aggregates statistics, they receive a username and a password that enables them to ingest new content by using the integrated FTP Server,

- *Report Users*: is a special role for providers that can access the platform reports. They may access the full organization reports or only those related to their content,
- *Users*: they are the final end-users of the solution, that connect to a portal or an app which is publishing the media ingested by the content providers. Users are usually profiled by an application server and go through a payment gateway or subscription before they can actually access the content.

User stories

Legend	
ID	US-xx (xx: unique increment number)
PP	Partner and person responsible for the user story description
I	Importance: L(ow), M(edium), H(igh)
S	Status: D(raft), A(greed)

ID	PP	I	Description	S
US-01	IO10		As a user, I want search and discover music using content identification / fingerprinting.	
US-02	IO10		As a user, I want search and discover music based on my profile (gender, age, location expressed at city/region level and optionally occupation).	
US-03	IO10		As a user, I want search and discover music based on other users similar to myself (user similarity).	
US-04	IO10		As a user, I want search and discover music or ringback tones similar to a given music video (or to a given audio track) based on content similarity (item similarity).	
US-05	IO10		As a user, I want search and discover music by exploiting enriched metadata to find related artists, new genre, or other relevant listening path. Few examples: ● all artists born in the location I'm visiting ● all artists connected to the artist I'm listening to by a common music background or by previous collaborations	

			● all tracks from the same genre recorded during the same period (1-12 months range) and around the same area (region)	

Following is an concrete example case, where a content provider ingests content to the platform:

Context	Content providers upload audio, video on the platform - RBTs are uploade on a specialized system (in this case only metadata is available on th platform).
Ingestion: metadata	Content providers ingest metadata along with files, e.g.: ● title (1) ● author (1) ● description (optional) ● genre (optional) ● content category (1+) ○ content subcategory (1+) ● copyright holder (optional) ● price Metadata is typically messy and incomplete, suffering for bad manua curation. In most cases only title, content category, content subcategor and price are available.
Ingestion: Audio/Video	Helix Cloud/CMSes send to MICO an audio/video asset for analysis alor with the available metadata.
Ingestion: RBT	CMSes send to MICO the RBT metadata (see above - actual media may c may not be available) for analysis. Analysis is then performed on metadat only.
Ingestion: UGC	Content provider is an end user ingesting a media and additional metadata ● location (coordinates) ● user gender ● user age ● user occupation (if available) The metadata on the user is derived from the social login of the applicatio
Results	MICO replies with:

	● metadata of the content item (for a list of metadata properties, se Ontology for Media Resource 1.0 from W3C), ● Sequence detection data (in the form of Media Fragments), ● Entity annotations (e.g. People, Organizations, Places, Products recognized in the content item (and related to the Medi Fragments), ● Similarity and recommendations. Helix Cloud/CMSes might send a context vocabulary.
	Content editor verifies the results and accepts them.

- content
  - IO tracks: several thousand tracks
  - IO music videos: check (at least 3 different platforms)
  - audio and video podcasts on music
  - Ringtones
  - Video Clips
  - Images

Dataset

An actual dataset of data used in live systems is provided as reference for development and testing:

ID	DS-02
Partner/Person	IO10/ David Riccitelli, Andrea Volpini
Description	Several value added contents used in live TLC platform for resale to end customers. Divided in music (full-track songs), videos (video clips), ringtones (short tracks, usually less than 30 seconds, suitable as ringtones), images (such as those used for screen background). Some metadata (such as file category) may be published in related spreadsheet files available in the same folder as the data files at this address: https://drive.google.com/a/insideout.io/#folders/0BxDtLV4i3ZwcaGlKN3d RHhGaDA
Formats	music: MP3 files; videos: 3GP files; ringtones: WAV, MP3, MMF, AMR, AAC; images: PNG, JPG, GIF

InsideOut10 News Video Showcase

Legend	
ID	US-xx (xx: unique increment number)
PP	Partner and person responsible for the user story description
I	Importance: L(ow), M(edium), H(igh)
S	Status: D(raft), A(greed)

ID	PP	I	Description	S
US-06	IO10		As a user, I want to upload geo-tagged videos.	
US-07	IO10		As a user, I want to view thumbnail sequences of video segments.	
US-08	IO10		As a user, I want to get info about similar video items and segments (item similarity).	
US-09	IO10		As a user, I want to get info about perceptually similar video items and segments (item similarity).	
US-10	IO10		As a user, I'd like to receive content recommendations from similar profiles (based on gender, age, occupation and location).	
US-11	IO10		As a user, I'd like to receive content recommendations based on most relevant news events in my area.	
US-12	IO10		As a user, I want to identify persons in videos, and receive related information about them.	
US-13	IO10		As a user, I want to identify products in videos, and receive related information about them.	
US-14	IO10		As a user, I want to identify broadcaster logos in videos, and receive related information about them.	
US-15	IO10		As a user, I want to identify brands in videos, and receive related information about them.	

US-16	IO10		As a user, I'd like to take a picture or upload an image and b recommended with videos related to that picture or image.	
US-17	IO10		As a user, I'd like to walk around, access content using a geographical map and be informed if there are videos covering th area (ie a neighborhood), monuments or any other relevant point o interest.	
US-18	IO10		As a user, I'd like to search content items using automatic speech recognition.	
US-19	IO10		As an admin, I want to see, validate and edit segmentation o videos.	
US-20	IO10		As an admin, I want to annotate news video segments and extrac a topic for each segment.	
US-21	IO10		As an admin, I want to filter and rank videos based on A/V qualit aspects.	
US-22	IO10		As an admin, I want to get a quick assessment of whether audio material has been edited before the upload.	
US-23	IO10		As an admin, I want to pre-filter nudity content.	
US-24	IO10		As an admin, I want to pre-filter content using conceptual an keyword based search.	
US-25	IO10		As an admin, I want the ingested contents to be automatically validated for copyright infringement.	
US-26	IO10		As an admin, I want the ingested contents to be classified using user-generated vocabularies (custom schemas) or existing linked data classification / vocabularies (i.e. IPTC).	

- content
    - combination of geo-tagged news content, news feeds, user-created content to selected past events as well as video clips sourced from YouTube
    - news content video podcasts from broadcasters, YouTube to evaluate video segment identification to selected past events

Datasets

ID	DS-12
Partner/Person	IO10/ David Riccitelli, Andrea Volpini
Description	User generated content coming from “Shoof”
Formats	videos in MP4 or 3GP format; images: PNG, JPG, GIF

ID	DS-13
Partner/Person	IO10/ David Riccitelli, Andrea Volpini
Description	AP news video content (http://www.aparchive.com/) along with the following optional metadata: ● Title ● Summary ● Story No ● Source ● Aspect Ratio ● Date ● People ● Subscription ● Shortlist extract ● Categories/Tags
Formats	videos in MP4 or 3GP format; images: PNG, JPG, GIF ● Resolutions: HD, SD ● Statuses: Not Digitized, Digitized ● Colors: Color, Black & White ● Aspect Ratios: 16:9, 4:3

ID	DS-14
Partner/Person	IO10/ David Riccitelli, Andrea Volpini
Description	YouTube video content (http://www.youtube.com/) for video segment identification and content exploration
Formats	Formats: H.264, WebM formats.

	Metadata: available using YouTube Data API v3 (https://developers.google.com/youtube/v3/) Resolutions: 240p, 360p, 480p, 720p, 1080p