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Reshaping Attention and Inclusion Strategies for Distinctively vulnerable people among the forcibly displaced

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Requirements for the CRIOS

Deliverable D8.1

Anas M. Al-Sobeh¹, Luisa Ardizzzone², Rubén Fuentes-Fernández³, Mohammed Ghazi Al-Zamel¹, Alberto Provenzano², Amani M. Shatnawi¹

¹ Yarmouk University | Defaa Street, 21163, PO 566, Irbid, Jordan

² CESIE | Via Roma 94, 90133 Palermo, Italy

³ UCM | Avda. de Séneca, 2, Ciudad Universitaria, 28040 Madrid, Spain



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Del. 8.1 Requirements for the CRIOS – v12 [January, 2020]

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Coordinator contact: Dr. Rubén Fuentes-Fernández | Universidad Complutense de Madrid | Avda. de Séneca, 2. Ciudad Universitaria 28040 MADRID, Spain.
t: +32/14 33 58 46 | e: rfuentes@ucm.es | w: www.ucm.es



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t: +32/14 33 58 46 | e: rfuentes@ucm.es | w: www.ucm.es



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t: +32/14 33 58 46 | e: rfuentes@ucm.es | w: www.ucm.es



RAISD Glossary

ARU	Action Research Unit
ARUL	ARU Leader
ARUP	ARU Participant
BPM	Business Process Management
BPMN	Business Process Modelling Notation
CMS	Content Management System
CRIOS	Collaborative Research and Innovation Online Software tool
CRM	Customer Relationship Management
DPO	Direct Public Offering
FOSS	Free/Open Source Software
HQ	Headquarter
ICW	Internal Collaborative Workspace
KPI	Key Performance Indicator
OMG	Object Management Group
RRI	Responsible Research and Innovation
TAIS	Tailored Attention and Inclusion Strategy
UCM	Universidad Complutense de Madrid (Spain)
UML	Unified Modelling Language
VC	Vulnerability Context
VG	Vulnerable Group

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t: +32/14 33 58 46 | e: rfuentes@ucm.es | w: www.ucm.es



About RAISD	
Call (part) identifier	H2020-SC6-MIGRATION-2018
Topic	MIGRATION-08-2018 Addressing the challenge of forced displacement
Fixed EC Keywords	Globalisation, migration, interethnic relations
<p>Forced displacement crises overcome societies and institutions all over the world. Pushed by the urgencies rather than events, solutions are frequently reactive, partial, and disregard some groups. The project 'Reshaping Attention and Inclusion Strategies for Distinctively vulnerable people among the forcibly displaced' (RAISD) aims at identifying highly Vulnerable Groups (VG) among these forcibly displaced people, analysing their specific needs, and finding suitable practices to address them. The concept of 'vulnerability context' considers the interplay between the features of these persons and their hosting communities, their interactions and experiences, and how different solutions for attention and inclusion affect them. As a result of this work, a methodology to carry out these studies will be developed. These goals are aligned with the call. They pursue characterizing these migrations and developing suitable aid strategies for them. The Responsible Research and Innovation (RRI) frames the project. It proposes that all actors (including civil society) co-design actions, transversely integrates the gender perspective, and supports sustainability. Our research strategy will be based on methodological triangulation (i.e. the combined application of several methodologies). We will implement it through a specific participatory action research approach to fulfil the aim of undertaking advocacy-focused research, grounded in human rights and socio-ecological models. The team will work as a network of units in countries along migration routes. The units will promote the VG people' involvement, so they can speak with their own voices, gather information, and test practices. Work will rely on a tight integration of Social and Computer Sciences research. Automated learning and data mining will help to provide evidence-based recommendations, reducing a priori biases. A software tool will support collaboration, continuing previous H2020-funded RRI work.</p>	

Coordinator contact:

Dr. Rubén Fuentes-Fernández | Universidad Complutense de Madrid | Calle del Profesor José García Santesmases, 9. Ciudad Universitaria, 28040 MADRID, Spain.

t: +34 91 3947548 | e:rfuentes@ucm.es | w: <http://www.ucm.es/>, <http://grasia.fdi.ucm.es/>

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Coordinator contact: Dr. Rubén Fuentes-Fernández | Universidad Complutense de Madrid | Avda. de Séneca, 2. Ciudad Universitaria 28040 MADRID, Spain.
t: +32/14 33 58 46 | e:rfuentes@ucm.es | w: www.ucm.es



Executive Summary

The RAISD project Consortium 'Reshaping Attention and Inclusion Strategies for Distinctively vulnerable people among the forcibly displaced' hereby shares the requirements for its Collaborative Research and Innovation Online Software tool (CRIOS).

Lead and contributing partners of Task 8.1 [Requirements elicitation]:

No	Name	Country	Role
1	Universidad Complutense De Madrid	Spain	Support partner and implementer
2	CESIE	Italy	Elicitation of partners' requirements
4	Helsingin Yliopisto	Finland	Analysis of project needs regarding the tool.
7	Yarmouk University	Jordan	Collaboration in the elicitation of requirements and the analysis of third-party tools and frameworks

The work in the project demands a multidisciplinary team working distributed geographically over time. It will use a variety of quantitative and qualitative methods from Social Sciences and techniques from Computer Science (e.g. data mining, automated learning and sentiment analysis) to process data and help researchers to create and test hypotheses. The team will also need effective mechanisms to share information.

The support to the previous functionalities will be organized around the CRIOS. The CRIOS will integrate functionality for information and knowledge sharing by different actors, and the related analysis tools. There will be specific access applications (*clients*) or rights to the CRIOS, according to the requirements of the different actors, e.g. people from vulnerable groups, civil society or researchers.

The CRIOS will work in tight integration with the Internal Collaborative Workspace (ICW) (see *D9.5 Internal collaborative workspace*). The ICW will store documents for research and deliverables (which can be linked and used by the analysis tools in the CRIOS), and planning information (including the calendar, tasks and their responsables). Depending on the final development, it can also provide some dissemination functionalities.

This document is to be updated during the lifecycle of the project if needed, introducing further information as milestone actions get finalised and reported.

*The present **Requirements for the CRIOS, Version 1** is part of WP8 Deliverable 8.1 Requirements for the CRIOS on behalf of WPL UCM, Spain [January 2020].*

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t: +32/14 33 58 46 | e: rfuentes@ucm.es | w: www.ucm.es



1 Introduction

1.1 Purpose

The CRIOS is a platform that implements several functions, utilities and services to support the collaborative work between different stakeholders. Following the principles of Responsible Research and Innovation (RRI) (Owen et al., 2012), these stakeholders include representatives of all the interested parties, who will participate as first-order actors in the RAISD activities.

The platform embodies a process architecture for the co-design and analysis activities related to the Vulnerability Contexts (VCs) and the Tailored Attention and Inclusion Strategies (TAISs) in the context of teams organized as working Action Research Units (ARUs). That process architecture is a well-structured workflow consisting of various phases that are supported by appropriate tools and methods, which guide the participation of innovation and knowledge actors through the activities. This process architecture partly reflects the RAISD methodologies (see respectively *D3.2 Work methodology and guidelines* and *D3.3* and *D3.4 TAIS methodology and guidelines*).

The process consists of both online activities and real-life workshops. These support actors to gradually and together identify the VCs and design and test the TAISs for them. The platform will facilitate the process via dialogues between participating actors and stakeholders. These dialogues allow the co-creation of accessible and transparent documentation of the intermediary and final process results. The platform will also include analysis tools to process data related to activities and produce reports on them.

Given the rules for the project appearing in deliverables related to data management (see *D9.1 Data Management Plan* and *D9.2 Privacy Plan*), the CRIOS will only process, store or transmit anonymized information. In case that some process can involve non-anonymized information, it will be processed locally (in the machine of the user requesting the processing), and never transmitted or stored remotely.

The CRIOS will have an architecture based on web services accessible from multiple *client* applications, which will be adapted to the specific needs of the different groups of stakeholders according to their context of action. It will provide several services to support the implementation of the activity framework from WP3. These services are:

- *Innovation services*. These are intended to facilitate interactions between stakeholders and to support their activities following the project methodologies.
- *Activity history*. These services log information on the use of the platform in order to create an accurate picture on how it has supported user activities.
- *Communication and dissemination of activities and results*. These services provide digests, reports and statistical data on the project activities, according to the dissemination policies.

The general prerequisites of the platform, as stated in the project Technical Annex, are the following:

- Support for online collaboration in order to reach common solutions.
- Support for online communication (i.e. discuss and comment).
- Support for the integrated use of analysis tools.

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After a preliminary analysis, it was found useful to add the following requisites to achieve the previous ones:

- Support for the online data collection of specific items. It will be usually as forms to be fulfilled by users, though more complex interfaces can be considered, either with users or other systems, according to identified needs during the project.
- Provide some means of dissemination of limited information for the general public.
- Support the analysis of past activities using the platform.
- Allow the incorporation and modification of functionality in the future according to the identified needs.

1.2 Design approach

The stakeholder feedback is considered essential for the success of the CRIOS: only if it fulfils the needs of the different stakeholders taking part in the project and the TAIS-related activities, it will become an effective support platform. Due to the changing needs and the possibility of unforeseen difficulties in the development of the platform, a rapid prototyping approach has been adopted.

The development will follow an iterative, incremental and participatory approach based on Lean Design (Olsen, 2015; Poppendieck & Poppendieck, 2009). This implies organising short development cycles, guided by users' feedback (here the participating stakeholders), focused on providing increments of the highest value for users, and with actual implementations or prototypes. Such approach is very well suited to work in RRI contexts as shows the partners' experience, and conforms to standard practices in engineering for innovative technologies.

An advantage of this approach is that it helps to ensure that the intended design and the implementation are coherent and evolve to fulfil users' needs. Early releases of working systems will allow involving the stakeholders from the start and assessing and evaluating the progress regularly. Preliminary testing will be performed prior to deployment of every version in a controlled laboratory environment with project members.

In order to fulfil its aims and facilitate its sustainability and widespread use, the CRIOS development will adopt the following principles. It will be built on top of Free/Open Source Software (FOSS), together with open standards and open protocols to facilitate interoperability, as much as possible. Besides, its development process will be "open", that is, with public repositories (e.g. GitHub¹ and BitBucket²), public tickets (reports and feature requests), and public documentation. This facilitates for anyone following the project development reporting bugs or even collaborating with the developers in the evolution of the platform. These principles will be always limited by the considerations included in the other deliverables of the project, including the Ethics Plan (see D3.1), Privacy Plan (see D9.2), and the requirements about data processing (see D1.4 and D1.5).

¹ <https://github.com/>

² <https://bitbucket.org/>

1.3 Vision and scope

The goal of the CRIOS is to support users to work in a collaborative way on the definition of TAISs following the RAISD methodology. This work will provide valuable insights on the process that will be used to enhance the methodology.

In this way, the features of the CRIOS are largely derived from the methodology. This methodology specifies a partly ordered sequence of phases in the process of developing TAISs. Each phase needs to analyse certain inputs and implement workshops with people representing different stakeholders. These tasks are coordinated by TAIS experts (currently the project researchers).

The purpose of the platform is to support users to carry out each of these phases and associated workshops, to collect their results, and to facilitate summarising and making public the outcome of the process. This is done by providing tools for getting information, analysing it, co-editing documents, user interaction, and publishing, in an integrated framework.

2 State of the art

The study of the tools related to the CRIOS includes collaborative platforms for the workflow (see section 2.1) and analysis tool to support data study (see section 2.2). Conclusions summarise findings (see section 2.3).

2.1 Collaborative platforms

The work with TAISs corresponds to the novel approach in the RAISD project, though it is framed by the wider paradigm of RRI (Owen et al., 2012). However, there are no specific collaborative platforms either for TAISs or RRI so far.

Regarding platforms and tools for collaborative work, there are plenty of alternatives. The ones used in a group or organization depend on many factors, including their computer skills, the kind of project they are working on (e.g. innovative vs consolidated process), their organisational structure (e.g. hierarchical vs flat structure) and the needs the software covers (e.g. communication, digital repository, planning, or collaborative editing).

Usually, organisations do not rely on a single tool that satisfies all their needs, because it would be probably tailored and of high costs, and it would make more difficult to interoperate with external partners. Thus, they combine multiple tools, which frequently also causes interaction problems.

Next sub-sections review some groups of these tools classified in several categories according to their main purpose: content management (see section 2.1.1); building communities (see section 2.1.3); matching people needs and services (see section 2.1.4); project management (see section 2.1.5); workflow management (see section 2.1.6); communication (see section 2.1.6); RRI co-design (see section 2.1.7). The lists do not aim to be exhaustive, but to offer a good perspective of the current trends in collaboration tools. This is useful to identify relevant functionality to support the RAISD process, and thus CRIOS requirements. This review is partly based on the classification and report for collaborative platforms of the H2020 project FoTTRIS (Bautista et al., 2018).

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t: +32/14 33 58 46 | e: r.fuentes@ucm.es | w: www.ucm.es



2.1.1 Content management

Content Management Systems (CMSs) are applications intended to support the creation and modification of digital content. Web CMSs support the creation of websites and the management of its contents. In this context, WordPress³ (WordPress, 2020), Drupal⁴ (Drupal, 2020), and Joomla⁵ (Joomla, 2020) are widely used examples. They usually implement plugin architectures that make possible to extend their basic functionality to support a wide range of needs when implementing websites. Examples of these plugins are those for the management of users, sells and payments, and social media, or for the usability and graphical aspect, and software updates.

The technical skills required to use these plugins vary in a wide range, since there are plugins intended for final users and others for technical staff. In the same way, their management requires a good technical knowledge. The basic installation can be simple, but going further (which is needed when traffic rises or needs are not usual) requires adjustments that are beyond the capabilities of the average user.

Many web-based tools in next sections are based or encapsulate some functionality that can be found in these web CMSs, but they package and tailor it to make easier the setup and adjust it to specific contexts.

2.1.2 Building communities

The tools in this section are intended to support the collaborative efforts of communities. They provide functionality for the management of users and their common activities, and to promote the engagement of new members.

CiviCRM⁶ (CiviCRM, 2020) is a suite for Customer-Relationship Management (CRM), with a focus on constituent relationship management, i.e. on service vs revenue. It is specifically designed for the needs of non-profit, non-governmental, and advocacy groups. It supports the management of volunteers, activists, and voters, and other more general business contacts, such as employees, clients, or vendors. Its functionality includes the management of contacts, memberships, cases, events, contributions by donors and accounting. CiviCRM is designed as a web-based suite of tools. It is open source.

NationBuilder⁷ (NationBuilder, 2020) is a platform to support the efforts of political organisations and advocacy groups. It gained popularity after the successful stories with it of the campaigns of Donald Trump and the Brexit movement in 2016 and Macron in 2017 (O'Brien, 2017). Campaigns are organized around a website and social media. It has functionality for fundraising, coordination of events, creation of petition pages with goals, and member management. This management includes support to track members using the email address from their profiles to find any public social media profiles associated with them.

Drutopia⁸ (Drutopia, 2020) emerges as an alternative to common platforms that support communities (e.g. NationBuilder) inspired by the principles of software freedom and community ownership. Its core values include

³ <https://wordpress.org/>

⁴ <https://www.drupal.org/>

⁵ <https://www.joomla.org/>

⁶ <http://civicrm.org/>

⁷ <http://nationbuilder.com/>

⁸ <https://drutopia.org/>

the protection of personal information and privacy, and the prioritization of collaboration and cooperation above competition. Drutopia software is based on a Drupal distribution. They also intend to provide hosting to support the use of this software as a service (i.e. “LibreSaas”). The governance of the institution and all its products and services is based on direct democracy with members.

Mobilize⁹ (Mobilize, 2020) is a platform to create, boost and manage social movements. Its customers include companies like Google, Microsoft, Salesforce, and Verizon, though it is used by other small and large companies. Their common requirement is to interact with large groups of external stakeholders, such as developer relations, on-demand workforces, brand ambassadors, startup accelerators, professional networks and marketplace sellers. The tool focuses on helping the group leaders to build strong relationships with their network of partners or members through communication strategies and actions at scale. This communication functionality includes email, sms, events and polls, organized around a built-in database and analytics tools.

Mighty Networks¹⁰ (Mighty Networks, 2020) support the creation of social networks to share common interests. It supports user management, including their membership to given networks, profiles including location and categories of interest. The platform uses all this information as input to proprietary algorithms that determine what members can be useful to introduce to others.

2.1.3 Matching people, needs and services

Communities trying to develop some product or result share the problem of how to match the capabilities and resources that people can offer with those needed for a project. The tools and platforms in this section address how to match them and boost people's involvement.

OurGoods¹¹ (OurGoods, 2020) is a network for creative people (e.g. artists, designers, crafts people, and activists). It connects them so they can barter their skills and spaces to get projects done. Formally, it is a peer-to-peer online network. From 2008 to 2016, it supported the setup and development of this kind of projects. It offered matching partners, account their activity in projects, and technical assistance. Registered users defined their profile, including lists of their needs and what they offered, and the sort of projects they were involved in. Then, they could search for other users who could fill those needs and projects where they could collaborate. After a matching, users could discuss on how to exchange labour and rate it. The network today (by the start of 2020) has a reduced activity through a Facebook page.

Taproot Foundation¹² (Taproot Foundation, 2020) is a non-profit organisation that connects non-profit organisations with skilled volunteers (who can belong or not to companies) through *pro bono* services. Taproot pursues that those organisations have full access to effective support operating functions (e.g. marketing, information technology, and human resources) that they need for their program delivery. It pairs those needs with

⁹ <https://mobilize.io/>

¹⁰ <https://mightynetworks.com/>

¹¹ <http://www.ourgoods.org/>

¹² <http://www.taprootfoundation.org/>

qualified and skilled volunteers in a variety of forms, from team-based long-term projects to one-time consultations.

Coliga¹³ (Coliga, 2020, a, b) was a company and tool that enabled communities of independent workers (i.e. freelancers) to share and receive job offers as a collective. Coliga charged a 5% fee and every worker who contributed to the completion of a job was rewarded financially. In this way, it supported emerging communities to thrive within the traditional market economy while maintaining their flexible dynamics and allowing workers to keep more of the value they generate.

Part-up¹⁴ (Part-up, 2020) is a platform and mobile app to match people and project teams. People describe their skills and decide via the app in which projects and with whom they want to work with. A user can find a work that fits, choose interesting communities (*tribes*) to join, and receive personal suggestions for temporary teams (*part-ups*) to contribute. This allows easily assembling temporary teams.

Taiga Tribe¹⁵ (Taiga Tribe, 2020) is a platform to find and hire collaborators for specific tasks, usually related to software development. Taiga Tribe is conceived as an extension to the project-management platform Taiga (see section 2.1.4), though it can be used for projects outside Taiga. Typically, the task manager creates a “gig” including a “user story”, i.e. a description of a feature from an end-user perspective. The gig also describes the expected characteristics and knowledge of people who can develop it. People interested offer their services, and the manager hires among those with the right profile. After finishing the gig, the manager pays the involved people through PayPal¹⁶ according to the agreed conditions.

2.1.2 Project creation and promotion

Communities need to recruit people and gather resources for their projects. Potential collaborators need to get to know about these projects and their needs to become engaged participants. The tools and platforms in this section address these needs.

Hylo¹⁷ (Hylo, 2020) is a collaborative platform that supports communities and networks to share resources. Users can post “intentions” about what they would like to do or create. Other users can support these if they want to, offer suggestions, and help them. Intentions can turn into “projects” and be broken down into steps. Users can fulfil requests to implement these steps. To get financial resources, the platform supports crowdfunding campaigns and Direct Public Offerings (DPOs). In this way, Hylo implements a complete “crowd-resourcing” process.

Colony¹⁸ (Colony, 2020) is a collaboration platform for distributed organisations focused on software development. Users can start projects online and recruit a workforce to work in them. It aligns the incentives of the workforce around being productive, which reduces the management workload. The platform does this by providing a semi-

¹³ <http://coliga.co/>

¹⁴ <https://part-up.com/>

¹⁵ <https://tribe.taiga.io/>

¹⁶ <https://www.paypal.com/>

¹⁷ <https://www.hylo.com/>

¹⁸ <http://colony.io/>

automated infrastructure built on Ethereum¹⁹ (Ethereum, 2020). This provides the ability to assign resources to tasks, automatically control some metrics regarding their fulfilment, and distributing among contributors the related rewards. Being based on smart-contract technology, the contract conditions are largely guaranteed by the contract itself. The platform also encourages the repeated participation through different built-in techniques based on game mechanics and behavioural design.

CoMakery²⁰ (CoMakery, 2020) is a platform aimed at comaker communities engaged in the early stages of the development of commercial products. Its approach is similar to that of Colony. Users can start a project or join an existing one to do different tasks. With such participation, they can earn shares of future revenues, get recognition, and unlock new opportunities. In this way, Comakery supports tracking and trading the work that someone does to create or improve a result (i.e. the so called “sweat equity”). Awards are distributed as project tokens. The platform also supports simple licensing agreements. CoMakery integrates different tools to provide these services. In particular, it includes Slack²¹ (Slack Technologies, 2020) for integration and an Ethereum blockchain accounting system.

Teem²² (P2PValue, 2016) is oriented towards online collaborative teams. It was developed under the European FP7 project P2Pvalue. It was originally conceived for commons-based peer production communities, but its features apply to any kind of open online community. It is meant to increase participation along with sustainability. Teem supports an informal project management. It has an area to define tasks where users can collaborate. Collaboration takes place in a workspace based on the online collaborative edition of documents and group chat. Teem is open source.

2.1.4 Project management

When a project is running, there is need for different management tasks to accomplish it, like assigning effort and deadlines, monitoring the achievement of milestones, or money accounting. This the focus of the tools and platforms in this section.

Taiga²³ (Taiga, 2020) is a free project management system based on agile principles (Highsmith, 2009). It allows using Kanban or Scrum templates (Stellman & Greene, 2014) to track projects. Taiga works with the concept of user stories (as Taiga Tribe, see section 2.1.3) to describe what end-users expect from the development. Backlogs list all features and user stories of a project. Taiga also integrates video conferencing functions and chats. Taiga is open source and web-based.

Basecamp²⁴ (Basecamp, 2020) considers three levels in companies: Company HQ (acronym for headquarters), teams, and projects. The work in them is organized using six tools: to-do lists to track work; a message board for posting announcements and updates; a chat room for quick chats with the team; a schedule for posting deadlines

¹⁹ <https://ethereum.org/>

²⁰ <http://www.comakery.com/>

²¹ <https://slack.com/>

²² <https://p2pvalue.eu/>

²³ <http://taiga.io/>

²⁴ <https://basecamp.com/>

and milestones; documents and files for the different project assets; notes for informal information about the work to do; automatic check-ins to get insights from the team on a regular basis. The platform is web-based.

OpenCollective²⁵ (OpenCollective, 2020) is a platform that allows communities to collect and manage money transparently. It operates in full transparency, so it can safely be hosted by an existing legal entity (an organisation or an individual). The platform is open source and can be adapted to comply with local regulations.

CoBudget²⁶ (CoBudget, 2020) makes possible to prepare collaborative and transparent budgets on a regular and recurrent basis. Every period, contributions to collective funds are published, including who contributed, to what concept, and how much. Basic functioning expenses (e.g. rental or utilities expenses) are subtracted, and the remaining is the discretionary budget. These funds can be allocated to proposals of potential uses that need funding (called “buckets”), which are proposed by users. Users have the right to allocate their part of discretionary funds as they will, so the resulting budget reflects the collective priorities of the group. As a software platform, CoBudget is responsive, web-based and open source.

OpenProject²⁷ (OpenProject, 2020) is a fully comprehensive suite for project management that also offers an easy to use collaboration space. It includes functionality for project planning, scheduling, roadmap and release planning, task management, team collaboration, Kanban, Agile & Scrum models, Gantt charts, bug tracking, time tracking, cost reporting, budgeting and also has the feature to create project’s Wikis. Since OpenProject is end-user oriented, it grants a very low learning curve to start using it effectively. Moreover, its administration panel allows the setting of its features by modules, with the purpose of creating a system more tailored to the needs of the end users and to roles and capabilities of user’s hierarchy. Interoperability with other systems is possible through plugins or programming interfaces (here, hypermedia REST API²⁸). OpenProject is open source. It supports different kinds of installation, including installation packages for all major Linux distributions and Docker²⁹ images and Univention App Center³⁰ App Appliances.

The Open Source Project Management Tools in Java³¹ (Java-Net, 2020) is a repository of project management tools intended for different aspects. The repository contains a variety of tools with different architectures and possibilities for integration. Also, the development stage is quite different, ranging from tools with a working version to others in alpha or beta stage, and from active to abandoned developments. GanttProject (GanttProject, 2019) is one of the tools included in this list that is active and with a working and regularly updated tool.

2.1.5 Workflow and business process management

Communities and organizations have repetitive process that can be described and partially automated to relieve some of the related workload. Some common functionalities in these tools are the definition of workflows and their

²⁵ <https://opencollective.com/>

²⁶ <http://cobudget.co/>

²⁷ <https://www.openproject.org/>

²⁸ <https://docs.openproject.org/api/>

²⁹ <https://www.docker.com/>

³⁰ <https://www.univention.com/>

³¹ <https://java-source.net/open-source/project-management>

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t: +32/14 33 58 46 | e:r.fuentes@ucm.es | w: www.ucm.es



related processes (frequently as automated processes) and user interfaces (when interactive user interaction is required), indicators for quality of service, reports on Key Performance Indicators (KPIs), notifications and reminders. This section reviews some relevant tools in this category. Given the project requirements, it focuses on platforms with an open source edition.

Apache Taverna³² (The Apache Software Foundation, 2020) is a workflow management system aimed at facilitating the design and execution of scientific workflows that include multiple local and remote services. It provides functionality to design graphically workflows, explore a catalogue of services and workflows, integrate third-party tools and plugins, and run workflows in a server. It also has limited capabilities to design user interfaces to be integrated in the workflow. Taverna is open source.

Joget Workflow³³ (Joget Workflow, 2020) is a platform to design and develop workflow and process management applications. These applications are cloud-based, including full support for record store and management, web-oriented, and mobile optimized. They can be extended via plugins. The platform also offers support for the development of the user interface of these applications. All this development functionality is largely based on development tools with a drag & drop interface. Joget is open source. There is a free install option (self-hosted and community edition), but the firm also offers several pricing plans according to different support levels.

Bonita³⁴ (BonitaSoft, 2020) is an automation and business process management platform. It supports the modelling of business processes using the Business Process Modelling Notation (BPMN) (OMG, 2014). It also supports the design and development of responsive applications connected to external tools and data, including user interfaces based on web technologies. It also offers functionality for application monitoring and reporting, and changing and scaling applications while they are running. Bonita has an open-source community edition.

Activiti³⁵ (Activiti, 2020) is a platform for the development and execution of workflows. It comprehends a suite of applications that offer functionality for the graphical modelling of workflows, an integrated development environment (as an Eclipse³⁶ (Eclipse Foundation, 2020) plugin) for the coding related to workflows, a workflow engine, and a web-based interface to deploy process definitions and launch their instances. Activiti is open source. It is the basis of the commercial Alfresco Process Services³⁷ (Alfresco, 2020).

jSonic BPM³⁸ (jSonic, 2020) is a Business Process Management (BPM) system. It offers functionality to support the complete development of workflows from design to testing. It includes a “Process Modeler” to allow end users without technical skills interactively design and map processes, a “Business Rules Engine” to define related rules, and a “Process Simulator” to run and test the system. It is open source.

³² <https://taverna.incubator.apache.org/>

³³ <https://www.joget.org/>

³⁴ <https://www.bonitasoft.com/>

³⁵ <https://www.activiti.org/>

³⁶ <https://www.eclipse.org/>

³⁷ <https://www.alfresco.com/es/bpm-software>

³⁸ <http://jsonic.org/>

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t: +32/14 33 58 46 | e:r.fuentes@ucm.es | w: www.ucm.es



2.1.6 Communication

The collaborative development of products requires tools that facilitate the communication of different aspects among participants, including perspectives, common understanding, or decision making. There is a wide range of tools for this.

MetaMaps.cc³⁹ (MetaMaps, 2020) is a concept mapping platform. It allows visually and collaboratively designing conceptual maps. These maps represent as graphs interconnected topics, concepts and content. Maps can be reused in other maps. With an increasing usage, information becomes part of a growing web of contextually-linked semantic data. This is the basis to develop a collective intelligence and understating. The platform displays a collection of public maps and topics. Creating or editing maps requires registration. MetaMaps is free, web-based and open source. Currently is only available in an invite-only beta version.

Loomio⁴⁰ (Loomio, 2020) is a tool for effective and collaborative decision-making. It pursues enabling a process of constructive deliberation aimed at synthesising solutions from diverse viewpoints. Loomio is organized around groups that can be public or private. The members of a group can create discussions on specific topics in it. There, they can post comments and create proposals. Proposals are requests for feedback on specific propositions. Members can either agree, abstain, disagree, or block (as a strong disagreement). With this approach, Loomio tries to make decision-making more efficient, reducing the use of meetings, emails, surveys or polls. The tool is free and open source.

Assembl⁴¹ (bluenove, 2020) is a platform aimed at harnessing the collective intelligence. It supports hosting and analysing complex and large online debates. Participants' contributions are mainly free text. These are further elaborated and organised using different tools, like comments, automated and manual tagging, or the assignment of topics and actions for improvement. Syntheses are produced regularly to give a panoramic view of the discussion. Voting can only be triggered at the end of a discussion to avoid a premature removal of proposals. This organisation of the continuous message flow facilitates eliminating the noise and focusing the attention on key aspects, ensuring the dynamics of collective intelligence. The platform was initially developed under the European FP7 project Catalyst⁴² (Catalyst, 2016), and today is commercialized by bluenove⁴³. The software platform is open source with a configurable and modular approach (e.g. modules of creativity, votes, and multi-criteria evaluation).

Slack⁴⁴ (Slack Technologies, 2020) is a team collaboration tool focused on messaging. It offers persistent chat rooms ("channels"), and direct messaging. Channels can be public or private, and be organized by groups and topics. Groups are sets of users and allow actions over the whole set (e.g. addressing them or adding all of them to a channel). Teams own channels. All content inside Slack is searchable, including files, conversations, and people.

³⁹ <https://metamaps.cc/>

⁴⁰ <https://www.loomio.org/>

⁴¹ <https://bluenove.com/en/offers/assembl/>

⁴² <http://catalyst-fp7.idea.kmi.open.ac.uk/>

⁴³ <https://bluenove.com/>

⁴⁴ <https://slack.com/>

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t: +32/14 33 58 46 | e:r.fuentes@ucm.es | w: www.ucm.es



Slack integrates with a large number of third-party services, like Google Calendar, Microsoft Office 365, Trello, Zoom or Twitter.

2.1.7 RRI co-design

The collaborative development of products following RRI principles requires tools that make possible the effective join work of heterogeneous stakeholders distributed in time and space. They need to allow the development of intellectual artefacts and reflecting on them. There are still few tools addressing these needs. One was developed in the H2020 FoTTRIS project (FoTTRIS, 2018).

The FoTTRIS co-RRI platform⁴⁵ (FoTTRIS, 2018; Bautista et al., 2018) is intended to support the co-design of RRI project concepts. It is organized around “projects” where participants collaborate through shared documents called “pads”. These documents follow templates with guidelines. These guidelines follow the FoTTRIS process architecture and methodology. The documents also have space for free text where participants can write down the specific results of their tasks. Participants can see who, when and what different contributors include in a document to track the development process. Users can only see and edit the documents of those projects to which they are assigned. The platform includes additional tools, like a file repository and a chat for online immediate communication, both in the context of projects, documents, and the platform. The platform is web-based and open source. It is based on the Etherpad platform⁴⁶ (Etherpad, 2020).

2.2 Analysis tools

The tools in this section aim to support data analysis, which is the process of working on data with the purpose of correctly arranging, explaining, making them presentable, and finding conclusions from them. It is used to find useful information from the data to make rational decisions. For that kind of data analytics process, tools offer a variety of functionalities that include: data collection, working on data quality, building the model, training the model, running the model with data, and displaying results. As well, these tools help to remove unnecessary data before the analysis, e.g. those that are not meaningful or are dependent. The following is a non-exhaustive list of illustrative and popular tools in this area.

Python⁴⁷ (Python Software Foundation, 2020) is a programming language that has become popular in the context of data analysis due to the multiple libraries and tools that use it in this area. Python Pandas and TensorFlow are examples of them.

Pandas⁴⁸ (Pandas, 2020) is an open source library for Python. It provides high performance data analysis functionalities. The main purpose of using Pandas is to make input data available for further processing, such as modelling and visualization. Popular tasks that can be handled with this library are data preprocessing and integration (McKinney, 2012). During the preprocessing task, Pandas provides developers with essential methods

⁴⁵ <http://ingenias.fdi.ucm.es/fotrris/home.php>

⁴⁶ <https://etherpad.org/>

⁴⁷ <https://www.python.org/>

⁴⁸ <https://pandas.pydata.org/>

to get rid of noise data, transform data into different forms, unify data, process missing values, and aggregate data. For instance, Series and Index classes are equipped with a set of string processing methods that make it easy to operate on each element of them. Perhaps most importantly, these methods exclude missing and not available values automatically. Moreover, Pandas functionalities allow for further integration among different sources of data. It can handle entity recognition and relationships among different data sheets.

TensorFlow⁴⁹ (Google Inc., 2020) is an open source library for dataflow and differentiable programming. It is provided for different programming languages, including Python, C++ and CUDA. It started as a library for calculations based on tensors, i.e. networks of calculation over data matrixes. This made it useful for deep learning techniques, which are based on neural networks, and it has mainly become popular for that. TensorFlow (Raschka & Mirjalili, 2019) provides developers with the basic functions to represent complex patterns and manage their relations. Ontological relations, for instance, can be handled using deep learning technique with acceptable performance as compared to other ones.

Tensorflow Hub (TF-Hub) is a platform to share machine learning expertise packaged as reusable resources. It uses a text embedding module. For instance, such platform provides the required functionality for sentiment analysis, i.e. to analyze the semantic aspects of a given text such positive and negative comments. This functionality has been widely applied to investigate the social behavior through the analysis of contents in online social network such as Facebook, Twitter and YouTube, in this case using recurrent neural networks to perform text classification for sentimental analysis.

RapidMiner⁵⁰ (RapidMiner, 2020) is a platform that combines all required functionalities for data analysis into one software package called RapidMiner Studio. It provides a data representation library that allows for processing and seamlessly integrates and optimizes data for building machine learning models. In addition, RapidMiner studio provides an optimized environment for developing those models using a visual workflow scheme for designing and automating the modelling process. Furthermore, it provides a set of operations for deploying models into an operational environment for further dynamicity and management.

For text mining (Ertek, 2013), RapidMiner offers several important functionalities that allows for combining text classification with association mining and cluster modeling. RapidMiner facilitates these tasks with an integrated development environment with a graphical user interface. This allows using functionality for rapid prototyping, development of data mining models, and scripting based on XML (extensible mark-up language). The visual modeling in the RapidMiner environment is based on defining the process in terms of operators and the flow of the process through these operators. Users specify the expected inputs, the delivered outputs, the mandatory and optional parameters, and the core functionalities of the operators, and the complete process is automatically executed by RapidMiner. For this, there are available many packages, for instance for text processing, Weka (Machine Learning Group at the University of Waikato, 2020) extension, parallel processing, web mining, reporting extension, series processing, community, and R (The R Foundation, 2020) extension.

⁴⁹ <https://www.tensorflow.org/>

⁵⁰ <https://rapidminer.com/>

Julia⁵¹ (Julia, 2020) is a high-performance open source programming language for data analysis. It applies multiple dispatch paradigms to facilitate expressing several object-oriented and functional programming patterns. In addition, Julia provides advanced functionalities for data visualization, especially for representing huge datasets over time dimension. Its ecosystem allows for loading multidimensional datasets fast and applies different essential data processing functionalities, such as joining, aggregation, pre-processing operations and online computations. Furthermore, Julia provides powerful tools for deep learning. Julia's rich machine learning and statistics ecosystem includes capabilities for generalized linear models, decision trees, and clustering. Julia also has the ability to use the features of other programming language such as Python, R, Java, and C, including their libraries for text analysis.

Ataccama⁵² (Attacama, 2020) is a commercial tool that includes a framework for data management. This basically supports five tasks: data discovery and profiling, meta-data management and data catalog, data quality management, master and reference data management, and Big Data processing operations. For each of these tasks, it provides a large number of functionalities that make the platform expressive to the degree that satisfies every data analysis phase without the need to use any other software. It provides several key features that enhance the data analysis process. The "Smart features" leverage the machine learning process by providing insights in it, which reduces the need for manual configuration. The self-service framework for components reduces the need for technical specialists to implement stand-alone projects. It also provides a collaboration scheme that allows teams to share their projects and create a collaborative platform.

Tools for qualitative analysis are related to the previous ones but offer a totally different set of functionalities. As opposed to quantities analysis that deals with exact data and magnitudes, qualitative analysis uses subjective judgments for non-quantifiable information, e.g. satisfaction with attention practices or relations between stakeholders. Usually, this kind of analysis is related to Social Sciences and its starts with documents as inputs, e.g. interviews, observations and reports. Two of the most popular tools in the area are Atlas.ti (Scientific Software Development, 2020) and NVivo (QSR International, 2020). They share some features. They work is based on marking documents and retrieving and displaying information. They can work locally or over a network (sharing projects), and support collaboration based on merging projects. Among their functionalities are (University of Surrey, 2020) coding and auto-encoding from text, video and audio, classification, transcription, annotations, comparison matrices, social network analysis.

2.3 Conclusions

The needs that the CRIOS is going to address in the context of the RAISD project and the development of TAISs are novel, so there are not tools that totally meet their requirements. However, given the project background on RRI and collaborative processes, some tools offer a partial support.

The closest tool to the RAISD needs is the FoTRRIS co-RRI platform (see section 2.1.7). It offers support for collaboration based on collaborative documents and includes the concept of project. However, it does not offer to participants a clear perspective of the overall process and being for more general projects, it does not include

⁵¹ <https://julialang.org/>

⁵² <https://www.ataccama.com/>

specific support for the different stages of TAIS project. In the case of the CRIOS, the guidance in the project offers more information using workflows. Also, it is intended to integrate or offer support for the use of third-party tools, particularly for the analysis of information, to help users in some stages.

In the case of tools focused on community management (see sections 2.1.2, 2.1.3 and 2.1.4), their features can be useful in the context of the RAISD project. Nevertheless, they are of less priority than providing support to develop TAISs, which is the core aspect of the project works.

The workflow management tools (see section 2.1.5) offer relevant functionality to describe and control the expected workflow. However, the CRIOS needs to offer a high degree of flexibility in the navigation of its workflows, as the envisioned RAISD process includes multiple co-creation cycles and non-quantitative evaluations of product to unlock stages.

Regarding communication tools (see section 2.1.6), their support for quick decision-making can be relevant in the context of the CRIOS. However, basic support for this can be achieved through shared documents. Thus, as with community management, this functionality is of less priority.

CMSs (see section 2.1.1) are highly useful to provide web-based platforms. This could be used in the CRIOS to easily support several requirements, like support access independently of the user's device and operating system, different languages, or accessibility issues.

Finally, the analysis tools (see section 2.2) to be used in the development of TAISs are still the object of research and debate in the project. Given the uncertainty about them, the CRIOS should offer an integration solution that allows changing them and their use according to the detected needs, and linked to meaningful contexts of use, e.g. the document where participants are collaborating.

3 Analysis of the CRIOS

This section analyses the main features of the CRIOS. Its basis are the requirements identified from three main sources. First, the methodological progress in the project so far. This determines the kind of processes and functionality required to work on TAISs. Second, the previous analysis of the state of the art (see section 2), which allows identifying potentially useful techniques and technological resources for the implementation. Third, the technological and architectural constraints identified in WP8 from interactions with the project partners.

3.1 Requirements for supporting the work methodology of RAISD

The RAISD project is aimed at supporting stakeholders to design (or identify) TAISs related to their VC. This design will be guided by the final TAIS methodology, which will be based on the experience gained in the project working in the pilots using a working methodology. This working methodology will give guidelines to researchers and stakeholders and will implement the conceptual framework of the project. The CRIOS will support teams in the application of these methodologies.

The main functional requirements were defined in the introduction as follows:

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t: +32/14 33 58 46 | e: rfuentes@ucm.es | w: www.ucm.es



- *R1. Innovation services.* These are intended to facilitate interactions between stakeholders and to support their activities following the project methodologies.
 - R1.1. Support for online collaboration in order to reach common solutions.
 - R1.2. Support for online communication (i.e. discuss and comment).
 - R1.3. Support for the integrated use of analysis tools.
 - R1.4. Support for online data collection of specific items.
- *R2. Activity history.* These services log information on the use of the platform in order to create an accurate picture on how it has supported user activities.
- *R3. Communication and dissemination of activities and results.* These services provide digests, reports and statistical data on the project activities, according to the dissemination policies.
 - R3.1. Provide some means of dissemination of limited information for the general public.
 - R3.2. Support the analysis of past activities with the platform.

The CRIOS must be compliant with web accessibility standards, in concrete level AA⁵³, and responsive so it can be accessed from a variety of devices (i.e. computers, tablets and smartphones).

This platform will be mainly based on state-of-the-art collaborative platforms and analysis tools (see section 2). The general prerequisites of the platform, as stated in the project Technical Annex, are the following:

- *This [the CRIOS] will integrate functionality for information and knowledge sharing by different actors, and the related analysis tools.*
- *This [the CRIOS] development will make use when possible of open software alternatives. Its starting point will be the software platform for collaborative RRI (co-RRI) research developed by UCM as part of the FoTTRIS project.*
- *It [the CRIOS] will act as an internal document repository, a workflow management tool, and an open innovation platform.*
 - *The repository will contain project information [...].*
 - *The workflow tool will make more agile understanding the state of the project execution and report on it.*
 - *As an open innovation platform, it will allow providing creative ideas to integrate them in the project.*
- *There will be specific access applications (clients) to the CRIOS, according to the requirements of the different actors, e.g. VGs, civil society or researchers.*
- *Study of data mining and analysis techniques available to address the project challenges.*
- *The tool will be fully free/open source software and use open standards and protocols to facilitate interoperability [as much as possible]. Its development process will be also 'in the open', that is, with public repositories, public tickets (but reports and feature requests) and public documentation. This would facilitate anyone to follow the project development, report bugs, or even collaborate with the developers.*

⁵³ <http://www.w3.org/WAI/>

3.2 Use cases

This section describes the main functional requirements that have been identified. These are described textually and with as use cases diagrams (OMG, 2017). This type of diagram is a presentation of user's interaction with the system (here the CRIOS), where actors represent users and use cases specify the expected functionality.

For all the use cases, the CRIOS will store anonymized log information on the use that actors made of the platform. This information will include at least: login and logout timestamps; time spent in each resource; time spent in each type of chat (i.e. platform, ARU and project); external tools launched from the platform.

3.2.1 Actors

There are five main types of actor in the platform. Figure 1 shows them. Each type has the capabilities of the previous one, as indicated by the relationships. For instance, an *Administrator* can perform all the actions of a *Registered user*.

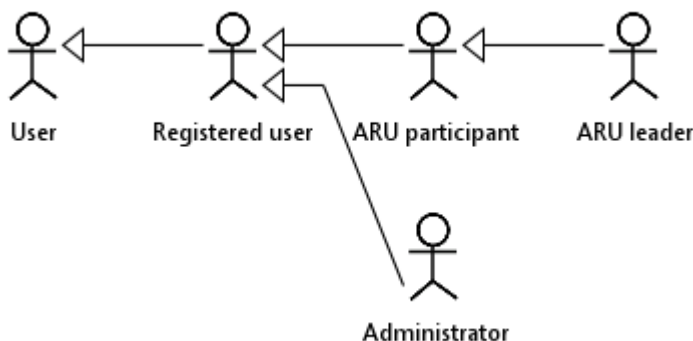


Figure 1: Type of actors as platform users

The main features of these actors are the following:

1. **User:** Everyone who accesses to the platform. They can explore the projects and activity information (respectively in the “Show Projects” and “Overview” sections of the platform) and request to register to collaborate in any of its projects.
2. **Registered user:** These are users registered in the platform. They can request to register in an ARU to participate in its projects. They can use a chat tool for communicating with other registered users.
3. **Administrator:** The user that manages the functionality of the platform related to the creation of new registered users, new ARUs, and the assignment of leaders to ARUs.
4. **ARU Leader (ARUL):** The administrator of an ARU. An ARU is a set of registered users who work together in common projects hosted by the platform. The ARUL is responsible for accepting users, creating new projects, and managing the users that participate in those projects. ARULs can also launch some specific analysis tools (e.g. those that require many computational resources).
5. **ARU Participant (ARUP):** A registered user assigned to an ARU. She/he can co-work in the different projects which she/he have joined. ARUPs can simultaneously edit the content of the ARU collaborative documents in

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Coordinator contact: Dr. Rubén Fuentes-Fernández | Universidad Complutense de Madrid | Avda. de Séneca, 2. Ciudad Universitaria 28040 MADRID, Spain.
t: +32/14 33 58 46 | e: rfuentes@ucm.es | w: www.ucm.es

real time, and use a chat tool for communicating with others working on the same document. They can also examine the working reports of the ARU project.

3.2.2 Use cases

The use cases identified for the platform are detailed in next subsections. The basic ones are summarized for each type of actor (see sections 3.2.2.1-3.2.2.5), while more complex one have specific sections (see sections starting in section 3.2.2.6). Figure 2 summarizes the key use cases that characterize each type of actor.

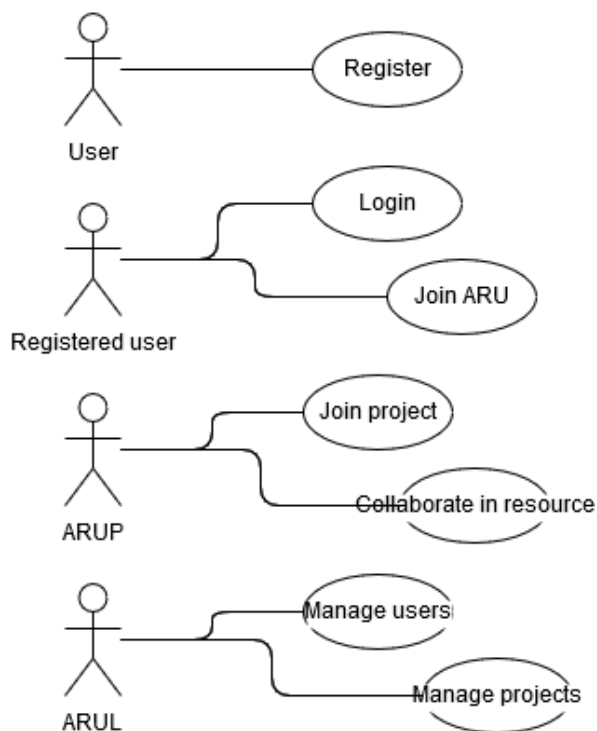


Figure 2: Use cases by type of actor

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3.2.2.1 Use cases for the user actor

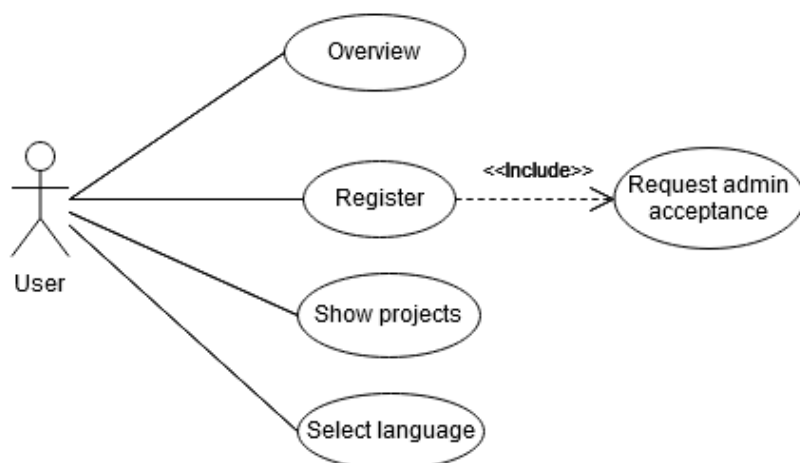


Figure 3. Use case diagram for the *user* actor.

A *user* can only access the main page of the platform. There, the *user* can perform the following actions:

- **Register.** To fill in the form to register in the platform. This will include at least: nickname, verified complete name and e-mail account, photo, institution, and a password. The user has to get acceptance from the platform *administrator* to finish up the registration process and become an *authorized user*.
- **Show projects.** This allows browsing the projects to see their public information.
- **Overview.** To consult general information about the activity in the platform (e.g. number of registered users and projects, or daily activity).
- **Select language.** To change the language of the information displayed in the platform.

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3.2.2.2 Use cases for the registered user actor

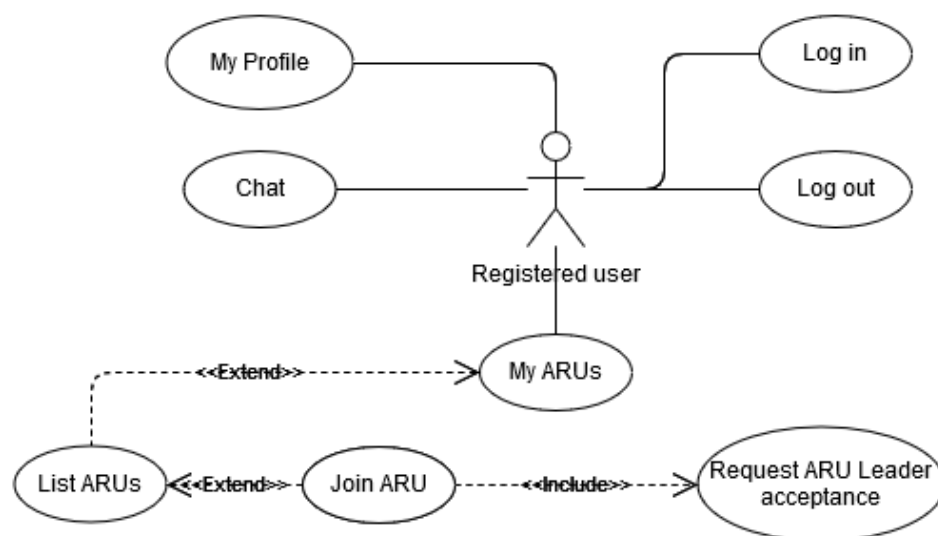


Figure 4. Use case diagram for the *registered user* actor.

After getting acceptance for registration in the platform, a *registered user* can perform the following actions:

- **Login.** This allows the user to start a session in the platform.
- **Logout.** This allows an already logged-in user to close her/his session in the platform. As a security measure, there is also an automatic logout after certain time without user's activity.
- **My Profile.** This allows viewing and modifying any of the user's personal data (see the "Register" use case in section 3.2.2.1) and changing the password. It also allows the user to become an "inactive" user, so she/he shows the willing of not participating further in the platform activities.
- **My ARUs.** This allows the user to examine the ARUs she/he belongs to and the projects where she/he is working, as well as the pending requests related to them.
 - **List ARUs.** To see the list of ARUs in the platform.
 - **Join ARU.** To request joining an ARU. This request will include a brief description of the reasons to request it. After acceptance by the *ARUL* of the ARU, the user will become an *ARUP*.
- **Chat.** This allows users to collaborate with other users in the platform using text chat.

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3.2.2.3 Use cases for the ARUP participant actor

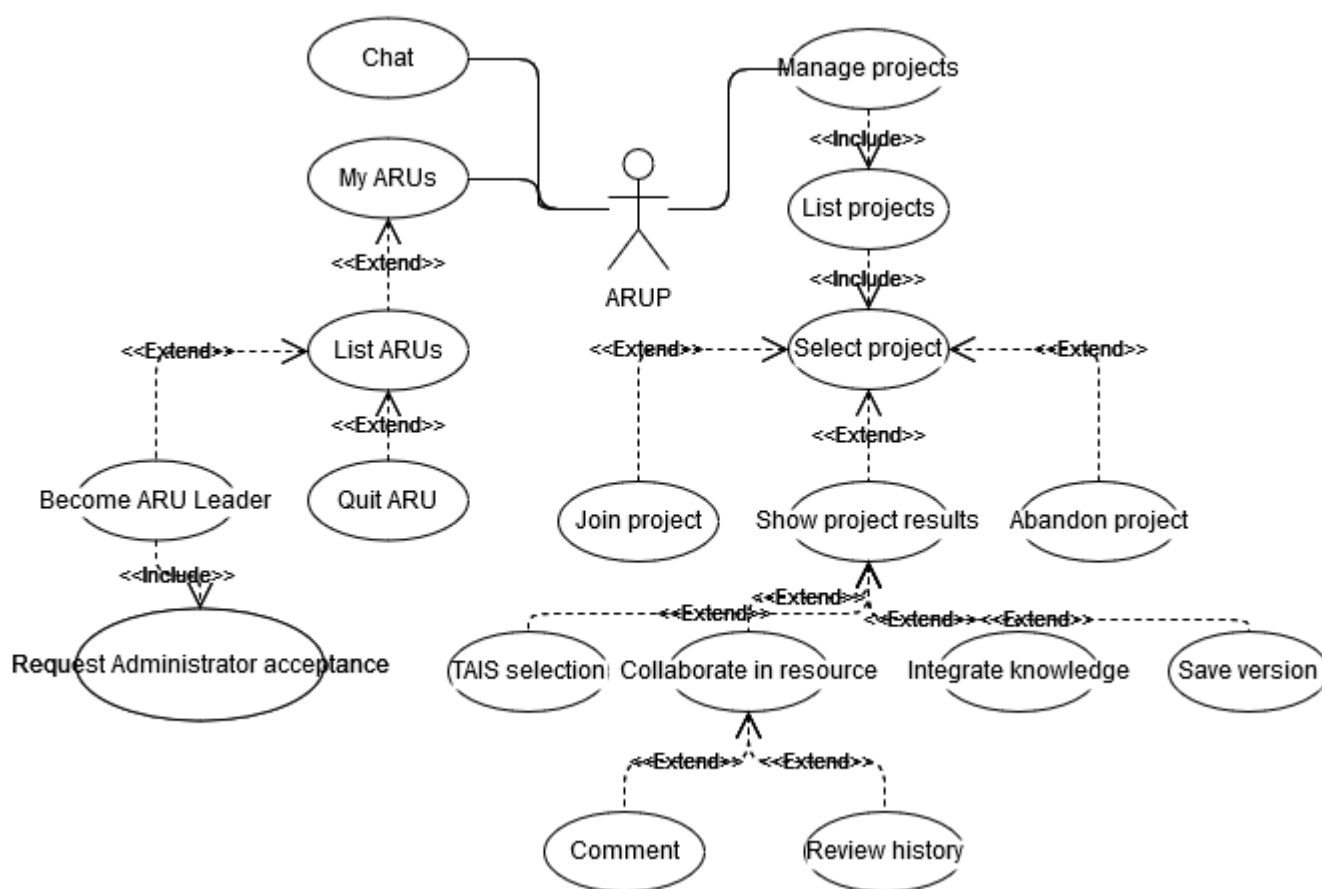


Figure 5. Use case diagram for the ARUP actor.

A *registered user* actor accepted in some ARU becomes an *ARUP*. This last actor can perform the following additional actions:

- **Manage project.** To manage the project where the *ARUP* participates or can participate.
- **Show project list.** An *ARUP* can see a list of all projects that belong to the her/his ARU.
- **Select project.** An *ARUP* can select one of the active projects in the list, and can do the following actions:
 - **Join project.** To request joining a project in an ARU the user belongs to. This request will include a brief description of the reasons to request it.
 - **Abandon project.** To request leaving a project the user belongs to. This request will include an optional brief description of the reasons to abandon it.
 - **Show project results.** To request showing the results of the selected project.
 - **Collaborate in resource.** To develop the collaborative contents that are the result of the different stages. This functionality is the basis of the RAISD methodologies. It is mainly accomplished through writing on shared documents that can be created by any ARUP participating in a project. The result can be printed out, saved in specific type, and exported.

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- **Comment.** To show/add/delete/update comments on the resource.
- **Review history.** To review the modifications (i.e. addition, modification, movement, deletion or comment) of a shared document. For each modification, there is information about the ARUP who made it, when, the type, and where in the document.
- **TAIS selection.** This is an example of specific working scenario with stakeholders. See later for details (see section 3.2.2.6).
- **Integrate knowledge.** This activity encapsulates the use of analysis tools and external information sources. This will be launched from the platform, or guidance provided to do it externally.
- **Save version.** To make a copy/backup of all the information of a project. This can be used for safety reasons (e.g. recovery of some loss of information or unintended change) and to keep track of changes (e.g. compare the project progress between milestones).
- **My ARUs.** This functionality extends the one with the same name for the *registered user* by adding the possibility to access the private resources of a project. It also supports the request to become ARUL.
 - **Become ARU Leader.** This request includes a brief description of the reason to request it, in addition to administrator acceptance. After acceptance, the user will become an *ARUL*.
 - **Quit ARU.** To request leaving an ARU. This request will include an optional brief description of the reasons to abandon it.

In the context of an ARU, a specific project or a resource, an ARUP can perform the following actions:

- **Chat.** To communicate with other ARUPs in the ARU using a text chat for those in the given context (i.e. ARU, project or resource).

The work in the ARUs includes the co-design of the different results of the RAISD practices. For instance, a specific type of project in an ARU could be the analysis of a context to identify and describe its VC or the development of a TAIS for a given VC.

3.2.2.4 Use cases for the ARUL leader actor

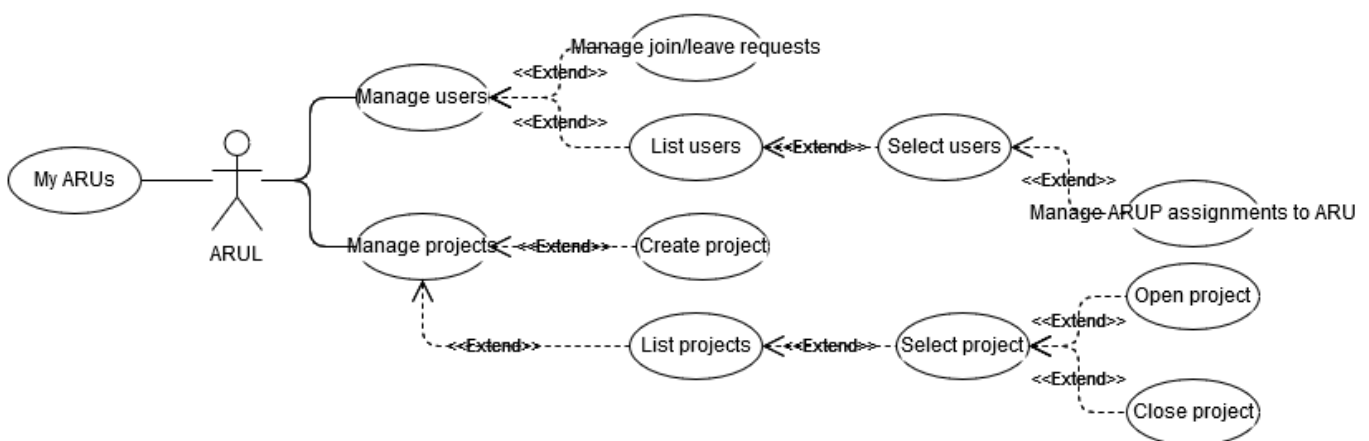


Figure 6. Use case diagram for the ARUL actor.

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An *ARUP* actor becomes an *ARUL* when she/he is granted by a platform *administrator* rights to manage an ARU after her/his request. These rights allow performing the following actions:

- **Manage users.** To accept/refuse users' request to join/leave the managed ARU or its projects. The ARUP can also manually assign or unassign an ARUP to her/his ARU.
- **Manage projects.** To create a project, to close a project the user manages, so no further modifications can be done on it, or to reopen a closed project.
- **My ARUs.** This functionality extends the one with the same name for the *ARUP* by adding the possibility to view the ARUs the user manages.

3.2.2.5 Use cases for the administrator actor

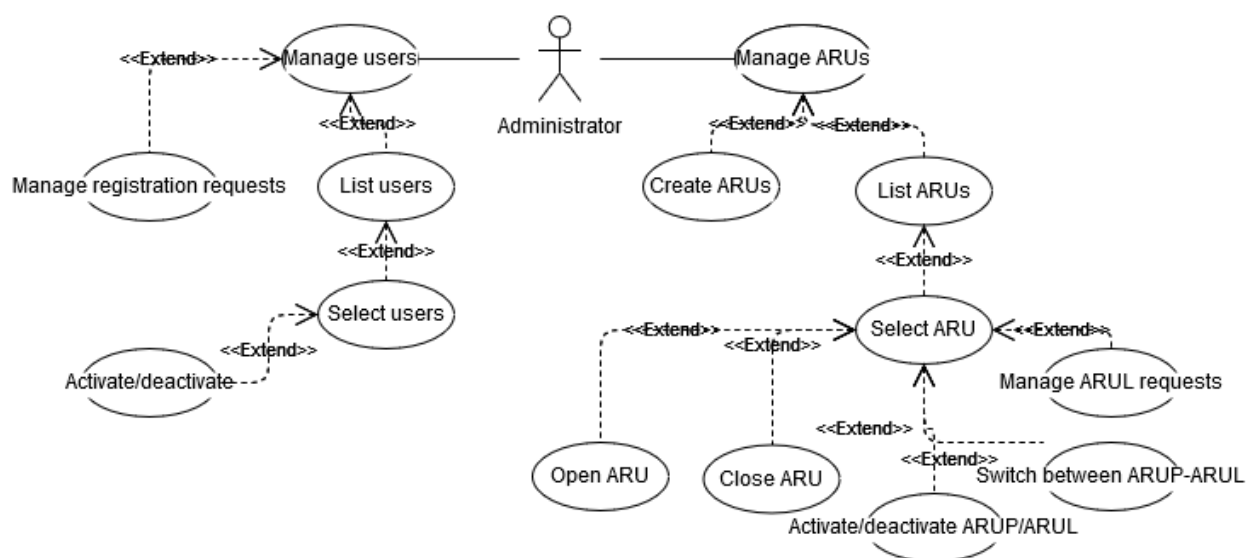


Figure 7. Use case diagram for the *administrator* actor.

A platform *administrator* actor can perform the following actions:

- **Manage users.** To accept/refuse users' request to become *registered users* of the platform, to activate/deactivate *registered users*.
- **Manage ARUs.** To create new ARUs, close existing ones (so no more activities can be done in neither them nor their projects), or open a closed one. Also, for an ARU, to accept/refuse requests to become an ARUL, to activate/deactivate ARUPs and ARULs, and to convert an ARUP into an ARUL or an ARUL into an ARUP.

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3.2.2.6 TAIS selection

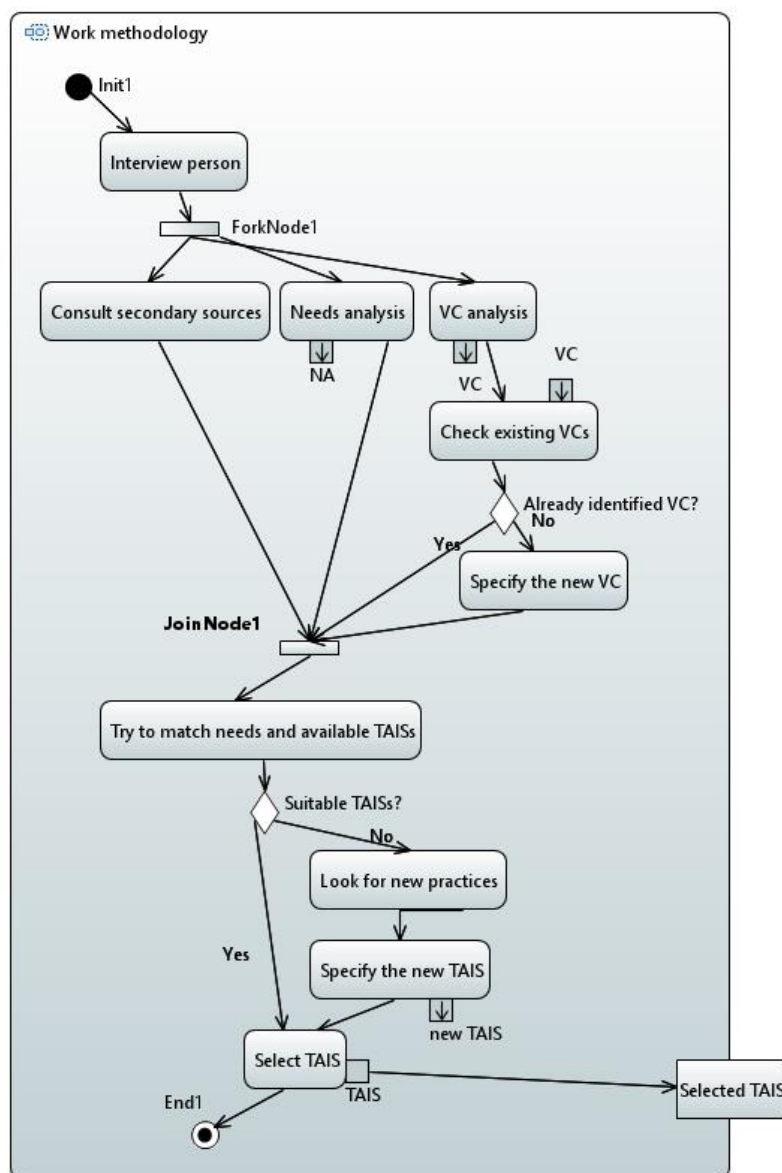


Figure 8: Use case for the selection of a TAIS

An ARUP can participate in the selection or elaboration of a TAIS for a given VC and some current needs for their participants. Figure 8 shows the related activity diagram.

The work in the actions of the activity follow the guidelines of the work (see *D3.2 Work methodology and guidelines* and *D3.3*) and TAIS (see *D3.4 TAIS methodology and guidelines*) methodologies. It is based on documents where ARUPs can collaboratively write down the related information (as mentioned in previous use cases). These documents contain related advice for the different aspects of each action. Linked to the documents, the participants can use different tools:

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- *Workflow map.* For an overview of the process and a perspective on its current state.
- *Chat.* For interactive communication (see use case “Chat” section 3.2.2.2).
- *External analysis tools.* Actions may have related tools to analyse information related to the current action (see use case “Integrate knowledge” in section 3.2.2.3). For instance, to launch tools for text analysis or clustering of profiles.
- *Resources.* These are whatever external resource that can be used in the action, e.g. documents, links, or scripts for tools (see use case “Integrate knowledge” in section 3.2.2.3).

3.3 Automated data analysis

The actual analyses over data provided in the CRIOS will be the result of studying the experts’ manual analyses during the fieldwork and pilots. This kind of functionality appears in the previous use cases as use case “Integrate knowledge” (see section 3.2.2.3).

In a first stage and as a proof of concept, basic text analysis and identification of categories will be provided. The text analysis will be related to the identification of main topics in the interviews. Experts are using several support tools in their analysis, mainly Atlas.ti (Scientific Software Development, 2020) and NVivo (QSR International, 2020). With them, they identified key concepts related to the identification of VCs. The identification is semi-automated because the actual terms used in the text and their categories are built as the analysis progresses. The tools will largely use the result categories from this analysis to reproduce it and as input to classification algorithms (here actually clustering) to identify groups of VCs and evaluate whether the automated classification resembles to that of experts.

4 Validation and experimentation

The CRIOS will be tested in the ARUs of the project. Its development will be integrated with the pilots, so these will define features requests, that will be implemented and offered for testing to the same working pilots. Developers will make available questionnaires to ARU participants for evaluation. Moreover, the platform will obtain logs from users’ activities to further assess how the platform is actually used.

5 Distribution and sustainability of the platform

The CRIOS will be supported by the RAISD project during its lifetime. After the project, it will be supported and maintained by the UCM-GRASIA research group in their servers to facilitate the interested groups the co-creation and use of TAISs. Initially, the UCM group has resources to support it during at least two years after the project. Later on, the use and evolution of the platform will determine how to maintain it.

The software will be published as open source in public repositories (e.g. GitHub and BitBucket). This will allow other groups to install their own instance of the platform, collaborate to improve the software, and adapt it to new needs and constraints. The CRIOS success after RAISD will largely depend on the ability to create an active community around this open source project.

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t: +32/14 33 58 46 | e: r.fuentes@ucm.es | w: www.ucm.es



6 Conclusions

This document has presented the analysis of requirements for the CRIOS platform. It has reviewed the needs already identified for it and the tools that can be regarded as related to them, either as a source of features or as a basis for their implementation. With this, it has outlined initial functional requirements and constraints of CRIOS.

Given that the is going to be developed simultaneously with the methodology to create TAISs that it must support, the main concern has been offering a suitable starting base functionality. This functionality should consider several aspects. First, support for collaborative work. Here, shared resources (mainly documents) have been identified as the most flexible option, and one with which most users are comfortable. Second, offering capabilities to support that work with analysis tools. The potential variety of tools take to consider initially as a baseline being able to launch or indicate how to do so from CRIOS. The actual value of these tools is the kind of analyses they can do. Thus, the focus of the development related to them is in creating the analysis techniques more than in providing a tight integration with other tools. This way also aligns with the actual work of experts. Third, providing guidance in the process according to the TAIS methodology. This will be done through integrated guidelines in resources and workflow maps that help users to understand the whole process and give them hints on procedures for specific tasks.

The previous functionality is the starting point to support the TAIS methodology and develop the analysis techniques for it. As such, this specification of requirements will be reviewed after each round of pilots (M19, M25 and M30) to incorporate new findings as features for the tool.

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t: +32/14 33 58 46 | e:r.fuentes@ucm.es | w: www.ucm.es



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t: +32/14 33 58 46 | e: rfuentes@ucm.es | w: www.ucm.es



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t: +32/14 33 58 46 | e: rfuentes@ucm.es | w: www.ucm.es



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