



D3.7 Update on the Engage repository and knowledge hub functionality (initial)

Deliverable D3.7

Engage

Grant:	783287
Call:	H2020-SESAR-2016-2
Topic:	SESAR-ER3-01-2016 Knowledge Transfer Network
Consortium coordinator:	University of Westminster
Edition date:	25 March 2020
Edition:	01.02.00

Founding Members



Authoring & Approval

Authors of the document

Name/Beneficiary	Position/Title	Date
Ines Gomez / Innaxis	Consortium member	25 March 2020
Paula Lopez-Catala / Innaxis	Consortium member	25 March 2020
Graham Tanner / University of Westminster	Consortium member	25 March 2020
Andrew Cook / University of Westminster	Project coordinator	25 March 2020

Reviewers internal to the project

Name/Beneficiary	Position/Title	Date
Ines Gomez / Innaxis	Consortium member	25 March 2020
Paula Lopez-Catala / Innaxis	Consortium member	25 March 2020
Graham Tanner / University of Westminster	Consortium member	25 March 2020
Eduard Gringinger / Frequentis	Consortium member	25 March 2020
Miodrag Sajatovic / Frequentis	Consortium member	25 March 2020

Approved for submission to the SJU By — Representatives of beneficiaries involved in the project

Name/Beneficiary	Position/Title	Date
Andrew Cook / University of Westminster	Project coordinator	25 March 2020

Rejected By - Representatives of beneficiaries involved in the project

Name/Beneficiary	Position/Title	Date
N/A		

Document History

Edition	Date	Status	Author	Justification
01.00.00	28 August 2019	Release	Engage Consortium	New document for review by the SJU
01.01.00	16 March 2020	Release	Engage Consortium	Incorporating SJU comments
01.02.00	25 March 2020	Release	Engage Consortium	Incorporating SJU comments

Engage

THE SESAR KNOWLEDGE TRANSFER NETWORK

This deliverable is part of a project that has received funding from the SESAR Joint Undertaking under grant agreement No 783287 under European Union's Horizon 2020 research and innovation programme.



Abstract

This initial report describes the planned functionality and features of the forthcoming Engage wiki and establishes the scope of the ATM concepts roadmap.

The opinions expressed herein reflect the authors' views only. Under no circumstances shall the SESAR Joint Undertaking be responsible for any use that may be made of the information contained herein.

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Executive Summary

Many results have been, and are being, developed under the SESAR framework producing results at different maturity levels: from fundamental research under the Exploratory Research programme to Very Large Scale validation activities. One of the overall goals of the Engage KTN is to facilitate links between the ongoing activities, particularly between the exploratory research actions and the SESAR mainstream programme.

In response to this need, the Engage KTN has proposed the development of a wiki platform which will not only serve as a repository of research material facilitating its access but, more importantly, will strengthen the links between existing work, connecting initiatives which have thematic similarities, and fostering communication between the relevant stakeholders to reinforce this community. To fulfil these objectives, an initial identification of requirements is detailed in the current document where the wiki features and functionalities are described. The wiki is being developed as an open platform enabling contributions from authors worldwide to communicate their progress in the ATM field (both SESAR and beyond).

In addition to the knowledge hub relating to ATM developments, the Engage wiki will also host the ATM concepts roadmap, taking the form of a live, interactive, 'infographic' tool enabling community interaction. While this activity also responds to the need of highlighting the links and synergies among the existing results from SESAR, the scope of the ATM concepts roadmap goes beyond the Engage timeframe, adopting a longer-term perspective. The ATM concepts roadmap aims to discover emerging concepts and techniques in the ATM domain that are demonstrating potential impact on the system and for its stakeholders.

1 Introduction

1.1 Motivation

The Engage wiki responds to the Knowledge Transfer Network (KTN) Call text requirement for the development of an Observatory: *“The Observatory is expected to **host the open source framework models, tools and metrics developed by SESAR 1 WP-E projects and in addition contain information** (e.g. scientific articles, PhD theses, conference presentations, etc.) **about worldwide long-term research in ATM related trends.**”*

The openness, its global dimension and the need to host materials of different kinds make the wiki an ideal format for this purpose. The Engage wiki provides a platform where researchers and stakeholders around the world can easily access the material on-line, but more importantly, to contribute to it, helping to build up a fluent network of knowledge in line with the KTN spirit. These are the key features that the Engage wiki provides which have been considered in the selection of this platform for the Observatory:

- User-friendly: for read-only purposes, the wiki is easily accessible and facilitates navigation through its material. In addition, interested parties can request an author account to edit the available material or create new content. The wiki text editor is very intuitive and requires no training. In any case, the Engage partners will provide support to wiki users upon request. A contact page will be provided.
- Enhancing collective knowledge: In order to contribute content, Engage wiki author accounts can be easily requested. This has several benefits, as indicated below.
 - Broadening the network of partners contributing to its content. Not limited to SESAR ER stakeholders.
 - Facilitating the validation of the content as the material is visible and editable by anyone with an author account. This feature provides openness and transparency.
 - Strengthening the network effect: the more it is used, the more attractive it gets, and this ‘forces’ new people to join it.
 - More dynamic than a classical website as its content is easier to modify and involves many more contributors. The availability of new updated content also brings more traffic to the site.
- The wiki platform is customisable, providing a flexible structure that can be adapted to the KTN’s needs and is changeable if required.

Please refer to Section 3 to read more on Engage wiki features and functionalities.

2 Wiki relationship with the Engage website

The Engage KTN website [1] contains updated content on Engage activities, approved public deliverables, an overview of the network, and news about recent or upcoming initiatives. The website objective is to give an overview of the key Engage facts and figures (static information) and to announce the latest initiatives. The website is not designed to contain scientific or technical material as the web visitor is not expecting in-depth content – it aims at creating basic awareness about Engage and its activities.

In contrast, the wiki will be handled as a live repository, with a more complex structure and more detailed content, containing scientific and technical material related to the scope of Engage (ATM research and innovation). Due to their different nature and purpose, and for the sake of simplicity, minimum overlap is expected between the website and the wiki. However, both will be interlinked.

The website [1] will include a highly visible link to the wiki. It will also contain a banner when the wiki is launched and this banner will be adapted through all the wiki milestones:

- opening to non-Engage contributors;
- special announcements;
- specific content promotion, etc.

The website will act as the communication channel for the wiki, supported by the other communication tools of Engage (Twitter, newsletter).

The wiki will of course comprise a reference to the website to explain the relationship between Engage and other projects. This will include the basis, idea and scope of the network and also a dedicated page for Engage as one of the SESAR projects.

The wiki and website will be clearly related since they will share the same domain, with the website using the main domain (engagektn.com) and the wiki a subdomain (wiki.engagektn.com).

3 Wiki features and key functionalities

3.1 MediaWiki functionalities

There are many options to build a wiki site. We compared some of the most commonly used ones (<https://www.wikimatrix.org/> [7]) and chose MediaWiki [3], which is the same software used by the Wikipedia. This has a positive side effect, because the look and feel is the same as Wikipedia, the Engage wiki will look familiar to everyone. The editing of pages works in the same way too. Also, Wikipedia has gradually implemented various functionalities over the years, and these have been reviewed, improved and are thoroughly used by readers and authors alike. This provides a confidence that the target platform works correctly, and that already has all the functionalities that we will need in the Engage KTN wiki.

Apart from the basic features and configuration of the MediaWiki, we have considered three add-ons that are available in the platform as particularly important when choosing MediaWiki:

- Phabricator (<https://www.mediawiki.org/wiki/Phabricator>): an open-source software development platform, which can be used by more advanced users to edit the features, or request someone else to work on a missing feature.
- Extensions (<https://www.mediawiki.org/wiki/Manual:Extensions>): installable functions that are ready to use and related to any type of wiki functionality: user management, editing, look and feel, authentication, search, etc.
- FAQs (<https://www.mediawiki.org/wiki/Manual:FAQ>) and Help sections (<https://www.mediawiki.org/wiki/Project:Help>): in which you can find how to do anything you may need for your wiki, thoroughly explained step-by-step.

Also, MediaWiki [3] is the same tool used by the earlier ComplexWorld network [4], coordinated by Innaxis. So the Engage project partners are familiar with the environment which facilitates content migration.

3.2 Engage KTN wiki features

The Engage KTN wiki will be an open and live portal, continuously updated by the community that will include a repository of projects and information about events, research, teaching and learning, etc. For more information on the content please see Section 4. Some of the special features of the Engage KTN wiki include:

- Community interaction platform: a platform open to everyone willing to collaborate, edit existing and generate new content.

- Community validation: the contents are validated by the community who can provide additional supplementary information or correct the existing content in case of mistakes or inconsistencies.
- Linking material: providing one single repository for all the projects from different programmes and different timeframes, allowing for linking the projects by thematic relevance.
- Cross-references: the menu and layout of the wiki will consider the idea that the visitor/reader stays on the site as long as possible. So everything will be related, we will install at the bottom of the page the Related Articles extension which suggests further reading. Also, the authors will be able to add additional related articles when editing their content.
- Complete search: we will install the extension Advanced Search. As we plan to have a high volume of content in the wiki, we would like the readers to find the pieces of information they are searching for as accurately as possible. By default wiki pages are indexed, but also this feature is configurable in case there is some content that the author or administrator does not wish to appear in the search option.

4 Wiki layout and structure

4.1 Wiki layout

The Engage KTN wiki will be built within a MediaWiki [3] application. As the same application is also used by the well-known repository Wikipedia, this choice brings the advantages of knowing that the installation and application are reliable. Additionally, everyone is familiar with the layout, structure and use of this software.

Except for some pre-defined basic layout aspects (navigation menu, user menu), MediaWiki is very customisable. For the rest of the layout, we will be consistent with Engage's design and image. Since the wiki is currently still being developed and the final layout will not be available until a final version becomes ready, a mock-up design of the Engage KTN wiki home is presented below.

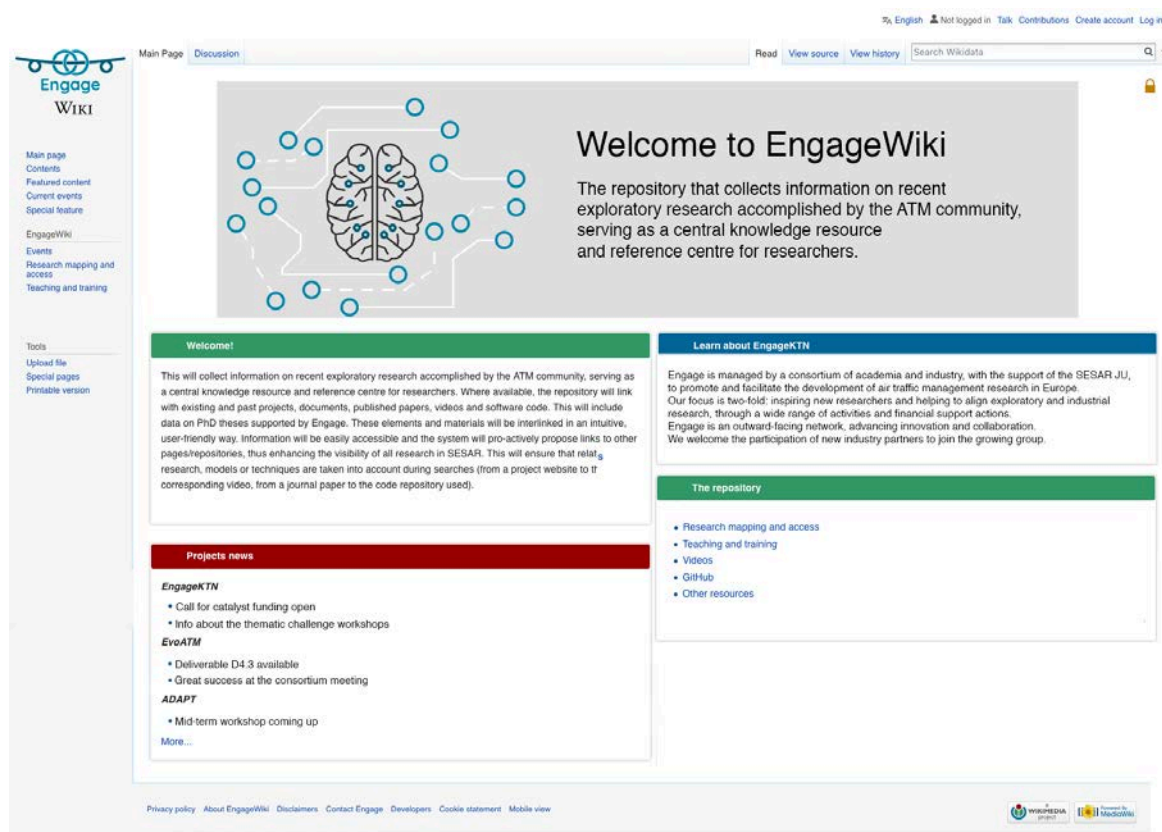


Figure 1. Engage KTN wiki layout

4.2 Wiki structure

MediaWiki software allows for using multiple menus, which can be adapted to the displayed content. This option allows information to be categorised and organised in the wiki according to the (potentially changing) requirements, placing user-friendliness and clarity at the heart of the design. The wiki will contain Main menu, Engage wiki menu and Repository.

4.2.1 Main menu

This is a menu showing the high-level organisation of the wiki content. For the user convenience, it will be placed in a part of the wiki Home page that is always visible, to highlight content that will be featured and displayed first. Its structure is as follows:

- Main page: link to the main page
- Contents: structure of the repository
- Featured content: content considered particularly important will be displayed in a more visible and separate way (this will be continuously updated)
- Current events: events organised by projects or by anyone related to ATM (this will be frequently updated)
- About Engage KTN / Contact us

4.2.2 Engage wiki menu

This menu will contain three sub-menus with their own sub-categories:

- **Events**
 - Conferences
 - PhD fairs
 - Recruitment fairs
 - Summer schools
 - Workshops
- **Research mapping and access**
 - ATM concepts roadmap
 - Research concepts map
 - Research projects database
- **Teaching and training**
 - Academic courses (taught programmes)
 - Internships (placements, exchanges)
 - Postgraduate and research degree programmes
 - Training courses (e.g. GEN-INTRO)

5 Wiki registration and user access rights

5.1 Wiki registration

Wiki registration is mandatory for editing mode. In contrast, registration is not required to access the wiki in read-only mode.

Accordingly, people willing to edit the wiki material, add new pages or update existing ones, must request an account and perform log in before editing. The registration link will be placed at the top menu of the page (as required by the MediaWiki software) to facilitate users' access. The potential user will have to provide basic contact details (name, e-mail address, entity) in the registration form, together with a short biography to ensure that his/her profile is relevant for the wiki scope. The form will also contain a captcha formula in order to prevent spam.

The requests will be received by Innaxis. Provided the registration data are true and correct (i.e. the request is made by a person, not robots/spam), the access will be granted, assuming that the information provided in the short bio can confirm the relevance for the wiki. In case of doubt, the administrator will contact the user to request further information before the account is approved.

Special page Search

Request account

Complete and submit the following form to request a user account.
 Make sure that you first read the [Terms of Service](#) before requesting an account.
 Once the account is approved, you will be e-mailed a notification message and the account will be usable at [login](#).

User account

Your e-mail address will be sent a confirmation message once this request is submitted. Please respond by clicking on the confirmation link provided by the e-mail. Also, your password will be e-mailed to you when your account is created.

Username:

E-mail address:

This is a special page, you cannot edit the page itself

Personal information

Your biography will be set as the initial content for your userpage. Make sure you are comfortable publishing such information.
 Try to include any relevant credentials in your biography below.

Personal biography (plain text only):

To help protect against automated account creation, please solve the simple sum below and enter the answer in the box ([more info](#)):

37-1 =

Figure 2. Engage KTN wiki account registration form

5.2 User access rights

The Engage KTN wiki will work with the pre-defined users from the MediaWiki tool, with level of access granted to each pre-defined profile. Further information about these profiles can be found on the MediaWiki support wiki (https://www.mediawiki.org/wiki/Help:User_rights_and_groups).

Administration and Bureaucrat accounts will be acquired in order for Innaxis, the University of Westminster and the SJU to administer the wiki content, and user access rights if needed. Other Engage partners may also request this type of account to manage content editions.

Other accounts will, in general, be User accounts, which allow editing any page except for those blocked by the administrators (e.g. the Engage description page, pages which must always be part of the wiki). The users will be able to edit any other page or description or add new pages. The number of total users will be unlimited.

6 Wiki content review and licensing

6.1 Wiki content

Once the users are approved as authors of the wiki articles, **their individual edits will not be monitored**. Free editing of content and creating pages will be allowed, the content will be validated by the community. In any case, older versions of all pages are stored and changes can always be reverted back by an administrator, so the content will not be lost in case of misconduct of a user.

MediaWiki has a very useful monitoring option that allows administrators to see the edits made over the last 30 days, filtered by user if necessary. This tool will be used to check the new content of the wiki every fortnight or once per month.

MediaWiki also has a tool that allows the latest images uploaded by anyone to be viewed on one page, which is very helpful for monitoring the content uploaded to the wiki.

In case the administrators notice that some of the content is similar or duplicated, there is also a tool that can compare two pages to detect duplication. In this case, the wiki administrators would decide how to act depending of the circumstances. One option would be to contact both authors in case the content is similar but added by different people. But the administrators would be free to delete one of the pages if they consider the content is the same or a copy from someone else.

6.2 Licensing

The Engage KTN wiki will be on a platform that is conceived and owned by the Engage KTN – and therefore its partners. The property of the idea and development of the platform itself is owned by the Engage consortium, and so will be noted in the “About” page of the wiki. It will also be mentioned that some of the content was part of ComplexWorld network wiki, developed between 2010 and 2016, with the support of SESAR WP-E, and now merged together with the Engage wiki.

A Creative Commons licence will apply to content generated within the wiki itself, whereas external content that is added to the wiki will be covered by their own existing licensing agreements. Creative Commons [6] is a non-profit organisation that has developed various free licences to standardise and simplify the creative and cultural content and to share and collaborate under the owners’/creators’ terms (<https://creativecommons.org/about/>).

For the Engage KTN wiki **contents**, the **Attribution-NonCommercial-ShareAlike 4.0 International (CC BY-NC-SA 4.0)** licence has been chosen. This means the content can be shared and adapted but it has to be attributed to the author and the material cannot be used for commercial purposes.

The CC logo will be included in the wiki and will also be included when the wiki contents are shared outside it (website, social media, mail-outs, etc.).

The wiki may contain other kinds of content, external documents or information which may have their own licensing. Any time one of these documents is referred, acknowledgement of the source shall be made under the applicable conditions to the document in question. This may apply to documents such as project deliverables, posters, images, papers, etc., that could be both linked to the wiki or uploaded within its pages. It will be specified that the CC licence chosen for the wiki will only apply to the content generated for the wiki itself, but the rest of the external content added can have its own licensing. This information can also be added to those pages where necessary.

The main goal of applying non-commercial licensing to the wiki is that nobody obtains a direct monetary benefit from another people's work and content. But also another good reason to keep the non-commercial option is to give more confidence to the authors who are willing to publish in the wiki, so they trust their input is not to be sold or reused for commercial purposes.

A specific section for non-commercial licensing will be added to the wiki, since specific terms will be applied. It has been considered necessary to add a section for the purposes and specifications of the Engage wiki non-commercial licence, since there may be some cases where there is a monetary benefit involved but it is not directly obtained from the content, i.e. if the content of a wiki is used in a course that is not free, or an event, etc. An e-mail account from the consortium will be available in this section so that any specific questions related to this non-commercial use can be addressed. This section will be completed during the development of the wiki, as more specific situations are expected to emerge.



Attribution-NonCommercial-ShareAlike 4.0 International (CC BY-NC-SA 4.0)

Under the following terms:



Attribution — You must give [appropriate credit](#), provide a link to the license, and [indicate if changes were made](#). You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use.



NonCommercial — You may not use the material for [commercial purposes](#).



ShareAlike — If you remix, transform, or build upon the material, you must distribute your contributions under the [same license](#) as the original.

No additional restrictions — You may not apply legal terms or [technological measures](#) that legally restrict others from doing anything the license permits.

Notices:

You do not have to comply with the license for elements of the material in the public domain or where your use is permitted by an applicable [exception or limitation](#).

No warranties are given. The license may not give you all of the permissions necessary for your intended use. For example, other rights such as [publicity, privacy, or moral rights](#) may limit how you use the material.

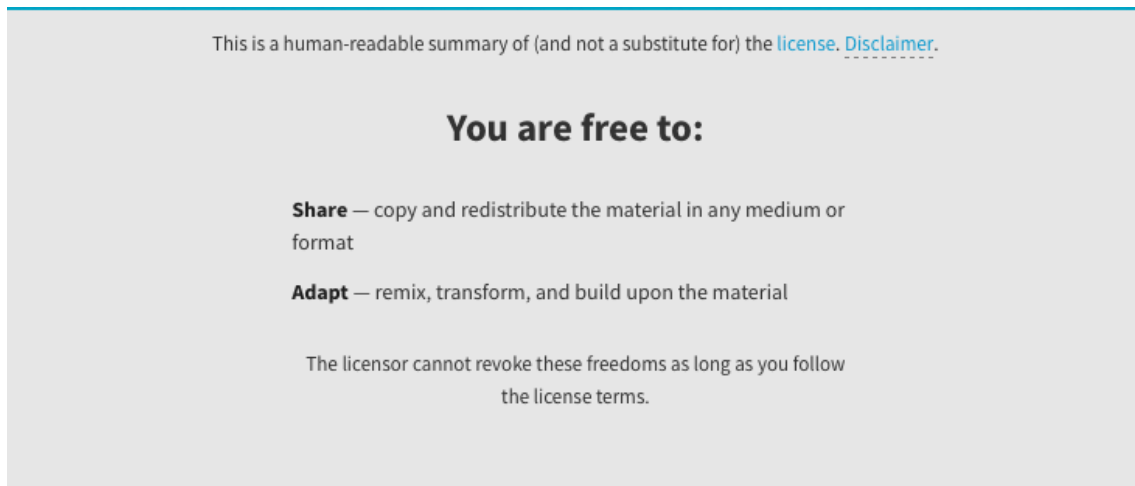


Figure 3. Creative Commons licence

Source and further info: <https://creativecommons.org/licenses/by-nc-sa/4.0/>

The complete licence can be found here: <https://creativecommons.org/licenses/by-nc-sa/4.0/legalcode>. This link will also be available in the Engage KTN wiki. It will be ensured that users registered in the wiki who wish to collaborate in the Engage KTN wiki are aware of the licensing rules applicable to the content they generate.

The code for adding the licence to a web instance can be found here: https://creativecommons.org/choose/results-one?license_code=by-nc-sa&jurisdiction=&version=4.0&lang=en

7 ATM concepts roadmap

The overall objective of the ATM concepts roadmap is to develop a long-term roadmap of ATM innovative concepts beyond the SESAR 2020 timeframe. This roadmap will be developed as an **on-line, 'infographic' tool enabling community interaction** such that researchers can exchange views and their input can be collected and considered for on-going roadmap updates. These functionalities are wiki requirements, as the roadmap will be hosted on the Engage wiki.

By monitoring the emergence of innovative concepts within the ATM domain that require further research and development beyond the ongoing and planned activities, we aim to foster breakthrough research that may create an impact on the ATM system, its operations and stakeholders, promoting new research opportunities.

7.1 ATM concepts scope

While the ATM concepts roadmap is considered a live entity, which will be regularly updated based on the monitoring of ongoing research initiatives, and interaction with stakeholders and researchers providing input, a first definition of the ATM “concept” scope is required for the first version of the roadmap.

In general, the term “concept” will cover R&D topics, future priorities and challenges, which fulfil the following conditions:

- A mechanism that can be described in terms of its potential operational relationship with, and/or impact on, the ATM system (which may include regulatory instruments and contributions from other fields, such as cryptology, that may modify or feed ATM);
- Be capable of contributing directly, or indirectly, to the improvement of ATM (else it is out of scope);
- Be describable in terms of a TRL cycle or similar (else it is too vague), and with a focus on lower TRLs (up to TRL 3);
- Be not already implemented (else it is out of the temporal scope).

As initially explained, the scope of the term may evolve during the Engage KTN duration if an adaptation is considered necessary as a result of the monitoring activity. However, the above conditions set up the basis for developing the first roadmap. These conditions have been agreed between the Engage partners and the SJU in a dedicated meeting.

7.2 Roadmap timeframe

The roadmap can be presented both in terms of:

1. Evolution over a number of years (time-based), or
2. By TRL levels, identifying the current maturity level of a certain concept and defining the path to progress beyond it.

The two options are represented in the following schemas

Option 1: Time-based

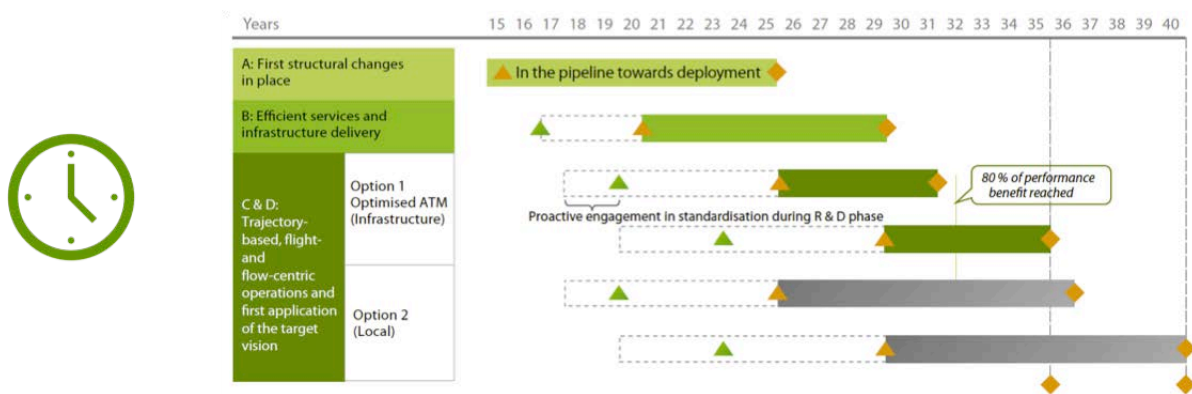


Figure 4. Time-based roadmap schema

Option 2: TRL-based

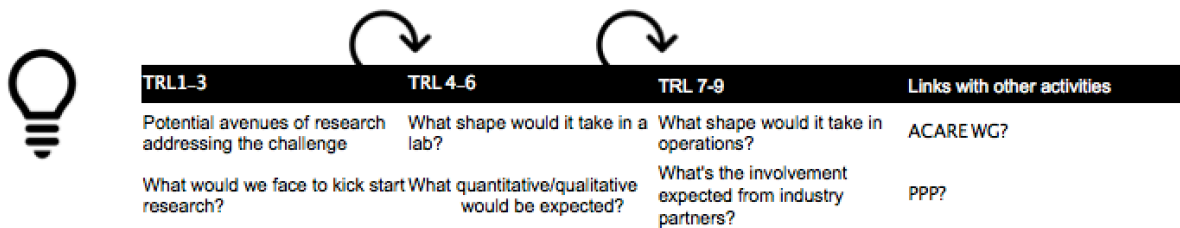


Figure 5. TRL-based roadmap schema

At the dedicated meeting previously mentioned, it was also agreed the TRL-based roadmap is more suited for the scope of this activity. On the one hand, defining time horizons for certain developments to be taken forward is challenging as it depends on a high number of variables which are out of scope of the Engage KTN: availability of resources (funding and expertise), detailed information on longer-term strategic (ATM) priorities, extent of research activities funded in the KTN *per se*. On the other hand, the TRL-based approach provides a better structure to define more definitive steps to follow a gradual evolution of technology maturity. Accordingly, the ATM concepts roadmap will be structured as a matrix where the concepts are placed according to their current



maturity level (with special attention to emerging topics, TRL0/1-3) and the guidelines/steps to progress towards higher maturity levels, to be defined. For this exercise, an identification of the potential barriers and bottlenecks will be necessary. This matrix will be presented to the ATM community through the Engage wiki (and promoted on the web) and formatted as an interactive tool. It will also contain a participation space to foster the collaboration of the community.

Note that although a TRL-based approach has been agreed, an alternative maturity scale might be preferred in the future, e.g. Societal Readiness Level (SRL).

7.3 Engagement and collaboration with other stakeholders

The ATM concepts roadmap, in order to be useful for the community, will require consistency with other initiatives and roadmaps. Relevant stakeholders need to be engaged with its development. While the wiki will include the feature for community interaction, it is essential to also keep an active role in the monitoring of other roadmaps and strategic research agendas as well as in engaging SESAR stakeholders (benefitting from the membership of the Engage Advisory Board and the links with the SESAR Scientific Committee). In particular, the following initiatives will be taken into account:

- Engagement with SESAR stakeholders, existing research in main work programme, SESAR deployment, other initiatives (e.g. ACARE, other PPPs and Joint Undertakings).
- A need to consolidate other roadmaps and strategic research agendas, Master Plan 2019 (and released 'drones' roadmap), ACARE SRIA, H2020, EC Aviation Strategy, etc.
- A proposed working collaboration: SJU, SESAR Scientific Committee, industry partners, interdisciplinary experts.
- Links with thematic challenges, research coordination map (and repository).

8 Planning: milestones and dependencies

- JUNE 2019
 - Wiki installed in a development environment: <http://www.wikidevengage.com>
- SEPTEMBER 2019
 - Wiki up and running on the final url: wiki.engagektn.com
 - Add ComplexWorld wiki material
 - Add HALA!¹ projects
- NOVEMBER 2019
 - Promotion starts: we will promote the launch of the wiki and provide the ability to register to users
 - SESAR ER/IR - SJU / CORDIS - project fiches
 - Other material: data from EUROCONTROL (TBC)
 - Contribution from external authors
- DECEMBER 2019
 - Announcement during SIDs
 - Wiki operational and including material from different calls (WP-E, SESAR1, IR projects...)
- 2020+
 - Maintenance
 - Administration

¹ Higher Automation Levels in ATM (SESAR WP-E network).

9 Measures of success

In order to monitor and document the use of the wiki, we will link it to a Google Analytics account, which provides a thorough usage report and statistics of the concerned site. Information includes number of visits, number of page views, number of pages per visit, average time on site, number of absolute unique visitors, most popular hours, demographic information, etc.

MediaWiki itself also has the functionality of reporting its own statistics. This is not such a detailed report as Google Analytics, but it provides useful information, especially regarding editing statistics which are not included in Google Analytics, to anyone, even to unregistered users.

Users and rights

- [Active users list](#)
- [Blocked users](#)
- [Change e-mail address](#)
- [Preferences](#)
- [Reset password](#)
- [User contributions](#)
- [User group rights](#)
- [User list](#)

Recent changes and logs

- [Gallery of new files](#)
- [Logs](#)
- [My watchlist](#)
- [New pages](#)
- [Recent changes](#)
- [Related changes](#)
- [Valid change tags](#)

Media reports and uploads

- [File list](#)
- [File path](#)
- [MIME search](#)
- [Search for duplicate files](#)

Wiki data and tools

- [Contribution scores](#)
- [Gadgets](#)
- [Popular pages](#)
- [Statistics](#)
- [System messages](#)
- [Version](#)

Redirecting special pages

- [External links search](#)
- [Random page](#)
- [Random redirect](#)
- [Search](#)

High use pages

- [Most linked-to categories](#)
- [Most linked-to files](#)
- [Most linked-to pages](#)
- [Most linked-to templates](#)
- [Pages with the most categories](#)
- [Pages with the most revisions](#)

Figure 6. Categories of MediaWiki reporting statistics

The wiki itself can provide information about its users: most active users, users who have made edits over the last 30 days etc. The wiki can even create a list of the top 50 contributors by score. According to https://www.mediawiki.org/wiki/Extension:Contribution_Scores the score is defined as:

$((\text{number of unique pages edited}) + 2 * \text{square root} ((\text{number of edits}) - (\text{number of unique pages edited})))$

Score calculated in this manner represents a weighted metric, based primarily on the number of unique edited pages, considering the total edited volume – high volumes possibly leading to higher quality pages.

Statistics

Page statistics	
Content pages	86
Pages (All pages in the wiki, including talk pages, redirects, etc.)	517
Uploaded files	101
Edit statistics	
Page edits since ComplexWorldWiki was set up	1,921
Average edits per page	3.72
User statistics	
Registered users	40
Active users (list of members) (Users who have performed an action in the last 30 days)	0
Bots (list of members)	1
Administrators (list of members)	4
Bureaucrats (list of members)	4
trusted (list of members)	1
Check users (list of members)	1
Widget editors (list of members)	0
View statistics	
Views total (Views to non-existing pages and special pages are not included)	2,432,519
Views per edit	1,266.28
Most viewed pages	
ComplexWorld Wiki	163,014
Uncertainty Propagation	156,053
Using a complex systems approach to model and analyse air transportation	140,592
Resilience in air transport	139,732
Non-classical complex metrics	113,311
Uncertainty in ATM	111,406
ComplexWorld Position Paper	82,170
Complex data analysis	79,171
Emergent behaviour	70,760
POEM	70,558

Figure 7. Example of MediaWiki reporting statistics



The wiki also provides more useful and direct information for reporting, such as most visited pages, number of pages, number of page edits, average edits per page, number of users, etc. This information is easily accessible and visible from the wiki itself and is therefore accessible to everyone.

We will also report and document on the wiki the media and publication citations that we are aware of (Engage newsletter, Innaxis newsletter, SESAR e-news, twitter and LinkedIn statistics, references in reports, articles, external websites, etc.) and their reach and response if any.

9.1 Wiki metrics

In addition to the analytics that capture wiki usage, the following metrics have been identified for measuring more 'active' success, in particular through the use of the associated research mapping activities hosted by the wiki.

Current suggestions include metrics for:

- identified emergent/interdisciplinary research themes;
- missing links/outliers identified in research and concept development;
- established researcher, institutional and domain links;
- ideas embedded in research proposals (ER, IR and beyond SESAR).

These metrics may be further developed when implementing wiki.

10 Beyond 2021

It is in the Engage spirit to keep the wiki live beyond the expected end of the network (i.e. beyond 2021). However, this would require a certain level of maintenance, therefore adequate resources would have to be allocated to keep the wiki operational. In particular, different possible levels of operation are considered beyond the KTN's contract:

1. The wiki is maintained in **read-only** mode (no editing will be allowed): the existing content will still be accessible to the whole community, including the wiki pages and all the material that is associated with it / uploaded thereto. However, the material available by the closure date of the KTN will be frozen – no additional updates will be allowed. This option will require some resources to cover the hosting costs, but this could be done with very limited effort. The Engage partners have agreed to cover the expenses associated with the wiki maintenance in read-only mode for five years after the contract closure.
2. The wiki is maintained open for **reading and editing but is not monitored by the KTN partners**: this option is similar in terms of maintenance costs to the previous one and Engage partners accordingly agree to cover the expenses associated with a read-only mode for five years after the contract closure. With this option, users previously registered as wiki contributors (registered authors) will still be able to update the wiki content. These updates will not be monitored by the Engage partners – this role and associated functionality would be passed to the SJU.
3. The wiki is maintained as **fully operational**: with this option, the operation of the wiki is maintained seamlessly after the network ends. In addition to the hosting costs included in the previous options, human resources will need to be allocated to approve/reject new users, supervise updates and – if needed – revert versions, give support to users, etc. After the KTN close-out, it will have to be agreed with the SJU, who will assume these tasks and associated operating costs.

In case that the wiki is not transferred to a third party or the SJU, the Engage partners will cover the IT costs for either option 1 or option 2 for five years after the Engage KTN contract closure, but without investing any significant efforts or other costs. Monitoring provision would need to be agreed under option 2, without costs for KTN partners. Should the SJU express a wish that the KTN should maintain a fully operational wiki beyond 2021, a corresponding wiki maintenance contract should be set in place before the closure of the current KTN contract (i.e. the KTN would not accept an unplanned workload to carry wiki maintenance without such maintenance contract).

If during the five years post-KTN period or beyond the SJU itself should decide to maintain the KTN wiki, the Engage partners would support the process by enabling the migration to another server chosen by the SJU, provided compatibility is ensured. The SJU would then assume all costs of such a transition. However, in the case that a different entity (i.e. neither one or more Engage partners, nor

the SJU) would be appointed to maintain the KTN wiki, Engage will export the wiki material in a digital format and provide it to the appointed entity. Engage will make reasonable provisions for the transfer of file content (extra costs of such a transition being borne by the SJU or a third party) and will subsequently close the Engage wiki.

Table 1. Possible levels of operation beyond the end of the KTN

Operation level	Functionalities		Engage	Transfer to SJU	Transfer to non-SJU parties
1. Read-only	Access and navigation through all wiki pages Pages can be read but not edited	Already covered*	-Five years hosting after the Engage KTN close-out date at no additional cost -Wiki maintenance during those five years	-Support for the transfer of the wiki to new hosting provided by the SJU -Effort allocated to the handover during Engage duration (i.e. to be covered by Engage contract)	-Wiki maintenance and hosting until the new entity has copied all material to a new wiki, up to a maximum of five years after the Engage KTN close-out date
		Not covered	-User support -Content updates	-Effort not eligible through Engage contract -Hosting cost beyond 2021 -Wiki material active transfer	-Effort not eligible through Engage contract -Wiki material active transfer -Hosting or maintenance beyond the set up of the new wiki
		Conditions		-Acknowledgement to Engage (as wiki authors) should be located in a visible place on the wiki home page -No transfer to non-Engage partners is allowed in the three years beyond Engage close-out	-Acknowledgement to Engage (as wiki authors) should be located in a visible place on the wiki home page

Operation level	Functionalities		Engage	Transfer to SJU	Transfer to non-SJU parties
2. Non-monitored editing	<p>-Access and navigation through all wiki pages</p> <p>-Pages can be edited by already-registered authors</p>	Already covered*	<p>-Five years hosting after the Engage KTN close-out date at no additional costs</p> <p>-Wiki maintenance during those five years</p> <p>-Content (non-monitored) updates by already-registered users on a voluntary / SJU-supported basis</p>	<p>-Support in the transfer of the wiki to new hosting provided by the SJU</p> <p>-Effort allocated to the handover during Engage duration (i.e. covered by Engage contract)</p>	<p>-Wiki maintenance and hosting until the new entity has copied all material to a new wiki, up to a maximum of five years after the Engage KTN close-out date</p>
		Not covered	<p>-User support</p> <p>-Content updates (from Engage partners)</p> <p>-New user requests</p>	<p>-Effort not eligible through Engage contract</p> <p>-Hosting cost beyond 2021</p> <p>-Wiki material active transfer</p>	<p>-Effort not eligible through Engage contract</p> <p>-Wiki material active transfer</p> <p>-Hosting or maintenance beyond the set up of the new wiki</p>
		Conditions		<p>-Acknowledgement to Engage (as wiki authors) should be located in a visible place on the wiki home page</p> <p>-No transfer to non-Engage partners is allowed in the three years beyond Engage close-out</p>	<p>-Acknowledgement to Engage (as wiki authors) should be located in a visible place on the wiki home page</p>

Operation level	Functionalities		Engage	Transfer to SJU	Transfer to non-SJU parties
3. Monitored editing	<ul style="list-style-type: none"> -Access and navigation through all wiki pages. -Editable pages -New user accounts are created -Updates are monitored 	Already covered*	<ul style="list-style-type: none"> -Five years hosting after the Engage KTN close-out date -Wiki maintenance during those five years -Monitored content updates by already-registered users on a voluntary / SJU-supported basis -Reverting to previous versions upon request or as a result of the monitoring -New account requests -User support 	<ul style="list-style-type: none"> -Support in the transfer of the wiki to new hosting provided by the SJU -Effort allocated to the handover during Engage duration (i.e. covered by Engage contract) 	<ul style="list-style-type: none"> -Wiki maintenance and hosting until the new entity has copied all material to a new wiki, up to a maximum of five years after the Engage KTN close-out date
		Not covered		<ul style="list-style-type: none"> -Effort not eligible through Engage contract -Hosting cost beyond 2021 -Wiki material active transfer 	<ul style="list-style-type: none"> -Effort not eligible through Engage contract -Wiki material active transfer -Hosting or maintenance beyond the set up of the new wiki
		Conditions	<ul style="list-style-type: none"> -A specific contract will be required covering these tasks beyond the KTN duration 	<ul style="list-style-type: none"> -Acknowledgement to Engage (as wiki authors) should be located in a visible place on the wiki home page -No transfer to non-Engage partners is allowed in the three years beyond Engage close-out 	<ul style="list-style-type: none"> -Acknowledgement to Engage (as wiki authors) should be located in a visible place on the wiki home page

* by existing Grant Agreement and/or extra support offered by the Engage consortium, where applicable.

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12 Acronyms

ATM	Air traffic management
CC	Creative Commons
EC	European Commission
ER	Exploratory Research
IR	Industrial Research
KTN	Knowledge Transfer Network
PPP	Public-Private Partnership
R&D	Research and Development
SESAR	Single European Sky ATM Research
SJU	SESAR Joint Undertaking
SRL	Societal Readiness Level
TRL	Technology Readiness Level
WP-E	SESAR Workpackage E (long-term and innovative research)

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