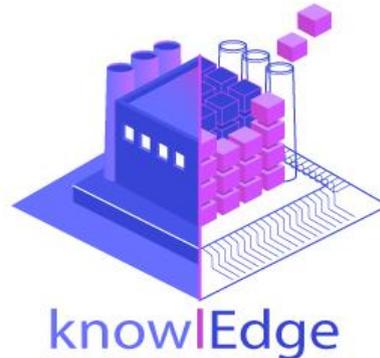Towards AI powered manufacturing services, processes, and products in an edge-to-cloud-knowlEdge continuum for humans [in-the-loop]

WP1: Project Management

EU ID: D1.1 Project Manual (quality assurance and risk assessment) v1.0

Deliverable Lead and Editor: Stuart Campbell, ICE

Contributing Partners: VTT

Date: 2021-03

Dissemination: Confidential

Status: For EU Approval

Abstract

The purpose of this knowlEdge deliverable, D1.1 "Project Manual", is as a manual for all project procedures and communications. This document provides the foundation for the practical work in the project throughout its duration and will help ensure that the project partners will follow the same well-defined procedures and practices assuring that the project is delivered on specification, on time, and on budget.

Grant Agreement: 957331

Document Status

Deliverable Lead	Stuart Campbell, ICE
Internal Reviewer 1	Stefan Walter, VTT
Type	Deliverable
Work Package	WP1: Project Management
ID	D1.1 Project Manual (quality assurance and risk assessment) Vs: 1.0
Due Date (Original)	2021-02
Delivery Date	2021-03
Status	V.1.0

History

See Annex B.

Status

This deliverable is subject to final acceptance by the European Commission.

Further Information

www.knowlEdge-project.eu and mailto:info@knowlEdge-project.eu

Disclaimer

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Project Partners:

For full details of partners go to www.knowlEdge-project.eu/partners

Executive Summary

This knowlEdge deliverable, D1.1 "Project manual", is a manual for all project procedures and communications. This document provides the foundation for the practical work in the project throughout its duration and will help ensure that all project partners will follow the same well-defined procedures and practices. Thus, this deliverable is an important and mandatory tool to ensure that the project is delivered on specification, on time, and on budget.

This manual is based on the project procedures as defined within the knowlEdge Description of Action and Consortium Agreement and where necessary extends them in the operational aspects. However, it is subservient to those documents.

It is one of the cornerstones for achieving the project results, identified as follows:

- **Description of Action (DOA):** Contractual agreement between the beneficiaries and the European Commission
- **Consortium Agreement (CA):** Contractual agreement dealing with legal aspects between the project beneficiaries
- **Project Manual (D1.1):** Defines guidelines and best practices for the daily project work. Once approved by the knowlEdge Board of Partners, as defined in the CA, it is also contractually binding on partners

This document contains a description of the following aspects:

- Internal Communication and Meetings
- Decision Making
- Document management
- Quality Management
- Deliverable preparation and submission
- Reporting
- Risk management approach and preliminary risk identification
- Scientific publications

Although formally delivered only at Month 2, the Project Manual is, however, a "living document", ie its content may be adapted through the project duration to reflect changes within the project management procedures. If explicitly requested by EU reviewers, a definitive version can be made available at the end of the project.

Table of Contents

0   Introduction

0.1   knowlEdge Project Overview

The knowlEdge is is a project funded by the H2020 Framework Programme of the European Commission under Grant Agreement 957331 and conducted from January 2021 until December 2023. The knowlEdge consortium consists of 12 partners from 7 EU countries, and its solution will be tested and evaluated in 3 manufacturing sectors with a total budget of circa 6M€. Further information can be found at www.knowlEdge-project.eu

AI is one of the biggest mega-trends towards the 4th industrial revolution. While these technologies promise business sustainability and product/process quality, it seems that the ever-changing market demands and the lack of skilled humans, in combination with the complexity of technologies, raise an urgent need for new suggestions. Suggestions that will be agile, reusable, distributed, scalable, accountable, secure, standardized and collaborative.

To break the entry barriers for these technologies and unleash their potential, the knowlEdge project will develop a new generation of AI methods, systems and data management infrastructure. This framework will provide means for the secure management of distributed data and the computational infrastructure to execute the needed analytic algorithms and redistribute the knowledge towards a knowledge exchange society. To do so, knowlEdge proposes 6 major innovations in the areas of data management, data analytics and knowledge management: (i) A set of AI services that allow the usage of edge deployments as computational and live data infrastructure, an edge continuous learning execution pipeline; (ii) A digital twin of the shop-floor to test the AI models; (iii) A data management framework deployed from the edge to the cloud ensuring data quality, privacy and confidentiality, building a data safe fog continuum; (iv) Human-AI Collaboration and Domain Knowledge Fusion tools for domain experts to inject their experience into the system to trigger an automatic discovery of knowledge that allows the system to adapt automatically to system changes; (v) A set of standardization mechanisms for the exchange of trained AI-models from one context to another; (vi) A knowledge marketplace platform to distribute and interchange AI trained models.

0.2   Deliverable Purpose and Scope

The purpose of this knowlEdge deliverable, D1.1 "Project Manual", is as a manual for all project procedures and communications. This document provides the foundation for the practical work in the project throughout its duration and will help ensure that the project partners will follow the same well-defined procedures and practices. Thus, this deliverable is an important and mandatory tool ensure that the project is delivered on specification, on time, and on budget.

Specifically, the DOA states the following regarding this Deliverable: "D1.1 Project Manual (quality assurance and risk assessment) (R/DEM/DEC/OTHER, PU/CO/CI, M2): helps the Consortium with quality assurance and identification of relevant quality standards and best practices and means to achieve them, and supports the implementation of internal quality checks".

It is possible to read the Project manual in a non-linear way, making use of it in appropriate situations to refresh knowledge about the handling of aspects within knowlEdge.

Nevertheless, every person involved in the project should read it completely at least once; regardless of the fact if such a person was involved from the very beginning of the project or if the person joined the project later. During the project, some of the procedures may change due to decisions taken by the partnership or because of practical aspects. If this is the case, the Project Manager (PM) will update the Project manual accordingly, but it is not intended nor needed to resubmit the document for EU approval.

0.3 Target Audience

The Project manual aims primarily at project participants. This document is listed in the Description of Action (DOA) as "confidential" since it provides information for project-internal usage only. In addition, it provides the European Commission (including appointed independent expert reviewers) with an overview of the project management approach and procedures.

Partners must ensure that all project individuals, both existing and new starters, should compulsory read this handbook including all template.

0.4 Deliverable Context

This manual is based on the project procedures as defined within the knowlEdge Description of Action and Consortium Agreement and where necessary extends them in the operational aspects. However, it is subservient to those documents.

It is one of the cornerstones for achieving the project results, identified as follows:

- **Description of Action (DOA):** Contractual agreement between the beneficiaries and the European Commission
- **Consortium Agreement (CA):** Contractual agreement dealing with legal aspects between the project beneficiaries

It is not the purpose of the Project manual to reproduce the content of the other documents "en masse". Some sections from these documents may nevertheless be recapitulated to make this Project Manual self-contained.

0.5 Document Structure

This deliverable is broken down into the following sections:

- **Section 0: Introduction**: Provides an introduction to this deliverable, including a general overview of the project and an outline of its purpose, scope, context, status, and target audience
- **Section 1: Internal Communication and Meetings:** Defines the communication mechanisms including the ones with the European Commission, between the consortium partners, and with other projects and programmes. Furthermore, it gives an overview of the planned project meetings
- **Section 2: Decision Making:** The projects process of decision making
- **Section 3: Document Management:** The document management approach and tools as well as the knowlEdge templates
- **Section 4: Quality Management:** The general quality management approach, including project metrics, quality planning, and relevant roles and responsibilities

- **Section 5: Deliverable Preparation and Submission Process:** The deliverable preparation and submission process applied in knowlEdge, including the review process and deadlines
- **Section 6: Reporting:** Project-internal and project-external reporting, ie the internal Project Progress Reports and the Quarterly Management Reports as well as the Project Periodic Reports that need to be delivered to the European Commission
- **Section 7: Risk Management and Identification:** Risk management mechanisms applied in knowlEdge including preliminary risk identification and quantification
- **Section 8: Publications:** Information pertaining to scientific and other publications

Annexes:

- **Annex A: Document History**
- **Annex B: References**

0.6   Document Status

This document is listed in the Description of Action as "confidential" since it provides information for project-internal usage only.

The Project manual must be approved by the Management Team (MT) and will be augmented from time to time on decisions of the General Assembly or MT. The Project manual may include Deliverable formatting, styling, and creation rules and thus all Partners and Leads should ensure that final deliverables adhere to these. Thus, once approved by the knowlEdge MT, it is binding on all partners. Should the European Union (EU) review process cause amendment of any part of the document that part (only) will be temporarily annulled until that part is amended and approved by the MT once more.

0.7   Document Dependencies

This document has no preceding documents or expected further formal iterations. If explicitly requested by reviewers, a definitive version can be made available at the end of the project.

0.8   Glossary and Abbreviations

A definition of common terms related to knowlEdge, as well as a list of abbreviations, is available at www.knowlEdge-project.eu/glossary

0.9   External Annexes and Supporting Documents

External Documents:

- Annexes:

  - knowlEdge Presentation Template – See Section 3.2
  - knowlEdge Deliverable Template – See Section 3.2
- Supporting Documents:

  - knowlEdge - Contact and Email Matrix - See Section 1.1.3
  - knowlEdge - Meeting Minutes -See Section 1.1.5

0.10   Reading Notes

- None

0.11   Document Updates

None

1 Internal Communication and Meetings

Ensuring effective communication among the project partners (and towards the outside world) is critical for the success of the project and is a fundamental practice to manage the project itself in the best way. The knowlEdge internal communication strategy and objective is to ensure all partners are fully informed about planning, work in progress, and challenges ahead. Section 1.1 defines the approach for communication with the European Commission (EC), internal project parties, and with related projects and programmes. In Section 1.2, the planned meetings including General Assembly, Management Team (MT) and review meetings, are discussed. Finally, Section 1.3 identifies the facets of the knowlEdge calendar that can be used to schedule meetings and virtual conferences.

1.1 Communication

1.1.1 Communication with the European Commission

Concerning communication with the EC, the Project Manager (VTT) will be the unique communication channel (except in circumstances explicitly defined in the GA/CA) to unify and facilitate the communication procedures. This way, the Project Officer and other officers at the European Commission (EC) will be provided with a unique contact.

1.1.2 Communication among the Consortium Partners

To minimise costs, the primary means of communication as defined in the CA are email and Microsoft Teams (similar to GoToMeeting, Webex, Skype, Uber Conferencing etc).

The following communication channels have been identified for project-internal communication:

- Contact Information (Section 1.1.3)
- Mailing Lists (Section 1.1.4)
- Biweekly Conference Calls (Section 1.1.5):

  - Operations (and plenaries)
  - Work Package
  - Tasks (optional)

In terms of the tools to enable this:

- MicrosoftTeams Calendar for the sharing of calendar information (Section 1.3)
- For Document and Deliverable Production: Word 2016 (not online version)
- For involvement in financial matters and reporting: Excel 2016 (not online version)
- Virtual Conferences:

  - Normal Telephone
  - Microsoft Teams for large group calls
  - Microsoft Teams (For bilateral or small group conferencing). However, partners initiating calls may choose to use Uber, Skype, or other forms of phone conferencing

- All staff: Browser access to:

- Microsoft SharePoint for the sharing of concurrently updated documents such as surveys (including online Excel, Word and Project Repository)
- All staff:
  - Subscription to project email exploders hosted by VTT or other Parties

1.1.3 Contact Information

A list of the people involved at partners, including their roles and contact data, is maintained in:

- SharePoint – knowlEdge – Documents – General – _Critical – All-MT-TASK-Reviewing Leaderships and Emails xlsx
- knowlEdge Contact applications at www.knowlEdge-project.eu/contacts (To be finalised)
- Partner Leads should update these contacts whenever necessary through the administration manned by VTT office (knowlEdge_admin@vtt.fi) who will take care of all changes necessary to mailing list.

1.1.4 Emails and Mailing Lists

Mailing lists have been set up to avoid email flooding and to ensure inclusivity. They are hosted and managed by project partner VTT (mailto:knowlEdge@vtt.fi). Points:

- Since many people are on these lists, particular care should be taken on their use. Conversely, it is important to not exclude partners from, for example, Task or WP discussions. For instance, if there is an interesting conference the full knowlEdge mailing list should be used.
- Putting a mailing list into CC should be minimised to avoid that project partners are flooded with irrelevant emails
- The lists are not moderated for those that are subscribed. Vice versa the VTT Project Office will moderate mail from unsubscribed addresses
- Where possible, all emails should start with "[knowlEdge]" within the subject line. Using the mailing lists, this prefix is added automatically by the mail server. For individual mails, it needs to be added manually
- The VTT Project Office should be contacted to add and remove individuals from lists. This is performed through a web interface
- Where possible, individuals should turn-off 'out of office' requests for these mailing lists since it can mean 40 people receive an out-of-office request and are then likely to block emails from you

The email list participants are exclusively maintained by the PM. As well as containing summary contact information for everyone within knowlEdge, a matrix is semi-automatically generated which allows partners to easily see which list everyone is subscribed to. VTT will regenerate this on a regular basis, at least quarterly, and provided read-only in the SharePoint – knowlEdge – Documents – General – _Critical – folder as "knowlEdge All-MT-TASK-Reviewing Leaderships and Emails xlsx". Any changes to the list should be made to mailto: knowlEdge_admin@vtt.fi.

General list of participants

Partner Tag (from DOA	Title	First name	Surname	Position	Email
ICE	Mr	Victor	Anaya	Technical Manager	victor.anaya@informationcatalyst.com
ICE	Mrs	Sarah	Fairhurst	Exploitation Manager	sarah.fairhurst@informationcatalyst.com
ICE	Mrs	Boki	Ashmore	Project Admin	boki.ashmore@informationcatalyst.com
VTT	Mr	Stefan	Walter	Project Manager	stefan.walter@vtt.fi
VTT	Mr	Göran	Granholm	Project Manager	goran.granholm@vtt.fi
VTT	Mr	Markku	Hentula		markku.hentula@vtt.fi
VTT	Mr	Ville	Lämsä		ville.s.lamsa@vtt.fi
VTT	Mrs	Leila	Saari		leila.saari@vtt.fi

Figure 1: Sample of Email Matrix

The table below shows the mailing lists adopted which are maintained by the administration office:

Mailing List Name	Recipients	Scope
knowledge@vtt.fi	"All" i.e. all involved people at all project partners or General Assembly members. With the exception of those on the knowlEdge-legal list, this includes all partners who are on at least one other list	Exchange of information that concerns all those involved in the project. This could be mails regarding administrative issues, e.g. planning of General Assembly meetings or the announcement of project-wide conference calls.
knowledge_mt@vtt.fi	"MT" Management Team list: One primary and authorised person per partner plus other nominated people from partners if applicable (typically legal or administration personnel). This primary authorised person must be able to decide and speak on behalf of the partner.	Announcements regarding management issues, e.g. discussion of GA and CA concerns, announcements of MT meetings, announcements of money transfers or financial reporting issues, etc. Note: It is the aim to keep the number of recipients for the mailing list low in number. It will be minimally used except for major or disrupting events within the project.
knowledge_wp[n]@vtt.fi Where: • [n] represents the WP number 1-9	"WP Lists" People involved in Work Packages. NB WP1 is effectively covered by the Ops and MT list and will seldom be used (if at all)	Discussion of Work Package-internal issues. Generally, all tasks/deliverable specific correspondence should take place on the WP lists. This has been found the most efficient way of working and stops list proliferation of multiple per-task lists

Figure 2: Mailing Lists – Overview

1.1.5 Bi-weekly Conference Calls

1.1.5.1 General Items

Multiple bi-weekly conference calls are arranged to bring together all active partners needing to be involved.

Points:

- It is the responsibility of the lead (typically the Project Manager, or WP lead) to set up, chair, and minute internal conference calls via the Project Office
- If the lead is unavailable, the vice lead or other dominant partner should be asked to fill-in for the lead
- Calls should always be held even if they are 5 minutes long to ensure there is momentum and regularity. However, if it is clear there is no business by anyone, the lead should send out a cancellation note
- All calls should be via Teams Conferencing:

  - This ensures that all individuals are easily familiar with the conferencing system
  - It is provided by partner VTT for the duration of the project and will manage the set-up of calls
  - When setting up the call invitation email the VTT Project Administrator will do this IF the meeting is repeating

- Bi-weekly conference calls are recommended during the active phases of WPs
- At least one person from each partner active in the group/WP/Task should participate
- The calendar sequencing is available on the knowlEdge Calendar – See Section 1.3
- Agendas, even if simple, should be available at least two days in advance and all partners can add agenda items ad hoc (although preferably in advance) except for formal groups such as MT or General Assembly where there are defined CA procedures
- Leads should wait at least 4 minutes before commencing the meeting to allow partners to join. However, during this period leads should make some periodic announcements else it can be perceived there is no-one there
- Minutes should be focused on actions, clear points, and decisions with the former having dates and responsible people recorded against them. The actions should be specifically followed up at the next meeting.
- The minutes are kept in SharePoint under the Work Package area with a file name/convention eg: "knowlEdge – Project Work – [WPx] – Meetings - Meeting Minutes.xlsx".
- Leads must record attendance in the minutes XLS and there is no concept of apologies – partner individuals are either there, or not, and should make alternative representation arrangements if they cannot make a meeting. Correspondingly the lead should act on continued absences of partners (but not necessarily individuals)
- It is the duty of all partners to check the minutes for clarifications but also for "To Do's". Objections regarding the minutes need to be stated before or at the next meeting.

1.1.5.2   Operations

- Nature: Binding on other groups (although cannot conflict GA, CA, etc)
- Lead: Project Manager / Technical Manager
- Timing: Bi-weekly
- Agenda: Should be sent out at least 2 days before the meeting
- Minutes: Should be provided on SharePoint within 2 days of each WP/Task meeting and the relevant distribution list informed when present
- Other: This allows any issues from the WP leads meeting to be discussed here

1.1.5.3   Work Package

- Nature: Binding on WP (although cannot conflict CA, GA, Operations, etc)
- Lead: WP lead
- Timing: Bi-weekly. Currently (but check):

  - WPX: 10:00 CET on Mondays
  - WPY: 11:00 CET on Wednesdays
  - [others will be added when they are active]

- Agenda: Should be sent out at least 2 days before the meeting
- Minutes: Should be provided on SharePoint within 2 days of each WP/Task meeting and the relevant distribution list informed when present

1.1.6   Communicating Project Results

Communicating project results is one of the main tasks of knowlEdge and the dissemination activities are defined within WP9. For an overview of the essentials of communicating information about the project and its results see Article 38 of the Grant Agreement ("Promoting the action").

1.1.7   GDPR

As in the instances above, personal data will be processed within the project when other kinds of activities are conducted, such as project administration, or the communication and dissemination of results.

Specifically personal data of the project members related to administrative and general management issues in the framework of the project is used for the following purposes:

- Creation of a contact list: Excel file, contact application, or other storage containing name, surname, company, professional email, professional phone number, and optional private email/mobile/private phone / skype user
- Creation of a participation list: Excel file or other storage per events meetings organised by the Consortium / EC only for logistic organisation purposes. Containing name, surname, organisation, ID/Passport (optional) (eg for accessing to the EC facilities or wifi in some countries), dietary requirements, hotel and travel information, attendance information, social information, special needs. This document could be shared with the staff in charge of the control access, or logistics, of the venue chosen for the event or other parties which may need this information.
- Signature sheet: For assistance control and justification purposes. Containing name, surname, company and signature or attendance indicator.

- Tools: To be included in the needed project's tools for the proper development of the project. The tools will be managed by VTT or an assigned party specified in the CA/GA/or MT decision (or equivalent) as Project Coordinator and/or Manager
- Email distribution list: Subscription of the project members to all the distribution lists relevant to their assigned tasks
- Document repository: Access of the project members to the project repository where all the relevant documentation will be stored, including those listed in the section Data Storage
- Contact or Similar Applications: Upload provided mandatory/optional information to valid contact applications to be used within the project

Regarding dissemination and communication activities, some personal data from the project participants may be collected too (eg images resulting from photo or video filming during the event).

The data controller of the above-mentioned personal data used for administration and dissemination, and communication purposes is the Project Coordinator VTT. To collect these personal data VTT sends a consent form to all project members (all persons from the different organisations which are partners of the Consortium) through the SharePoint as soon as they request to be added by the Partner Leads to the project. Only when this is received are they added to all the project processes/systems. This content and agreement is then retained by VTT.

Further information on this and the overall consortium Data Management Plan is available in Deliverable D1.2.

1.2 Meetings

As outlined in Section 1.1.2, communication between the partners will be mostly made through emails and conference calls. Real-world meetings among project partners will be arranged in accordance to the COVID-19 current situation when feasible. All partners have been provided with travel budget as part of their "other direct costs" budget. This budget is broadly proportional to a partner's role and overall man-months in the project.

In the following subsections, information about project-internal General Assembly meetings (Section 1.2.1) as well as the requested review meetings (Section 1.2.2) is given. Information about the meetings of the Management Team (MT) is presented in Section 2.

1.2.1 General Assembly Meetings

Partners have agreed that General Assembly meetings take place at least once a year or at any time upon written request of the Management Team (MT) or 1/3 of the members of the General Assembly.

All partners should be represented by at least one person unless it is clear from the agenda they are needed for less or no days. The General Assembly meetings are intended to take place at the locations of the project partners to evenly distribute organisational efforts and travel costs. For each General Assembly meeting, the Project Manager will issue an initial agenda, in cooperation with the local host of the meeting, detailing logistics, timing, and primary objectives. The agenda must be issued at least four

weeks before the actual meeting and at least one week before a more precise agenda including full timing. The knowlEdge partners are requested to shape the agenda by providing feedback regarding the topics to be discussed and sessions in general. Sessions may include, but are not limited to:

- Welcome, Objectives, and Agenda (host and Project Manager)
- Management and status report (Project Manager)
- Status report of active Work Packages (WP Leads and Task Leads)
- MT session (see Section 2)
- Discussion of date for the next plenary meeting

For each General Assembly meeting or single meeting sessions, some partners will be appointed with the responsibility to write "decision minutes". In general, the Project Manager is responsible for taking overall minutes. The agenda, decision minutes, all presentations and other documents provided at the meeting are collected in a specific meeting subfolder of the knowlEdge SharePoint meeting folder. Partners should share presentations and documents within one week after the meeting, but where possible already before or during the meeting (eg slides).

Apart from the regular General Assembly meetings, the Project Manager may stimulate or request additional meetings as necessary, eg meetings with a special focus on technical or implementation issues. However, it is not necessary that all project partners must attend these additional meetings.

The current schedule is available from the Project Manager.

1.2.2   Management Team Meetings

As defined in Article 22 of the knowlEdge Grant Agreement, regular reviews will take place during the implementation or after the project. The aim of reviews is to assess the work carried out during the past review period including the project reports and all deliverables due in the review period.

The Management Team (MT) meetings take place at least 4 times a year. Financial periods, and thus formal review periods, for knowlEdge have been set (nominally) to M18 and M36 months within the Grant Agreement. In addition, a non-financial review meeting will take place at M9 and M27. There is little practical difference between the reviews themselves but for the financial period considerable additional work for partners to calculate the figures. The precise point in time, as well as the location of the meetings, may change but the location will invariably be Brussels. They can change eg if the Independent Expert Reviewers ask for a demonstration of the knowlEdge-enabled services and Apps on-site. Furthermore, the European Commission (EC) may ask for extraordinary review meetings or shorten the review period, leading to more than the intended 4 review meetings.

For the preparation of a review meeting, the participants will meet one full day before the actual review meeting at the same location. If the review can only be held on Monday this can mean participants may meet/travel over the weekend. The duration of this preparation meeting may be extended or shortened if justified.

It is unlikely that all partners will need to attend review meetings and they need to only attend those which are most active which will in turn will be dependent on which tasks and WPs are active. However, it is likely that Managers will need to attend all and that WP/Sector leads will attend when relevant WPs are active.

It is compulsory for all project partners to read Article 22 of the Grant Agreement on the matter of reviews.

1.3 Calendar

To ensure that all knowlEdge team members are fully aware of the relevant virtual conferences and physical meetings a Microsoft Teams calendar is used with instructional points as follows:

1. Primary URL
   https://teams.microsoft.com/l/channel/19%3a89849b0826cb4a94a12b3cad7f74ada1%40thread.tacv2/General?groupId=4d0fdee6-f098-4711-8667-29b849d663d7&tenantId=68d6b592-5008-43b5-9b04-23bec4e86cf7
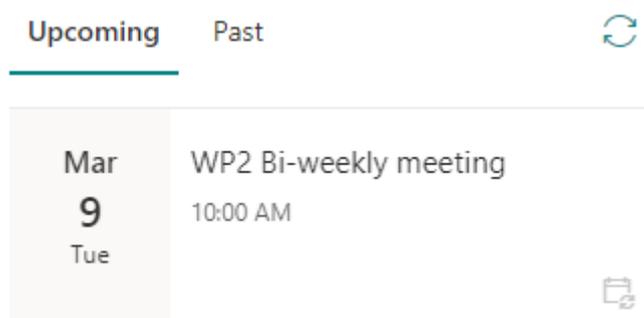
2. To set up an appointment please contact project admin

Figure 3: Initial knowlEdge Calendar

2 Decision Making

In a multilateral project, it is important that there are clear responsibilities and this section introduces the knowlEdge decision processes. First, Section 2.1 presents a general overview of the decision making hierarchy, then Section 2.2 describes formal decision making focused around the knowlEdge General Assembly; Section 2.3 then addresses the ad-hoc operational decision making focused on WP/Task/Deliverables; Section 2.4 identifies how conflicts are settled.

2.1   General Overview

The information in this major section is partially taken from the knowlEdge Consortium Agreement (CA) to make the Project manual self-contained. As the Consortium Agreement is a legally binding document, its content is overruling. If there will be an amendment to the Consortium Agreement during the project that makes any information given in the Project manual invalid, the (new) content of the Consortium Agreement is overriding the content of the Project manual. Further additional information regarding the operation of the knowlEdge Management Team (MT), representation in meetings, voting rules, veto rights, etc. can be found in Section 6 ("Governance Structure") of the knowlEdge CA.

The decision making with knowlEdge has a hierarchy of 'instruments' broadly as follows:

Task → Work Package → Operations Meetings → Project Manager → Project Manual → Management Team (MT) → General Assembly → Consortium Agreement → DOA → GA

However, each body has a right to subsidiarity (self-control and decision making at the lowest level) if it does not conflict with decisions/procedures/agreements of an 'upper' 'instrument' – for example, Tasks meetings cannot simply decide to use a different template for document writing since these are defined in the Project manual.

In addition, procedures for decision making are followed which may include the right of Partners to escalate a decision to an upper instrument (typically Work Package, MT, or General Assembly) which may then overrule the previous decisions that were made by instruments lower in the hierarchy.

2.2   Consortium Decisions

The decisions of the project consortium, as expressed by General Assembly and defined in the knowlEdge Consortium Agreement (Section 6.1), are legally binding formal decisions which are binding on all beneficiaries of knowlEdge and their staff. The General Assembly is the ultimate decision-making body of the knowlEdge consortium. For the avoidance of doubt, the term "General Assembly" is for convenience only and is not intended to imply the existence of any legal partnerships among the partners.

The General Assembly consists of one representative of each partner (beneficiary). The General Assembly membership list is maintained within the SharePoint – knowlEdge – Documents – General – _Critical – folder as "knowlEdge All-MT-TASK-Reviewing Leaderships and Emails xlsx" and a snapshot is also given below. The Project Manager/Coordinator shall chair all meetings of the General Assembly, unless decided otherwise.

As defined in Section 6 of the knowlEdge Consortium Agreement, the General Assembly meets at least once a year but in general, these meetings will take place three-four times a

year as part of the plenary meetings. If this is not possible, or if an extraordinary GA Meeting needs to take place, such a meeting may also be held via conference calls. Agendas must be circulated in normal circumstances normally 7 days in advance and 3 days for extraordinary meetings.

The General Assembly shall not deliberate and decide validly unless two-thirds of its members are present or represented. Each member shall have one vote. A party that was declared by the General Assembly to be a defaulting party may not vote. Decisions are taken by a two-thirds majority of the votes cast. There is no 'chair decides in the case of a draw' clause in the CA, so this infers that if there is not a majority, ie there is at a maximum a draw, the vote is not agreed with.

The General Assembly shall be free to act on its own initiative to formulate proposals and take decisions in accordance with the procedures set out in the knowlEdge Consortium Agreement, although decisions cannot conflict with it or the MT. Voting procedures, as well as the decision-making process of the General Assembly, are defined by the Consortium Agreement within Section 6 of the document.

2.3 Ad hoc Consortium Decisions

Ad hoc consortium decisions are those decisions necessary to achieve the project results but involve only internal resources. This includes, but is not limited to, decisions taken by Work Package and Task meetings as well as specific requests for decisions by the Project Manager/Coordinator, eg for the location of a meeting or the timing of conference calls and meetings.

Broadly speaking, the same rules as for the consortium decisions shall be followed, but the following shall prevail:

- There can be no conflict with consortium decisions
- As per Section 2.1, decisions made can be overruled/adjusted by more senior instruments in the decision-making hierarchy
- Only attendees, in the case of physical meetings, may vote
- If partners do not vote within the predefined period, their vote will not be counted. The decision coordinator (eg Project Manager, WP Lead, or Task Lead) will define times in which responses are valid. This should be usually 5 days and should not be shorter than 2 days. Partners should ensure that they set up suitable "out-of-office" arrangements, if necessary
- A missing response is perceived as approval. This rule does not apply if a partner flags that they are not able to take a decision in the period and justify it. In this case, a missing response should be taken as an abstention

2.4 Settlement of Disputes

The settlement of disputes has been defined in Article 11.8 of the knowlEdge Consortium Agreement. Broadly speaking, before any out-of-project action the GA must always be used as a discussion forum. If an issue cannot be settled, the partners enter a mediation process as defined in the CA.

3 Document Management

This section introduces common procedures and practices that are used for handling various kinds of documents within knowlEdge. Section 3.1 deals with the use of the Microsoft SharePoint. Section 3.2 identifies the internal templates and Section 3.3 the document metadata that supports them. Finally, Section 3.4 comments on the knowlEdge glossary.

In addition to the document management, a software versioning and revision control system (most likely GitLab) will be set up by VTT once the WP3-8 implementation tasks begin.

3.1 SharePoint

The knowlEdge document management approach aims at reducing the burden for project partners to synchronise, store, and locate documents. For this, a solution for document management and storage will be used: SharePoint.

If an email exchange refers to a document on SharePoint it should ideally include a hyperlink/directory path share to the document and not just an informal reference so ensuring minimal work by the typical multiple email consumers to access the document. However, the exchange of documents via mailing lists is acceptable, provided that more static or final versions of the document are also stored in SharePoint.

SharePoint is used within knowlEdge for the exchange and transfer of documents in progress. Furthermore, some documents extensively used by all partners, eg the current version of the DOA or the knowlEdge templates, are also stored in SharePoint, as this eases access to these frequently requested files. Root location SharePoint – knowlEdge – Documents – General – xxx…" contains several key documents that partners, and many individuals need to be familiar with; these include:

- Consortium Agreement (CA)
- Description of Action (DOA)
- Word and PowerPoint Templates
- Contact information
- Project Manual

If it is necessary to share the SharePoint folder with further colleagues, the VTT Project Office should be contacted.

VTT will be in charge of SharePoint subscription acquisition and management.

The following list briefly describes the intended content of each folder for the main folders:

- **Documents – General – _CRITICAL:** Critical documents for the project as mentioned above
- **Documents – General – Admin:** Source versions of previous and current EU Contract (including DOA) and CA
- **Documents – Project Work:** Contains subfolders for each Work Package and then within each subfolder, each task, and within each task there are subfolders for each deliverable
- **Documents – General – Marketing:** Logos, Graphics, Brochures, etc and their sources

- **Documents – General – Meetings:** Resources and results primarily for physical meetings such as plenaries

It should at all times be considered that data stored in the SharePoint can be viewed and altered by all other participants in the project.

3.2 Templates

In knowlEdge, Microsoft Word, Excel, and PowerPoint, as part of the Microsoft Office suite are used for most documents. For Microsoft Word and PowerPoint, templates have been created and are available in SharePoint. To make sure that documents can be easily exchanged, all partners need to make use of at least Microsoft Office 2013.

For all formal deliverables, and informal ones that are submitted to the EU, the Microsoft Word template MUST be applied. The current word template is in the SharePoint "Documents – General – _CRITICAL…." folder and in the D1.1 folder since it is an annex to the Project manual.

See file: "**knowlEdge Deliverable Template vx**" where the x version number may vary.

It is also mandatory to make use of the knowlEdge Microsoft PowerPoint template for external presentations regarding knowlEdge – ie at non knowlEdge events and reviews meetings. It is preferred to use this for internal meetings as well. If knowlEdge is only a minor part of a presentation, eg to show the different projects a partner is involved in, it is NOT mandatory to make use of the knowlEdge Microsoft PowerPoint template, but it should be considered.

See file: "**knowlEdge Presentation Template vx**" where the version number may vary.

The quantitative input for the Project Periodic Reports and Management Reports is collected through a SharePoint Excel sheet and a web-based time tracking tool. More details about this are mentioned in Section 6.1. A template for the Project Periodic Reports ("Periodic Reports", see Section 6.3.1) will be provided at the end of the first period and the template for the Final Report will be based on this.

As there might be minor changes to the templates, all partners are requested to make use of the latest version of a template, ie not to take an existing deliverable, or presentation, and fill in new content.

3.3 Document Metadata

3.3.1 Deliverable Cover page and Footer

The Word deliverable template cover page defines certain styles that are then referenced via field codes in other parts of the document – eg the status information on page 2 and in page footers. This allows information to be entered once and automatically referenced throughout the document. This includes information for WP/Deliverable ID, Name status etc. Particular CARE should be taken when filling-in in this template correctly so as not to overwrite the styles (or to be sure the styles are applied later) and to ensure field codes in the footer or other areas are not over written. Field codes can be updated through a Ctrl+A (Select All) "F9" and/or a Save/Open and a double check should be made when producing PDF versions for the EU that field codes have been updated.

Note that page numbering is complex since the sections up to and including the contents page, are numbered in roman numerals (I, II, III…) and the remainder in Latin numerals (1, 2, 3,). Because of this, altering anything in the footers tends to have significant consequences taking a long time to fix it!

3.3.2 Deliverable Status Information

The following states are used for deliverables:

- **Draft**: The working versions of a deliverable, ie work in progress which is not ready for review yet
- **For EU Approval** (implying consortium approved): A deliverable which has been accepted by the project-internal reviewers and is therefore sent to the EC (for approval)
- **EU Approved:** A deliverable accepted by the EC and therefore ready for publication at the knowlEdge Website if it is public

3.3.3 Naming Conventions and Versioning

In general, filenames should be meaningful and unique, and they should include the word 'knowlEdge' at the start to distinguish from other projects where appropriate.

Considering formal deliverable names in isolation:

- *D1.3.1a – Periodic Report (M6)*
  Example of deliverable file name: "*knowlEdge - D1.3.1a – Periodic Report (M6) – Draft - v0.9.0 - ICE*"
  Comments: The deliverable name matched the specific Tasks eg T1.3.1 Periodic Reporting with the 'a' (from "abc") representing each of the versions in this case at M18/30/48.

If generating a PDF (for example for the definitive version to the EU) eg from a Word document it should have the same filename as the original document except for the file extensions (eg "*pdf*"). When generating a final PDF for submission always search for "Error" since this process has a habit of showing up 'Error! Ref Source not found issues' which can be easily missed in the Word version of the document.

3.3.4 Microsoft Office Metadata

Microsoft Office allows metadata properties for each document to be entered. In knowlEdge, the fields "Author" and "Title" should be used. Usually, the author information will be filled in automatically, provided the author (deliverable lead) stated their full name in the Word personalisation properties. The title needs to be filled in manually and should be the same as on the first page of a document. For instance, for the Project manual, the title is "D1.1 – knowlEdge – Project manual". Further metadata fields are optional to fill in. To set these Microsoft Word options go to the "File" menu, select Info, and then the options are shown on the right side of the screen. Click on a property to edit it.

3.3.5 Tracking of Changes and Commenting

The editor (generally the Task Lead) of a deliverable, should decide whether changes should be tracked or not during the work on the first draft versions of a deliverable. Before submission of this version for Reviewer 1, **all** track changes mark-up and comments should have been erased and, if not, it should be returned without review.

Because of template or Microsoft Word issues, it could be the case that it is not possible to reconstruct who has written which comment. If the name/initials are missing in the comments after a document has been saved, it should be checked if the options are set as seen in Figure . Furthermore, the "Document Properties and Personal Information" should not be deleted when making use of the "Inspect Document" functionality, as this will also erase personal information about the authors of the comments from the document.

Finally, every author should make use of clearly defined initials that can be easily traced back to the author's name, so Microsoft Word document property information should be set accordingly.
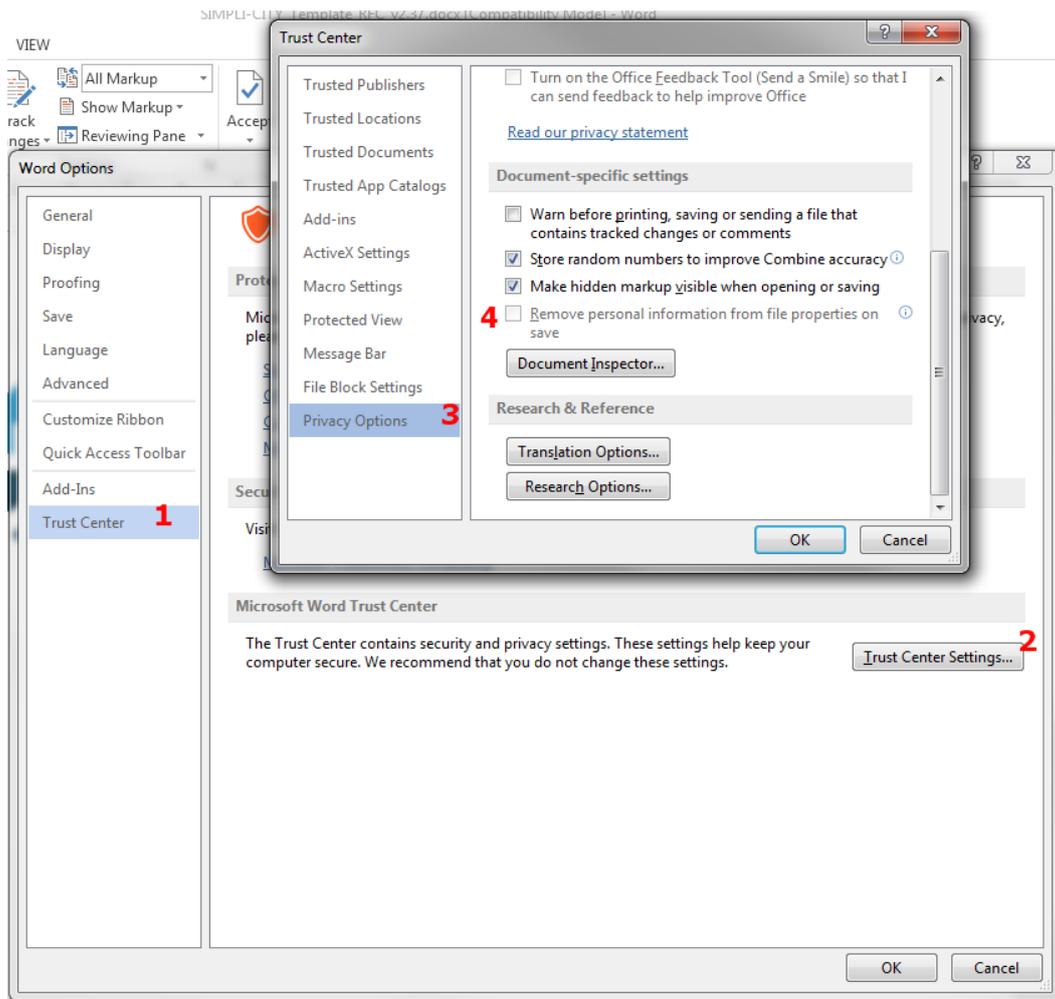
Figure 4: How to Set Options so that Comments are Traceable (Microsoft Office)

3.3.6 Deliverable Confidentiality Information (Dissemination Levels)

There are two different dissemination levels for knowlEdge project deliverables:

- **Public (PU):** Public deliverables are potentially available to everybody. Public documents are identified accordingly as in the DOA and CA. Once accepted by the EC, these documents will be uploaded to the project Website.
- **Confidential (CO):** Confidential deliverables are only for the members of the knowlEdge consortium. It is not allowed to forward them to project-external parties apart from the EU, reviewers, and the projects Advisory Board members provided

they have signed a Non-Disclosure Agreement (NDA). Confidential documents are identified accordingly as in the DOA and CA.

Information regarding the dissemination levels must be marked in each deliverable as defined in the knowlEdge template. Furthermore, a brief description of the dissemination level and the logic for it needs to be given in Section 0.6 (*Document Status*) of each deliverable.

Note that members of the Advisory Board will have access to both public and confidential deliverables and will, via their contractual agreement, be asked to sign the same confidential clauses as per the CA.

3.3.7 EU Response to deliverables

Once a document has been submitted to the EU by the Coordinator, it will typically be assessed by a review committee and either "Approved as-is", "Approved" with a request for modification (noting these modifications are not typically assessed until the next review), or rejected with a request for more significant modification. The actions to be taken here are as follows:

- **Approved:**

  - Project Manager to modify the document cover page to update status information
  - Document to be PDF'ed and both Word/PDF versions made available in the 'Approved Deliverables' directory and in the directory of the relevant deliverable
  - If a deliverable is public, it will be uploaded to the project website
  - All the above are to be notified to the consortium

- **Approved with Modification:**

  - Important note – generally the editors should a) not dispute the reviewers comments since they are neutrally made to benefit the consortium and b) should deal with the comment with 'professionalism' – eg not inserting a few terse sentences which might 'technically' correct the issue but probably don't adapt to the 'spirit' of what was necessary. However, if a significant comment is disagreed with by the Deliverable Team, the Task Lead should bring this initial to MT who will then decide how to process this issue within the Consortium and engaging with EU / Reviewers as necessary through the PM/Coordinator.
  - For changes that are made (or not made) then the Deliverable Lead should ensure sure this is performed in review and bubble mode. A copy of the redline version should be given to Reviewer 1 for a neutral check and then a redline and clean version should be given to the PM who will resubmit to the EU and communicate submission and EU responses back to the consortium.
  - Note that to the best of the current understanding, the costs/time associated with these changes are valid costs for the EU and are chargeable noting of course all forecast work is also necessary and there are budget ceilings

- **Rejected:**
  Broadly speaking this is the same process as above except:

  - Whilst the process in the EU is not completely clear, it is possible that there can be a deduction of efforts on the deliverable and thus partner payments for those

responsible. This is also one of the reasons that time-tracking on a per-deliverable basis is necessary.

- Since the comments are significant this needs a more robust approach and the WP lead should sure they are involved in the deliverable re-production as well as the Task Lead and their team. Invariably, it may also involve discussion in the MT and/or GA and can have an impact on other deliverables.

3.4　Table of Abbreviations and Glossary

Each single deliverable must be checked for abbreviations or necessary additions to the project glossary. The glossary will contain the definitions of relevant terms and roles as well as a list of abbreviations. It is maintained as a single resource by the Project Office and Task Leads and the internal reviewers must check the abbreviations as well as the glossary resources regarding the completeness.

It is the duty of the editors to make sure that new abbreviations are added to the glossary before submitting a deliverable; furthermore, the editor needs to control that abbreviations are reused within a deliverable instead of having different abbreviations for the same terms. In all cases, it is the duty of all deliverable contributors to support the editor, especially by pointing out new abbreviations and glossary terms.

Acronyms and Abbreviations should be established, ie expanded, the first time they are mentioned in a deliverable except if they are well-known in the context of the project – for example knowlEdge, DOA etc – and in which case their first expansion is optional. A list of such 'expected to be known' acronyms is indicated in the glossary.

The format of the glossary and the list of abbreviations will initially be a Microsoft Word document published on the website, until the website is completed. From that date on, the list of abbreviations and the glossary will be converted into editable online resources.

4 Quality Management

According to ISO standard 9000:2005, quality is defined as the "degree to which a set of inherent characteristics fulfils requirements", with requirements being the totality of expected features and characteristics of a product. With respect to a research project such as knowlEdge, this means that the project needs to meet the expectations raised and to enable the desired benefits to be achieved based on the project results (ie the project scope).

Quality management in knowlEdge includes the following:

- **Project Metrics** and assessment criteria as defined in the DOA. To keep this Project manual self-contained, the project objectives and assessment criteria as defined in the DOA are listed in Section 4.1
- **Quality Planning** for the single Work Packages, as defined in Section 4.2
- **Quality Management**. Definition of quality management-related roles and responsibilities as defined in Section 4.3
- **Quality Assurance** for deliverables in terms of delivery timelines and peer reviews; this will be discussed in Section 5
- **Quality Monitoring**; this is one of the major goals of the project reporting activities as defined in Section 6
- **Risk Management**; Discussed in Section 7

4.1 Project Metrics

Project metrics in terms of assessment criteria are used to periodically rate the project outcomes against those metrics. This will allow the monitoring of the project's on-going activity and therefore is an important internal AND external tool in quality assurance and risk estimation. As knowlEdge follows an incremental and prototype-driven development approach, the advancements in objective achievements can be monitored throughout the project, based on the degree the prototypes meet the requirements specified in line with the assessment criteria.

In the various impact orientated table defined in the DOA, the knowlEdge project objectives and assessment criteria are listed. Even though these criteria provide a good foundation for quality monitoring and assessment they are defined at a high-level. It is necessary to derive single, finer-grained requirements from the assessment criteria (and other sources) and appoint quality responsibilities, as will be identified in the next subsections.

WP leads, Managers, and ultimately the Project Manager are responsible for monitoring if the metrics are being met and for raising issues to WP / Task leads or individual partners if they are not. In these cases, a clear corrective action plan must be put in place or a rationale of why metrics could not be met should be presented to the MT by, primarily, WP leads in combination with task leads.

4.2 Quality Planning

For each of the Research and Technical Development (RTD) Work Packages (WP3-WP7) as well as for the piloting & validation Work Packages (WP8), quality plans need to be set up at the beginning of the Work Packages. As quality is defined by the degree knowlEdge

will be able to meet the expectations and to enable the desired benefits, these quality plans are directly related to the project objectives.

The quality plans will be part of the Requirements Analysis (T2.2 – Evolutionary Requirement Engineering and Innovations), the Global Architecture and the Functional/Technical Specification (T2.4 - Vision, Specifications and System Architecture) to derive the actual strategic, functional, non-functional, and technical requirements from the high-level assessment criteria and other input. Importantly, the high-level requirements defined during the requirements analysis will feature information on quality criteria, ie how to test that the requirement has been achieved, and on the priority of the single requirements, eg "Must have", "Should have", "Could have", or "Won't have". Each requirement will be linked to a specific task. If a requirement needs to be fulfilled through cooperation between several tasks, it will be primarily linked to the task having the highest workload in its realisation and secondarily linked to other tasks involved in its achievement. The list of requirements relevant to a single Work Package and its tasks provides the most important part of the quality plans for that Work Package.

The defined requirements can then be used to assess the quality of the project in terms of the degree of fulfilment of the project scope. The quality should be both verified and validated. According to the Capability Maturity Model Integration (CMMI), verification is "confirmation that work products accurately reflect the requirements specified for them. In other words, verification ensures that `you built it right´", while validation is the "confirmation that the product, as provided (or as it will be provided), will fulfil its intended use. In other words, validation ensures that `you built the right thing´"[1].

Together with the more generic project metrics defined in DOA Section 2.1, the quality plans provide a secure basis for MT agreement on the overall quality expectations, communication of the quality agreements to all project partners, quality monitoring, and product verification.

Notably, project objectives, assessment criteria and requirements are not written in stone. During the project, the project consortium as well as the Independent Expert Reviewers can give hints to change the current focus of work. However, it should not be forgotten that the efforts to correct flaws from the requirements analysis increases the longer they remain undetected.

4.3   Quality Management

All project participants are obligated to contribute to quality management both regarding adopting specific roles in quality management as well as by considering quality plans in their daily work.

In general, the WP Lead is responsible for quality monitoring in the according Work Package. For this, the WP Lead interacts with the Task Leads and all other partners involved in that Work Package on a regular basis, eg through bilateral interaction and regular conference calls; furthermore, the WP Leads also check the Project Progress Reports (see Section 6) in order to estimate if there is a discrepancy between the current status of a task and the envisioned target state at a specific point of time. This target-performance comparison is part of the Management Reports that are sent to the Project Officer. If a discrepancy is severe, ie it is unlikely that it can be resolved within the next

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[1] Definitions taken from CMMI Product Team, *Capability Maturity Model Integration, Version 1.1, CMMI for Software Engineering*, Pittsburg, PA: Carnegie Mellon Software Engineering Institute, 2002.

project quarter, this must be signalled immediately by the Deliverable lead, to the WP Lead and the Project Manager, who may decide to forward this information to the GA.

The figure below shows the appointed WP Lead and updated versions of this table are maintained within knowlEdge – Documents – General – _Critical – folder as "knowlEdge All-MT-TASK-Reviewing Leaderships and Emails xlsx"

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Group	ID	Organisation	Name	
WP Lead	WP1	VTT	Stefan Walter	stefan.walter@vtt.fi
	WP2	ICE	Victor Anaya	victor.anaya@informationcatalyst.com
	WP3	LINKS	Claudio Pastrone	claudio.pastrone@linksfoundation.com
	WP4	BSC	Sergio Alvarez	sergio.alvarez@bsc.es
	WP5	WWU	Fabian Berns	fabian.berns@uni-muenster.de
	WP6	FIT	Farshid Tavakolizadeh	farshid.tavakolizadeh@fit.fraunhofer.de
	WP7	CERTH	Dimos Ioannidis	djoannid@iti.gr
	WP8	VTT	Markku Hentula	markku.hentula@vtt.fi
	WP9	K-T	Karl Koepke	karl.koepke@kautex.textron.com

Figure 5: Work Package Leads

In terms of the quality plans, an essential element is to ensure that all documents are homogeneous in look-and-feel and professionally written. As such, the knowlEdge StyleGuide presents set of rules that MUST be followed by all document contributors and editors. See Section 5.

5   Deliverable Preparation and Submission Process

In the following subsections, the preparation and submission process for the knowlEdge deliverables are defined. This includes the definition of appropriate deadlines for the deliverable preparation and delivery (Section 5.1), information about the review process (Section 5.2) and negative consequences of non-delivery in Section 5.3. Further information regarding the software deliverables, ie prototypes, is in Section 5.4.

5.1   Deliverable Preparation and Responsibilities

It is the responsibility of the Task Leads to:

- Govern the deliverable preparation and submission
- Set deadlines
- Perform the final editing including checking of coherence, consistency, and completeness
- Stay in contact with internal reviewers, the WP Lead, and the Project Manager
- Make sure that abbreviations are in line with the Table of Abbreviations and Glossary and that new abbreviations and glossary terms are added

Nevertheless, it is of course the duty of all participants in a task to contribute to deliverables.

It is recommended to clarify and agree the structure (contents page) of each deliverable first with the primary partners in the tasks and then with the Project Manager. Then to appoint sections to relevant, responsible parties soon after a task starts. Furthermore, examples of necessary input by contributors should be given, especially if several partners contribute to the same section. Without such examples, it is highly likely that the editor will receive heterogeneous input, leading to a much higher workload for the editor, as the single parts need to be harmonised.

A party whose previously unpublished foreground or background may become part of a deliverable to which they have not contributed, must be warned 14 days prior to the submission of the "Reviewer 1" version of the deliverable to the internal reviewers so they can raise any issues. This warning process is also defined in the Consortium Agreement.

Deliverables MUST be laid out according to the knowlEdge Word template (see Section 3.2). As there can always be an update to the template, the latest version of the SharePoint template should be used.

The size of the deliverable in most cases should be kept as succinct as possible for the deliverable in question. Most deliverables should keep a limit of 50 pages. Naturally, some documents such as the Technical Specification cannot be presented in such a succinct way, while prototype deliverables (see Section 5.4) should even be oriented towards a size of 15-25 pages using the knowlEdge Microsoft Word template.

5.2   Reviewing

knowlEdge applies project-internal quality control of deliverables through peer reviewing. Deliverables that are estimated to be final by the editors (Task Leads) will be sent successively to one appointed reviewer from the consortium. The reviewed-versions of the deliverable should be labelled as the "Reviewer" version as mentioned previously in Section 3.3.3.

Reviewer will be appointed based on their knowlEdge and funding share. Preferably, the reviewer will be from partners not (heavily) involved in the task the deliverable is linked to, to prevent a conflict of interest in terms of workload when many changes are necessary. However, this is not possible in every case, as in some tasks, all or almost all, knowlEdge partners are contributors so individuals in other parts of the partner/knowlEdge should be utilised. Reviewers must be available on the date agreed and return comment on time. Similarly, Task Leads must deliver on time. The reviewer organisations have been fixed by the consortium and are available in the SharePoint – knowlEdge – Documents – General – _Critical – folder as "knowlEdge All-MT-TASK-Reviewing Leaderships and Emails xlsx" noting that although the partner allocations are not expected to change; individuals may be revised. A snapshot of this information is shown below.

WP	#			Lead	Type	Level	M	WP	Reviewer 1 3 * Effort	Reviewer 1* Effort PM
WP2	D2.1		User need specification and scenario definition [Initial/Updated/Final]	FIT	R	PU	5	WP2	K-T	VTT
	D2.2		Evolutionary Requirement Engineering and Innovations [Initial/ Updated/Final]	ICE	R	PU	6	WP2	CERTH	VTT
	D2.3		Market Radar and Technology Adaptations [Initial/ Updated/Final]	UPC	R	PU	6	WP2	WWU	VTT
	D2.4		Vision, Specifications and System Architecture [Initial/ Updated/Final]	ICE	R	PU	6	WP2	VTT	VTT

Figure 6: List of Reviewers

All reviewers and Task Leads reacting on reviews by changing the deliverable, are strongly advised to begin the review as soon as the finished document is available to them, and to hand over the document as early if possible.

After the reviewer has received the "Reviewer" version, the reviewer will review the deliverable to the best of their knowlEdge and provide the review back to the relevant Task Lead within the timeframe defined above. The reviewer will provide comments regarding the content and the structure of the deliverable that then to be incorporated or handled by the deliverable contributors into the "Coordinator" version. The reviewing objectives are[2]:

- Ensure that the technical content is accurate and comprehensive
- Ensure that references refer to correct external sources
- Ensure that all project standards and guidelines (eg project stylesheet and template) are adhered to in the preparation of the deliverable
- Ensure that the deliverable is clear and lucid when used by others and that no ambiguity is present in the deliverable
- Ensure that the content in no case contains unnecessary verbose content

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[2] The objectives have been taken from M. Chemuturi, *Requirements Engineering and Management for Software Development Projects*. Berlin, Heidelberg: Springer-Verlag, 2013.

It is ESSENTIAL to note that review is for ALL these aspects and thus, for example, every reviewer should be fully conversant with the project document template before attempting any review.

Reviewers must:

- Review as if they were an EU reviewer meaning that they need to wipe their mind of deep knowlEdge knowlEdge, assumptions, and discussions
- Comment in a constructive way, eg instead of writing "I do not understand" or "I do not like this", reviewers should explicitly state what they do not understand or like and how they suggest improving the content and where possible fixing the problem if not too hard to fix.

All updates of the "Reviewer1" version of the deliverables should be provided with changes tracked.

After reworking the reviewed deliverable from the contributors, if minor changes were required, the document goes to the coordinator.

PM staff will do one final read-through and ensure that the cover page status information is correct. Assuming no serious issues and only formatting/typos are corrected, they will then submit the deliverable to the EUs Project Officer in PDF format notifying the consortium in parallel.

Deliverables will be released for reviewed at least 3 weeks before DOA date submission. Reviewers are requested to provide their input in 1 week period, giving time to reviewers to implement required changes. The version to be reviewed by the coordinator will be provided at least 1 week before DOA date of submission.

5.3   Non-Delivery of deliverables

If a lead of a responsible partner for a task fails to organise and deliver on time, the PM/MT may decide to request to General Assembly to change leadership on this or other leadership tasks including a subsequent movement of budget/days allocated to the leadership role since all Tasks leads invariably received a larger amount of Man-Months for the task.

If a deliverable (final submittable version and allowing for a 3-week review period) is expected to be late, it is the responsibility of the Task Participants and Deliverable and Task Lead and WP Lead to raise this issue to the General Assembly formally and before late delivery.

By default, the General Assembly will apply the following "acceptable" delays provided there is a well-presented case for the delay **which can be defended before the EU AND that a review deadline is not imminent**

- *Providing >= 1 month of notice of deliverable delay, a delay of 1 month is accepted*
- *Providing < 1 month of notice of deliverable delay, only a delay of 2 weeks of delay is accepted*
- *If the start of a deliverable is delayed because a preceding deliverable on which it is significantly dependent is delayed, this delay shall be added to the due date of that deliverable noting that the Coordinator/Project Manager and/or General Assembly will negotiate new deadlines during this process with the Task/Deliverable Lead although from an EU perspective, unless the EU Formally agree this via a DOA Amendment, the original delivery date is still valid.*

The WP and Task/Deliverable Lead must make a case for additional delay that can be accepted by the General Assembly. By default, delays proven to be due to the review process shall not be considered as a delay unless the input quality was so poor to make the review process unduly difficult.

If there is no consensus, primarily because some General Assembly member(s) are part of the relevant deliverables, a second discussion will take place removing those members and that shall then be the decision. In the case where all General Assembly members are involved, the Coordinator shall take the final decision regardless of whether they are involved or not.

After this (first) decision of delay, if the parties responsible for that deliverable (ie all parties responsible for producing the deliverable) still fail to deliver on time, then the General Assembly or Coordinator shall propose to General Assembly or to the MT (depending on the seriousness of the matter) and they shall then decide, if other Task/Deliverable leadership and man-months for other tasks are still appropriate and if so shall re-assign days/leadership and thus budget accordingly.

*In such cases, the Task/Deliverable Lead should take most of the responsibility for the delay although all parties involved also have responsibility and this should be considered in any General Assembly decision. In such cases, the MT or coordinator has the right to pause all activities of the conflicting Party until the General Assembly meeting has been taken place which should preferably be in 1 month, 2 months latest, and if this does not take place this action will be suspended (not voided) until it does take **place [ie the defaulting partner would continue as normal]***.

*In the case where parties who are responsible for delivery, including Task Leads and Team members who repetitively fail to deliver, the Coordinator on the decision of General Assembly shall be entitled to invoke an Earned Value System as described in **[CA Section]** 4.2.*

5.4 Software Deliverables (Prototypes)

Most of the deliverables from the R&D Work Packages, ie WP3 to WP8 are implementations. In addition to the actual software packages, these deliverables should include information including the following aspects:

- **Introduction:** Description of software
- **Scope and Relationship to Architecture:** This section will be based on a brief overview of the knowlEdge Global Architecture
- **Components:** Description of single components, their function, etc
- **Requirements and Preparations:** Both for users and developers of the software
- **Installation and Deployment:** From a user perspective
- **Execution and Usage:** From a user perspective
- **Limitations and Further Developments:** This is especially important for the first prototypes. The "Further Developments" part can be omitted for final prototypes

6 Reporting

Reporting activities within knowlEdge can be divided into reports aiming at project management (ie internal reporting) and reporting requested by the EC. To an extent, the latter is a subset of the former.

In the following subsections, the procedures to produce the Internal Reports (Section 6.1, including Subsection 6.1.1 Activity Tracking, 6.1.2 Cost Tracking, 6.1.3 Time Tracking and also 6.1.4 Responsibilities of the WP Leads) are first presented. Then the 6-monthly Internal Management Reports (IMRs) (Section 6.2) followed by the Project Periodic Reports (PPRs) (Section 6.3) which are generated from the IMRs. Section 6.2.2 provides an overview of the deadlines regarding the PPRs. The timeline for delivery of the these is indicated below.

Timeline	Time Tracking (MM)	Cost Tracking (Expenses)	Activity Tracking	Internal	External Version (EU)
Monthly	Y	N	N	N/A	N/A
Quarterly	N	Y	Y	N/A	N/A
9	Aggregated	Aggregated	Added	Yes	Yes No Financials
18	Aggregated	Aggregated	Added	Yes	Yes
36	Aggregated	Aggregated	Added	Yes	Yes

Figure 7: Delivery timeline

6.1   Internal Reporting

6.1.1   General

In knowlEdge, project management reporting is conducted through internal monthly activity tracking combined with more detailed quarterly reports of expense costs and WP activities as well 3 monthly Internal Management Reports (plus a report at M9). The PM also compiles formal "Project Periodic Reports" (PPRs) derived from the IMRs which constitute deliverables D1.3.

6.1.2   Outcomes

Project-internal reporting aims at three different outcomes:

- A continuous overview of the project progress
- Potential risks in terms of quality and effort/resource issues should be identified as early as possible to apply countermeasures, if necessary
- Regular reports on activities related to WP9, eg dissemination activities or collaboration events, help to compile the according reports in short time and to validate the degree of success with regard to the assessment criteria (project metrics) see Section 4.1 of this document.

Each partner (the 'recording partner ') must provide its reports not later than 15 days after the end of each project month or quarter end.

6.1.3   Activity Tracking

One of the significant issues in managing project consortiums such as knowlEdge, is the need for on-time and accurate information on the person days used by each beneficiary. In knowlEdge, a detailed project management approach to time tracking is applied. As such, it is compulsory that all beneficiaries provide monthly person days information to ensure that all resources are well accounted for. This data should not be changed at a later point in time unless there has been an error in the data. If this is the case, a formal text explaining the change has to be added in the reporting system and if the error is between PPR periods, this text will be used for reporting to the EU (see Section 6.2).

Tracking is conducted using a series of three linked SharePoint Excel files which allows:

- The reporting of consumed resources in terms of person months
- The reporting of consumed expenses
- The presentation of statistics and analysis about the consumption rate per WP, Task, Partners etc

At first, all this is performed on a task/monthly basis, ie each partner defines the consumed resources for each task the partner has been involved in during a month, including a suitable description of the activities undertaken. Over time, for partners which correctly manage this in can be moved to quarterly reporting.

A continuous overview of the projects progress is important to recognise potential risks. To track activities SharePoint's XLS is used. These reports are for project internal viewing and will not be published for externals or the EC.

Note that in the following diagrams, all figures are 'dummy' data for illustrative purposes only.

Every partner accesses SharePoint and registers in sheet "SharePoint – knowlEdge – Documents – General – Reporting - MM v[x].xlsm" the tasks performed and the hours taken. Of course, the partner must be maintaining timesheets internally according to the EU contract which can easily be used to do this.

The following topics should be included to the report:

- The activities, which were performed in the last month
- Important decisions which were made regarding to an active task
- Affected deliverables/tasks, which were worked on in the last month

An example might be:

"Making vision document template and contents page (0.5d). Participation in 2 WP1 calls and preparation as well as related telecoms (0.5d). Multiple iterations of master storyboard between James and Stuart (2d). Definitions of other sections. Input to Sections 2 and 3 (3.5d), merging contributions from partners (0.9d)".

Once the 15-day deadline is over, the Project Manager performs a quick scan of the entries to check for any obvious errors or missing reporting. If so, the Project Manager will chase the leads of the partners concerned and encourage them to update/add their information and an approval process will commence as described in sections below.

The reason for this tracking is as follows and is based on previously successful project experience and its associated methodology:

Rationale:

- To track resources utilised by partner, task, Project (manpower and expenses) judged against budget items
- To track over- and under-spending per partner
- To track a partner's contributions to project
- To track a partner's claim on spending vs contribution perceived by Task/WP/PM Leads to ensure no creative use of project budgets
- To provide input to the IMRs and PPRs

If there are remaining issues they will be escalated to the General Assembly.

Note that individual personnel costs themselves are **not** tracked; instead, time tracking is applied to estimate resource consumption (see next section).

6.1.4   Cost Tracking

Tracking of costs (apart from personnel costs) relevant for project metrics is handled through a similar SharePoint – knowlEdge – Documents – General – - Reporting - Expenses v[x].xlsm ". Completed sheets follow the same process as for the hours tracking except figures need only be entered on a quarterly basis.

The PPRs embrace the following sections, which must be filled in individually by each partner. This includes all non-personnel costs (ie not the funding or the overhead etc.) that occurred in that quarter, eg:

- Audit costs
- Equipment costs (either complete or depreciated)
- Travel costs
- Dissemination costs
- Plenary (meeting) costs
- Any other funded costs

6.1.5   Responsibilities of the Task and WP Leads

The previous sections described how the input is collected. Once this data has been collected the Task Lead, WP Lead, and the PM are invited in some cases to approve the relevant entries – for example, a T1.1 Lead could be asked to approve all entries relating to T1.1, the WP1 Lead all entries for WP1, and the PM all entries. Each is asked to specify "Yes" – ie all ok, "Query" – some uncertainties, "No" – ie more mayor issues. Thus, WP Leads are responsible to verify if the recorded efforts (in terms of person days) are realistic. If this is not the case, this should be first clarified with the partner in question. If the issue cannot be resolved, the WP Lead or Project Manager/Coordinator may need to be more deeply involved. To verify the time statements, each WP Lead will be able to check the time declarations on a per-task level. Furthermore, there is an overview sheet showing the planned and consumed resources per Work Package, quarter, and partner.

Tasks/WP Leads should not be shy to 'doubt' a partner's figures if they do not appear to conform with the efforts perceived in practice and the partners whose figures are doubted should recognise:

- This is standard project management practice

- These aspects from the consortium agreement
- They should be recording this information anyway for the DOA and thus it should be easy to provide these figures

Each WP Lead also has the responsibility to identify other potential risks, eg that tasks cannot meet their objectives, that there will be delays, or that resources are consumed in an excessive way. Apart from the input from the IMRs, WP Leads monitor the status of the single tasks in their Work Package through direct interactions with Partners/Task Leads, and regular conference calls.

6.2   Internal Management Reports

While the recordings, approvals, and reports presented in the last section aim primarily at project-internal usage of the given information, the IMRs are compiled also to give the MT and GA a periodical overview of the project's progress. To decrease the efforts of all partners, they are based on the monthly entries.

The IMRs are not official deliverables although are inferred in the DOA. In the following subsections, the content of each report and the deadlines to produce this content are presented.

6.2.1   Content

Each IMR includes the following sections:

- **'Work Package Status Reports'** are written for each WP compiled from task input for each task in that Work Package that was active through the quarter. As described in Section 6.1.5, the WP Leads are responsible to compile the single sections and they will be collected from the Tasks Leads via a SharePoint Word file created by, and on the request of, the PM:

  - **Overview:** A brief overview of the status of the Work Package - about 5-15 lines
  - **Important Results:** Important research results and technical developments are stated per task. For each task, 5-10 lines of text should be written. Important results include, deliverables (if finished), accepted and published scientific papers, and implemented prototypes.
  - **Target-Performance Comparison:** This comparison is objective-driven, ie it is necessary to estimate if each task will provide the expected output in time, budget, and quality. If the performance of a task is as expected, this can be described in one single sentence. If the target of a task could not be met, this should be described in enough detail and reasons should be stated. One aspect of the Target-Performance Comparison is the description of risks that may occur or incidents that did occur. Risk reporting in knowlEdge will be described in more detail in Section 7.1.3.
  - **Changes:** Necessary changes in Work Package Objectives and Deadlines: should only be stated if applicable, ie either the objectives of a Work Package cannot be met, or the results will be delayed.

  - **Risks:** An analysis of current risks (actions taken, change of status), the inclusion of new risks, and potentially the removal of mitigated/passed ones. This information will also be uploaded on Sygma at the M9/18/36 reporting periods.

- **Quantitative analysis** including a 'Target-Performance Comparison Regarding Efforts per Partner'. This is essentially an aggregation of the task-based numbers collected with the Excel sheet mentioned in Section 6.1.3 and produces a table showing the planned and consumed resources in terms of person months per partner and per Work Package. The Target-Performance Comparison Regarding Efforts per Partner is compiled by the Project Manager/Coordinator and is based on the time statements as provided by the single partners and verified by the WP Leads.

6.2.2   Deadlines

In the following table, the deadlines for the delivery of the input for the IMRs are defined. The review process is different from the one defined for all deliverables – notably, reviewing is performed on a per- Work Package basis.

Deadline	What is due?	Contributors
15 days after end of quarter (month)	Monthly time track as previously described. All expenses for the quarter should have been recorded. The Project Manager checks if all partners have contributed, but partners need to deliver this without former notice.	All partners
20 days after end of quarter	WP Leads have condensed information from the monthly input provided by the partners and deliver accordingly input for the IMR in terms of the Work Package Status Report. Furthermore, questionable statements (regarding both efforts and contents) have been identified and clarified. Individual Work Package Status Reports are distributed to all partners involved in a Work Package.	WP Leads
25 days after end of quarter	Partners state feedback regarding Work Package Status Reports.	All partners
30 days after end of quarter	Work Package Status Reports are finalised, ie comments by the partners are regarded or clarified. IMR/PMR is compiled by Project Manager and provided to WP1 Vice Lead UPV for reviewing	WP Leads Project Manager
35 days after end of quarter	Review is submitted to Coordinator for editing and if applicable submitted to the Project Officer.	Project Coordinator

Figure 8: PPR/IMR Deadlines

6.3   Project Periodic Reports and Final Report

Apart from the IMRs, PPRs and Final Reports need to be created as requested in Article 20 of the knowlEdge Grant Agreement. In the following subsections, a brief overview of the process to generate these reports (Section 6.3.1), especially the Financial Reports (Section 6.3.1), for knowlEdge will be provided. For a general overview of project reporting requirements within H2020, refer to the Grant Agreement Article 20.

6.3.1   Periodic Reports and Final Report

As defined in the knowlEdge Grant Agreement, reporting periods are: Period 1 from project month 1 to project month 18 and Period 2 from month 19-36. For each of these

reporting periods, a 'Periodic Report' needs to be delivered to the EU within 60 days from the end of the reporting period although internally it obviously needs to readily be less than this duration. There is a formal deliverable for each one of these reports. In addition, Period 1 has an interim non-financial report (review) at M9 which is for informal delivery and whose content is essentially the non-financial aspects of the formal reports. In knowlEdge, this means that the first (informal) Periodic Report must be fully ready and delivered at the end of September 2021.

The periodic reporting based on the two reporting periods is mandatory and therefore does not require a separate deliverable. However, the additional Interim Report at M9 is identified as D1.3. The reports are all linked to T1.1 and collect material from the ongoing internal reporting, including financial reporting where applicable.

Article 20.3 in the Grant Agreement describes which content is required for the Periodic Reports. The Project Manager will provide a template for the Periodic Reports, which follows the requirements of Article 20.3.Apart from the Periodic Reports, it is also necessary to create a 'Final Report'. Analogous to the Periodic Reports, this report is due within 60 days after the end of the project. The Final Report should not be confused with the last Periodic Report, even though these reports share content. In general, the Final Report will be based on the PPRs, IMRs and the reports that are part of WP1.

In the table below, the timeline for the compilation of the Project Periodic Reports is presented. Some of the efforts will be performed in parallel to the efforts necessary to compile the last IMR in a specific reporting period. The timeline for the compilation of the Final Report will follow a similar pattern.

Considering the 40-day (to allow for issues) deadline for the final figures; should a partner (and its auditors if applicable) believe that this deadline is not possible, they should raise this issue formally 10 days before hand to the PM noting the reasons why and the newly scheduled date. The PM has a right to accept (or not) this rational/timing noting that 50 days is the absolute deadline due to the deadlines to the CA. If such a delay is accepted the Coordinator, on the advice of the PM, will notify the European Commission and their reaction will be communicated back to the partner. Regardless other partners figures will be submitted.

Deadline	What is due?	Contributors
10 days after reporting period ends	All information which exceeds the information already provided within the internal reporting and IMRs is submitted by the partners to the single WP Leads	All partners on request of the Project Manager
15 days after reporting period ends	WP Leads have condensed all information necessary for the Core of the Report section; the input for the Deliverables Table has also been prepared by the WP Leads; the input for the Milestones Table has been prepared by the Milestone Leads	WP Leads Milestone Leads (as defined in the DOA)
20 days after reporting period ends	First overall draft of the report is presented to the partners	Project Manager
25 days after reporting period ends	Individual Financial Statement data have been filled presented to the Manager either on paper or through the CEC systems	All partners (plus third parties)

30 days after reporting period ends	Feedback regarding first overall draft is given by the partners	All partners
35 days after reporting period ends	First "For Review" version of the report is presented to appointed reviewers	Project Manager
40 days after reporting period ends	Financial Statements have been checked by Manager; partners will be informed if they are allowed to transmit their Financial Statements	Project Manager
45 days after reporting period ends	Feedback by appointed Reviewers is provided	Reviewers
50 days after reporting period ends	Updated second "Reviewer2" version of the report is presented to appointed Reviewers	Project Manager
55 days after reporting period ends	Notification of acceptance of deliverable, or request for further improvements	Reviewers
60 days after the end of the reporting period	Final modifications have been made and report is submitted through the Participant Portal	Project Coordinator

Figure 9: Periodic Reports – Deadlines

6.3.2   Financial Statements (old Forms C)

Periodic Financial Statements (previously commonly known in FP7 as "Form Cs") must be submitted to the EC as part of the Periodic Reports, using the Participant Portal of the EC. As described above, the Form Cs must be filled in by the single project partners within 30 days after a reporting period is ended. The Project Manager will then check the validity of the financial statements within 14 days; for this, the WP Leads will be consulted. Forms C must be filled in by all partners as well as third parties with the latter being solely coordinated by those partners who have third parties. Once all Forms Cs have been finalised, accepted, and (electronically) signed by the Coordinator, the Coordinator will transmit them to the EC. It is important to understand that should a partner be late; the available forms will be submitted regardless and then the errant beneficiary will not get paid until these are included in the next financial report/payment or the end of project Final Report/payment.

In general, partners are obliged to adhere to the rules defined for financial provisions as defined in Article 20.3.(b).a.(i) of the knowlEdge Grant Agreement. Furthermore, the EC has published a "Note for beneficiaries in the 7th Framework Programme for Research and Innovation – How to avoid common errors identified in cost claims[3]", which should be carefully checked by all partners, especially "The 10 Most Frequent Errors Identified". As long as there is no updated version for the H2020 programme, this source is used as a guideline.

The knowlEdge consortium makes use of the EUs web-based tool 'Sygma' to complete and submit Forms C. This tool is provided by the EC and accessible via the EUs Participant Portal[4]. To make use of electronic-only transmission and signature of Forms C, each beneficiary appoints a "Financial Statement Authorised Signatory (FSIGN)" in the Participant Portal.

To allow the PM/Coordinator to check the individual partner's Forms C, it should be saved as a draft, which allows the Project Coordinator to see and comment before the form is

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[4] http://ec.europa.eu/research/participants/portal/desktop/en/home.html

transmitted and signed officially by the FSIGN of a partner. Once the finalised and electronically signed forms have been received from all partners, the Coordinator will transmit the whole package to the EC.

7 Risk Management and Identification

"*The purpose of the Risk theme is to identify, access, and control uncertainty and, as a result, improve the ability of the project to succeed*"[5]

Risk management is the continuous, systematic, and proactive approach to identify and assess risks and to draft according risk responses, if necessary. It is applied to control the risks and therefore enhance the probability to achieve the project's objectives. In knowlEdge, a distributed approach to risk management is followed as part of the overall quality management activities. In the following subsections, the general approach to risk management in knowlEdge (Section 7.1) as well as preliminary risk identification (Section 7.2) is presented. The focus is on the identification of risks arising in ICT projects.

7.1 General Approach

According to the ISO standard 31000:2009, risk is the "effect of uncertainty on objectives". This definition includes the three most important aspects of risks:

- Risk is uncertain and may therefore never happen
- Risks have effects and therefore need to be managed
- Risks are measures against defined objectives

A risk is an uncertain event (or set of events) that will have an impact on the project objectives if it occurs. It can have an impact regarding timeliness of the project results, project costs, quality, and scope (quantity). Risk management deals with the identification, assessment, and control of risks. It is proactive, ie is not applied when it is too late (it is not crisis management), continuous, ie part of all project phases, and systematic, ie follows a defined approach to risk management.

In a project such as knowlEdge, the biggest risks are related to:

- **Timeliness:** Single deliverables and the whole project not being delivered in time
- **Budget:** Partners consume their funding share but do not finish their tasks
- **Quality:** Quality of explicit deliverables (eg documents and software) and implicit ones (eg impact) is not in line with the quality goals of the project, or the quality expectations of Advisory Board or the EC
- **Scope (Quantity):** The project objectives (as defined in Section 4.1) cannot be fulfilled

Together, these four dimensions constitute the "Devil's Square"[6] as depicted in Figure . Naturally, there are various interdependencies between the dimensions. For instance, a low quality of the basic deliverables such as the Functional Specification or Technical Specification (in knowlEdge: T2.4) may lead to a situation in which partners implement incorrect functionalities. In turn, this will bind resources needed elsewhere, which could lead to delays and budget non-compliances.

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[5] Taken from PRINCE2, *Managing Successful Projects with PRINCE2*. Norwich: The Stationary Office, 2009.
[6] Harry M. Sneed, *Softwaremanagement,* Cologne: Verlagsgesellschaft R. Müller, 1987.
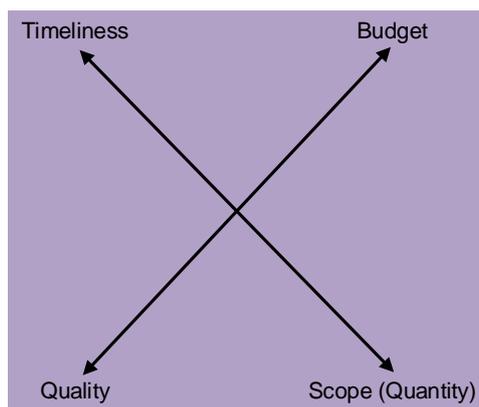
Figure 10: "Devil's Square"

knowlEdge risk management process consists of steps, which form a sequentially executed cycle, ie risk management is performed continuously:

1. **Risk Identification:** Baseline study of potential risks, leading to a basic inventory of them
2. **Risk Analysis:** Identification of risk causes and further description of potential risks. This includes the potential impact of a risk and the probability that it occurs
3. **Risk Response Planning:** Based on the risk analysis, it should be decided if the risk should be:

   - **Accepted** ("do nothing"), which should only be done for risks with a low occurrence probability and low potential impact
   - **Transferred** to another party, which is not generally possible for most risks in a project such as knowlEdge
   - **Reduced** either by the probability of the event occurring, or the impact of the event, should it occur
   - **Avoided** by changing some aspect of the project. While this is the most desirable risk response, it is very often not possible because of project-intrinsic factors. In such cases, risk reduction is the strategy that should be chosen

4. **Risk Monitoring:** Continuous monitoring of the identified risks and, if some aspect has been changed, most importantly the probability and the potential impact of a risk
5. **Risk Reporting:** Risks need to be reported if the according relevant event will most-likely occur which may lead to issues regarding the four dimensions of the Devil's Square.

These are more fully described in the subsections below.

In knowlEdge, risk management follows a distributed approach. In general, the WP Leads are responsible to assess the risks that could occur to the project objectives and sub-objectives linked to the Work Package and as defined in the DOA. In addition, project-wide risks are linked to WP1 and therefore the Project Manager/Coordinator is responsible for them. Without the contribution by all partners in the project, it will not be possible to identify, quantify, and monitor risks and start corresponding countermeasures.

7.1.1   Risk Identification

Several risks have already been identified within the knowlEdge DOA (Section 1.3.5) and formally recorded on the EU Sygma system. Furthermore, an overview of general risks in

software development projects will be given in Section 7.2. In addition, it is the duty of the WP Leads to trigger the continuous identification of risks which are reported in the IMRs, and consolidated into PPR/Sygma.

7.1.2   Risk Analysis and Risk Response Planning

As already mentioned, a risk can either be:

- Accepted ("do nothing")
- Transferred to another party
- Reduced regarding either the probability of the event occurring, or the impact of the event, should it occur
- Changing some aspects of the project

In a project such as knowlEdge, risks should only be accepted if the risk of their occurrence and their impact is small. A transfer to another party is difficult to achieve contractually and therefore unlikely to be possible. Hence, usually, risk responses should consist in actions to reduce the risk or to avoid the risk. However, avoidance is not always possible, as it may require that important aspects of a project need to be changed, which might not be feasible. In this case, the potential impact of the risk and/or its occurrence probability should be lowered by according procedures and updated in the IMR risk tables.

7.1.3   Risk Monitoring

Risk monitoring is a continuous task that needs to be pursued until a risk is resolved (ie it cannot occur anymore or there is no potential impact anymore) or the project has ended. Risk analysis never ends – new risks appear, while parameters (most importantly: occurrence probability, and potential impact regarding timeliness, budget, quality, and scope) of already identified risks may change.

In general, risk monitoring is led by the corresponding WP Leads. Single risks are appointed to Work Packages and tasks and may span more than one task or Work Package. Hence, a risk owner is appointed for each identified risk. The WP Lead of the primary Work Package appoints the risk owner of the identified risks. The risk owner is the person, who is responsible for the risk monitoring and reports regularly to the according WP Lead and onwards to the PM/MT/ General Assembly as well as IMR/PPR reporting.

7.1.4   Risk Reporting

For the IMRs, the WP Leads compile brief statements about identified risks that may lead to timeliness, budget, quality, and scope (quantity) issues. These statements will be included in the individual Work Package Status Reports of each IMR.

Risks need to be reported if the according relevant event will most likely occur, which may lead to issues regarding the four dimensions of the Devil's Square. In general, timeliness issues (ie delays) should be reported by the Task Leads to the WP Leads. If a delay cannot be made up for in the next quarter or a deliverable will be delayed, the Project Manager and the MT need to be informed by the relevant WP Lead. If a delay may influence the delivery of one of the software-driven knowlEdge milestones, the PM, Project Coordinator, the MT, and the Technical Manager need to be informed.

Budget, quality, and scope issues should be reported on a regular, informal basis together with the input for the IMRs. Hence, the WP Leads are once responsible to identify such issues, but all partners are requested to contribute. All partners need to justify if their

budget (funding) for a Work Package in a PPR period will be out of a 10% upper and lower tolerance limit of the planned numbers and justify it. Note that additional funding can only be re-attributed to a partner if the MT agrees (as defined in the knowlEdge Consortium Agreement, Section 7.1.7 – Under and Over Spend Procedures) and thus, even if any additional claims are accepted, partners must still deliver on their contractual elements and expectations of the DOA.

7.2 Preliminary Risk Identification

In this section preliminary risk identification for knowlEdge is. It supplements the identification of potential risks from the DOA. It primarily aims at risks related to the fact that knowlEdge is driven by development and hence, risks typically arising in software projects will be discussed. This list is not exhaustive – it is the responsibility of the single WP Leads to identify further risks. Furthermore, risk analysis and monitoring also needs to be conducted within the single Work Package as discussed within the last section.

7.2.1 Risks Related to Project Management

Related to: WP1.

Potential risks:

- Unclear and incomplete Description of Action
- Missing description of tasks
- Inadequate project control mechanisms
- Unrealistic work plan regarding timing
- Unrealistic work plan regarding budget
- Unclear deliverable approval conditions
- No predefined design and implementation process
- Missing quality adherence in design and implementation process
- Missing acceptance of Project Manager/Coordinator
- Missing acceptance of new project staff
- No on-the-project orientation for new project partners and new project staff
- No availability of project staff
- Change of Project Manager/Coordinator

7.2.2 Risks Related to Vision, Use Cases, and Requirements

Related to: WP2.

Potential risks:

- Unrealistic project objectives
- Unclear project objectives
- Inadequate end user involvement
- Missing end user acceptance
- Ambiguous requirement definitions
- Inadequate definition of functional specification
- Inadequate definition of technical specification
- Incomplete non-functional requirements
- Increasing number of requirements during the project lifetime
- Changing requirements

- Missing inclusion of data privacy requirements

7.2.3 Risks Related to Exploitation

Related to: WP9.

Potential risks:

- Language barriers
- There is an unclear concept/fit between partner aspirations
- Technology changes make the concept limited or redundant
- Issues with IPR especially joint IPR
- Not all partners achieve the exploitation expected

7.2.4 Risks Related to Design

Related to: WP2.

Potential risks:

- High system complexity
- Insufficient usability
- Poor global architecture
- Changes in global architecture
- Unsuitable software design
- Missing interfaces between components
- Design of unnecessary functionalities

7.2.5 Risks Related to Implementation

Related to: WP3-7.

Potential risks:

- General:

  - Implementation starts without design
  - Usage of unknown technologies and tools
  - Missing data privacy and security concepts
  - Software decay (also known as software rot)
  - Implementation of unnecessary functionalities
  - Missing adherence to implementation guidelines
  - Software tests are neglected by developers
  - Missing test infrastructure
  - Inadequate test management and test reporting
  - Insufficient software reviews
  - Poor tool usage or tool availability
  - Introduction of unsuitable tools
  - Poor hardware and general resources availability
  - Missing configuration management
  - Change of Technical Manager
  - Very shallow definitions / low detail in DOA text about the single components might lead to definitions not suitable for the resulting component / requirements

- Vision, architecture, functional, and technical specification are delivered late, hindering a timely implementation of technical components
- Too much overhead using the SCRUM approach with (usually) only two partners participating per task
- Partners develop too much new technology instead of using existing ones
- Too detailed specifications are written, consuming too much time and resources
- Requirement specification is too large and concentrates on superficial features without specifying KPIs
- User roles not elaborated enough, especially referring to authorisation security

- Core:

  - Connectors of existing tools do not match those needed for the use cases
  - Data model / data structures are not defined widely enough and/or are ambiguous in meaning of terms
  - Data interoperability of the disparate systems is impossible due to the breath of syntaxes and formats
  - Orchestration requires connectivity off MES/SCADA systems which are inaccessible
  - Distributed computing is available in theory, but it is difficult to implement due to access to factory machines
  - Analytics and AI do not have access to a) real data and b) data with failure information…so as to perform prediction

7.2.6   Risks Related to Pilots

Related to: WP8:

- Full compatibility with the use-cases systems missing
- Internet security policies preventing connection to the platform at end-users premises
- Low usability
- Users skills are insufficient
- Computation time is too large
- Demonstrators are not able to convince of the competitive industrial use of the results
- Results are not applicable across the entire application field
- The cost is higher than the value of the functionality provided
- Core product functionalities are not ready when demonstration activities begin
- Demonstrators are late
- Inadequate location for demonstration
- Unavailability of the physical supports for the demonstration activities

7.2.7   Risks Related to Impact

Related to: WP9:

- Language barriers
- Dissemination budget and audience is limited
- Unrealistic dissemination metrics and impact
- Difficulties to reach industrial public
- Not enough dissemination material
- Poor social networks dissemination

- Intended objectives of the workshops were not achieved
- In the workshops, the target audience was not reached
- Not possible to reach an understanding with other projects for a collaboration
- Material developed was insufficient to attract people's attention

7.2.8 Risks Related to Human Factors

Related to: All WPs

- Language barriers
- Too little communication within the project
- Missing teamwork
- Inappropriate knowlEdge of project staff
- Employee turnover
- Unmotivated project staff
- Insufficient experience of WP Leads and Task Leads
- Insufficient experience of project staff in research projects

7.2.9 Risks Related to Technology and External Factors

Related to: All WPs.

- Wrong choice of technologies and software
- Chosen technologies get out-dated during the project
- Phase-out of third-party software used in the project
- Missing support by third party software providers
- No real time behaviour of services and apps
- Deficits/Bugs in used third party software
- Disagreement on open-source licensing types

8 Publications and Events

This section covers matters related to the publishing of scientific or other information including the publishing of foreground (results) in Section 8.1 and the procedure for the handling of event attendance 8.2.

8.1 Publishing

The rules for the publication of foreground in scientific papers as defined in the knowlEdge Consortium Agreement (Section 8.4.2) identify:

- Notification of planned publications: 21 days before the publication
- Objections regarding planned publications: Within 14 days of notification

In the case of scientific papers, partners should be informed 15 days prior to the submission of a paper. If foreground or background of a partner not involved in the submission is part of the paper, this needs to be clearly stated. Notifications should be made by the primary author of a paper.

The notification should include the names of the authors, the title of the paper, and the abstract.

All scientific publications and any other significant dissemination relating to foreground of the project shall include the following statement to indicate that it was generated in knowlEdge.

"*The research leading to these results has received funding from the Horizon 2020 Programme of the European Commission under Grant Agreement No. 957331*"

Notably, this statement does not imply that the funding for a scientific publication is solely from knowlEdge. Hence, the statement can also be used in papers where several funding agencies are stated.

Scientific publications need to be reported to the Impact Manager and then to the EU via Periodic Reporting.

8.2 Events

A travel budget has been provided for each partner but, in accordance with the CA partners, cannot 'just attend any conference' and this will need to be part of both the impact plan and their financial capacity/budget to attend. All such events thus need to be approved in advance by the Project Manager, Impact WP Lead. At the end of the event, information will also need to be presented back to the Impact Manager (WP9 Lead) according to a standard template which will be provided by them in an on-line (SharePoint) word document.

Travelling to conferences and meetings can be booked as "other direct costs" of each partner. Expensive trips and trips to locations outside Europe should be verified by the Project Officer (through the Project Manager/Coordinator) for clarification prior to submission/booking. Else, there is a risk that the EC will not fund the travelling.

Annex A: History

Document History	
Versions	V0.1: • Near Final Draft produced by ICE • Sent to VTT for review V0.3: • Inclusion of task and deliverable numbers V1.00: • EU Submitted version
Contributions	ICE: • Stuart Campbell – Entire Document VTT: • Stefan Walter – Formal Reviewer

Annex B: References

None
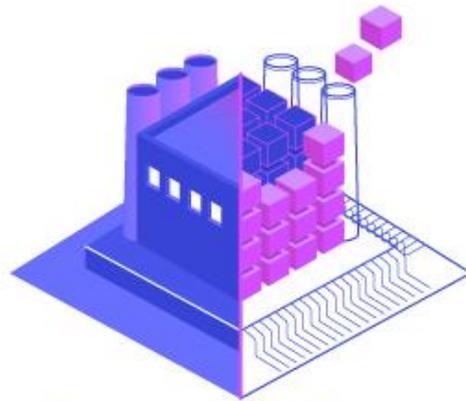
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