Deliverable Appendix - WP1 WP2 WP4 Use Cases survey

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Abstract

This document contains the survey that WP1 WP2 WP4 leaders have submitted to all the 22 Use Cases Leaders for collecting information concerning the baseline costs, the engineering processes and the tools used in the use cases.

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1. Instruction HowTo fill the survey

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The purpose of WP1 is to establish the project baseline for the verification of the progress of the use cases and the specification of the requirements for different aspects of the project: integration platform, tools, governance, etc. The performance and the fulfilment of the project goals will be evaluated to these requirements at each engineering cycle.

The purpose of WP2 is to provide a consolidated Engineering Procedure which relies on Service Oriented Architecture (SOA) that can be implemented using the integration platform based on WP3 and WP4 results.

The Engineering Procedure will be designed as a flexible system for supporting the Plant Life cycle of all the use cases of the AHT project.

WP1 and WP2 are strictly inter-dependent because WP2 requires the engineering process analysis carried out in WP1 to define an improved engineering process (WP2), and the adoption of the improvements of the engineering process (WP2) will be evaluated with respect to the use case baselines and to the requirements defined in WP1.

The leaders of WP1 and WP2 have prepared a document for each use case, where the use case leaders have to fill the sections with the analysis of the use case.
These documents will be the starting point for the production of deliverable D1.2 and D2.1 due at month 6 of the project (01/10/2019)

In the following, you can find an explanation of the main sections of the template:

   A. **Baseline summary:** In this section provide just a short summary of the use case baseline.
   B. **Baseline analysis:** This section represents the starting point of the entire analysis from the perspective of the engineering process. The section is intended to guide the use case leader in the study of the engineering process, in order to identify all the information required to:
       a. define the use case baseline (the current snapshot of the engineering process adopted in the use case) and the related training material;
       b. identify and plan potential improvements with respect to the baseline;

c. provide relevant information for the general improvement of the Engineering Process and its automation.

C. **Engineering Process survey:** This section collects information that will be analysed and considered for the design of a flexible Engineering Process that can be adopted for the development of life cycle plants of products/services of each use case supported in the project.

D. **Baseline costs analysis:** Starting from the information collected in section B, this section focuses specifically on the engineering costs analysis.

E. **Baseline reference indicators:** In this section use case leaders must define the indicators that will be adopted for the evaluation of the improvements and achievements related to the engineering process and obtained during the project.

F. **Training material indicators:** In this section use case leaders must define the indicators that will be adopted for the evaluation of the improvements and achievements related to the training material and obtained during the project.

G. **Baseline plan:** In this section, use case leaders are called to propose an action plan to improve both the baseline and the Engineering Process. The goal is the matching of the six Arrowhead Tools objectives proposed in the DoA by improving tools, toolchains, training material and evaluation/validation processes.

Engineering Process

For your convenience, in the following you can find the description of the engineering phases composing the engineering process.

Phase number	Phase title	Phase description
1	**Requirements**	Requirements elicitation is the practice of researching and discovering the requirements of a system from users, customers, and other stakeholders. The output of this phase is typically a list of requirements.
2	**Functional design**	The functional design phase consists in adopting the "functional design" paradigm to simplify the design of the system/product. A functional design assures that each modular part of the system/product has only one responsibility and performs that responsibility with the minimum of side effects on other parts. Functionally designed modules tend to have low coupling. The output of this phase is typically a model, or an architecture.
3	**Procurement and Engineering**	The procurement is the process of finding and agreeing to terms, and acquiring goods, services, or works from an external source required to engineer the system/product and construct/manufacture it. Procurement is used to ensure the buyer receives goods, services, or works at the best possible price when aspects such as quality, quantity, time, and location are compared. The engineering phase includes the design, development and test of the system/product, generating a prototype of the system/product and, after some iterations the final version of system/product (that will be deployed and commissioned).

4	**Deployment and Commissioning**	The deployment phase consists in the installation/integration of the system/product in the final operative environment. The deployment includes also the preliminary verification and validation of the system/product, that precede the commissioning. The commissioning phase is the process of assuring that the system/product is designed, installed, tested, operated, and maintained according to the operational requirements of the owner or final client. A commissioning process may be applied not only to new projects but also to existing units and systems subject to expansion, renovation or revamping. The commissioning precedes the operations & management phase.
5	**Operations and management**	These phases consist in operating and managing the system/product according to the operational specification of the system/product and requirements of the owner or final client.
6	**Maintenance**	Maintenance consists in identifying and establish requirements and tasks to be accomplished for achieving, restoring, and maintaining an operational capability for the life of the system/product. For a system/product to be sustained throughout its system life cycle, the maintenance process has to be executed concurrently with the operations process. Maintenance addresses bug fixes and minor enhancements, as well as, minor adaptations to standard, new features, etc.. Significant changes in the system/product are considered in the evolution phase. In the maintenance phase, we can also consider the de-commissioning of the system/product at its end-of-life.
7	**Evolution**	The evolution phase deals with the inability to predict how user requirements, market and technology trends will evolve a priori. The role of this phase is to monitor these aspects and identify potential significant changes in the future version of the system/products. The evolution phase must ensure also a continuous improvement of the system/product, always respecting the user requirements in an efficient, reliable and flexible way. Finally, this phase has to deal with the management of the end-of-life of the system/product.
8	**Training**	This phase includes all the educational and professional training activities required by the engineering process, across the entire system/product lifecycle.

2. WP1 WP2 WP4 Use Case survey structure

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[Use case name]

This template has been created to collect the information required to prepare D1.1, D2.1 and D4.1 deliverables. The objective is to provide support for the use case baseline analysis (WP1/WP2), the baseline description (WP1) and for the definition of an improved version of the engineering process (WP2), and the architectural and interoperability considerations (WP4). The requested information is intended to simplify and unify the process of use case analysis that, being the first step for the baselines definition and the engineering process improvement, will have an impact on the entire project: providing all the requested information is fundamental to this regard.

Back to WP1/WP2 Info Link

Provide input to the different sections in the placeholders marked by [...].

Acronyms:
- UC-EP: Use case specific engineering process
- AHT-EP: improved and flexible version of the engineering process, covering all the UC-EPs.

A. **Baseline summary**
  a. **General description of the baseline;**
     [...]
  b. **Initial architecture of the use case as a sequential list of functional blocks;**
     [...]
B. **Baseline analysis**
  Analyse the engineering process currently adopted in the use case (UC-EP). Provide the following information:
  a. **overall description of the UC-EP, highlighting the current coverage of the engineering phases;**
     [...]
  b. **state-of-the-art techniques adopted in the engineering phase of the use-case;**
     [...]
  c. **description of the adopted toolchain(s)/technologies (if any);**
     [...]
  d. **analysis of the licensing model adopted in the toolchain;**
     [...]
  e. **analysis of each single engineering phase:**
     i. **engineering activities currently performed in the phase;**
        [...]
     ii. **adopted tools;**
        [...]

         iii.   **the automation level of the engineering phase (how are the tools used in each phase connected? What is the manual work to adapt the EP sub-phases?;**
             [...]

    f.   **toolchain automation:**
         i.   **evaluate the level of integration of the toolchain;**
             [...]
         ii.   **evaluate the automation level of the interactions between the phases of the engineering process;**
             [...]
         iii.   **describe the type of information passed from phase-to-phase and how the information is managed through the engineering process;**
             [...]
         iv.   **evaluate the impact of the tools licensing model on the automation of the toolchain;**
             [...]

    g.   **identify missing tools (for automation and for interoperability between phases and subphases) in the current toolchain, inadequate tools or missing functionalities in existing tools;**
    [...]

    h.   **identify tools or parts of the architecture critical/indispensable for your use case;**
    [...]

    i.   **identify and evaluate the available training material (gap analysis of tools and training material);**
    [...]

For points j-l refer to the description given [here](#)

    j.   **design and modelling components;**
         i.   **already used;**
             [...]
         ii.   **planned to be used;**
             [...]

    k.   **interaction components;**
         i.   **already used;**
             [...]
         ii.   **planned to be used;**
             [...]

    l.   **storage components;**
         i.   **already used;**
             [...]
         ii.   **planned to be used;**
             [...]

  C. Engineering Process survey

a. **Group the methodologies and tools of the UC-EP, used across the lifecycle of the Use Case, and match these groups with a specific phase of the Engineering Process proposed in AHT's DoA (AHT-EP);**
[...]

b. **Identify which of the AHT-EP phases are not applicable for the specific use case domain and why these phases cannot be used in this domain;**
[...]

c. **Analyse how the planned improvement of the toolchain (see section G) potentially impact on the engineering process;**
[...]

d. **Report lack of technology to support the use case in one or more phases of the AHT-EP;**
[...]

e. **In case you have steps that you are unable to map on the AHT-EP, give a description of these steps and suggest possible modifications to the AHT-EP to support them;**
[...]

f. **Specify the order in which the AHT-EP phases are adopted in the use case domain;**
[...]

g. **Describe the current scalability level (EP applied to the development of products and by-products recursively);**
[...]

h. **List the standards currently you adopt for each phase and the whole Engineering Process of the Use Case;**
[...]

i. **Summarize the differences between the UC-EP and the standard Engineering Process;**
[...]

j. **Provide any additional comments on the Engineering Process.**
[...]

D. **Baseline costs analysis**

a. **evaluate the engineering costs of each engineering phase;**
[...]

b. **evaluate the costs of toolchain integration and automation;**
[...]

c. **evaluate how licenses cost impact on the engineering process costs;**
[...]

d. **evaluate how standards impact on the engineering process costs;**
[...]

e. **evaluate the costs of training material and activities.**
[...]

E. **Baseline reference indicators**

a. [Link to baseline indicators table](#)

(In the table headers a note explains the contents of the columns)

[...]

F. **Training material indicators**

    a. [Link to training material table](#)

    (In the table headers a note explains the contents of the columns)

    [...]

G. **Baseline plan**

    a. **list actions that you think should be done to reach the goals of the use case; include research activities, implementation, documentation preparation etc.**

  The baseline description must include a plan illustrating:

    b. **the actions for matching the objectives, indicating the current state, the expected improvement and the actions required to reach it. The objectives of DoA are the following:**

       i. **Reduction of solution engineering costs by 20-50%**

       [...]

       ii. **Interoperability for IoT and SoS engineering tools**

       [...]

       iii. **Interoperability and integration of data from legacy automation engineering tools to the Arrowhead Framework integration platform**

       [...]

       iv. **Integration platform interoperability with emerging digitalisation and automation framework**

       [...]

       v. **Flexible, interoperable and manageable security for digitalisation and automation solutions**

       [...]

       vi. **Training material (HW and SW) for professional engineers**

       [...]

    c. **What would be the modifications needed to the AHT-EP to match the objectives stated in the baseline plan? How AHT can support this new improved Engineering Process;**

    [...]

    d. **A list of engineering tools that will be developed to reach project objectives;**

    [...]

    e. **The improvement of the toolchain(s) (if not already specified in the previous section G.a.);**

    [...]

    f. **The training material that will be provided (if not already specified in the previous section G.a.);**

    [...]

    g. **The evaluation and validation process that will be adopted to verify the objectives achievement.**

    [...]

3. List of abbreviations

Abbreviation	Meaning
AHT	ArrowHead-Tools
SOA	Service Oriented Architecture
DoA	Declaration of Agreement
UC	Use Case
UC-EP	Use Case Engineering Process
AHT-EP	ArrowHead-Tools Engineerign Process

4. Revision history

4.1 Contributing and reviewing partners

Contributions	Reviews	Participants	Representing partner
X	X	Gianvito Urgese	POLITO
X	X	Paolo Azzoni	Eurotech
	X	Federico Montori	IUNET

4.2 Amendments

No.	Date	Version	Subject of Amendments	Author
1	2019-10-25	0.1	First Draft	Gianvito Urgese
2	2019-11-25	0.2	Second Draft	Gianvito Urgese

4.3 Quality assurance

No	Date	Version	Approved by
1		0.1	Jerker Delsing