Deliverable 5.1

Stakeholder Analysis Report

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Executive Summary

This report provides the TAMS4CPS stakeholder classification framework for suitable stakeholder management and maintenance of a stakeholder list.

1 Introduction

The primary aim of TAMS4CPS is to lay the foundations for concrete EU-US collaboration in modelling and simulation (M&S) for Cyber-Physical Systems (CPS). To be able to achieve this, TAMS4CPS aims to proactively engage relevant stakeholders to ensure that the requirements of industry are translated into specific guidance that influences the collaboration and research agenda. This task will involve development of a suitable stakeholder management framework in which to classify stakeholders, creation and subsequent maintenance of the stakeholder list. Webinars will be a key dissemination method within TAMS4CPS as this enables the project to interact directly with significantly more stakeholders than would be possible through face-to-face meetings. The stakeholder list created as part of this task will be particularly important for promotional purposes to ensure appropriate participation in these webinars. Effective stakeholder interactions and input will also be helpful in compiling the impact analysis report at the end of the project, which will articulate the nature and anticipated significance of impacts associated with particular M&S research developments.

This report will mainly comprise the framework for stakeholder classification i.e. the framework within which TAMS4CPS will record information on stakeholders for more effective interaction. The list of stakeholders will be maintained separately by the project team and will not be included within this report. This list (maintained in a excel spreadsheet) is attributed by the name of the stakeholder, organisation, contact details, area of expertise and specifics of any interactions had with them. The area of expertise will be maintained as a pop-down list of keywords to avoid ambiguity and avoiding synonymous terms.

2 Stakeholder Categories

This classification of stakeholders described within the T-AREA-SoS [T-Area-SoS] project forms the basis of stakeholder classification within this deliverable.

The classification is for stakeholders in the project, not for CPS stakeholders in general (but see section 2.3, below).

2.1 Primary Stakeholders

Primary stakeholders are those who are ultimately affected by the project, i.e. who expect to benefit from or be adversely affected by the project and who need to interact directly with the project.

2.1.1 EU Commission

This comprises of the division within the EU Commission involved in the Digital Agenda for Europe initiative.

2.1.2 Expert Community

This community of stakeholders comprises of experts (developers, users as well as people with commercial interest) from the fields of CPS, M&S and Internet of Things (IoT) from industry and academia. Hence, this category can be further classified as:

2.1.2.1 Industry

2.1.2.2 Academia

2.2 Secondary Stakeholders

Secondary stakeholders are those with an intermediary role in the development or use of a project. They may need to interact indirectly with the project by providing input to or using output from the project.

2.2.1 Funding bodies

This category is made up of funding bodies interested in the identified priority research and development needs as well as the strategic research agenda for trans-Atlantic collaboration. The stakeholders will also involve funding bodies in the capacity of key enablers for trans-Atlantic collaboration in modelling and simulation for cyber-physical systems. Funding body comprises of:

2.2.1.1 National

2.2.1.2 International

2.3 Tertiary Stakeholders

Generally, tertiary stakeholders are those who are not involved or affected by a new or changed system, but can influence opinions either for or against system design options. In this case, tertiary stakeholders of the project can be considered to be largely composed of stakeholders in modelling and simulation for CPS. These could include those developing or using models directly (for various purposes) and also those who use the results of models, without necessarily being concerned with the details of the modelling activity itself.

Tertiary stakeholders for Modelling & Simulations for CPS can be subdivided as:

2.3.1 CPS developers

2.3.2 CPS operators

2.3.3 CPS users

2.3.4 Tool Vendors (i.e. developers and suppliers of modelling tools)

2.3.5 CPS researchers

2.3.6 Policy makers

3 Stakeholder Frameworks

It is possible to position these types of stakeholder according to CPS type and/or lifecycle stage for a CPS. This may have implications for the type of model in which a particular stakeholder has an interest, but it is not definitive at the generic level, only within a specific context. For instance, policy makers may have an interest in model results prior to introduction of a technology and during its operation, depending on the question they have to address.

For the purpose of being able to specify the particular interest of a stakeholder, we combine two frameworks. The first concerns the classification according to CPS type, as defined in TAMS4CPS D1.1, and reproduced below (Table 1).

The second framework is the systems engineering lifecycle as defined by the DANSE project. This is considered applicable because the project looked at the problem of systems of systems (applicable to group, federated, and enterprise in the CPS classification above) specifically from a modelling perspective (see DANSE Deliverable D_8.1.1+D_8.2.1).

The combination of these frameworks is shown in Figure 1. The lifecycle is predicated on a *possible* initiation phase, followed by a SoS (System of Systems) creation phase, in which certain architectural features, infrastructure, and interface standards may be defined, and then an operational phase during which new systems may be added and removed. The individual systems are created according to a regular single system lifecycle; DANSE uses the Vee-model concept which, whilst it is not strictly a lifecycle but rather the concept of how systems development is organised, is often interpreted to be so in broad terms (Figure 2).

	Individual	Group/Collaborative	Federated	Enterprise
Description	Device with embedded software with capability to monitor and respond to its local environment. Specific functional purpose.	Collection of devices with embedded software that exchange data to provide a range of services associated with the users' local environment and activities.	Large network of similar devices providing co-ordination and optimization of resources to many users.	Flexible interconnection of heterogeneous devices offering multi-modal provision of a range of services.
Illustrative Example				
Transport	Single vehicle + "driver" e.g. current vehicles giving driver assistance	Collective vehicles (e.g. convoys), communication between vehicles	City/Regional Traffic control (100's-100,000); interactions between vehicles and infrastructure	Management of multi-modal transport at regional or national level

Table 1: Framework for M&S classification according to CPS type (from TAMS4CPS, D1.1)

The Vee diagram describes the manner in which a set of needs (requirements) are developed into the components of a system and then integrated into the delivered system, which components are verified at various stages and the system is both verified and validated against the user's original requirements. Figure 2 shows a typical Vee diagram, in process form (a sequence of activities). Broadly, developers are the stakeholders concerned with virtually all the modelling within this process. Researchers and tool vendors are concerned with all stages to the extent that they develop the modelling technologies necessary to support the CPS developers throughout the process.

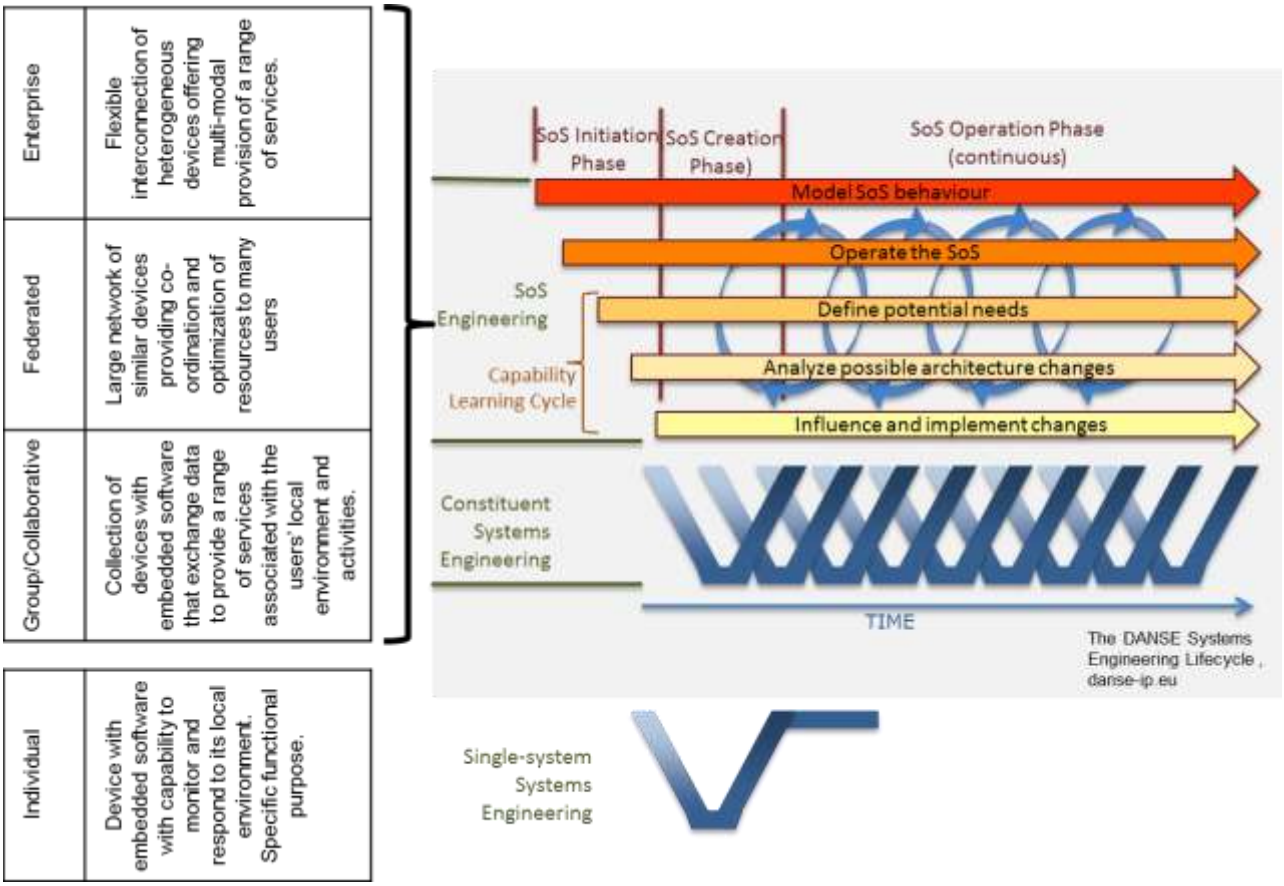

Figure 1: Combining DANSE Systems Engineering Lifecycle with TAMS4CPS classification of CPS types

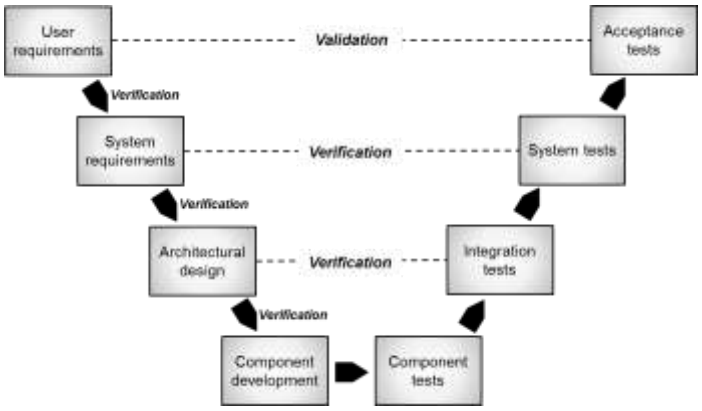

Figure 2: Vee Diagram, as depicted by Stevens, R., Brook, P., Jackson, K., and Arnold, S. (1998) Systems engineering – coping with complexity, pg. 8, Prentice Hall, Europe

It should be noted that in Figure 1, the Vee-diagram at the individual system level includes a schematic in-service element, since models appropriate for operators, users, developers, etc. are required in this phase.

The combined frameworks of Figure 1 are represented in the map of Figure 3; although it is not possible to precisely define the stakeholders associated with different areas of the map, because it is more relevant to advising the space for different modelling approaches, nevertheless, a broad map of area of interest for the stakeholders identified above is indicated in Figure 4. For most stakeholders, it is the output of M&S, rather than the techniques themselves, which are of primary interest. Within the design cycle, it is usual to use models of increasing fidelity as the design matures, but this does not significantly affect the distinction between stakeholders relevant to the design activity overall. However, this map can be used as a prompt during stakeholder brainstorming activities to support the identification of all relevant stakeholders associated with a particular modelling approach or domain problem space.

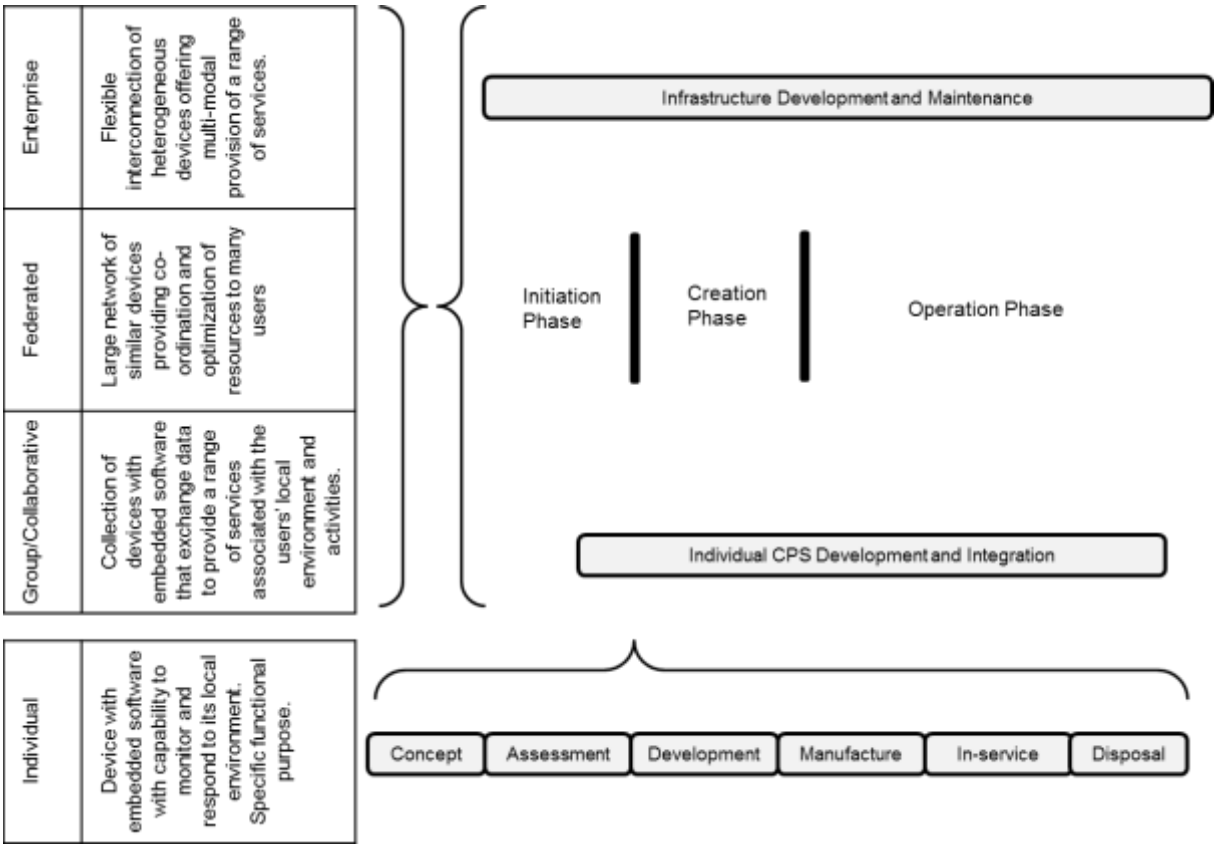

Figure 3: Schematic map of stakeholder space associated with Modelling and Simulation for CPS

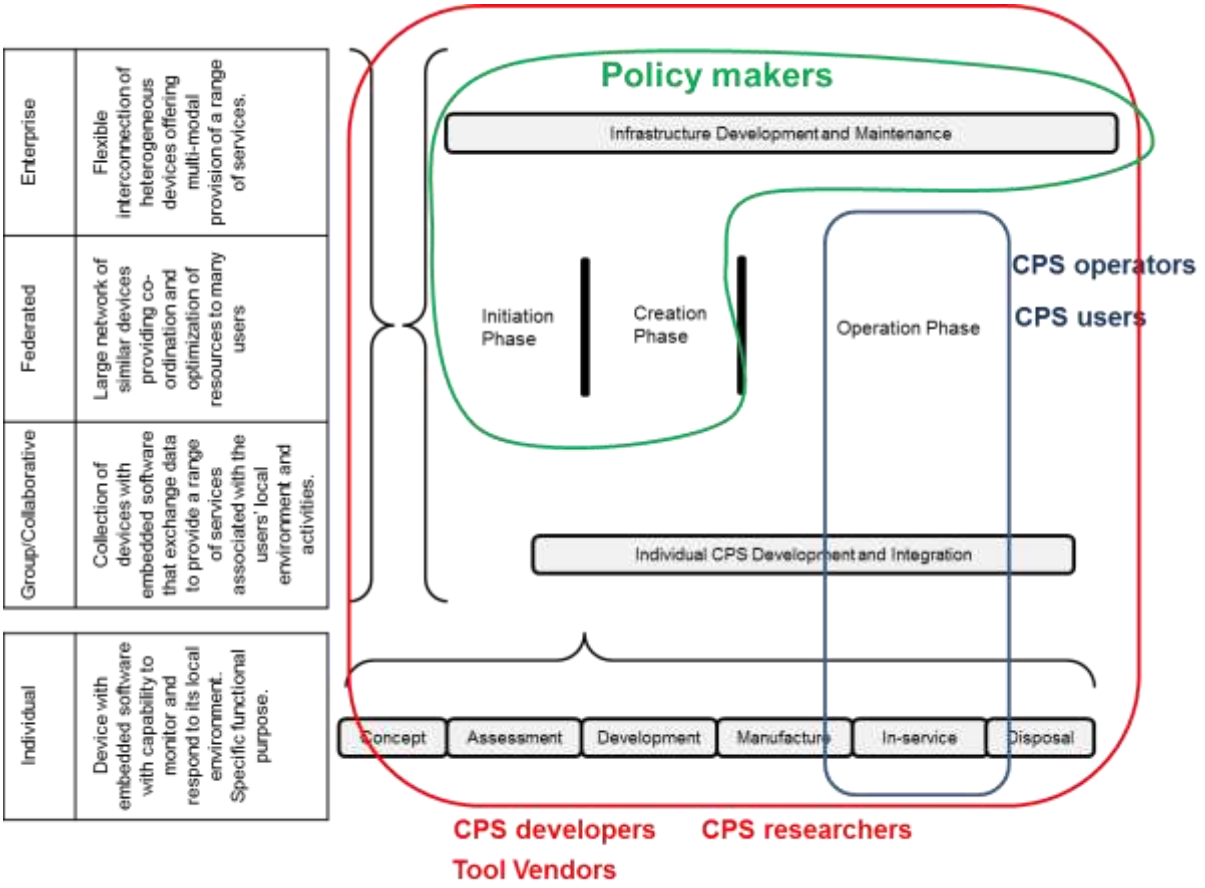

Figure 4: Areas of interest for different stakeholder groups in modelling and simulation for CPS

4 Conclusion

Task 5.2 of TAMS4CPS includes development of a suitable stakeholder management framework in which to classify stakeholders and the present deliverable 5.1 provides this classification framework.

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