D1.3: Plan for innovation management†

Abstract: This deliverable provides a document that presents a plan for managing the innovations created within the sustAGE project.

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### The sustAGE Consortium

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List of Abbreviations

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<th>Description</th>
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<tr>
<td>IMB</td>
<td>Innovation Management Board</td>
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<td>IMS</td>
<td>Innovation Management System</td>
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<td>IoT</td>
<td>Internet of Things</td>
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<tr>
<td>IPR</td>
<td>Intellectual Property Right</td>
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<td>MVP</td>
<td>Minimum Viable Products</td>
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<td>TRL</td>
<td>Technology Readiness Level</td>
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Executive Summary

This document reflects the innovation management task for the knowledge creation in sustAGE. It serves as a plan and guideline for the consortium and as a source of information for the European Commission.

This deliverable presents the consortium strategy to enable an effective realization of innovative results within the sustAGE project. The project consortium is relying on an Open Innovation strategy and the underlying idea of this concept is presented and described further within this deliverable. It does so by presenting methods and instruments that allow the realization of Open Innovation in sustAGE by integrating external knowledge into the project.

A structured process of how to manage an idea within the sustAGE project is described to better plan its successful realization. This is foremost fostered by setting-up clear innovation responsibilities like the dedicated Innovation Management Board (IMB). Its structure, tasks and goals are presented within this deliverable along with its duties. In addition to addressing concept of innovation management in research, this document includes a roadmap for the identification of key innovations, exploitation and development of solutions through its overall approach.
1 Introduction

This document describes the framework and initial thoughts and activities through which sustAGE will manage the innovation within the project and seek to maximize impact of its work and results. To maximise the impact, external as well as internal opportunities for innovation are considered and subject to reviews on a quarterly basis, following guidelines as proposed by the European Innovation Management Standard CEN/TS 16555 [3]. The present deliverable also intends to capture regular review and updates of the business plan and related activities, ensuring that innovation activities of all partners are continuously updated with the overall sustAGE vision, enabling efficient innovation throughout the project in the business areas of for example manufacturing, transport & logistics, recommender systems or mental training market.

The main purpose of innovation management is to ensure that project research activities, technological developments and achievements are kept well connected to outside technology developments. An additional goal of innovation management is to maintain low risk level for the project and to prevent the project results from losing relevance, given evolving trends in the market. From a scientific perspective, innovation management of research will be considered. Work related to this tasks will in addition support the safeguarding of IPR related assets and their validation in alignment with the project description, related contracts and agreements.

1.1 Intended readership

The Innovation Management Plan is a public (PU) document. Its’ readership is considered to be the European Commission, the sustAGE Project Officer, project partners involved in the sustAGE consortium, beneficiaries of other Horizon 2020 funded project but also the general public.

1.2 Relationship with other sustAGE deliverables

This deliverable mostly relies on work from Work Package 3, Work Package 4, Work Package 5 which are the work packages where customization is accomplished and technical results are developed. To some extent work described here is also linked to Work Package 6 (WP6) as it captures innovations from the sustAGE pilots, benchmarking, impact analysis and the evaluation of the solution against individual business needs. The probably closest relation however can be seen with Work Package 7 (WP7) as in particular the exploitation and dissemination of results depends on the innovation management as they propel the identification of innovative assets and the exploitation of key exploitable results as an outcome of the project.
2  Innovation process and types of innovation

2.1  Innovation Process

According to an innovation definition provided by the European Commission, innovation is generated not only through research and technology development, but also through new marketing and management solutions [4]. In simple words, innovation can be defined as the process of producing something new that can contribute to increase quality in life. The identification of business needs can be seen as the first step of every innovation process. In order to identify potential solution ideas, the precisely understanding of market needs and opportunities is a crucial step.

In theory, an innovation process can be separated into three phases. The idea phase is the first one and includes the generation of ideas and a concept development. Collection of innovation potentials, derivation of ideas and their respective evaluation and release are steps that are done within this phase as well as an extensive analysis and derivation of concepts for the solution, implementation and marketing. The development phase is the 2nd phase and includes development and testing of the solutions to the finished product. Market launch is the last phase of innovation process and captures every step until to control of market success [5] [6]. The illustrated process can be seen as an ideal-typical innovation process in the figure below (c.f., Figure 1).

![Figure 1: Phases of an ideal-typical Innovation Process](image)

Type of Innovation

Generally speaking, four types of innovation are essentially defined [5] which group innovations into product, process, marketing, and organizational:

- **Product Innovation**: creation or improvement of a product or service
- **Process Innovation**: creation or improvement of production or delivery method
- **Marketing Innovation**: new marketing methods
- **Organisational Innovation**: introduce a new organisational method into the firm’s business practices, workplace organisation or external relations

sustAGE focuses mostly on the 1st type of innovation, namely *product and service innovation*, as it is mainly committed to delivering novel technical solutions for optimizing workforce management and for supporting employers and ageing employees. Accordingly, the effective coordination and management of the various technical innovations produced in
sustAGE by the different consortium members is one of the important key parts of the project. Such coordination is supposed to enable a successful monitoring of the work being done under the light of the market and the respective business cases which sustAGE defines and targets. Following this, Innovation Management is necessary in order to enable a systematic and successful conversion of new ideas into the developments of new products and services. The sustAGE Innovation Management approach will be presented in Chapter 4.

2.2 Innovation Management of Research

Innovation management of research entails procedures to promote new knowledge and new technology derived in sustAGE in a number of different research areas such as multi-modal state and trait estimation, computer vision, machine learning, temporal reasoning, recommender systems, IoT and behavioural sciences. The assessment of new innovations can be conducted based on structured questionnaires as the one presented in Appendix A and in parallel assess the innovative capacity of key organizations in delivering these innovations. This procedure allows the results to be compared for further analysis and support contributing organizations to strengthen the potential of their innovations and innovative capacity. In this respect the innovation management aims to confirm the capability of the project’s developments through the IMB to execute the necessary steps to transform novel technology and research results into a marketable product and to prepare its commercialization. Furthermore, for increasing the chances of successful innovation commercialization, it is important to consider beyond the technology-related steps the business-related elements in the project activities and open up the project to interactions with specialized actors, which could help to improve the commercialization chances of innovations.

Concerning technology-related steps, prototyping is the most common measure that the project will undertake in order to bring innovation to the market, starting with MVPs (minimum viable products) up to the full-fledged, customized solution. The MVP should within this development process contain just enough features to satisfy the early test of sustAGE pilots and hereby allow reasoning and essential feedback for future product enhancements and developments. Testing activities and pilot development complement the above measure. The engagement by an industrial research team in project innovation management activities is also important to facilitate innovation commercialization. This further supports the view and need of universities and research centres that are seeking complementary capabilities to support them in commercializing their technologies. To this end, in sustAGE the three companies of the IMB (SAG, IMA, AEGIS) have a track record in business and innovation and will be actively involved to monitor closely the technology-related steps and improve the commercialization chances of innovations. With respect to business-related steps the market study (c.f., D7.2: Exploitation Strategy, Section 3 “Actions within the sustAGE Exploitation”) and the business plan are the most common steps to support the commercialization of innovations.

Releasing part of the technologies developed as open source with appropriate licenses will aim to attract external stakeholders in testing these technologies and support a wider acceptance. In parallel, the dissemination activities foreseen (c.f., D7.3: Dissemination Plan) will aim to create a community of interest around the project and its developments and support the knowledge transfer of sustAGE R&D activities to SMEs, academia, policy makers, researchers, students and industries in different market sectors.
3 Open Innovation Method

On pillar of the sustAGE innovation system is the concept of Open Innovation. Open Innovation describes an innovation approach that is shifted from so-called closed innovation processes (c.f. Figure 2), which takes place traditionally within the company or project team boundaries, towards a more open way of innovating (see Figure 3). Where Open Innovation permits innovations to leave and potentially re-enter the innovation cycle, Closed Innovations only consider internal innovation approaches which stay only internally as they are targeting the market. In simple words, Open Innovation strives to integrate the environment to improve marketable product and process of innovation [1] as more actors are involved in the innovation process. As defined by the European commission, Open Innovation can be understood as a premise “to open up the innovation process to all active players so that knowledge can circulate more freely and be transformed into products and services that create new markets, fostering a stronger culture of entrepreneurship” [7].

![Figure 2: Closed Innovation Model](image)

Figure 2: Closed Innovation Model [6]
Furthermore, Open Innovation assumes to amplify interactions between internal and external actors for information and knowledge sharing [8]. Following this, the sustAGE consortium aims to combine internal and external ideas into sustAGE architectures and systems. Purposive inflows (external knowledge going into the sustAGE consortium) and outflows (internal knowledge going out of the sustAGE consortium) of knowledge will be used by the consortium to accelerate innovation within the sustAGE project and to expand the markets for external use of innovative sustAGE outputs.

Knowledge inflows are characterized as an outside-in-process, where external knowledge is acquired to strengthen internal competencies and improve the innovation process in the sustAGE consortium. Such knowledge inflows improve the development of new products and business within the sustAGE project. There are basically three different channels within the process of knowledge inflow. The business-to-business channel describes the involvement of supplier and development partner. The business-to-customer channel describes the involvement of customers, allowing the consortium to determine customer needs and trends more accurately. Moreover, there is a business-to-academia channel, capturing the sustAGE collaboration with academic institutions like universities or research institutes [6].

Knowledge outflows can be seen as an inside-out-process, where in-house knowledge is released to public. By doing so, internal knowledge is supposed to be monetised through external paths to market. For example, new technologies developed within the sustAGE project can be provided for use within other business sectors than primarily targeted by the sustAGE solution. Wherever possible, ideas and technologies within the sustAGE project will be made public in order to generate possibilities of external collaborative work or crowdsourcing.

The strategic, managed exchange of information with actors outside of the project consortium is supposed to enable an integration of external resources and knowledge into the sustAGE innovative process. By doing so, the consortium aims to enhance innovation and thus deliver
additional value for customers. Besides including external information, technology insourcing might be seen as another important aspect of Open Innovation, leading to the potentially to develop technology Spin-offs and accordingly to the serving of new markets, as it is illustrated in Figure 4.

Figure 4: Open Innovation [9]

3.1 Methods to realize Open Innovation for sustAGE
Following the concept of Open Innovation, the sustAGE consortium aims to integrate external knowledge into the sustAGE innovation process. External expertise from consortium’s advisory board (EAB) is a proven method to integrate external knowledge. However, externals can be everybody with a potential to improve the development of new products and business within sustAGE, as for example related sustAGE industries, policy makers, users, suppliers, scientists etc. Within the process, external input is used to improve the identification of needs and solutions within sustAGE project. In turn, identified needs and solutions will be integrated into the sustAGE project to improve idea generation, concept development, Prototyping, Product-/ Market Testing and Market Launch (c.f. Figure 5).
Figure 5: Potential sustAGE Instruments for Open Innovation

However, the underlying question is how externals can be integrated into the sustAGE innovation process. The consortium has identified some instruments that can be used as possible ways to include external knowledge into the innovation process of sustAGE, hence realizing the concept of Open Innovation within the sustAGE project. These methods are identified to be innovation competitions, innovation communities and lead-user-method.

**Innovation Competitions**

One method to integrate external ideas into sustAGE innovation process is the exclamation of an innovation competition. Participants will be asked to generate new ideas and to bring in improvement suggestions for products, solutions and specific problems. The best contributions can win prices. Using such an innovation instrument, the sustAGE consortium has to ensure that…

1) …the topic and task of the competition is formulated clearly, and…

2) …that the winning prices have to be attractive enough to act as effective incentive to participate in the innovation competition.

If an Innovation Competition will be used within sustAGE project, the implementation and surveillance of such an innovation competition will be task of the sustAGE Innovation Management Board. Moreover, the IMB will be responsible for judging the contributions and for awarding the best innovation proposals.

**Innovation Communities**

Another possibility is the establishment of a sustAGE innovation community. External participants can communicate and interact within this community which will be supervised by the IMB. By doing so, the community can contribute to develop solutions for specific tasks.
The sustAGE consortium collaborates with the participants and implements tasks for which the members are supposed to find solutions as a community. A known example for such community instrument is the community for Open Source Development.

Lead User Method
Using the Lead User Method, the sustAGE Innovation Management Board will identify specific customers and users and will try to integrate them actively into the sustAGE innovation process. The users and customers are supposed to identify problems within developed sustAGE products and further to help solving them.
4 sustAGE Innovation Management

Innovation Management is the capability to manage an idea of new products, services, processes or an improvement of already existing business systems up to its successful realization. Referring to a definition of the European Commission, innovation management “starts at the point of capturing the creative works and finishes when a product or service is deployed” [10]. Following this, innovation management is a process that requires an understanding of both markets and technologies. Both competences are needed if creative ideas should be transformed successfully into new products. The sustAGE consortium will refer to the European standard on innovation management. Following the European innovation management standard CEN/TS 16555 [3], an IMS includes all activities that are necessary in order to create continuous innovation.

It is important to point out the difference between invention and innovation. sustAGE outcomes can only be classified as an innovation if they produce tangible benefits or satisfy needs and wants when used [11]. Hence, the impact of sustAGE innovations can be anything that delivers a benefit to someone or addresses a need, like for example societal, research, environmental, technical, commercial, education etc.

In order to facilitate a structured process, with clear responsibility, a dedicated innovation management team has been setup within the sustAGE project, consisting of an Innovation Manager (IM) and an Innovation Management Board (IMB). The innovation manager is Frank Werner (SAG), who has multi-year experience in business and innovation. The innovation manager is supposed to monitor the outcomes of the technical process and to match them to business opportunities. This requires a continually monitoring of the sustAGE related market and technology landscapes. If necessary, the innovation manager will adapt the prepared development plan to meet the sustAGE objectives and identified market needs. The innovation management board (IMB) is established to provide support function with refer to innovation tasks. The IMB consists of Frank Werner (Director Research at Software AG), Lucia Pannese (CEO of imaginary s.r.l.), Ilias Spais (Senior Project Manager at AEGIS) and Petros Patias (professor at The Aristotle University). The sustAGE Innovation Management Board will meet at least quarterly (physical meetings or remote conferencing) to review the exploitation potential of the technologies, based on the market opportunities, individual partner plans and technical progress achieved by each of the partners.

The goals of the sustAGE Innovation Management can be divided into cost-, time- and result aspects (c.f. Figure 6) [6]. Taking into consideration the cost perspective, the effort within sustAGE development should be preferably small in order to enable positive business earnings. Developments should take as little time as possible as the factor time is expected to have big impact on market success. Finally, taking into consideration qualitative and quantitative aspects, the innovative sustAGE results are supposed to be huge enough to act successfully in the market.
The sustAGE Innovation Management is responsible to support the whole innovation process from the development of new ideas until the realisation of new products in the market. Following this, the IMB is responsible for managing all activities related to innovation, from market need through capturing the IP, to market deployment. Innovation will be managed in all stages of the sustAGE project and not just after results have been created. Moreover, the sustAGE innovation management is responsible for securing the foundations during the project. The sustAGE Innovation Management will follow a strategy that will

a) address the ownership of anything new that is developed within the sustAGE project

b) allow all those new elements to be exploited by the consortium

In more detail, the IMB will be responsible for:

- The management of all IPR whether Foreground or Background IPR.
- Generation and management of the exploitation plan, IPR strategy, commercial approach
- Negotiation and coordination of exploitation agreements in a manner to satisfy the interest of all the members of the sustAGE consortium. The agreement will formalise exploitation restrictions, licensing arrangements, protection of IPR.

In order to guarantee a successful realization of these responsible fields, all partners will frequently be asked to fulfil surveys, capturing all innovation-related information and simplifying to monitor and control them. More precisely, the survey will contain the following fields:
1. **New Element:** Anything new that the sustAGE project creates (new ideas, new concepts, new knowledge, new methods, new products)

2. **Ownership/ IPR:** For each of the new elements created in sustAGE, it will be specified who owns it and how much of it is owned (in case of joint ownership)

3. **Beneficiary/ Target group:** who is expected to benefit for each of the new sustAGE elements created

4. **Channels:** Methods for reaching the identified target groups above

5. **Stage of completion:** What is the reach of level of the new element

The innovation assessment (c.f., Appendix A: sustAGE Survey and Innovation Questionnaire) will be taken by the innovation manager on a periodic basis, starting in M12. The results will be discussed by the IMB to work out new business values. The IMB will consolidate the assessment results in an innovation catalogue which will be updated continuously.

Within a research project, innovation is closely related to exploitation. Following this, the results of the innovation surveys are supposed to be used as input for sustAGE exploitation. Moreover, as communicated in the Proposal, the sustAGE innovation results will be presented twice during the project, namely in D7.5 (Initial Draft of Exploitation Activities) and in D7.7 (Exploitation Plans and long-term sustainability).

![Figure 7: Planned Innovation Assessments and their Reporting](image-url)
5 Innovation Road Map

The sustAGE consortium has developed a roadmap for bringing key innovations in the development of solutions through its overall approach, as it can be found in the DoA. To achieve its full innovation potential sustAGE will take the following actions:

Excellent science and innovation: The sustAGE project will address open research questions in the areas of multi-modal state and trait estimation, machine learning and artificial intelligence, computer vision, temporal reasoning, recommender systems, IoT and behavioural sciences. The new scientific results will promote the new knowledge in user-centered solutions, human-machine confluence and cognitive training in work-environments and will be rested and validated in real-world settings, aiming to open up innovation and strengthen the EU market.

Commercialization push: The sustAGE project starting tool-set is comprised by both mature tools, tools that will be extended through the course of the project, and brand-new tools that will be built during the course of the project. The mature tools (TRL7) are tools that are already in the market place, but will still gain new features as a result of the work carried out in the project. The rest of the tools (TRL4-6) will be extended to reach a level that is as close to market-ready as possible within the time and effort limitations of the project. Moreover, sustAGE will contribute new tools in the domain of temporal reasoning and state and trait estimation, natural language understanding, recommender systems.

New business opportunities: The sustAGE project plans to release part of its solutions as open source with the appropriate licenses. This will include APIs, parts of developed products, tools built that do not infringe on specific partner IPR, etc. Additionally, new technologies and scientific discoveries will be published, using Open Access. This is part of sustAGE strategy to help start-ups and young entrepreneurs innovate, join the marketplace and succeed.

Innovation through better understanding of the landscape: The sustAGE framework will improve our knowledge and understanding of the necessities of older adult workers, real-life recommender systems and other human-computer interaction systems in the long-term. It will address the notion and real-world methods, practicalities and adoption of related technologies between industry leaders, as well as issues about communicating and raising awareness of the various stakeholders. Having done that, sustAGE paves the way for new and improved products that will address the core market requirements.

Demonstration of applicability in different domains: sustAGE framework with its diverse tools demonstrates advanced capacities in the domain of Human-Computer Interaction. This broad range of applicability supports the vision of the project for highly adopted AI solutions. Therefore, this opens the way for the adoption of our framework to other application domains.

Personalized well-being for the future of the EU: sustAGE aims at collecting all lessons learned from applying the new techniques in real-world applications, and forming EU directions and recommendations for Longevity, Well-being and Productivity of the Ageing Workforce, which will promote development of new services, products and solutions of different application domains.
6 Conclusion

This deliverable outlines an Innovation Management Plan for the sustAGE project. The consortium will rely on the Open Innovation Concept and aims to integrate external knowledge into the sustAGE development in order to improve the innovation process. Innovation competitions, innovation communities or the use of lead-user-method have been identified as potential methods to include externals into the sustAGE project. A dedicated innovation management will continuously monitor the outcomes of the technical development process and match its results to business opportunities and market needs. Following this, all partners within the consortium will periodically participate in an innovation survey every six months, starting in M12. The first innovation results will be presented in the Mid-term Progress Report in M18.
7 References


[3] Innovation management - Part 7: Innovation Management Assessment


Appendix A: sustAGE Survey and Innovation Questionnaire

1. Describe the innovation
   *(in less than 300 characters, spaces included):*

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2. Is the Innovation developed within the project...
   - a) Under development
   - b) Already developed but not yet being exploited
   - c) being exploited

3. Characterise the type of innovation
   *(only to be answered if 2b or 2c is selected)*
   - Significantly improved product
   - Significantly improved service (except consulting ones)
   - Significantly improved process
   - Significantly improved marketing method
   - Significantly improved organisational method
   - Consulting services
   - New product
   - New service (except consulting ones)
   - New process
   - New marketing method
   - New organisational method
   - Other

4. If other, please specify: ________________________________

5. Characterise the macro type of innovation
   *(only to be answered if "under development" is selected for Q2):*
   - Product
6. Will the innovation be introduced to the market or deployed within a partner:
   (a) Introduced new to the market (commercial exploitation)
   (b) Deployed within a partner (internal exploitation: Changes in organization, new internal processes implemented, etc.)
   (c) No exploitation planned

7. If no exploitation planned, please explain why no exploitation is planned
   (answer only if 6(c) is selected)

8. Is there a clear owner of the innovation in the consortium or multiple owners?
   - A clear owner
   - Multiple owners

9. Indicate the "owner" of the innovation:
   <Partner Name>

10. Indicate the step(s) already done (or are foreseen) in the project in order to bring the innovation to (or closer to) the market
    (answer only if 6(a) is selected)

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<tr>
<td>1. Technology transfer</td>
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<td>2. Engagement by Industrial research team of one of their company's business units in project activities</td>
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<tr>
<td>3. Pilot</td>
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<td>4. Capital investment (VC, Angel, other)</td>
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<td>5. Investment from public authority (national, regional)</td>
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6. Business plan
7. Prototyping
8. Market study
9. Demonstration or Testing activities
10. Feasibility study
11. Launch a start-up or spin-off
12. Other

11. If other, please specify

12. Indicate which participant(s) (up to a maximum of 3) is/are the key organisation(s) in the project delivering this innovation. For each of these identify under the next question their needs to fulfil their market potential.

Org 1: <Partner Name 1>
Org 2: <Partner Name 2>
Org 3: <Partner Name 3>

13. Indicate their needs to fulfil their market potential

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<th>Investor readiness training</th>
<th>Investor introductions</th>
<th>Biz plan development</th>
<th>Expanding to more markets</th>
<th>Legal advice (IPR or other)</th>
<th>Mentoring</th>
<th>Partnership with other company (technology or other)</th>
<th>Incubation</th>
<th>Start-up accelerator</th>
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<td>Org 3</td>
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14. When do you expect that such innovation could be commercialised?

(answer only if 6(a) is selected)

- Less than one year
- Between 1 and 3 years
- Between 3 and 5 years
- More than 5 years
- Do not know

15. Have any of the project partners...

(only to be answered if "Done" or "Planned in Project" is chosen for 10.5 "Investment from public authority")

- already applied for support from private investors?
- already applied for investment from public authorities?
- been planning to start discussions with private and public investors?
16. Which partners are in discussion with investors (or are planning such discussions)?

(the above questions are to be answered for each innovation developed by the project, up to a maximum of 3 innovations)

**General Questions**

(questions below are to be answered once per partner, not for each innovation)

17. How does the consortium engage end-users?

- ☐ End user organization in the consortium
- ☐ An end user organization outside of the consortium is consulted
- ☐ No end user organization in the consortium or consulted

18. Are there in the consortium internal IPR issues that could compromise the ability of a project partner to exploit new products/solutions/services, internally or in the market place?

- ☐ yes
- ☐ No

19. Which are the external bottlenecks that compromise the ability of project partners to exploit new products, solutions or services, internally or in the market place?

- ☐ IPR
- ☐ Regulation
- ☐ Workforce's skills
- ☐ Standards
- ☐ Financing
- ☐ Trade issues (between MS, globally)
- ☐ Others

20. Indicate how many patents have been/will be applied for by the project: