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PROJECT (IP)

Universal Open Architecture and Platform for Ambient Assisted Living

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Table of Contents

Table of Figures

List of Tables

1 Executive Summary

This document reports about the structure and organization of the EvAAL (standing for Evaluating AAL Systems through Competitive Benchmarking) competition. It first summarizes the meaning and purpose of EvAAL with respect to the architecture, platform and services of universAAL and with the other deliverables related to the community building activities.

Then it discusses the background of EvAAL, in particular how EvAAL fits the community building strategy and its purpose from a technical point of view. Then it presents the intended audience of EvAAL and discusses previous experiences of competitions organized to support other communities in order to identify the best practices.

The second part of this document describes the organization and structure of EvAAL, specifying the structure of the committees and their roles, the financial aspects, the tasks to be done with respect to establishing and running the competition, the criteria to be used to measure the success of EvAAL and to drive its future competitions, and the modalities of marketing of EvAAL. Finally the document summarizes a roadmap to the first competition.

2 About this Document

2.1 Relationship to Architecture, Platform and Services

universAAL aims at defining and implementing a reference architecture and platform for AAL applications that becomes widely accepted in the whole AAL community, and to define and realize on such platform a number of services that prove its validity and open business opportunities.

In this process it is essential that the universAAL architecture, platform and services are supported by communities of different stakeholders (ranging from developers to industries, service providers, end users, etc.) that guarantee a development of universAAL even after the end of the project. For this reason universAAL implements a number of community building tasks (in particular tasks 8.1, 8.2, and 8.4) that realize specific community building strategies for different sets of stakeholders.

The community building activities are also supported by the EvAAL competition (Evaluating AAL Systems through Competitive Benchmarking) that is implemented in Task 8.5 and described in this deliverable. In particular EvAAL has the role of attracting stakeholders around the universAAL activities and to help grow the corresponding communities.

However EvAAL has also very specific and technical challenges that have implications on the development of the architecture, platform and services. In fact, the evaluation and comparison of complex AAL systems is still far from being a reality [Conn08], this implies that, at the state of the art, the universAAL architecture and platform solutions can hardly be compared with other solutions, and thus even the impact of new solutions and strategies to be adopted in the universAAL development can hardly be evaluated.

EvAAL aims at advancing the state of the art in the evaluation and comparison of AAL platforms and architectures. To this purpose, it aims at creating an environment in which the researchers, students, and even industries can compare their solutions and exchange ideas on which such comparisons may become feasible. In particular, EvAAL adopts a step by step approach, by dividing the problem into smaller pieces. In an initial phase it promotes competitions on specific, small scale topics in order to create a large data set and to evolve benchmarks and evaluation methodologies. Once this phase is mature enough, EvAAL will enter in a second phase in which more complex (and even complete) systems can be evaluated and compared.

From the point of view of the development team of universAAL, and in particular of the activity of workpackages 2, 3, and 4, the creation of data sets, benchmarks and evaluation methodologies achieved by EvAAL will become the mean to evaluate the quality of their solutions. On the other hand, since it will base the benchmarking and evaluation of competing artifacts on the tools and platform developed in WP2 and WP3 it will also promote the use of the universAAL platform and the evaluation of solutions and services constructed over this platform.

2.2 Relationship with Other Deliverables

The deliverable is related to the following universAAL deliverables:

- **D8.1 – Roadmap and established open source community**: this document presents the roadmap on how the open source community shall work, during and after the project ends. It also describes the open source community itself, member lists and cooperation infrastructure. Deliverable D8.1 is closely relates D8.5, since D8.5 focuses on the competition which is one of the main initiatives in support to the construction of the open source community. Under this respect the Deliverable D8.5 will gain inspiration and ideas for the organization of the competition from the community established by Task 8.1 (and described in D8.1), and at the same time it will attempt to enlarge the community by the involvement of competitors and possibly industries and service providers interested in the competition topics.

- **D8.2 – Roadmap and established end user community**: this document presents a roadmap on how the end user community shall work, during and after the project ends. D8.5 and the competition do not address directly end-users, however end users may find attractive (at least) some of the competition topics and thus they may get involved in the universAAL end-user community. Under this respect the ideas and feedbacks for the competition organization are expected also from Task 8.2 and from the end-user community.

- **D8.3 – Standardization usage plan and contributions:** this document presents the plan that identifies where in universAAL what standards should be applied. It also reports on where standards were used, what standards we have contributed to and how. The competition organized in Task 8.5 may take advantages for the use of standards as technologies enabling new competing artifacts. Under this respect the competition organization may gain inputs and ideas from Task 8.3 and deliverable D8.3.

- **D8.4 – Plan for user and industry involvement and results:** this document provides a list of companies/industry working with AAL and it presents a plan for their involvement. Some industries may become involved in the competition on view of the competition scientific achievements. Under this respect the plans in D8.4 may include the exploitation of the competition as a mean to achieve industries involvement. On the other hand the results of D8.4 may give benefit to the competition organization in terms of contacts with industries for their involvement in support to the competition or for the definition of ideas and guidelines for the competition.

2.3 Structure of this Document

The remaining part of this document is organized as follows.

Chapter 3 discusses the motivations of the competition within universAAL and how the competition fits the strategy for the community building. To this purpose Chapter 3 also describes the stakeholders inherent for the competition. Finally it discusses past (and running) experiences on competitions in other fields in order to identify best practices.

Chapter 4 describes the actual organization and structure of the competition. In particular it describes the boards running the competition, along with their roles, responsibilities and relationship. The chapter also describes the tasks that should be achieved in order to make the necessary arrangements and to run the competition and the criteria for the evaluation of the competition success. Finally the chapter describes the financial aspects of the competition in order to identify a suitable financial plan, and the strategies to attract competitors and stakeholders.

Chapter 5 reports the roadmap of the competition, by explaining the main milestones of the competition organization and the timeline of the activities.

The Appendix concludes the deliverable by presenting the call for ideas.

3 Background

The AAL competition is a key point of the community building strategy devised in the universAAL project. Its role is to contribute to the creation of the AAL community by using an approach (organizing a competition among AAL-related artifacts) that has been successfully adopted in the past to build communities in many other scientific areas. This section presents the reasons for the competition and reviews similar initiatives undertaken in the past to support other communities.

3.1 Why do We Need an AAL Competition?

The AAL competition (hereafter called EvAAL, that stands for Evaluating AAL Systems through Competitive Benchmarking) fits within the universAAL strategy for community building. This strategy is described in the universAAL DoW, and it will be revised in Deliverable 8.1. It consists of three main universAAL initiatives, one supporting each other:

- The AAL Manifesto (as described in [Deliverable D9.2] and available also in the AALOA website [AALOA]), which has been released in the first months of the project within the activities of Workpackage 9. The Manifesto is a live document expressing the vision, objectives, and challenges in AAL.

- The AALOA Association (as described in [Deliverable D8.1]), which should support the community by providing an open forum where all interested stakeholders can openly meet and discuss their vision of AAL, and propose and evaluate solutions. The association is also meant as a federation of projects addressing different aspects of development of AAL.

- The AAL Competition (as described in this deliverable), which is the mean to create consensus and interest around the community and the association among practitioners, service providers, developers etc. The competition is organized as a project within the AAL association as described in the above point.

The objectives of these initiatives are to:

- Raise interest of industry (by opening an open discussion about market and business opportunities) and of the academic world (in particular by attracting PhD students and, in turn, fresh ideas);

- Enable a life expectation of the association greater than the universAAL life span of 4 years (for this reason the vision promoted should be feasible in the medium, long term);

- Raise interest on the Association (by promoting appealing initiatives, one of these will be the EvAAL competition)

- Gathering support by key people and key research labs (to such people is first addressed the Manifest)

It should be observed that this strategy has been devised by observing similar strategies adopted in other fields in the construction of communities of successful associations (for example [ECLIPSE], [APACHE]).

Within this strategy the EvAAL competition has thus the main role of attracting to the community different stakeholders from the academia, industry service providers and even end-users. However such a goal can be achieved only if the competition will have a solid scientific background and objectives. Under this respect the competition should address several specific objectives that can be summarized in the following points:

1. it should contribute to create consensus around relevant AAL problems and to address them;

2. it should become widely recognized as a valuable international community;

3. it should promote the aggregation of research and industry;

4. it should stimulate young developers to bring fresh ideas and create new solutions;

5. it should allow the publication of needs, requirements, and issues in AAL.

We observe that creating consensus in the scientific world about relevant and important AAL problems will be achieved by EvAAL as a byproduct of the contribution within EvAAL of competitors and experts in AAL serving in its scientific committees. This in turn will result in added value to universAAL since it can contribute to refine the universAAL objectives, in order to keep the platform design and development at the state of the art. For the same reason it is also important that EvAAL be open to new ideas that may come from a better cooperation between industry and research and also from young developers and students.

We also stress that the kind of feedback obtained from EvAAL will cover several aspects. On the one hand the proposals of new ideas for competition will make the competition fast to react to technologies developments and new ideas coming from the AAL communities. On the other hand the effort made to set up competitions will grant tests of the universAAL platform and it will train a new generation of developers to the use of the universAAL platform.

From the point of view of universAAL these results of EvAAL have a higher value if the communities involved in EvAAL have a high reputation in AAL. For this reason it is necessary that EvAAL attract the best minds of the scientific and industrial communities, as well as the best students and competitors. This is possible only if it is widely recognized by the international community that operates in AAL.

About point 5) it should be observed that it is actually a consequence of the process of organizing and sustaining such a competition in the coming years. In fact AAL is a wide research field that encompasses several areas of science. Any non-trivial AAL system is, in practice, configured as a complex pervasive, context-aware system that inherits solutions from several specific scientific areas such as sensing, communication, reasoning, interaction, etc. The need for evaluation and comparison of heterogeneous solutions, that is mandatory in any competition, will naturally give rise to the need for widely accepted scenarios, benchmarks and evaluation criteria, but also of interfaces, and tools for the automation of the competition and for the fairness of the evaluation. In other words this work will give rise to the need for a common platform on which to develop the competing artifacts in such a way that all the competitors will develop their artifacts on the same, equal conditions.

This latter point, i.e. the growing awareness for the need of a common platform, is important from the point of view of universAAL. In fact universAAL aims at unifying different approaches, ideas and visions of AAL within a unique, new universAAL platform (that partly inherits from existing platforms, see [SOPRANO, OASIS, AMIGO, MPOWER, GENESYS]), hence the universAAL platform, when available, will be a natural candidate to support the competitions initiatives, and in fact, it will be used as the base on which competitors will develop their competing artifacts (as it is also stated in the universAAL DoW: "[…] the AAL competition will be a contest that will promote the development of AAL applications using reference architecture and tools implemented in WP2 and WP3."). On the other hand the universAAL platform will take benefits from a new generation of developers, used to develop over this platform for the competitions that will provide feedbacks, improvements, and even developments of the platform itself.

Finally we emphasize that there are currently no competitions addressed to ALL subjects, universAAL project will establish the first one. This competitions should be related both to industrial exploitability of universAAL platform and research purposes.

3.2 The Purpose of the AAL Competition

EvAAL (Evaluating AAL Systems Through Competitive Benchmarking) is an international competition aimed at raising interest in the research and developer communities in the multidisciplinary research fields enabling Ambient Assisted Living [AAL09] (AAL), and at creating benchmarks for the evaluation and comparison of AAL systems.

The EvAAL competition aims at contributing to AAL disciplines in the same way as other competitions have contributed to their respective areas. Under this respect EvAAL is inspired by successful competitions such as the Trading Agent Competition [TAC10] (TAC) and DARPA Grand Challenge [DGC07]. An extensive survey of competitions is presented in Section 3.4.

Differently than the above mentioned competitions, beyond the support to the growth of the AAL community and the spread of the universAAL platform in this community, the main technical objectives of the competitions organized by EvAAL is to:

- Enable the comparison of different AAL solutions

- Experiment with benchmarking and evaluation methods

- Identify relevant AAL problems, requirements and issues

- Identification of new, original solutions for AAL

We aim to enable the comparison of different AAL solutions, by establishing suitable benchmarks and evaluation metrics that will be progressively refined and improved in the years. In particular, EvAAL will focus not only on comparison of algorithms, but also of cost, deployment effort, time and costs, etc. In the time EvAAL will also grow the capacity of offering more and more sophisticated and realistic environments hosting the challenges. Nevertheless, evaluating and comparing different AAL systems by means of competitive benchmarking gives rise to a number of issues due to the complexity of such solutions and to the richness of the environments and users' requirements. Hence a one-size-fits-all approach to evaluating AAL systems is unrealistic. A possible solution is decomposing core system functionalities into components and pairing each component with specific evaluation strategies. However, up to now, a clear consensus among researchers about the evaluation methods and objectives is still to be reached, and current approaches to the evaluation of AAL systems tend to be subjective or piecemeal [Conn08].

EvAAL's objective is to fill the gap by working around the evaluation issues and by offering to researchers an arena where to try, test and experiment not only AAL solutions but also benchmarks and evaluation methods. To this purpose, EvAAL will be open to all issues related to the test environment (living laboratories vs. into the wild), to the benchmarking (automatic vs. based on users' evaluations), to the tools supporting the competition etc. The outcome would be a toolkit of techniques from which system developers can draw. Making these techniques open, available, and easy to use will enable comparative evaluation between similar components across systems and, in the end, of whole AAL systems.

However EvAAL recognizes that facing the full complexity of the evaluation of AAL systems is not feasible in its early phase and, in fact, a clear vision on the methods for the evaluation of full, complex AAL systems is still to be reached. For this reason EvAAL will initially focus on specific technological challenges related to AAL, and will use the results achieved from the competitions on these subjects to set up a set of tools and methodologies, with a view to approach the full problem in a subsequent phase. Under this respect, some of the themes that may be considered in the initial phase of EvAAL could be: sensing (this theme covers the aspects of collecting any kind of context information from the environment), seasoning (that concerns with the problem of transforming context data into knowledge), acting (concerns the environment control through actuators), communication, interaction (among user and the AAL system), etc.

Of course these themes will be extended (and may even change focus) in the years in order to adapt to technological evolutions and breakthroughs in AAL. The input to this evolution of EvAAL will come from the experience in the early EvAAL competitions and from the community that gradually will be built around EvAAL.

Once EvAAL will become more mature, and especially once the universAAL platform will become more stable and usable, EvAAL will extend (or even change) its focus, to address services and platforms rather than basic features. The reason for this focus shift of EvAAL (which is summarized in Figure 1), is that basic features and their technologies will become more stable with the passing of time. Hence their embedding in the universAAL platform will be given for granted. At that point it will be natural to provide the competitors with the universAAL platform along with a number of available features, and hence the competitors will have the chance to compete on higher level issues. Although it is not possible right now to establish when this focus shift will occur, we can expect that it will happen in the last phase of universAAL or at its end.
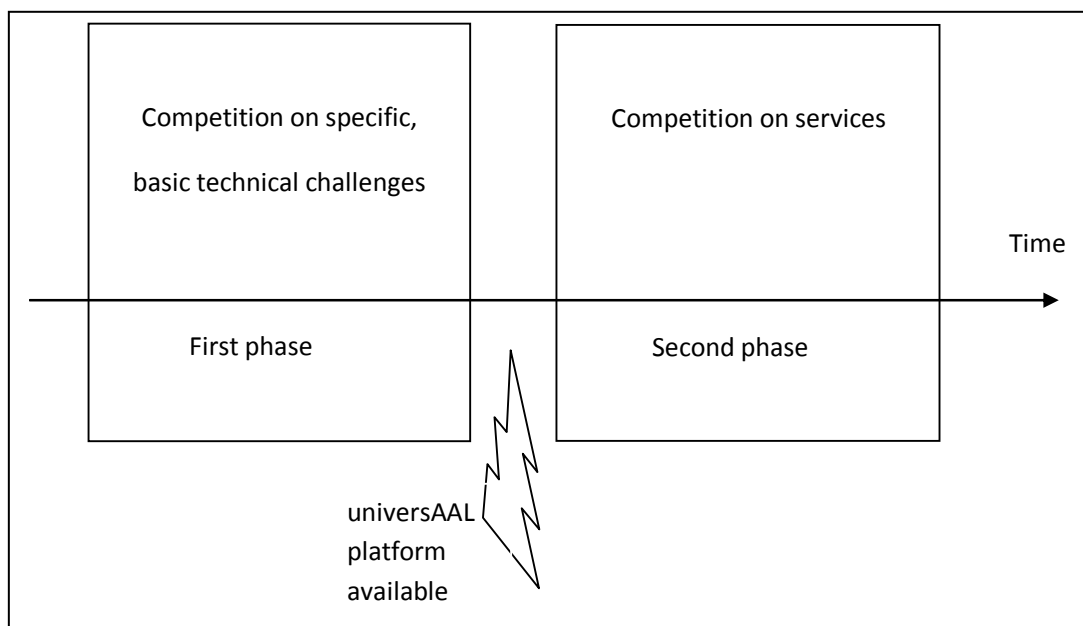
Figure 1. The EvAAL focus shift

3.3   The Target Groups of the AAL Competition

A lot of scientific research has been done in the past years and numerous projects have resulted in a considerable amount of applications and product concepts which ended up with a variety of prototypical isolated solutions. Unfortunately the industry is still waiting to step into the huge market potential.

Thus, the main question is now how we can motivate the industry to open their range of products to the AAL market. A lack of business models as the foundation for a cooperation between developers, service providers, medical device manufacturers and the housing industry is almost unanimously named as the greatest marketing hindrance to a broad implementation of innovative assisted living systems.

The high costs of the isolated solutions are the cause of this deficit. Only when covering the aging person's entire clinical picture the costs can be minimised as then the people can remain longer at home and the unallocated funds gained from postponing nursing home stays can compensate the investments in AAL solutions.

As a consequence future AAL solutions must cover the whole value chain which includes all stakeholders – investors, researchers, industry providers, policy makers, health insurance companies and end-users – to provide smart solutions for an improved quality of life in later years. This includes users and caregivers (primary stakeholders), organisations offering services (secondary stakeholders), organisations supplying goods and services (tertiary stakeholders) and organisations analysing the economical and legal context of AAL (quaternary stakeholders). For more details about these stakeholders we refer to the activities of tasks 8.1-8.4 reported in deliverables D8.1, D8.2, D8.3, and D8.4. The role of secondary stakeholders is taken by organisations that provide services to the main target group (i.e. security-service providers, care-service organisations, shopping services, transport services, delivery services, social services, community centres, etc.), while the tertiary stakeholders are all industries and companies that supply goods and services to the secondary stakeholders. The quaternary stakeholders of AAL are organisations and institutions that work in the economical and legal context of AAL. They deal with the diversity of social, welfare and healthcare systems, with the lack of visible value chains, with the heterogeneous target groups of user and buyer, with the lack of standards and certification and with the funding and reimbursement of AAL services (see AALIANCE 2009).

Only such a consequent inclusion of all stakeholders can help to go beyond all boundaries and market barriers. However, as a first step there is also a clear need to convince the technological industry of this vision. Only when the industry is ready to develop products and services based on a common platform, AmI and AAL will get a real chance for having success. Afterwards all stakeholders will follow that given way when the business models will have been created.

To reach this the first target group for the calls for competition will be the developers of the scientific and research community (universities and research institutes) to realize plug-ins, products and services based on the universAAL platform. The competition will be a very good tool to motivate them to go this first step.

When exceeding the critical mass of products and services based on the universAAL platform the developers from the industry - and here especially the small and medium enterprises - will see a better chance to distribute their products when they are built on universAAL. Thus the next target group of the AAL competition will be the product and service developers from SMEs and worldwide enterprises. The goal will be also to involve the industry in the building process of services and applications. Naturally investors will follow this approach when there will be enough impact.

After reaching a considerable set of services a third target group of the AAL competition will be the service providers and health insurance companies. One focus of the competition can than be to provide eligible business models based on existing services (on the basis of universAAL).

The last step to cover the whole value chain will then be to motivate founders to establish new companies with the focus of an integrator of AAL services and products. There is a huge gap to be filled since nobody has the overview of what services and devices are available at the moment. Thus for the last competition this could be an opportunity to focus on the integration of the available universAAL services and products.

3.4 Established Best Practice

Programming competitions are well established means to identify good programmers or future programmers (i.e. students). The first competitions began in mid nineties, and were mostly addressed for student. Prizes were usually symbolic (medals and titles) and had no particular specific topic or industrial interest. More recently, competitions have been created to stimulate the research in particular fields. Some private companies have also begun to attract the interest of the programmers' community by providing prizes in cash.

The purpose of this chapter is to select best practices of the most famous programming competitions. The idea is to receive inspiration about the organizational structure, the kind of event (e.g. standalone or in conference), the funding scheme and the main goals of each competition.

In the following paragraphs some of the most important competitions are reviewed. The summary of the competitions and the best practices that will be considered in the EvAAL implementation are reported in tables 1 and 2, respectively.

3.4.1 The International Collegiate Programming Contest

The Association for Computing Machinery (ACM) International Collegiate Programming Contest (ICPC) [AMC-ICPC] is the oldest, largest, and most prestigious programming contest in the world. It is sponsored by ACM at Baylor University and IBM.

The contest involves almost 2,000 universities from over 80 countries universities. Universities host regional competitions and advance teams to the ACM-ICPC World Finals.

Figure 2. ACM ICPC logo

The ICPC is a team competition, each team consist of three university students with less than five years of university education.

Teams are given 5 hours to solve between 8 and 12 programming problems. Solutions must in C, C++, or Java and must pass a test with test data. The winner is the team which correctly solves most problems in the shortest time.

Compared to other programming contests, the ICPC is characterized by a high time pressure (8 problems in 5 hours with only one computer per team), the key point in the competition is, thus good teamwork and the ability to work efficiently in a limited time frame

The competition is organized in regional contests that select the teams that will go to the final competition. The place of the final competition is chosen each ear.

Regional contests are organized by at least 12 institutions of higher learning and cover a particular regional area. Each regional contest has a steering committee of faculty members from institutions in the region. The World Finals aim to host from 30 to 40 teams, the *Director of Regional Contests* authorizes proposals of new regional contests.

A typical contest runs for two days, one day with technical and cultural content, the next day with a the contest and an awards celebration. Facilities are typically provided by the institution with

additional expenses covered by team fees and sponsor support. Following this approach we will evaluate in EvAAL the opportunities for a similar kind of support.

3.4.2 International Olympiad in Informatics

The International Olympiad in Informatics (IOI) [IOI] is an annual computer science competition for secondary school students patronized by UNESCO and IFIP.

The contest consists of two days computer programming where students must solve three algorithmic problems in five hours. Students compete on an individual basis and selected through national computing contests.

The contestant has to write a computer program (in C, C++ or Pascal) which is assessed by being run with test data. Based on the number of resolved problems and on the time needed to finish the task gold, silver and bronze medals are given to the top 50% of the competitors.

The IOI is organized on an annual basis by one of the participating countries. Each participating country sends a delegation of four students and two adults. The students are selected in national olympiads. The organization of the competition is composed of a President, representing the competition worldwide, an Executive Director, who provides service for the administration of the IOI, a Chairman, who is charged with organizing the IOI in the designated year in the respective country. Moreover the following committee is set-up:

General Assembly: is composed by the leaders of the countries involved in IOI, the President and the Executive Director, the Chairman and members of the other committees. The International Committee is charged with overseeing the organization of the IOI, and the International Technical Working Group that is charged with coordinating the environment and grading system at IOI.

3.4.3 Darpa Grand Challenge

Darpa Grand Challenge [DGC07] is a prize competition funded by the Defense Advanced Research Projects Agency of United States Department of Defense to sponsor research on driverless vehicles. The objective of the event is to build an autonomous car that is able to drive from Los Angeles to Las Vegas without human intervention.

The competition tries to stimulate research in this field, the results are of key interest for the US army as it is foreseen to have one third of the ground military force automated by 2015 to keep warfighters off the battlefield. Challenges have been performed from year 2004 to year 2007.

The competition is open to teams and organizations from around the world: high schools, universities, businesses and other organizations.

There are four qualifying steps:

1. technical papers and videos selection
2. vehicle testing at team sites
3. a rigorous eight-day vehicle test (National Qualification Event)

In order to apply, team leaders provide DARPA with basic information on their teams and vehicles. The evaluation of the teams is rigorous: demonstration videos must be supplied together with technical papers, and finally site tests are performed at the competitor's place.

Similar to this approach we will request to the applicants to the call for competition to provide basic information about the competing artifacts in order to prepare better the benchmarks and evaluation tools.

3.4.4 Trading Agent Competition

The Trading Agent Competition (TAC) [TAC10] is an international forum designed to promote and encourage high quality research into the *trading agent problem*. The game has been designed jointly by a team of researchers from the e-Supply Chain Management Lab at Carnegie Mellon University and the Swedish Institute of Computer Science.

The objective of the competition is to develop algorithms for dynamic supply chains. Today's supply chains are mostly static, relying on long-term relationships among key trading partners, more flexible and dynamic chains may better match suppliers and customers as market conditions change.
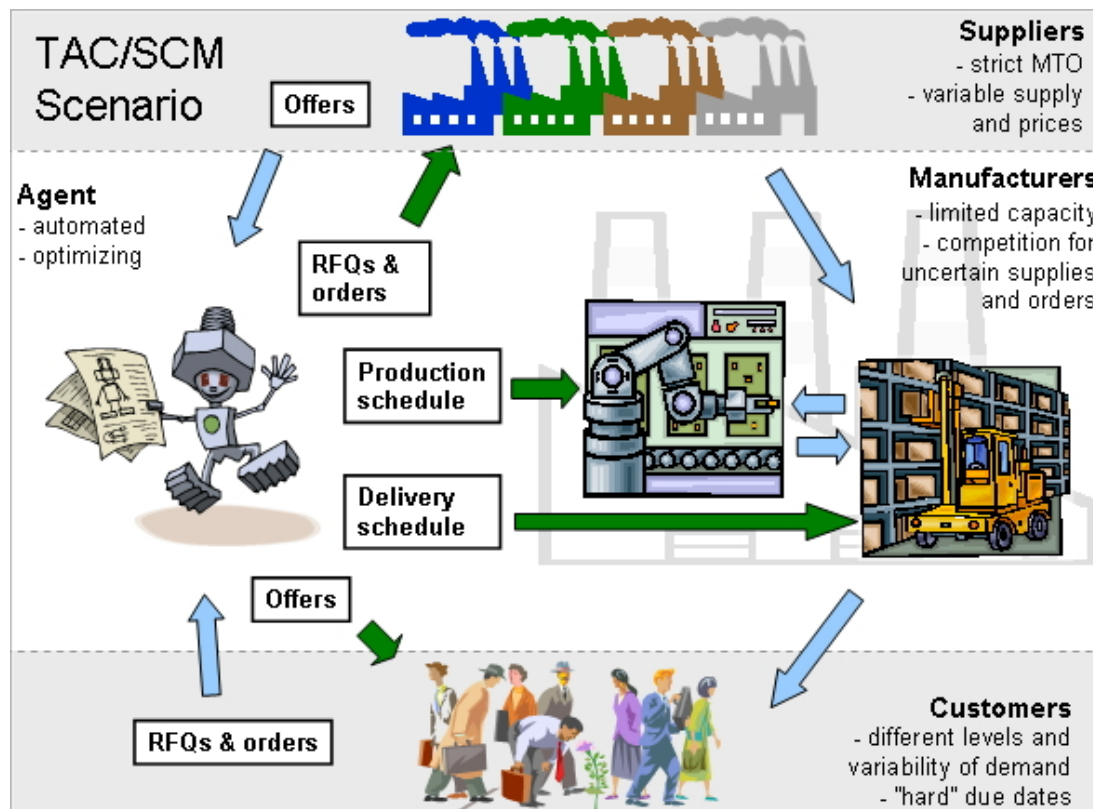
Figure 3. An agent buying components from suppliers, manufacturing
goods and delivering to customers

Competitions have run from 2003 up to 2010 and are open to researches from all over the world.
There two possible scenarios where the participants can apply for their algorithms:

- TAC Classic - a "travel agent" scenario based on complex procurement on multiple simultaneous auctions
- TAC SCM - a PC manufacturer scenario based on sourcing of components, manufacturing of PC's and sales to customers

The organization is held by an advisory board of two people. The competitions are usually set-up together with some related conference (e.g. the 2010 version was held in concomitance with EC10, the ACM conference on electronic commerce).
The idea of organizing the competition in a hosting conference ensures the dissemination of the competition results to a larger audience. This option will be considered in the EvAAL competition.

3.4.5 Google Programming Contest and Google Code Jam

The Google Programming Contest [GPC] was launched in 2002 with the objective of stimulating research in highly efficient data processing of web pages. The aim was writing a program that provided a framework for processing parsed data from 900,000 web pages and creating some interesting output that could fit into a single web page.

The prize of the competition was $10,000 US dollars and a visit to Google Inc. in Mountain View

There are two possible tracks:

1. Systems:
   means programming a high performance, scalable infrastructure for handling the data
2. Applications:
   is about dealing with the semantics of the data, e.g. detecting templates in web pages, classification of content, detect duplicates, …

A panel of Google scientists judged the proposals and chose a winner based on the utility of the produced output and the scalability and the elegance of the design.

Google Code Jam [GCJ] is a newer competition from Google. The aim of the competition is to find a solution for a generic algorithm using whatever programming language. The first rounds are online, the last round is held in Dublin. Final prizes range from 100 to 5000 US dollars.

Both competitions are sponsored by Google and the code provided during them must be licensed in a way Google can exploit it. Every programming language and development environment is allowed.

The amount of prizes of this competition can be considered as our target for the EvAAL competition. Furthermore, as in these competitions, we will consider the opportunity of constituting a panel of evaluators in order to assess aspects that are not directly measurable by benchmarks.

3.4.6 CONNECT Code-a-Thon Challenge

The CONNECT Code-a-Thon Challenge [CCTC] is a competition organized by the Florida International University, the Open Health Tools organization and the American Academy of Family Physicians National Research Network. The competition aims to disseminate and improve the use of CONNECT [CON], an open source software solution that supports health information exchange.

The challenge consists in taking the John Halamka example of the HL7 Continuity of Care Document, an XML-based standard for the encoding of a patient summary clinical document, and creating innovative style sheets for display of the CCD contents to a primary care physician taking calls from patients after office hours. The challenge is to improve the functionality of the style sheet produced by HL7 for use in CONNECT Universal Client applications that display CCD for devices: smartphones, netbooks, and full size displays.

The winning solution must comprise: an error-free demonstration, a clear presentation of the improved value for the primary care physician working outside of office hours, an attractive and appealing GUI display, an efficient use of the physician's time, and improved physician decision making with innovative data display capabilities illustrated with data from the Halamka CCD.

 Participation is open to students and professionals.

All the produces style sheets will be given to the CONNECT Open Source Community. In a similar way, all the results and achievements of the EvAAL competition will be given to the AALOA community and will constitute a base for future developments of the competition.

Name	Topic	Competitors	Prize	Birth year
ACM ICPC	algorithms	University students	Title	1977
IOI	algorithms	Secondary school students	Title	1989
Darpa Grand Challenge	automated vehicles	high schools, universities, businesses	2 million US dollars	2004
TAC	trading agent problem	Universities, researchers	Title	2003
Google PC	processing of web pages	Everybody	10,000 US dollars	2002
Google CJ	algorithms	Everybody	5,000 US dollars	2008
CONNECT Code-a-Thon	HL7 CCD stylesheets	students and professionals	Title	N/A

Table 1. Summary of competitions

Competition	Best practices
ACM ICPC	Costs covered in part by the institution with additional expenses covered by team fees and sponsor support
Darpa Grand Challenge	Team leaders should provide basic information on their teams and competing artifacts
TAC	Competition organized in a hosting conference to ensure the dissemination of the competition results to a large audience
Google PC &CJ	A panel of evaluators assess aspects that are not directly measurable by benchmarks
CONNECT Code-a-Thon	all the results and achievements of the competition are be given to the community and constitute a base for future developments of the competition

Table 2. Summary of best practices that will be considered for EvAAL

4 AAL Competition Structure

4.1 Organization

The EvAAL competition is developed as a project under the AALOA association [AALOA]. This will grant EvAAL to possibility to disseminate its activities under the umbrella of AALOA and it will grant direct access and easier acceptance of EvAAL in the AALOA community. Furthermore the fact that EvAAL is designed within the AALOA association also means that it can support the activities of the association too, even beyond the end of universAAL. For this reason EvAAL has an organization structure "made to last".

Once EvAAL will be established and widely recognized it will be run as an independent event, which will take place in sites selected by the steering board. Living labs will be privileged with respect to other sites. However in the first years EvAAL may not have enough funds and volunteers to be organized as an independent event. For this reason it may be organized as an accompanying event of a conference on AAL to be selected by the steering board. This would greatly simplify the organization and the financial management of EvAAL, since local facilities will be provided by the conference organizers and the costs will be covered by the participants in forms of fees. However, if EvAAL will find a suitable financial support, the competitors' fees might also be covered by EvAAL.

In the rest of this section we describe the EvAAL structure assuming that EvAAL is run as an independent event. In the case that EvAAL is run as an accompanying event of a conference then some of the roles described here will not be necessary (in particular the local chairs will no longer be needed and the financial chair will not have also the role of registration chair). Also the other roles should be revised accordingly.

EvAAL is run by a Steering Board (SB), which organizes the competition periodically (the decision about the period is taken by the SB, for example it could be annual or biennial). We describe here the organization of EvAAL assuming that the competition is annual. In the case of biennial competitions the dates and periods should be revised accordingly. The Advisory Board (AB) supports the activities of the SB by giving advice regarding the strategic decision-making process. Sometimes the AB may pose questions to the whole group, sometimes it consults individual members. On the other hand the AB does not have any authority to vote or to take decisions.

To the purpose of organization of the competition, the SB annually issues a *call for ideas* (that is reported in Appendix A of this document) which is addressed to all relevant stakeholders (including not just technology experts, but also service providers, industries, end users) in order to collect ideas about methods, issues to be studied, benchmarks etc. The call for ideas is disseminated using all the available dissemination channels, including presentations at conferences/workshop, personal mails directed at possibly interested people, publication on mailing lists/web sites, etc.

All collected ideas and suggestion are evaluated and selected by the Steering Board in order to constitute the base for the subsequent *call for competition*. In particular the call for ideas requests either just simple ideas, or full proposals for special themes competition. In the latter case the submissions to the call for ideas should indicate a detailed a plan for the organization of a special theme competition, a chair for the special theme competition, and a preliminary scientific board.

The Steering Board thus collects all the submissions to the call for ideas, and selects a number of special theme competitions. The selection is based on the quality of the submission, on the feasibility of the organization plan, on the availability of resources, on the scientific reputation of the proposers, on the possibility of recruiting the chair of the special theme competition, as well as other volunteers, to form the final Scientific Committee of the special theme competition. It should be stressed here that all the people taking part to a Scientific Committee are volunteers.

The Steering Board then establishes one Special Theme Chair and one Scientific Committee for each special theme competition, whose first role is to prepare a *call for special theme competition.* The Steering board then collects all the calls for special theme competitions into the call for competition, which is disseminated through all the available channels.

At the same time the Steering Board nominates the General Chair and the Organizing Committee of the competition. The General Chair has the role of coordinating the Scientific Committees and the Organization Committee to ensure the success of the competition, while the Organizing Committee is responsible for the logistics issues of the whole competition. Specific roles of the Steering board, of the Organization Committee, and of the Scientific Committees are described in the next sub-sections. Figure 2 represents the Steering Board and the competition committees. In particular it highlights the chairs involved in each committee.

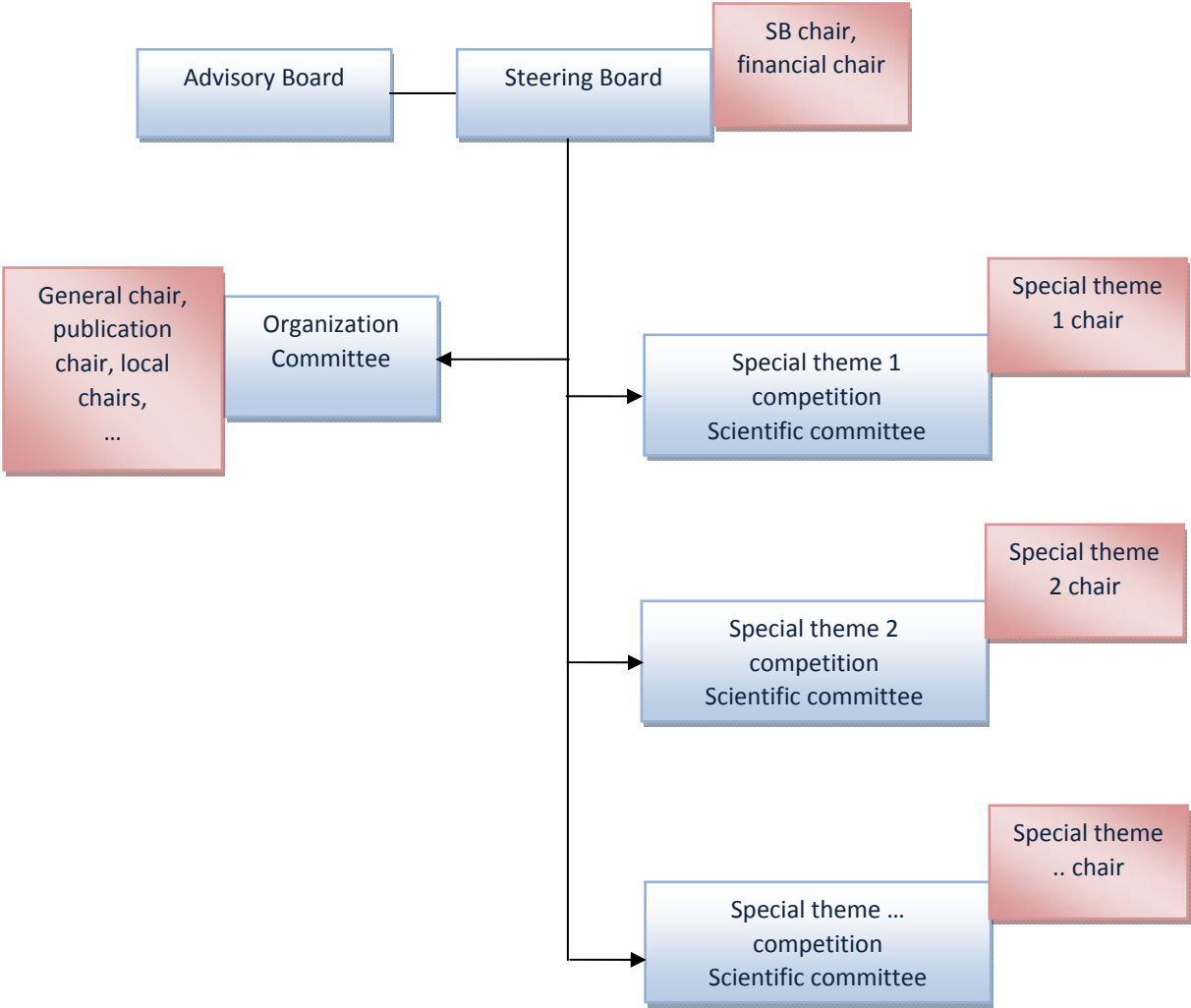Figure 4. The Steering board and the committees of a competition

4.1.1 Role and responsibilities of the Steering Board

The Steering Board (SB) is responsible for the maintenance and evolution of the competition. In particular, it fulfills the following roles:

1. Maintains a repository of the historical record
2. Seeks for locations for the competition and select the site where the competitions are held.

3. Selects the competition dates that do not conflict with other major international and regional related events (conferences/competitions) that might adversely affect the success of the planned competition.

4. Issues the call for competition ideas

5. Review and approve the special theme competition plans proposed by applications to the call for ideas

6. Recruit and appoint the annual competitions committees, in particular the general chair, the Special Theme Chair, the Financial, Publication and Publicity chairs.

7. Review and approve the logistic plan (i.e., venues for the competition, hotels, tasks, schedule, resources and financial plans) proposed by the organizing committee.

8. Work with the general chair(s) to get the necessary approvals from the IEEE including advance payment to help in the initial expenses

9. Work, as needed, with the general chair(s) to remedy any problems that could affect the long-term viability of the competition.

10. Evaluate the progress of EvAAL and determine strategic changes that include adding, reshaping or discontinuing features in future events.

11. Review this list of responsibilities as well as the responsibilities of the various committees and propose amendments to the EvAAL organization.

12. Yearly review and if needed update the evaluation criteria and the success metrics of EvAAL.

13. Selects the members of the Advisory Board

Decision making – The SB chair decides before of each meeting the agenda, which includes a list of proposals/options on which the SB should take a decision. Each proposal/option is first discussed in the SB, and the discussion is moderated by the SB chair, then the SB chair stops the discussion and request the SB members to vote. A proposal is accepted if at least 50%+1 SB members vote for it.

In the case in which two or more proposals/options are conflicting, the SB chair may decide to ask for a vote on each option independently, or he/her may ask for a vote in opposition. In the latter case the option that takes the larger number of votes (even if below 50%) is the one which is approved.

Voting can be conducted by e-mail or by a show of hands (in face-to-face meetings).

Membership - The SB is formed by at least 5 members with long-standing commitment for EvAAL and selected by the SB (initially the SB is composed by members of universAAL involved in Task 8.5 and other members of universAAL willing to contribute). In this regard, long-standing is defined as being active in any capacity in the running of the competition for at least 3 years. To ease the decision process, the maximum number of members of the SB is fixed to 7. At least two members of the SB should have an academic background and at least 2 members should have an industrial background. Anybody that fulfils the requirement of commitment to EvAAL may candidate himself/herself for the SB. The members of the SB evaluate the curricula of the candidate and vote for his/her acceptance. The candidate is accepted if at least 50%+1 of the members of the SB vote positively for him/her.

The SB elects a chair for a one-year term.

Terms of Membership - Members of the SB shall serve a single term of 5 years. The term starts immediately after his/her recruitment. To ensure continuity, the terms are staggered to ensure that, under normal operation, only one SB member is replaced every other year. In any case, each member of the SB will serve in the Committee for a term of duration of 5 years.

Vacancy - In case of an emergency vacancy, the SB recruits a new SB member according to the rules given in the Membership subsection.

Meetings - The SB shall conduct its business by meeting at least once per semester. In the semester in which the competition takes place the meeting shall take place during the competition.

The quorum for these meeting is 3.

The cost of conducting such meetings (excluding travel) should be budgeted in the next competition budget. Additional meetings, if needed, shall be held by conference calls and e-mail.

The SB Chair shall prepare the agenda for the meeting and take minutes of the meeting.

Decisions for running the business shall be made by a majority vote of those voting members attending. The Chair vote will be considered a tiebreaker.

Minutes of each meeting will be distributed to the SB within 30 days of the meeting.

4.1.2 General Chair(s)

The general chairs are appointed at least 18 months before the competition by the SB. Criteria for selection include balancing geographical and technical factors. The General Chairs are appointed by the SB for a 21-month term (18 months before the competition and 3 months afterwards). One of the general co-chairs should be member of the SB.

The general chair(s) has (have) the ultimate responsibility for the success or the lack of thereof of any given competition in terms of 1) technical quality of the competition (and of the competing artifacts), 2) quality of the organization, 3) number of attendees and 4) satisfaction of the participants.

The main role of the general chairs is to be the focal point for all contacts regarding the competition internally, i.e., for the various committees, as well as with the outside world. In addition, he/she works to:

1. Work with the SB and Advisory Council to establish the Organizing Committee for the conference.

2. Raise funds (in coordination with the Finance Chair and the Steering Committee)

3. Help the Scientific Committees and their chairs to prepare with the Organizing committee the Call for Special Theme Competitions and approve it for their public release within the Call for Competition.

4. Corresponds, either directly or through an authorized delegate, with the various competitors and participants

5. Approves financial plans and major changes in expenses in consultation with the Registration and Finance Chair.

6. Helps the Organizing Committee in preparing the reception of the participants

7. Helps the Publicity Chair in organizing the publicity for the event.

8. Reports quarterly on the progress of the preparation.

9. Prepare the letters needed for visa requirements for competitors or attendees who may need them.

10. During the competition, the General Chair should enlist all efforts to ensure smooth running of the conference.

11. Submits a written final report to the SB after the conference.

4.1.3 Special Theme Competition Chair(s)

The Special Theme Competition Chair(s) (briefly CC) are appointed by the SB to lead the formation and running of the technical program. Criteria for selection include balancing geographical and technical factors. The CC is appointed by the SB for a one-year term.

The roles and responsibilities of the CC(s) can be summarized in:

1. Identify the members of the Scientific Committees of the Special Theme Competition. This should be done by consultation with the previous year's organizers, the SB to include only those members who have been participating actively in the process of scientific evaluation of the competitors and of the competing artifacts.

2. Lead the effort to prepare the Call for Special Theme Competition

3. Define the criteria for competitors' selection and get concurrence of the General Chair and the Steering Committee.

4. Organize the reviewing process with a goal of avoiding deadlines around major holidays (Christmas, New Year or any holiday in the host country).

5. Maintain a list of reviewers (name, affiliation, addresses, etc.)

6. Give periodic reports to the General Chairs on the status of the submissions and review process

7. Inform the General Chair and the Steering Committee of the results of the review and the preliminary selection.

8. Inform potential competitors of their acceptance and the procedures to their final participation to the competition.

9. If the competitors have to pay a fee to participate, the CC make the final selection of the participants in conjunction with input from the Finance Chair and in consultation with the General Chair (so that only the competitors that have paid the registration fee will be included in the final program).

Finally the CC should also organize the competition session. This includes:

1. Defining the spaces and logistics requirements of the special theme competition and ensure that these requirements are met by the local organizers

2. Develop the benchmarks to be used in the competition, with the help of the scientific committee and in accordance to the GC.

3. Implement (with the help of the scientific committee) the benchmarks and suitable tools necessary to run the competition and distribute the tools and competition guidelines to the competitors

4. Maintain a repository of the competition outcomes

5. Reports monthly on the progress of the preparation.

6. Prepare a final report on the Special Theme competition for the SB

4.1.4 Registration and Finance Chair

To ensure financial stability year after year, the term for the registration and finance chair is a 3-year conference cycle. The term can be renewed once.

Over this period, the registration and finance chair carry the following roles:

1) Inform the general and technical chairs of the competitors that have paid their registration fees

3) Prepare the budget plan of the competition with the general chair.

4) Raise financial support from any relevant stakeholders in accordance with the Steering Committee and the general chair.

5) Prepare the registration materials including name badges, meal tickets, etc.

6) After each competition, prepare a balance sheet and distribute it to the Steering Committee, the General Chair and all organizing committees (technical, publicity, local, etc.)

7) Maintain a running set of procedures to be transmitted to the successive finance chairs.

4.1.5 Publicity Chair

The publicity chair is nominated yearly and belongs to the local organizing committee. His role is to coordinate the advertisement of the competition and the dissemination of the call for competition. Specifically, the list of responsibilities are:

• Coordinate the distribution of the call for ideas and for the subsequent call for competition in various conferences, journals, mailing lists, etc. with members of the Organizing Committee.

• Manage and maintain the web site for the competition

• Add to the site information on the competition venue (including directions, maps, hotels, etc.)

• Add hotlinks to members of the Steering Committee, the general co-chairs and the special theme competition chairs for the competition.

• Maintain letters in several languages to be addressed by the general chairs to secure visas.

• Working with the local chairs, organize local publicity with schools, universities, research and industrial organizations, etc.

4.1.6 Local Chairs

The local chair is nominated yearly and belongs to the local organizing committee. His role is to coordinate the local organization of the competition, and to guarantee that the needed are provided locally. Specifically, the list of responsibilities are:

1) Arrange the housing accommodations (including special preparations for dietary or health reasons).

2) Arrange for the competition venues

3) Prepare and distribute information on directions, visas, health certificates, transportation, etc.

4) Organize the social events.

4.1.7 Publication Chair

The publication chair is nominated yearly and belongs to the local organizing committee. He manages the publication of the proceedings (if any), and contacts and manages the relationship with the hosting conferences (if any).

Specifically, if the competition results are presented in a hosting conference, he identifies a suitable conference and propose it to the steering board for acceptance. Then he manages the relationships with the conference, including the editing of papers describing the competing artifacts and their preparation in accordance to the format required by the conference proceedings.

On the other hand, if the competition results are published in a journal, he identifies a suitable journal and propose it to the steering board. Then he manages the relationships with the journal, including the editing of papers describing the competing artifacts and their preparation in accordance to the format required by the journal.

4.2 Financing

The financing of the competition is pursued according to a specific budget plan that must be defined every year by the Registration and Finance Chair along with the General Chair and approved by the Steering Board. This section will analyze the typical costs we have to charge to the organization in order to run a competition (this also includes the prize awarded to the winner) and sustained by the competitors to participate. We first discuss the organizational aspects of the competition and how they can impact on the financial requirements for running the competition. Finally we provide tentative cost

estimation by assuming an implementation schema for the first competition. Any final estimation of the financial requirements is deferred to the Steering Board and it is direct consequence of its strategic decisions for the implementation of the first competition.

4.2.1 General Organizational Costs

The costs for the competition can be divided in the following categories:

1) Logistics Costs

These operating costs include different items related to all the activities carried out by the Local Committee in the site of the competition. Such activities are:

- Catering service for the meals during the competition days

- Social event

- Evaluation site costs; for example reservation of the Living Lab infrastructures and personnel during the competition days

- Reimbursement for the evaluation committee

- Conference Material (city map, note block, pen , program, gadgets, etc)

2) Costs for benchmarks preparation

Some development activities are needed to prepare the network infrastructure that collects the data during the competition according to the selected benchmarks. Such activity activities can be divided in:

- Toolkit development; it will be used by the applicants to integrate their system with the competition infrastructures (e.g. Living Labs infrastructures)

- Infrastructure set up; installation of the server(s) and network services to collect data produced during the competition

- Tuning and configuration; testing of the infrastructure with mock-ups and simulators.

3) Prize

The prize is the most relevant cost for the organization. It will be covered mainly by sponsors but recovery procedure must be defined in case the amount of donations is not adequate. Different partners of universAAL consortium have already expressed their availability to support the first competition of EvAAL; any contribution is only on voluntary basis.

 The prize must be proportional to the costs sustained by applicants to:

- Prepare their system for the competition

- Participate to the competition.

4) Publication Costs

The costs for publishing the results of the competition depends on the kind of publication. Specifically we distinguish between three types of publications:

- The competition datasets consisting of all the data collected during the competition

- The description of the systems used by the competitors

- The qualitative evaluation of all the systems during the competition.

The datasets publication is relevant only as digital publication manageable by means of the EvAAL web site, hence with negligible costs. The description of the competitors' work and the final evaluation can be compared to a special issue of a scientific publication. Thus, the costs are equivalent to those one of international conference proceedings sponsored by associations like IEEE and ACM.

5) Publicity and Dissemination Costs

These costs can be reduced by using internet tools for the distribution of the Call for Competition and Call for Competition Ideas. By the way participation to the most important conferences on topics selected for the competition will increase the dissemination of the initiative by contacting key personalities and distributing publicity material (e.g. brochures and leaflets) to the conference attendees

4.2.2 Competitors Costs

The cost for competitors can be summarized in:

1) **Tuning of the software/hardware system** for the competition. We suppose the people interested to the competition are already working on the selected topic. They will not start from scratch, but they will adapt a previous work to the requirements of the competition. In this respect we foresee two kind of modifications:

   - A first adaptation of the system to maximize the performance according to the selected evaluation metrics and benchmarks.

   - The integration of the system with the competition toolkit to connect their system to the monitoring infrastructure deployed at the competition site.

2) **Registration fee**

3) **Travel costs** for the people who have to reach the site of the competition, and transportation of any hardware stuff needed to compete.

4) **Accommodation costs**

5) **Meals**

4.2.3 Impact of the Competition Organization

Once EvAAL will be established and widely recognized it will be run as an independent event, which will take place in sites selected by the steering board. Living labs will be privileged with respect to other sites. However in the first years EvAAL may not have enough funds and volunteers to be organized as an independent event. For this reason it may be organized as an accompanying event of an international conference to be selected by the steering board (e.g. AAL Forum, Ambient Intelligence Conference). This would greatly simplify the organization and the financial management of EvAAL, since local facilities will be provided by the conference organizers and the costs will be

covered by the participants in forms of fees. The typical facilities covered by a conference can simplify the management for:

- Logistics costs

- Publications costs

- Publicity and dissemination costs

On the other hand the infrastructures and facilities available at conference sites with respect to those ones available at ad hoc sites like Living Labs may be limited to evaluate complex systems. This could reduce the scientific relevance of the competition results.

However another major problem due to the organization of EvAAL as independent event is that, to reach the same benefits of an international conference in term of logistics and publication facilities, the number of attendees must be high. In international conferences such costs are covered by a consistent fee paid by attendees. Fees can be easily variable, according to a short search on major conferences [NCStats] the participation may vary from 100 to 800 participants and the costs from 450 to 700 Euro. Such a high number of participants can simplify the recruitment of sponsors, which are encouraged to promote their brands in conference with higher participation. But from the systems evaluation perspective a too much high number of participants can be really problematic. How much time would imply the system deployment, configuration and testing of 100 different competitors?

4.2.4 Cost estimation for a Competition Scenario

The objective is to get both the advantages of having support from an international conference and the better qualitative results accessible by running the competition in a Living Lab.

We can organize the competition in two phases: the real evaluation of competing systems executed at the Living Labs, the presentation of the competition results, prize awarding and results publication supported by a companion conference.

For the sake of simplicity, suppose a scenario where we organize a competition on "Indoor Localization and Tracking" theme and we decide to select maximum 12 applicants. The first phase could be organized in 4 days. Dedicating 2.5 hours for evaluating the system of each competitor we could schedule 3 competitors per day.

at Living Lab	Note	people	days	day hours	unit cost	
Tuning	Industry/Research costs	2	15	7	50	€ 10.500
Registration fee	service catering	2			25	€ 50
Travel costs		2			200	€ 400
Accomodation	2 nights	2	2		120	€ 480
Meals	dinners	2	3		25	€ 150
Mission costs	Industry/Research costs	2	3	7	50	€ 2.100
						€ 13.680

at Conference	Note	people	days	day hours	unit cost	
Registration fee	conference fee	1			500	€ 500
Travel costs		1			200	€ 200
Accomodation	3 nights	1	3		120	€ 360
Meals	dinners	1	4		25	€ 100
Mission costs	Industry/Research costs	1	4	7	50	€ 1.400
						€ 2.560

Total competitor cost	**€ 16.240**

Table 3. Estimated costs for 12 competitors

The economical value of the prize should cover at least the costs of participating to the competition. In this case, considering to almost doubling the expenditure we have a range of 20K-30K Euro, that's the equivalent of a research grant.

In such scenario, from the organization point of view, the costs can be reduced to the funds for the prize and the operational costs for running the competition. These last costs can be summarized in:

- The cost of preparing the toolkit
- The costs of the evaluation committee
- The costs for attending the conference

Operational costs	Note	people	days	day hours	unit cost	
Toolkit preparation	Industry/Research costs	2	10	7	50	€ 7.000
Infrastructure deployment	Industry/Research costs	2	2	7	50	€ 1.400
						€ 8.400

Evaluators at Living Lab		people	days	day hours	unit cost	
Travels		4			200	€ 800
Accomodations		4			120	€ 480
Meals	8 meals	4	4		25	€ 800
Transfert Costs	Industry/Research costs	4	4	7	50	€ 5.600
						€ 7.680

Evaluators at Conference		people	days	day hours	unit cost	
Registration Fee	3 days conference	4			500	€ 2.000
Travels		4			200	€ 800
Accomodations		4			120	€ 480
Meals	3 dinners	4	3		25	€ 300
Transfert Costs		4	4	7	50	€ 5.600
						€ 9.180

Total Operational Costs	**€ 25.260**

Table 4. Operational costs

In conclusion we can say that a first estimation of the total cost for organizing the competition may vary from **45K** to **55K Euro**. It has been assumed the Living Labs don't charge the use of the evaluation site, but in general many other variables must to be considered. For example the toolkit preparation can be charged to universAAL consortium and following editions will imply only a simple update of the toolkit. Depending on the selected competition themes the costs for producing the toolkit could be insignificant. The same considerations can be done for the costs of the evaluators, depending on the kind of arrangement we can achieve with the conference committee. For big conferences like AAL Forum a small percentage of the fee could cover most of the competition costs.

4.3 Tasks

The EvAAL project will support an open process in which interested and invited researchers from the industry and academic world will define the objectives and the rules of the competition. UniversAAL will support the financing of a non-profit association for the setup and management of the competition

during the life of the project. The association will award the winners with a consistent prize, and will publish the data sets obtained during the execution of the competition, to create a benchmark useful for the whole community of researchers in AAL. With the growth of the community around the annual competition, the needs of an open framework will be more marked, and universAAL will endow the results of its initial development, with the further benefit of receiving a valuable feedback on the usability and extendibility of the framework.

The community building approach based on competitions have been successfully used in many other fields. For example the Trade Agent Competition (TAC) established in 2002 has raised interest of dozens of research groups that build over the time a common framework for the implementation of the competition. In the case of EvAAL, the competition should also concern aspects on which, for practical reason, the research community paid little attention in the past. EvAAL refer to important aspects related to the deployment and configuration of the AAL environment. Under this respect the Living Labs of the universAAL partners ITACA and Philips will be a precious resource. An industrial advisory board will provide a forum for communications among the industries, the research community, and the participants to the competition. This dialogue will enable the groups to identify and discuss areas of mutual interest and define the scope of the competition in the years to come. The synergy created by such open process will both promote the universAAL platform and steer the development and revision of the artifacts product by the project itself.

The AAL competition will be a contest that will promote the development of AAL applications using reference architecture and tools implemented in universAAL. The first contest will basically address European PhD students working on the AAL area and will be opened once the universAAL results have been validated from the technical point of view (this latter achievement is dependent on workpackage 5). It will encourage doctoral students to become core developers of new platform implementations of the reference architecture envisioned by universAAL.

After an industrial advisory board is established it will provide a forum for communications among the industries, the research community, and the participants to the competition. This dialogue will enable the groups to identify and discuss areas of mutual interest and define the scope of the competition in the years to come.

The competition will be an annual event aimed at rising interest around the AAL themes and universAAL, and at building the universAAL community. Each year the competition will address a specific AAL challenge identified by a call, to be specified in cooperation with the Industrial advisory board and research communities that will be widely spread in the scientific and industrial communities.

The first EvAAL competition will focus on the special theme on indoor localization and tracking (it is, at the time of writing, the only special theme in EvAAL that reached a sufficient maturity to sustain a competition). The main objective of this competition organized by EvAAL is to enable the comparison of different localization solutions, by establishing suitable benchmarks and evaluation metrics. In particular EvAAL invite everybody to contribute to the discussion related to use cases, datasets, evaluation criteria and benchmarks. They will be given access to the tools and platforms and a short description of the domain in order to develop novel universAAL services. For this purpose EvAAL will create specific committees for evaluating the ideas and developing the competition on indoor localization by establishing an EvAAL mailing list. The competition submission deadline for the first competition will be September 1st, 2011. After the integration of competition ideas till October 31st, 2011 the publication of the competition will be done by November 15th, 2011.

A sponsorship of the industries, as well researchers, and independent developers participating to the AAL competition will be needed. Under this respect, EvAAL will seek for cooperation with existing communities that may be interested in the universAAL project.

4.4   Evaluation Criteria

The measure of success of EvAAL depends on its ability of reaching its main objectives. In particular there are two kinds of objectives. The first is related to the ability of EvAAL of supporting the growth of the community and to become a widely recognized in the international community. The second kind of objectives is related to technical aspects of AAL, in particular the ability of EvAAL of identify relevant AAL problems, requirements and issues, and the EvAAL capability of identification of new, original solutions and of their evaluation.

About the first point (capacity of supporting the growth of a community), there are some aspects that are not easily measurable in the short period, among these are the ability of EvAAL to foster the development of new research themes and related conferences, as well as the creation of a synergy among different stakeholders (for instance developers, service providers, industries etc.). On the other hand there are some aspects that are directly measurable in the short period, and that implicitly give indications about the growing of a community around EvAAL. Namely such success metrics are:

- Number of responses to the Call for Ideas;

- Number of submissions to the Call For Competition;

- Number of competitors and number of attendees at the competition;

- Number of industries and service providers involved in EvAAL (in particular with respect to the identification of special themes for competition).

For this reason (being easily measurable even in the short period), these success metrics will be considered in the first editions of EvAAL.

About the second aspect (the capability of identifying new issues and to evaluate solutions) we observe that there are no simple direct metrics for measuring this aspect. On the other hand, it is implicitly assured if the community around EvAAL grows and becomes more and more important in the AAL communities. In fact if EvAAL fails to meet its technical objectives it will hardly be capable of gluing and keeping a large community. On the other hand a large community of people around EvAAL will provide to EvAAL a large base of ideas for its technical development.

As AAL evolves with time EvAAL shall evolve with it. For this reason the evaluation criteria and success metrics of EvAAL need to be periodically revised and updated. This role is assigned to the EvAAL Steering Board, which, to this purpose, also prepares, distributes and analyses evaluation forms to be distributed to the EvAAL attendees.

Finally, further evaluation metrics are:
- Cost overrun or underrun

- The development of artifacts participating to the competition as extensions of the universAAL platform

- The involvement of former competitors in the development/use of the universAAL platform

- The involvement of former competitors in the future EvAAL and association initiatives

4.5   Marketing the Competition

Once the Competition is ready to start in the market it is important to apply marketing techniques in order to have as much success as possible, because marketing is an essential factor that depends directly, in this case, on the competition success.

The AAL competition should follow a complete marketing process. This process is composed by a strategic marketing phase, a marketing mix phase, a marketing execution phase and a marketing control phase.

In the first phase, **strategic marketing** there several actions has been carried out: the background study (see section *3. Background*), the analysis of the target customers (see section *3.3. The Target Group of the AAL Competition*) and the analysis of dissemination (described in D9.2 Dissemination plan). Using all these data has been possible to do a diagnostic and fix the AAL Competition objectives (see section *3.2. The Purpose of the AAL Competition*), marking guidelines for achieving them, and determining what and whom they are addressed.

In the second phase is the **marketing mix**. The marketing mix is a combination of marketing tools that a company uses to satisfy their target customers and achieving organizational goals. These marketing tools are classified under four broad categories:

- Product
- Price
- Place (distribution)
- Promotion

These four elements are the **basic components of a marketing plan** and are collectively called **the 4 P's of marketing**. The goal is to make decisions that center the four P's on the customers in the target market (developers, universities and researcher   institutes, product and service developers, investors, service providers, health insurance companies…) in order to create perceived value and generate a positive response.
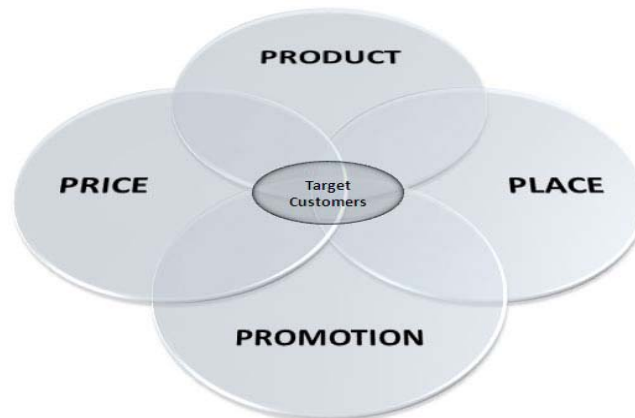

Figure 5. The four components of a marketing plan

The marketing mix should be used as the starting point for the practical marketing of the competition but other theories can be used in the marketing of the AAL Competition.

4.5.1 Product: the Competition

Product is the actually offering by the company to its targeted customers which also includes value added stuff. Product may be tangible (goods) or intangible (services). The competition, in this case, is a mix of both causes since it offers the opportunity to develop new tools (software and hardware) for obtaining new AAL services. The competition is itself a service, not only for the scientific community but also for the AAL market as well, as it brings to the AAL community the opportunity to develop new AAL Services and provide new functionalities.

Taking into account some marketing product decisions that can be applied to the competition, this includes:

- Product or competition design and plan: present it in a proper and tempting manner: take care of the design of the posters, leaflet where it is announced and accurately create a logo that can get the attention of the target public. For that, professional designers should evaluate and analyze the aim of the competition and create a series of graphical material (logo, PowerPoint template, colors…) that are used when presenting and handling the competition.
- Competition quality: recognized board. The board should be formed by acknowledged persons related to the AAL field from the academia and industry.
- Competition benefits: they should emphasize the advantages from this competition over other initiatives inside the AAL field or similar.
- Branding: A brand is a tool used by organizations to differentiate from competitors: The *AAL Competition* should aim to create a solid reference among other similar initiatives in the AAL domain.
- Description of the competition: the regulations and plan should be clear and be published on time. It could also be beneficial to have a kind of forum before (to install the programs and software required) and after the competition (share ideas, tools…)

As mentioned in the universAAL Description of Work, the project aims to create the foundations of the competition as it will exist after project ending.

4.5.2 Place: When and Where

Place refers to how an organization distributes the product or service we are offering to the target audience. EvAAL must distribute the product to the target audience at the right place at the right time. Efficient and effective distribution is important if EvAAL is to meet its overall marketing objectives. If EvAAL underestimates a demand and target public cannot attend the event, the impact of the competition will be affected.

For the first competition, there are two locations to take into account: Living lab where the systems will be installed and the participant put on scene their solutions and the event where their results are presented. They should both be carefully decided.

Concerning the place for the Living lab, it should be in place easy to reach (European country) and also appealing. Aspects like the availability of technical and human resources, the presence of external experts on the competition area and companies working with the Living lab should be exhaustively analyzed as well as the travel costs.

The selection of the location to present the results from the competition should be decided taken into account the relevant congresses, conferences and events which most of the target audience could be attending. An alternative is to organize them together with other AAL reference events (i.e. AAL Forum)

4.5.3 Promotion: Channels to Announce the Competition

The channels where the competition should be announced are diverse and they are described in the D9.2 Dissemination plan. As identified in that deliverable, there are two types of channels: commercial and scientific. The steering board should identify in which publications (scientific journals), websites, congresses, events and associations (AAL Forum, Continua, etc) the conference should be broadcasted in.

Work is currently being done to decide the appropriate scientific channels. This process will be supported by networking efforts and by including a local program committee to each competition. Furthermore, the steering board has decided to include people from outside the project in many of its processes to ensure an open and more freely adaptable structure. The participants in the competition will be asked to send in a paper for the steering committee to approve. This collection of scientific papers can be published in relevant scientific journals.

In terms of commercial channels there are these days many cheap and alternative types of channels open to use. Setting up a website (http://evaal.aaloa.org/) or a site in an existing community presenting the competition in e.g. LinkedIn, XING, Facebook or Twitter will enable the information to be widely spread in a very short time without any expensive marketing effort. However, one should here keep in mind the openness of the channels, which in some cases can lead to unbeneficial side effects such as limited control of the communication.

YouTube can also be used with a high degree of success. Here, the competition can present a video introducing the competition, the location, the processes, the winner, etc… This is a very cheap and simple way of marketing the competition and its results – and it is highly suitable for newsletters, e-mails and other channels of communication where it is possible to insert a link to the video.

4.5.4 Price: Registration Fee and Prize

This includes the registration fee for the competition. At the beginning it should be low to attract a great number of participants. A high fee for an unknown competition is not convenient. Therefore, it should be just symbolic with exemptions for students. The Steering board has suggested letting the fee be the general payment of participating in the conference where the results are presented. The participants will most likely not be scared off by this small fee since it should be paid anyway if they were to join the conference.

The prize should be able to catch the attention of the target audience, to encourage them to participate. The prize will be funded through sponsorships and the correct amount is currently being discussed on steering board level. Apart from the monetary prize, the conference will also be able to attract participants through other motivating angles. The competition winner will for instance be presented at the conference, in relevant journals and in other relevant media, thereby causing them to obtain community recognition. The goal is that such recognition should enable the participants to widen their network, to boost their reputation and to open their market possibilities.

All in all, these measures should enable the competition to attract relevant participants from all over Europe, to gain international recognition and to boost AALOA.

The third phase is the **marketing execution**; it means the execution of the marketing process detailed previously. Some mechanism to evaluate the results obtained would be established in order to know the effectiveness of the AAL Competition marketing.

And the **marketing control** phase should establish mechanism of feedback and evaluation in order to check if the AAL Competition objectives have been accomplished and apply corrections if are needed.

5 Roadmap

The organization of EvAAL in the first years face the difficulty of organizing an event aimed at a community that does not yet exist. For this reason in the first years EvAAL may take a different form than in the following years, once the community is grown and may better support EvAAL. Furthermore the organization of the competition should be synchronized with the roadmap for the association and community building activities of universAAL, as it makes no sense to organize a competition if no association and community can take benefits from this.

The general plan for the annual competition follows these main points:

1. The SB finds a site for the competition and nominates the General Chairs (GC) and the organizing committees;

2. The SB issues the Call for Ideas;

3. The SB collects and evaluates the responses to the call for ideas and nominates the Special Theme Competition Chair(s) (CC), and the Scientific Committees (SC) for the Special Theme Competitions

4. The CCs prepare the Special Theme Call for Competition

5. The SB collects the Special Theme Call for Competition and issues the Call for Competition (CfC)

6. The SB starts in parallel the organization of the next competition, starting from point 1.

7. Each CC collects the applications to the CfC and, with its SC, selects the participants to its special theme competition

8. There is a shepherding phase in which each SC provides to the competitors of the Special Theme Competition a competition toolkit in order to let them prepare their competing artifacts according to given interfaces and standards. During this phase each SC also prepares the benchmarks to be used for the comparison and evaluation of the competing artifacts.

9. In parallel to 2-7 the Organizing Committee makes the necessary preparation for the competition:

    a. Arranges the competition site and solves all the issues for the logistics and facilities

    b. Keep updated the website (program, information for competitors and for attendees, etc.…)

    c. Arranges for lunches and breaks

    d. Finds hotels for attendees and arrange for discounted prices

    e. Organizes the publication of the proceedings

    f. Prepares the complimentary kits for the attendees (badges, gadgets, bags, proceedings etc.…)

    g. Organizes the social event

    h. Arrange for the attendees fees (manages payments etc.)

    i. Optionally manage the sponsorship from international associations such as IEEE, ACM, etc.

    j. Finds supporting sponsorships

    k. Manages letters for Visas etc.

10. Finally the competition is run:

    a. The CCs and SCs selects the winners

    b. The SB awards the prizes

    c. The next competition is advertised (place, GC, organizing chairs, etc.)

11. The SB evaluates the competition and makes the necessary adjustments for the organization of the next competition.

Note that there is a partial overlap between two consecutive competitions because the GC and organizing committee of the next competition should be nominated before the current competition takes place. To this purpose the SB should start in parallel (in point 6) a new process for the next competition.

It is clear that such a plan is suitable only once EvAAL has reached maturity and has a large community in support to its activities. Furthermore in the first years it is not possible to follows such a plan due to initial delays and setups, and to the fact that its roadmap should be coordinated with the community building and dissemination plans of universAAL.

Another major problem that is faced in the first years is that there are major costs due to the organization of EvAAL, should it be organized as an independent event. In particular these costs are inherent to the site and to the logistics and preparation of EvAAL at point 9. These issues are discussed in deeper details in Section 4.2.

For this reason we prospect here an alternative roadmap for the first competition. This roadmap will be revised annually with the objective of converging towards a roadmap based on the scheme depicted below.

Month	1	2	3	4	5	6	7	8	9	10	11	12
Call for Ideas and its dissemination	■											
Constitution of the SB	■											
Collection of the CfI applications		■	■									
Evaluation of the special themes and selection of the competition site				■	■							
Preparation of the call for competition				■	■							
organization of in-site logistics						■	■	■	■	■	■	■
Selection of competitors							■					
Shepherding of the competitors phase								■	■	■	■	
The competition takes place												■

Table 5. The roadmap GANTT

The alternative plan assumes that EvAAL begins with an incubation period (comprising a limited number of editions), in which it is organized as an accompanying event of a major AAL conference. It also considers that in this initial phase the SB has not be established yet, hence some arrangements are made directly by the partners of task 8.5 of universAAL. Furthermore parts of this plan have already been implemented. In particular the tasks that have already been completed are:

April 2010: Finalization of the Call for Ideas (CfI): the CfI can be found in Appendix A.1;

May 2010: Dissemination to a selected list of related EU projects. This task has been achieved in cooperation with WP9 which actually carried out the dissemination;

Then the next steps with a **tentative timeline** (this is dependent on the availability of a major AAL conference in the period of interest and on its acceptance of EvAAL as co-event) that may start from the establishment of the competition Steering Board are:

Month 1:

- Dissemination of the CfI to all relevant stakeholders identified in the task 8.1. This activity is carried out by the WP9 team.

- Constitution of the SB (this is executed by the task 8.5 team assisted by the whole universAAL consortium)

Month 2/3:

The SB (in accordance with the universAAL consortium) selects the site for the first EvAAL and nominates the GCs

Months 3-5:

The GCs and Organizing Committee stipulate the agreement with the hosting conference; make the necessary agreements with the conference organizers for the competition organization (number of rooms, computing, internet facilities, etc.)

Month 5:

- The SB and the GCs collects and evaluates the responses to the call for ideas and nominates the Special Theme Competition Chair(s) (CC), and the Scientific Committees (SC) for the Special Theme Competitions

- The SB and the GCs collect the Special Theme Call for Competition and issue the Call for Competition (CfC)

Month 6: The SB starts in parallel the organization of the next competition.

Month 7: The CCs and the SCs receive the submissions and select the competitors. Acceptance letters are issued.

Month 8 – 12: There is a shepherding phase in which each SC provides to the competitors of the Special Theme Competition a competition toolkit in order to let them prepare their competing artifacts according to given interfaces and standards. During this phase each SC also prepares the benchmarks to be used for the comparison and evaluation of the competing artifacts. The competitors prepare/refine their artifacts

Month 12: the competition takes place

Month 13: The SB evaluates the competition and makes the necessary adjustments for the organization of the next competition.

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[GENESYS] EU FP7 project: GENeric Embedded SYStem Platform, http://www.genesys-platform.eu/

[ECLIPSE] The Eclipse community, http://www.eclipse.org/community/

[APACHE] The Apache community, http://community.apache.org/

[ACM-ICPC] The ACM International Collegiate Programming Contest, http://cm.baylor.edu/welcome.icpc

[IOI] The International Olympiad in Informatics http://www.ioinformatics.org/index.shtml

[CCTC] The CONNECT Code-a-Thon Challenge http://hit.fiu.edu/challenge.htm

[CON] The CONNECT community http://www.connectopensource.org/

[NCStats] Networking Conferences Statistics http://www.cs.ucsb.edu/~almeroth/conf/stats/

Appendix A.

A.1 The Call for Ideas

The EvAAL Contest

Version 0.10

http://evaal.aaloa.org

The **EvAAL** international contest: **Evaluating AAL Systems Through Competitive Benchmarking** is a research program aimed at evaluating pervasive and ubiquitous systems by comparing working solutions in a controlled environment. EvAAL will assess the research results which have been the focus of many workshops in the recent years[1]. We want to raise interest in the research and developer communities about the multidisciplinary research fields enabling Ambient Assisted Living[2] (AAL), and about **creating benchmarks** for the evaluation and comparison of AAL and AmI systems. To these ends, we are now giving shape to the EvAAL Contest, and invite you to join in our efforts.⌗

Evaluating any AAL system is a very complex task, because of the great diversity of solutions, the lack of standards and the different objectives for which AAL systems are built. Even once the above issues are solved, comparing AAL systems would remain incredibly challenging, because of the richness of both environments and user requirements: a *one-size-fits-all approach to evaluating AAL systems is unrealistic*. The solution we propose is to identify some core system functionalities and to identify evaluation strategies for each. Even this is not an easy task: in fact, no clear consensus has been reached up to now among researchers about the evaluation methods and the significant metrics, with the consequence that current approaches to the evaluation of AAL systems tend to be subjective or piecemeal[1].

EvAAL's objective is to tackle this task by offering to researchers an arena where to try, test and experiment not only AAL solutions but also benchmarks and evaluation methods. To this purpose, EvAAL will be open to all issues related to the test environment (living laboratories versus into the wild), to the benchmarking (automatic vs. based on users' evaluations), to the tools supporting the competition and so on. The intended outcome of EvAAL is a toolkit of techniques from which system builders can choose. Making these techniques open, available, and easy to use will enable comparative evaluation between similar components across systems and, in the end, of whole AAL systems.

The first task for EvAAL is to identify some core system functionalities of pervasive and ubiquitous systems which represent specific technological challenges related to AAL. Once results are achieved from the competitions on these subjects and a set of tools and methodologies is established, a subsequent phase can start where we approach the problem of evaluating complete AAL systems. The core system functionalities that we will initially consider are:

Sensing: this theme covers the aspects of collecting any kind of information from any relevant place (in- / on-body, in- / on-appliance, etc.) or environment (home, outdoor, vehicles, public spaces, etc.). Information may be a simple piece of data (for example the temperature in a room), or data aggregate (for example the position of a user).

Reasoning: is concerned with the problem of aggregating, processing and analysing data in order to either infer new data or deduce actions to be performed within different and possibly cross-connected spaces (body, home, vehicle, public spaces).

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[1] K. Connelly, K.A. Siek, I. Mulder, S. Neely, G. Stevenson, C. Kray "Evaluating Pervasive and Ubiquitous Systems" 2008

[2] Ambient Assisted Living Roadmap, http://www.aaliance.eu/public/documents/aaliance-roadmap/ 2009

Acting: concerns the automatic control of the environment through actuators affecting the physical world or by means of other services whose effects might be limited to the virtual realm. Control can be local or remote, in real time or off-line.

Communicating: this theme covers the communications issues involving the flow of information from sensors to reasoning systems, among reasoning systems, and from reasoning systems to actuators, where all these components can be connected dynamically, in mobility and in arbitrary spaces.

Interacting: this theme involves the explicit interaction between human users and systems and services embedded in intelligent spaces by means of personalised multi-modal interfaces, possibly across multiple spaces.

Competition organization. The main objective of the competitions organized by EvAAL is to enable the comparison of different AAL solutions, by establishing suitable benchmarks and evaluation metrics that will be progressively refined and improved in the years. In particular, EvAAL will focus not only on comparison of algorithms, but also of costs, deployment effort, comfortableness, etc. Over time EvAAL will also grow the capacity of offering more and more sophisticated and realistic environments hosting the challenges.

To reach these objectives EvAAL will issue an annual call for competition ideas addressed to all relevant stakeholders (including not just technology experts, but also service providers, industries, end users) in order to collect ideas about methods, issues to be studied, benchmarks etc. The ideas and suggestion collected will be evaluated and selected by the scientific committee of EvAAL to form the base of the yearly call for competition. In order to encourage the participation, EvAAL will award a prize to the winners of the competition. At the end of the competition EvAAL will openly publish the software kits and the benchmarks developed for the competition.

Call for Competition Ideas

EvAAL will create specific committees for evaluating ideas and developing the competition on specific themes of interest. A first committee focusing on **indoor localization and tracking issues** is already beginning its activity and is planning a competition on this subject (visit http://evaal.aaloa.org/sensing for more info).

We invite you to submit competition proposals and to contribute to the discussion for the next competition (2011) by subscribing to the EvAAL mailing list:

- contest@evaal.aaloa.org

Proposers of accepted ideas, will be invited to actively participate in the scientific supervision and in the organisation of the competition

Sponsorship

We invite all those interested to help EvAAL in raising funds and recruit sponsors. The promoters of the **AALOA community** (http://www.aaloa.org) will guarantee the essential funds for the organization of the competition in absence of suitable sponsorships.

Acknowledgements

EvAAL is a project born within the **AALOA community** (http://www.aaloa.org) proposed by the **universAAL** FP7 project (http://www.universaal.org). Four Living Labs are supporting the competition so far: the *Carelab of the Technologic Institute of Odense*, *the CIAMI Living Lab of UPV*, *the living lab at Fraunhofer IGD, and the UPM Living Lab.*

A.2 Table of acronyms

AAL	Ambient Assisted Living
AALOA	Ambient Assisted Living Open Association
AB	Advisory Board
ACM	Association for Computing Machinery
EvAAL	Evaluating AAL Systems through Competitive Benchmarking
CC	Special Theme Competition Chair
CfC	Call for Competition
CfI	Call for Ideas
GC	General Chair
IEEE	Institute for Electrical and Electronic Engineering
ICPC	International Collegiate Programming Contest
IOI	International Olympiad in Informatics
SB	Steering Board
SME	Small and Medium Enterprise
TAC	Trading Agent Competition
XML	eXtended Markup Language