



# FORTISSIMO

## D9.2 WP9 Year 2 Report

<b>Workpackage:</b>	WP9	Business Models for ISVs
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## Executive Summary

Work Package 9 “Business Models for ISVs” aims to analyse the marketplace for HPC-Cloud based simulation focusing on business models for Independent Software Vendors (ISVs). On the basis of this analysis, ISVs will be informed of the needs of the HPC-Cloud value chain, which will in turn be informed of the needs of ISVs who will be able to make informed decisions in the formulation of their own confidential business models.

To achieve its objectives this work package is structured into four tasks: a management task, a task to analyse licensing models, a task to analyse the ISV marketplace, and a task supporting a yearly forum engaging ISVs in the analysis, training and dissemination activities of Fortissimo.

The major achievements of this Work Package obtained during the reporting period (Project months 13 to 24) were:

- conducting an analysis of viable business plans for small ISVs offering services on HPC cloud infrastructures;
- providing requirements to the marketplace architecture;
- providing support to the development of the marketplace business plan;
- organizing the first Fortissimo (ISV) forum;
- completing the preliminary organization of the second Fortissimo (ISV) forum.

The only notable deviations from what stated in the Fortissimo Description of Work (DoW) are the shift of the Fortissimo Forums outside the planned reporting periods, due to the delayed start of the wave of experiments from Call1 and Call2, in order to insure a relevant participation to the events. In particular, the first Forum was held in October 2014 in Milan and the second will be held in Amsterdam in July 2015, at the very beginning of the third Project Year.

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## 1 Introduction

Work Package 9 “Business Models for ISVs” aims to analyse the marketplace for HPC Cloud based simulation focusing on business models for Independent Software Vendors (ISVs). It needs to be noted that throughout this document the term ISVs will refer only to those vendors that serve HPC users, typically, but not limited to, producing software for engineering and manufacturing simulation.

On the basis of this analysis, ISVs will be informed of the needs of the HPC-Cloud value chain, which will in turn be informed of the needs of ISVs who will be able to make informed decisions in the formulation of their own confidential business models.

To achieve its objectives this work package is structured into four tasks: a management task, a task to analyse licensing models, a task to analyse the ISV marketplace, and a task supporting a yearly forum engaging ISVs in the analysis, training and dissemination activities of Fortissimo.

This deliverable presents the Work Package activities from month 13 to month 24 of the Project.

In Section 2 we present the Work Package Roadmap and vision, explain the key challenges of this work package, as well as its main priorities and objectives.

In Section 3 we list the main achievements over the yearly reporting period.

In Section 4 we report the work done, through three subsections. Subsection 4.1 describes the workplan for the period which is being reported, what each task is supposed to achieve and how the tasks relate to each other and other tasks in other work packages. Subsection 4.2 describes the technical work done on a task-by-task basis, detailing with any technical problems encountered. Subsection 4.3 brings all of the work of the work package together into a coherent whole. It also describes the interaction with other work packages and presents details on future plans.

In Section 5 we introduce the deliverables from the work package and state their purpose, significance and how they will contribute both to the future work of the work package and to that of the other work packages.

In Section 6 we report the effort spent at the end of the first yearly period, analysing deviations from the planned effort.

In Section 7 we discuss problems and deviations from workplan.

In the final Section 8, we present the outline of the work to be completed during the next reporting period.

## 2 Work Package Roadmap and Vision

Fortissimo's final scope is to facilitate access to digital manufacturing tools and high-performance computing platforms for European industries and especially SMEs. This action must bring together the whole value chain in order to stimulate both the use of the Cloud by industries for simulation, modelling and forecasting and the provision of relevant services exploiting the Cloud's capabilities to support innovation.

ISVs are therefore a key stakeholder for the Fortissimo Infrastructure, since not only is Fortissimo contributing to increase competitiveness of European manufacturing industry through the innovative infrastructure that it is developing and testing, but it aims to create commercial opportunities for European ISVs, and service and HPC infrastructure providers through the creation of a new market for their products and services.

With respect to ISVs, on the one hand Fortissimo is addressing innovation offering ISVs and simulation service providers the possibility to port their applications to a Cloud of HPC resources and to be able to evaluate and gain experience with Cloud-based service and business models in a controlled environment. On the other hand Fortissimo is trying to overcome the present barriers to the development and exploitation of HPC-Cloud-based simulation services, and the licensing models used by ISVs are often considered one of the major obstacles restricting software use in Cloud environments.

Modelling and simulation software can be developed in-house, be obtained from ISVs or be available as open source. Most small companies whose principal business involves manufacturing will be unlikely to have the necessary skills to generate the software or the resources to fund its development. Neither will they have the in-house application or HPC expertise to set up models to run on an HPC system. Nor are software licence terms particularly favourable for companies that need to perform simulations only occasionally. Many End-user companies have been critical of ISVs' licensing models, which they find to be too restrictive to use in HPC environments. These issues limit the ability of small companies to exploit modelling and simulation and have a direct impact on their competitiveness.

ISVs are often themselves small companies that rely on a core customer base and do not have the resources to carry out the major restructuring of their software to exploit emerging and future computer architectures. In some cases, the only way forward for ISVs is to be acquired by a bigger player, which often moves core competences out of Europe. Fortissimo is addressing this situation by supporting ISVs to make their applications be more HPC-enabled as part of the experiments. Often the changes required for a software to operate on a high-end HPC system are minimal and the benefits to the end-user in terms of scale of model and speed of result are very high.

Fortissimo is creating an environment in which different business models can be trialled by ISVs and end-users. This will not only enable end-users to access modelling and simulation in a cost-effective way that was previously unavailable. It will also allow ISVs to investigate new business and licence models that would enable them to innovate their products while retaining profitability, independence and their customer base. Fortissimo is committed to moving the state-of-the-art forward in terms of software licensing and business models, taking into account the needs of both the software providers and end-users.

To obtain the collaboration of ISVs it is evident that Fortissimo must provide value to them. With this in mind, it is evident the experiments in WPs 4, 5 and 6 play a key role, most of those requiring the use of ISV applications. The conduct of these experiments needs to confirm the role that ISV applications have to play in the successful implementation of end-

user applications and to establish the viability of a business providing such applications on HPC Clouds. The role of this Work Package, directly addressing business models for ISVs for an HPC Cloud, is indeed to monitor and evaluate, with the precious contribution of WP8, the value of this business.

The action is conducted through three technical Tasks, related to the analysis of actual licensing models (Task 9.1), the analysis of ISV marketplace (Task 9.2) and the organization of a yearly ISV forum (Task 9.3), bringing together ISVs and other key stakeholders.

The first 12 months activities were conceived as a set up and general intelligence gathering period. The first steps were therefore to collect a database of reference contacts of Fortissimo partners with ISVs, to be used as a basis for the information collection, and to set up the basis of a general framework of challenges ISVs meet when porting their applications to the Cloud in general and specifically to an HPC Cloud. The first Market Analysis, conducted with a broad and complex questionnaire and a set of interviews, had the scope to go further, as a first test of the assumptions of the framework. A second important test came with the first ISV Forum held in Milan in October 2014, which brought together ISVs with End Users and Resource Providers.

The second 12 months activities leveraged on the work done in the first period, together with the indications coming from the first wave of experiments, ended in December 2014, and from the second wave, which started their activities in October 2014. All the indications received induced us to focus on a specific segment, small ISVs relatively new on the market, and with no previous HPC Cloud strategy, since they have no preconceptions, are agile in their process and they are willing to test new models in order to increase their market share. For this segment we identified the most promising models to test.

The tests and a further refinement iteration of the process will be the object of the third year activities, made possible by the opening up of the marketplace.



### **3 Major Achievements**

The major achievements of this Work Package obtained during the reporting period (Project months 13 to 24) are:

- conducting an analysis of viable business plans for small ISVs offering services on HPC Cloud infrastructures;
- providing requirements to the marketplace architecture;
- providing support to the development of the marketplace business plan;
- organizing the first Fortissimo (ISV) forum;
- completing the preliminary organization of the second Fortissimo (ISV) forum.

## 4 Work done

### 4.1 Work planned for the reporting period

To achieve its objectives this work package is structured into four tasks: a management task, a task to analyse licensing models, a task to analyse the ISV marketplace, whose activity is strictly interwoven with the preceding one, and a task supporting a yearly forum engaging ISVs in the analysis, training and dissemination activities of Fortissimo. Cineca is leading this work package.

#### Task 9.1 Analysis of licensing models

This task analyses current ISV licensing models, their underlying motivation and resultant barriers to the use of ISV products in an HPC-Cloud environment.

Besides collecting new information and insights through desk study, the plan was to approach ISVs collaborating as partners in the first or second wave of experiments, through direct discussion or during Thematic Working Group meetings to understand their business process, requirements, and estimate the impact of business model changes on their business operations.

#### Task 9.2 Analysis of the ISV marketplace

An analysis is made of the marketplace for ISV products and the barriers to their use in an HPC-Cloud environment. Issues such as availability of HPC-resources, of application domain expertise, of HPC expertise, of appropriate training and other relevant factors are considered.

Task 9.2 plan consisted in leveraging on and contributing to Task 9.1 activities, with similar actions, but from a broader point of view.

The plan envisaged to use the outcome of the first market analysis and the discussion during the first ISV Forum to test the framework on specific points and to use the knowledge to start building a set of novel business models to be discussed and tested with ISVs.

#### Task 9.3 The yearly ISV forum

The DoW envisaged a yearly forum, where ISVs and other interested organisations including end-users and domain experts could be able to discuss the outcomes of the above tasks and use the intelligence gained to formulate their own confidential marketing and business. This forum makes extensive use of the intelligence and insights gained in Tasks 9.1 and 9.2, draws on the work of WP8, Sustainability, and contributes to WP10, Dissemination and Training.

The first ISV Forum was planned in conjunction with the experiments workshop in the first month of activity of the second wave experiments, and its outcome analysed, in order to provide hints not only for Task 9.1 and 9.2 activities, but also for improvements to the organization of the second Forum. The delayed occurrence of the first ISV Forum moved our planning of the second Forum at the beginning of Year 3, again in conjunction with the experiments workshop in the first month of activity of the final wave of experiments.

### 4.2 Work done during the period

#### Task 9.1 Analysis of licensing models

In the framework of this task, the first step was to leverage on the database of contacts of Fortissimo partners with European ISVs, for a series of interviews aimed to gather information to build up and refine the Customer Profile and Value Map canvas that will be

described in Ch. 4.3.2. The primary scope was to understand their business process, requirements, and estimate the impact of business model changes on their business operations. The collected information and the gained insights were shared to WP8 to define and refine a viable business model for the Fortissimo marketplace, as described in Ch. 11.4.4 “Business case for ISV” of Fortissimo Deliverable D8.2 [1].

The Thematic Working Group (TWG) on licensing models for Cloud, collecting all interested participants from Fortissimo partners, supported Task 9.1 activities.

### **Task 9.2 Analysis of the ISV marketplace**

This task provided the core material for the analysis described here in Ch. 4.3.2, especially regarding the Value Proposition section.

Particularly relevant was the discussion on the outcome of the first market analysis and the discussion during the first ISV Forum to develop ideas for novel business models to be discussed and tested together with ISVs.

### **Task 9.3 The yearly ISV forum**

Organizing a large event, involving a significant number of participants from industry is always a complex task, especially in the current economic recession period, where budget cuts to travel costs are commonplace.

For the first edition of the Forum, it was also a primal requirement to ensure a level of participation high enough in number and quality to sustain the probability of success of the following editions as well. To support the participation of end-users we chose to join the Forum with a planned experiment workshop organized by WP4 and WP5. This acted both as a show case for the preliminary results and challenges of the first wave of experiments and as a kick-off meeting for the second wave of experiments, even if it meant to have the Forum later than expected by the DoW, due to the delay in the start of these experiments. The 2014 Forum in Milan was a success (we describe it thoroughly in Section 4.3.1), so that the same formula was adopted for the 2015 edition, whose preparation was made during the reporting period for this deliverable. The Forum will be held in July 2015, at the beginning of Project Year 3, in Amsterdam with the significant support of the local partner SurfSARA.

## **4.3 Overall workpackage**

The description of the work done by WP9 will start from the detailed description of the first Fortissimo Forum, since its outcomes determined the direction of the following activities.

### **4.3.1 The first ISV Forum**

The first Fortissimo Forum was held on October 15th, 2014 at the Politecnico di Milano, Milan, Italy.

In accordance to Fortissimo DoW, the annual Fortissimo Forum aims to bring together Independent Software Vendors (ISVs), Service Providers, Small & Medium Enterprises (SMEs) and technical experts around the theme of HPC applications in the Cloud. Specific topics for the 2014 edition were application deployment and licensing solutions for the Cloud. Representatives from major ISVs presented their solutions and strategies; solution providers from I4MS projects talked about their services and solutions; manufacturing SMEs discussed

their needs and expectations. The Fortissimo Forum was concluded with a panel discussion about HPC Cloud, adoption barriers for SMEs and solution concepts. This was reflected in the Agenda, as presented in Table 1. All presentations are publicly available on the Fortissimo Project website, [1].

**Table 1: Agenda of the first Fortissimo Forum**

<b>Time</b>	<b>Topic</b>	<b>Presenter</b>	<b>Title</b>
10:00-10:10	Welcome	<i>Claudio Arlandini (CINECA)</i>	<i>Fortissimo Forum 2014 – Welcome</i>
10:10-10:30	Fortissimo keynote	<i>Guy Lonsdale (scapos)</i>	<i>The Fortissimo Project</i>
10:30-10:50	ISV presentation	<i>Ravi Kunju (Altair)</i>	<i>Infinite Exploration on the Cloud: HPC in a Snap</i>
10:50-11:10	ISV presentation	<i>Pär Mattsson (COMSOL)</i>	<i>The Future of Simulations</i>
11:10-11:30	ISV presentation	<i>Wim Slagter (ANSYS)</i>	<i>Toward Best-Practice Enterprise Cloud for Engineering Simulation</i>
11:30-12:00	Break		
12:00-12:20	ISV presentation	<i>Anthony Massobrio (CD-adapco)</i>	<i>Enabling CAE Technologies on Cloud Architecture: CD-adapco Case</i>
12:20-12:40	ISV presentation	<i>Simon Weston (ICON)</i>	<i>CFD in the Cloud - Challenging the barriers to entry for SMEs</i>
12:40-13:00	ISV presentation	<i>Josko Balic (AVL)</i>	<i>AVL Vehicle System Simulation in Cloud Environment</i>
13:00-14:00	Lunch		
14:00-14:20	ISV presentation	<i>Wolfgang Ziegler (SCAI)</i>	<i>Déjà-vu - same procedure as every year</i>
14:20-14:40	End-user presentation	<i>Renaud Laborbe (Open Ocean)</i>	<i>The Marine Cloud Experiment</i>
14:40-15:00	End-user presentation	<i>Lorenzo Bucchieri (EnginSoft)</i>	<i>EnginSoft Multidisciplinary CAE provider - HPC scenarios for engineering simulations</i>
15:00-15:30	Break		
15:30-15:45	CloudSME project presentation	<i>Nicola Frantini (CloudBroker)</i>	<i>Facilitation of experiments to enable simulation in the Cloud</i>
15:45-16:00	CloudFlow project presentation	<i>Nejc Bat (Arctur)</i>	<i>Workflow-as-a-service a new approach to engendering Cloud solutions</i>

16:00-	Fortissimo project		
16:15	presentation	<i>George Graham (EPCC)</i>	<b><i>The Fortissimo Marketplace</i></b>
16:15-			
16:55	Panel discussion	<i>Panelists:</i>	<i>Moderators:</i>
		<i>Ravi Kunju (Altair)</i>	<i>Claudio Arlandini (CINECA)</i>
		<i>Pär Mattsson (COMSOL)</i>	<i>Ullrich Becker-Lemgau (Intel)</i>
		<i>Wim Slagter (ANSYS)</i>	
		<i>Anthony Massobrio (CD-adapco)</i>	
		<i>Simon Weston (ICON)</i>	
		<i>Josko Balic (AVL)</i>	
16:55-	Wrap-up and	<i>Ullrich Becker-Lemgau</i>	
17:00	Farewell	<i>(Intel)</i>	

#### 4.3.1.1 Attendance

The participants to the Forum were 62, with respect to 70 registered. The no-show percentage (11%) was then particularly low for a free event targeted to industries.

In Table 1 the attendees are listed according their affiliation, and in Table 2 (graphically represented in Figure 1) according their country of origin.

The numbers immediately demonstrate the Fortissimo Forum was able to meet its goals, attracting a considerable interest in the target groups, ISVs and industrial end-users, coming from 12 European countries.

**Table 2: Attendees statistics with respect to affiliation entity**

<b>Attendee affiliation</b>	<b>Number</b>	<b>%</b>
Fortissimo core partners	18	29,0
Resource Providers	5	8,1
ISV	14	22,6
Industrial end users	23	37,1
Other	2	3,2

**Table 3: Attendees figures according to country of origin**

<b>Country</b>	<b>Number</b>
Canada	1
Ireland	1
Macedonia	1
USA	1
Austria	2
Netherlands	2
Slovenia	2
Sweden	2
Spain	5

France	6
UK	7
Germany	8
Italy	24

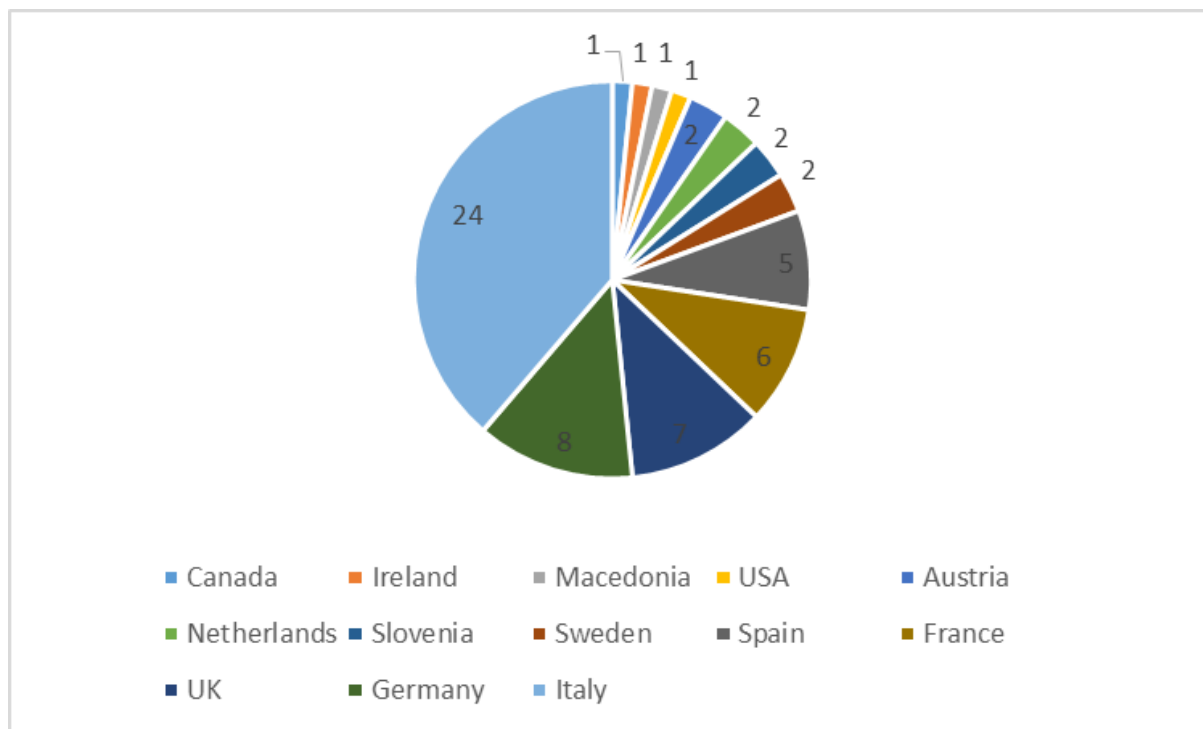


Figure 1: Attendees figures according to country of origin

#### 4.3.1.2 Presentations key points

Guy Lonsdale presented the Fortissimo Project in the framework of the I4MS initiative, focusing on its objectives. He then described a few case studies, chosen among WP4 experiments.

He was followed by a score of ISV presentations. Each presenter, chosen with a mix combining the largest ISVs with niche providers, discussed their company actual solutions and roadmap for HPC Cloud adoption. It is interesting to note that each company has a strategy in place, with subtle variations among them. Altair for example offers customers a physical appliance certified by the ISV, to be used as a private cloud, with no license limitations (HyperWorks Unlimited) [2]. COMSOL is more concentrated in offering a simplified customizable access to inexperienced customers to hide the complexity of the underlying infrastructure (COMSOL Application Builder) [3]. ANSYS [4] also introduced a flexible user interface web-based for their products, suitable for Cloud infrastructures, and they are planning to add Pay-per-Use software license to their licensing models, suitable for fluctuating needs and peak demands. CD-adapco [5] introduced years ago a licensing model suitable for use in private or public Clouds, where the license server remains in a ISV system, and the customers pays the usage time independently of the number of parallel threads. ICON [6] sees in Software-as-a-Service (SaaS) applications an enabling way to increase their market share in a Computational Fluid-Dynamics (CFD) world dominated by few giants. AVL [7] presented their experience on building a SaaS application in a collaboration with a Cloud provider.

Fraunhofer SCAI [8] presented then the elasticLM [9] technology developed in the EU-funded project SmartLM, a licensing model explicitly created for Cloud. It was followed by two presentations offering the point of view of end-users regarding challenges and benefits in moving to a HPC Cloud based approach, by EnginSoft [10] and Open Ocean [11].

The final presentation session was dedicated to insights from the three ongoing I4MS (ICT Innovation for Manufacturing SMEs) initiative [12] projects devoted to Cloud technologies: cloudSME [13], Cloudflow [14] and Fortissimo, presenting in detail their capabilities, ecosystem and architecture.

All presentations are publicly available on the Fortissimo Project website, [1].

### 4.3.1.3 Panel discussion

#### 4.3.1.3.1 *Question 1: Will the Fortissimo marketplace be a helpful mechanism to enable SMEs to adopt HPC technology?*

**Wim Slagter, ANSYS (WS):** The concept is viable but depends on the execution/implementation. The main concern is on the ability to perform matchmaking/code validation – it is a large industry space and there is now a large volume of experts doing that in the industry. But he encourages continuation because the concept is good and there is a buy-in for ISVs. However it needs to consider that all ISVs have (and will have) their own solutions.

**Josko Balic, AVL (JB):** He sees an analogy with office in Munich representing the German steel industry – driven by users (construction companies) – that constitutes a very expensive consulting “hub”. The real issue is who will be the first/main investors in the Fortissimo marketplace. Possibly the cloud providers?

**Ravi Kunju, Altair (RK):** He provides another analogy, utilities industry. Every large manufacturing company used to have their own power plant, now they buy electricity from the market. The utilities model may be applied to computational industry; there is a need to provide regional services. The simulation has to become a commodity. But there is a warning, since the Fortissimo HPC providers need to understand the concept of private cloud evolution and compete with strong players. The value chain has not to become an added cost for the end user. Adding middle-men layers, as in every supply chain, increases costs, Fortissimo needs to carefully manage the value-cost proposition.

**Simon Weston, ICON (SW):** Large ISVs have their own facilities and portals. Fortissimo might be a more attractive opportunity for the smaller ISVs, with a niche offer. However, there may be an overlap with other service providers elsewhere. Fortissimo needs to find a clear market position.

**Pär Mattsson, Comsol (PM):** He has a more optimistic view. There is a lot of SMEs not using simulation so the Fortissimo Marketplace, demonstrating value with good case studies will be a key enabling factor. It is a great tool for raising awareness.

**Anthony Massobrio, CD-Adapco (AM):** Matchmaking and code validation can be a controversial issue. It is necessary to avoid private agendas when presenting a solution to the end-user. He must be able to choose freely among a range of proposals. A second issue to be carefully taken into account are the difficulties linked to technologies export. Simulation software may fall under restriction rules on which countries could be allowed to use it.

#### **4.3.1.3.2 Question 2: Will the HPC Cloud service model help SMEs to use simulation & HPC?**

**RK:** Affirmative. Altair sees customers with strong requests for HPC Cloud (on demand). However, not only SMEs but also large enterprises often have small CAE<sup>1</sup> departments with the same needs.

**AM:** Affirmative, CD-adapco customers often do not have the necessary infrastructure to do CAE effectively.

**WS:** Innovation is found in small companies and start-ups. They have biggest innovation power but also most challenging problems. HPC Cloud is an enabler for those people. Training in using simulation tools is the key. ANSYS is also involved in the digital manufacturing actions in the United States.

**JB:** The key to success is in the financial gain the IT department may demonstrate when using cloud services. In any case, not only targeting SMEs, but working with OEMs<sup>2</sup> is important.

**SW:** The Cloud service model will definitely attract Start-ups. They are often funded with venture capital and are very careful in their spending. Also, Fortissimo pricing models have to match company's needs having financial planning linked to VC<sup>3</sup> funding.

**Schneider Detleff, Altair (audience):** You need to remember that often for the SME hardware and software costs are not the challenging issue, but those related to personnel needed to exploit (high-end) CAE.

#### **4.3.1.3.3 Question 3: How could Fortissimo work to eliminate the remaining barriers? Are the investments still too high? Does the way of working need to be adapted/simplified to help new/naïve users use simulation tools?**

**RK:** CAE needs expert users; press-the-button solutions are not possible. It is necessary to train the people in using the correct simulation in the correct infrastructure, with a simplicity that hides the complexity. Application-aware environments (IT infrastructures) can be done (and are done through existing middle-ware and web-browser GUI<sup>4</sup>s).

**WS:** Training programs in Academia, in cooperation with ISVs, are there and can play a key role in training CAE human resources. The real cost is made by the human resources working on the problems.

**Daniele Panfiglio, Comsol (audience):** In Italy industries do not know a lot about HPC. They know more on IT data. There is a strong need to evangelize the potential customers and create awareness.

#### **4.3.1.3.4 Question 4: SMEs report that licensing costs are still a key limiting factor or concern. What are your comments on that?**

**WS:** Flexible licensing solutions are important and will lower the barrier for SMEs, at least for initial use. Later on, it will be possible to convert them to long term licenses.

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<sup>1</sup> CAE: Computer Aided Engineering

<sup>2</sup> OEMs: Original Equipment Manufacturers

<sup>3</sup> VC: Venture Capital

<sup>4</sup> GUI: Graphical User Interphace



**AM:** CD-adapco introduced flexible licenses already in 2008-2010. The adoption in the beginning was not fast, probably due to previous competence/know-how in SMEs. Now even Universities in Italy are totally on-demand customers. He returned then to the issue of focusing the user options into solutions provided to expert engineers (who still need enhanced ease-of-use).

**RK:** Altair recently introduced flexible licensing for customers, with Hyperworks on demand and Hyperworks unlimited. The latter product combines hardware and software in a box providing unlimited core configuration on runs. The capability is only constrained by the physical configuration of box. Next versions will first move to license in cloud and then replicate the Hyperworks unlimited offer through services mediated by geographically located data centres.

#### 4.3.1.4 Concluding Remarks

The Fortissimo Forum was able to reach its goals. It raised an interest level high enough to attract a relevant attendance, both in number and quality. Representatives of most major European ISVs were present and the discussion with end-users and resource providers was lively and rich.

For next editions, it will probably be useful to reduce the number of presentations to give more space to the panel discussion.

The major takeaways of the Forum were:

- The need for HPC Cloud services is felt by all stakeholders;
- Small ISV are more likely to be interested in the opportunities provided a HPC Cloud marketplace than large ones which have competence, capabilities, and market scale to build up their own Cloud infrastructure;
- HPC Clouds and in particular the setup of a EU-level marketplace are considered as enabling tools for innovation adoption in EU industries, and especially SMEs;
- The most ISVs involved in the CAE industry have an HPC Cloud strategy, although the chosen approach varies radically;
- Building a successful HPC Cloud marketplace presents serious challenges: the way to success is likely a combination of competence with flexibility and security.

#### 4.3.1.5 Attendees list

Table 4: Attendees list

Participant	Affiliation	Country
Amedro Brian	Open Ocean	France
Arlandini Claudio	CINECA	Italy
Balic Josko	AVL	Austria
Bat Nejc	ARCTUR	Slovenia
Bayrasy Pascal	Fraunhofer SCAI	Germany
Bechis Massimo	PRYSMIAN	Italy
Becker-Lemgau Ullrich	Intel GmbH	Germany
Boutanios Ziad	Binkz	Canada
Bucchieri Lorenzo	EnginSoft	Italy
Calegari Patrice	Bull	France
Cassina Jacopo	Holonix	Italy
Cavallo Paolo	AMET srl	Italy
Chiarini Alessandro	SCS srl	Italy

Cotelo Queijo Carmen	CESGA	Spain
David Olivier	Bull	France
Derado Ivo	AVL	Austria
Diaz Ramon	Gompute	Sweden
Fantini Nicola	CloudBroker	Italy
Felice Romeo	CD-Adapco	Italy
Ferrandi Paolo	Mox Dfa	Italy
Fischer Hartmut	Forschungszentrum juelich	Germany
Garcia Carlos	ICMR	Ireland
Graham George	EPCC	UK
Guarnieri Fabio	Nice	Italy
Heere Frank	SURFsara	Netherlands
Kunju Ravi	Altair Engineering	USA
Laborbe Renaud	Open Ocean	France
Locatelli Luigi	Altair Engineering	Italy
Longoni Matteo	Moxoff	Italy
Lonsdale Guy	SCAPOS	Germany
Male Richard	HPC WALES	UK
Massobrio Anthony	CD-Adapco	Italy
Mazzucchelli Paolo	Aresys	Italy
McDonald Andy	EPCC	UK
Mourino Carlos	Cesga	Spain
Ocklenburg Andreas	Sander Werbung	Germany
Padmore Karen	HPC Wales	UK
Padula Giuseppe	Unirsm	Italy
Panfiglio Daniele	Comsol Srl	Italy
Pasqua Francesco	CINECA	Italy
Perales Fernando	UNIMETRIK	Spain
Pere-Laperne Jacques	Algotech	France
Pere-Laperne Alexandre	Algotech	France
Persson Mattsson Paer	Comsol Multiphysics	Sweden
Petkoski Vlatko	MIKROSAM	Macedonia
Pieri Roberto	SCS	Italy
Piscaglia Federico	Politecnico di Milano	Italy
Ponzini Raffaele	CINECA	Italy
Povalej Ziga	XLAB	Slovenia
Pralits Jan	Wolf Dynamics	Italy
Sawyer Mark	EPCC	UK
Scandroglio Carlo Alberto	ANSYS Italy	Italy
Schneider Detleff	Altair Engineering	Germany
Slagter Wim	ANSYS	Netherlands
Spisso Ivan	CINECA	Italy
Struckmann Nico	HLRS	Germany
Tamayo José M.	NEXIO Simulation	Spain

Ugolotti Beppe	NICE	Italy
Valles Ruben BIFI	Universidad de Zaragoza	Spain
Weston Simon	ICON	UK
Young Paul	DCU	UK
Ziegler Wolfgang	SCAI	Germany

### 4.3.2 Sketching business models for small ISVs on HPC Cloud marketplaces

The discussions held in the first Fortissimo Forum made clear that to have a meaningful impact WP9 activities should focus on small ISVs. Large ISVs have already a defined Cloud strategy, and they made clear during our discussion that changes in their licensing models, even at a trial level, were not welcome or would involve a lengthy discussion along the management chain, that would at the end be incompatible with the Project timeframe.

At the contrary, small ISVs are often still in a preliminary phase regarding their HPC Cloud strategy, but are more willing to experiment to increase their market share, and have leaner management chains making interactions easier. Furthermore, having success stories with small ISVs could foster positive impact to change to the whole ISV ecosystem.

#### 4.3.2.1 Methodology

To propose new business models for small ISVs we adopted the method delineated in the new Osterwalder et al. book [15] (with additional material provided on the companion website [16]) on Value Proposition Design. This book expands the previous one by Osterwalder and Pigneur [17], the de-facto standard for Business Model Generation analysis, since it contains tools more suited to detail an existing business model than to create a new one.

We complemented our analysis with other tools described in Aulet book [18] on Startup implementation, since we found they provided a better understanding on customers' need analysis, and in the new research by the St. Gallen University Business Model Innovation Group [19], to explore novel business models and their impact. We are grateful to one of the Project reviewers for having pointed us to this last resource, since it is very recent and not yet widely known outside its scholar environment.

The identified process requires following these steps:

1. Create the Customer Profile (CP)
2. Create the Value Map (VM)
3. Establish fit between the Customer Profile and the Value Map
4. Provide feedback to WP2/3 to create a Value Proposition prototype
5. Test and iterate process

##### 4.3.2.1.1 Customer Profile

The Osterwalder *et al*'s [15, 16] Customer Profile Canvas (CPC) is a good starting point, but we decided to complement it with some of the Aulet [18] tools to go further.

The Customer Profile [15] clarifies our customer understanding. We found useful to consider this concept together with that of Beachhead Market (BM) [18], that is the single market opportunity from an opportunity matrix that an entrepreneur should focus on at the beginning to avoid losing focus.

To define a BM to choose, it is necessary to segment possible customers in different sub-segments fulfilling these three conditions:

1. The customers within the market all buy similar products
2. The customers within the market have a similar sales cycle and expect products to provide value in similar ways.
3. There is “word of mouth” between customers in the market, meaning they can serve as compelling and high-value references for each other in making purchases.

Defining a Customer Profile using the CPC tool requires understanding the Customer Gains, Pains and Jobs, where:

- **Gains** describe the outcomes customers want to achieve or the concrete benefits they are seeking;
- **Pains** describe bad outcomes, risks, and obstacles related to customer jobs;
- **Customer Jobs** describe what customers are trying to get done in their work and in their lives, as expressed in their own words.

#### 4.3.2.1.2 Value Map

The Value Map describes how the company intends to create value for a customer.

Using Osterwalder *et al*'s [15, 16] Value Map Canvas (VPC) it is necessary to detail our actual understanding of the services “Business containers for small ISVs”.

Defining a Value Map using the CPC tool requires understanding the ingredients of our value proposition that are Gain Creators, Pain Relievers and the complete set of our Products and Services our value proposition is built upon, where:

- **Gain Creators** describe how your products and services create customer gains;
- **Pain Relievers** describe how your products and services alleviate customer pains.

#### 4.3.2.1.3 Establish fit

Searching for Fit is the process of designing value propositions around products and services that meet jobs, pains, and gains that customers really care about. Fit between what a company offers and what customers want is the number one requirement of a successful value proposition.

Fit happens in three stages. The first occurs when relevant customer jobs, pains, and gains are identified as addressable with an own value proposition. The second occurs when customers positively react to this value proposition and it gets traction in the market. The third occurs when a business model that is scalable and profitable is found.

#### 4.3.2.1.4 Value Proposition

The above steps should have as an outcome a list of requirements for the Business Container service for small ISVs to be delivered to WP2/3.

These High-Level Product Specifications should lead to a Prototype. This needs to be made in parallel with a Value Proposition quantification, to determine how the benefits of our service turn into value that the customer gets out of it, and calculate quantitative metrics to show this value to the customer.

At this point it is also necessary to find the right Business Model, which is the way to create value not only for the Customer but also for the Business, mapping the Value Proposition canvas to the Business Model Canvas.

We found the St. Gallen Business Model Navigator<sup>TM</sup> tool [19] a useful one to identify candidate business models. The tool is based on Prof. Gassmann team research, which

discovered 90 % of all existing business models are just a recombination of 55 archetypal repetitive patterns. The tool transforms this main concept – creating business model ideas by utilizing the power of recombination – into a ready-to-use methodology, with three steps: Initiation (understanding the context), Ideation (proposing new models with the help of special pattern cards), and Integration (elaborating the new ideas into full-blown business models).

#### **4.3.2.1.5 Test and iterate**

At this point it is necessary to find among our ISV contact list one or more Earlyvangelist to test our Service and Business Model. The term was coined by Steve Blank [20] to describe customers who are willing and able to take a risk on a new product or service. Earlyvangelists are used to build a foothold market and shape our value propositions via experimentation and learning.

The underlying idea is that Business Plans are great execution documents in a known environment with sufficient certainty. Unfortunately, real markets always present high uncertainty. Therefore, systematically testing ideas to learn what works and what doesn't is a far better approach than writing a plan. It is necessary to experiment, learn, and adapt to manage this change and progressively reduce risk and uncertainty.

### **4.3.2.2 Implementation**

#### **4.3.2.2.1 Customer Profile**

To complete the Customer Profile evaluation, once determined the subsegments we wanted to focus on, we proceeded through the following steps:

- a. Identifying customer jobs
- b. Identifying customer pains
- c. Identifying customer gains
- d. Prioritize jobs, gains and pains

The challenge of the exercise comes from the fact that we are not conducting it as it is usually done as the entrepreneur developing its own business, but as a third party (Fortissimo as a consultant) acting on behalf of the ISVs and often working on second-hand data coming from them.

First, this obliged us to focus on a particular class of ISVs, to increase the impact of our analysis avoiding excessive fragmentation. We chose to consider the necessity of a CFD ISV trying to setup services on the Fortissimo marketplace. The choice was motivated by the fact that most of the small ISVs in Fortissimo are indeed producing CFD codes, and by the fact that the HPC CFD market in Europe is well established and economic data is available.

We identified 3 distinct ISV Customer subsegments:

1. Managers of big or small companies that have the final choice on the tool to acquire on the basis of the economic and technical requirements, but they are not likely to use the software themselves;
2. Engineers that will use the software themselves on R&D projects for the development of new products for their own company;
3. Engineers that will use the software themselves on R&D projects as consultants for third parties.

From the discussions we had with ISVs we arrived at the conclusion that most small CFD ISVs are producing software for particular engineering niches, serving SMEs. This makes it

much more likely that the technical end-user is also the one making the purchasing decision. Also, we found that due to the frequent lack of simulation skills in SMEs, they mostly rely on consulting for this R&D step, often provided by the ISV itself.

Therefore, we could choose as the ISV Beachhead Market the “SME engineering consulting company”, so that we might safely consider only profile “3.” for deepening our Customer Profile.

To develop the CPC we followed successfully [15] indications, delineating Customer Jobs, Pains and Gains using the templates provided by [16]. The answers summarize the key outcome (in terms of highest ranked in order of importance) of a number of interviews held with companies matching the customer profile.

**Customer Jobs** describe what customers are trying to get done in their work and in their lives, as expressed in their own words.

**Table 5: Trigger questions for Customer Jobs**

Trigger Questions
<b>What is the one thing that the customer couldn't live without accomplishing? What are the stepping stones that could help the customer achieve this key job?</b>
The customer, a consulting engineer working on an R&D project for a third party SME, needs to deliver results within the time constraint given by the client SME and the budget given by his own management, to make the project profitable.
<b>What are the different contexts that the customers might be in? How do their activities and goals change depending on these different contexts?</b>
The context may depend on the market where the client SME operates. It could require special security requirements the service provider needs to comply with, or special Service Level Agreements (SLAs). This may translate into the necessity of service customization to serve such a customer.
<b>What does the customer need to accomplish that involves interaction with others?</b>
The customer is under continuous interaction with the client SME, as well he is likely to have a number of interactions with the ISV support especially if he is new to use HPC Cloud services.
<b>What functional problems are the customers trying to solve?</b>
Obtaining simulation results as soon as possible, to gain insight for the client.
<b>Are there problems that you think customers have that they may not even be aware of?</b>
As derived from the experience of the Fortissimo partners, the HPC Cloud new user is often neglecting to consider the bottleneck given by input/output data transfer.
<b>What emotional needs are your customers trying to satisfy? What jobs, if completed, would give the user a sense of self-satisfaction?</b>
The customer is focused on solving his clients engineering problem. Problem solving is a particularly rewarding human task at the emotional level.

**Customer Pains** describe bad outcomes, risks, and obstacles related to customer jobs.

Table 6: Trigger questions for Customer Pains

Trigger Questions
<b>How do the customers define too costly? Takes a lot of time, costs too much money, or requires substantial efforts?</b>
Time and budget are dictated by the client SMEs' requests and therefore may vary. Another common request is that simulations should be run overnight, to allow an efficient use of the engineer working time to analyze results and prepare new simulations.
<b>What makes the customers feel bad? What are their frustrations, annoyances, or things that give them a headache?</b>
Even with a powerful workstation, it is often impossible to reach the level of accuracy that the client problem would require within the provided time constraints. The engineer knows he is often not providing the client the best result that technology could allow, and this is a cause for frustrations.
<b>What are the main difficulties and challenges customers encounter? Do they understand how things work, have difficulties getting certain things done, or resist particular jobs for specific reasons?</b>
For an engineer accustomed on working on his own workstation with a CAE software, it is usually difficult to deal with the concept of a shared resource where his simulation needs to be processed through a batch system, introducing queuing times.
<b>What risks do the customers fear?</b>
The customer is focused on solving his client's engineering problem. Every problem or delay introduced by the service provided by the ISV is likely to be considered in a very negative manner.
<b>What barriers are keeping the customers from adopting a value proposition?</b>
Data security concerns and lack of expertise are the most cited causes.

**Customer Gains** describe the outcome customers want to achieve or the concrete benefits they are seeking.

Table 7: Trigger Questions for Customer Gains

Trigger Questions
<b>Which savings would make customers happy? Which savings in terms of time, money, and effort would they value?</b>
The answers we had may be summarized in: having the results in hours and not days, maximizing the Return Of Investment (ROI) from license costs, and minimizing the learning time for new technologies.
<b>What quality levels do they expect, and what would they wish for more or less of?</b>
They expect the results to be provided in a timely manner, a few hours maximum (ideally overnight).
<b>What would make your customers' jobs or lives easier? Could there be a flatter learning curve, more services, or lower costs of ownership?</b>
A common request is a transparent access to the underlying infrastructure, ideally allowing the engineer to interface to a software GUI he is accustomed to.

**How do your customers measure success and failure? How do they gauge performance or cost?**

Success and failure are determined in the ability to deliver the report to the client on time. Performance is often rated over costs, since costs in some cases may be transferred to clients.

**What would increase your customers' likelihood of adopting a value proposition? Do they desire lower cost, less investment, lower risk, or better quality?**

They desire a complex mix of these four elements, with the added component of the need to build the trust in the Resource Provider to be able to deliver its promise.

A more succinct but complete list of recognized Customer Jobs, Pains and Gains is provided in Fig. 2.

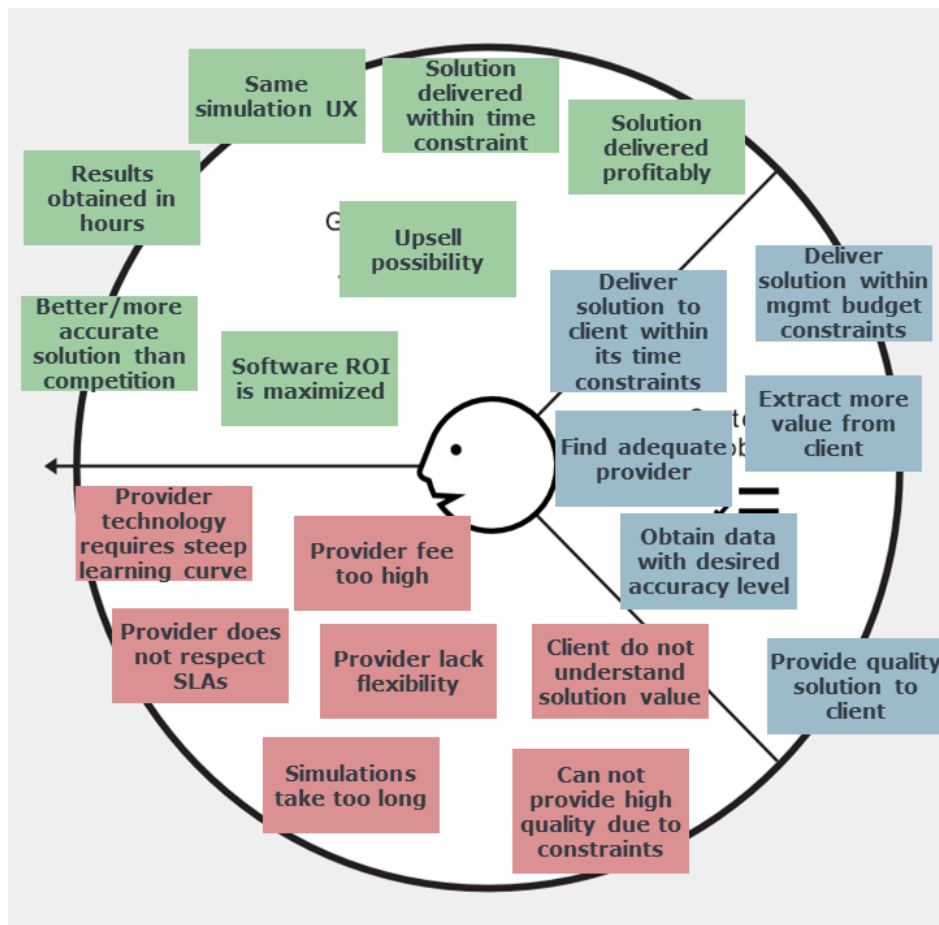


Figure 2: Customer Profile Canvas (template courtesy of Strategyzer.com).

#### 4.3.2.2.2 Value Map

To complete the Customer Profile evaluation we proceeded through the following steps:

- List service components
- Outline pain relievers
- Outline gain creators
- Rank those in order of importance



The first step is therefore to build a list of all the Products and Services the ISV value proposition is built around. These are what is needed to help the customers complete either functional, social, or emotional jobs or to help them satisfy basic needs. At this level, it is crucial to acknowledge that products and services do not create value alone, but only in relationship to a specific customer segment and their jobs, pains, and gains.

Here is a list of possible **product and services** CFD ISVs are interested to activate (or at least to evaluate their activation) moving to a HPC Cloud:

- Pre-sales evaluation;
- SaaS simulation;
- PaaS;
- Remote pre/post processing;
- Training;
- Case studies and best practices access;
- Advanced support;
- Premium services (Service Level Agreements-SLAs, etc.);
- Consultancy;
- Software (SW) customization and enhancement;
- Easy accounting and billing.

To develop the list of Pain Relievers and Gain Creators we used the templates provided by [16].

**Pain Relievers** describe how exactly products and services alleviate specific customer pains. They explicitly outline how ISVs intend to eliminate or reduce some of the things that annoy customers before, during, or after they are trying to complete a job or that prevent them from doing so.

**Table 8: Trigger Questions for Pain Relievers**

Trigger Questions
<b>Could the products and services...</b>
<b>... produce savings? In terms of time, money, or efforts.</b>
They could produce savings both in term of costs (this is evident in many deliverable reports of WP4 experiments), and time to result.
<b>... make customers feel better? By killing frustrations, annoyances, and other things that give customers a headache.</b>
They could provide unprecedented accurate simulations, or add new physics.
<b>... fix under-performing solutions? By introducing new features, better performance, or enhanced quality.</b>
Collaborative remote visualization may open better training and e-support services.
<b>... put an end to difficulties and challenges your customers encounter? By making things easier or eliminating obstacles.</b>
Keeping a User Experience (UX) as similar as possible to a desktop application will reduce the learning curve.
<b>... eliminate barriers that are keeping your customer from adopting value propositions? Introducing lower or no upfront investment costs, a flatter learning</b>

**curve, or eliminating other obstacles preventing adoption.**

As already expressed in the DoW, the Fortissimo Marketplace model is made to tackle adoption barriers for SMEs, with benefits like: lower capital expenditure, ease of adoption, via the “one-stop-shop” approach, and flexible license arrangements for software.

**Gain Creators** describe how your products and services create customer gains. They explicitly outline how you intend to produce outcomes and benefits that your customer expect, desire, or would be surprised by, including functional utility, social gains, positive emotions, and cost savings.

**Table 9: Trigger Questions for Gain Creators**

Trigger Questions
<b>Could your products and services...</b>
<b>... create savings that please your customers? In terms of time, money, and effort.</b>
They could produce savings both in term of costs (this is evident in many deliverable reports of WP4 experiments), and time to result.
<b>... produce outcomes your customers expect or that exceed their expectations? By offering quality levels, more of something, or less of something.</b>
The availability of unprecedented accuracy simulations, or with new physics added, often provide new insights that lead to unexpected new optimizations, or even completely new solutions.
<b>... outperform current value propositions and delight your customers? Regarding specific features, performance, or quality.</b>
Collaborative remote visualization opens also new frontiers to collaborative work inside the client company.
<b>... make your customers' work or life easier? Via better usability, accessibility, more services, or lower cost of ownership.</b>
All things added, with a lower cost of ownership the customer gets improved services with the same (if not better) usability.
<b>... help make adoption easier? Through lower cost, fewer investments, lower risk, better quality, improved performance, or better design.</b>
Cloud services move CAPital EXpenditure (CAPEX) costs to OPERating EXpenditure (OPEX), which makes adoption easier by the customer management.

A more succinct but complete list of recognized Customer Jobs, Pains and Gains is provided in Fig. 3.

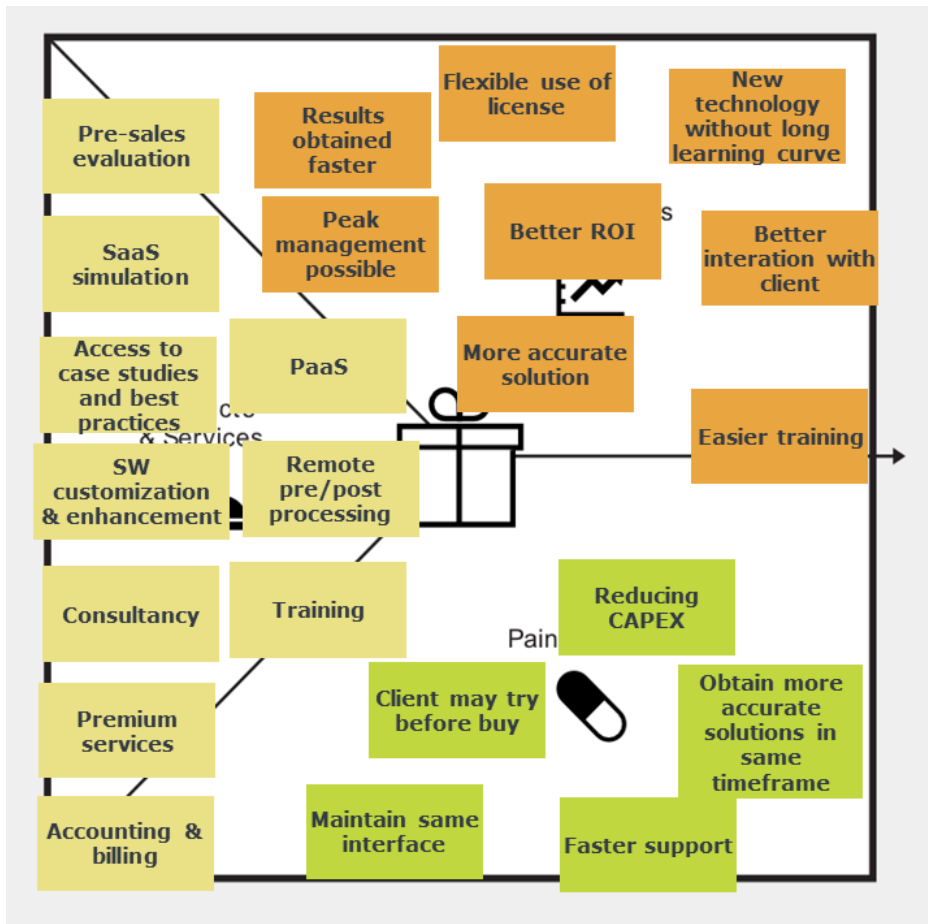


Figure 3: Value Proposition Canvas (template courtesy of Strategyzer.com).

#### 4.3.2.2.3 Establish fit

Establishing fit means to compare previous CPs and VMs to see how Pain Relievers and Gain Creators match customer’s jobs, pains, or gains.

In Fig. 4. we put together the two component canvas into a single Value Proposition Canvas that is used to analyze matches.

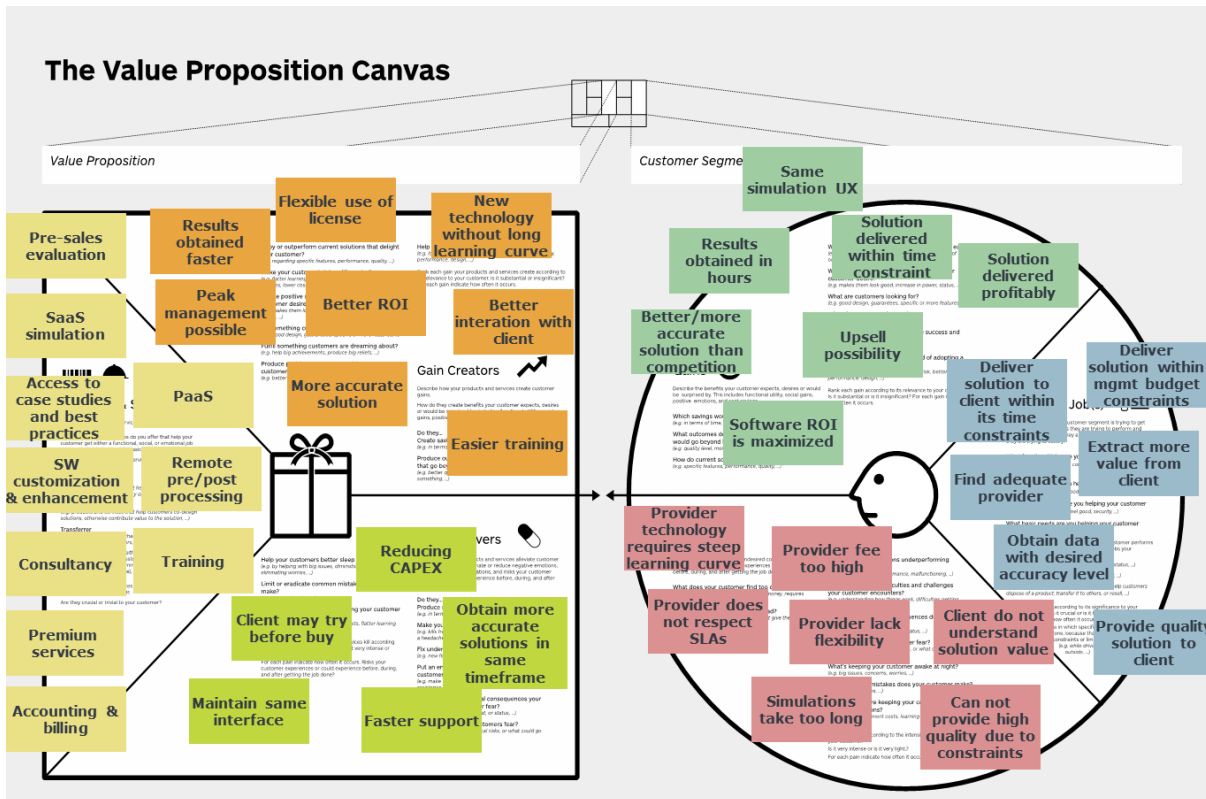


Figure 4: Establishing fit between CPC and VBC (template courtesy of Strategyzer.com).

Describing the complex network map of matches between the items is particularly challenging. We adopt here a graphical approach where we consider separately the three VPC areas, and their relations to the CPC. Each item is numbered, and the link to a specific item in the CPC is expressed by drawing its number on it.

Fig. 5 details how Product and Services map to the items identified by the CPC, Fig. 6 details how Gain Creators items map to the items identified by the CPC, and last Fig. 7 details how Pain Relievers items map to the items identified by the CPC.

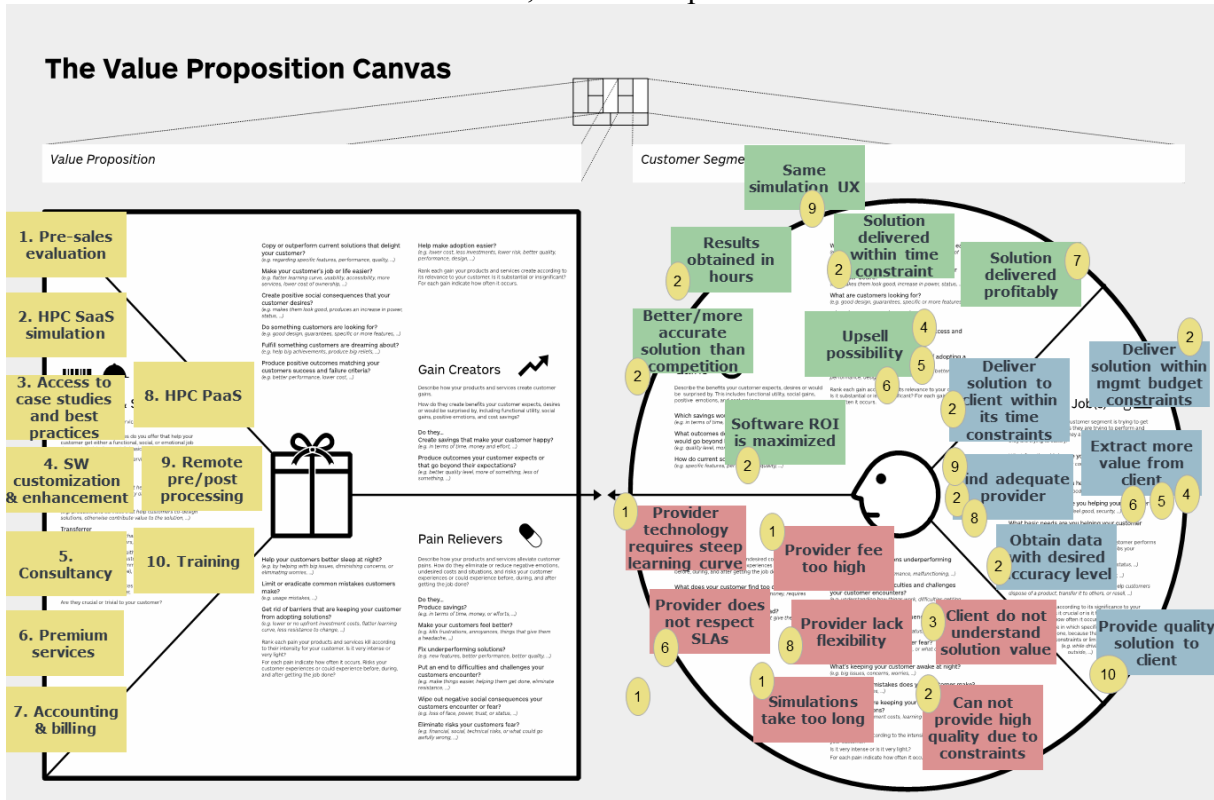


Figure 5: How Product & Services fit CPC

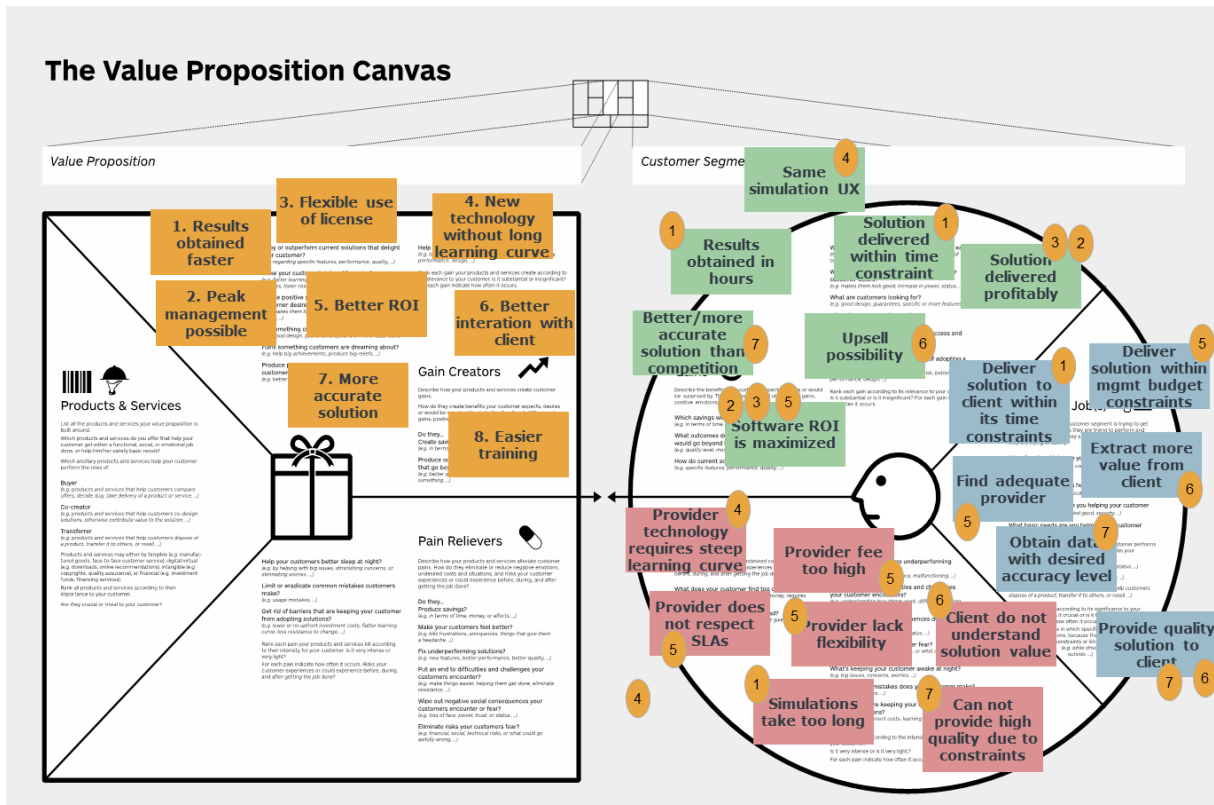


Figure 6: How Gain Creators fit CPC

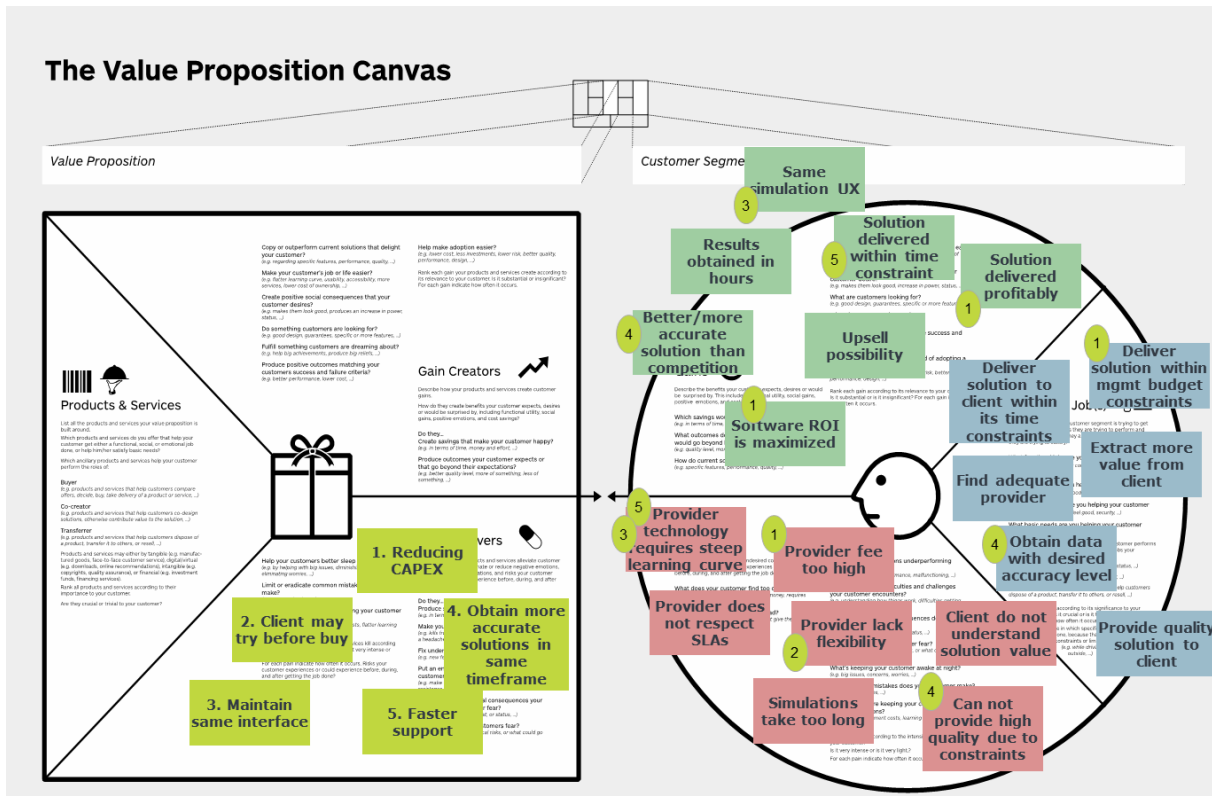


Figure 7: How Pain Relievers fit CPC

Having established the fit, we are now ready to move to the Value Proposition and the detail of the business model.

#### 4.3.2.2.4 Value Proposition

To complete the Customer Profile evaluation we proceeded through the following steps:

- Define the Core Value Proposition
- Delineate the baseline Business Model
- Create alternatives
- Flesh out the most promising novel Business Models

To design a business model we need firstly to go deeper into the data collected during the first two phases, ranking jobs, pains and gains, as well as services, pain relievers and gain creators. This allows us to focus on a single value proposition that may be rooted on the best fit between ISV and client priorities, and simple enough to be easily implemented and tested on the Fortissimo Marketplace. This is what we call the Core Value Proposition.

The ranking for each individual responder was asked during the same interviews made to obtain the list of points, and a collective ranking was easily done by translating the ranking into a point system.

Taking the highest ranking items it was possible to select what is called in literature a Minimum Viable Product to analyze its associated baseline Business Model (BM).

For sake of simplicity, instead of describing it with the classic Osterwalder's Business Model Canvas [17], we will adopt the Gassmann's Magic Triangle [19] (Fig. 8).

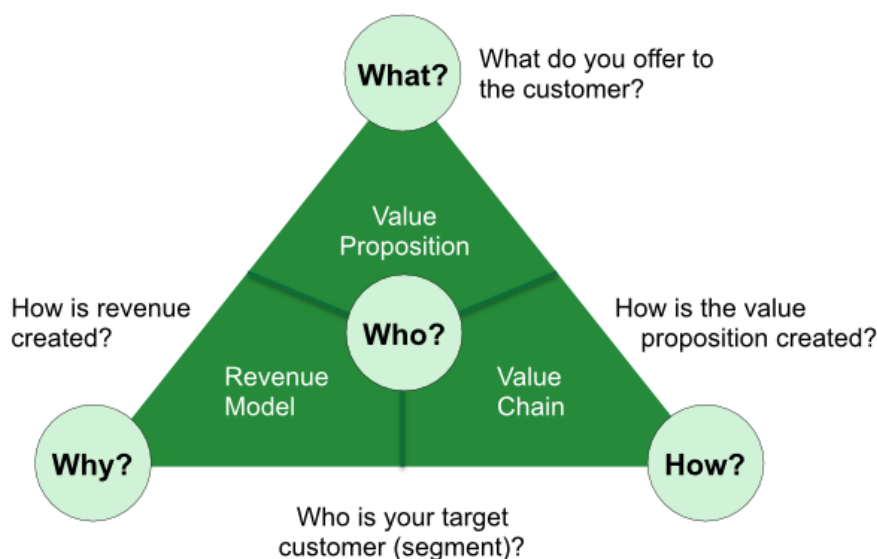


Figure 8: The Magic Triangle describing the basic component of a Business Model

Table 10: Magic Triangle Breakout for baseline BM

Magic Triangle Breakout for baseline BM	
<b>Who?</b>	SME engineering consulting companies.
<b>What?</b>	A SaaS service for ISV's CFD application.
<b>Why?</b>	Client pays on-demand fee based on consumed cpu_hours.
<b>How?</b>	ISV implements SaaS service on Service Provider infrastructure, i.e. the Fortissimo marketplace. Service Provider returns accounting data based on consumed cpu_hours.
<b>Value Proposition</b>	Client use ISV Software as SaaS because it allows larger, more accurate simulations without CAPEX, or same simulations in shorter times, and SW license is paid on demand.
<b>Revenue Model</b>	Profit is made on the margin left by Service Provider fee.
<b>Value Chain</b>	The strategic partnership with Fortissimo allows the ISV to avoid CAPEX investment to set up own Cloud infrastructure if it wants to provide SaaS services, and profit from marketplace as a marketing platform to enlarge ISVs SW awareness in the EU market.

In Year 3, this model will be implemented in the Fortissimo marketplace by WP2 as the so-called Fortissimo Business Containers, as described in Ch. 8.1 of the Fortissimo reporting deliverable D2.2 [22].



It is a matter of fact this is already a new business model for the EU Computer Aided Engineering (CAE) ISV market, which is still dominated by the traditional way of selling software, with a license fee usually matched with an annual maintenance fee, depending on the number of concurrent users, concurrent parallel threads, etc... For an analysis of actual ISV licensing models, see [23].

However, the model presented here is obviously not a surprising one, following the pattern already adopted in other software markets, like customer relationship management (CRM), management information systems (MIS), enterprise resource planning (ERP), where SaaS is already a de facto standard.

Is there the possibility to create more out-of-the-box, disruptive models, that may be tested and compared with respect to the baseline BM and may constitute a valuable insight for the niche ISV approaching for the first time the Cloud and in particular the Fortissimo marketplace?

To explore this possibility we adopted the ideation tool described in [19]. The authors looked at several hundred business model innovators and found that about 90 % of the innovations turned out to be re-combinations of previously existing concepts. They identified 55 repetitive patterns that form the core of essentially all new business models. As an example, Nespresso's BM to sell coffee machines and capsules, considered one of the most innovative model of recent years, is nothing but an adaptation of a pattern already used by John D. Rockefeller's Standard Oil to sell kerosene for lamps in late 19<sup>th</sup> century.

The identified 55 business model patterns form the central ideation tool of the St. Gallen Business Model Navigator<sup>TM</sup> (BMN) methodology. The underlying concept is that re-combining existing concepts is a powerful tool to break out of the box and generate ideas for new business models. The 55 patterns are condensed into a handy set of pattern cards. Each pattern card contains the essential information that is needed to understand the concept behind the pattern: a title, a description of the general logic, and a concrete example of a company implementing the pattern in its business model. During the stage of ideation, the level of information on the card is just right to trigger the creation of innovative ideas.

The way in which the cards are applied is termed pattern confrontation to describe the process of adapting the pattern to one's own initial situation. During a WP9 ideation session, participants asked themselves how the pattern would change their business model if applied to their particular situation. Even if at first glance the cards might seem unrelated to the problem, often the stimuli, in the form of pattern cards, cause innovative ideas to emerge, which inspire discussions among the group members. Obviously it is not practical to work with all 55 cards together, so that there was a selection made by the WP9 leader as facilitator, including, as recommended by [19] authors, not only patterns close to the existing one, but also a few distant one, to stimulate creativity. The methodology is indeed powerful, although challenging since all individuals with a profound background in the existing industry like those working in this Work Package have difficulties in overcoming the dominant industry logic.

The generated ideas underwent a first screening for internal and external consistency, and the most promising ones were kept for further analysis. Here, an internal consistency check means confirming that the business model is consistent in its core dimensions who-what-how-why, and an external consistency check means confirming that the business model is consistent with the external change drivers.

#### ***4.3.2.2.5 Test and iterate***



The ideation process produced a series of interesting concepts, the most promising are listed in Table 11. For seek of clarity, the reader must remember that all these ideas assume that changes are independent of the Fortissimo Marketplace Business Model; that is they involve only the relation between the ISV selling SaaS services on the Marketplace and their direct customer, identified here as an “SME engineering consulting company”. As a first approximation, the reader may assume that for every simulation the customer runs on a Fortissimo Resource Provider (RP) system, the ISV pays a per-cpu-hour fee to the Fortissimo Marketplace. For every consideration on the Fortissimo Marketplace Business Model itself, please refer to WP8 Deliverables.

**Table 11: Sketches of novel BMs for ISVs after the ideation phase.**

BMN PATTERN	#	SKETCH IDEA
SHOP-IN-SHOP	1	ISV keeps hourly rates low selling virtual spaces to third-parties, like: <ul style="list-style-type: none"> <li>• Fab-labs, 3D printing labs selling physical prototypes of the simulation results</li> <li>• Designer studios selling artistic renderings of the simulation results, professional reports and presentations including simulation results</li> </ul>
RAZOR AND BLADE	2	ISV provides SW for free in its desktop version, but some options are available only on the SaaS service at a high pay-per-use rate
	3	Pay-per-use hourly rate is very low (lower than the fee the ISV gives to RP), but:
	3a	Client must pay the upload/download of files at per-MB rate
	3b	Input needs a special format from a specific mesh-producing software, which costs a high amount per produced mesh
	3c	Client needs to buy extra tokens to see specific outputs
PERFORMANCE BASED CONTRACTING	4	ISV is paid by the customer consulting company a fixed rate on the client contract
PAY WHAT YOU WANT	5	After the simulation ended the customer chooses the rate he wants to pay within three options: <ul style="list-style-type: none"> <li>• Premium (which gives benefits to be determined)</li> <li>• Baseline</li> <li>• Nothing (but the customer needs to complete a lengthy feedback)</li> </ul>
FREEMIUM	6	ISV gives to all customers a cpu_hours package for free (but pays the RP for them), giving to premium paying customers services like: <ul style="list-style-type: none"> <li>• A larger package (unlimited?) of cpu_hours</li> <li>• Remote visualization</li> <li>• Support</li> <li>• Training</li> </ul>
FLATRATE	7	Customer pays a fixed per-simulation fee independent of its duration or number of parallel threads
	8	Customer pays a fixed monthly rate independent on the number of simulation runs

After the ideation phase, a rapid internal and external consistency check was made on the 10 ideas to extract the two most promising models for further analysis, choosing models 3a (hereinafter, “Alpha” model) and 8 (hereinafter, “Beta” model). Some of the other models are promising, but require extensive change in the ISV SW itself, making it much more challenging to discuss with the ISV about their possible adoption and test.

Tables 12 and 13 sketch these two models with the Magic Triangle description and outline where they differ from baseline (italic bold sections).

**Table 12: Magic Triangle Breakout for the Alpha Business Model**

<b>Magic Triangle Breakout for Alpha BM</b>
<b>Who?</b>
SME engineering consulting companies.
<b>What?</b>
A SaaS service for ISV’s CFD application.
<b>Why?</b>
<i>Client pays on-demand fee based on cpu_hours and MB transferred, where the cpu_hours fee is much lower than in the baseline case.</i>
<b>How?</b>
ISV implements SaaS service on Service Provider infrastructure, i.e. the Fortissimo marketplace. <i>Service Provider returns extensive accounting data.</i>
<b>Value Proposition</b>
Client uses ISV SW as SaaS because it allows larger, more accurate simulations without CAPEX, or same simulations in shorter times, and SW license is paid on demand. <i>Client perceives the SW as (almost) free making it more difficult to compare real simulation costs with competitors.</i>
<b>Revenue Model</b>
Profit is made on the margin left by Service Provider fee.
<b>Value Chain</b>
The strategic partnership with Fortissimo allows the ISV to avoid CAPEX investment to set up own Cloud infrastructure if it wants to provide SaaS services, and profit from marketplace as a marketing platform to enlarge ISV SW awareness in the EU market.

**Table 13: Magic Triangle Breakout for the Beta Business Model**

<b>Magic Triangle Breakout for Beta BM</b>
<b>Who?</b>
SME engineering consulting companies.
<b>What?</b>
A SaaS service for ISV’s CFD application.
<b>Why?</b>
<i>Client pays monthly fee.</i>
<b>How?</b>

ISV implements SaaS service on Service Provider infrastructure, i.e. the Fortissimo marketplace. *Service Provider returns extensive accounting data.*

#### Value Proposition

Customer uses ISV SW as SaaS because it allows larger, more accurate simulations without CAPEX, or same simulations in shorter times. *Fixed monthly fees make the proposition particularly convenient for peak management, and push the customer to make larger, high accuracy simulations a standard for their consulting work, pushing the market along.*

#### Revenue Model

Profit is made on the margin left by Service Provider fee. *A detailed analysis of accounting data is required to set correct pricing.*

#### Value Chain

The strategic partnership with Fortissimo allows the ISV to avoid CAPEX investment to set up own Cloud infrastructure if it wants to provide SaaS services, and profit from marketplace as a marketing platform to enlarge ISV SW awareness in the EU market.

These indications are now ready to become requirements for WP2 for the implementation of specific Business Containers. The opening of the Marketplace to the public in Year 3 will allow the possibility to test these propositions.

The scouting for Earlyvangelists among the ISV Fortissimo partners, which fit the specific market segment we considered in our analysis, is ongoing. In particular EnginSoft, partner of Exp. 418 and 519, which has the peculiarity to be both an ISV and an engineering consulting company, expressed the interest to participate in the test phase. Contacts are ongoing also outside the Fortissimo consortium.

The analysis of the usage patterns of CAE software provided by the HPC centres will help to evaluate numbers for the different fee schemes of the Alpha and Beta models with respect to the baseline one.

## 4.4 Introduction

As detailed in the Fortissimo Description of Work (DoW) the outputs of this Work Package consist of three yearly reports, in detail:

**D9.1)** WP9 Year 1 Report: The first formal yearly report on WP9 including the first ISV Market Analysis Report and a report on the first ISV Forum. At month 12.

**D9.2)** WP9 Year 2 Report: The second formal yearly report on WP9 including the second ISV Market Analysis Report and a report on the second ISV Forum. At month 24. This is the present document.

**D9.3)** WP9 Year 3 Report: The final formal yearly report on WP9 including the final ISV Market Analysis Report and a report on the final ISV Forum. At month 36.

Since for the opportunity reasons explained in D9.1, the first ISV Forum was held outside the reporting period, having obtained the necessary EC approval, the report on the first ISV Forum is included in D9.2. This has been considered more convenient than having a dedicated whitepaper, meant as an Appendix of D9.1, as envisaged in that Deliverable. D9.3, to be published at month 36, should therefore contain the reports for both the second and the final Fortissimo Forums.

Number	Title	Due	Status
D9.1	WP9 Year 1 Report	PM12	Approved
D9.2	WP9 Year 2 Report	PM24	Done

Table 14: Cumulative status of deliverables from workpackage 9.

## 4.5 D9.2 WP9 Year 2 Report

It is the current document.

## 5 Resources used

The following effort (in staff months) by partners has been reported in this work package at month 24 for the period months 13 to 24 (June 2015 effort number are estimates).

<b>Participant</b>	<b>Pro-rata effort</b>	<b>Planned effort</b>	<b>Reported effort</b>
UEDIN	0,67	0,67	0,00
GENCI	0,67	0,67	0,28
CINECA	2,00	2,00	1,94
XLAB	0,67	0,67	0,67
ARCTUR	0,67	0,67	0,39
GOMPUTE	0,67	0,67	0,28
INTEL	1,00	1,00	0,00
SICOS	0,72	0,72	0,00
<b>Totals</b>	<b>7,05</b>	<b>7,05</b>	<b>3,56</b>

**Table 15: Resources used**

Due to the low quantity of overall effort available to this Work Package, we do not consider the deviations from planned effort meaningful, since they may be easily overcome in the next reporting periods. Moreover, the focus of the work package is expected to be more towards later periods, so the reduced effort at this stage is not unexpected.

## 6 Problems and Deviations

In this reporting period a number of minor problems and challenges have been encountered. In this section these problems are mentioned, including the undertaken reaction and their current status.

Tasks 9.1-9.2 problems:

- The WP9 team lacked competences in Business Model Innovation. We acknowledge pointers from one of the Project reviewers on the methodology to adopt. The learning and adoption process delayed the WP9 activities. Actions were then made to share the newly acquired competences to other work packages, and in particular WP8. A business model innovation workshop initiated by the Exploitation Manager and dedicated to WP8 team members will be held in July 2015. Status = closed.
- The Thematic Working Group on software licensing, described in [23], was not completely successful in supporting WP9 activities, due to limited feedback and participation to its activities by its member. At Project Coordination Committee level there is an ongoing discussion on how to revisit the formula to ensure a more active participation. Status = open.

Task 9.3 problems:

- The timeline described in DoW for the annual Forum was not respected. The delayed start of WP5 experiments forced us to move the date of the first Fortissimo Forum to Year 2, as described in Ch. 4.2. The consequent delay of WP6 activities will move the second Forum to the beginning of Year 3. However, as described in Ch. 4.3.1, the choice to have the Forum together with the starting wave of experiments general kick-off made the first Forum a success in terms of participation and quality of the contributions. Status = closed.

## 7 Plans for next period

### Task 9.1 Analysis of licensing models

Besides collecting new information and insights, we will approach ISVs collaborating as partners in the experiments to propose and lead limited experiments on new licensing models, and estimating their impact on their business operations. In particular, the models defined as baseline, Alpha and Beta in Ch. 4.3.2.2.5 will be tested.

This will allow a cycle of “Test and iterate”, according the definition given in Ch. 4.3.2.

### Task 9.2 Analysis of the ISV marketplace

The proposals discussed in this document will be discussed during the second ISV Forum, that will provide new insights to use for further refinements and the new “Test and iterate” phase.

This will open the possibility to calculate the possible impact on the ISV marketplace, proposing best practices and risk mitigation scenarios.

### Task 9.3 The yearly ISV forum

Following the model adopted with the first ISV Forum, also the second will be held in conjunction with the experiments workshop in the first month of activity of the final wave of experiments, at the beginning of July 2015 in Amsterdam. Its outcome will be analysed, in order to provide hints not only for Task 9.1 and 9.2 activities, but also for improvements to the organization of the final Forum. The delayed occurrence of the first two Forums should not be a hindrance to have the final Forum at the end of Year 3 as envisaged by DoW. A final decision on the date for the final event will also depend on a possible extension of the Project.

The following risks have been identified and contingencies have been proposed:

- Insufficient interest in the next ISV Forums, translating in a limited participation to the events;
  - the event is likely to have a good participation if the perceived value is high, therefore we must make sure the outcome of the Forums and of the Work Package activities is adequately disseminated;
  - to overcome resistance to attendance by industrial End-Users and ISVs due to budget restrictions, we will consider the possibility to hold the event in the framework of other events where a score of the expected participants is already likely to attend.
- Limited involvement of ISVs in Work Package activities, especially low completion rates of questionnaires and low number of interviews;
  - in occasion of questionnaires release or interviews campaign we will ask the contribution of all partners to push their respective personal contacts to the participation;
  - a policy of sharing the insights from the analysis with all stakeholders will be put in place in order to increase the perceived value of participation.

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