

# PROJECT FINAL REPORT

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# 1 Final publishable summary report

## 1.1 Executive summary

This publishable summary comprises a presentation of the vision and objectives of Fortissimo, the challenges that these presented, the achievements that resulted, a discussion of the end-user-driven experiments carried out, an in-depth discussion of the business aspects of HPC-Clouds from the perspective of all potential participants in the value chain, a set of recommendations to support the exploitation of viable business opportunities, a discussion of impacts, both realised and potential, and overall conclusions from the project

The vision of Fortissimo is to enable European manufacturing industries to benefit from the efficiency and competitive advantages inherent in the use of simulation, as practised, successfully and for some time now, by numerous high-tech industries. The importance of advanced simulation to increased competitiveness for both large and small companies is well established. The mechanism adopted by Fortissimo to realise this vision is the provision of simulation services running on an HPC-based cloud infrastructure, the Fortissimo Marketplace.

The achievements of Fortissimo comprise:

- The implementation of a prototype “one-stop shop”, the Fortissimo Marketplace, where end-users new to HPC can get expert advice on opportunities to improve their competitiveness through the use of HPC combined with access to the expertise necessary to exploit those opportunities and where more experienced users of HPC can have easy access to HPC services;
- The establishment of Fortissimo Marketplace Limited, the legal entity to carry out the business of the Fortissimo Marketplace.
- The development of business models to address the long-term sustainability and viability of the Fortissimo Marketplace;
- A wide awareness of the potential benefits of the HPC-Cloud-based simulation across European manufacturing. The creation of this awareness has been based around the 44 success stories resulting from the 53 end-user driven experiments;
- The commercially relevant new services resulting directly from the experiments.

These outcomes have significant potential to improve the competitive position of European manufacturing industry and to create new business opportunities for the diverse actors in the HPC-Cloud value chain including infrastructure providers, service providers, ISVs, HPC experts, application domain specialists and end-users.

The Fortissimo Marketplace now exists as a usable ecosystem supporting interactions between all players in the value chain. A legal entity has been established to carry out the business of the Marketplace. A confidential business plan has been developed to support and develop that business. That business plan sets out how the activities of the Marketplace will develop. The challenge now facing the Fortissimo Marketplace (and the legal entity which conducts its business) is to compete in a challenging market where there are already several aggressive players. Flexibility, opportunism and the right approach to promotion and sales will be essential components in the tactical and strategic approaches to the establishment and development of the business of the Fortissimo Marketplace.

## **1.2 Summary description of project context and objectives**

### **1.2.1 Vision and Objectives**

The vision of Fortissimo is to enable European manufacturing industries to benefit from the efficiency and competitive advantages inherent in the use of simulation, as practised, successfully and for some time now, by numerous high-tech industries. The importance of advanced simulation to increased competitiveness for both large and small companies is well established. The mechanism adopted by Fortissimo to realise this vision is the provision of simulation services running on an HPC-based cloud infrastructure, the Fortissimo Marketplace. Towards the realisation of this vision, Fortissimo has addressed the following goals:

- Making advanced simulation accessible to industrial users, particularly SMEs, through the creation of a “one-stop shop”, the Fortissimo Marketplace, where hardware, expertise, applications and visualisation and other tools are easily available and affordable on a pay-per-use basis;
- Creating and demonstrating a sustainable commercial ecosystem where actors at all levels in the value chain can realise sufficient commercial benefit to enable that commercial ecosystem to persist independently of EU funding, providing services to manufacturing industry, particularly SMEs.

The focus in Fortissimo has been on business-relevant application experiments to develop, test, refine and demonstrate this “one-stop-shop” and to confirm its economic viability to all participants in the value chain. A key objective has been to overcome the barriers to the development and exploitation of HPC-Cloud-based simulation services. This has been done through the development, testing, evaluation and demonstration of HPC-Cloud-based simulations, complemented by the creation of a working infrastructure, the Fortissimo Marketplace.

### **1.2.2 Challenges**

The challenges facing Fortissimo, the development of the Fortissimo Marketplace and its use by potential beneficiaries have been manifold and include:

- Flexible and affordable accessibility of HPC resources: HPC systems are not, in general, accessible by companies, particularly SMEs, on affordable, flexible, pay-per-use terms. The creation of an environment where such systems can be made widely available in an affordable pay-per-use way is an essential development;
- Lack of awareness of the capabilities of simulation: Many small organisations, which could benefit from advanced simulation, are not aware of its capabilities and benefits;
- Lack of domain expertise in small companies or departments of larger organisations: Many organisations, even those aware of the capabilities of advanced simulation, lack the necessary in-house expertise to exploit those capabilities to improve their competitiveness and profitability;
- Lack of HPC expertise in small companies or departments of larger organisations: There is a general lack of HPC expertise in small companies and even in many departments of larger organisations;
- Licensing issues: The adaptation of licensing models to enable pay-per-use of applications and resultant services needs to be addressed.
- Ease of use: increasing the ease with which HPC can be used in the manufacturing sector through the availability of ready-to-go applications and on-demand access to HPC systems;
- Combining skills and resources: this is essential for the effective use of HPC resources which include software, licensing, domain and HPC expertise and compute cycles.

### **1.2.3 The Fortissimo Approach**

The Fortissimo approach has been straightforward and pragmatic:

- A prototype HPC-Cloud infrastructure, the Fortissimo Marketplace, has been set up using existing hardware resources owned by the Fortissimo partners;
- The “one-stop shop” concept has been tested and evaluated using 53 business relevant experiments involving all levels of the value chain. These experiments have formed the basis for an extensive dissemination and awareness activity based on success stories derived from the experiments;
- The comprehensive dissemination activity has created awareness of the capabilities and potential of HPC-Cloud-based simulation to all potential participants in the value chain and has stimulated the market for the provision of the necessary infrastructure, software, services and expertise as well as creating awareness amongst potential end-users.

### **1.2.4 The Dynamics of Fortissimo**

Participants in Fortissimo comprise all players in the value chain from end-users through to HPC computer centres. The dynamic of these players collaborating is as follows:

- Experiments indicate end-user requirements as input to the development of the Fortissimo Marketplace;
- Domain and HPC experts support the development feedback loop between the Marketplace developers and the experiments;
- Experiments produce dissemination material including the success stories, the Fortissimo Brochure, flyers and the industry-facing Fortissimo website. This activity supports the creation of a critical mass of interest and an awareness across industry of Fortissimo and of the benefits of advanced simulation using Cloud-based HPC;

Establishing a critical mass of activity results is essential towards a growing and viable Fortissimo Marketplace. Furthermore, all participants in the value chain must see a clear benefit from their involvement in the Marketplace and its activities.

### **1.2.5 Achievements**

Fortissimo has contributed to overcoming the barriers of access to HPC-based advanced simulation by providing the benefits of Cloud (low cost of entry, elasticity and pay-per-use models), combined with the necessary expertise (application domain and HPC) and open-source and licensed software.

#### **1.2.5.1 Development of the Fortissimo Marketplace**

To address the challenge of developing an infrastructure fit for purpose, Fortissimo has been driven by end-user requirements where business-relevant application experiments have been used to test and demonstrate both the infrastructure and the concept of the “one-stop pay-per-use shop”. Furthermore, the participants in the experiments have represented all actors across the value chain to ensure its viability in real commercial use. These actors comprise end-users; ISVs, simulation service providers, HPC and domain experts, and HPC centres.

To achieve its objective of enabling European manufacturing industries to benefit from the efficiency and competitive advantages inherent in the use of advanced simulation, Fortissimo has addressed the following tasks:

- To establish a prototype European Marketplace for HPC-Cloud simulation services offering European manufacturers, particularly SMEs, access to a pay-per-use one-stop shop for simulation and modelling applications;
- To run a total of 53 end-user driven application experiments that showcase the innovative use of modelling and simulation using the HPC-Cloud services and infrastructure.;
- To create a self-sustaining HPC-Cloud ecosystem for by removing barriers to the uptake of modelling and simulation and tailoring new services to the requirements of industry.

To address the challenge of developing an infrastructure fit for purpose, Fortissimo has been driven by end-user requirements where business-relevant application experiments have been used to test and demonstrate both the Marketplace and the “one-stop pay-per-use shop”. Furthermore, to ensure wide applicability, the participants in the experiments have represented all actors in the value chain.

The prototype Fortissimo HPC-Cloud infrastructure has been built from the existing hardware resources of the beneficiaries connected together by “glue” software. This “glue” software has comprised current off-the-shelf solutions, supplemented by further development only where necessary.

### **1.2.5.2 The Experiments**

A central activity in Fortissimo has been the performance of 53 experiments focusing on real industrial problems. These experiments have clearly demonstrated the benefits of advanced Cloud-based-HPC simulation. They resulted in 44 success stories which have been the cornerstone of an extensive dissemination and awareness-creation campaign. The success stories are available on the Fortissimo website<sup>1</sup>. Furthermore, the experiments have provided important feedback into the development of the Fortissimo Marketplace and to an analysis of the benefits of Cloud-based-HPC simulation in the accompanying Fortissimo Impact Report.

In most experiments an economic return greater than the investment of public funding made by the EC was noted. However, not all benefits can or should be reduced to purely monetary returns: Improved products and services; improved reputation; faster design cycles; feasibility; environmental impact of less waste; and environmental and societal benefits should also be taken into account.

The experiments involved both naïve and experienced end-users. The former would not otherwise have been involved in an activity capable of giving them a significant business benefit. The latter were looking to increase the scope of existing applications (bigger, faster, lower cost etc.).

Creating and promoting success stories, derived from successful experiments, is a key factor in reaching the Fortissimo goal of promoting the use of digital simulation to SMEs. A wide range of industrial sectors and applications are represented in the experiments. This is essential for the effective demonstration of the flexibility of Cloud-based-HPC simulation and how it can address the challenges facing individual SMEs.

The success stories encapsulate the positive outcomes of the experiments where the benefits of the results of the experiments can be clearly demonstrated. These 44 success stories form a diverse body of material due to grow in the follow-on project Fortissimo 2.

### **1.2.5.3 Business cases for the Fortissimo Marketplace**

Different kinds of business models serving user segments of the marketplace have been considered. To determine the sustainability of the different business models, various business scenarios have been analysed.

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<sup>1</sup> <https://www.fortissimo-project.eu>

This analysis has included the costs involved in different business scenarios based on their operation and sustainability. This has been done by reviewing the possible revenue streams that could be generated based upon the available key resources, partners, and activities, and the customer segments, customer relations, channels and value propositions. The following sections summarise the outcomes of this analysis as a set of business cases.

Significant activity has taken place towards the understanding the interplay in the market between users and providers at large. A specific activity has focused on the needs of ISVs to support the on-stop-shop and pay-per-use concepts.

#### **1.2.5.4 Dissemination**

A significant activity based around the success stories from the experiments has created substantial awareness of the potential of HPC across industry, politicians and the general public.

This dissemination activity has created awareness of the capabilities and potential of HPC-Cloud-based simulation to all potential participants in the value chain and has stimulated the market for the provision of the necessary infrastructure, software, services and expertise as well as creating awareness amongst potential end-users.

#### **1.2.5.5 The Major outcomes of Fortissimo**

The following major outcomes have resulted from Fortissimo:

- A prototype “one-stop shop”, the Fortissimo Marketplace, where end-users new to HPC can get expert advice on opportunities to improve their competitiveness through the use of HPC combined with access to the expertise necessary to exploit those opportunities and where more experienced users of HPC can have easy access to HPC services;
- Business models have been developed to address the long-term sustainability and viability of the Fortissimo Marketplace. Significant emphasis has been placed on developing business models, with a broad scope, covering market expectations and pricing, which benefit all levels of the value chain enabling them to establish a viable business in the provision of services and leading to a sustainable Fortissimo Marketplace;
- A wide awareness of the potential benefits of the HPC-Cloud-based simulation across European manufacturing. The creation of this awareness has been based around the success stories resulting from the 53 end-user driven experiments;
- A new marketplace for the provision of HPC-Cloud-based services. Some of these services are described later in this document in section 1.2.5.2, but it is anticipated that novel services will also be developed in response to the significant and diverse commercial opportunities the HPC-Cloud will create.

These outcomes have significant potential to improve the competitive position of European manufacturing industry and to create new business opportunities for the diverse actors in the HPC-Cloud value chain including infrastructure providers, service providers, ISVs, HPC experts, application domain specialists and end-users.

### **1.3 A description of the main S&T results/foregrounds**

As discussed above in sections 1.2.5.1 and 1.2.5.2 above, the technical activity in Fortissimo has focused on the development of that software necessary to implement the Fortissimo Marketplace and to enable the

experiments which address both the implementation of industry-relevant solutions and providing input, informing the development of the Marketplace.

The prototype Fortissimo HPC-Cloud Marketplace infrastructure has been built from the existing hardware resources of the beneficiaries connected together by “glue” software. This “glue” software has comprised current off-the-shelf solutions, supplemented by further development only where necessary. The “glue” software developed in Fortissimo is available as open-source. That is to say, it is freely available to other parties. Other than the utility this software provides to enable the Fortissimo Marketplace, it will not be otherwise exploited, but will remain available for other parties both inside and outside Fortissimo to use.

The software developed within the 53 experiments is generally highly proprietary. This software has focused on the implementation of the experiments and has involved ISVs, code owners, HPC experts and HPC Centres. Many of the partners, primarily code owners and ISVs, are now looking to exploit this software through the provision of services. Indeed, 9 experiments have indicated that they wish to provide a service available within the Fortissimo Marketplace using precisely that software developed during the implementation of solutions within the 53 industrially relevant experiments. 16 experiments have indicated an interest in offering HPC-based services via the cloud, not necessarily via the Fortissimo Marketplace.

## ***1.4 The potential impact, the main dissemination activities and exploitation of results***

### **1.4.1 Potential Impact**

The potential impact of Fortissimo is discussed within the framework of data collected from the participants in the project and in the experiments.

#### **1.4.1.1 Gathering of Data**

The gathering of data for this report has concentrated on information from the partners in the Fortissimo experiments. This represents a significant body of diverse experience and expertise. These partners are computer centres, companies and research organisations which fall roughly into the following categories:

- Providers of high-performance computer cycles;
- Independent Software Vendors (ISVs);
- Providers of software including open-source and in-house codes;
- Domain (such as CFD) experts;
- HPC experts;
- Industrial end-users.

The Fortissimo project is very close to the market because it directly addresses the stimulation of European industry through the adoption of Cloud-based-HPC computing. Its business-relevant experiments have placed a particular emphasis on the use of advanced simulation in manufacturing. Such simulation, involving the development of new products and services, is very close to the core businesses of most of the experiment partners in Fortissimo. Details of the outcomes of these experiments and their impact on the products and services sold by these partners are, in many cases, closely guarded information. This has introduced a level of abstraction, anonymisation and consolidation into the gathering of data and the information in that data. This necessarily implies that a document such as this deals with imprecise data which have, to varying degrees, been filtered and redacted by the partners concerned.

To compound this imprecision, much of the data provided deals with new products, services and markets. This means that we are dealing with imprecise market data and predicted deployments and revenues. In such cases, it is possible for a single datum to give a distorted picture of a wider market which renders any interpretation of such statistics uncertain or pointless. Rather than pursue a path of optimistically consolidating data and presenting meaningless averages and other statistics, we have chosen to present the data gathered in a qualitative way drawing on the information presented both by the Fortissimo success stories augmented by further information from the Fortissimo computer centres.

In total the results from 53 experiments and data from the partners involved have been used as the basis for this report. The gathering of data has involved interactions between the authors of this document, the Fortissimo computer centres and the other partners in the experiments. Much of this information is encapsulated in the success stories and the Experiments available via the Fortissimo Webpages, <https://www.fortissimo-project.eu>. The partners providing information for this report, can be roughly broken down as follows:

- Industrial end-users (58);
- ISVs (34)
- Code Owners (2)
- Domain experts (34)
- HPC experts (43)
- High-performance computer centres (8)

In total 120 partners were involved in the experiments broken down as above. It should be noted that some partners took multiple roles e.g. a partner might be both an ISV and a domain expert. Equally, there might be multiple end-users in a particular experiment.

The data underpinning this report was gathered from the HPC Centres and from the individual partners in the experiments. This data was captured directly from the HPC Centres, from the Experiment Final Reports and from the success stories and associated templates. In many cases the data were subject to refinement and clarification involving significant interaction between the experiment partners, the HPC-Centres and the participants in the Dissemination and Training work package responsible for the development of the Fortissimo success stories.

### **1.4.1.2 The Data Gathered**

It should be noted that out of the 53 experiments conducted in Fortissimo, 44 resulted in success stories published on the Fortissimo Website, the Fortissimo Brochure These 44 experiments have been used in the development of the KPIs below. Following the gathering of data from these experiments, the following KPIs were identified.

#### ***1.4.1.2.1 Affordability***

The availability of Cloud-based HPC systems, on a pay-per-use basis, opens up the use of such systems to companies which otherwise would only have access via an expensive in-house system. In many cases, such a system would not be financially viable because it would represent too great a capital investment. Furthermore, the cost of ownership of such a system would be much greater than pay-per-use deployment of a Cloud-based system. This is because a cloud-based system generally has a much greater utilisation than an in-house one.

16 experiments reported affordability as being a key issue in the use of Cloud-based HPC.

#### ***1.4.1.2.2 Feasibility***

Feasibility is the complement to affordability. Some industrial applications are not feasible using an in-house system because it would have to be so big as to render it financially unviable. The elasticity of the Cloud-based approach can overcome this by making very large systems available on a pay-per-use basis at an affordable cost. In other words, the availability of very powerful systems via the Cloud enables large simulations to be undertaken which otherwise would not be possible on a smaller system or which would take too long to be consistent with the timescales of the design process.

Furthermore, simulations could reveal properties which physical experiments could not. The experiment entitled HPC-Cloud-based Simulation of Steel Casting is an example where simulation can reveal features not amenable to physical inspection.

22 experiments reported feasibility as being a key issue in the use of Cloud-based-HPC simulations.

#### ***1.4.1.2.3 Access to Expertise***

Many of the end-users were naïve users of simulation. Some might have no experience at all of the benefits of simulation and some might have tried elementary simulations using low-power in-house systems. In several cases access to domain expertise, such as CFD or the use of a particular software package, and to HPC expertise were seen as important.

12 experiments reported access to expertise as being a key issue in the use of advanced Cloud-based-HPC simulations.

#### ***1.4.1.2.4 Increased Revenue***

The success stories generally demonstrated an increase in revenue for the participants in the experiments. This included small consultancies able to increase their turnover through the use of HPC, ISVs able to sell their codes, domain and HPC experts able to sell their skills and computer centres able to sell cycles. Interestingly, many participants in the value chain presented increases in revenue, but some presented more revealing figures by presenting increased profit. This is discussed in the section 1.4.1.2.5 below which deals with increased profit.

28 experiments reported increased revenue as being important drivers to the use of Cloud-based HPC. These figures should be considered together with those for cost savings above in section 1.4.1.2.7 and increased profit in section 1.4.1.2.5 below.

This was a highly variable indicator with indications of increased revenue in the millions of Euros while some partners reported increases in the low thousands. The experiments HPC-Cloud-based Design of High-Pressure vessels and the experiment HPC-Cloud-based Simulation of Flange Tightening are experiments reporting significant returns, while other experiments report increased revenues in the tens of thousands of Euros only.

#### ***1.4.1.2.5 Increased Profit***

The success stories generally demonstrated an increase in profit for the participants in the experiments. This included small consultancies able to increase their profit through the use of HPC, ISVs able to sell their codes, domain and HPC experts able to sell their skills and computer centres able to sell cycles. Interestingly, many participants in the value chain presented the more revealing increases in profit, but some presented less revealing figures by presenting increased revenue. These figures should be considered together with those for increased revenue in section 1.4.1.2.4 above and cost savings in section 1.4.1.2.7 below.

8 experiments reported increased profit as being important drivers to the use of Cloud-based HPC. Again, this indicator is variable with some experiments presenting increased profit in the thousands of Euros and other in the hundreds of thousands.

#### ***1.4.1.2.6 Job creation***

6 experiments reported increased employment as a result of new capabilities through the use of Cloud-based HPC. One might expect the replacement of physical experiments with computer-based simulation to reduce employment, however in these cases it appears that the opening of new business areas contributed to the creation of new, highly skilled jobs.

#### ***1.4.1.2.7 Cost savings***

Many partners reported cost savings for several reasons including:

- Cloud-based computer cycles are cheaper than in-house cycles;
- HPC-based simulation was cheaper than physical experiments;
- Cloud-based HPC was cheaper than in-house systems;
- Design cycles were shorter with fewer physical prototypes needed;
- Improved industrial processes resulted in less wasted material and energy;
- Improved products resulted in cost savings;
- Favourable licensing arrangements;
- Mission critical simulations could be carried out more accurately and quickly, thus saving operational costs.

30 experiments saw cost savings as an important driver for the use of Cloud-based-HPC simulations.

#### ***1.4.1.2.8 Quality of simulations***

Partners from 4 experiments noted that the availability of Cloud-base HPC made it possible to carry out much more detailed simulations with the following benefits:

- Better products through high-fidelity simulation;
- Zero failure rates in statutory product inspection;
- Less waste in manufacture;
- Shorter design cycles involving fewer iterations and lower staff effort;
- Better industrial processes.

#### ***1.4.1.2.9 Shortened design cycles***

Partners from 15 experiments noted shorter design cycles as an important driver for the use of Cloud-based-HPC simulations. Benefits included:

- Shorter times to market;
- Lower design costs;
- Increased competitive advantage;

#### ***1.4.1.2.10 Improved competitive position***

Partners from 10 experiments noted an improved competitive position as a result of using advanced simulation. This improvement resulted from faster design cycles, shorter time to market, better products and lower costs.

### **Improved industrial performance**

Partners from 10 experiments noted improved performance of their products in industrial use. Examples of this can be seen in the experiments HPC-Cloud-based Design of High-pressure Vessels, HPC-Cloud-based Simulation of Flange Tightening and Advanced Simulation of Hydro-power Turbines.

#### ***1.4.1.2.11 Improved products***

Partners from 9 experiments noted improved products as a result of using Cloud-based-HPC. These products included: light aircraft; industrial manufacturing equipment; high-voltage cables; optimised aircraft wiring; more detailed chemical data; improved high-performance cars; better chimneys; better engine components; and better ships.

#### ***1.4.1.2.12 New and Improved services***

Partners from 10 experiments identified new and improved services available or to be made available via the Fortissimo Marketplace or otherwise. These included: prediction of drifting snow; molecular modelling; processing of cartographic data; electro-magnetic design; analysis of gears; drug discovery; manufacture of engine components; seismic processing; crowd monitoring; and the design of communication buoys.

#### ***1.4.1.2.13 New business opportunities***

Partners from 8 experiments noted new business opportunities arising from the use of Cloud-based-HPC simulation. These included the areas of: composite material design; molecular modelling; electromagnetic design; environmental modelling; additive manufacture; superconductors; and ship design.

#### ***1.4.1.2.14 New licence models***

New approaches to software licensing were noted in 9 experiments.

#### ***1.4.1.2.15 Services to be offered in the FF Marketplace***

Partners from 9 experiments expressed an interest in placing services in the Fortissimo Marketplace. 24 services are currently available.

#### ***1.4.1.2.16 Services to be offered elsewhere.***

Partners from 16 experiments expressed an interest in offering HPC-based services via the Cloud.

#### ***1.4.1.2.17 Discussion***

Whilst the principal aim of Fortissimo is to benefit SMEs in the manufacturing sector, it is clear that there need to be benefits across the value chain to support a thriving infrastructure supporting the use of advanced Cloud-based-HPC simulations. The Fortissimo experiments carried out demonstrate, in the preceding sections, a wide range of benefits addressing all participants across the value chain. These participants include industrial end-users, HPC experts, domain experts, code owners, ISVs and computer centres. The Fortissimo Marketplace provides an ecosystem where all these participants have either a financial (i.e. they make money for their services) or commercial (they make better products more cheaply) or a competitive (time to market is reduced) benefit. Such benefits are clearly described and qualified above.

## 1.4.2 Dissemination Activities

### 1.4.2.1 Discussion

The activities undertaken in Fortissimo supporting dissemination and the creation of awareness and the broadening of its impact have included:

- The development of the Fortissimo style;
- The development of the Fortissimo website linked to the Fortissimo Marketplace;
- The development and promotion of success stories and associated videos;
- The press campaign and supporting press releases;
- Promotion of the Open Calls;
- The development of appropriate public reports and documents<sup>2</sup>;
- Attendance at conferences and exhibitions;
- Cooperation with other EU initiatives such as I4MS<sup>3</sup>;
- The development and promotion of training material;

These activities and their impact on industry are discussed in the following sections.

### 1.4.2.2 Success Stories and their Effectiveness

One of the main goals of Fortissimo is to encourage European SMEs to use digital simulation for the development and optimisation of their products in order to stay competitive in a global market. However, for an SME the integration of new technologies into the development work flow or into production is of higher risk than for a large company. This is because the investment will be a much bigger fraction of the overall turnover. To mitigate this risk for SMEs, it is essential to demonstrate that the deployment of new technology can lead to increased business for other SMEs companies. This is one of the major goals of Fortissimo.

The Fortissimo project has developed 53 experiments aimed at demonstrating to SMEs the benefits of using advanced digital simulation. Moreover, these experiments show clearly how to integrate digital simulation and HPC technologies into current working practices while keeping the risk and necessary investment at a low level.

Creating and promoting success stories, derived from successful experiments, is a key factor in reaching the Fortissimo goal of promoting the use of digital simulation to SMEs. A wide range of industrial sectors and applications are represented in the experiments. This is essential for the effective demonstration of the flexibility of Cloud-based-HPC simulation and how it can address the challenges facing individual SMEs.

Fortissimo has created and published 44 success stories that demonstrate the business benefits of digital simulation for SMEs. These form the basis for a raft of communication and promotional activities in Fortissimo which will be continued in Fortissimo 2 and through the commercial activities of Fortissimo Marketplace Ltd, the legal entity of Fortissimo. Additional success stories will result from the nearly 40 additional experiments in Fortissimo 2. This set of success stories is a considerable asset. It will be an important component in realising Fortissimo's goal of stimulating the business of SMEs by bringing HPC-Cloud-based simulation to them. The success stories are available from the Fortissimo web site. A brochure brings all success stories into a single document. Flyers have been developed to promote individual success stories.

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<sup>2</sup> This document, the collated success stories and the Fortissimo White Paper available on the Fortissimo website.

<sup>3</sup> <http://i4ms.eu/i4ms/i4ms.php>

Fortissimo has produced three industrial videos demonstrating the business impact of an experiment on the end-user. Their impact has been maximised by choosing three different segments and using three different success stories from three different countries. All three videos are short and to the point to give the main message of the success story without losing the attention of the audience. These videos are highlighted on the webpages namely the experiment and pressroom pages. These videos will also be used for general introduction to the Fortissimo Marketplace at events including presentations, workshops and conferences.

### **1.4.2.3 Effectiveness of the Press Campaigns**

One of the main activities of Fortissimo has been the planning and execution of a communication and press campaign. Fortissimo contracted five different agencies in five countries (UK, France, Spain, Italy, and Germany) which were led by the German agency, Flutlicht.

The campaign was mainly based on highlighting the Fortissimo success stories picking one or two for each communication. The target was not only technical communication channels such as technical magazines, but also general everyday news channels such as newspapers and web portals. The goal was to promote the Fortissimo brand and the Fortissimo Marketplace together with the central message around the business benefits of digital simulation.

The press campaign has been successful with significant impact. More than 225 articles about Fortissimo, the Fortissimo Marketplace and business benefits of digital simulation as demonstrated in Fortissimo have been published in seven countries over a period of three months to the end of the project. The articles comprised online and printed articles in diverse media types including national daily newspapers, weekly news magazines, mainstream and technology media and horizontal media outlets such as production, engineering, and cloud computing.

### **1.4.2.4 The Fortissimo Web Site and its Effectiveness**

The Fortissimo web site has been under continuous development since its inception. Its layout and structure have been developed to support service and solution offerings. A central element of the web site is the success stories presented in an intuitive way so that users can easily and quickly identify success stories relevant to their business.

Analytics for web-page usage indicate a steadily increasing traffic to the web site. The number of sessions have gone up from about 200 per week in 2015 to 300 per week at the end of 2016. The average number of pages displayed per week has gone up from about 600 in 2015 to more than 1,300 pages per week at the end of 2016).

This is clearly the result of the very successful PR campaign undertaken during November and December 2016. Furthermore, the average number of pages shown per session has gone up from 3.3 to 4.4 pages. The Fortissimo Web site provides direct access to the Fortissimo Marketplace and so is an important component in its promotion. It should also be noted that the web site was an important tool used in the promotion of the Open Calls for Experiments described below in section 1.4.2.7.

### **1.4.2.5 Impact on Industry**

Fortissimo's impact on industry is demonstrated in section 1.4.1.2 **Error! Reference source not found.** where the KPIs are presented. This impact has manifested itself across the value chain in the following ways:

- Affordability of superior design capabilities;

- Feasibility of previously infeasible simulations;
- Access to expertise both HPC and domain specific;
- Increased revenue or profit either through the sale of services or product enhancements;
- The creation of new jobs;
- Cost savings;
- Better design through higher-fidelity simulations;
- Shortened design cycles;
- Improved competitiveness through a range of benefits;
- Better, more performant products;
- New and improved services;
- New licence models; and
- Access to new capabilities via the Fortissimo Marketplace.

#### **1.4.2.6 Cooperation with other initiatives**

Fortissimo has cooperated fully with other EU initiatives such as I4MS (see section 1.4.2.1) and related projects. This support has included:

- Direct liaison with EU officials;
- Participation and presentations at events;
- The organisation of workshops;
- The development of joint promotional material;
- Participation in regular planning meetings.

#### **1.4.2.7 The Open Calls for Experiments**

The Open Calls both in Fortissimo and in Fortissimo-2 provide a good measure of awareness in industry of the potential benefits of Cloud-based HPC. In all four open calls, 2 in Fortissimo and 2 in Fortissimo-2, there was strong competition for funding and clearly a growing awareness of the industrial benefits of this technology.

- In Fortissimo Open Call 1, 65 proposals were submitted. These corresponded to a request for funding of €14.9 million. 22 proposals were selected for funding with a value of €5.1 million.
- In Fortissimo Open Call 2, 82 proposals were submitted. These corresponded to a request for funding of €18.3 million. 10 proposals were selected for funding with a value of €2.2 million.
- In Fortissimo-2 Open Call 1, 73 proposals were submitted. These corresponded to a request for funding of €16.6 million. 22 proposals were selected for funding with a value of €5.1 million.
- In Fortissimo-2 Open Call 2, 102 proposals were submitted. These corresponded to a request for funding of €17.2 million. 15 proposals were selected for funding with a value of €2.5 million.

#### **1.4.3 Exploitation of results**

The principal exploitable results from Fortissimo are the Marketplace and the commercial opportunities enabled by the experiments.

This exploitation is described further in sections 1.2.5.5, 2.2.3, 2.2.4 and 2.2.5

### **1.5 The project website**

The project website (<https://www.fortissimo-project.eu>) addresses the following key points:

- Access to the Fortissimo Marketplace;

- Links to the success stories and the experiments;
- Contact details;
- Links to other relevant information.

## 2 Use and dissemination of foreground

### 2.1 Section A (Public)

#### 2.1.1 Section A1

TEMPLATE A1: LIST OF SCIENTIFIC (PEER REVIEWED) PUBLICATIONS, STARTING WITH THE MOST IMPORTANT ONES										
NO.	Title	Main author	Title of the periodical or the series	Number, date or frequency	Publisher	Place of publication	Year of publication	Relevant pages	Permanent identifiers <sup>4</sup> (if available)	Is/Will open access <sup>5</sup> provided to this publication?
0	No peer reviewed publications	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

#### 2.1.2 Section A2

TEMPLATE A2: LIST OF DISSEMINATION ACTIVITIES										
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<sup>4</sup> A permanent identifier should be a persistent link to the published version full text if open access or abstract if article is pay per view) or to the final manuscript accepted for publication (link to article in repository).

<sup>5</sup> Open Access is defined as free of charge access for anyone via Internet. Please answer "yes" if the open access to the publication is already established and also if the embargo period for open access is not yet over but you intend to establish open access afterwards.

NO.	Type of activities <sup>6</sup>	Main leader	Title	Date/Period	Place	Type of audience <sup>7</sup>	Size of audience	Countries addressed
1	Web site	Intel, EPCC	Fortissimo	Q3/2013 - Q4/2016	<a href="http://www.fortissimo-project.eu">www.fortissimo-project.eu</a>	General public		Europe
2	Conference	Bull, Gompute	STAR Global Conference	17.03.2014-19.03.2014	Wien, A	Technical leaders, engineers		Europe
3	Conference	Sicos	Hannover Messe	07.04.2014-11.04.2014	Hannover, D	Technical leaders, engineers		World
4	Conference	Gompute	Gompute User Meeting	06.05.2014-07.05.2014	Göteborg, S	Technical leaders, engineers		Europe
5	Conference	Sicos	NAFEMS Deutschsprachige Konferenz 2014	20.05.2014-21.05.2014	Bamberg, D	Technical leaders, engineers		Germany
6	Conference	EPCC, HLRS, CINECA, CESGA	Prace Days 2014	20.05.2014-22.05.2014	Barcelona, E	Technical leaders, engineers		Europe
7	Conference	ESI	ESI Global Forum 2014	21.05.2014-22.05.2014	Paris, F	Technical leaders, engineers		Conference
8	Conference	Bull, INRIA	NAFEMS France Conference 2014	03.06.2014-04.06.2014	Paris, F	Technical leaders, engineers		Conference

<sup>6</sup> A drop down list allows choosing the dissemination activity: publications, conferences, workshops, web, press releases, flyers, articles published in the popular press, videos, media briefings, presentations, exhibitions, thesis, interviews, films, TV clips, posters, Other.

<sup>7</sup> A drop down list allows choosing the type of public: Scientific Community (higher education, Research), Industry, Civil Society, Policy makers, Medias, Other ('multiple choices' is possible).

9	Conference	EPCC	NAFEMS UK Conference 2014	10/06/2014	Oxford, UK	Technical leaders, engineers		Conference
10	Conference	Scapos, ESI, HLRS, CESGA, ICON, PIPISTREL, Intel	I4MS Days	17.06.2014-18.06.2014	Berlin, D	Technical leaders, engineers		Conference
11	Conference	Cineca	Ansys Users Group Meeting - Italy	21.06.2014-22.06.2014	Parma, I	Technical leaders, engineers		Conference
12	Conference	Scapos, SCAI, Cineca, EPCC, HLRS, Bull, Gompute, Intel	International Supercomputing Conference	22.06.2014-26.06.2014	Leipzig, D	Technical leaders, engineers		Conference
13	Conference	Cineca	9th Int. OpenFOAM Workshop	23.06.2014-26.06.2014	Zagreb, CRO	Technical leaders, engineers		Conference
14	Conference	Cineca	Altair Eurpean Hyperworks Technology Conference	24.06.2014-26.06.2014	München, D	Technical leaders, engineers		Conference
15	Conference	Cineca	World Manufacturing Forum 2014	01.07.2014-02.07.2014	Milano, I	Technical leaders, engineers		Conference
16	Conference	Bull, GENCI, Intel	Teratec	01.07.2014-02.07.2014	Palaiseau, F	Technical leaders, engineers		Conference
17	Conference	Scapos, Sicos, Bull, HLRS	ISCcloud	29.09.2014-30.09.2014	Heidelberg, D	Technical leaders, engineers		Conference

18	Conference	Sicos	LS-DYNA Forum 2014	06.10.2014-08.10.2014	Bamberg, D	Technical leaders, engineers		Conference
19	Conference	Bull	ORAP Forum	14.10.2014-15.10.2014	Paris, F	Technical leaders, engineers		Conference
20	Conference	Scapos	NAFEMS Multiphysics Simulation 2014	21.10.2014-22.10.2014	Manchester, UK	Technical leaders, engineers		Conference
21	Conference	Enginesoft, CINECA	International CAE Conference	27.10.2014-28.10.2014	Turin, I	Technical leaders, engineers		Conference
22	Conference	HLRS, EPCC, Scaops, SURFsara	SC14	16.11.2014-21.11.2014	New Orleans, US	Technical leaders, engineers		Conference
23	Conference	Gompute	ANSYS Convergence Conference	24/02/2015	Porto, P	Technical leaders, engineers		Conference
24	Conference	Intel	Co-Summit 2015	10.03.2015-11.03.2015	Berlin, D	Technical leaders, engineers		Conference
25	Conference	Gompute	STAR Global Conference	16.03.2015-18.03.2015	San Diego, US	Technical leaders, engineers		Conference
26	Conference	Sicos, Intel	Compute Cluster Conference - Cebit	19/03/2015	Hannover, D	Technical leaders, engineers		Conference

27	Conference	EPCC, scapos, Arctur	I4MS intermediate review	25/03/2015	Brussels, B	Technical leaders, engineers		Conference
28	Conference	Sicos	Hannover Messe	13.04.2015-17.04.2015	Hannover, D	Technical leaders, engineers		Conference
29	Conference	EPCC	Supercomputing in Engineering	15.04.2015-16.04.2015	Derby, UK	Technical leaders, engineers		Conference
30	Conference	EPCC	FoF PPP Impact workshop	29/04/2015	Brussels, B	Technical leaders, engineers		Conference
31	Conference	Gompute	Gompute User Meeting	05.05.2015-06.05.2015	Gothenburg, S	Technical leaders, engineers		Conference
32	Conference	EPCC, scapos, Intel	I4MS Day	22/05/2015	Brussels, B	Technical leaders, engineers		Conference
33	Conference	CINECA, EPCC	Prace Days	26.05.2015-28-05.2015	Dublin, IR	Technical leaders, engineers		Conference
34	Conference	Arctur	CloudFlow Project Conference	28/05/2015	Portoroz, SLO	Technical leaders, engineers		Conference
35	Conference	Gompute	ANSYS Automotive Simulaton World Congress	02.06.2015-03.06.2015	Detroit, US	Technical leaders, engineers		World

36	Conference	Gompute, Sicos	European LS-Dyna Conference	15.06.2015-17.06.2015	Wuerzburg, D	Technical leaders, engineers		Europe
37	Conference	ESI	NAFEMS World Congress	21.06.2015-24.06.2015	San Diego, US	Technical leaders, engineers		World
38	Conference	AVL	AVL AST International User Conference 2015	23.06.2015-25.06.2015	Graz, A	Technical leaders, engineers		Europe
39	Conference	Gompute	2nd OpenFOAM Workshop	29.06.2015-02.07.2015	Detroit, US	Technical leaders, engineers		Europe
40	Conference	EPCC	Experiment Workshop	06.07.2015-07.07.2015	Amsterdam, NL	Technical leaders, engineers		Europe
41	Conference	Intel	Fortissimo Forum	08/07/2015	Amsterdam, NL	Technical leaders, engineers		Europe
42	Conference	Intel, Bull, Gompute, scapos, SCAI, EPCC, HLRS	ISC High Performance 2015	13.07.2015-15.07.2015	Frankfurt, D	Technical leaders, engineers		Europe
43	Conference	Intel	ISC Cloud & BigData 2015	29.09.2015-30.09.2015	Frankfurt, D	Technical leaders, engineers		Europe
44	Conference	Intel	EMO MILANO 2015	05.10.2015-10.10.2015	Milano, I	Technical leaders, engineers		World

45	Conference	Cineca	Int. CAE Conference 2015	19.10.2015-20.10.2015	Verona, IT	Technical leaders, engineers		Europe
46	Conference	Intel	ICT 2015	20.10.2015-22.10.2015	Lisbon, P	Technical leaders, engineers		Europe
47	Conference	Xlab, Pipistrel	CLASS Conference – Cloud Assisted Services	05.11.2015-06.11.2015	Bled, SLO	Technical leaders, engineers		Europe
48	Conference	Intel, Bull, Gompute, scapos, SCAI, EPCC, HLRS	SC15	16.11.2015-19.11.2015	Austin, US	Technical leaders, engineers		World
49	Conference	SURFsara	Super D Event SURFsara	15/12/2015	Amsterdam, NL	Technical leaders, engineers		Europe
50	Conference	EPCC	NAFEMS: Improving HPC Adoption in Engineering Simulation	10/02/2016	Manchester, UK	Technical leaders, engineers		Europe
51	Conference	Gompute	STAR Global Conference	07.03.2016-09.03.2016	Prague, CS	Technical leaders, engineers		World
52	Conference	Cineca	MECSPE Fair	17.03.2016-19.03.2016	Parma, I	Technical leaders, engineers		Europe
53	Conference	EPCC	Supercomputing in Engineering	07/04/2016	Derby, UK	Technical leaders, engineers		Europe

54	Conference	HLRS	HPC User Forum	11.04.2016-13.04.2016	Tucson, US	Technical leaders, engineers		World
55	Conference	Gompute	Gompute User Meeting	12.04.2016-13.04.2016	Gothenburg, S	Technical leaders, engineers		Europe
56	Conference	scapos, SCAI	CAE Grand Challenge	12.04.2016-13.04.2016	Hanau, D	Technical leaders, engineers		Europe
57	Conference	Arctur	AERO	20.04.2016-23.04.2016	Friedrichshafen, D	Technical leaders, engineers		Europe
58	Conference	Intel	Hannover Fair 2016	25.04.2016-29.04.2016	Hannover, D	Technical leaders, engineers		World
59	Conference	Sicos	NAFEMS Germany Conference	25.04.2016-27.04.2016	Bamberg, D	Technical leaders, engineers		Germany
60	Conference	Arctur	Ansys Convergence Regional Conference	25/05/2016	Ljubljana, SLO	Technical leaders, engineers		Slovenia
61	Conference	Arctur	Mipro 2016	30.05.2016-03-06-2016	Opatija, HR	Technical leaders, engineers		Europe
62	Conference	Intel	Automotive Simulation World Congress (Ansys)	07.06.2016-08.06.2016	Munich, D	Technical leaders, engineers		World

63	Conference	Intel	ANSYS Electronics Simulation Expo	07.06.2016-08.06.2016	Munich, D	Technical leaders, engineers		World
64	Conference	Arctur	EUROSATORY	13.06.2016-17.06.2016	Paris, F	Technical leaders, engineers		Europe
65	Conference	EPCC	NAFEMS UK Conference	15.06.2016-16.06.2016	Telford, UK	Technical leaders, engineers		UK
66	Conference	EPCC, HLRS, Intel, Bull	ISC High Performance 2016	19.06.2016-23.06.2016	Frankfurt, D	Technical leaders, engineers		Europe
67	Conference	Cineca, Enginsoft	POWER-GEN Europe	21.06.2016-23.06.2016	Milan, I	Technical leaders, engineers		Europe
68	Conference	Intel	I4MS European Conference	23/06/2016	Amsterdam, NL	Technical leaders, engineers		Europe
69	Conference	Cineca	Farete 2016	05.09.2016-06.09.2016	Bologna, I	Technical leaders, engineers		Italy
70	Conference	sicos	LS-DYNA Forum 2016	10.10.2016-12.10.2016	Bamberg, D	Technical leaders, engineers		Europe
71	Conference	Intel	COMSOL Conference 2016 Europe	12.10.2016-14.10.2016	Munich, D	Technical leaders, engineers		Europe

72	Conference	Cineca	Int. CAE Conference 2016	17.10.2016-18.10.2016	Parma, I	Technical leaders, engineers		Europe
73	Conference	Arctur	eCarTec	18.10.2016-20.10.2016	Munich, D	Technical leaders, engineers		Europe
74	Conference	Xlab	Class Conference 2016	09/11/2016	Bled, SI	Technical leaders, engineers		Europe
75	Conference	EPCC, HLRS, Intel, Bull, Gcompute	SC 2016	13.11.2016-18.11.2016	Salt Lake City, US	Technical leaders, engineers		World
76	Conference	Arctur	METSTRADE	15.11.2016-17.11.2016	Amsterdam, NL	Technical leaders, engineers		Europe
77	Conference	EPCC	Experiment Workshop	28.11.2016-29.11.2016	Amsterdam, NL	Technical leaders, engineers		Europe
78	Conference	Intel	Fortissimo Forum	30/11/2016	Amsterdam, NL	Technical leaders, engineers		Europe
79	Press article	Intel	New Electronics, Neil Tyler, High performance computing accessible to smaller companies, 22.11.2016 <a href="http://www.newelectronics.co.uk/electronics-technology/high-performance-computing-">http://www.newelectronics.co.uk/electronics-technology/high-performance-computing-</a>	22/11/2016	UK	Technical Managers, Engineers		UK

			accessible-to-smaller-companies/148486/					
80	Press article	Intel	Compare the Cloud, Abner-Leopold Hofstadler, Manufacturing and High-Performance Computing with Fortissimo's Mark Parsons, 23.12.16 <a href="https://www.comparethecloud.net/watch/manufacturing-and-high-performance-computing-with-fortissimos-mark-parsons/">https://www.comparethecloud.net/watch/manufacturing-and-high-performance-computing-with-fortissimos-mark-parsons/</a>	23/12/2016	UK	Technical Managers, Engineers		UK
81	Press article	Intel	The Manufacturer, Jonny Williamson, SMEs gain access to high-end computer simulations, 31.10.2016 <a href="http://www.themanufacturer.com/articles/smes-gains-access-to-high-end-computer-simulations/">http://www.themanufacturer.com/articles/smes-gains-access-to-high-end-computer-simulations/</a>	31/10/2016	UK	Technical Managers, Engineers		UK
82	Press article	Intel	Scientific Computing World, Robert Roe, Fortissimo launches service to broker HPC resources, 31.10.2016 <a href="https://www.scientific-computing.com/news/fortissimo-launches-service-broker-hpc-resources/">https://www.scientific-computing.com/news/fortissimo-launches-service-broker-hpc-resources/</a>	31/10/2016	UK	Technical Managers, Engineers		UK
83	Press article	Intel	CAO.fr, David Lourme, Fortissimo lance une plateforme de distribution de services de calculs HPC, November 4th <a href="http://www.cao.fr/actu/7153/Fortissimo-lance-une-plateforme-de-distribution-de-services-de-calculs-HPC.html">http://www.cao.fr/actu/7153/Fortissimo-lance-une-plateforme-de-distribution-de-services-de-calculs-HPC.html</a>	04/11/2016	France	Technical Managers, Engineers		France

84	Press article	Intel	Agence France Presse, Lucie Godeau, L'autre actu de la Tech, December 19th	19/12/2016	France	General public		France
85	Press article	Intel	CloudMagazine.fr, Frédéric Mazue, La modélisation haute-performance dans le cloud : une nouvelle tendance pour les entreprises, December 20th <a href="http://www.cloudmagazine.fr/actualites/fortissimo-la-modelisation-haute-performance-dans-le-cloud-une-nouvelle-tendance-pour-les-6461">http://www.cloudmagazine.fr/actualites/fortissimo-la-modelisation-haute-performance-dans-le-cloud-une-nouvelle-tendance-pour-les-6461</a>	20/12/2016	France	Technical Managers, Engineers		France
86	Press article	Intel	ITRManager.com, Paul Dubois, Fortissimo Marketplace, a unique place for High-Performance computing, December 13th <a href="http://www.itrmanager.com/articles/166276/fortissimo-marketplace-guichet-unique-services-calcul-hautes-performances.html">http://www.itrmanager.com/articles/166276/fortissimo-marketplace-guichet-unique-services-calcul-hautes-performances.html</a>  This article presents Fortissimo Marketplace as the first and only marketplace proposing services providers for all the needs in high-performance computing and modelization. "Fortissimo Marketplace constitute a unique spot for software and hardware solutions, modelization technologies and expertise in the form of prepaid or pay-per-use tools".	13/12/2016	France	Technical Managers, Engineers		France

87	Press article	Intel	<p>IMPRESA MIA, n/a, SMEs: the access to advanced simulation with computer becomes simple: Fortissimo Marketplace brings together suppliers, November 3  <a href="http://www.impresamia.com/pm-i-laccesso-alla-simulazione-avanzata-con-il-computer-diventa-semplice-il-marketplace-di-fortissimo-riunisce-migliori-fornitori/">http://www.impresamia.com/pm-i-laccesso-alla-simulazione-avanzata-con-il-computer-diventa-semplice-il-marketplace-di-fortissimo-riunisce-migliori-fornitori/</a></p> <p>The article fully reports the press release, describing in details the Fortissimo Marketplace and focusing on its benefits, including the fact that it simplifies access to high-performance computer simulations for small and medium sized enterprises</p>	03.11.2016	Italy	Technical Managers, Engineers		Italy
88	Press article	Intel	<p>BUSINESS COMMUNITY, Claudio Gandolfo, The access to advanced simulation with computer becomes simple for SMEs, November 7  <a href="http://www.businesscommunity.it/m/20161116/fare/Per_le_PMI_l_accesso_alla_simulazione_digitale_avanzata_diventa_semplice_php">http://www.businesscommunity.it/m/20161116/fare/Per_le_PMI_l_accesso_alla_simulazione_digitale_avanzata_diventa_semplice_php</a></p> <p>The article fully reports the press release, describing in details the Fortissimo Marketplace and focusing on its benefits, including the fact that it simplifies access to high-performance computer simulations for small and medium</p>	07.11.2016	Italy	Technical Managers, Engineers		Italy

			<p>sized enterprises.</p> <p>Moreover, the article is enriched by the following quote provided by Fortissimo: "We know that companies that use high-performance computing and high-performance data analytics really seek clear economic and business benefits from doing so. However, we also know that far too few companies actually use these technologies. Fortissimo is all about helping companies to take their first steps in using modelling and simulation to improve their business processes and their products", states Professor Mark Parsons, project coordinator for the Fortissimo project.</p>					
89	Press article	Intel	<p>BTBORESETTE, Domenico Megali, Suppliers and SMEs meet on Fortissimo, November 2  <a href="http://www.btboresette.com/for-nitori-pmi-si-incontrano-fortissimo">http://www.btboresette.com/for-nitori-pmi-si-incontrano-fortissimo</a></p> <p>The article fully reports the press release, describing in details the Fortissimo Marketplace and focusing on its benefits, including the fact that it simplifies access to high-performance computer simulations for small and medium sized enterprises</p>	02.11.2016	Italy	Technical Managers, Engineers		Italy

90	Press article	Intel	<p>TOM'S HARDWARE.IT, Giuseppe Saccardi, Fortissimo brings HPC simulation into the Cloud, November 16  <a href="https://www.tomshw.it/fortissimo-porta-la-simulazione-hpc-nel-cloud-81469">https://www.tomshw.it/fortissimo-porta-la-simulazione-hpc-nel-cloud-81469</a></p> <p>This article appears on this technology website linked to La repubblica.it, the major daily in Italy. The press release contents have been presented with a strong focus on the convenient access to HPC for Smes that Fortissimo marketplace offers.</p>	16.11.2016	Italy	Technical Managers, Engineers		Italy
91	Press article	Intel	<p>DATAMANAGER.IT,n/a, European project for SMEs: comes Marketplace Fortissimo, November 16  <a href="http://www.datamanager.it/2016/11/progetto-europeo-le-pmi-arriva-marketplace-fortissimo/">http://www.datamanager.it/2016/11/progetto-europeo-le-pmi-arriva-marketplace-fortissimo/</a></p> <p>The press release has been fully reported on the online version of this magazine that is the most successful IT b2b title in Italy.</p>	16.11.2016	Italy	Technical Managers, Engineers		Italy
92	Press article	Intel	<p>TECHNOPOLIS, n/a,The Cloud is Fortissimo, December 1 PDF</p> <p>This short article is a very good summary of the press release and it is a good result as this publication is the tech overprint of Il Sole 24 Ore (main business</p>	01.12.2016	Italy	Technical Managers, Engineers		Italy

			daily).The title plays on the name of the project that in Italian means "very strong". The text highlights the strong input to SMEs this project can provide.					
93	Press article	Intel	<p>ILPROGETTISTAINDUSTRIALE.IT, n/a, The access to advanced simulation with computer becomes simple: Fortissimo Marketplace brings together the best suppliers and SMEs, December 1</p> <p><a href="http://www.ilprogettistaindustriale.it/laccesso-alla-simulazione-avanzata-con-il-computer-diventa-semplice-il-marketplace-di-fortissimo-riunisce-i-migliori-fornitori-e-le-pmi/">http://www.ilprogettistaindustriale.it/laccesso-alla-simulazione-avanzata-con-il-computer-diventa-semplice-il-marketplace-di-fortissimo-riunisce-i-migliori-fornitori-e-le-pmi/</a></p> <p>The article proposes the full content of the press release and uses the provided images to show real examples to their readers, who are industrial designers.</p>	01.12.2016	Italy	Technical Managers, Engineers		Italy
94	Press article	Intel	<p>PMI.IT, Filippo Vendrame, Fortissimo: the marketplace for SMEs, December 15</p> <p><a href="http://blog.pmi.it/15/12/2016/fortissimo-marketplace-per-pmi/">http://blog.pmi.it/15/12/2016/fortissimo-marketplace-per-pmi/</a></p> <p>The article summarises all the main advantages of using HCP simulations for SMEs, highlighting the aspect of cost savings. This publication focuses on the topic SMEs, as its name says.</p>	15.12.2016	Italy	Technical Managers, Engineers		Italy

95	Press article	Intel	<p>Mundo Financiero, Fortissimo Marketplace brings together key providers and SMEs, Nov. 2, 2016  <a href="http://www.elmundofinanciero.com/noticia/62408/empresas/el-marketplace-de-fortissimo-reune-a-proveedores-clave-y-pymes.html">http://www.elmundofinanciero.com/noticia/62408/empresas/el-marketplace-de-fortissimo-reune-a-proveedores-clave-y-pymes.html</a></p>	02/11/2016	Spain	General public		Spain
96	Press article	Intel	<p>Datacenter Insider, Ulrike Ostler, More HPC for SMEs thanks to sponsorship and the cloud, 31.10.2016  <a href="http://www.datacenter-insider.de/mehr-hpc-fuer-den-mittelstand-durch-foerderung-und-cloud-a-556146/">http://www.datacenter-insider.de/mehr-hpc-fuer-den-mittelstand-durch-foerderung-und-cloud-a-556146/</a></p> <p>Article derived from an interview of Ulrike Ostler with Carolyn Brock. In this article, the Fortissimo project is being describes as well as the problems which SMEs have been facing regarding digital simulation. Consequently, the Fortissimo marketplace is being introduced as a solution to bring together providers, experts, and clients (SMEs) and the advantages of digital simulation are being described. This is a very detailed article of neutral to positive tonality. It additionally features an image of Koenigsegg, and a description of the Transinsight experiment.</p> <p>"Due to the cloud-based</p>	31/10/2016	Germany, Austria, Switzerland	Technical Managers, Engineers		Germany, Austria, Switzerland

			<p>approach, the development can be accelerated significantly.</p> <p>Additionally, less promising directions of research can be identified and stopped more quickly. Transinsight guesses that there are hundreds of potential users for this new service and that there is a potential increase in profits of up to three per cent/year for specialists of medicinal technology.</p> <p>This article has also been published on <a href="http://cloudcomputing-insider.de">cloudcomputing-insider.de</a>.</p>					
97	Press article	Intel	<p>Die Zeit online, Renate Grimming (dpa), EU wants to facilitate access to High-Performance Computing for small companies, 31.10.2016</p> <p><a href="http://www.zeit.de/news/2016-10/31/internet-eu-will-kleinen-firmen-zugang-zu-grossrechnern-erleichtern-31111403/">http://www.zeit.de/news/2016-10/31/internet-eu-will-kleinen-firmen-zugang-zu-grossrechnern-erleichtern-31111403/</a></p> <p>This article is the result of an interview of Renate Grimming (dpa) with Carolyn Brock. It is a brief article summarizing the fortissimo project, its agenda and approach, as well as the problems SMEs have gaining access to HPC and the marketplace as potential solution.</p> <p>"The aim is to strengthen the global competitiveness of European businesses. For this purpose, a new marketplace has been launched on Monday. All</p>	31/10/2016	Germany, Austria, Switzerland	General public		Germany, Austria, Switzerland

			<p>necessary tools and services shall be provided here one-stop, explains Carolyn Brock of Fortissimo Ltd, which was created out of an EU initiative.</p> <p>This article has also been published by 102 German magazines, newspapers, and online publications, including broad-reaching media such as Bild.de (a popular generalist), heise.de (an important tech-publication), and die Welt (an important German newspaper).</p>					
98	Press article	Intel	<p>Süddeutsche Zeitung, Helmut Martin Jung, Quickly Calculated, 07.12.2016 Print</p> <p>This article is the result of an interview between Helmut Martin Jung and Carolyn Brock. It was published in the section "business and technology" in the most important daily newspaper in Southern Germany and has a size of more than a half page. The article elaborates upon the Fortissimo project, its declared aims and agendas, the importance and advantages of digital simulation, also for SMEs, and contains an own section on supercomputers. It is a highly detailed publication.</p>	07/12/2016	Germany, Austria, Switzerland	General public		Germany, Austria, Switzerland

99	Press article	Intel	<p>Süddeutsche Zeitung online, Helmut Martin Jung, Big Data also for small players, 06.12.2016  <a href="http://www.sueddeutsche.de/digital/supercomputer-fuer-den-mittelstand-mal-eben-durchgerechnet-1.3282255/">http://www.sueddeutsche.de/digital/supercomputer-fuer-den-mittelstand-mal-eben-durchgerechnet-1.3282255/</a></p> <p>This article also is the result of the interview between Helmut Martin Jung and Carolyn Brock. It is a different version of the printed article and contains similar information, as well as numerous citations by Carolyn Brock.</p> <p>"We help businesses to understand what they are actually doing" (Carolyn Brock)</p>	06/12/2016	Germany, Austria, Switzerland	General public		Germany, Austria, Switzerland
100	Press release	Intel	02.11.2016 - Access to advanced computer simulations made easy: Fortissimo Marketplace brings together key providers and SMEs	02/11/2016	UK	General public		UK
101	Press release	Intel	16.12.2016 - Fortissimo: Cloud-based High Performance Modelling sets a new trend	16/12/2016	UK	General public		UK
102	Press release	Intel	02.11.2016 - Fortissimo Marketplace rapproche les grands fournisseurs des PME pour mettre la simulation informatique avancée à la portée du plus grand nombre.	02/11/2016	France	General public		France
103	Press release	Intel	16.12.2016 - Fortissimo, La modélisation haute performance	16/12/2016	France	General public		France

			dans le Cloud: le début d'une nouvelle tendance.					
104	Press release	Intel	02.11.16 - L'accesso alla simulazione avanzata con il computer diventa semplice: il Marketplace di Fortissimo riunisce i migliori fornitori e le PMI	02/11/2016	Italy	General public		Italy
105	Press release	Intel	15.12.2016 - La progettazione in Cloud ad elevate performance diventa una nuova tendenza con il progetto Fortissimo	15/12/2016	Italy	General public		Italy
106	Press release	Intel	02.11.2016 - El acceso a las simulaciones informáticas avanzadas se vuelve fácil: El Marketplace de Fortissimo reúne a proveedores clave y PYMES	02/11/2016	Spain	General public		Spain
107	Press release	Intel	13.12.2016 - El Proyecto Europeo Fortissimo ayuda a las PYMES españolas a adoptar servicios de computación de altas prestaciones (HPC)	13/12/2016	Spain	General public		Spain
108	Press release	Intel	15.12.2016 - Fortissimo: la modelización de altas prestaciones basada en la nube establece una nueva tendencia	15/12/2016	Spain	General public		Spain
109	Press release	Intel	02.11.2016 - Fortissimo Marketplace ermöglicht Unternehmen einfachen Zugriff auf komplexe Computersimulationen	02/11/2016	Germany, Austria, Switzerland	General public		Germany, Austria, Switzerland

110	Press release	Intel	15.12.2016 - Fortissimo: Cloud-based High Performance Modelling liegt im Trend	15/12/2016	Germany, Austria, Switzerland	General public		Germany, Austria, Switzerland
111	By-lined article	Intel	By-lined article: The real need for speed	Q1/2017	UK	General public		UK
112	By-lined article	Intel	By-lined article: Le vrai besoin de vitesse	Q1/2017	France	General public		France
113	By-lined article	Intel	Byliner regarding the successful case of Koenigsegg, proposed in mainstream pitches	Q1/2017	Italy	General public		Italy
114	By-lined article	Intel	By-lined article: The real need for speed	Q1/2017	Spain	General public		Spain
115	By-lined article	Intel	By-lined article: Wenn es mal wieder schnell gehen muss	Q1/2017	Germany, Austria, Switzerland	General public		Germany, Austria, Switzerland
116	Press articles	Intel	225 press articles (see D10.5 for details)	Q4/2016	UK, France, Spain, Italy, Germany, Austria, Switzerland	General public		UK, France, Spain, Italy, Germany, Austria, Switzerland
117	Success Story (web)	Scapos	HPC-Cloud-based simulation of light-aircraft aerodynamics	Q2/2015	<a href="http://www.fortissimo-project.eu">www.fortissimo-project.eu</a>	General public		Europe
118	Success Story (web)	Scapos	Cloud-based simulation of steel casting	Q2/2015	<a href="http://www.fortissimo-project.eu">www.fortissimo-project.eu</a>	General public		Europe
119	Success Story (web)	Scapos	Cloud-based design of high-pressure vessels	Q2/2015	<a href="http://www.fortissimo-project.eu">www.fortissimo-project.eu</a>	General public		Europe
120	Success Story (web)	Scapos	Cloud-based simulation of flange tightening	Q2/2015	<a href="http://www.fortissimo-project.eu">www.fortissimo-project.eu</a>	General public		Europe

121	Success Story (web)	Scapos	HPC-Cloud-based design of high-voltage cables	Q2/2015	<a href="http://www.fortissimo-project.eu">www.fortissimo-project.eu</a>	General public		Europe
122	Success Story (web)	Scapos	HPC-Cloud-based urban planning	Q2/2015	<a href="http://www.fortissimo-project.eu">www.fortissimo-project.eu</a>	General public		Europe
123	Success Story (web)	Scapos	HPC-Cloud-based optimisation of aircraft wiring	Q2/2015	<a href="http://www.fortissimo-project.eu">www.fortissimo-project.eu</a>	General public		Europe
124	Success Story (web)	Scapos	HPC-Cloud-based prediction of air quality	Q2/2015	<a href="http://www.fortissimo-project.eu">www.fortissimo-project.eu</a>	General public		Europe
125	Success Story (web)	Scapos	HPC-Cloud-based reduction of vehicle emissions	Q2/2015	<a href="http://www.fortissimo-project.eu">www.fortissimo-project.eu</a>	General public		Europe
126	Success Story (web)	Scapos	Cloud-based simulation of the thermodynamic properties of hazardous chemicals	Q2/2015	<a href="http://www.fortissimo-project.eu">www.fortissimo-project.eu</a>	General public		Europe
127	Success Story (web)	Scapos	HPC-Cloud-based design of copper-alloy moulds	Q2/2015	<a href="http://www.fortissimo-project.eu">www.fortissimo-project.eu</a>	General public		Europe
128	Success Story (web)	Scapos	HPC-Cloud-based simulation of sports-car aerodynamics	Q2/2015	<a href="http://www.fortissimo-project.eu">www.fortissimo-project.eu</a>	General public		Europe
129	Success Story (web)	Scapos	HPC-Cloud-based design of centrifugal pumps	Q2/2015	<a href="http://www.fortissimo-project.eu">www.fortissimo-project.eu</a>	General public		Europe
130	Success Story (web)	Scapos	HPC-Cloud-based simulation of drifting snow	Q2/2015	<a href="http://www.fortissimo-project.eu">www.fortissimo-project.eu</a>	General public		Europe
131	Success Story (web)	Scapos	HPC-Cloud-based molecular modelling	Q2/2015	<a href="http://www.fortissimo-project.eu">www.fortissimo-project.eu</a>	General public		Europe
132	Success Story (web)	Scapos	HPC-Cloud-based map interpolation for civil engineering	Q3/2016	<a href="http://www.fortissimo-project.eu">www.fortissimo-project.eu</a>	General public		Europe

133	Success Story (web)	Scapos	Advanced Simulation of Electromagnetic Effects	Q3/2016	<a href="http://www.fortissimo-project.eu">www.fortissimo-project.eu</a>	General public		Europe
134	Success Story (web)	Scapos	Advanced Simulation of Metal Casting	Q3/2016	<a href="http://www.fortissimo-project.eu">www.fortissimo-project.eu</a>	General public		Europe
135	Success Story (web)	Scapos	Cloud-based simulation of high-temperature concentric chimneys	Q3/2016	<a href="http://www.fortissimo-project.eu">www.fortissimo-project.eu</a>	General public		Europe
136	Success Story (web)	Scapos	Cloud-based simulation of gear designs	Q3/2016	<a href="http://www.fortissimo-project.eu">www.fortissimo-project.eu</a>	General public		Europe
137	Success Story (web)	Scapos	Cloud-based simulation of a laser welding system	Q3/2016	<a href="http://www.fortissimo-project.eu">www.fortissimo-project.eu</a>	General public		Europe
138	Success Story (web)	Scapos	Cloud-based simulation of the binding capacities of target drug compounds	Q3/2016	<a href="http://www.fortissimo-project.eu">www.fortissimo-project.eu</a>	General public		Europe
139	Success Story (web)	Scapos	Cloud-based simulation in the design and manufacture of camshafts	Q3/2016	<a href="http://www.fortissimo-project.eu">www.fortissimo-project.eu</a>	General public		Europe
140	Success Story (web)	Scapos	Cloud-based analysis of seismic data	Q3/2016	<a href="http://www.fortissimo-project.eu">www.fortissimo-project.eu</a>	General public		Europe
141	Success Story (web)	Scapos	Cloud-based simulation of pipeline components in the oil&gas industry	Q3/2016	<a href="http://www.fortissimo-project.eu">www.fortissimo-project.eu</a>	General public		Europe
142	Success Story (web)	Scapos	Cloud-based environmental modelling	Q3/2016	<a href="http://www.fortissimo-project.eu">www.fortissimo-project.eu</a>	General public		Europe
143	Success Story (web)	Scapos	Cloud-based Additive Manufacturing	Q3/2016	<a href="http://www.fortissimo-project.eu">www.fortissimo-project.eu</a>	General public		Europe

144	Success Story (web)	Scapos	Cloud-based simulation of metal forming by stamping	Q3/2016	<a href="http://www.fortissimo-project.eu">www.fortissimo-project.eu</a>	General public		Europe
145	Success Story (web)	Scapos	Cloud-based optimisation in the cutting of steel reinforcements	Q3/2016	<a href="http://www.fortissimo-project.eu">www.fortissimo-project.eu</a>	General public		Europe
146	Success Story (web)	Scapos	HPC-Cloud-based optimisation of water turbines for power generation	Q3/2016	<a href="http://www.fortissimo-project.eu">www.fortissimo-project.eu</a>	General public		Europe
147	Success Story (web)	Scapos	Cloud-based simulation of the optical properties of dyes for the design of time-temperature integrators	Q3/2016	<a href="http://www.fortissimo-project.eu">www.fortissimo-project.eu</a>	General public		Europe
148	Success Story (web)	Scapos	Cloud-based simulation of high-temperature superconducting cables	Q3/2016	<a href="http://www.fortissimo-project.eu">www.fortissimo-project.eu</a>	General public		Europe
149	Success Story (web)	Scapos	Cloud-based simulation for services based on crowd-sensing	Q3/2016	<a href="http://www.fortissimo-project.eu">www.fortissimo-project.eu</a>	General public		Europe
150	Success Story (web)	Scapos	Cloud-based design of motorcycle helmets	Q4/2016	<a href="http://www.fortissimo-project.eu">www.fortissimo-project.eu</a>	General public		Europe
151	Success Story (web)	Scapos	Cloud-based design for the manufacture and simulation of high-performance composite structures	Q4/2016	<a href="http://www.fortissimo-project.eu">www.fortissimo-project.eu</a>	General public		Europe
152	Success Story (web)	Scapos	Cloud-based simulation for non-invasive intercranial pressure measurement	Q4/2016	<a href="http://www.fortissimo-project.eu">www.fortissimo-project.eu</a>	General public		Europe
153	Success Story (web)	Scapos	Cloud-based simulation of complex fluids	Q4/2016	<a href="http://www.fortissimo-project.eu">www.fortissimo-project.eu</a>	General public		Europe

154	Success Story (web)	Scapos	HPC-Cloud-based seakeeping design	Q4/2016	<a href="http://www.fortissimo-project.eu">www.fortissimo-project.eu</a>	General public		Europe
155	Success Story (web)	Scapos	HPC-Cloud-based standard strength assessment of commercial ships	Q4/2016	<a href="http://www.fortissimo-project.eu">www.fortissimo-project.eu</a>	General public		Europe
156	Success Story (web)	Scapos	Cloud-based shape optimisation in manufacturing	Q4/2016	<a href="http://www.fortissimo-project.eu">www.fortissimo-project.eu</a>	General public		Europe
157	Success Story (web)	Scapos	HPC-Cloud-based microscopy	Q4/2016	<a href="http://www.fortissimo-project.eu">www.fortissimo-project.eu</a>	General public		Europe
158	Success Story (web)	Scapos	HPC based Delft3D service for modelling flooding, morphology, and waterquality	Q4/2016	<a href="http://www.fortissimo-project.eu">www.fortissimo-project.eu</a>	General public		Europe
159	Success Story (web)	Scapos	Cloud-based simulation of the hydrodynamic behaviour of buoys	Q4/2016	<a href="http://www.fortissimo-project.eu">www.fortissimo-project.eu</a>	General public		Europe
160	Success Story (flyer)	Scapos	HPC-Cloud-based simulation of light-aircraft aerodynamics	Q2/2015	n.a.	General public		Europe
161	Success Story (flyer)	Scapos	Cloud-based simulation of steel casting	Q2/2015	n.a.	General public		Europe
162	Success Story (flyer)	Scapos	Cloud-based design of high-pressure vessels	Q2/2015	n.a.	General public		Europe
163	Success Story (flyer)	Scapos	Cloud-based simulation of flange tightening	Q2/2015	n.a.	General public		Europe
164	Success Story (flyer)	Scapos	HPC-Cloud-based design of high-voltage cables	Q2/2015	n.a.	General public		Europe
165	Success Story (flyer)	Scapos	HPC-Cloud-based urban planning	Q2/2015	n.a.	General public		Europe

166	Success Story (flyer)	Scapos	HPC-Cloud-based optimisation of aircraft wiring	Q2/2015	n.a.	General public		Europe
167	Success Story (flyer)	Scapos	HPC-Cloud-based prediction of air quality	Q2/2015	n.a.	General public		Europe
168	Success Story (flyer)	Scapos	HPC-Cloud-based reduction of vehicle emissions	Q2/2015	n.a.	General public		Europe
169	Success Story (flyer)	Scapos	Cloud-based simulation of the thermodynamic properties of hazardous chemicals	Q2/2015	n.a.	General public		Europe
170	Success Story (flyer)	Scapos	HPC-Cloud-based design of copper-alloy moulds	Q2/2015	n.a.	General public		Europe
171	Success Story (flyer)	Scapos	HPC-Cloud-based simulation of sports-car aerodynamics	Q2/2015	n.a.	General public		Europe
172	Success Story (flyer)	Scapos	HPC-Cloud-based design of centrifugal pumps	Q2/2015	n.a.	General public		Europe
173	Success Story (flyer)	Scapos	HPC-Cloud-based simulation of drifting snow	Q2/2015	n.a.	General public		Europe
174	Success Story (flyer)	Scapos	HPC-Cloud-based molecular modelling	Q2/2015	n.a.	General public		Europe
175	Success Story (flyer)	Scapos	HPC-Cloud-based map interpolation for civil engineering	Q3/2016	n.a.	General public		Europe
176	Success Story (flyer)	Scapos	Advanced Simulation of Electromagnetic Effects	Q3/2016	n.a.	General public		Europe
177	Success Story (flyer)	Scapos	Advanced Simulation of Metal Casting	Q3/2016	n.a.	General public		Europe

178	Success Story (flyer)	Scapos	Cloud-based simulation of high-temperature concentric chimneys	Q3/2016	n.a.	General public		Europe
179	Success Story (flyer)	Scapos	Cloud-based simulation of gear designs	Q3/2016	n.a.	General public		Europe
180	Success Story (flyer)	Scapos	Cloud-based simulation of a laser welding system	Q3/2016	n.a.	General public		Europe
181	Success Story (flyer)	Scapos	Cloud-based simulation of the binding capacities of target drug compounds	Q3/2016	n.a.	General public		Europe
182	Success Story (flyer)	Scapos	Cloud-based simulation in the design and manufacture of camshafts	Q3/2016	n.a.	General public		Europe
183	Success Story (flyer)	Scapos	Cloud-based analysis of seismic data	Q3/2016	n.a.	General public		Europe
184	Success Story (flyer)	Scapos	Cloud-based simulation of pipeline components in the oil&gas industry	Q3/2016	n.a.	General public		Europe
185	Success Story (flyer)	Scapos	Cloud-based environmental modelling	Q3/2016	n.a.	General public		Europe
186	Success Story (flyer)	Scapos	Cloud-based Additive Manufacturing	Q3/2016	n.a.	General public		Europe
187	Success Story (flyer)	Scapos	Cloud-based simulation of metal forming by stamping	Q3/2016	n.a.	General public		Europe
188	Success Story (flyer)	Scapos	Cloud-based optimisation in the cutting of steel reinforcements	Q3/2016	n.a.	General public		Europe

189	Success Story (flyer)	Scapos	HPC-Cloud-based optimisation of water turbines for power generation	Q3/2016	n.a.	General public		Europe
190	Success Story (flyer)	Scapos	Cloud-based simulation of the optical properties of dyes for the design of time-temperature integrators	Q3/2016	n.a.	General public		Europe
191	Success Story (flyer)	Scapos	Cloud-based simulation of high-temperature superconducting cables	Q3/2016	n.a.	General public		Europe
192	Success Story (flyer)	Scapos	Cloud-based simulation for services based on crowd-sensing	Q3/2016	n.a.	General public		Europe
193	Success Story (flyer)	Scapos	Cloud-based design of motorcycle helmets	Q4/2016	n.a.	General public		Europe
194	Success Story (flyer)	Scapos	Cloud-based design for the manufacture and simulation of high-performance composite structures	Q4/2016	n.a.	General public		Europe
195	Success Story (flyer)	Scapos	Cloud-based simulation for non-invasive intercranial pressure measurement	Q4/2016	n.a.	General public		Europe
196	Success Story (flyer)	Scapos	Cloud-based simulation of complex fluids	Q4/2016	n.a.	General public		Europe
197	Success Story (flyer)	Scapos	HPC-Cloud-based seakeeping design	Q4/2016	n.a.	General public		Europe
198	Success Story (flyer)	Scapos	HPC-Cloud-based standard strength assessment of commercial ships	Q4/2016	n.a.	General public		Europe

199	Success Story (flyer)	Scapos	Cloud-based shape optimisation in manufacturing	Q4/2016	n.a.	General public		Europe
200	Success Story (flyer)	Scapos	HPC-Cloud-based microscopy	Q4/2016	n.a.	General public		Europe
201	Success Story (flyer)	Scapos	HPC based Delft3D service for modelling flooding, morphology, and waterquality	Q4/2016	n.a.	General public		Europe
202	Success Story (flyer)	Scapos	Cloud-based simulation of the hydrodynamic behaviour of buoys	Q4/2016	n.a.	General public		Europe
203	Booklet	Arctur	Fortissimo Case Studies 1st edition	Q2/2015	n.a.	General public		Europe
204	Booklet	Arctur	Fortissimo Case Studies 2nd edition	Q4/2015	n.a.	General public		Europe
205	Booklet	Arctur	Fortissimo Success Stories 3rd edition	Q4/2016	n.a.	General public		Europe
206	Booklet	Arctur	Fortissimo Success Stories 4th edition	Q1/2017	n.a.	General public		Europe
207	Poster	Arctur	HPC-Cloud-based simulation of light-aircraft aerodynamics	Q2/2016	n.a.	General public		Europe
208	Poster	Arctur	Cloud-based simulation of steel casting	Q2/2017	n.a.	General public		Europe
209	Poster	Arctur	Cloud-based design of high-pressure vessels	Q2/2018	n.a.	General public		Europe
210	Poster	Arctur	Cloud-based simulation of flange tightening	Q2/2019	n.a.	General public		Europe

211	Poster	Arctur	HPC-Cloud-based design of high-voltage cables	Q2/2020	n.a.	General public		Europe
212	Poster	Arctur	HPC-Cloud-based urban planning	Q2/2021	n.a.	General public		Europe
213	Poster	Arctur	HPC-Cloud-based optimisation of aircraft wiring	Q2/2022	n.a.	General public		Europe
214	Poster	Arctur	HPC-Cloud-based prediction of air quality	Q2/2023	n.a.	General public		Europe
215	Poster	Arctur	HPC-Cloud-based reduction of vehicle emissions	Q2/2024	n.a.	General public		Europe
216	Poster	Arctur	Cloud-based simulation of the thermodynamic properties of hazardous chemicals	Q2/2025	n.a.	General public		Europe
217	Poster	Arctur	HPC-Cloud-based design of copper-alloy moulds	Q2/2026	n.a.	General public		Europe
218	Poster	Arctur	HPC-Cloud-based simulation of sports-car aerodynamics	Q2/2027	n.a.	General public		Europe
219	Poster	Arctur	HPC-Cloud-based design of centrifugal pumps	Q2/2028	n.a.	General public		Europe
220	Poster	Arctur	HPC-Cloud-based simulation of drifting snow	Q2/2029	n.a.	General public		Europe
221	Poster	Arctur	HPC-Cloud-based molecular modelling	Q2/2030	n.a.	General public		Europe
222	Video	Arctur	Fortissimo introduction	Q3/2016	<a href="https://youtu.be/GBUtAjuqciU">https://youtu.be/GBUtAjuqciU</a>	General public		Europe
223	Video	Arctur	Fortissimo Industrial Video: Texas	Q3/2016	<a href="http://youtu.be/qu8pzvonaV8">http://youtu.be/qu8pzvonaV8</a>	General public		Europe

224	Video	Arctur	Fortissimo Industrial Video: OpenOcean	Q3/2016	<a href="https://youtu.be/iPeu1Y8gYMw">https://youtu.be/iPeu1Y8gYMw</a>	General public		Europe
225	Video	Arctur	Fortissimo Industrial Video: Zeco	Q4/2016	<a href="http://youtu.be/Zp5C3Lfw4qs">http://youtu.be/Zp5C3Lfw4qs</a>	General public		Europe

## 2.2 Section B (Confidential<sup>8</sup> as appropriate)

### 2.2.1 Part B1

TEMPLATE B1: LIST OF APPLICATIONS FOR PATENTS, TRADEMARKS, REGISTERED DESIGNS, ETC.					
Type of IP Rights <sup>9</sup> :	Confidential Click on YES/NO	Foreseen embargo date dd/mm/yyyy	Application reference(s) (e.g. EP123456)	Subject or title of application	Applicant (s) (as on the application)
None	N/A	N/A	N/A	N/A	N/A

### 2.2.2 Part B2

Type of Exploitable Foreground <sup>10</sup>	Description of exploitable foreground	Confidential Click on YES/NO	Foreseen embargo date dd/mm/yyyy	Exploitable product(s) or measure(s)	Sector(s) of application <sup>11</sup>	Timetable, commercial or any other use	Patents or other IPR exploitation (licences)	Owner & Other Beneficiary(s) involved
"GLUE SOFTWARE" SEE SECTION	SEE SECTIONS 1.2.5.1, 1.3, 2.2.3 AND 2.2.4	NO	N/A	FORTISSIMO MARKETPLACE	ADVANCED SIMULATION	CURRENTLY IMPLEMENTED	N/A	THE FORTISSIMO CONSORTIUM

<sup>8</sup> Note to be confused with the "EU CONFIDENTIAL" classification for some security research projects.

<sup>9</sup> A drop down list allows choosing the type of IP rights: Patents, Trademarks, Registered designs, Utility models, Others.

<sup>10</sup> A drop down list allows choosing the type of foreground: General advancement of knowledge, Commercial exploitation of R&D results, Exploitation of R&D results via standards, exploitation of results through EU policies, exploitation of results through (social) innovation.

<sup>11</sup> A drop down list allows choosing the type sector (NACE nomenclature) : [http://ec.europa.eu/competition/mergers/cases/index/nace\\_all.html](http://ec.europa.eu/competition/mergers/cases/index/nace_all.html)

Type of Exploitable Foreground <sup>10</sup>	Description of exploitable foreground	Confidential Click on YES/NO	Foreseen embargo date dd/mm/yyyy	Exploitable product(s) or measure(s)	Sector(s) of application <sup>11</sup>	Timetable, commercial or any other use	Patents or other IPR exploitation (licences)	Owner & Other Beneficiary(s) involved
PROPRIETARY IMPLEMENTATIONS	SEE SECTIONS 1.3, 2.2.3, 2.2.4 AND 2.2.5	YES	N/A	NEW SERVICES	MANUFACTURING	CURRENTLY IMPLEMENTED	N/A	INDIVIDUAL PARTNERS

### **2.2.3 Purpose of the exploitable foreground**

The purpose of the exploitable foreground is two-fold:

- To implement a prototype software environment enabling the experiments to be carried out and resultant services to be set up; and
- To develop that software needed to implement the Fortissimo Marketplace using off-the-shelf solutions where possible and developing minimal “glue software” to join the various software components together.

The former software is highly proprietary. It forms the basis for services to be offered within the Fortissimo Marketplace and for solutions to be implemented which might be exploited either through external consultancy or via externally available services. The latter “glue” software, but not necessarily the components it binds together which may be proprietary, will be made freely available as an open-source offering.

### **2.2.4 Exploitation of the foreground**

As presented in section 2.2.3 the exploitation path for foreground is clear. It has been used to implement the individual experiments. Additionally, it will be used in to implement both internal and external services. These external services may use the Fortissimo Marketplace or other marketplaces or both. The software developed to implement the experiments will be largely proprietary because it will be close to market. The “glue” software to implement the Fortissimo Marketplace by binding together off-the-shelf components, will be freely available as open-source.

### **2.2.5 IPR exploitable measures**

The nature of Fortissimo, where the software to enable the experiments will generally be proprietary and where the software to bind components together to implement the Marketplace is open-source, lends itself to particularly simple IPR management. Software developed within the experiments will generally be available only to the experiment partners, although some licensing arrangements may be possible on a case-by-case basis. It should be noted that IPR developed to implement a particular experiment belongs to the partners in that individual experiment only and not to all partners in Fortissimo. Other software will be freely available as open-source.

### **2.2.6 Further research**

Further development of the Marketplace and further experiments are taking the initial work of Fortissimo forward, involving further development work and implementation effort.

### **2.2.7 Potential and expected impact**

The potential and expected impact of the foreground developed in Fortissimo is described in detail in section 1.4 above.