



## D3.2 First Market Review Version 2.1

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## Change Log

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V2.1	Sally Bridgwater	Modified following comments from TERATEC review



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## Executive Summary

This report is an analysis of the market for POP services in Europe, and an outline of the strategy that we will use for the next year of the project. We look at the market in terms of organisation type and propose a set of targets for the POP partners involved in Community Development.

### 1. Introduction

This report is an analysis of the market for POP services in Europe, and an outline of the strategy that we will use for the next year of the project. In their report for the EU, *A strategic agenda for European leadership in Supercomputing: HPC2020*<sup>1</sup>, IDC estimated that the use of HPC to improve products and services could add 2% to European GDP in 2020. POP has an important role to play in realising that ambition.

Ultimately the aim of POP is to help organisations to get more out of their existing software and hardware. Software is often a large investment for an organisation and the life of a piece of software is typically much longer than that of a piece of hardware. Despite this fact software often does not receive anything like the funding that hardware does, and organisations often lack the resources to analyse the ongoing performance of their code. POP needs to convince such organisations that code modernisation is worthwhile. POP is not alone in this endeavour - in 2015 Intel ran a series of workshops on the topic backed up by a range of web resources<sup>2</sup>, with more events planned for 2016.

There are various arguments in favour of improving software efficiency and these may apply to different audiences. For some users time to solution is important, for others improved throughput or utilisation of resources is the biggest benefit, while for others the attraction might be the opportunity to solve more interesting problems. We need to tailor our arguments for different audiences.

We need to recognise that bringing POP in to analyse a code is disruptive to normal business and involves a certain amount of cost in time and effort on the part of the code owner. Many organisations will also have concerns related to preserving the intellectual property which their software represents. In addition, for some organisations the use of software in a production environment is regulated, and updated software has to go through some form of certification process before it can be used, which can act as a disincentive

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<sup>1</sup> <http://hpcuserforum.com/eu/downloads/SR03S10.15.2010.pdf>

<sup>2</sup> See for example <https://software.intel.com/en-us/articles/what-is-code-modernization>



to change. Since POP has set itself targets for numbers of analyses performed during the project, in the next twelve months we need to focus on users who are able to overcome these issues and start working with POP quickly.

To date POP has largely worked with academic codes. This is natural: it is where most of the Consortium have the greatest number of contacts and where collaboration with an organisation like POP is natural. We are making progress with some potential industrial users but this takes time due to issues of confidentiality, authorisation to use outside resources etc. In what follows we consider some issues in marketing POP services.

## 2. Confidentiality and IP

Many organisations understand the value of their software and the IP vested in it, and want some guarantees that POP will respect that. This is easily addressed through POP's standard Terms & Conditions, or through additional NDAs signed between members of the POP consortium and a User organisation.

However, for some industries, types of organisations, or software applications this will not be enough. For some industries employees of POP partners may need a formal security clearance (for example weather forecasting or the nuclear or defence industries). For the highest levels of security clearance, it will be important to consider the timescales as obtaining clearance could take several months. However standard security checks are usually swift and unlikely to be a significant issue.

Given the project timescales it will be preferable to work with organisations which are able to take up POP services relatively quickly, i.e. they have the authority to take decisions relating to IP and security relatively quickly. This suggests a broad focus on areas such as manufacturing, energy and perhaps the creative industries. In areas such as defence or financial services we are more likely going to work with SMEs or small autonomous business units than large monolithic organisations with complex management structures.

## 3. Resources to work with POP

As explained earlier, there is a cost involved in any organisation working with POP, in terms of the time and effort put in by the code owner. We need to target organisations where this is not an issue.

One industry POP might have pursued is oil & gas where the large players make extensive use of HPC and rely on a large supply chain of companies providing a range of services, many of which are software based. Unfortunately, the collapse in oil prices since 2014 has led to a massive contraction in the industry, and major restructuring within those organisations



that remain. In spite of this there may still be opportunities within such organisations e.g. if they have an urgent need to reduce computing costs. However, we will not actively target this industry unless we see evidence of a recovery.

## 4. Market Segments

Since the market for POP services is so broad, we will break it into segments characterised by how they already use technical computing and how they might use POP, with the specific aim of identifying pros and cons of working with each segment.

In this break-down we are ignoring organisations that just use packaged applications or SAAS, and also organisations that run serial code on HPC clusters (e.g. some bioinformatics research organisations).

### 4.1 Large Commercial Organisations that use HPC

In this case the organisation will likely have a substantial investment in HPC, both hardware and software. They will most likely use a mixture of home-grown and commercial applications, including legacy code. They are likely to be interested in performance analysis as a “fresh pair of eyes”, and possibly a performance plan. They are likely to do any code improvements in house, possibly using contractors or external service organisations. Typically, these kinds of organisations will be found in many sectors including manufacturing, financial services and energy.

In many organisations getting approval to use POP will be time consuming, and confidentiality may be a big issue, it will be important to consider if such organisations can use POP in a timely manner.

However, the fact that they have made an investment in HPC indicates that they place a certain value on their use of software and likely to be very open to a free performance analysis service.

As of 1<sup>st</sup> September, POP has worked on four audits for large commercial organisations.

### 4.2 Other Large Commercial Organisations

There are other large organisations that use software on a smaller scale, e.g. small clusters and desktops. Whether they are interested in using POP will depend on what benefits software brings to their organisation and what in-house expertise they have. We will face the same issues with confidentiality and decision making as in the first case. When these organisations consist of multiple small scale business units we will face many of the same issues as when dealing with SMEs.



### 4.3 SMEs that use HPC (Tier-1 and above)

These organisations are relatively uncommon because of the associated costs (both in accessing HPC resources and acquiring the necessary skills to use them effectively). It is worth noting that the EU is addressing this through the Fortissimo Project<sup>3</sup> which provides immediate, practical help to organisations wishing to use HPC, as well as developing longer-term mechanisms to facilitate access to HPC for smaller organisations. Those in Fortissimo will already be partnered with HPC specialists who may well be able to provide this assistance, however it may be possible to use Fortissimo to meet potential clients, e.g. via the Fortissimo mailing list.

These types of organisations are likely to be interested in POP's full range of services. Finding such SMEs may be challenging.

### 4.4 SMEs with small-scale parallel applications

These organisations occur in many market sectors. Typically, they will be running jobs on a single computer using OpenMP or a GPU. Sometimes they will use a small cluster. They are likely to have some in-house expertise for maintaining and extending their applications, but lack the expertise to do the kind of profiling POP offers.

These kind of organisations are likely to be interested in POP's full range of services, and relatively flexible in their approach to working with outside organisations. However, they may be hard to find.

### 4.5 SMEs with serial code

Serial codes do not fall within the focus of POP and applications to the POP service from these organisations will need to be treated on a case-by-case basis. For example, POP could recommend a suitable methodology and training on parallelising serial code e.g. using OpenMP. If these organisations parallelise their code, they would then be eligible to reapply for POP services.

### 4.6 ISVs

There are a large number of ISVs in Europe developing and marketing software for technical applications. Many of these organisations could benefit from POP services, especially if their software is quite mature and not tuned to modern architectures.

A consideration when offering POP services to ISVs is the aim of quantifying the impact POP has made. One solution would be for the ISV to provide suitable standard industrial cases, another is to work with one or more of their customers. Of course the impact of improving a widely-used piece of software is potentially very big. One of the survey questions in WP2 will address this issue by asking the customers about the number of users of the code.

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<sup>3</sup> <http://fortissimo-project.eu/>



One method we will use to locate ISVs is to target them directly using lists of software available online, there is also likely to be a large presence of ISVs at conference events where we can discuss POP with them.

Up to 1<sup>st</sup> September 2016 POP has or is currently working on 10 codes by ISVs, of which five are from SMEs, and is in discussions with four more. Due to the commercial nature of the applications, these take longer to initiate than academic applications.

#### **4.7 System Integrators/Vendors**

Many suppliers of hardware face requirements to tune applications to their architecture, and indeed their ability to win a competitive procurement may depend on how well they can do this. While the big players in this industry (Cray, IBM etc.) have large dedicated teams for just this purpose, suppliers of smaller systems (such as ClusterVision, OCF etc.) do not, and could well benefit from a partnership with POP. As is the case with ISVs, we would ideally like to gauge the impact POP's work had.

Working with system integrators might be beneficial as they have already developed trust with customers, so if POP partners can build trust with a system integrator, a chain of trust can then be developed with customers. In addition, system integrators will already have HPC customers who have invested in parallelising their codes which are of obvious interest to POP.

#### **4.8 Academic & Research Organisations**

Researchers and IT support staff in these organisations are often much better informed about parallel computing and HPC than the commercial sector. They are likely to have access to a range of hardware resources but may be comparatively short of software development support. This means that, even if the researchers are long-term users of HPC, their codes may well perform poorly. Researchers in these organisations will be very open to working with a third party if it benefits their research, and the support staff at the institution may well be amenable to putting POP in touch with suitable candidates.

Quantifying the impact of POP (e.g. in terms of science realised) may be harder than with private sector organisations because of the timescales involved.

POP will particularly target codes with a large user base, these will be located through working with area experts, HPC Centres and online lists of codes. Another resource will be searching source code repositories that are widely used, these often give information on the number of users or downloads of the application which will be useful in quantifying POP's impact.



## 5. Business Development Strategy

Technical computing is used across virtually all major vertical market sectors in the EU and therefore we see little merit in targeting one over any others.

However, we do see arguments in favour of focussing our short-term business development strategy on organisations that are likely to be receptive to POP's services and quick to make decisions. Based on our market segmentation these are likely to be SMEs and Academic/Research organisations. That is not to say that we won't welcome other kinds of user (indeed we are currently in discussions with a number of large commercial organisations and a system integrator) but we will not go out of our way to attract them.

There is a big overlap with the dissemination work of WP7, and indeed if POP attends an event it is likely to be both for the purposes of business development and for dissemination. The major initiatives that we will take in the first year are:

1. Presenting at appropriate events;
2. Direct marketing through POP partners' existing channels;
3. Targeted, direct approaches to potential users;
4. Promotion via PRACE and other EU-funded initiatives.

### 5.1 Events

We will target general events aimed at users of HPC/technical computing. These include PRACE Days, ISC, TERATEC Forum and other HPC meetings. In addition, we will try to attend meetings focused on a particular industry, such as NAFEMS (computer aided engineering) and the Mobile World Congress (Internet of Things). Events with a large commercial presence will also be a main focus, but these will generally be focused on a particular industry anyway.

In general POP does not have a big enough budget to support exhibiting at events, so we will look to present (either a talk or poster) and to make direct contact with speakers and exhibitors. The fliers and other collateral produced in WP7 will be invaluable for this. NAG will also feature POP at appropriate events that it attends as an exhibitor or sponsor.

We recognize that events won't always be a good way to connect with SMEs, and the more an event is focused on an application area the smaller the percentage of potential POP users us likely to be. On the other hand, if we just target events like ISC and PRACE Days then we will be largely preaching to the converted.



## 5.2 Direct Marketing

In addition to the work done in WP7, we will use the POP partners' other channels to advertise the service. For example, POP has featured in NAG's electronic newsletter (which has around 20,000 subscribers) and will be promoted through its various social media channels. The aim here is to drive traffic to the POP website and solicit enquiries from potential users.

## 5.3 Targeted Approaches

As a Consortium we are already using our contacts to identify potential POP users and that will continue. However, it is important to identify new (to us) prospects and research how best to approach them. We will identify potential candidates through analysing attendees at events, monitoring publications and blogs, the use of search engines and from lists of software.

This is potentially the most important aspect of our strategy as it is the approach most likely to identify SMEs, but will also be the hardest to implement.

POP will also investigate the use of services such as LinkedIn Pro to identify key people with the skills and history to suggest they would be interested in the POP services. This will have the added advantage of allowing POP to target commercial people and organisations.

## 5.4 EU Initiatives

We will work closely with the other Centres of Excellence funded under the EINFRA-5-2015 Call, with PRACE, and with other appropriate EU-funded projects to identify users who can benefit from our services. We have already identified a number of codes used by the other Centres of Excellence to audit. POP has also provided training courses for multiple Centres of Excellence and suggest these be included in the workflow of the Centres of Excellence. POP has already participated in meetings with the Centres of Excellence such as the EXDCI Workshop that was part of the European HPC Summit Week.

SESAME-NET is another EU-funded project that POP is in contact with and will be particularly useful for attracting SMEs. SESAME-NET aims to facilitate access and take-up of HPC by industry and particularly SMEs. Offering our services alongside the network will complement each other well.

## 5.5 HPC Centres

POP will liaise with HPC Centres in order to offer our services to users and the Centres themselves, similarly to working with system integrators/vendors. This will increase the visibility of POP and also will give us access to any industry and SMEs utilizing the HPC services there and also allow us to connect other SMEs we are working with to the HPC Centres.



Working closely with HPC Centres also gives us more options with regards to the sustainability of POP and we will investigate ways to establish POP as a contact point between SMEs and the Centres and the potential for spreading POP's expertise to staff at the HPC Centres.

## 6. Business Development Targets

In the next 12 months POP will need to do a minimum of 60 assessments to meet its targets. We believe that to hit those targets we need to do (as a minimum) the following:

1. Each partner in WP3 needs to attend at least two distinct events and generate an average of 5 new prospects<sup>4</sup> from each event. NAG will aim to attend at least four events.
2. Each partner needs to identify a total of 20 prospects over the twelve-month period, by whatever means it feels most appropriate. NAG will identify 60 prospects. We will aim for 25% of the prospects to be private-sector organisations, although we recognise that this is a stretch goal.

If we achieve 140 prospects, then we need a conversion rate of less than 50% to meet our targets for this year and still have a reasonable pipeline going into the final period. We believe that this is achievable given that the prospects are interested in using POP and it is a free service. We will use our CRM system to track progress.

As of the 1<sup>st</sup> September, in our CRM system, there are 51 POP Users, 19 interested leads and 94 potential leads. It seems that our conversion rate is quite good from interested leads to POP Users. We have satisfied our goals and there is a good distribution of leads from each partner.

Out of the users 22% are from private-sector organisations and out of the leads around 26% are from private-sector organisations so we have managed to achieve our stretch goal of 25%.

## 7. Sustainability of POP

Longer term the sustainability of POP is a very important topic. In order to fully weigh up the options we will use questions asked to POP's customers via WP2 to quantify (amongst other questions):

1. How much they would be willing to pay for the service provided by POP
2. Their interest in staying in the service
3. The services they found the most useful
4. Their estimated ROI.

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<sup>4</sup> We define a *prospect* as somebody who has expressed an interest in using POP, fits the general criteria to use POP, and has the authority or capability to get their organisation to sign up to the service.



Using the data obtained from WP4 and the POP partners, we can estimate the amount of time and money required to provide each service which will allow us to plan for sustainability accordingly.

Initially a discussion document will be circulated to all the partners to discuss the sustainability of POP and their thoughts and requirements. This will then be reviewed and considered in monthly meetings and the face-to-face consortium meetings that occur twice a year before D3.5 is due in March 2017 on the recommendations for POP sustainability.

Two initial options stand out as a starting point for discussion:

1. Offering a subscription that covers the full range of services provided by POP potentially with a certain amount of uses for each service per year.
2. Offering the audits for free and the using paid for proof-of-concept work to subsidise the time and effort required by the audits

Working closely with other projects and HPC initiatives may open up new avenues for sustainability of POP that WP3 will investigate as they become apparent. For example, if there is a high demand for training in this area we will investigate including this in the service package or in some form as a separate service.



## Acronyms and Abbreviations

- D – Deliverable
- GDP – Gross Domestic Product
- GPU – Graphical Processing Unit
- HPC – High Performance Computing
- IP – Intellectual Property
- ISC – International SuperComputing
- ISV – Independent Software Vendor
- NAG – Numerical Algorithms Group Ltd
- NDA – Non-Disclosure Agreement
- OpenMP – Open Multi-Processing
- POP – Performance Optimization and Productivity
- PRACE – Partnership for Advanced Computing in Europe
- ROI – Return on Investment
- SAAS – Software As A Service
- SME – Small or Medium-sized Enterprise
- WP – Work Package