



D3.5 Report and Recommendations for POP Sustainability Version 2.0

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Change Log

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Executive Summary

This report outlines alternative approaches to ensure the sustainability of POP beyond the end of the project and makes recommendations on how that activity should be carried forwards.

1. Introduction

This report explores the issues and options related to sustaining the POP activity beyond the end of the project. It makes some recommendations for the future direction of the project which will be discussed with existing POP users before a final business plan is produced in Month 24.

Due to the varied makeup of the consortium options will work for some of the partners but not others. A draft of this report has been circulated to all partners, discussed at a specific WP3 teleconference and at face-to-face consortium meetings to gather each partner's thoughts and requirements before a recommendation was made.

2. Relevant Issues

2.1 Consortium Composition

The current consortium was chosen to bring together complementary expertise in a variety of areas: performance optimisation tools, running HPC infrastructures, and promoting the use of parallel computing and HPC. Since the purpose of forming the consortium was to apply for EU funding the members of the consortium were all based in the EU. The number of partners chosen was a good fit for the amount of funding available and the need to keep the activity manageable.

Since POP was funded, several organisations have indicated that they would have liked to have been involved. These include an SME which offers performance tuning as a service, another SME which develops and sells performance profiling tools, and various academic organisations. Several organisations outside the EU have also been impressed by the initiative.

If POP were to look to expand beyond the EU, then we might need non-EU partners to do business development and training, at the very least. Possible areas of expansion are considered in the section on *Scope of Activities* below.

We could also consider expanding the partners within the EU, provided this did not spread the available funding too thinly, or lead to competitive tensions within the consortium. Such tensions might arise if, for example, one partner wished to promote their toolchain over others, or two partners both tried to



develop the same kind of business on the back of POP audits. There might be benefits in improving our market development activities in some regions, although we note that there would need to be additional advantages for organisations brought in to do that.

2.2 Public Funding

The most obvious avenue for sustaining POP beyond March 2018 would be for the existing consortium to apply for a second round of Centre of Excellence funding from the EU. The next call for this is not expected until 2018 so even if we were successful there would be a gap in funding since the project ends in March 2018. At some point, however, it is likely that EU funding will cease so this should not be a long-term solution to sustainability.

As one of the partners, NAG, is based in the UK, its participation may be affected by the UK's decision to leave the European Union. Until that happens NAG is still eligible to bid for EU funding and the UK Government has indicated that, in the absence of a formal arrangement covering UK organisations' involvement in H2020, it will fund their participation where projects have been agreed before the UK's formal departure.

Other sources of public funding exist but these are likely to be limited to specific groups of users. One could, however, envisage multiple partners bringing their own national funding and collaborating to offer a broader service. It is however, important to keep the European dimension to POP and it would be undesirable if the funding model prevented some groups of users from accessing the POP services.

2.3 Scope of Activities

We have the opportunity to expand into other regions. The most obvious locations would be North America and Asia, however in the latter case we might encounter issues with language and business culture. Expansion would be a good case for bringing another partner into the consortium to increase our reach in completely new markets. However, such expansion may be premature and better pursued after we have achieved a sustainable business in Europe.

Up to now we have focussed on parallel codes, not least because POP was funded under an explicit HPC call. However, there are a lot of serial codes that could benefit from a POP audit, especially if we could help their owners parallelise them. From a business point of view such people are less likely to have the skills to implement the recommendations of a performance plan than our current users, so there is an opportunity here to generate significant revenue. However, this is also a potential pitfall due to their potential lack of knowledge to maintain and further develop this parallel code. Similarly, the tools and methodology used by the POP project have been designed to work with codes that are already parallel and would need considerable adaptation before giving equivalent insight into serial codes. Nevertheless, we note the encouragement received from the POP reviewers to consider this possibility



and see the advantage this would provide to increase the uptake of parallel computing.

Further services outside of the POP performance analysis such as general code modernisation, “hardening” of research codes etc. could be offered commercially on a case-by-case basis to further subsidise and sustain POP.

2.4 POP as a Legal Entity

Currently POP is a consortium of independent partners covered by a contract with the European Commission and a Consortium Agreement between the partners. We have already seen one drawback of this when concluding NDAs with potential users (essential when dealing with commercial organisations) in that the agreement is by necessity with one POP partner rather than with the consortium as a whole.

If POP were to offer services on a commercial basis, then it would need to operate through a legal entity for several reasons. The most obvious is the need to report income and pay taxes, but there are other practical reasons such as the need to hold Professional Indemnity Insurance (also known as Professional Liability Insurance) in case of prosecution for negligence or consequent damages. The precise requirements in this case may vary between jurisdictions, but it is generally regarded as a necessary cost of doing business since customers often require such insurance to be held to protect themselves if they, in turn, are prosecuted. Other requirements can include a recognised quality management certification such as ISO 9001 and environmental management certifications such as ISO 14001. It is becoming increasingly common for larger commercial and governmental organisations to insist that their entire supply chain conforms to such standards. While it would not be necessary to cover all these requirements from day one, being an independent legal entity provides the necessary framework to acquire them as needed.

There are different kinds of legal entity in different legal jurisdictions. The most normal would be to set POP up as a limited company owned by the POP partner institutions, but other alternatives could be considered, including various not-for-profit options.

An alternative to setting POP up as a separate legal entity would be to offer POP services through an existing organisation which would sub-contract work to partners as needed. Within the consortium, NAG has experience of doing this with academic partners where an end user organisation contracts with NAG to deliver a service and that service is fulfilled by a NAG sub-contractor that happens to be a University. TERATEC also has the ability to subcontract such work.

2.5 Confidentiality and Publicity

Many POP clients expect a high degree of confidentiality in their dealings with POP and, while understandable, this has limited our ability to publicise the success that we’ve been having. While it is unreasonable to expect



commercial organisations to give us permission to use their name or publicise details of their code before we have delivered a satisfactory service, ideally satisfied customers would let us do so.

A potential model we could follow is that of HPC Wales, which offered free access to commercial organisations on condition that any scientific results would be published in the open literature (otherwise they had to pay for access). This offers a model where accepting public money carries with it an obligation to be open and transparent in how it is used. We would include certain safeguards, for example, the right to review before publication and the removal of sensitive information.

POP clients are least likely to want their work with POP published when it reveals large inefficiencies in the application. Clearly the main solution to this is to ensure the availability of Proof of Concept and consultancy work to improve these issues. However, this also involves considerable investment of time by the client, especially for a SME it may be prohibitive to fully implement the necessary changes to improve their software's performance. Therefore, we will explore the possibility of providing funding for joint development between POP and the SME to fully implement the POP recommendations. It would again be with the proviso that POP can publicise the successful software improvement. This is more in line with the Fortissimo and SHAPE projects with longer-term collaboration with SMEs to encourage more efficient uptake of HPC.

3. Options

The advantages and disadvantages of the available options for sustaining the POP service will be discussed here before a recommendation is made.

3.1 Publicly-Funded Free Service

This is the simplest option and, in effect, allows us to carry on the service as it is. The obvious source of funding is the next round of CoE funding from the EU, and we could also look for a mix of national funding sources. However, this should not be a long-term plan to sustain POP.

3.2 Privately-Funded Free Service

Under this option the partners would continue to offer audits and performance plans for free, because they could derive other benefits from the POP service. These benefits would need to be significant enough to make it worth their while to fund the non-revenue generating parts of the POP service (essentially work packages 1, 2, 3 and 7). Some potential examples are selling consultancy services to implement performance plans and maintain code going forward, delivering training courses, or selling CPU hours, and also less tangible benefits such as increased exposure of tools.



However, there are often strong restrictions on these activities by most of the partner organisations and there is no clear way that some of the partners would be able to cover their costs. Therefore, it is apparent that there would not be enough benefit to the consortium to make it worthwhile for all partners.

3.3 Commercial Service

This is perhaps the simplest model conceptually, although it might be complicated to implement in practice. There are two possible (complementary) charging models which could be used:

3.3.1 Subscription Model

In this scenario organisations pay an annual fee to gain access to POP services. We could offer multiple tiers with different service levels. From our point of view this provides a predictable income stream, encourages people to use the service once they've signed up, and would help develop a community. However, it is unlikely that all users would be interested in a continuous engagement so might be best suited to organisations with a lot of code (HPC Centres or Hardware Integrators) or that have an interest in continuous improvement of a small number of codes (ISVs).

3.3.2 Consultancy Model

In this scenario organisations pay for each service as and when they need it. This is probably closer to most user's expectations and may be easier to justify within many potential client organisations. However, this could lead to a lumpy income stream and might position us in more direct competition with existing commercial organisations. A lumpy income may be acceptable for some partners, NAG is used to dealing with this, but it is difficult for other partners due to the need for secured funding for salaries, for example.

3.4 Hybrid Model

An obvious question is whether these options are mutually exclusive or whether there are ways to combine them, at least in the short term. In principle, it looks attractive to transition from the current publicly-funded model to a fully commercial model via a period when some services are funded by public money and others through commercial contracts.

If some of the partners were in receipt of national funding this would be very difficult due to state-aid rules. However, if the Centre of Excellence received another round of funding from the EU we would have more ability to commercialise part of the service to smooth the transition to full sustainability.

This option would allow the most flexibility which will help the consortium to arrange itself in the most beneficial manner for all partners.



4. Recommendation

The ultimate goal for POP is to be self-sustaining through revenue generated by delivering services to end users. To get there directly will be difficult, so we propose that we base our future plans on the Hybrid Model, and apply for further EU funding in the next CoE call.

We will only use this funding to provide services free-of-charge where the customer meets our criteria. For example, they agree that, subject to certain safeguards, the outcomes of the service will be public. Safeguards could include, for example, the right to review information to be published and to prevent commercially sensitive information (including anything deemed critical of the software) from being published. Users who want complete confidentiality would need to pay for their audits etc. at a commercial rate. We would also limit the number of services available free-of-charge to any given organisation/group. Alongside the current services offered by POP we can also offer our expertise in related commercial HPC services on a case-by-case basis to help us transition from full funding.

By partnering up with HPC centres and PRACE, we can offer the POP services to vet and certify applications for access to those HPC resources. This will allow for an independent analysis, improvement where needed, and help ensure that European HPC resources are being used most efficiently. Once POP becomes a standard we will assess the potential to charge for the service and certification.

In the short term, commercial services will be offered via NAG or TERATEC who have the necessary insurances etc. in place and experience in delivering services to commercial clients using university personnel. Once we achieve a certain level of demand then a separate legal entity can be formed. This approach ensures flexibility in our ability to build towards self-sustainability whilst considering the needs of all partners in the consortium and allowing room for growth.

This sustainability plan will be expanded upon with a Business Model in Month 24 which will utilise KPI data being collected by WP2 from the existing POP clients and community to inform details such as pricing and cost, and make specific goals for the sustainability of the project.



Acronyms and Abbreviations

- BSC – Barcelona Supercomputing Center
- CA – Consortium Agreement
- CoE – Centre of Excellence
- D – deliverable
- DoA – Description of Action (Annex 1 of the Grant Agreement)
- EC – European Commission
- EU – European Union
- GA – General Assembly / Grant Agreement
- HLRS – High Performance Computing Centre (University of Stuttgart)
- HPC – High Performance Computing
- IPR – Intellectual Property Right
- ISV – Independent Software Vendor
- Juelich – Forschungszentrum Juelich GmbH
- KPI – Key Performance Indicator
- M – Month
- MS – Milestones
- NAG – Numerical Algorithms Group Ltd
- NDAs – Non-Disclosure Agreements
- PEB – Project Executive Board
- PM – Person month / Project manager
- POP – Performance Optimization and Productivity
- R – Risk
- RV – Review
- RWTH Aachen – Rheinisch-Westfaelische Technische Hochschule Aachen
- USTUTT (HLRS) – University of Stuttgart
- WP – Work Package
- WPL – Work Package Leader