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D5.4 – Intermediate Innovation Management Report

WP5 – Promoting EU HPC CoEs

Work package:	5	Promoting EU HPC CoEs	
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List of abbreviations

EU – European Union

BSC – Barcelona Supercomputing Centre

CoE – European Centers of Excellence

CSA – Collaboration Support Action

GDPR - General Data Protection Regulation

HPC – High Performance Computing

HPC3 – High Performance Computing Centers of Excellence Council

IP – Intellectual Property

IPR – Intellectual Property Rights

IPR-Helpdesk – European Intellectual Property Rights Helpdesk

UCL – University College London

WP – Work Package

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Executive Summary

This deliverable describes the Innovation Management aspects of the FocusCoE project, which are being carried out in the Innovation Management Task 5.4. This includes the original plans for the task, the progress on the activities carried out in the first half of the project, and the plans for the second half of the project. Task 5.4 was set up to manage the innovations created by the FocusCoE project, and so a framework was set up to capture and manage these. We found, however, that the scope for innovation management within the project was limited. We therefore propose additional activity for this task, to be carried out in the second half of the project. Leveraging the high-level view of FocusCoE towards the CoEs, we aim to complete the work carried out under this task with a study of innovation management best practices across the CoEs. Such a study is of interest to the CoEs, and so the results will be impactful. We will then determine if there are useful cross-cutting innovation management activities that the task can carry out to the benefit of the CoEs.

1   Introduction

The European Union (EU) has launched ten European Centers of Excellence (CoEs) for computing applications, as a part of the three-pillar European High Performance Computing (HPC) Ecosystem (Developing Exascale technologies, providing access to High Performance Computing (HPC) infrastructure, and achieving excellence in HPC applications), with several more due to start in the second half of 2020. These CoEs aim to support the EuroHPC research agenda by testing large scale applications on (pre-) exascale machines.

In order to support these CoEs in their mission to contribute to a globally competitive HPC ecosystem, FocusCoE was selected as a Collaboration Support Action (CSA). The main objective of the fifth work package (WP5) within FocusCoE is to promote the EU HPC CoEs competences and services, and to establish and promote the EU HPC CoE "brand".

Task 5.4, which is the focus of this report, was designed to deal specifically with the management of the innovation outputs arising from FocusCoE itself. Although not a research project in itself, FocusCoE aimed to capture and manage any generated Intellectual Property (IP) and innovations, which for example may have taken the form of course material and software tools developed in the training work package (WP4), as well as the dissemination and outreach infrastructure developed in Task 5.3 (Operational Support for Dissemination and Outreach Infrastructure).

It was also hoped that the other FocusCoE work package tasks may also develop IP, hence the primary activity in this task was to periodically survey the activities across FocusCoE to identify potential IP. The task would then work with the developers of the IP in order to identify, plan and implement routes to promote the IP protection, whether though commercial routes or as open source, dependent upon the nature of the IP. These activities, once potential IP had been identified and exploited, would contribute to the overall sustainability of FocusCoE by ensuring that IP and innovation generated within the project has a life extended by the scope of the project.

We have introduced new activities to extend the task, since the first half of the project gave the impression of minimal inward-facing FocusCoE innovation management opportunities due to the nature of the project as a CSA. The new activities will examine the innovation management activity across all of the CoEs in order to reach conclusions that will be useful to the CoEs themselves. The study will aim to present to the CoEs what works, and what doesn't, in terms of innovation management approaches. It will also consider what opportunities there may be for FocusCoE to carry out useful actions in the realm of innovation management to the benefit of the CoEs, that does not overlap their ongoing activities.

2   Innovation Management

This section discusses the innovation management framework that was established, and what happened within that framework in the first half of the project.

2.1   Managing Innovation within FocusCoE

Whilst the central objective of the FocusCoE CSA is to support the European CoEs for HPCs, and not to carry out research in its own right in order to generate new technologies or other intellectual property (IP), there are some development activities which might result in potential innovation management candidates.

Candidates come in the form of course materials and software tools developed in the training work package (WP4), as well as dissemination and outreach infrastructure developed in Task 5.3. It was hoped that several other work package tasks may develop IP, so the first activity of this task was to periodically survey the activities of FocusCoE to identify potential IP.

The surveying is done through a regular agenda item in the Project Coordination Committee meetings. This allows FocusCoE to react to specific innovation opportunities as they arise.

2.2   Innovation Management Aspects and Stages

The innovation management approach within FocusCoE is guided by the knowledge and IP management principles described by the following aspects (dealt with in further detail in D5.1 - Initial Strategy for Communication, Dissemination, Innovation and Event Management):

1. **Interpretation** - Overall management of all activities relates to understanding needs, with the objective of identifying new ideas, and managing them in order to develop new products and services which satisfy these needs. These needs encompass the range of research impact, societal impact, and commercial impact that may be achieved as a result of the action.
2. **Implementation** - UCL coordinates Innovation Management in the project as Leader of Task 5.4, activities are supported by BSC. The task runs from M1 to M36 and is fulfilled by 7PMs.
3. **Innovation Process** - Innovation Management activities in the project are designed to promote interdisciplinary entrepreneurial opportunities, from invention through to exploitation. For each product entering the process, the benefits, and potential for impact are assessed, the capacity to exploit from within the project (and/or need for

exploitation beyond the project) are considered, and the mechanism for exploitation is formulated, whether for research, societal or commercial impacts.

4. **Stages in Innovation**:
   i. *Secure the foundations* - ensuring the commercial framework is in place and all consortium members are suitably aware, trained and supported in their innovation activities.
   ii. *Capture project outputs* – ensuring mechanisms are in place to ensure beneficial results when entering the innovation process.
   iii. *Manage and protect project outputs* – ensuring the intellectual capital and property in those beneficial results hold their value for subsequent exploitation.
   iv. *Disseminate, exploit and communicate project outputs* – ensuring appropriate effort is expended in order to realise the anticipated research, societal or commercial impact.

2.3 18-month Status and Future Expectations

With a framework established to capture and manage innovations, we have found to date that one innovation has been entered into the innovation management process in the first half of the project. The innovations that were anticipated from the project outset include:
   i. the CoE training portal of WP4,
   ii. the training materials of WP4,
   iii. the services portal of WP5,
   iv. and all project documentation and reports.

In terms of managing and protecting project outputs from an IPR perspective for FocusCoE-produced IP:

i) The tools developed as part of the CoE Training Portal of WP4, have, at the time of writing this deliverable, just entered the Innovation Management process. WP4 determined that the best way to deliver the training portal was through a paid service called time.ly (https://time.ly/), rather than through bespoke software. This was installed on the PRACE website as the best way to reach the target audience. WP4 enhanced the implementation of the portal with some code that conducts some parsing of the CoE calendar feeds (https://gitlab.com/eurohpc/eurohpc-calendars), this piece of code is very specific to the purpose it is being used for. The IP considerations for this portal are therefore largely under the control of the time.ly owners. An aspect of innovation management that we can contribute meaningfully in this case is in the dissemination of the CoE Training Portal. The goal here is to ensure that dissemination channels have been properly utilised, and that the target audience has been informed of the existence of the CoE Training Portal as much as possible. This process is underway, and will be reported in D5.5 - Final Innovation Management Report.

ii) The aggregated training/event contents that feed into the CoE Training Portal belongs to the CoEs' partners themselves, and so it is for them to determine any patent / copyright / protection aspects for them.

iii) The CoE Services Portal developed by Task 5.3 is currently under development and therefore has not entered yet into the innovation management process. The first version of the Services Portal is planned to be online in June/July 2020. As with the case of the trainings delivered by each of the CoEs, the services (and related technologies) provided by the CoEs also belong to CoE partners themselves.

iv) Regarding all FocusCoE documentation and reports, the written contents generated by the project are by nature protected under copyright, unless specified the contrary. Reports are expected to be shared publicly, following the open access policy defined by the project or defined in each of the documents and deliverables after final approval from the Commission. Any use of personal data is handled following GDPR rules. Given the non-technical nature of the project, there are no real novel technologies expected to be produced (that could lead to more complex IPR protection mechanisms such as patents, trade secrets, etc).

It is also noteworthy that not all types of innovation are necessarily linked to the emergence of new technologies (and the products related to them), but also innovation can also be linked to new processes, positioning or paradigms[1] that can lead to novel business models or changes. In this sense, the establishment of a new CSA as an umbrella for the CoEs, also by nature needs to establish new processes to foster the cooperation between COE's (such as it is done in WP2), create ways for providing support (as it is done in WP3 and WP4) or leverage and share best practices among them (WP5).

3   Next steps and conclusions

There will be some degree of useful innovation management activity to carry out in the second half of the project, in the form of:

i.   Enhanced or targeted dissemination measures to increase the impact of the CoE training portal developed in WP4,
ii.   Specific training materials to be produced by WP4,
iii. The CoE services portal being developed in WP5.

Beyond the above, there is limited useful activity for this task to perform as originally intended, with limited foreseeable commercial potential for what FocusCoE itself produces.

While we will be keeping the innovation management framework open and running in order to capture any FocusCoE innovations which are suitable for innovation management, we are also now planning to carry out additional activity in the task, in the form of a cross-CoE analysis of the innovation management activities of each of the CoEs. This will be discussed in the section below.

3.1   Extension of Scope for Task 5.4

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[1] Tidd, J., Bessant, J., and Pavitt, K. Managing Innovation. Integrating Technological Market and Organizational Change. John Wiley & Sons, Ltd. 2005.

Task 5.4 is described as follows in the FocusCoE DoA:

> *"This task will focus on managing the innovation outputs arising from the FocusCoE itself. Although not a research project, FocusCoE will generate Intellectual Property (IP) and innovations in the form of course material and software tools developed in the training work package (WP 4), as well as the dissemination and outreach infrastructure developed in Task 5.3. We expect several other work package tasks to develop IP, so the first activity of this task will be to periodically survey the activities of FocusCoE to identify potential IP. The task will then work with the developers of the IP in order to identify, plan and implement routes to promote the IP, whether though commercial routes or as open source, depending on the nature of the IP in question. These activities will contribute to the overall sustainability of FocusCoE by ensuring that IP and innovation generated within the project has a life extended by the scope of the project."*

The task originally set out to manage the IP/innovations generated by FocusCoE itself (rather than those produced by the CoEs), and, as discussed in the previous section, we have found few candidates / potential candidates for innovation management, and those few have limited scope for meaningful innovation management activity.

The framework established to capture and manage innovations will be left running through the remainder of the project, but in addition to that we are now proposing an additional activity for the task that would look out across the CoEs, rather than just inwardly at FocusCoE.

Task 5.4's additional activity will analyse the innovation management best practices across the CoEs. The task aims to identify cases of success and failure, establishing patterns and describing techniques, with the benefit of a birds-eye-view of the innovation management activity across the full set of CoEs. Then, the task aims to determine what opportunities there are in additive innovation management activities that the task can carry out, by identifying gaps and/or cross-cutting measures that could be taken.

The CoEs naturally have their own innovation management activities, the emphasis on the extended activity is to analyse what they are already doing, producing useful conclusions from this birds-eye-view study, and then determining what could be done in addition to the existing activities that would not duplicate the already existing effort. The content that has fed the study is in the first instance based on already available public deliverables or using deliverables or content made available for sharing between FocusCoE and other CoEs (working with the CoE Innovation Managers to obtain documents or parts of documents while maintaining confidentiality where appropriate. Later in the document this aspect is further discussed), or from relevant information that has already been provided by the CoEs to FocusCoE in previous questionnaires. Additionally, we are coordinating with the efforts in WP4 on business and sustainability to address the CoEs directly, updating them on our progress and seeking discussion and input to help feed the study. Likewise, we will coordinate with the working group (WG) on business & sustainability that was set up by HPC3, as their work and data-gathering is relevant to our study.

Scope of the study

The analysis initially seeks to address the following questions (although the precise questions that the study addresses may be adapted/evolved as appropriate):

1. Are the Innovation/Business/Sustainability Management plans available on the CoE websites (are they public or confidential)? Can confidential management plans be obtained through agreement with the author CoE? Are there cases where no deliverables are listed?

2. The concepts of Innovation, Business, and Sustainability are overlapping, subtly different, and can be varying in terms of their definitions. How are the CoEs treating these terms? Dissemination is usually treated separately, though it is strongly linked, how does this fit in for the CoEs? Would it be useful to propose standardised terms, relationships, or distinctions for these concepts?

3. How are the CoEs handling the reporting of Innovation/Business/Sustainability Management in terms of deliverables? What are the approaches in terms of frequency, timing, and scope?

4. How are the CoEs carrying out their Innovation/Business/Sustainability Management? What are the approaches?
   a. Which are the common measures for IP protection and how do they link their exploitation routes?
   b. Which are the main engagement strategies with external stakeholders?
   c. How is industrial/market/end-user feedback collected?
   d. What is working? What isn't working?

5. Do the CoEs view the exploitation side of innovation management as having the potential to drive self-sustainable CoEs? Is it realistic for them to be self-sustainable at this stage in their lifetimes? When will it be?

Following the study, regardless of whether we go on to carry out useful additive activities, the analysis itself is of great interest to the CoEs, who are keen to see what innovation management techniques have been working, and which haven't, along with guidelines and best practices. The analysis is therefore the key step, and allows us to then evaluate how this refocused task is proceeding, ensuring that any proposed activity is useful, additive, and not burdensome to the CoEs. We have received broad support for these proposed activities, across FocusCoE and from those within the CoEs themselves, particularly from newer CoEs who have yet to establish their innovation management activities. The reception to our data gathering requests has also been entirely positive from all of the CoEs.

Framework, constraints and methodology

The study is being written in the form of an internal document in the first instance, its contents and form of release (be it public or restricted to just the CoEs) will need to be carefully balanced in order to take into account sensitive contents, in accordance with the wishes of the CoEs.

Methodologically – we have been collecting information using primary and secondary sources including:
- FocusCoE has been already surveying CoEs for relevant information, which can be used in the analysis.
- Public information such as project websites, public deliverables, etc.
- Direct contact with the CoEs, with those responsible for innovation management in their CoE.

- WP4's efforts on business and sustainability include workshops on sustainability with innovation management representatives from each of the CoEs. We are attending these workshop and have been addressing the CoEs directly, updating them on our progress and seeking discussion and input to help feed the study. The first WP4 sustainability workshop took place on 5 November 2020, the second workshop will take place in January 2021.
- The HPC CoE Council[2] (HPC3) Working Group on Business Models and Development[3] is surveying its members (at least one for each CoE) with some relevant questions on business models and sustainability that that can feed into this study (and vice-versa, as we expect HPC3 to be able to use our findings), depending on the completeness and detail of the answers obtained. The WG is preparing an analysis on sustainability across the CoEs (providing a preview of what is currently applicable and what possible options could be explore to ensure CoEs sustainability), therefore both their work and data-gathering is relevant to our study. Our shared work with this WG can assist the CoEs in their preparations for proposals for the next round of HPC CoE calls, where many CoEs will be transitioning to a second or third phase. Several of the CoEs will be finishing their current phase at the end of 2021, which is when key parts of their sustainability plans may kick into action, this study can therefore help them in shaping these activities.

In attempting to study the innovation management approaches of the CoEs, a challenging aspect is in collecting adequate amounts of materials (deliverables, other documents) to work with. IPs are often a confidential matter within a CoE, and therefore deliverables that describe them can also be confidential. Our approach to this challenge has included the following considerations:

1. The emphasis was initially on material that is publicly available, including deliverables, websites, and survey results.
2. The CoE deliverables relevant to this study come in the form of dissemination, business, sustainability, and innovation deliverables. Confidentiality concerns will typically apply to a subset of these, but it varies for each CoE. As such, the situation for each CoE has been considered individually.
3. Once we identified gaps in the publicly available information, we sought to communicate with CoE Innovation Managers to obtain information that they were willing to divulge, be it via the direct sharing of materials, the sharing of censored materials, or transmission of information in a form that the CoE is comfortable sharing. We dealt with confidentiality on a case-by-case basis. Typically, it is specifics about IPs which are treated as confidential, rather than the innovation management methods being applied. For this study, the key aspect of interest is the methods being applied.
4. The study itself or parts of it will be made confidential to the public. Its availability may be restricted to just the CoEs. This minimum level of availability must be ensured, as the study is for the benefit of the CoEs.

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[2] The HPC CoE Council, formed of representatives from each of the HPC CoEs and FocusCoE, provides a joint voice of the CoEs in the European HPC ecosystem to strengthen the impact of HPC applications.
[3] HPC3 has the capacity to form working groups designed to address specific areas of interest. One such working group is the HPC3 Working Group on Business Models and Development, which examines the business models and development of the HPC CoEs, in order to prepare the HPC3 sustainability as described in FocusCoE DoA.

5. We have carefully taken into account the sensitivity of CoEs receiving requests for input, minimising the number and scale of requests.

Taking all of the above into account, and taking into account how the report is shaping up at the time of writing, we anticipate the outcome to be a productive and useful study. Innovation management is a challenging subject for research projects, particularly for academic partners, with many CoEs learning how to tackle this subject while they are running. We anticipate that this analysis carried out by Task 5.4 will be useful to all of the CoEs, but particularly to new CoEs and those CoEs transitioning to a subsequent iteration/phase. These CoEs may be considering how to approach innovation management and can therefore benefit from the collective experiences of the CoEs to date. The study will also be useful to the HPC CoE Council (HPC3) Working Group on Business Models and Development (see deliverable D2.2 – First Report on GA meetings), and for WP4 in designing their business training workshops.

Timeline

The following is the proposed timeline for the remainder of the project:
- **M18-M24** – Gather and digest all publicly available material on the innovation management activities from the CoEs. Begin drafting a document describing the summary of cross-CoE innovation management, analysing it and reaching conclusions about what is working, what isn't, and what opportunities there are for additive activities that Task 5.4 can provide.
- **M24** – Milestone -- Review progress made (reviewed initially by WP5, then by the Project Coordination Committee), add to the timeline if it is needed, define any necessary further adjustments to the approach.
- **M24** – Gather input from the CoEs at the first WP4 CoE Sustainability Meeting, attended by the CoEs. Include this input into the study.
- **M24** – Aim to complete a first draft of the study report.
- **M26** – Present findings from the study at the second WP4 CoE Sustainability Meeting, attended by the CoEs.
- **M26** – Aim to finalise the study report.
- **M27** – Evaluate expended and remaining effort in Task 5.4. If there are not enough PMs available for the full proposed additional activities, then the scope will need to be limited, if there are excess PMs in the task, then the cross-cutting activities can be scaled accordingly, or the excess reallocated to other tasks in need of additional effort, in the first instance in WP5.
- **M27-M36** – Carry out ongoing innovation management activity determined from the study.
- **M36** – D5.5 Final report on innovation management.

Current status

At the time of writing (M24), the online- and deliverable-based input into the study has been gathered and the CoE innovation management representatives have been contacted and their input gathered to fill in any holes in the dataset.

We also attended the first WP4 CoE sustainability meeting on 5 November 2020 to update the CoEs on our progress and to seek input for the study. The meeting was attended by 32 participants, from 17 institutes, representing the CoEs, including BioExcel, ChEESE, CompBioMed, E-CAM, EoCoE, ESiWACE, EXCELLERAT, HiDALGO, MaX and POP.

The main aim of the meeting was to discuss the different ongoing activities, plans and methodologies currently being considered and used across the CoEs in order to sustain beyond their funded periods. The key aspects which were addressed within the meeting were: the different approach being employed by the CoEs; the different understandings, definitions, and expectations of sustainability; the different and possible barriers to sustainability faced by the CoEs both practically and regulatory; and the needs of the CoEs to make sustainability possible, and how they relate to continuing research in the CoEs to prepare for the exascale.

The study report itself is nearing its complete first draft, which is due for completion at the end of the month. It is evident that no silver bullet for sustainability exists. Each of the CoEs, although common in their endeavours in HPC, operates under different conditions. For a wide range of reasons, relating to both the personnel involved in the project and possible sociopolitical barriers to continuing their involvement in certain types of legal entities, and the sectors which some of the CoEs operate in - for example medicine - which are heavily regulated to prohibit commercialisation of academic software for clinic use.

Based on discussions in the sustainability meeting and feedback from participants on what they feel will be most useful. The report can provide an invaluable tool to existing and future CoEs not by providing a concise guide to innovation management in every scenario, as too many scenarios exist, but instead by providing a report on the fundamentals of best-practice. This will include a broad but limited set of scenarios, along with possible end-points for innovation management and sustainability, and recommendations and best practices in such areas as: stakeholder engagement, capture and management of Intellectual Property, and Innovation Management across whole CoEs based on the experiences of those approaching the end of the funding lifetime. This will include guidance for the CoEs in relation to harnessing 'Innovation Radar', which is the European Commission's data-driven method focused on the identification of high potential innovations and the key innovators behind them in EU-funded Research and Innovation projects.

4   Conclusions

The management of FocusCoE's own innovations is ongoing but is expected to be limited. With the extension of the scope of activities in Task 5.4 to carry out a study of innovation management across the CoEs and determine cross-cutting innovation management activities, more productive activities and more impactful outputs can be realised compared with the task as originally planned. Given that there has been (and is expected to be) limited effort required for internal FocusCoE innovation management, it is anticipated that these additional activities can be carried out with the effort originally assigned to Task 5.4. Based on the current status of the study report, it is clear that this extended activity is benefiting from its bird-eye view of the CoEs' innovation management activity, and thus will be able to provide useful recommendations, best-practices, and definitions.