

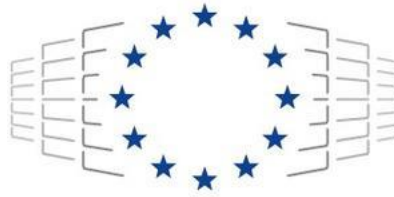
H2020-JTI-EuroHPC-2019-2



Coordination and Support for National Competence Centres on a European Level

Project Number: 951740

D3.2
The CASTIEL Report
Training, Twinning and Mentoring Plans and
Achievements



EuroHPC
 Joint Undertaking

This project has received funding from the European High-Performance Computing Joint Undertaking (JU) under grant agreement No 951740. The JU receives support from the European Union's Horizon 2020 research and innovation programme and Germany, Italy, Spain, France, Belgium

Work package:	WP3	Training, Twinning, Mentoring
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Dissemination Level	Public	

Date	Author	Comments	Version	Status
2021-09-06	WP3 Partners	Initial draft	V0.0	Draft
2021-09-22	Martina Blazkova	Amended draft	V0.1	Draft
2021-09-28	Martina Blazkova	Final version for submission	V1.0	Final
2022-01-25	Martina Blazkova	Amended draft version after the review	V1.1	Draft
2022-01-31	Martina Blazkova	Amended final version after the review	V1.2	Final

Change Log

Date	Section	Change
2022-01-20	Headings – 2, 2.2, 2.2.1, 2.3, 2.4, 2.4.1, 2.5, 3.1, 3.5	Clarification of the headings
2022-01-20	1 Introduction	Amendment of the text to reflect the changes
2022-01-20	2 Training Plan Design and Implementation	Amendment of the text to reflect the changes
2022-01-20	2.2.2 Key Findings of the Analysis of Individual NCC's Training Profiles	Adding a new sub-section summarising the training profiles of NCCs
2022-01-20	2.5 Development of the Training Matrix	Adding document categories present in the Training Matrix
2022-01-20	2.6 Classification of Best Practice Guides on Training	Adding a new sub-section about best practice guides on training
2022-01-20	3.4 Mentoring Paths Supported by CASTIEL WP3	Adding information about the meetings with the NCC mentors
2022-01-20	3.5 Mentoring and Twinning Interactions among NCCs	Adding more information about the mentoring and twinning interactions
2022-01-20	4.2 Fostering Collaborations among NCCs	Placing this section as <i>Section 2.7 Collaborations among NCCs</i> and adding examples of collaborations among NCCs in the first year
2022-01-20	5 Major Achievements	Clarification of the major achievements
2022-01-20	7 References and Applicable Documents	Adding the website of NCC Montenegro with the collaborative conference
2022-01-20	Original Annex 3	Changing the number to Annex 5
2022-01-20	New Annex 3	Adding a new annex with the CASTIEL mentoring and twinning processes
2022-01-20	Annex 4	Adding a new annex with the mentoring and twinning template documents

List of Abbreviations

AI	Artificial Intelligence
API	Application Programming Interface
BSC	Barcelona Supercomputing Centre
BSCW	A web-based groupware tool for efficient collaboration
CC	Competence Centre
CoE	Centre of Excellence
CoI	Call of Interest
CPU	Central Processing Unit
CTO	Chief Technical Officer
DevOps	Software development (Dev) and IT operations (Ops)
DoA	Description of Action
EU	European Union
EuroHPC JU	The European High Performance Computing Joint Undertaking
EXCELLERAT	The European Centre of Excellence for Engineering Applications
FocusCoE	Focus Centres of Excellence
FPGA	Field Programmable Gate Array
GA	Grant Agreement
GDPR	General Data Protection Regulation
GPU	Graphics Processing Unit
GUI	Graphical User Interfaces
HPC	High-Performance Computing
HPDA	High-Performance Data Analytics
ICM	Initial Competence Map
KPI	Key Performance Indicator
M	Month
NCC	National Competence Centre
NDA	Non-Disclosure Agreement
OEM	Original Equipment Manufacturer
OpenMPI	Open source Message Passing Interface
PHP	Hypertext Pre-processor
PMT	Project Management Team
PRACE	Partnership for Advanced Computing in Europe
Q	Quarter
SME	Small and Medium Enterprise
TMTF	Training Mapping Task Force
TTM	Training, Twinning and Mentoring
WP	Work Package
WPL	Work Package Leader
WGT	Working Group on Training
WUI	Web-based User Interfaces

Executive Summary

The focus of CASTIEL Work Package (WP) 3 Training, Twinning and Mentoring is to identify and catalogue the current state-of-the-art of training activities in HPC, HPDA and AI in National Competence Centres (NCCs) as well as across Europe and at the same time to identify gaps and needs in training. This will lead to an initial training plan that aims to cover the identified training needs as well as the relevant actors, and further it will promote a comprehensive implementation of the mentoring and twinning programme.

The first deliverable *D3.1 Initial Training, Twinning and Mentoring Opportunities and the Needs of NCCs* [1], submitted by 31 January 2021, provided the initial overview of available training competences in the NCCs, initial training, twinning and mentoring (TTM) opportunities, and a first identification of the TTM needs of individual NCCs. The current deliverable *D3.2 Training, Twinning and Mentoring Plans and Achievements* will present the evolution of training, twinning and mentoring plans as well as the respective activities done by WP3 within the first year of CASTIEL.

Progress with regard to the training plan has been made as further information was obtained from the detailed analysis of the training activities section of the training mapping survey – which was sent to the Training champions in November 2020 – and from discussions with the NCCs. This information helped to understand the situation at the national level in relation to the training of individual NCCs. The discussions about the second wave of the training mapping survey started in the first year of the project and they will continue in the following months. Due to the complexity of this topic and the varying levels of maturity of the training offers of different NCCs, the development of the training plan as well as its implementation will continue throughout the second year of the project.

As described in D3.1, the HPC portal [2] is used to display the training activities of NCCs and many improvements to the users' and viewers' interfaces have already been implemented through collaboration among CASTIEL [3], EuroCC [4], PRACE [5] and FocusCoE [6]. To enable sharing of training materials, best practice guides and resources by NCCs, a tool called Training Matrix was launched on the project portal EuroCC Access [7]. Further changes to these tools are expected so that they can serve the NCCs in a more effective way.

Significant effort has been made in the planning and development of the mentoring and twinning programme. Activities include the creation, distribution and thorough analysis of the online questionnaire about the mentoring and twinning topics, the creation of supportive documents for NCCs to understand the processes and to easily find a mentor or a mentee, and the initiation of five mentoring paths to share experience and knowledge among NCCs. The mentoring and twinning programme was launched on 21 April 2021 and NCCs have started to plan collaborations with other NCCs. The focus during the second year of the project will be on fostering these mentoring and twinning collaborations as well as other training related collaborations and on the mentoring paths.

Additionally, cooperation with several technology providers have been established through their presentations and workshops for the NCCs and similar activities with the same as well as new providers are anticipated in the second year of the project.

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1 Introduction

The focus of CASTIEL WP3 Training, Twinning and Mentoring is to identify and catalogue the current state-of-the-art of training activities in HPC, HPDA and AI across Europe and at the same time to identify gaps and needs in training. This will lead to an initial training plan that aims to cover the identified training needs as well as the relevant actors, and further it will promote a comprehensive implementation of the mentoring and twinning programme.

The tasks of this WP are summarised as follows:

- Task 3.1: Working Group on Training <M1-M24>.
- Task 3.2: Development and Execution of the Training Plans <M2-M24>.
- Task 3.3: Development and Execution of Twinning and Mentoring Plans <M2-M24>.

The first deliverable D3.1 *Initial Training, Twinning and Mentoring Opportunities and the Needs of NCCs* provided the initial overview of available training competences of NCCs, initial training, twinning and mentoring (TTM) opportunities, and a first identification of the needs for TTM of NCCs [1]. This deliverable D3.2 *Training, Twinning and Mentoring Plans and Achievements* will present the evolution of training, twinning and mentoring plans and the respective activities within the first year of CASTIEL.

Section 1 Introduction is followed by Section 2, the description of the design and implementation of the training plan. Section 2.1. describes the content of the meetings on the topic of training activities, training mapping and the analysis with the Working group on Training (WGT), which consists of the members of CASTIEL WP3, Training champions and their deputies from all NCCs. Section 2.2 is about the methodology and the results of a more profound analysis of the training activities section of the training mapping survey. Section 2.3 introduces the proposed changes to the next wave of the training mapping, which is planned for the second quarter of 2022, so that relevant information is collected in a more effective way compared to the initial mapping. Section 2.4 describes the portals used for publishing the training activities of NCCs and Section 2.5 presents the training tool that was developed and launched within the first year of the project to provide space for sharing training related materials. Section 2.6 introduces the best practice guides on training and Section 2.7 provides examples of collaborations among NCCs in the first year.

Section 3 is dedicated to mentoring and twinning. Section 3.1 describes the design and implementation of the mentoring and twinning plan, the process, the definitions and the current status. Section 3.2 introduces the meetings organised with the WGT in which the mentoring and twinning topics were discussed. Results of the questionnaire for mentoring and twinning are presented in Section 3.3. An overview of the mentoring paths initiated by CASTIEL WP3 can be found in Section 3.4. Section 3.5 reports on the mentoring and twinning interactions among NCCs.

In Section 4 the presentations and workshops with technology providers are introduced.

Major achievements are summarised in Section 5 and concluding remarks are given in Section 6.

References in Section 7 and Annexes 1-5 conclude this document.

2 Training Plan Design and Implementation

Task 3.2 *Development and Execution of the Training Plans* aims to develop a training plan to close the training gaps that are not properly covered by the existing activities and to issue a recommendation on the skills and activities needed by the NCCs to complement the currently available training activities in Europe.

The first step was to map the current training activities within the EuroCC network. The first training assessment (training mapping survey) among all the NCCs was carried out in October – November 2020 and it encompassed training events in the academic years 2019-20 and 2020-21. The survey has been described in detail in D3.1, which was submitted on 29 January 2021 (Sections 2.1 *Methodology*, 2.2 *Results from the Generic Section* and 2.3 *Results from the Training Activities Section*). As the analysis of the training activities section started in January 2021, only a brief description was included in D3.1. During spring 2021, the detailed analysis of the training activities was conducted with the objective of comparing individual training profiles and identifying strengths and weaknesses with the overall goal of developing a training plan in which twinning and mentoring are integral components. More details about the detailed analysis can be found in this document in Section 2.2.

The initial training mapping document with the structure and the categories asked provided useful information. However, the instructions were not clear enough and NCCs provided heterogeneous information, some of the requested information showed to be less necessary, therefore it was decided that changes, such as clearly define the HPC, HPDA and AI scope of the courses and simplifying the categories, are needed in the next wave of the training mapping that is planned for Q2 2022. For a more constructive and efficient discussion, the Training Mapping Task Force (TMTF) was established in March 2021. In addition to the members of CASTIEL WP3, the task force is composed of 11 Training champions/deputies following a Call of Interest (CoI) announced by CASTIEL WP3. The aim of the TMTF is providing feedback on the current training mapping document and the information collection and suggesting improvements for the next wave (please refer to Section 2.1 and Section 2.3 for more details).

At the same time, the discussions about the training registry of the HPC portal [2] started with the intention to ensure that European initiatives, i.e. CASTIEL [3] and NCCs within EuroCC [4], PRACE centres [5], CoEs within FocusCoE [6], provide uniform information about their training activities (see more details in Section 2.4.1). These debates have also had an influence on the discussions about the next training mapping survey. As this is a very complex issue, the discussions about the improvements of the second wave of the training mapping and the HPC portal are ongoing and are expected to continue during the second year of the project. The reviewers' feedback with regard to the training portals was taken into account and necessary changes will be implemented in the following months.

From the discussions with the Training champions and from the results of the initial questionnaire, which was distributed in November 2020, the need for a dedicated place to share training materials and resources among NCCs became apparent. Therefore, the Training Matrix was created in the portal EuroCC Access [7], in the restricted area for NCCs (please see more details in Section 2.5). The Training Matrix also includes the best practice guides on training that were created as outcomes of meetings, presentations or workshops (refer to Section 2.6 for more details).

Due to the mentioned complexity, the training plan is work in progress. The training plan also contains information about various types of collaborations among NCCs, e.g. speakers' exchange, collaboration on workshops, information exchange and other types of collaboration (more information can be found in Section 2.7).

The Training champions played a significant role in developing the training plan by providing feedback and suggestions in the meetings organised during the first year of the project. This way of communication with the Training champions will continue in the second year of the project.

2.1 Meetings of the WGT Related to Training

During the first year of the project, the following meetings of the WGT took place with the objectives of presenting results of the information gathered from the Training champions and receiving feedback from them. The feedback helped to shape the work of CASTIEL WP3 related to the training plan and training activities. These 12 meetings were also useful in getting to know all the members of the WGT, in understanding the needs of individual NCCs and in initiating conversations among NCCs during the meetings as well as outside of them.

1) 11 December 2020 – Introduction and presentation of results from the questionnaire

After the establishment of the WGT in the initial months of the project, the first meeting was organised to get to know each other and to introduce the work of this WP. An update on the training mapping survey was provided, followed by the presentation of the results from the questionnaire that was distributed to the Training champions and deputies in November 2020. The objective of the questionnaire was to gain more information about the training resources and needs of all NCCs. At the end of the meeting there was time to answer questions and get feedback, followed by a short introduction of the next steps.

2) 2 February 2021 – Presentation of results from the training mapping survey – generic section

The analysis of the initial information received from the training mapping survey was split into two parts – the generic section and the training activities section. After completion of the analysis of the generic section by CASTIEL WP3, a meeting with the WGT was set up to present the results and to outline the planned analysis of the training activities section. Questions were answered and feedback was received on both parts of the presentation. At the end of the meeting, the next actions for M5 – M16 were presented in order to raise awareness of the work that this WP was doing for the NCCs.

3) 30 March 2021 – Discussion with the TMTF about the next wave of the training mapping

As mentioned, the TMTF was established with the aim of providing feedback to CASTIEL WP3 and suggesting improvements for the next wave, which was explained at the beginning of this meeting. Then the participants were divided into three groups that worked on the following questions:

1. What kind of training events do we want to collect? – Short courses only or education/university courses too?
2. How do we collect the information for the next mapping? – Through a Microsoft Excel table or in another way?
3. What will be the structure of the document?
4. What questions do we keep, delete and/or add?
5. What else needs to be changed?

After the given time, each group presented the key points and conclusions. A discussion with the whole group followed with the goal of reaching consensus on each question, which was achieved. The meeting was finished with a presentation of the next steps.

4) 16 April 2021 – Presentation of the detailed analysis of the training activities section of the training mapping survey

The next meeting with the WGT was organised once the analysis of the training activities section of the training mapping survey was completed. The methodology and the results from

the analysis were presented in detail. Feedback, questions and answers followed the discussion. Here too, the next steps and actions closed the meeting.

5) 20 – 30 April 2021 – Discussions with NCCs about the status of the training area

To better understand and address specific needs of individual NCCs, small scale group discussions were initiated by CASTIEL WP3 to specifically outline the current stage – and potential risk factors – of the NCCs' training programmes in HPC/HPDA/AI. A brief summary of outcomes of these group discussions is provided further.

Composition of groups

WP3 announced several dates and times for NCCs to choose from. The Training champions or their deputies were asked to choose the best suited slot and write a name of a person who would present the current situation of the training area in their NCC.

The following meetings with NCCs took place in the following dates:

1. 20 April 2021 – Czech Republic, Slovenia, United Kingdom (A), Poland.
2. 21 April 2021 – Netherlands, Greece, Croatia, Switzerland.
3. 22 April 2021 – Latvia, Turkey, Spain, Finland.
4. 26 April 2021 – Hungary, Luxembourg, Iceland, France.
5. 27 April 2021 – Lithuania, Slovakia, Estonia, Norway.
6. 28 April 2021 – North Macedonia, Belgium, Bulgaria, Cyprus.
7. 29 April 2021 – Ireland, Romania, Portugal, Italy, Montenegro.
8. 30 April 2021 – Austria, Germany, Denmark, Sweden, United Kingdom (B).

Up to three Training champions (or delegates) from each participating NCC attended the group discussions. NCC representatives from the United Kingdom participated in two meetings due to a different focus of the activities that they provide and wanted to report on – one on academia and another on industry. Precise accounts were given that comprehensively describe the national situation and outline specific obstacles in sufficient detail. Discussions and the exchange of advice among participating NCCs took place in many groups.

General Remarks

A common topic throughout all individual group discussions was the complexity faced with approaching industries. Significant efforts have been made and industries seem to be open to HPC and associated training programmes, but general guidelines are missing and actual expectations are hard to identify. Very limited experience is available (with only a few NCCs having established operational connections, e.g., Italy, the United Kingdom) and strategic outlooks appear to be disjoint rather than converging towards a common objective.

Some of the NCCs' training units have a long tradition in educational activity while others start from scratch, so there is a significant disparity in offer and structural organisation. However, most of the NCCs have expressed interest in CASTIEL's twinning and mentoring programme, hence with the help of cross-NCC collaborations these gaps may soon be closed and individual strengths could rapidly become visible on a broader European scale.

Several NCCs are already involved in bilateral (or even multilateral) exchanges of training events and corresponding lecturers. Such collaborations essentially arise from successful previous cooperation. Local legal requirements are taken into account on a best effort basis. Nonetheless, it was desirable to establish a common EU-wide framework universally applicable to all various kinds of training exchanges carried out in collaboration between different NCCs. This way national training programmes could be extended to a much broader audience, while at the same time a common legislative background would not prevent any NCC from benefitting from a particular specialisation offered by another NCC.

There is currently no consensus among NCCs on whether or not to provide a dedicated infrastructure for training events. Several NCCs have carried out exploratory projects to test various solutions and different platforms, however, a large fraction of NCCs consider training events also as a form of promotion of their national supercomputing centres, hence they host the training courses in order to advertise a specific HPC infrastructure to a target audience of potential future usage.

The following constraints were reported more than once by the NCCs during the discussions:

- Missing EU-wide framework of how to handle exchanges of trainers and domain specialists.
- Lack of trainers in general or for specific topics.
- Lack of a list of interchangeable courses (between NCCs) that are clearly tagged as a) for beginners, b) for intermediate level, c) for advanced users.
- Lack of knowledge of how to best attract industries.
- Unclear process of periodic updates of the data of individual NCCs.
- Language incompatibilities when extending the national offer to an EU-wide audience.
- Unclear role of EuroCC Access and how to manage data deposits there.
- Missing repository for collecting and exchanging online training materials, especially for beginner's level courses (however, the Training matrix has been launched in the meantime, and the HPC portal should also be taken into account).

CASTIEL WP3 will address the mentioned constraints, where applicable, in the second year of the project through knowledge exchanges, workshops and guidelines. Several knowledge exchanges and workshops have been planned starting from Q4 2021.

2.2 Detailed Analysis of NCCs' Training Activities

There is a diversity of approaches to training across the NCCs and CASTIEL WP3 wanted to capture this diversity and offer a consolidated overview of the options that are available at the different NCCs. Following the data acquisition process of Task 3.1 (collecting training mapping surveys from each of the 33 NCCs by the end of 2020), a detailed analysis of the training activities of the NCCs was carried out in spring 2021. As a result of this, the WGT can now characterize national-level training profiles in an unbiased and semi-quantitative manner. As mentioned at the beginning of Section 2, this should be regarded as a preliminary attempt to compare individual training profiles and identify strengths and weaknesses with the overall goal of developing a training plan in which twinning and mentoring form integral components.

A subset of seven categories was selected by CASTIEL WP3 on which the analysis was based. The selected categories were the following (the capital letters in parentheses refer to the respective column in the original spreadsheet of the training mapping survey):

- Teaching Methodology (J).
- Target Audience/Sector (V).
- Target Audience/Academia/Skill Level (W).
- Target Audience/Industry/Size (X).
- Target Audience/Existing vs. Future Users (Z).
- Scientific Domain (AB).
- Technical Domain (AC).

The key tool used in the analysis were so-called profiles – a graphical representation characterizing individual categories. Rather than using simple arithmetic means, where each profile of a particular NCC would contribute with a factor of 1/33 to the average baseline, weighted arithmetic means [8] were taken into account. Such profiles then served to

automatically detect suitable pairs of NCCs for twinning with complementary training profiles in a particular category. The detailed description of the used methodology to analyse the data collected in the training mapping survey is provided in Annex 1.

The next section presents the key findings from the analysis.

2.2.1 Key Findings of the Analysis per Category

The results of the analysis of the training activities show as a general trend a frequent identification of EU13 countries as best matching twinning partners in virtually all of the NCC evaluations. Brief summaries for each of the categories are as follows:

- **Teaching Methodology (J)** – The predominant teaching methodology of all NCCs is “Combined Lectures & Hands-On activities”. Occasionally, some NCCs place more emphasis on stand-alone “Lectures” or “Hands-On”, while “Hackathons” and “Self-Learn” should both be considered of limited use in HPC course work.
- **Target Audience/Sector (V)** – The major sector of all NCCs’ target audience is “Academia” (≈68%). Significant other sectors are “Industry” and “Public Admin” (both ≈15%) but “NCC Personnel” and “Other” are targeted only in exceptional cases. A sizeable fraction of NCCs focus only on an academic audience. Only a minor subset of NCCs has a more-than-average focus on “Industry” as sector of their respective target audience (13 out of 33).
- **Target Audience/Academia/Skill Level (W)** – For “Academia” as selected sector of the target audience, the skill level “Early-Stage Researchers” constitutes the most important group in NCCs’ training programmes (≈39%) followed by “Undergraduate Students” (≈34%) and “Experienced Researchers” (≈16%). Interestingly, only 4 out of 33 NCCs consider this differentiation mainly irrelevant. The majority of NCCs exhibit a profile of comparable shape to the baseline.
- **Target Audience/Industry/Size (X)** – When “Industry” had been selected as sector of the target audience, “SMEs” were the most important target group of NCCs’ training programmes (≈62%), while larger sized enterprises received decreasing levels of dedication. Quite a considerable number of NCCs had not reported data in this category (13 out of 33) and another fraction responded with indifferent recognition of size (6 out of 33).
- **Target Audience/Existing vs. Future Users (Z)** – “Beginners’ Level” of existing users form a target audience of comparable importance to “Future Users” (≈34% versus ≈35%). In contrast, “Intermediate Level” and “Advanced Level” of existing users constitute a target audience of reduced dedication (≈21% and ≈9%). A minority of NCCs (3 out of 33) report “Other” as a significant target group in this category and it might be interesting to learn what they refer to in particular (to be discussed in some forthcoming group meeting).
- **Scientific Domain (AB)** – By far the most important scientific domain in NCCs’ training programmes is “Computer Science, Computer Engineering, Electrical Engineering, Telecommunications” (≈42%) followed by “Not domain specific” (≈16%), “Mathematical Sciences” (≈14%), “Fundamental Physics” (≈7%) and “Biochemistry, Bioinformatics, Life Sciences” (≈6%). Many NCCs dedicate their HPC training to only a few scientific disciplines and only a minor subset of NCCs (13 out of 33) show a broad consideration of all various scientific domains. The fraction reporting just “Not domain specific” is also quite significant (7 out of 33).
- **Technical Domain (AC)** – Overall the main technical domains considered by NCCs’ training programmes are “AI, Machine Learning, Deep Learning” (≈23%) followed by “Not relevant” (≈14%), “Scientific Programming” (≈11%), “HPC” (≈11%), “Data

Science and HPDA” (≈10%) and “Parallel Programming” (≈8%). Contrary to the category Scientific Domain, most of the NCCs exhibit a broad distribution of considered technical domains, sometimes with a predominance of HPC.

The methodology as well as the results from the analysis and their graphical representation considering the 7 categories mentioned above were presented in detail to the Training champions at a meeting on 16 April 2021 (please refer to Section 2.1 for more details). These results were later used as supporting documents for the mentoring and twinning programme described in Section 3. All Training champions and EuroCC WP leaders have access to these documents and the graphical representation of results for each category in dedicated repositories in compliance with GDPR and they can see how they stand in each selected category in comparison to the average baseline of all NCCs as well as to individual NCCs. This can also give them ideas for potential mentors/mentees.

2.2.2 Key Findings of the Analysis of Individual NCC’s Training Profiles

The detailed analysis also provided a comprehensive and informative overview of training profiles of individual NCCs identifying their strengths and weaknesses. The individual NCC’s training profiles could be summarised as following:

- 12 NCCs have a well-equilibrated program targeting academia, industry and public administration, 13 NCCs target academia and industrial audience with 6 NCCs focusing mainly on SMEs and 2 NCCs on larger sized enterprises. 6 NCCs are exclusively targeting academic audience. 2 NCCs did not provide any answer.
- 22 NCCs dedicate their training activities to existing beginners, intermediate and advanced users with 6 NCCs having a strong focus on beginners and 5 NCCs on intermediate users. 9 NCCs focus either on two or one category of existing users. 8 NCCs have a more than average focus on future users. 2 NCCs did not provide any answer.
- 14 NCCs offer training activities with no particular distinction with respect to the scientific domain. Strong focus on Computer Science, Computer Engineering, Electrical Engineering, Telecommunications have 7 NCCs.
- 25 NCCs provide training activities covering the technical domains of our interest - HPC, HPDA and AI. 26 NCCs focus on several technical domains.
- A well-equilibrated profile in “Teaching Methodology” have 14 NCCs. 12 NCCs also offer self-learn activities.

Both the detailed analysis of NCCs’ training activities and the key findings of individual NCCs’ training profiles will be included in the Training plan. Also, guidelines will be developed by the WGT and provided to all NCCs specifying what should be the baseline of the training offering in the countries of EuroCC.

2.3 Improvements in the Next Wave of the NCCs’ Training Mapping

As described at the beginning of Section 2, CASTIEL WP3 decided to launch the second wave of the training mapping survey by Q2 2022 to capture the evolution of the training activities of the NCCs. WP3 initiated discussions about the changes and improvements in spring 2021 and they are still ongoing. 11 interested Training champions were involved through the TMTF as described in Section 2. The new information will serve to update the EuroCC training catalogue created in November 2020 and to evaluate the impact of CASTIEL on the updated training offer.

Several sources of feedback are being taken into account to establish the new question catalogue for the assessment:

- The feedback received from the WGT during the discussions about the results of the first survey (see Section 2.1).
- The feedback collected from the TMTF through a discussion in small groups during an online meeting and through a follow-up exchange on a shared training mapping document (see Section 2.1).
- The information that CASTIEL WP3 has deemed valuable during the first year of the project for establishing the Training plan, for evaluating real needs and gaps of the NCCs, for suggesting mentoring and twinning pairings among the NCCs.
- The need of collecting information suitable for direct entering into the training registry of the HPC portal (please refer to Section 2.4.1).
- The reviewers' feedback with regard to the mapping of training offers and capturing the diversity of the options available at the different NCCs.

The following main suggestions are proposed by WP3 to improve the assessment:

- Enable a more efficient filling-in of the information and analysis of the results (i.e., by reformulating some questions and eliminating redundant options).
- Improve the categorising of university courses: The new questionnaire will clearly distinguish between academic programmes and modules, and short courses. For other fields, such as “duration of the course” and “accreditation”, such a distinction will also be taken into account.
- Clearly define the HPC, HPDA and AI scope of the courses that have to be part of the assessment, to avoid the submission of large numbers of out-of-scope courses, especially university courses.
- Simplify the category of (expected) participants from industry, for instance by differentiating only between SMEs and larger companies.
- Add the “Generic questions” (high-level, non-course-specific questions) to the training mapping survey at the end of the project, so that the results can be compared with those at the beginning of the project.
- The new survey will include questions present in the HPC portal (see the current full list in Section 2.4.1 below) as well as additional ones (e.g., number and gender of participants and trainers, prerequisites, ...).
- Other suggestions will be proposed, also those reflecting the reviewers' feedback.

For the first assessment, a Microsoft Excel table had to be compiled by each NCC and sent back to CASTIEL WP3 for the analysis. This procedure raised some doubts due to the long compilation time and difficulty of the analysis. Another option for the second wave would be to collect the information directly through the HPC portal (taking into account the GDPR regulations). If implemented, the automatic porting of events from other training calendars to the HPC portal (see Section 2.4.1) would reduce the workload of many NCCs since they would not need to provide the same information in different calendars. Other tools have also been considered, but a final agreement has not yet been reached.

2.4 Portals to Show Training Activities of NCCs

2.4.1 HPC Portal

The DoA for Task 3.1 *Working Group on Training* includes the creation of a “comprehensive catalogue of training opportunities” in the EuroCC landscape and of a “training activities map” (both conceptual and geographical). On the one hand, these goals are met by the “Training

Events” section of the HPC portal. This section is planned to be the central place for the collection and display of all training activities offered by the NCCs as well as training by PRACE and by the CoEs within FocusCoE. On the other hand, the “Map of HPC services” [9] will allow to visualise such activities on a geographical map.

Given the tasks description in the Grant Agreement and the available financial and personnel resources in CASTIEL WP3, we believe that the strategy to use the HPC portal has been an appropriate solution.

The HPC portal has been filled with training events since February 2021, at first by CASTIEL WP3, based on the submissions of all NCCs in the first training mapping survey. In April 2021, members of NCCs received instructions to login and to enter further training events in the HPC portal (as planned by D3.1 Section 2.1). Compared to the first implementation, many changes were needed in the internal and external interfaces of the portal during the first year of the project to suit the needs of the EuroCC and CASTIEL projects. Therefore, many NCCs did not get the chance to enter their training activities in the portal yet. This will be rectified in the upcoming months and all NCCs irrespective of the maturity level will show their training offers.

The technical implementation and maintenance of the portal are carried out by Barcelona Supercomputing Centre (BSC) personnel within the PRACE project (please refer to D3.1 Section 2.1 for more information), without relying on any external services. The training section of the portal consists of a publicly visible interface (the training calendar) and of an interface to enter events (after login). At the moment, the training calendar has a basic design allowing to list and filter training events according to a few criteria (see Figure 1). In contrast, a prototypically improved calendar display appears in the training section of EuroCC Access [10] (see Section 2.4.2 for details).

Training events

LEVEL
DOMAIN
AUDIENCE
Filter

NAME	SCOPE	LEVEL	DOMAIN	STATUS	PROVIDER	ACCESS
Artificial Intelligence		Potential users	Mathematics		FRI UNIZA	
Applied Mechanics		Beginner	Mathematics		MTF STUBA	
CECI - Introduction to data storage and access		Beginner			UCLouvain	
VSC - Linux intro		Beginner			UGent	
Quantum Computers		Potential users	Mathematics		UNIZG FER	Link
Introduction to High Performance Computing		Beginner	Mathematics		CaStoRC Cyl	
ONLINE: Machine Learning with R at LRZ		Potential users, Intermediate, Advanced			LRZ	Link

Figure 1: Display of training events in the HPC portal.

So far, the efforts have been focused on finalising the fields and the corresponding options in the input interface rather than on the display of the information. Currently, those are the fields that can be entered for each event by a logged-in user:

- Title (compulsory unformatted text).
- Service scope (optional unformatted text).
- Service description (optional formatted text).
- Level (optional multiple selection).
- Scientific domain (optional multiple selection).
- Service access (optional formatted text).
- Category (compulsory multiple selection, ranked).
- Audience (optional multiple selection).
- Service start (compulsory date).
- Service end (compulsory date).
- Service valid until (compulsory date).
- Provider (optional multiple selection, ranked).
- Location category (optional multiple selection).
- Language (compulsory multiple selection).
- Technical domain (compulsory multiple selection).
- Format (optional multiple selection).
- Initiative (optional multiple selection).
- Country (optional multiple selection).
- Logo (image uploading).

In particular, every new entry in the field “Provider” has to be separately enriched with meta-data (e.g., description, postal address, latitude and longitude) to allow their display on the “Map of HPC services” on the HPC portal. There, the training events associated to each provider can be geographically located. Yet, the correct implementation of the map will still require some time in the next months due to the process complexity (distinguishing between organiser and location of training events, using the map for other services such as HPC systems and CoEs).

As a result of the current implementation, the fields listed above apply to all HPC services in the HPC portal (this also includes Applications, Benchmarking services, Documentation, etc., in addition to Training Events). It has been agreed among CASTIEL, FocusCoE and PRACE representatives that a specific input mask for training events will be implemented instead (based on a subset of those fields and their options and a few new ones). Moreover, some of the existing fields’ names and options will have to be reformulated for the sake of clarity and consistency. The input interface also needs to be improved by adding built-in compilation instructions, which are so far sent separately to the NCC representatives. Many changes have already been implemented and more will be proposed taking into account the reviewers’ feedback.

One of the long-term improvements emerged in the meetings of the WGT (see Section 2.1) is the realisation of a central tool for registration and feedback collection that could be used by NCCs (currently each training provider deals with registrations and feedback collection independently). Alternatively, an existing provider may be adopted (e.g., Indico [11], currently used by PRACE).

The main challenge is to render the HPC portal a central access point for HPC, HPDA and AI training in Europe. In this perspective, the database of training events both by PRACE and by the CoEs will have to migrate to the HPC portal. Currently, PRACE events are entered in the PRACE portal, which relies on the platform Indico for calendar functionalities, registration, and feedback collection. Additionally, through an automatic mapping, events on the PRACE portal are added to the CoEs’ database of training events hosted by time.ly [12]. The time.ly registry is embedded in several CoE portals and CoE websites (e.g., the EXCELLERAT Service Portal [13]).

When transitioning from time.ly to the HPC portal, all events already present in the time.ly database will have to be included in the HPC portal. For this reason, CASTIEL, FocusCoE, and PRACE are jointly establishing a field-by-field mapping of the entries from time.ly to the HPC portal to eventually allow for an automatic porting.

2.4.2 EuroCC Access – Training Section

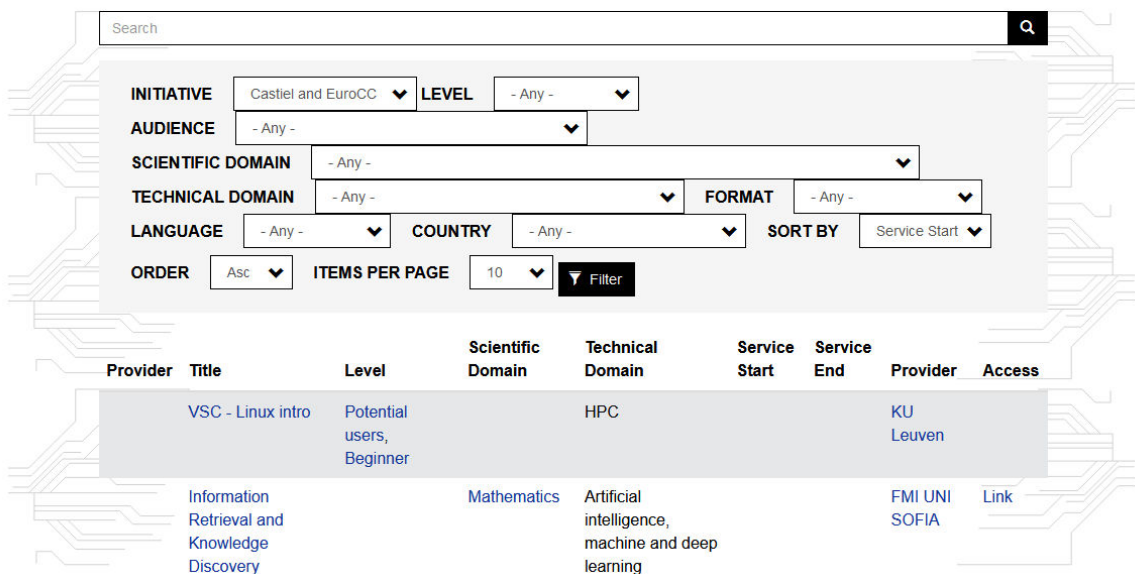
As described in D3.1, EuroCC Access presents “a competence map of the NCCs and their HPC-related activities along with a place for an exchange with other stakeholders”. EuroCC Access is equipped with a training section that has undergone a continuous development during the first year of the project. On the one hand, the public part of the training section contains an embedding of the HPC portal training database described in the previous section. On the other hand, the NCC Area is only available for logged-in NCC members and features a variety of functionalities, such as a Forum for questions, the Knowledge and the Application matrix to collect knowledge about different topics and the NCCExchange to share resources. For training related topics, the NCC Area includes the Training Matrix and the training instance of NCC Exchange, described in detail in Section 2.5.

The training registry of the HPC portal embedded into EuroCC Access has been equipped with a selection of filters and displayed information, enriched in comparison to the current display in the HPC portal. This is the result of suggestions from the NCC members (see D3.1 Sections 3.2.5 and 3.2.6), of discussions both within CASTIEL and with training stakeholders, and of the exchange with the implementation team at BSC. Currently, training events can be filtered by the following fields among those listed in the previous section (see also Figure 2):

- Level.
- Scientific domain.
- Audience.
- Language.
- Technical domain.
- Format.
- Initiative.
- Country.



Find training offers from the National Competence Centres here! From beginner to expert courses, if C++ or Open MP, there's something for everybody.



The screenshot shows a search interface with various filters and a table of training events. The filters include Initiative (Castiel and EuroCC), Level (- Any -), Audience (- Any -), Scientific Domain (- Any -), Technical Domain (- Any -), Format (- Any -), Language (- Any -), Country (- Any -), Sort By (Service Start), Order (Asc), and Items Per Page (10). A 'Filter' button is also present.

Provider	Title	Level	Scientific Domain	Technical Domain	Service Start	Service End	Provider	Access
	VSC - Linux intro	Potential users, Beginner		HPC			KU Leuven	
	Information Retrieval and Knowledge Discovery		Mathematics	Artificial intelligence, machine and deep learning			FMI UNI SOFIA	Link

Figure 2: Display of training events in EuroCC Access (embedding of the HPC portal database).

In addition, training events can be sorted (ascending or descending) by their starting date.

However, these filters and the display options will be discussed again during the second year of the project. It is necessary to first finalise the fields and the corresponding options in the input interface of the HPC portal, according to the criteria explained in the previous section. The reviewers' feedback on the EuroCC Access – Training section will also be taken into account so that the website can provide a way to the training offers of the NCCs, the branding of events is displayed and no other projects can be selected.

2.5 Development of the Training Matrix

The Training Matrix, which has been available since 17 May 2021, enables the NCCs to collect and share best practices, available resources, and mechanisms for training and its organisation and thus contributes to complete WP3's mission in Task 3.1 *Working Group on Training* and to satisfy the needs of NCCs for a place to exchange training-related material.

The Training Matrix currently consists of two parts:

1. The Training Matrix on EuroCC Access, which is a collection of meta-data.
2. A directory called NCC Exchange on the shared workspace system BSCW containing training best practices and files.

All NCC members who have registered to the portal EuroCC Access can be granted permission to access information and modify or enter new information to the Training Matrix.

The Training Matrix on EuroCC Access is a tool to collect meta-data, see Figure 3. It consists of PHP scripts to manipulate collected data stored in a database on the same server as the usual

data of EuroCC Access. NCCs can enter and edit meta-data such as URL, name, or description of all material related to training that they want to share with other NCCs. URL, name, description and contact data are free text fields. Moreover, they can assign tags, e.g., the material's topic(s), free accessibility, the owning and managing NCC(s) and the availability of hands-on material for their entries. All meta-data can be filtered according to these tags and sorted by a selected category by clicking on the corresponding column header. This allows NCCs to find relevant materials even in a large set of meta-data.

Filters

Filters work per category. Multiple selections per category are possible. Only list results containing any of the tags:

Topic

- Best practices for in-person teaching
- Best practices for online teaching
- Course organisation and administration
- EuroCC Mentoring/Twinning

Free Access Yes No

NCC

- Austria
- Belgium
- Bulgaria
- Croatia

Hands-on Yes No

Data

URL	Name	Description	Topic	Free Access	NCC	Hands-on	Contact	
http://www.hlrs.de/training/par-prog-ws/	HLRS Online Courses	Workshop materials from HLRS. Some courses require a username/password that you can obtain by contacting the provided address.	Material (exercises/hands-on/training)	Yes	Germany	Yes	regi-adm@hlrs.de	Details/Edit
https://doku.lrz.de/display/PUBLIC/Lecture+Notes+and+Materials	LRZ Education and Training	Lecture Notes and Materials from LRZ	Material (exercises/hands-on/training)	Yes	Germany	Yes	education@lrz.de	Details/Edit
https://learn.cineca.it/course/index.php?categoryid=9	CINECA HPC courses portal	Materials of CINECA HPC courses	Material (exercises/hands-on/training)	Yes	Italy	Yes		Details/Edit
https://enccs.se/training-resources/	ENCCS Training Resources	Curated training material from ENCCS training events. References to external training material as well.	Material (exercises/hands-on/training)	Yes	Sweden	Yes	info@enccs.se	Details/Edit

Figure 3: The Training Matrix on EuroCC Access.

Since the Training Matrix on EuroCC Access is only a collection of meta-data, the directory NCC Exchange on BSCW is the solution for NCCs to share material directly. If NCCs have materials that do not have a link yet, they can upload them together with a regulation file to the NCC Exchange into a matching subdirectory, see Figure 4. This provides a URL they can use as meta-data.

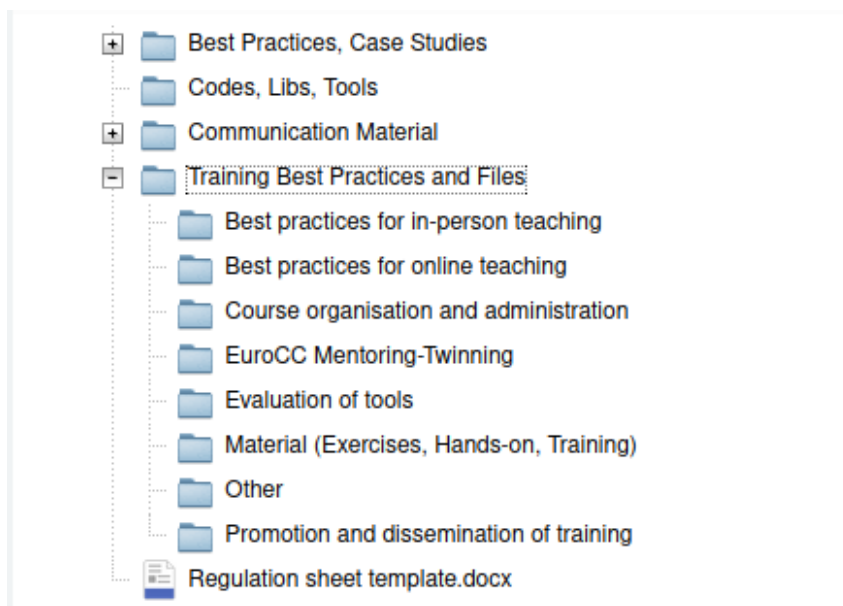


Figure 4: Directory structure for training material on NCC Exchange.

A flow chart is provided for the NCCs on EuroCC Access to visualise all the steps necessary to work with the Training Matrix, see Figure 5.

HOW TO USE THIS TOOL

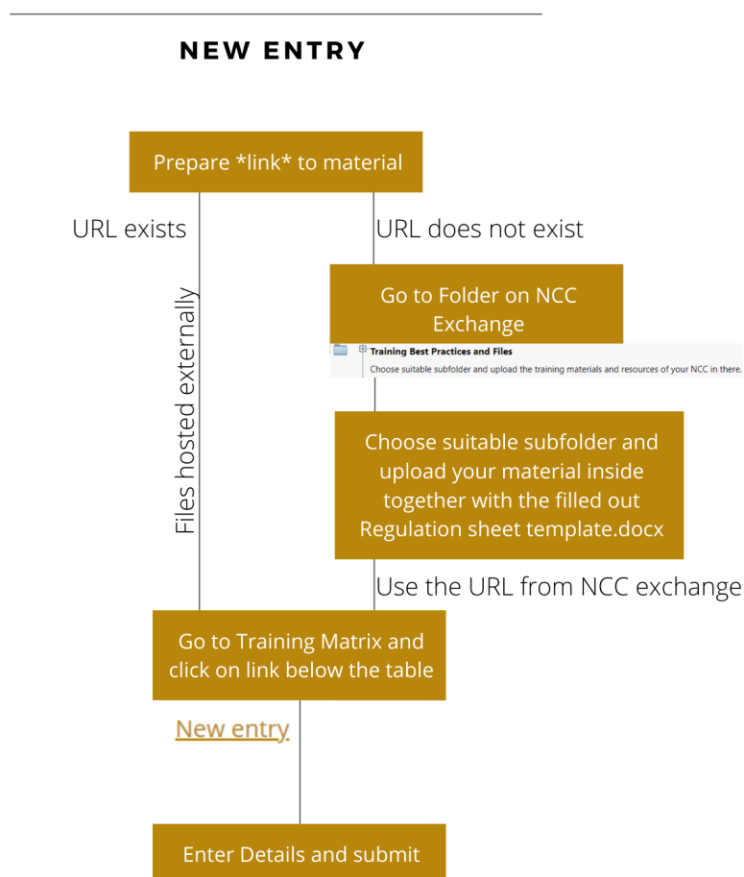


Figure 5: Flow chart showing how to work with the Training Matrix.

Until the end of September 2021, the following document categories were uploaded in the Training Matrix:

- NCC Material (exercises/hands-on/training) – 5 documents uploaded from 4 different NCCs:
 - Workshop materials, Lecture notes and materials, Materials of HPC courses, Curated training material from training events and Education materials, tutorials, and how-to-guides.
- Other Material (exercises/hands-on/training) – documents uploaded from PRACE - PRACE tutorials, HiDALGO - training events and Intersect - Existing Research Software Engineering Training Material.
- Best practices for in-person and online teaching – from HPC Carpentry.

To further improve the exchange of information between NCCs, CASTIEL WP3 will encourage all Training champions to upload their training materials to the Training Matrix. An announcement will also be included in the weekly EuroCC newsletter.

2.6 Collection of the Best Practice Guides on Training

In the first year, WP3 started to collect training related material, including the best practice guides on training in the Training Matrix. As of the end of September 2021, there was no best practice guide from NCCs in the Training Matrix. The best practices guides will be collected from the NCCs as well as created by the CASTIEL WP3 in the second year of the project. The plan is to provide best practice guides for in-person and online courses, for the train the trainer topic and other training related topics.

2.7 Collaborations among NCCs in the First Year

CASTIEL WP3 has been approached by several NCCs since the beginning of the project to provide support or advice to their NCC or contacts from other NCCs to initiate collaboration. Support or advice were related to the mentoring and twinning procedures, searching for a suitable partner, or to the training activities and recommendation for trainers, among other topics.

NCCs collaborate among themselves with or without the support from CASTIEL and further collaborations are to be expected throughout the duration of the project and beyond. Examples of such collaborations are provided in the next section.

2.7.1 Examples of Collaborations among NCCs in the First Year

The following section provides examples of collaborations among NCCs in the first year. NCCs collaborated on joint conferences, workshops or courses, they shared information about training events and/or invited other NCCs to participate in HPC, HPDA and AI related events. Further NCCs asked for potential speakers and other NCCs offered to speak at events of other NCCs or NCCs asked for experiences from other NCCs on training related topics.

One example of a collaboration among NCCs was the EuroCC Training Event on 18-19 February 2021 – High Performance Computing, High Performance Data Analytics, and Artificial Intelligence Workshop [14] happening at the 25th International Information Technology IEEE Conference IT 2021 in Žabljak, Montenegro [15], where 4 NCCs contributed to the agenda as speakers.

Several other NCCs also collaborated on joint workshops about HPC, HPDA and AI related topics.

One example of a joint conference and a joint online course can be found in **¡Error! No se encuentra el origen de la referencia..**

Who	What	When	Website
NCC Austria, NCC Slovenia	ASHPC21, First Austrian-Slovenian HPC Meeting (conference)	31 May 2021– 2 June 2021	https://ashpc21.si/
NCC Czech Republic, NCC Germany, NCC Austria	Introduction to MPI @ IT4I (ONLINE course)	5 May 2021 – 27 May 2021	https://events.gauss-centre.eu/en/kalender/pdf/285

Table 1: Joint collaborations on conferences and courses.

During December 2020 and August 2021, 5 NCCs posted 8 training related posts for other NCCs through the Slack channel for the Training champions which were successfully answered by interested NCCs. The posts were related to the following:

- Request for speakers on topics of HPC, HPDA and potentially AI for NCC’ online training conference.
- Invitation for other NCCs to participate in the “Workshop on Delivering Live Online Courses” organised by PRACE-6IP in collaboration with FocusCoE. Other invitation to the OpenMP workshop and hackathon organised by one of the NCCs.
- Sharing of training tools and manuals.
- Sharing of NCC’ experience from collaboration between the NCC and Centres of Excellence (CoEs), namely BioExcel, Excellerat, HiDALGO, to use their performance tools for NCC’ user projects and encouragement to other NCCs to get in touch with these CoEs.
- Invitation to discuss possible partnerships for the EuroHPC call “Training and Education on High Performance Computing”.
- Request for help from NCCs to share good practices and knowledge about selected topics (training, industrial collaboration, access to the HPC infrastructure). This NCC also expressed the wish to collaborate with other NCCs with similar needs in order to create a joint application for mentoring and to have a common mentoring event.
- While researching HPDA tools, one NCC asked other NCCs to share the names of their HPDA training to help the NCC to figure out the needs of training of their users.

Some of these posts were also distributed to the Training champions through the mailing list for the Training champions. Mailing list, as described in D3.1, is a communication tool used by the Training champions to communicate training related information, requests and questions. Additional posts with an invitation to the NCC’s workshop and a request for mentors were also sent via this mailing list.

CASTIEL WP3 will encourage more collaborations among NCCs in the second year of the project, for instance by emailing all Training champions regularly and reminding them of all resources, processes, material and opportunities for collaboration, by providing information, being the central point and advising the NCCs with respect to the training, twinning and mentoring.

3 Mentoring and Twinning

3.1 Mentoring and Twinning Plan Design and Implementation

As written in the DoA, the CASTIEL's Mentoring and Twinning programme aims to accelerate the building of new skills and competencies within NCCs and strong collaboration across NCCs with similar or complementary interests taking advantage of all currently available knowledge and experience.

In December 2020, WP3 started to work on the mentoring and twinning proposal. In January 2021, the mentoring and twinning process was developed and it was presented to the Training champions in a meeting on 5 February 2021 (please refer to Section 3.2 for more details).

In order to identify the potential mentors and mentees as well as the topics for mentoring and twinning, a questionnaire was designed by the WGT. Potential topics and workshops for mentoring were proposed in collaboration with CASTIEL WP2 – Competence Mapping and Networking. Other CASTIEL WPLs were also consulted about potential topics for mentoring and twinning related to their respective areas – WP4 Industrial Interaction and Business Development and WP5 Awareness Creation, the CASTIEL Gate and Outreach. The questionnaire to find out about the mentoring and twinning topics can be found in Annex 2.

The link to the online questionnaire was distributed to the Training champions by email on 22 February 2021 with a two-week deadline on 8 March 2021. They submitted the completed questionnaire on behalf of their NCC covering all areas of interest. These answers helped to identify the existing expertise across NCCs and the support that NCCs needed. More details about the results can be found in Section 3.3.

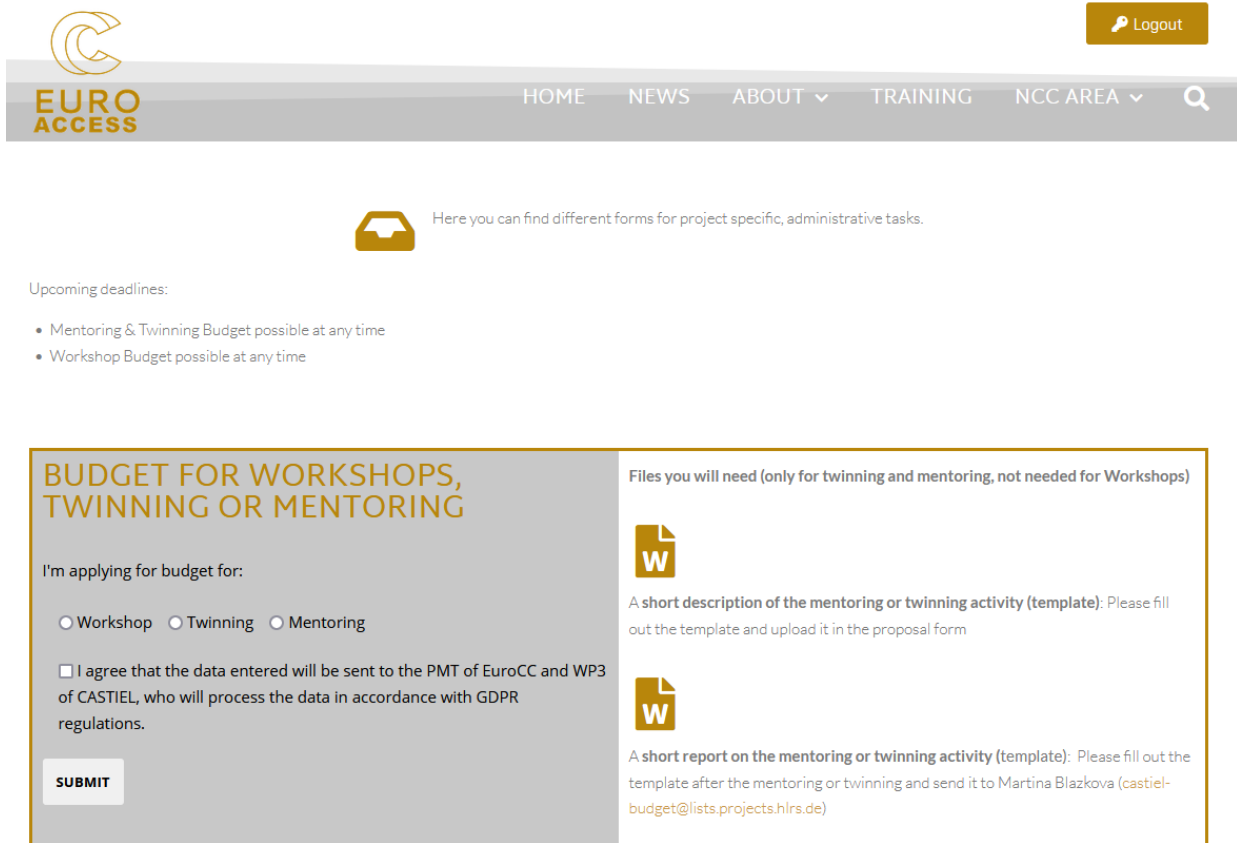
In March and April 2021, the mentoring and twinning process was amended according to the results of the questionnaire for mentoring and twinning topics to make the process clearer and more understandable for the NCCs. A document called *CASTIEL Mentoring and Twinning Processes* was created and it describes the aim of the mentoring and twinning programme, definitions of mentoring and twinning, the support that CASTIEL WP3 provides in terms of mentoring and twinning, the steps necessary when mentoring or twinning is initiated either by NCCs or by CASTIEL WP3 and where to look for information about potential mentors and mentees (this document can be found in Annex 3).

This document about processes was distributed to everyone in CASTIEL and EuroCC by mailing lists on 21 April 2021. It has also been saved on BSCW in the CASTIEL and EuroCC folders for reference.

According to this document, CASTIEL WP3 defines mentoring and twinning as follows:

- **Mentoring:** NCC with experience in a specific topic shares this experience with a person/people from other NCCs. Mentor-mentee connections are established in order to enable in-depth counselling and joint problem-solving in a one-to-one/one-to-many relationship typical of mentoring. This will also include in-person events, if applicable.
- **Twinning:** An activity between two NCCs from different countries to exchange best practices, courses, experiences, or to implement a project together. In this case, the relationship is a two-way exchange between the participating parties. Twinning partnerships will be established with the identification of one or several specific objectives that the twinning NCCs will commit to achieve. The actual knowledge skills and competence transfer will be adapted to each specific situation. This will also include visits for a few days, if applicable.

The financial guidelines on applying for the workshop, mentoring and twinning budget were created jointly by the PMT and WP3. A detailed description of the steps that need to be taken before, during and after each application process was summarised in the document *Financial Guideline for Workshop, Mentoring and Twinning Budget from CASTIEL*, together with a link to the application form and to the documents' templates in the NCC Area of EuroCC Access – Administration (see Figure 6). These documents' templates are necessary for the application for the mentoring and twinning budget (they can be found in Annex 4). The financial guidelines were distributed to everyone in CASTIEL and EuroCC by mailings lists on 20 April 2021. They have also been saved on BSCW in the CASTIEL and EuroCC folders so that everyone can access them.



The screenshot shows the 'Administration' area in EuroCC Access. At the top, there is a navigation bar with 'HOME', 'NEWS', 'ABOUT', 'TRAINING', and 'NCC AREA'. A 'Logout' button is in the top right. Below the navigation bar, there is a section for 'Forms' with a brief description: 'Here you can find different forms for project specific, administrative tasks.' Underneath, 'Upcoming deadlines:' are listed as 'Mentoring & Twinning Budget possible at any time' and 'Workshop Budget possible at any time'. The main content area is titled 'BUDGET FOR WORKSHOPS, TWINNING OR MENTORING'. It contains a form with the following elements: 'I'm applying for budget for:' with radio buttons for 'Workshop', 'Twinning', and 'Mentoring'; a checkbox for 'I agree that the data entered will be sent to the PMT of EuroCC and WP3 of CASTIEL, who will process the data in accordance with GDPR regulations.'; and a 'SUBMIT' button. To the right of the form, there is a section titled 'Files you will need (only for twinning and mentoring, not needed for Workshops)'. It lists two required files: 'A short description of the mentoring or twinning activity (template): Please fill out the template and upload it in the proposal form' and 'A short report on the mentoring or twinning activity (template): Please fill out the template after the mentoring or twinning and send it to Martina Blazkova (castiel-budget@lists.projects.hlr.de)'.

Figure 6: Administration area in EuroCC Access for budget applications.

To facilitate the search for potential mentors or mentees or to find a match between NCC mentors and NCC mentees, WP3 produced supporting documents (such as a view by mentoring/twinning topic or by country) using the information from the analysis of the questionnaire for mentoring and twinning and from the training mapping. All documents were saved on BSCW in a specific folder that can be accessed by the Training champions and EuroCC WPLs (see Figure 7).

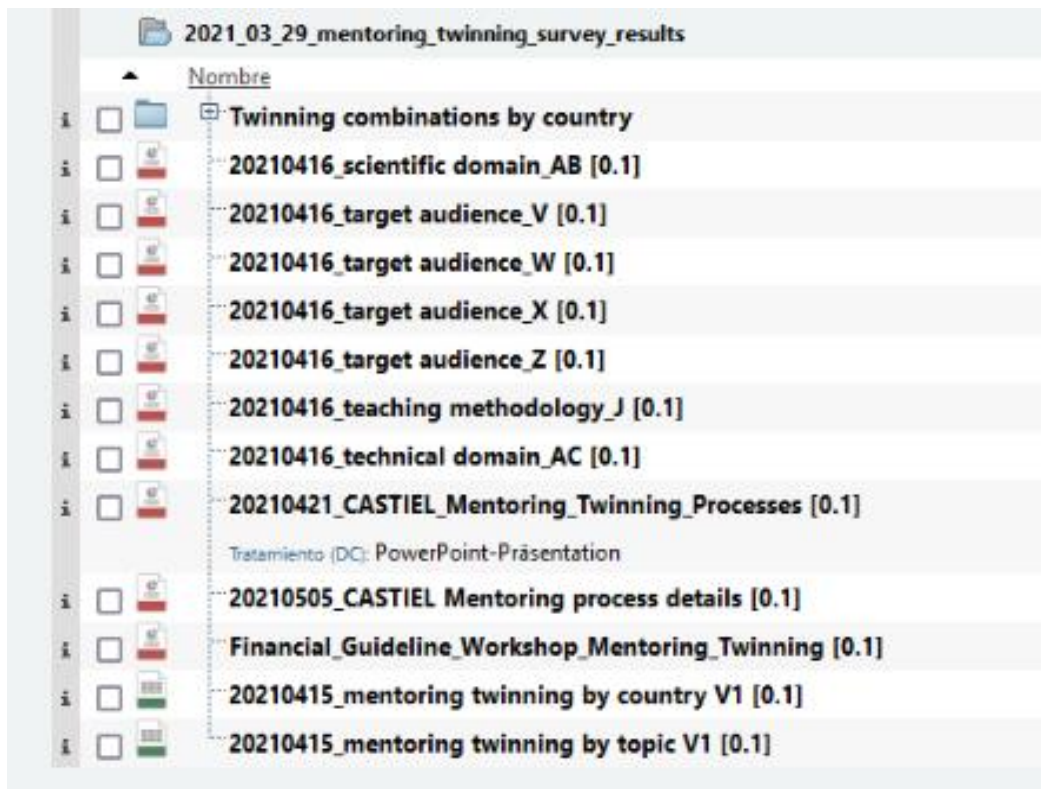


Figure 7: Mentoring and twinning documents on BSCW.

The mentoring and twinning programme was launched on 21 April 2021 and it is expected to run until the end of the second year of the project – August 2022. Mentoring and twinning can start in several ways:

- Between two or more NCCs **without any support from CASTIEL WP3** – NCCs that would like to exchange knowledge and experience agree mutually the details of the mentoring or twinning and then they proceed with the implementation. After their collaboration is finished, the NCCs will send a report to WP3.
- Between two or more NCCs **with support from CASTIEL WP3** – NCCs that would like to start a mentoring or twinning interaction will contact CASTIEL WP3 and the required support will be provided based on the needs of the NCCs, e.g., selection of a mentor/mentee, feedback on the collaboration agreement, support with the application for the mentoring or twinning budget.
- **Mentoring initiated by CASTIEL WP3** – WP3 initiated mentoring paths on five topics that came out of the questionnaire for mentoring and twinning with the highest interest to enable the exchange of information in a more effective way (see Section 3.4 for more details).
- **Twinning supported by CASTIEL WP3** – WP3 plans to encourage twinning interactions in autumn 2021 by putting together NCCs that represent an ideal match.

The status of the mentoring and twinning interactions is described in Section 3.5. As the mentoring and twinning programme has recently started, more activities are expected during the second year of the project on both sides – on the side of the NCCs and on the side of CASTIEL WP3.

All information related to mentoring and twinning presented in this deliverable is part of the mentoring and twinning plan. This plan is also work in progress and some topics will be expanded to provide comprehensive overview of the work done by CASTIEL in this area.

3.2 Meetings of the WGT Related to Mentoring and Twinning

The Training champions also played a significant role in the mentoring and twinning plan evolution with providing feedback and suggestions in the meetings of the WGT organised during the first year of the project. This way of communication with the Training champions will continue in the second year of the project.

Two meetings were organised to discuss topics related to mentoring and twinning. The feedback and suggestions collected during these meetings helped to improve the documents and processes created by CASTIEL WP3 and to recognize the topics within each NCC, in which they have or lack experiences.

1) 5 February 2021 – Presentation of the mentoring and twinning proposal

The mentoring and twinning process was developed and presented to the Training champions at a meeting on 5 February 2021. The presentation focused on explaining the aim of the mentoring and twinning programme, the definitions of mentoring and twinning, the proposed process of mentoring and proposed topics for mentoring. The topics were jointly selected by CASTIEL WP2 and WP3 on the basis of the results of the competence mapping done by WP2 and the results from the initial questionnaire that was sent to the WP3 Training champions at the end of November 2020. The selection of the **mentoring topics** resulted in the following list:

1. **AI and HPC applied to industries:** Focus on AI and HPDA applied to industrial use cases using HPC.
2. **Training best practice:** Focus on training methodologies and best practices and on how to use HPC infrastructure for training activities.
3. **Outreach and collaboration with industries and public sector:** The application of HPC and Big Data in the industrial and the public sector and outreach of these sectors.
4. **HPC disruptive technologies for industries:** Sharing of projects on disruptive hardware or technologies, e.g., accelerating computing, exa-scaling, novel and energy efficient hardware applied to industrial problems.
5. **Quantum Computing:** Sharing experiences of NCCs that have quantum computing activities related to industrial issues.
6. **Programming best practice and industrial software development:** Focus on identifying the competence needs and training requests related to the software management, interface and architectural design, technologies and the best practice in the industrial field such as DevOps, GUI, WUI, and digital twins.
7. **Tech and App for modelling and simulation:** The mentoring path will identify what fields and software are the most used by NCCs and set up the ad-hoc workshops. The mentoring activity will focus on topics such as material design, environment, engineering and pharma.
8. **Other networking needs:** A series of workshops and meetings about opportunities to join the NCC network forces in 1) EU proposals/relevant calls in the domains of interest; 2) policy areas concerning EuroHPC JU or the European and global HPC research and infrastructure network as a whole. The goal of this activity is to enable the circulation of ideas and opportunities within the EuroCC competence centres and accelerate collaborations and synergies.

The presentation further introduced the process of twinning, together with proposed **twinning topics** that included not only training, but also other topics of interest for NCCs:

- Training.
- Industrial interaction.
- Interaction with academia.

- Communication, dissemination and raising awareness.
- Competences.
- Participation in EU projects.
- General support.
- Option to suggest other topics of interest.

These topics were identified by CASTIEL WP3 together with CASTIEL WP2, WP4 and WP5. For selected topics a few sub-topics were proposed so that detailed information from NCCs could be obtained, e.g., Training – Exchange of best practices, training methodologies and information in general; Industrial interaction – How to interact with SMEs/large companies.

A wrap-up about the next steps and timeline of the activities concluded the presentation. Afterwards, a discussion about the proposal with the whole group took place where questions were answered and clarifications were made.

Although the results from the competence mapping and the initial questionnaire provided partial information about some NCCs, it was decided to take them as a starting point for determining the mentoring and twinning topics and adjust the process in due course if needed. During this meeting another questionnaire was proposed to find out more information about the topics for mentoring and twinning. It was agreed to discuss this questionnaire in the follow-up meeting.

2) 12 February 2021 – Discussion about the questionnaire for mentoring and twinning

The next meeting with the WGT was organised the following week, on 12 February 2021, to discuss the suggested questionnaire. The document was distributed to the Training champions before the actual meeting so that they could read it in advance and prepare questions, suggestions and feedback.

The mentoring topics stayed the same, however, the twinning topics were changed slightly according to the feedback from the WGT during the first meeting. Some of the twinning topics were grouped into the category General support and the list of twinning topics presented at the meeting was the following:

- Training.
- Industrial interaction.
- Interaction with academia.
- Communication, dissemination and raising awareness.
- General support.

At this meeting, several sub-topics were also presented for every topic to obtain detailed information from NCCs, e.g., Training – Exchange of best practices, training methodologies and information in general; Industrial interaction – How to interact with SMEs/large companies.

The questionnaire was explained at the meeting and it was commented that the answers would be collected online. Feedback was then obtained through a moderated discussion with the whole group. A confusion was also expressed by the NCCs related to the financial aspects of activities in CASTIEL and of the mentoring and twinning. It was decided to address these issues separately another time, e.g., by creating and distributing the financial guidelines on applying for the workshop, mentoring and twinning budget.

3.3 Mentoring and Twinning Questionnaire Results

As described in the previous section, CASTIEL WP3 conducted an online survey among NCCs to find out about the interest in each suggested topic for mentoring and twinning. The following sections show the results obtained from the completed questionnaires.

3.3.1 Results of the Mentoring Topics

Given the topics that emerged from this questionnaire, every NCC has decided to participate as one of the following options:

- A contributor (= can provide mentoring on a certain topic).
- As someone who would like to receive mentoring and learn more about a specific topic (= interested NCC).
- Neither of these.

The questionnaires were analysed to find a match between NCC contributors and interested NCCs. The results of the survey for each mentoring topic are presented in Table 2.

Topic for Mentoring	Contributors	Interested	Neither
T1 – AI and HPC applied to industries	12	18	3
T2 – Training best practice	24	5	4
T3 - Outreach and collaboration with industries and public sector	12	18	3
T4 - HPC disruptive technologies for industries	9	22	2
T5 – Quantum Computing	8	17	8
T6 - Programming best practice and industrial software development	16	13	4
T7 - Tech and App for modelling and simulation	20	5	8
T8 – Other networking needs	8	3	25

Table 2: Questionnaire results for mentoring topics.

3.3.2 Results of the Twinning Topics

Every NCC has selected one of the following options in the twinning topics:

- Have experience (and could offer twinning).
- Lack experience (and would need twinning).
- Neither of these.

The following tables show the results for the twinning topics – Table 3 (Training topics), Table 4 (Industry topics), Table 5 (Academia topics), Table 6 (Communication, dissemination and raising awareness) and Table 7 (General support topics). In some cases, the total number of responses is 34 because one country selected more options.

Twinning topic - Training	Could offer twinning	Would need twinning	Neither of these
Training: Exchange of best practices, training methodologies and information in general.	27	3	3
Training: Offer to teach technical topics in a training activity of other NCC, such as GPU, OpenMPI, Big Data, etc.	24	7	2
Training: How to design, develop and promote a training/course for different levels of users from academia.	29	3	1
Training: How to design, develop and promote a training/course for different levels of users from industry.	16	12	5

Training: How to design, develop and promote a training/course for different levels of users from the public sector.	14	13	6
Training: How to create, set up and implement training programmes respecting the target audience, levels of experience etc.	21	7	5
Training: How to train trainers.	13	15	5
Training: How to attract experts/specialists from outside NCC for the education/training activities for specialised topics.	17	12	4
Training: How to involve professors from universities in creating dedicated/targeted training in collaboration with the NCC.	19	11	3
Training: How to attract participants to the training activities. Targeted outreach to new communities or a specific audience.	18	9	6
Training: How to identify the users' needs for education/skill development?	17	12	4
Training: Best practices and experience for online training activities.	27	6	0
Training: Proposals preparation for funding training mobility.	16	11	6
Training: Organisation of a professional training centre.	13	16	4
Training: Experience of organising a seasonal school as a training event.	26	4	3
Training: How to provide a successful mentoring experience.	12	16	5
Training: How to provide a successful twinning experience.	4	23	6
If you have experience in other topics not mentioned above, as well as if you lack experience in other topics, please let us know here. Other suggestions (please specify):	4	3	27

Table 3: Questionnaire results for twinning topics – training.

Twinning topic – Industrial interaction	Could offer twinning	Would need twinning	Neither of these
Industrial Interaction: Exchange of best practices and information related to industrial interaction in general.	19	12	2
Industrial Interaction: How to approach and interact with SMEs.	20	14	0

Industrial Interaction: How to approach and interact with large companies.	18	15	1
Industrial Interaction: How to find out needs of industrial end-users.	19	13	2
Industrial Interaction: How to get involved in HPC, HPDA, AI projects with industry.	18	13	2
Industrial Interaction: How to get EU funding for HPC, HPDA, AI industrial projects.	14	16	3
Industrial Interaction: Accelerating the adoption of HPC technologies in the industry through upskilling.	9	19	5
Industrial Interaction: Technical limitations of HPC, HPDA and AI in industrial applications.	15	14	4
If you have experience in other topics not mentioned above, as well as if you lack experience in other topics, please let us know here. Other suggestions (please specify):	1	2	30

Table 4: Questionnaire results for twinning topics – industrial interaction.

Twinning topic – Interaction with academia	Could offer twinning	Would need twinning	Neither of these
Interaction with Academia: Exchange of best practices and information related to interaction with academia in general.	26	1	6
Interaction with Academia: How to involve professors from universities in collaboration with the NCC (e.g., creating events).	25	6	3
Interaction with Academia: How to find out needs of academic end-users.	28	2	3
Interaction with Academia: Curricular activities of NCCs.	17	10	6
Interaction with Academia: Open discussion with students on specific needs not covered in academic education.	19	10	4
If you have experience in other topics not mentioned above, as well as if you lack experience in other topics, please let us know here. Other suggestions (please specify):	1	0	32

Table 5: Questionnaire results for twinning topics –interaction with academia.

Twinning topic – Communication, dissemination and raising awareness	Could offer twinning	Would need twinning	Neither of these
Communication, Dissemination and Raising Awareness: Exchange of best practices and information related to communication, dissemination and raising awareness in general.	23	8	2
Communication, Dissemination and Raising Awareness: Communication and dissemination strategies.	20	11	2
Communication, Dissemination and Raising Awareness: Public relations and outreach.	21	10	2
Communication, Dissemination and Raising Awareness: Social media strategy.	17	12	4
If you have experience in other topics not mentioned above, as well as if you lack experience in other topics, please let us know here. Other suggestions (please specify):	1	2	30

Table 6: Questionnaire results for twinning topics – communication, dissemination and raising awareness.

Twinning topic – General support	Could offer twinning	Would need twinning	Neither of these
General Support: Outreach and collaboration with the public sector.	18	12	4
General Support: Sharing existing projects and experiences with the public sector.	10	16	7
General Support: Interaction with other CoEs and initiatives.	19	8	6
General Support: Participation in EU projects. Proposals preparation. Scientific writing.	24	5	5
General Support: Business development	15	14	5
General Support: Access to the HPC infrastructure	28	3	2
General Support: Infrastructure organisation	27	3	3
General Support: HPC competences, skills	29	2	2
General Support: HPDA competences, skills	21	9	3
General Support: AI competences, skills	21	9	4
General Support: Quality criteria	13	12	8
General Support: Legal aspects	10	18	5
General Support: Financial aspects	13	13	7
If you have experience in other topics not mentioned above, as well as if you lack experience in other topics, please let us know here. Other suggestions (please specify):	3	1	29

Table 7: Questionnaire results for twinning topics – general support.

Training champions have access to these results, broken down by topic and country, i.e. it is clearly presented for every country in which topic they have or lack experience. This information is useful when looking for a potential mentor or a mentee.

3.4 Mentoring Paths Supported by CASTIEL WP3

A mentoring path is a series of events, such as detailed workshops, hackathons, one-to-one mentoring etc., that derive from an initial workshop organised by the NCC contributors introducing a selected mentoring topic.

The mentoring topics that had more contributors than interested parties (see Section 3.3.1 for details) will be subject of twinning rather than mentoring. Thus, based on the results of the questionnaire, the following topics were not included in the mentoring paths:

- Training best practices.
- Tech and app for modelling and simulation.
- Other networking topics.

In May 2021, CASTIEL WP3 initiated **mentoring groups on five topics** with NCC contributors-mentors who have experience and can provide mentoring on them. The aim is to prepare workshops for the remaining NCCs, who will have the opportunity to learn more about these topics:

- Outreach and collaboration with industries and public sector (9 NCC mentors).
- HPC disruptive technologies for industries (6 NCC mentors).
- Programming best practises and industrial software development (10 NCC mentors).
- Quantum Computing (8 NCC mentors).
- HPC, HPDA and AI applied to industrial use cases (10 NCC mentors).

CASTIEL WP3 standardised the mentoring path for all topics in a "mentoring process" procedure: a uniform structure to be followed by the NCCs to set up the mentoring path and apply for financial support. The procedure contains several steps (1-7) aimed at setting up the first workshop of the mentoring path on the above mentioned topics. The procedure can be found in Annex 5.

CASTIEL will be overseeing the organisation of the first workshop and the mentoring path to ensure their successful completion, one-to-one mentoring between mature and less mature NCCs and further detailed workshops.

Since May 2021, several meetings with the NCC mentors have taken place in respective groups with the objective of planning the first workshops:

- 12/05/2021, 15/06/2021, 23/06/2021 Outreach and collaboration with industries and public sector
- 18/05/2021 HPC disruptive technologies for industry
- 20/05/2021 Programming best practice and industrial software development
- 25/05/2021, 13/07/2021, 06/09/2021 Quantum computing
- 27/05/2021, 13/07/2021 HPC, HPDA and AI applied to industrial use cases

Two workshops are already planned: Outreach and collaboration with industry and public sector on 28 October 2021 and HPC, HPDA and AI applied to industrial use cases on 25 November 2021. Further meetings and proposed workshops are expected during the second year of the project.

3.5 Mentoring and Twinning Interactions among NCCs

The CASTIEL mentoring and twinning programme was launched on 21 April 2021 and all NCCs were encouraged to use this opportunity to exchange information, and in the case of the less experienced NCCs, to learn from the more experienced ones. To support these interactions, CASTIEL provides financial support to those who apply for it. The detailed steps are described in the *Financial guideline for Workshop, Mentoring and Twinning Budget from CASTIEL* that is available to everyone in EuroCC and CASTIEL.

To report the number of mentoring and twinning activities in the first year, an email was sent to the Training champions explaining how to report the planned or initiated mentoring and twinning interactions in the first year of the project – from April 2021 (alternatively from the beginning of the project) until August 2021.

During the period April 2021 – August 2021, CASTIEL received one application from two NCCs for the twinning budget which was successfully approved. Due to the current epidemiologic situation, the twinning was planned as a virtual collaboration from July 2021 until the end of September 2021. In this initial twinning partnership, the cooperating NCCs wanted to focus on the outreach and collaboration with industry. This was intended as an introductory twinning collaboration between the two parties, which served as a pilot and a basis for the inclusion of more NCC activities, and joint cooperation within the EuroCC activities.

Of the remaining NCCs, 15% of them reported that they have initiated discussions about an organisation of possible mentoring and/or twinning activities with other NCCs without starting specific activities yet. In one case two new NCCs agreed to look for mentors together and their call for mentors was answered by two NCCs. The mentoring activities are planned for autumn 2021. In other cases, a regional twinning related to training among two or three NCCs will happen in autumn 2021 and a possible twinning or mentoring regarding the collaboration with industry may happen between one mature and one less mature NCC.

Another 15% of NCCs have started to plan these activities internally, without contacting any NCCs until now, and the remaining NCCs have not yet started any planning or activity.

As the mentoring and twinning programme started relatively close to summer, more interactions are expected during the second year of the project. Also, the focus of NCCs at the beginning of the project was more on competence and training mapping, therefore the mentoring and twinning will become more important in the second year of the project.

It is foreseen that the NCCs will initiate mentoring and/or twinning interactions with one another, collaborations on workshops/trainings, exchanges and other interactions without any support from CASTIEL.

CASTIEL WP3 will also proactively support mentoring and twinning interactions in the second year of the project, e.g., by putting in contact those NCCs that represent an ideal match according to the analysis of training activities (see Section 2.2.2) and by organising workshops for the Training champions where they will share their knowledge and experience on training related topics. CASTIEL WP3 will also support interactions between less mature NCCs and the mature ones by putting in contact suitable NCCs.

Due to the pandemic situation, all exchanges among NCCs happened online and it is expected that the majority of the interactions in the second year of the project will also happen online, which in a way facilitates the exchanges.

In addition, further support will be provided in collaboration with CASTIEL WP2, that identified various forms of networking preferences among NCCs:

- Sharing specific competences, experiences and achievements mastered by a NCC.

- Learning specific competences from other NCCs.
- Networking (both learning and sharing) with other NCCs on a given topic.

CASTIEL WP2 collected 368 networking preferences around 66 different topics, training being one of the most often mentioned topics. WP2 has shared the results with WP3 as well as with WP4 to define the roadmap of actions to be implemented in the second year of the project.

Information about all interactions and collaborations will be reported by the NCCs in their Technical progress reports (TPR) every quarter. These reports will be monitored by CASTIEL WP3 and the PMT.

4 Other Types of Activities

Apart from the training, the mentoring and twinning activities, other types of activities were organised during the first year of CASTIEL. They are described in more details in this section.

4.1 Technology Providers' Presentations and Workshops Series

4.1.1 Background

On 13 October 2020 CASTIEL was contacted by NVIDIA with a proposal to promote the NVIDIA Deep Learning Institute offering to the EuroCC network. NVIDIA wanted to engage constructively with a broader audience and leverage the EuroCC network to reach representatives from as many NCCs as possible. It was mutually agreed that it would be more effective to organise a unique presentation rather than engage with each NCC individually. The NVIDIA presentation was the first from a series of presentations and workshops where interested technology providers could present their tools and training offers to the NCCs.

To find out about NCCs' interests with regard to other providers and their offers, two questions were sent by email to the Training champions on 21 January 2021 with a deadline on 25 January 2021. In the first question, NCCs were given three options of providers suggested by the PMT – AMD, Intel and IBM as well as the option to suggest which other providers/companies they would be interested in hearing from.

The majority of the NCCs, that provided answers to these questions, were interested in all the mentioned providers. Additionally, the NCCs suggested the following companies they were interested in hearing from:

- HP.
- ARM.
- Oracle.
- Microsoft.
- Atos.
- HPE.
- Fujitsu.

Regarding the second question about the offers of the providers, NCCs were given the following options: a) Training offers; b) Technology products, innovation technologies and tools which they could specify further, and c) the option to propose and specify other topics they would like to learn about from these providers.

The majority of the NCCs were interested in hearing about training offers from these providers. Further, they also wanted to hear about technology products, innovation technologies and tools and in some cases, they provided more information: tools for training especially aimed at industry and/or non-academic users; tools and technology connected to concrete exploitation opportunities, but not marketing (training, remote access, tutoring).

Other topics, that were mentioned, were related to:

- HPC software and hardware solutions; new products based on HPC technology.
- Machine-learning-enabled hardware.
- Tools for refactoring and acceleration of software.
- Examples of best practices of Private Public Partnerships.
- Co-design and collaboration opportunities.
- Recent developments in the field (move to big data, increased demand of computational resources, move to AI).
- Licensing options (potentially free) of premium one API products for academic use.
- Products and roadmap for: GPU and FPGA and Intel's programming models for this hardware.

Since February 2021, CASTIEL WP3 together with the PMT started to approach the selected technology providers with the opportunity to interact with all NCCs and initiate more detailed discussions.

4.1.2 Presentations and Workshops from Technology Providers

The following presentations and workshops took place in the first year of the project:

1) NVIDIA

On 19 January 2021, NVIDIA presented the Deep Learning Institute offering, the Deep Learning Institute Ambassador programme and the NVIDIA GPU boot camps. The online event was attended by the Training champions or their deputies (51 participants).

2) AMD

On 8 June 2021, the AMD-EuroCC Half-Day Workshop CPU/GPU took place online. It was attended by more than 100 EuroCC members. A joint press release was created afterwards to raise awareness of the collaboration [16].

After the welcome and introduction from the AMD Chief Technology Officer (CTO), the relevant messaging and take-away information alongside pertinent technical information in the respective CPU and GPU sessions were included. Each session covered architecture details, power and cooling considerations, software development environment and platform considerations. The last session included the next steps, where to find more material, how to engage companies like AMD in general (NDAs, timelines + roadmaps to sync with procurement timescales).

3) Intel

On 14 September 2021, Intel gave an online introductory presentation to the members of EuroCC (55 participants). During the presentation, Intel presented its current software tools offering and strategy and its ecosystem of tools and software related training programs. The presentation was closed with an open discussion with questions.

Future Presentations and Workshops from Providers

The next selected provider (Huawei) will give an introductory presentation to the members of EuroCC on 30 November 2021.

Discussions with the following technology providers (contacted by CASTIEL) are ongoing or planned in the following months:

- SiPearl.
- Graphcore.

- Light On.

Further collaborations are also discussed with NVIDIA and AMD with the aim to enter into a next stage of information exchange between the providers and the NCCs, either individually or as a whole.

5 Major Achievements

The main achievements and contributions to the overall work of CASTIEL presented in this deliverable can be summarised as follows:

- Gained an overview of the initial training profiles of individual NCCs and identification of strengths and weaknesses.
- Agreement among CASTIEL, FocusCoE and PRACE representatives on a specific input mask for training events that was implemented in the HPC portal to better serve the needs of all three initiatives.
- CASTIEL, FocusCoE, and PRACE jointly created a field-by-field mapping of the entries from time.ly to the HPC portal to eventually allow for an automatic porting.
- The training registry of the HPC portal embedded into EuroCC Access equipped with a selection of filters and displayed information.
- The development of the Training Matrix for collection and sharing best practices, available resources, and mechanisms for training.
- CASTIEL's Mentoring and Twinning programme to accelerate the building of new skills and competencies inside NCCs and strong collaboration across NCCs with similar or complementary interests.
- Identification of cross-domain expertise of every NCC and access to this information by all NCCs.
- Five mentoring paths initiated by CASTIEL WP3 to give space to the NCC-mentors to share their experiences and knowledge with the remaining NCCs through workshops.
- Some training collaborations and mentoring and twinning interactions among NCCs were fostered by CASTIEL WP3.
- Interactions with technology providers such as Intel, AMD, with the intention of introducing them to the NCCs and starting more involved discussions.

6 Concluding Remarks

This deliverable describes the planning and development of the training plan, the mentoring and twinning plan as well as the respective WP3 activities during the first year of CASTIEL.

Progress with regard to the training plan has been made as further information was obtained from the detailed analysis of the training activities section of the training mapping survey and from discussions with the NCCs. This information helped to understand the situation at the national level in relation to the training of individual NCCs, which will then be used to propose recommendations to the NCCs. The discussions about the second wave of the training mapping survey started in the first year of the project and will continue in the following months. Due to the complexity of this topic and the varying levels of maturity of the training offers of different NCCs, the development of the training plan will continue throughout the second year of the project.

To display the training activities of NCCs, the HPC portal is used and many improvements to the users' and viewers' interfaces have already been implemented through collaboration among CASTIEL, EuroCC, FocusCoE and PRACE. To enable sharing of training materials, best practice guides on training and resources by NCCs, a tool called Training Matrix was launched

on the EuroCC Access portal. Further changes to these tools are expected so that they can serve the NCCs in a more effective way.

Significant efforts have been made in the planning and development of the mentoring and twinning plan. Activities include creation and distribution of the online questionnaire about the mentoring and twinning topics, its thorough analysis, creation of supportive documents for NCCs to understand the processes and to easily find a mentor or a mentee, and initiation of five mentoring paths to share experience and knowledge among NCCs. The mentoring and twinning programme was launched on 21 April 2021 and NCCs have started to plan collaborations with other NCCs. The focus during the second year of the project will be on fostering these mentoring and twinning collaborations as well as other training related collaborations and on the mentoring paths.

Additionally, cooperation with several technology providers have been established through their presentations and workshops for the NCCs and similar activities with the same and new providers are anticipated in the second year of the project.

7 References and Applicable Documents

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- [11] Indico, <https://getindico.io/>.
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- [16] Press release about collaboration with AMD, HPC wire, <https://www.hpcwire.com/off-the-wire/amd-collaborates-with-eurocc-to-support-hpc-growth-across-emea/>.

Annex 1 – Methodology of the Detailed Analysis of the Training Activities

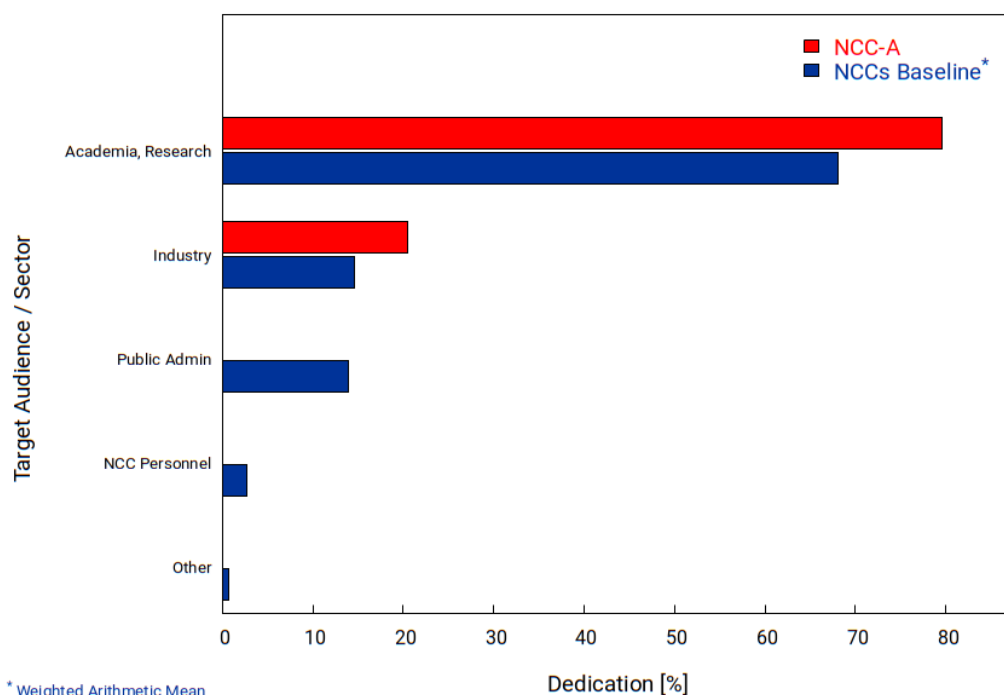
In the following section the individual steps of the analysis are briefly outlined. First, it describes profiles – the key tool used in the analysis, it continues with the description of weighted arithmetic means and provides details about underlying weights and it finishes with illustrating how to use these profiles for automatically detecting suitable pairs of NCCs with complementary training programmes in a particular category.

Profiles – The Central Tool Used in This Analysis

A graphical representation characterizing individual categories listed in Section 2.2. for a particular NCC has been developed in the form of profiles. An example is given in Figure 8.

The category (Target Audience/Sector) was chosen arbitrarily and the NCC-A is a placeholder for any of the 33 real NCCs. All available options for this particular category are drawn on the y-axis. The x-axis is given in percentage units of the total number of mentions of all criteria by all various training events. When Training champions were asked to compile the training mapping survey, each training event (every new line in the spreadsheet) was supposed to be assigned a label designating specific associations. For example, if a particular training event was targeting an academic audience, then a label of ‘a’ was put into column V of the spreadsheet. If, on the other hand, the training event was more directed towards an industrial audience, then a label of ‘b’ was assigned and further, if both types of audiences were considered to form the target then both labels, ‘a’ and ‘b’, were put together into the respective cell of column V. Labels just refer to individual options (hereafter also termed classes) mentioned on the y-axis.

The first step in computing a profile as shown in Figure 8 is to sum up all mentions of all labels, ‘a’, ‘b’, ‘c’ ... which will formally represent 100% of the training programme of a particular NCC in the selected category. Next, partial sums of all mentions of individual labels are computed separately (just for labels ‘a’, just for labels ‘b’ ...) and put into perspective by relating them to the overall sum. This latter ratio can certainly be expressed in percentages and the results are precisely the meaning of the red bars shown in Figure 8. Since we will obtain an individual “set of red bars” for each of the 33 NCCs, we can also determine an average picture representing the mean value of all NCCs, which is also included in Figure 8 in the form of blue bars. This average of all the 33 NCCs will constitute a reference, a baseline, against which all national-level assessment can be carried out. Taken together, all the collected data will already form a complete profile and differences between red and blue bars in a particular class indicate a particular “strength” or a certain degree of “less than average dedication” of the NCC in that specific domain. For example, what can directly be inferred from Figure 8 is that NCC-A’s training programme is quite strong in targeting an audience from academia or industry. It does, however, not focus on an audience from public administration, NCC personnel, or some other specific group. This brings us to another interesting attribute. Dealing with percentages implies that the sum of all red/blue bars will have to result in 100%. So, whenever we detect some overcapacity in some class (red bars are longer than blue bars), it follows that there will also be some “less than average” capacity in some other class, otherwise we could not uphold the normalisation (both sets of bars have to sum up precisely to 100%).



* Weighted Arithmetic Mean

Complementary Twinning Matches

- 1) 🦒 NCC-X 0.169 [0.014]
- 2) 🧠 NCC-D 0.313 [0.014]
- 3) 🦩 NCC-H 0.475 [0.014]

Figure 8: Profile representing category Target Audience/Sector (V).

Further explanation with respect to the remaining elements in Figure 8 will be given next.

Weighted Arithmetic Means

Rather than using simple arithmetic means, where each profile of a particular NCC would contribute with a factor of 1/33 to the average baseline, weighted arithmetic means were taken into account. The idea of bringing in such weights is to properly respect significant differences in the size of all the 33 countries as well as the varying degree of development of corresponding training programmes in HPC/HPDA/AI. Thus, a natural choice for a suitable weight was,

$$\text{weight(NCC)} = \# \text{training events} / \text{million citizens},$$

so the number of training events provided per million people in the country, which ideally is a parameter of comparable size between different NCCs. Another simplification is to make use of normalised weights, where $\sum w_i = 1$, i.e. the sum of all weights equals 1. A graphical representation of the distribution of all normalised weights, w_i , is given in Figure 9. As becomes evident, the majority of NCCs have comparable weights with just two “outliers” that still do not over-dominate the calculation of weighted arithmetic means.

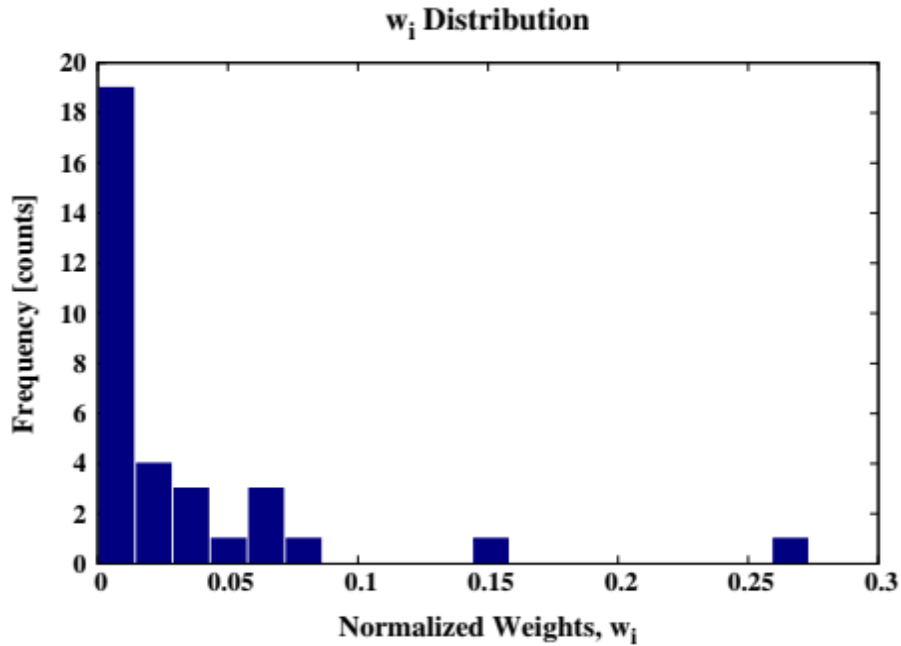


Figure 9: Distribution of normalised weights used in the analysis.

Identifying Complementary Profiles

With the availability of profiles, the next immediate question is how to best detect pairs of NCCs with matching capacities. An illustrative example is given in Figure 10.

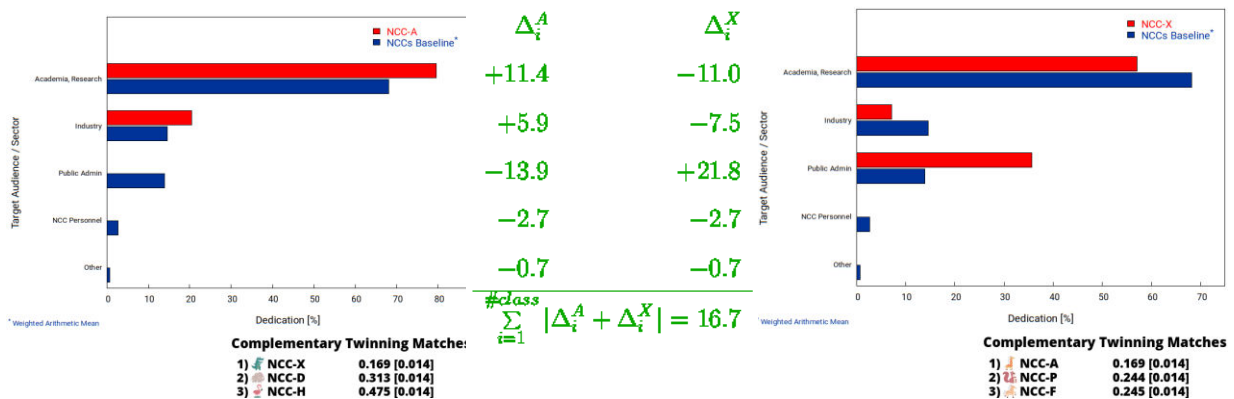


Figure 10: Demo example of using Δ_i to identify complementary profiles.

As becomes clear from just looking at the differences between red and blue bars, in all the classes NCC-A (on the left) exhibits an overcapacity, NCC-X (on the right) is lagging somewhat behind, hence would benefit from a partnership with NCC-A in this particular category. On the other hand, NCC-X's particular strength of also serving a target audience in the sector of public administration, is a class that NCC-A does not cover at all. So again, mutual benefit would arise if these two countries would embark on a collaboration in this specific category and the obvious intention is to identify such cases for potential twinning/mentoring in an automatic way. A simple procedure to achieve this is based on differentials, Δ_i , which are just the differences between the actual percentages in some class of a particular NCC and corresponding baseline results. Explicit sets of Δ_i (expressed in percentages) are indicated in green in Figure 10. What can be seen is that a good match in some class was represented by a pair of Δ_i of comparable magnitude but opposite in sign. So, the sum over all classes of absolute values of such Δ_i -sums should give rise to a scoring coefficient that can describe the quality of

the match (see the 16.7 in Figure 10). Screening for minimal values of such scoring coefficients is the most straightforward way to identify suitable pairs of complementary NCCs. The top 3 results (smallest 3 scoring coefficients now expressed in fractions rather than absolute percentages) are also included in the profiles (see bottom right corner). For a given NCC these are the best choices for twinning in the considered category. In addition, an absolute reference is also included (given in squared brackets) which is the sum of all best values in each of the classes (regardless of the NCC). The closer these two values are to each other, the better the quality of the screen, hence the more significance had a potential collaboration.



Annex 2 – Questionnaire about Topics for Mentoring and Twinning

Questionnaire about Mentoring and Twinning Topics

Fields marked with * are mandatory.

Introduction

Dear all,

In view of the fact that maturity varies from one participating state to another, it is clear that a coordinated and thus controlled flow of interactions is needed, to

- enable access and uptake of expertise and knowledge by less mature Competence Centres, being mentored by other Centres more mature in certain areas,
- facilitate the identification and access to cross-domain expertise and to strengthen national activities for industry, academia and the public sector,
- establish a single European access point for and to the National Competence Centres.

Therefore, we would like to ask you to provide **one complete answer** to the following questions covering **the whole NCC**, including the Champions for Training, for Industrial Interaction, Competence Champions and the Communication Champions, as well as other members of the NCC. **The Training Champions will submit the completed questionnaire on behalf of their NCC.**

IMPORTANT: One person at a time can edit the draft. Once you enter the information you want, save the questionnaire as a draft (there is a button on the top right side), choose to send the draft via email to your colleague and then close it.

Please submit the questionnaire in **max. 2 weeks – by Monday 8th March 2021, EoB** at the latest.

The complete answer will help us to identify the expertise across NCCs and the support that NCCs need. Based on this information we will propose the mentoring and twinning programmes, that will be implemented from March-April on.

Thank you for taking the time to reply these questions!

Definitions:

- **Training:** Theory possibly with hands-on exercises on a specific topic. Focus on teaching. One event.
- **Workshop:** Engagement in an intensive discussion and activity. Focus on interaction.
- **Mentoring:** NCC specialized/ experienced in a certain topic, shares or trains people from other NCCs on that subject in a workshop followed by a mentoring path.
- **Twinning:** An activity between two countries to exchange best practices, courses, experience, or to implement a project together.

Your NCC

* Please select the country you represent:



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English ▾

Contact

martina.blazkova@bsc.es

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Mentoring

Merging the WP2/WP3 survey we have drafted these topics for mentoring.

Please let us know:

Column 1 - In which topic(s) does your NCC **have experience** and could **offer mentoring**?

or

Column 2 - In which topic(s) does your NCC **lack experience** and would **need mentoring**?

Topics for Mentoring

(Please select all topics that apply)

	Could offer mentoring	Would need mentoring
Training best practice	<input type="radio"/>	<input type="radio"/>
HPC, HPDA and AI applied to industrial use cases	<input type="radio"/>	<input type="radio"/>
Outreach and collaboration with industries and public sector	<input type="radio"/>	<input type="radio"/>
HPC disruptive technologies for industries	<input type="radio"/>	<input type="radio"/>
Quantum Computing	<input type="radio"/>	<input type="radio"/>
Programming best practice and industrial software development	<input type="radio"/>	<input type="radio"/>
Tech and App for modelling and simulation	<input type="radio"/>	<input type="radio"/>

If you **have experience in other topics not mentioned above** where you could offer mentoring, as well as if you **lack experience in other topics** and you would need mentoring, please let us know here.

	Could offer mentoring	Would need mentoring
Other suggestions (please specify):	<input type="checkbox"/>	<input type="checkbox"/>

Training, Twinning, Support

For the following topics, please let us know:

Column 1 - In which topic(s) does your NCC **have experience** and could **offer** training/twinning/support?

or

Column 2 - In which topic(s) does your NCC **lack experience** and would need training/twinning/support?

Training

(Please select all topics that apply)

	Have experience	Lack experience
Exchange of best practices, training methodologies and information in general.	<input type="radio"/>	<input type="radio"/>
Offer to teach technical topics in a training activity of other NCC, such as GPU, OpenMPI, Big Data, etc.	<input type="radio"/>	<input type="radio"/>
How to design, develop and promote a training/course for different levels of users from academia.	<input type="radio"/>	<input type="radio"/>
How to design, develop and promote a training/course for different levels of users from industry.	<input type="radio"/>	<input type="radio"/>
How to design, develop and promote a training/course for different levels of users from the public sector.	<input type="radio"/>	<input type="radio"/>
How to create, set up and implement training programmes respecting the target audience, levels of experience etc.	<input type="radio"/>	<input type="radio"/>
How to train trainers.	<input type="radio"/>	<input type="radio"/>
How to attract experts/specialists from outside NCC for the education/training activities for specialised topics.	<input type="radio"/>	<input type="radio"/>
How to involve professors from universities in creating dedicated/targeted training in collaboration with the NCC.	<input type="radio"/>	<input type="radio"/>
How to attract participants to the training activities. Targeted outreach to new communities or a specific audience.	<input type="radio"/>	<input type="radio"/>
How to identify the users' needs for education/skill development?	<input type="radio"/>	<input type="radio"/>
Best practices and experience for online training activities.	<input type="radio"/>	<input type="radio"/>
Proposals preparation for funding training mobility.	<input type="radio"/>	<input type="radio"/>
Organization of a professional training centre.	<input type="radio"/>	<input type="radio"/>
Experience of organizing a seasonal school as a training event.	<input type="radio"/>	<input type="radio"/>
How to provide a successful mentoring experience.	<input type="radio"/>	<input type="radio"/>
How to provide a successful twinning experience.	<input type="radio"/>	<input type="radio"/>

If you **have experience in other topics not mentioned above**, as well as if you **lack experience in other topics**, please let us know here.

	Have experience	Lack experience
Other suggestions (please specify):	<input type="checkbox"/>	<input type="checkbox"/>

For the following topics, please let us know:

Column 1 - In which topic(s) does your NCC have experience and could offer training/twinning/support?

or

Column 2 - In which topic(s) does your NCC lack experience and would need training/twinning/support?

Industrial Interaction

(Please select all topics that apply)

	Have experience	Lack experience
Exchange of best practices and information related to industrial interaction in general.	<input type="radio"/>	<input type="radio"/>
How to approach and interact with SMEs.	<input type="radio"/>	<input type="radio"/>
How to approach and interact with large companies.	<input type="radio"/>	<input type="radio"/>
How to find out needs of industrial end-users.	<input type="radio"/>	<input type="radio"/>
How to get involved in HPC, HPDA, AI projects with industry.	<input type="radio"/>	<input type="radio"/>
How to get EU funding for HPC, HPDA, AI industrial projects.	<input type="radio"/>	<input type="radio"/>
Accelerating the adoption of HPC technologies in the industry through upskilling.	<input type="radio"/>	<input type="radio"/>
Technical limitations of HPC, HPDA and AI in industrial applications.	<input type="radio"/>	<input type="radio"/>

If you have experience in other topics not mentioned above, as well as if you lack experience in other topics, please let us know here.

	Have experience	Lack experience
Other suggestions (please specify):	<input type="checkbox"/>	<input type="checkbox"/>

For the following topics, please let us know:

Column 1 - In which topic(s) does your NCC have experience and could offer training/twinning/support?

or

Column 2 - In which topic(s) does your NCC lack experience and would need training/twinning/support?

Interaction with Academia

(Please select all topics that apply)

	Have experience	Lack experience
Exchange of best practices and information related to interaction with academia in general.	<input type="radio"/>	<input type="radio"/>
How to involve professors from universities in collaboration with the NCC (e.g. creating events).	<input type="radio"/>	<input type="radio"/>
How to find out needs of academic end-users.	<input type="radio"/>	<input type="radio"/>
Curricular activities of NCCs.	<input type="radio"/>	<input type="radio"/>
Open discussion with students on specific needs not covered in academic education.	<input type="radio"/>	<input type="radio"/>

If you have experience in other topics not mentioned above, as well as if you lack experience in other topics, please let us know here.

	Have experience	Lack experience
Other suggestions (please specify):	<input type="checkbox"/>	<input type="checkbox"/>



For the following topics, please let us know:

Column 1 - In which topic(s) does your NCC **have experience** and could **offer** training/twinning/support?

or

Column 2 - In which topic(s) does your NCC **lack experience** and would **need** training/twinning/support?

Communication, Dissemination and Raising Awareness

(Please select all topics that apply)

	Have experience	Lack experience
Exchange of best practices and information related to communication, dissemination and raising awareness in general.	<input type="radio"/>	<input type="radio"/>
Communication and dissemination strategies.	<input type="radio"/>	<input type="radio"/>
Public relations and outreach.	<input type="radio"/>	<input type="radio"/>
Social media strategy.	<input type="radio"/>	<input type="radio"/>

If you **have experience** in other topics not mentioned above, as well as if you **lack experience** in other topics, please let us know here.

	Have experience	Lack experience
Other suggestions (please specify):	<input type="checkbox"/>	<input type="checkbox"/>



For the following topics, please let us know:

Column 1 - In which topic(s) does your NCC **have experience** and could **offer** training/twinning/support?

or

Column 2 - In which topic(s) does your NCC **lack experience** and would **need** training/twinning/support?

General Support

(Please select all topics that apply)

	Have experience	Lack experience
Outreach and collaboration with the public sector.	<input type="radio"/>	<input type="radio"/>
Sharing existing projects and experiences with the public sector.	<input type="radio"/>	<input type="radio"/>
Interaction with other CoEs and initiatives.	<input type="radio"/>	<input type="radio"/>
Participation in EU projects. Proposals preparation. Scientific writing.	<input type="radio"/>	<input type="radio"/>
Business development	<input type="radio"/>	<input type="radio"/>
Access to the HPC infrastructure	<input type="radio"/>	<input type="radio"/>
Infrastructure organization	<input type="radio"/>	<input type="radio"/>
HPC competences, skills	<input type="radio"/>	<input type="radio"/>
HPDA competences, skills	<input type="radio"/>	<input type="radio"/>
AI competences, skills	<input type="radio"/>	<input type="radio"/>
Quality criteria	<input type="radio"/>	<input type="radio"/>
Legal aspects	<input type="radio"/>	<input type="radio"/>
Financial aspects	<input type="radio"/>	<input type="radio"/>

If you **have experience** in other topics not mentioned above, as well as if you **lack experience** in other topics, please let us know here.


	Have experience	Lack experience
Other suggestions (please specify):	<input type="checkbox"/>	<input type="checkbox"/>

Would you have anything else to add or comment?

Thank you very much for your time! We appreciate it.

Submit

Annex 3 - CASTIEL Mentoring and Twinning Processes



CASTIEL Mentoring and Twinning Processes

April 21, 2021
Revision: July 6, 2021



CONTENT

CASTIEL WP3

- Aim of the CASTIEL's Mentoring and Twinning Programme
- Definitions
- Support by CASTIEL
- Mentoring and twinning initiated by NCCs
- Mentoring initiated by CASTIEL
- Twinning initiated by CASTIEL
- Potential mentors and mentees

AIM OF THE CASTIEL's MENTORING AND TWINNING PROGRAMME

CASTIEL WP3



Accelerate the development of 'new' HPC Competence Centres and build strong collaborations across NCCs with similar interests taking advantage of the currently available knowledge and experience.

DEFINITIONS - MENTORING

CASTIEL WP3



Mentoring

What

NCC experienced/ specialized in a certain topic **shares** that experience with a person/people from other NCCs.

How

Mentor-mentee connections are established in order to enable in-depth counselling and joint problem solving in a **one-to-one (many)** relationship typical to mentoring.
This will also include **visits** for some days, if applicable.

Who

Mentoring can be organized by **interested NCCs with or without support from CASTIEL.**

DEFINITIONS – TWINNING

CASTIEL WP3



Twinning

What

An activity between **two NCCs** from different countries to exchange best practices, courses, experience, or to implement a project together. In this case the relationship is a **two-way exchange** between a mentor and a mentee.

How

Twinning partnerships will be established with the identification of one or several specific **objectives** that the twinning NCCs will commit to achieve. The actual knowledge skills and competence transfer will be adapted to each specific situation. This will also include **visits** for some days, if applicable.

Who

Twinning exchanges can be organized by **interested NCCs with or without support from CASTIEL.**

SUPPORT BY CASTIEL

CASTIEL WP3



CASTIEL WP3

coordinates the mentoring and twinning programme

Self-Initiated by NCCs

(If requested) Support mentoring interactions of **matched NCCs**

(If requested) Support twinning interactions of **matched NCCs**

Initiated by CASTIEL WP3

Support the organisation of mentoring workshops and the subsequent mentoring interactions



Match potential NCCs for twinning and **support** the twinning interactions

The process of applying for Remuneration for Workshops, Mentoring & Twinning can be found in the **Financial Guidelines** saved on the BSCW – [CASTIEL](#) and [EuroCC](#) folder.

MENTORING AND TWINNING INITIATED BY NCCs

CASTIEL WP3

- 1 Two NCCs choose either mentoring or twinning and they agree the necessary details.
- 2 The NCCs will fill out an application form and submit it at any time.
- 3 After the application approval, the NCCs will organise the mentoring or twinning.
- 4 At the end, the NCCs will send an overview of the expenses and a short report about the mentoring or twinning activity.

These activities will take place from April/May 2021 to August 2022.

CASTIEL WP3 is not necessarily involved in these exchanges, unless NCCs request help or advice.

The Financial Guidelines are saved on the BSCW – [CASTIEL](#) and [EuroCC](#) folder.

MENTORING – RESULTS FROM THE QUESTIONNAIRE

CASTIEL WP3

We have got the following **results** from the questionnaire about the proposed mentoring topics:

Topic	Can offer	Need	Neither
Training best practice	23	6	4
AI and HPC applied to industries	12	18	3
Outreach and collaboration with industries and sector	11	19	3
HPC disruptive technologies for industries	8	22	3
Quantum Computing	7	18	8
Programming best practice and industrial software dev	16	13	4
Tech and App for modeling and simulation	20	5	8
Other topics	8	3	25

MENTORING INITIATED BY CASTIEL – TOPICS

CASTIEL WP3



The mentoring paths will be supported in the following topics:

Mentoring workshops organized by interested NCCs with support from CASTIEL

*The topics that have more contributors who can offer mentoring than those who need mentoring will be subject of the **twinning** rather than the mentoring activities.*

- **T1 – AI and HPC applied to industries (4h)**
 - This workshop will focus on **AI, Machine learning applied to industrial use cases using HPC**. By sharing their experience, the contributors will help orientating the mentoring path by organizing the specific topics. By taking advantage of industrial use cases, we can provide specific courses to create new AI competences for the interested people, such as AI algorithm creation, massive parallel training on HPC, AI programming paradigm.
- **T2 – Outreach and collaboration with industries and public sector (4h)**
 - A series of workshops and meetings on different topics about the **application of HPC, HPDA and AI to the industrial and public sectors** and how to improve outreach to these sectors to increase their engagement.
- **T3 – HPC disruptive technologies for industries (4h)**
 - Those NCCs that have a project on **disruptive hardware or technologies** will share their experiences in a series of workshops. Projects will be applied to industrial problems and related to accelerating computing, exa-scaling, novel and energy efficient hardware.
- **T4 - Quantum Computing**
 - The aim of the workshop is to involve all NCCs who have **quantum computing activities** related to industrial issues, in order to share their experiences with the various quantum computing technologies available today in the vast world panorama.
- **T5 – Programming best practice and industrial software**
 - The workshop will identify the competence needs and training request about the **software management, interface and architectural design**. For each of these arguments we can set up a mentoring path that shows the technologies and the best practice in the industrial field such as devops, GUI, WUI and digital twins.

MENTORING PROCESS INITIATED BY CASTIEL (1/3)

CASTIEL WP3



- 1** CASTIEL will put into contact the contributors and give them the list of interested NCCs.
- 2** The contributors will decide who will take on the role of the organiser of the initial workshop.
- 3** The organiser will apply for the workshop budget, if applicable (face-to-face event).
- 4** The organiser and all contributors will establish the content of the first workshop & possible subsequent mentoring paths.

MENTORING PROCESS INITIATED BY CASTIEL (2/3)



CASTIEL WP3

5

The organiser and contributors will find out from the interested NCCs the best **suited date** for the first workshop.

*This workshop will give an **overview of a topic of interest** and the single mentoring activities. These activities will take place **from April/May 2021 to August 2022**.*

6

Once the date is selected, the organiser will be responsible for the **workshop management & organisation** with the help of contributors.

*The workshop can be either **online or F2F** or a combination of both in one of these ways:*

- Hackathon

- Hands-on & discussion over results

- Round-table meeting

- Presentation

- Other format

If possible and if of interest, we recommend recording the workshop and subsequent meetings and uploading the videos to the EuroCC ACCESS Training repository.

MENTORING PROCESS INITIATED BY CASTIEL (3/3)



CASTIEL WP3

7

During the workshop, the **subsequent mentoring paths** will be decided

*Each mentoring group will involve **one mentor** from the workshop contributors and can involve **a single mentee or a group of mentees** from the interested NCCs.*

*The **mentoring path** can include workshops, knowledge transfer or other way of knowledge/experience sharing.*

*Each **mentor will be responsible** for organising their own sub-part of the mentoring path.*

8

The mentor and the mentee/s can apply for the **mentoring budget**.

*The **Financial Guidelines** are saved on the BSCW – [CASTIEL](#) and [EuroCC](#) folder.*

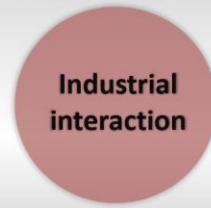
TWINNING INITIATED BY CASTIEL – TOPICS

CASTIEL WP3



Focus on all areas, not only on training

Twinning exchanges organized by interested NCCs with support from CASTIEL



TWINNING PROCESS INITIATED BY CASTIEL

CASTIEL WP3



1

CASTIEL will put into contact the NCCs that create a good match. They will agree the necessary details with the support from CASTIEL.

2

The NCCs will fill out an application form with the support from CASTIEL and submit it at any time.

3

After the application approval, the NCCs will organise the mentoring or twinning with the support from CASTIEL.

4

At the end, the NCCs will send an overview of the expenses and a short report about the mentoring or twinning activity.

These activities will take place from April/May 2021 to August 2022.

The Financial Guidelines are saved on the BSCW – [CASTIEL](#) and [EuroCC](#) folder.

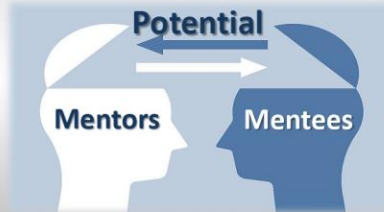
POTENTIAL MENTORS AND MENTEEES

CASTIEL WP3



If you are **looking for a potential mentor or a mentee**,
check the following documents:

*The results from the
questionnaire about the
mentoring and twinning topics
split by topic and by country*



*The summaries from the
analysis of the training
activities section from the
training mapping*

These documents can be accessed
by **WPLs and Training Champions/Deputies**
on the BSCW [in the folder](#)
2021_03_29_mentoring_twinning_survey_results

Annex 4 – Mentoring and Twinning Template Documents

1. A Short Description of the Planned Mentoring/Twinning Activity

Type of activity – mentoring or twinning:

The NCC-mentor:

The NCC-mentee(s):

Section 1. Your Visit - *Preferred date to start your visit, its estimated duration, logistical matters such as accommodation and office space (in case of F2F) or other logistical matters in case of a virtual collaboration.*

Section 2. Mentee(s) motivation - *Justify your choice of the host and indicate what you expect to gain from this collaboration and what your motivation is for the collaboration.*

Section 3. Host collaboration description - *The level of support granted by the proposed host, what the host expects to gain from the collaboration and what his/her motivation is for hosting the mentee(s).*

Section 4. A detailed description of the areas of planned support (*e.g. training, outreach and collaboration with industry, academia, public sector, any other topic/area where you need support and what the focus will be within each area*)

2. A Short Report on the Mentoring or Twinning Activity

Type of activity – mentoring or twinning:

The NCC-mentor:

The NCC-mentee(s):

Dates of your activity:

A detailed description of the areas of provided support:

What has/have the NCC-mentor gained from the activity:

What has/have the NCC-mentee(s) gained from the activity:

What worked well and why:

What did not work well and why:

Suggestions for improvement:

Annex 5 – CASTIEL Mentoring Process Procedure

Supported Topics for Mentoring

Given the topics that emerged from the WP3 mentoring and twinning questionnaire, each NCC has decided to contribute as a contributor = can provide mentoring on this topic, or the one that would like to receive mentoring and learn more about this topic = interested NCC, or neither of these.

The topics that have more contributors than interested NCCs to learn will be subject of the twinning rather than the mentoring activities. Specifically, given the results of the survey, the following topics will not be included in the mentoring workshops: *training best practises, tech and app for modelling and simulation, other topics.*

The following steps are meant to set up the first workshop of the mentoring path on the **following topics**:

- Outreach and collaboration with industries and public sector,
- HPC disruptive technologies for industries,
- Programming best practises and industrial software development,
- Quantum Computing,
- HPC, HPDA and AI applied to industrial use cases.

CASTIEL Mentoring Process Step by Step

1. CASTIEL will put into contact the contributors and give them the list of interested NCCs.
2. CASTIEL will plan a meeting during May 2021 with all contributors with the following aim:
 - To decide the content and format of the first workshop and possible following mentoring path. This first workshop will give an overview of a topic of interest and the particular mentoring activities. The mentoring path will involve only one contributor as a mentor, there can be more mentoring paths on the same topic with different contributors. The first workshop can take one of the following formats:
 - Hackathon
 - Presentation
 - Hands-on and discussion over results
 - Round-table meeting
 - Other format
 - The contributors will decide who will take on the role of the main organiser of the initial workshop.
 - All contributors will provide their availability.
3. The organiser will apply for a workshop budget, if applicable (face-to-face event).
4. The organiser, given the available dates of the contributors, will create a doodle for the interested NCCs to decide the date for the first workshop.
5. Once the date is selected, the organiser will be responsible for the workshop management and organisation with the help of contributors: e.g.,
 - Creation and announcement of the event (either online or F2F or a combination of both),
 - Creation of the participation online link or organisation of the in-person event,
 - Preparation of the content of the workshop,

- Registration of the participants and
- Any other necessary activity.

If possible and if of interest, we recommend recording the workshop and subsequent meetings and uploading it to the EuroCC ACCESS Training repository.

6. During the first workshop, each contributor NCC, that shows interest for the topic, will offer to organise its own activity into the mentoring path. The interested NCCs can join the contributors and create a mentoring group for a single activity. Each mentoring group will involve one mentor from the workshop contributors and can involve a single mentee or a group of mentees from the interested NCCs. Both the mentor and the mentee/s can apply for the mentoring budget at any time, if of interest.
7. Each mentor will be responsible for organising their own subpart of the mentoring path. The mentoring path can include workshops and knowledge transfer. This should be specified in the application form, if applying for the mentoring budget, or in a joint document between a mentor and a mentee, if not applying for the budget. These mentoring activities will take place from September 2021 to August 2022.

CASTIEL will be overlooking the organisation of the first workshop and the mentoring path to ensure the successful completion of the planned knowledge transfer.