Report on Research, Development and Innovation (RDI) for Professional Higher Education (PHE)

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1. Introduction

The RECAPHE project intends to broaden insight and awareness of applied research and innovation activities within Professional Higher Education Institutions in Europe and to create a platform for imparting further competences to research staff and students related to their specific experiences and needs. It aims to strengthen the profile of applied RDI in PHE in Europe, by:

- gaining insight into the scope and nature of applied RDI activities within PHE institutions in Europe;
- distinguishing the different competences required of applied researchers;
- assisting researchers in RDI to enhance their capacities;
- providing a clear future vision for applied RDI in Europe and a strategy on how to achieve it.

It stands out as the first project to systematically consider applied research competences with a focus on PHE and to propose a concise competence framework: *The RECAPHE Research Competence Framework*[1] is designed to build the research capacity of different target groups in Universities of Applied Sciences and specifically in Professional Higher Education Institutions.

This Report on Research, Development and Innovation (RDI) for Professional Higher Education (PHE) has two main objectives (1) to sum up the results of the RECAPHE project and (2) to outline policy recommendations on RDI in PHE. To that end, we have designed a set of activities based on different methods, which will be described in the following chapters of the present report.

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[1] www.recaphe.eu/competence-profiles

2.   Summary of project results

2.1 IO1 - Staff competence profiles for Research & Innovation in Professional Higher Education

The Intellectual Output 1: "Staff Competence Profiles for Research and Development" started in September 2019 and contained five Tasks:

O1A1 Screening of RDI activities and capacities at European PHE institutions

O1A2 Mapping/collecting RDI competences

O1A3 Structuring/classifying RDI competences

O1A4 Designing a self-evaluation tool

O1A5 Piloting of self-evaluation tool

The aim of this intellectual output includes the creation of the competence framework and the competence profiles for different target groups. This framework will help to clearly distinguish the different competences required for conducting applied research and innovation in PHE Institutions, as compared to academic research that takes place in traditional universities.

The first task was the screening of RDI activities and capacities at European PHE Institutions (O1A1). Usually, researching on and defining competences relies on an evaluation of mastery in a specific field, this meaning that we should observe and describe the practices of persons involved in a specific professional field or domain. Thus, the first step of our research was an expert-supported comprehensive screening and collection of documents on research areas that are important for research on UAS and related competences. This research was conducted by the whole consortium in order to benefit from regional and national resources and expertise. However, the research confirmed the importance of the RECAPHE project in how there is no such thing as a concise competence framework or model adapted to our needs and goals in professional higher education to be found yet.

Establishing a competence framework (O1A2 & O1A3) has been an ongoing agile, collaborative effort open for further adaptation in order to ensure the quality, applicability and validity of it, establishing a sharing and peer feedback culture that we believe to be in line with RECAPHE's scope and mission. The consortium analysed the materials and made an inventory of typical tasks, demands and competences in applied research. The question of

how to determine the relevant applied research competences led to a threefold background supplement that provides a) the definition of different target groups the competence framework refers to, b) a research lifecycle as a reference setup in which certain competences will be specifically crucial at specific phases, and c) characteristics of UAS or PHE research with a focus on Applied Research. The Consortium defined five different target groups: Beginner Researcher/Students, Academic Staff/Teachers/Mentors, Administrative and Supporting Staff, Institutional Academic Leaders, and Policy Makers. With these framework outlines, the list was narrowed down to a short list of PHE-relevant or applied research competences, organised into a framework of competence clusters and discursively validated in several extensive validation rounds.

Six competence clusters were derived from the research lifecycle: 1. Research Design for Innovation, 2. Research Management, 3. Research Based Teaching, 4. Teamwork, 5. External Cooperation & Knowledge Transfer, 6. Leadership, Scientific Guidance & Supervision. A short description of the different competence clusters can be found in table 1.

Tab. 1: Short description of the competence clusters of the RECAPHE Competence Framework

Competence Cluster	Short description
RESEARCH DESIGN FOR INNOVATION	This competence cluster refers to the key elements of preparing, designing and conducting research processes, initiatives and projects from the scientific and methodological point of view.
RESEARCH MANAGEMENT	This competence cluster refers to the ability to organize and manage a research initiative, process or project from its first idea through possible application for funding including monitoring and management of the research activities, to its final report and publication
EXTERNAL COOPERATION AND KNOWLEDGE TRANSFER	This competence cluster refers to the ability to actively seek to develop a transfer ecosystem in which research results are shared, disseminated and transferred throughout the research initiative with internal and external stakeholders in all stages of knowledge production and dissemination. It also refers to competences of UAS students and staff to act in collaborative

	external environments (world of work, civil society, public administration etc.).
TEAMWORK	This competence cluster refers to interpersonal competences (group work, leadership, taking different roles in a team).
RESEARCH BASED TEACHING	This competence cluster refers to the ability to integrate teaching and research activities and engage students into research activities.
LEADERSHIP, SCIENTIFIC GUIDANCE AND SUPERVISION	This competence cluster refers to competences related with scientific guidance and evaluation of scientific efforts.

We consider this competence framework as a basis for further work that we are continually optimizing, e.g. by presenting it to exterior parties at conferences and working groups and asking for feedback and validation, and also by harmonizing it with the next steps of the RECAPHE project. This way, we introduced the ESCO classifications of knowledge (Know-Know), skills (Know-How) and attitudes (Know-How-to-Be) for describing the competences in the competence clusters (cf. https://ec.europa.eu/esco/). Moreover, we assessed the relevance on four levels and the aspired competence level on three levels in a competence matrix for different target groups (see Tab. 2).

Tab. 2: Relevance of competence cluster for different target groups (–/irrelevant, 0/slightly relevant, +/relevant, ++/very relevant)

Cluster	Beginner Researcher / Students	Academic Staff/Teachers/ Mentors	Administrative and Supporting Staff	Institutional Academic Leaders	Policy Makers
Research Design	+	++	–	+	0

for Innovation				
Research Management	+	++	0	++	++
Research Based Teaching	++	++	–	–	–
Teamwork	++	++	+	++	++
External Cooperation & Knowledge Transfer	0	++	0	++	++
Leadership, Scientific Guidance & Supervision	–	++	–	++	–

For the design of the self-assessment tool (O1A4 &O1A5), the learning objectives (O2A1 & O2A2) developed in Intellectual Outcome 2 were included. As these outputs overlapped, a more detailed description of the design of the self-assessment tool and the piloting can be found in the summary of O2.

Intellectual Output 1 resulted in a report that can be found on the RECAPHE website and in a self-assessment tool.

2.2 IO2 - Training materials for PHE Research & Innovation professionals

The primary aim of O2 is the creation of relevant research, development and innovation-supporting training materials to address the identified competences and research gaps and challenges faced by HEI staff and researchers. Through the activities of this output (O2), the project aims to put forward expert-developed exemplary self-learning micro-modules on selected competence-building themes. It is intended that using the course delivery and instruction templates and methodology put forward, the outputs will then be further built on and expanded to include additional micro-modules addressing more competences.

The specific objectives of O2 are:

- Definition and finalisation of learning outcomes realisable using training courses
- Selection of experts for output assessment and validation
- Definition of the structure and contents for proposed self-learning modules
- Authoring and testing of selected micro-modules by experts, and testing carried out in RECAPHE partner institution environments.
- The design of the supporting schedule and supporting infrastructures i.e, online registration pages and technical underlying structures.

These objectives were realized through the activities carried out under 02A1-O2A6.

O2A1 (Definition of learning outcomes)

O2A1 applied the competence framework that was developed in O1 to design learning outcomes using the Bloom's taxonomy classification system. This is a hierarchical classification of the different levels of thinking. This taxonomy enabled the focused proposition and development of the relevant RECAPHE learning outcomes, specifically tailored to meet the intended students' expectations.

O2A2 (Validation of learning outcomes)

Once the learning outcomes were developed, the next step was the validation of the learning outcomes. The learning outcomes were validated using a group of experts

from the different RECAPHE partner institutions. In total, 15 experts were recruited to carry out a validation of the competence framework and learning outcomes to ascertain their appropriateness for use by the target audience. The breakdown of the experts who carried out the validation exercise are ATU Sligo-2, KIC-3, JU-2, DHBW-2, VIKO-2, IPS-2, EUROK-2.

O2A3 (Definition of modules)

The production of a list of starting modules (based on a learning needs analysis) was achieved in this activity through the collaboration of all project partners. Suitable module themes and titles were defined and the potential content in the proposed modules was decided on. These were developed on the basis of the identified competence cluster (from O1), target audience, intended learning level and module relevance. Furthermore, the learning outcomes were aligned with all of the agreed modules defined in this activity.

O2A4 (Authoring of content)

The different modules were allocated to expert module developers in the various RECAPHE partner institutions. Here, the content of each module was developed and authored internally, with the 15 experts (annex 1) within our Consortium further reviewing the content of the modules.

O2A5 (Testing)

The modules once developed were tested at each partner Institution and the data was then collected, analysed and evaluated. The collation of the analysed and evaluated opinions and data following the institutional testing was then carried out by a working group led by output lead, ATU Sligo and Co-leader VIKO, and amendments were made accordingly based on the review from the RECAPHE partner institutions.

O2A6 (Creation of course schedule)

A course schedule for the different modules produced by the RECAPHE project was designed, developed, and implemented. This included the design of the backend infrastructures and the necessary registration elements needed for the use, accessibility and implementation of the modules.

Process: Project implementation and Outcomes completed

As part of the overall process, the RECAPHE Consortium along with the 15 experts from the partner institutions designed, developed, implemented and agreed on the following competence/cluster modules and the respective learning outcomes:

Competence Cluster:

· Research Design for Innovation

· Research Management

· External Cooperation and Knowledge Transfer

· Teamwork

· Research Based Teaching

· Leadership, Scientific Guidance & Supervision

The next step in the process was the identification of the target audience, level of knowledge and relevance of those clusters/modules to the target audience. This information was then used to define and elaborate on the respective RECAPHE modules to be developed, with the course content authored by expert developers in RECAPHE partner institutions. This led to the production of relevant module materials (and the supporting infrastructures) which will be used to facilitate the competence development goals of the project.

2.3 IO3 - Online training videos and infrastructure on Research and Innovation competences for PHE

The aim of Output 3 - Online Training System was to provide a set of 7-minute video lectures, corresponding to the overall set of topics defined in this application, and the module outline described in O2. We have used an e-learning format that consists of 4 components: Read, Watch, Do, Additional Resources. This format will allow people to learn about specific competences, or follow the whole course, depending on their personal learning objectives. A number of studies show that bite-sized learning, can be more effective than traditional 20 minute – 1 hour e-learning sessions. This can be particularly true in the case of credentials for continuing professional education aimed at mentors, who have significant restrictions on their time due to their main employment.

Coming to the final result of O3, we were working on specific activities planned as follows:

O3A1: Establishment of Standards and Setup of Equipment

The videos were authored across the partnership by the various authors of the modules. To ensure consistent production values, both in terms of content as well as technical production quality, the consortium set up a production manual detailing a structure for storyboards, style of each lecture, as well as technical standards for filming, lighting and audio.

O3A2: Creation of Storyboards

Each module-authoring team used the templates created in O3A1 to storyboard their videos. The storyboard consists of a written description of the script, slides as well any animations, video-clips or other media which will be included in each video-lecture.

O3A3: Test Recordings

Following preparation of the storyboards, each module presenter(s) filmed an initial version of their video-lecture.

O3A4: Validation of Tests

The initial recordings were uploaded to an internal video-sharing platform, and internal review (within the partnership) was conducted. The comments on the videos providing feedback on content, presentation and technical quality, were used in improving the storyboard and overall production.

O3A5: Recording of Final Lectures

After incorporating the feedback from O3A4, each author recorded the definitive version of their lectures. The vast majority of the recordings took place during the TPM meeting in Krakow, in the Eurokreator's creative space – iLab plus.

O3A6: Editing

Editing involved integration of slides, videos, audio and any other interactive material which is required by the storyboard into each of the lectures.

O3A7: Translation and Subtitling

Once each of the lectures has been produced, the national PHE associations create accompanying subtitles in their respective national languages, and synchronise these with the videos.

O3A8: Publication

Publication involved the uploading of the videos to a content distribution platform (YouTube), as well as registering the appropriate metadata. It will also involve uploading it as a complete course on the project's website (in progress).

Throughout the O3 activities, we provided 15 video lectures:

1. Foresight in Applied Research
2. Benchmarking as a Best Practice in Industry Analysis
3. Identify Local Needs of Applied Research
4. Scenario Planning
5. Bridging the worlds of Academia and Standardization - Part 1: How to Use Standardization to Network and Collect Inputs for Applied Research
6. Strategy Tables for Grant Applications
7. Inclusive Learning Environment
8. Management of Entrepreneurial Innovative Research
9. Effective Team-Oriented Communication
10. Time Management in Research
11. Risk Management in Research Projects
12. Effective Collaboration With Stakeholders to Get the Most out of the Research Activities_ management
13. Supervisory Skills for Researchers
14. How to Apply Open Licenses to Your Digital Research Outputs
15. Bridging the worlds of Academia and Standardization - Part 2: How to Use Standardization for Dissemination and Sustainable Exploitation of Applied research results

Each video lecture teaches a specific competence, consisting of theoretical concepts as well as descriptions of case studies. The videos are an integral part of the RECAPHE online training in the form of short lectures or discussions with the participation of experts, each footage fits into a specific micro-module content.

3. Scenario Planning

The scenario planning technique is a method of strategic planning used in politics, science and business. The aim is to analyse possible developments of the future and to present them in a coherent way. The concept "scenario" stands for the idea of a possible future and thus implicitly always refers to the possibility of further, alternative futures. (Kosow et al. 2008).

A scenario is defined as: Representation of a possible future situation (future picture) including the development paths that lead to the future situation. The aim of the scenario is to define and analyse relevant key factors for orientation with regard to future developments.

Scenarios serve different functions. The following four are particularly noteworthy (Kosow et al. 2008):

1. Explorative function or knowledge function: scenarios can be used to generate new knowledge about possible futures and to analyse a situation.
2. Communication function: scenarios can be used to communicate complex issues.
3. Goal-setting function: Scenarios can be used to define a specific goal/desire of a possible future.
4. Decision-making and strategy-building function: scenarios can help to make decisions and form long-term strategies.

The scenario planning process consists of five different phases, which are presented below and carried out for our use case Research and Development in Professional higher education.

3.1 Scenario field definition

The Scenario field definition asks the following questions:
- For what topic is the scenario to be developed?
- What is the subject and the problem to be addressed?
- Where are the boundaries? What is not considered?

The Scenario field definition helps to narrow down the topic and create a clear framework for the work. Once the topic is determined, the appropriate key factors that influence the field can be identified (Kosow et al. 2008).

Under the framework of the RECAPHE project, the consortium proposes to design the scenario space which involves listing key driving forces thought to be important to the future of RDI in PHE, and mapping these on independent 'axes' in a scenario space. By doing this, we will be able to identify four to five probable 'worlds' representing different sets of future challenges and

opportunities for applied research & innovation in Europe. Following up on this step, the project has decided to define key measures within each scenario, considering their potential for great impact on the outcome of the scenario described. Among such measures, a broad diversity of forces is included (e.g.: economic growth, legislative environment, technology diffusion and proliferation, or competitive capability). In conclusion, there will be prepared descriptions for the future reality of RDI in PHE.
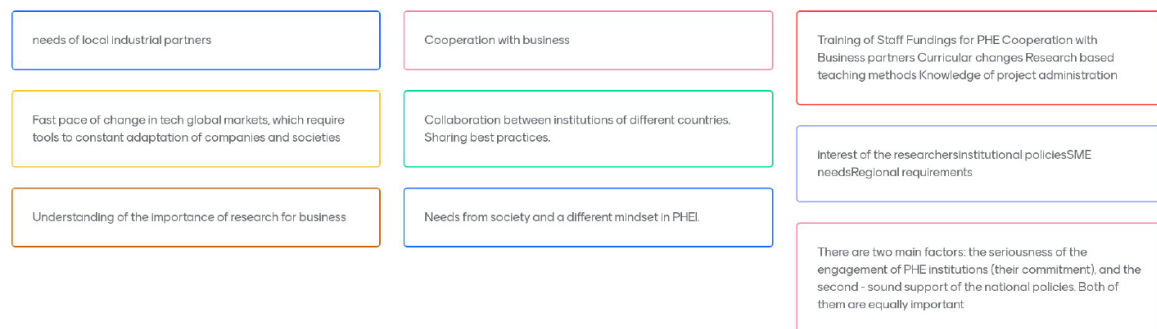
3.2. Identification of key factors

Once the scenario field has been determined, the various key factors are identified. Key factors or "descriptors" are central variables that describe the scenario field. They can be variables, parameters, trends, developments but also events.

Key factors can be identified using various methods. Among other things, with preliminary empirical work in the form of desk research, but also with participatory workshops or interviews. In the context of the project, we decided to use the second method and determined different driving forces for RDI in PHE in a workshop with 15 participants. A Mentimeter survey was used to give a visual overview of the discussion (see Fig. 1).
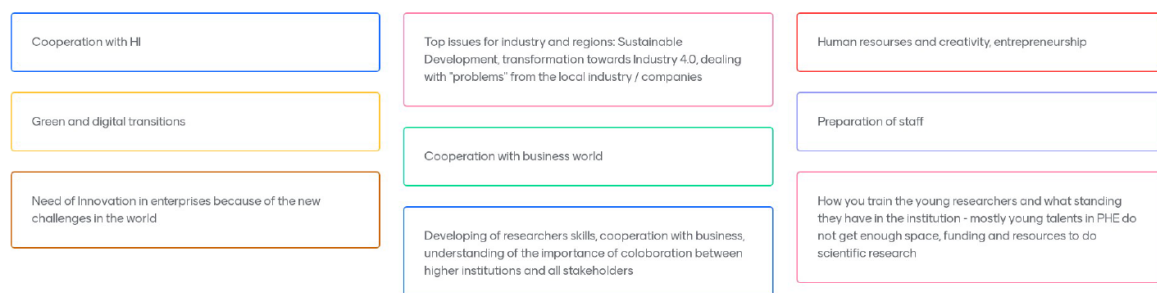

Fig. 1 - Driving forces for the future of RDI in PHE results from the activity

3.3 Analysis of the key factors

After the key factors have been identified, they are analysed in the next step. One way to analyse possible characteristics is with the help of a SWOT analysis.

The SWOT analysis was conducted in an expert workshop. To ensure that the analysis was carried out systematically, it was combined with a PESTEL analysis.

2.3.1 SWOT & PESTEL

The SWOT analysis is a tool from the business world. The acronym SWOT stands for Strengths, Weaknesses, Opportunities and Threats. Its analysis supports the identification of internal and external factors of a given context in a form of a matrix.

Internal factors	Strengths	Weaknesses
External factors	Opportunities	Threats

Fig. 2 - SWOT analysis matrix

- *Strengths*: characteristics of the subject that consists of advantages over others
- *Weaknesses*: characteristics that place the subject at a disadvantage relative to others
- *Opportunities*: elements in the environment that the subject could exploit to its advantage
- *Threats*: elements in the environment that could cause trouble for the subject

As an assessment framework, a SWOT analysis is an effective tool to support summarizing other findings, consisting of a part of strategic planning and risk.

PESTEL is another analytical method to find a systematic overview of one's own environment. Here, various influencing factors are taken into account. The acronym PESTEL stands for Political, Economic, Social, Technological, Environmental and Legal. It refers to internal and external factors.

P	E	S	T	E	L
Political	Economic	Social	Technological	Environmental	Legal

Fig. 3 - PESTEL analysis matrix

A SWOT analysis is often integrated into a broader analysis of a certain subject. A model allowing a combined analysis of PESTEL-SWOT combined analyses (Feliciano, 2021) is presented below (fig. 4) and aims to promote an in-depth analysis, considering all factors (particularly external factors) as described in the VET21001 Toolkit (VET21001 consortium, 2022).

Aspects to Consider	Strenghts	Weaknessess
Internal Context >> Governance and structure		
Policies, Objectives and Strategies		
Capabilities (Resources and Knowledge)		
Information Systems		
Relationships with internal stakeholders		
Organizational Culture		
Standards		
Contracts		
External Context >> Political		
Economic		
Social		
Technologal		
Environmental		
Legal		
Key drivers		
Relationships with external stakeholders		
	Opportunities	**Threats**

PESTEL-SWOT Combined Analyses (Feliciano, 2021)

Fig. 4 - PESTEL-SWOT Combined Analyses (Feliciano, 2021)

This model of PESTEL-SWOT Combined Analyses served as a basis for the conceptualisation of Research, Development and Innovation (RDI) in Professional Higher Education (PHE) in this report.

3.3.2 Operationalisation of the analysis of key factors

The project consortium contributed to this analysis of RDI in PHE following this procedure: experts were divided into different groups and had to come up with ideas about RDI in PHE in Europe (see Fig. 5).

3.3.3 Results from the PESTEL-SWOT combined analysis

Aspects to Consider	Strengths	Weaknesses
Governance and structure	- More specialised in PHE - smaller institutions and more flexible to changes and adaptation - RDI orientation to the needs of regional users - Sound position of PHE sector in European HE	- PHE organizations are not initially structured to cover research, requiring investment in infrastructures and career paths and their legal framework - Lack of procedures and hierarchical structure - Research funding through European research programmes (relatively low success of applications) - No Master degree programmes in Lithuanian professional higher education
Policies, Objectives and Strategies	Experience and strategies for practice-oriented training and teaching in place	Lack of deployed strategies to address the internal weaknesses and external threats identified in this analysis
Capabilities (Resources and Knowledge)	The intellectual motivation of teaching staff for research	- Lack of financial motivation of teaching staff to accept more tasks and responsibilities related to research activities - Lack of applied research competence profiles - Lack of research competencies in PHE teaching and non-teaching staff - Lack of resources which creates challenges in terms of recruitment of students
Information Systems	Through the practical experience of the staff, new project management and cooperation tools from the business world are used.	Lack of project management tools and tools targeted to specificities of applied research in different fields/sectors
Relationships with internal	Usually smaller organisations with shorter communication channels	More sensitivity to external environment - less stability

stakeholders		
Organizational Culture	● More informal communication between individual institutes. ● High prioritisation of practical experience	● The assumption that teaching staff can do applied research without time and resources allocated to that
Standards	● Standards in cooperation with external stakeholders	● Lack of financial motivation of staff to being involved in research
Contracts	● Partly existing contracts with external stakeholders	● Lack of legal frameworks to compensate financially and career wise teaching staff who performs applied research and to allow research-only careers

Aspects to Consider	Opportunities	Threats
Political	● Slow but growing orientation to applied research in EU Funding programmes for applied research ● More funding from the EU for AR projects; development of RDI ● Researchers' collaboration through EURASHE Research Community of Practice ● Erasmus+ funding for researchers' competence development across Europe ● European University alliances	● Lack of investment from national funds due to lack of credibility of applied research as research usually associated with Universities and natural sciences ● PHEIs are not in the top priority when comparing to universities ● High competition for EU funding ● Relatively weak collaboration with academic universities and research institutes ● Teaching workload of PHE institutions' academic staff – lack of time for research activities.
Economic	● Some EU Funding programmes for applied research exist	● EU funding programs have fewer funds than for other types of research (see differences between ERASMUS+ and Horizon) ● Lack of investment from national funds due to lack of credibility of applied research as research usually

		associated with universities and natural sciences ● Limited interest in PHE leads to lack of financial support
Social	● Slow growing credibility of applied research and its recognition by the market and societies ● Non-trad students (lack of support) more connected to social issues and research areas related, lack of credibility but it is changing	● Lack of credibility of applied research as research is usually associated with universities and natural sciences ● Not sophisticated for advanced research, lack of credibility - legitimacy
Technological	● The proliferation of project management tools that could be used by PHEs ● Connection with business partners of external stakeholders, various tools available for AR	● Lack of personalised tools targeted to specificities of applied research in different fields/sectors that could be used by PHE ● Expensive tools needed
Environmental	● Climate change requires innovative tools and will boost investment ● Structures, infrastructures more adapted to local needs and environmental challenges	● Climate change require innovative tools
Legal	● More PHE students the more will work in research	● Lack of legal frameworks to compensate financially and career wise teaching staff who perform applied research and to allow research-only careers ● Lack of legal frameworks for partnerships with the market in terms of research (work-based research-based learning) ● Lack of legal frameworks for PHE degrees based on research ●
Key drivers	● The fast pace of change due to globalization and technology	● Lack of deliverables quality due to time pressure

Relationships with external stakeholders	● Opportunity to get the real cases to AR and transfer the results to both academia and society	● Lack of continuity - research is linked to the production processes

Fig. 5 - PESTEL-SWOT analysis of RDI in PHE

3.4 Scenario generation

After all characteristics of RDI in PHE have been analysed, the information gathered is used to create various future scenarios. We have decided on three scenarios based on the data available.

The first scenario describes a future in which none of the existing factors has changed. This scenario describes the status quo of RDI in PHE.

The second scenario describes a best-case scenario. All strengths have increased and all positive opportunities are real. This should be used as a benchmark for the development of policy recommendations.

The third and last scenario describes the worst-case scenario. All threats have occurred and the weaknesses of RDI in PHE have increased. This scenario is intended to serve a communication function and illustrate the importance of policy decisions on this issue.
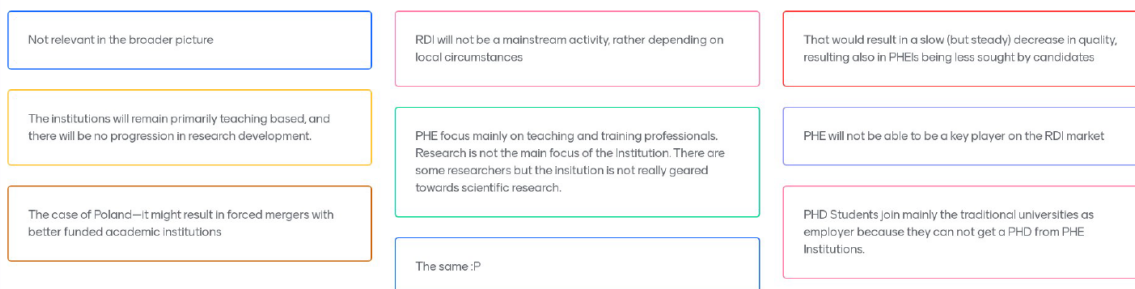
3.4.1 Everything Stays the Same Scenario

The first scenario shows us what would RDI in PHE look like if anything stayed the same. Thus, it reflects the status quo and gives us an overview of the current state of RDI in PHE.

Again, we asked a consortium of experts with the help of a Mentimeter survey to give us an idea of what such a scenario could look like. You can see the results of the survey in Fig. 6.

How would RDI in PHE look like if nothing changes?

Not relevant in the broader picture

RDI will not be a mainstream activity, rather depending on local circumstances

That would result in a slow (but steady) decrease in quality, resulting also in PHEIs being less sought by candidates

The institutions will remain primarily teaching based, and there will be no progression in research development.

PHE focus mainly on teaching and training professionals. Research is not the main focus of the institution. There are some researchers but the insitution is not really geared towards scientific research.

PHE will not be able to be a key player on the RDI market

The case of Poland—it might result in forced mergers with better funded academic institutions

The same :P

PHD Students join mainly the traditional universities as employer because they can not get a PHD from PHE Institutions.

How would RDI in PHE look like if nothing changes?

Less students, as they will choose universities in bigger cities as they have a better esteem.

Teaching is concentrated not on research methods

PHE will not be well equipped to respond to regional demands and future changing landscape

There are not many funding opportunities for PHE Institutional Research

The public does not see PHE like traditional universities

Fig. 6 - Scenario: everything stays the same

First, let us describe what this scenario would imply for the internal structures of the Professional Higher Education institutes:

The PHE organisations are not structured for research especially in terms of investment in infrastructures (e.g. systems and technology) and careers as well as in the legal framework. There is also a lack of structured systems and procedures to apply, manage and account for research projects. There are isolated research clusters, but they are driven more by the intrinsic motivation of the people involved than by a strategic guideline and vision of the organisation. The existing research projects are mostly isolated and dependent on local circumstances, there are little synergies between different research clusters. The focus in teaching is on the training of professionals and not on the transfer of research results and the teaching of research methods. Students interested in scientific problem-solving turn to traditional universities instead of PHEs. This prioritisation also has an impact on staff selection and career paths. Young scientists aiming for a Ph.D. qualification will find fewer suitable positions at PHE institutes. In addition, most PHEIs will continue to lack the legal authority to award Ph.D.s. This means that the scientific naïve will be left behind. As a result, young scientists will continue to go to traditional universities. In the long term, this development will have an innovation-inhibiting effect on the quality of teaching at PHEIs and the organisations will not be well equipped to respond to regional demands and the future changing landscape.

Externally, this development in the area of research and development also has an impact on the environment of PHEs. Public opinion continues to make a clear distinction between traditional universities and PHEIs. Full academic and scientific education is attributed more to traditional universities. Companies and external stakeholders turn to traditional universities for answers to future questions and do not see PHEIs as qualified partners in terms of research and innovation. The lack of internal prioritisation of research also means that fewer research projects are being announced specifically for PHEIs and applied research topics.

Thus, there is a lack of funding for projects and expansion continues to be hampered. As a result of this development, PHEIs will not play a major role in the European higher education landscape and will not receive much attention from politics.

3.4.2 Best Case Scenario

As a second scenario we understood what would be the reality of RDI in PHE like in the best case. To get the scenario, we inquired again the consortium of experts using Mentimeter as it is described in Fig. 7.
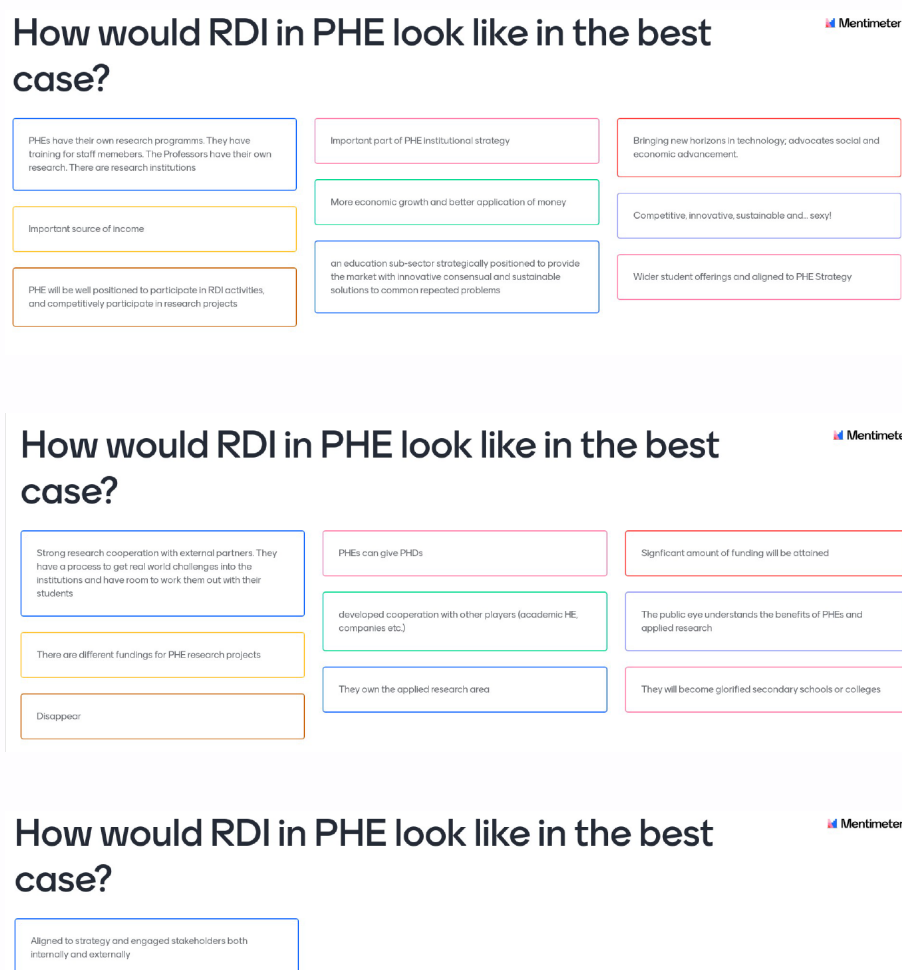

Fig. 7 - Best Case Scenario

One possible best-case scenario could be the following: Internally PHEIs have developed their own research strategy. This is reviewed at regular intervals. Institutions have established their own quality assessment and policy processes. There are appointed representatives who are primarily responsible for the promotion of research activities within the institution. Each professor pursues his or her own research field. The research interest and previous research activities are strongly considered in appointment procedures.

Furthermore, the teaching/learning activities are in the foreground. Students learn applied research methods and scientifically based problem-solving. All important competencies are covered (see the Recaphe Competence Framework[2]). The knowledge taught is deepened in regional research projects with external stakeholders. The Institutions provide wider student offerings aligned with the RDI strategy. Not only students and teachers, but also administrative staff and academic leaders receive regular training on RDI processes, dissemination and policy developments in the research field. The focus on applied research provides PHEIs with an attractive source of income through their diverse research projects.

The PHE institutions position themselves as knowledge transfer partners. They act as interfaces between science, business and society. The high level of competence in applied research leads to research cooperation with external stakeholders from businesses and society. They bring real local and regional challenges to the PHEIs, where professors, research staff and students work together to find solutions. Research activities are based on the needs of the regional network and they share resources with their regional partners (e.g. technological equipment). This gives the institutes a high profile and a strong connection to the community. PHEIs possess legal requirements to award Ph.D. degrees. This increases the attractiveness of PHEIs as employers and leads to higher employment of Ph.D. students, which increases the innovation potential of the institutes. Especially for cooperative Ph.D. projects between PHEIs and business actors, the conditions are very favourable. Policymakers are also responding to the development of the institutes and are funding more projects with a focus on applied research. The PHE sector also has a solid position in European higher education. Communities of practice for the collaboration of researchers are increasingly found in the EU.

There are more Erasmus+ funding opportunities for the competence development of researchers across Europe. PHEs participate in European Higher Education Alliances.
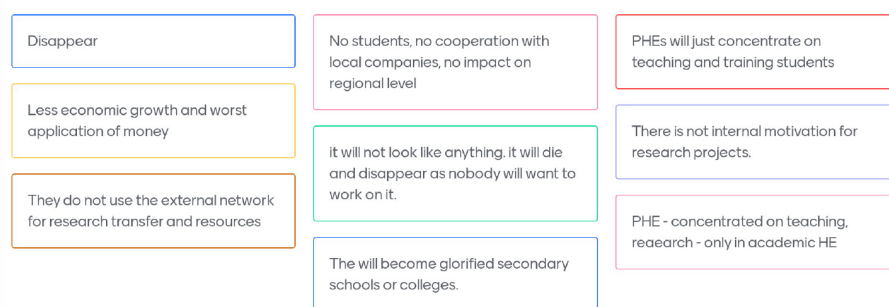
3.4.3 Worst Case Scenario

In our third and last scenario we consulted the experts in the consortium, to describe the scenario of having RDI in PHE in its worst case as can be seen in the results in Fig. 8.

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[2] See https://recaphe.eu/competence-profiles

How would RDI in PHE look like in the worst case?

Disappear	No students, no cooperation with local companies, no impact on regional level	PHEs will just concentrate on teaching and training students
Less economic growth and worst application of money	it will not look like anything. it will die and disappear as nobody will want to work on it.	There is not internal motivation for research projects.
They do not use the external network for research transfer and resources	The will become glorified secondary schools or colleges.	PHE - concentrated on teaching, reaearch - only in academic HE

How would RDI in PHE look like in the worst case?

they do not have funding

Fig. 8 - Worst Case Scenario

A possible worst case scenario of RDI in PHE could have the following impact on the Internal Structures: PHEIs are not structured for research, which requires investment in infrastructures and career paths and their legal framework. There is no strategy and no work is being done to change this. There is no motivation for research projects on the part of professors and academic decision-makers. Lack of legal framework to financially and career compensate teachers who do applied research and to enable pure research careers. There is also a lack of competence profiles for applied research. There is no training in applied research for teaching and non-teaching staff in PHE. The academic mid-level staff is supposed to focus primarily on teaching and no development opportunities are given. Further qualifications have to be self-financed and pursued in free time. PHEIs are unattractive employers for young researchers. Research projects that are nevertheless completed are of poor quality due to time pressure and lack of resources. Teaching is outdated and does not draw on new research findings. There are few young professors and diversity is lacking.

Although PHEIs are very close to regional needs due to their structure, there is no use of the external network for research and transfer of results. PHEIs thus have no impact at the regional level. They are regarded by the public more like secondary schools and colleges or lighter variations of a traditional degree programme. The public view is that students who do not make it to traditional universities go to professional higher education Institutions. There is no funding for research activities due to a lack of investment from national funds due to the lack of credibility of applied research as it is usually associated with universities and

sciences. There is very high competition for existing EU funds. PHEIs will fade into irrelevance in the long run.

4. Recommendations for RDI in PHE

Policymakers at the European level, as well as national and regional level governments and institutional leaders, play an important role in the design and implementation of RDI over European institutions in PHE. This chapter is dedicated to issuing policy recommendations to those mentioned agents and to PHE high-level managers on how to ensure the relevance of RDI in PHE, considering the profile of researchers and the HE institutions in which they are placed.

4.1 Consultation process

As part of the consultation process, two rounds of a survey (annex 2) targeted to institutional staff (mainly from PHE institutions); national rectors conferences and national authorities, and European policymakers and stakeholders were conducted.

The completion of the survey is supported by the formulation of policy recommendations on RDI for PHE on how the profile of researchers in PHE institutions may be strengthened within institutions, regions, countries and on the European level, as well as the identification of future challenges and opportunities for applied research and innovation in Europe.

The survey gathered a total of 32 responses.

4.2 General aspects of the consultation process sample

The sample of this consultation is mainly from academia, particularly from Universities of Applied Sciences, but also from public services, being gender balanced and mainly representing rectors/vice-rectors, professors, academic researchers and high management level for R&I, QA and international affairs.

Fig. 9 - Role in the institution

The age range, 51-60 is the most representative. 18/32 of the participants have a PhD and 9/32 have a Master's Degree.

When requesting to rate the personal level of interest of the competence clusters based on the RECAPHE Research Competence Framework[3] on PHE, we can witness that the highest interest rates are on External Cooperation and Knowledge Transfer, Research-Based Teaching and Leadership, Scientific Guidance and Supervision (fig. 10).
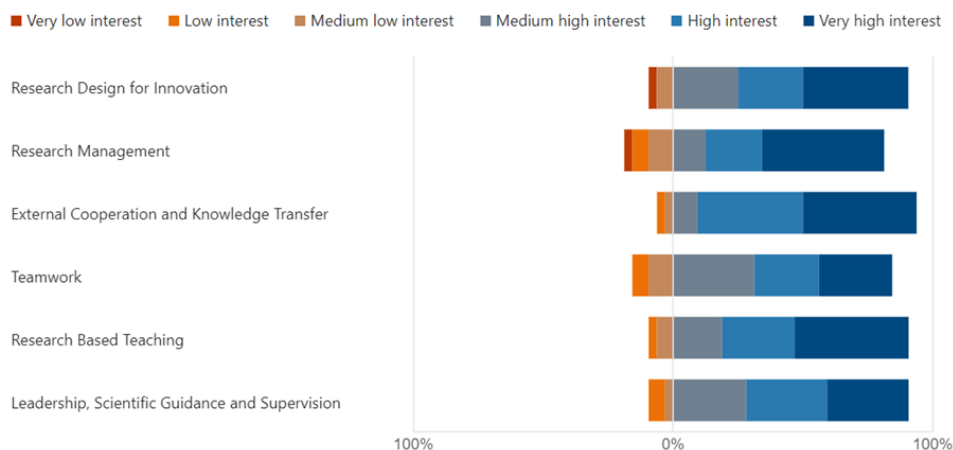

Fig 10 - Level of interest in the following competence clusters

Lowest interest rates are on Research Management and Teamwork (fig, 10). Even though Leadership, Scientific Guidance and Supervision & Research Based Teaching has high-interest rates, it contrasts with the lowest rates as well (fig. 10).

4.3 Research areas and target groups in RDI

According to this consultation, the higher amount of research in the PHE institutions by Research Area (considering the ones listed on the RECAPHE Research Competence Framework) are: Applied research in contrast to fundamental research, Research with interdisciplinary approaches and research methods and Research with cooperation partners (fig. 11). On the other side, the lowest amount of research in the PHE institutions are Research based on regional issues, Research for practical innovation and Research with cooperation partners. Being those research areas the ones with less prominence in the PHE institutions, it shows the lack of RDI in place and the need to enable conditions to boost it.

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[3] See https://recaphe.eu/competence-profiles
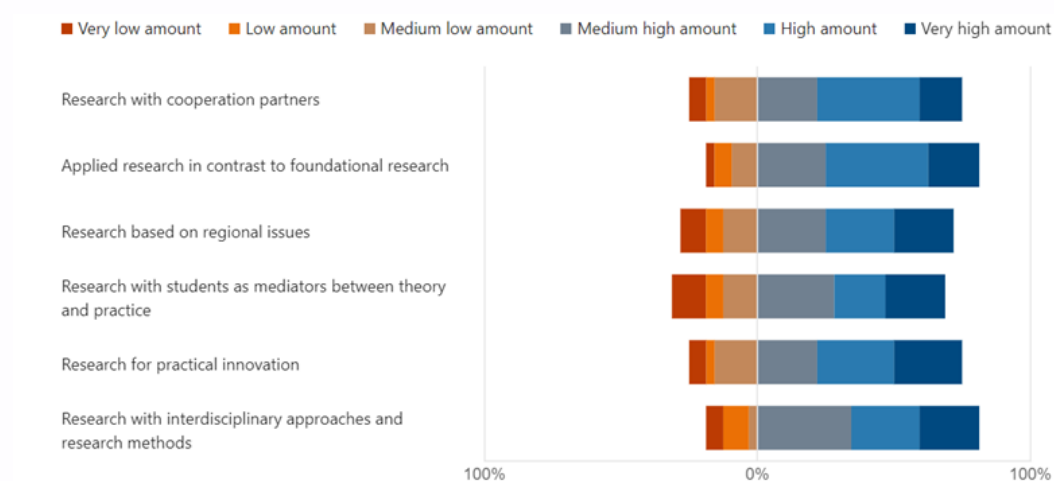
Fig 11 - Amount of research carried out in your institution per PHE & UAS Research Areas

Once again, we can verify that one of the areas - Research with cooperation partners - is controversial, being in the highest and also in the lowest rates.

This consultation also shows that Educational and research professionals, Institutional academic leaders, and Teachers and research staff are the staff groups with the highest influence on research in the institutions, contrasting with Administrative and supporting staff, Policymakers and Students/learners (fig.12).
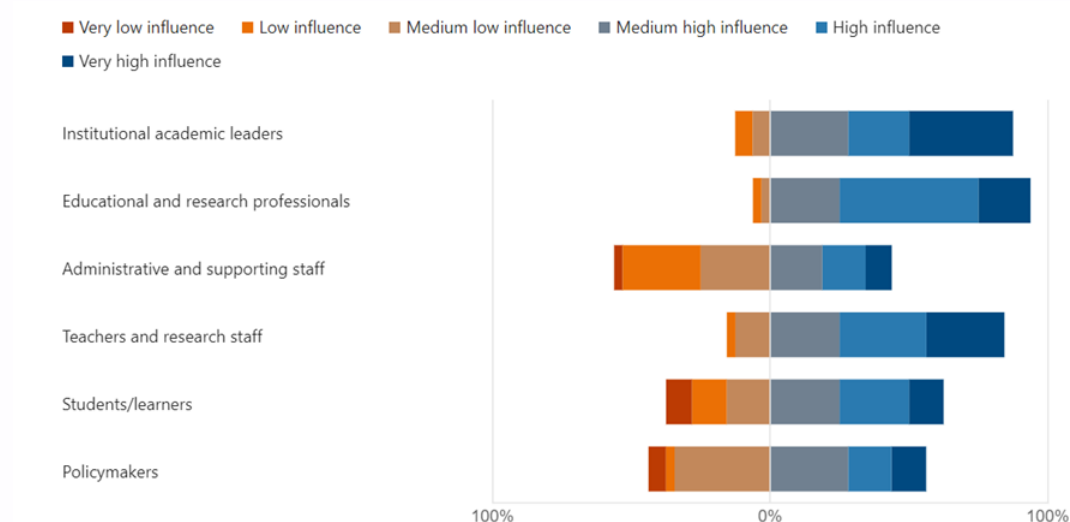
Fig. 12 - Level of influence in research of these target groups in your institution

4.4 Recommendations to increment the amount of research in PHE institutions

Below, some recommendations on how to tackle the challenge of ensuring high quality of applied research in PHE institutions:

- Create conditions for *alumni* to be an integral part of RDI placing students as mediators between theory and practice. The usual involvement of students in RDI is time limited and often linked to a project requirement. Likewise, neither students nor junior researchers can be involved in RDI projects due to their lack of sufficient professional expertise.

- Broaden the scope and amount of administrative and supporting staff in RDI projects. This staff category tasks are often limited to supporting only and have low influence on the research process itself. Often also not involved in the purpose and value of the research activities.

- RDI projects must be based not only on the personal interest of a given researcher but mirror the common interest of various researchers in the PHE institution.

- Development of human resources and of the conditions to enable a reasonable division of tasks and responsibilities for dedicating proper time to RDI.

- Staff who dedicates to both teaching and research, face a duality: the general focus is often on teaching rather than research. In this context, it would be helpful to establish a research support centre in PHE institutions to equip academic staff for RDI, by offering training for good research and supporting project applications.

- Further recognition of the research workload in the personal attributions and research activities of the academic staff as a criterion to obtain a permanent position (following the general practice in traditional universities).

4.5 Drivers and obstacles to RDI in PHE

There are various drivers and obstacles at the macro, meso and micro levels to conducting RDI activities in PHE institutions. This consultation revealed the major aspects of influence in RDI: Research capacity (human resources), Financial resources and Economic growth and the lowest influence: Pandemics/Natural disasters/wars, Technology diffusion and proliferation, and Technological level of the market (fig. 13).
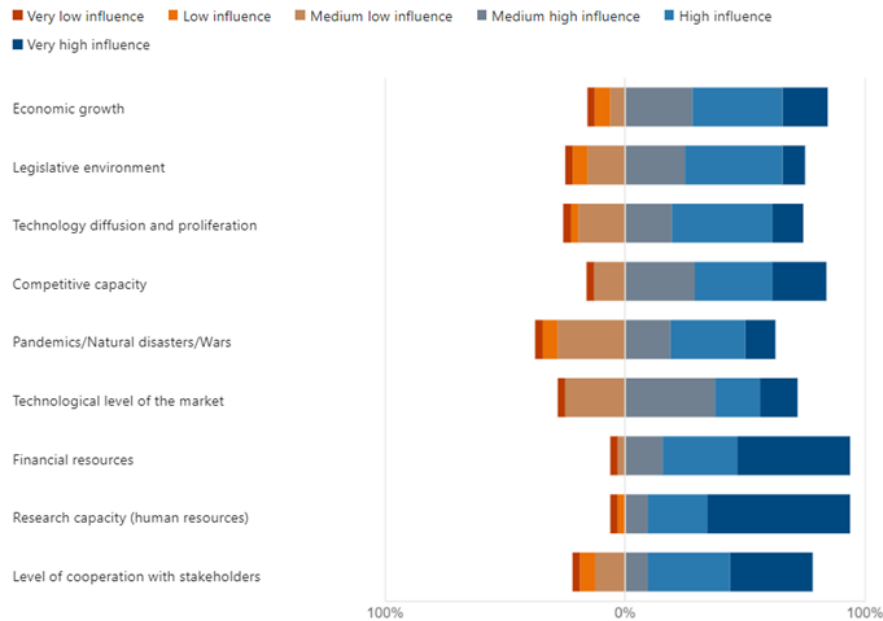
Fig. 13 - Influence of drivers and obstacles to RDI in PHE institutions

Nevertheless, there are other factors influencing RDI in PHE, being the human resources capacity and workload and how to balance it (e.g.: incompatibility of teachers' working time with the development of a research mission); the disadvantage of the PHE institutions that cannot award PhDs autonomously comparing to Universities, which impacts the conditions to the research staff and funding provided to PHE institutions; fostering research partnerships as an undoubted driver for RDI in PHE; as an obstacle, that research activity is mainly oriented by national needs and the expertise of the research staff; and lack of openness to new research areas.

4.6 Challenges of RDI in PHEIs at the national level

With this consultation, we were able to map some of the challenges felt on research processes by the PHE institution at the national level (fig. 14) that will be grouped by country in the following paragraphs according to the ones we got more inputs about.

Fig. 14 - Challenges on research processes faced by the PHE institution at the national level

Netherlands

- Strong division between applied research and academic research. Applied Research needs to carve its own niche and be established and valued on its own merits.
- Dual university system - Doctorates in PHE are still in the pilot stage and are only offered at universities. Nevertheless, the further development of applied research requires a larger influx of junior research staff.
- Lack of impact of applied research findings into practice or profitable enterprises.
- Insufficient funding compared to traditional research universities (e.g.: UAS can spend 6% of their total budget on research, whereas research universities spend more than 50%). Some funding schemes are currently partly shared with universities which leads to competition, although separate organisations exist to cater to the funding of academic and applied research.

Bulgaria

- Regulation of RDI in PHE is not specified and follows a general approach with Research universities. It shows the need to foster interinstitutional cooperation.
- Legislation is not adapted for partnerships, joint ventures between PHE and companies, and HEIs.

Hungary:

- Lack of research capacity
- Macro-economic situation led to restriction of scientific research funding and other equipment, leading to insufficiencies and delays in RDI projects
- Lack of financial resources
- Low level of international partnerships
- Obstacles for researchers to connect and apply research products with industries

Belgium

- Restrict financial resources dedicated to RDI projects in PHE institutions
- Insufficiency or nonexistence of permanent staff for research in PHE institutions. The staff is mostly "teaching-centred" with an average of teaching time of 480 hours annually or more. A solution could be implementing the teacher-researcher status in the PHE as it is the basis in the Universities

- Lack of adequate infrastructure and administrative staff to develop large-scale research projects. Doctoral schools are only present in universities, which reduces research training opportunities for PHE teachers

Germany
- Diversity HE acts per federal state and type of HE institution when it comes to the eligibility to award doctoral degrees and to apply for third-party funded projects on the national level
- Traditional universities are often preferred for research and have better funding

Lithuania

- Absence of Master degree studies in PHE sector
- Low developed RDI culture of business companies with a negative influence on the scientific and applied research volume and demand
- UAS are restricted from participation in international or fundamental research projects due to the lack of critical mass of senior research staff and requirements to involve doctoral students
- Absence of sufficient public funding for research, to ensure a high level of quality in applied research

Armenia
- Lack of national funding to promote RDI
- Lack of predictability of research outcomes from a commercialisation point of view

Ireland
- With the creation of Technological Universities, many institutional policies and procedures are not yet in place, which affects the response to challenges at national level
- Lack of opportunities specifically for Technological Universities to lay the groundwork in order to compete with long-established universities
- Situation of all researchers that are lecturers, which make temporary replacement staff complicated and a long process. This leads to researchers being spread thinly or not getting involved at all in the process

Spain

- Excessive bureaucracy, which makes certain processes harder.

4.7 Recommendations to improve research processes at the national level

In the previous sub-chapter, the major challenges on RDI faced by the PHE institution at the national level are described. This sub-chapter is dedicated to setting recommendations to improve the research processes at the national level.

- Promote equal conditions, rights and funding for all types of HE institutions abandoning the dual system of HE
- Foster flexibility, concerning joint diplomas and double diplomas, interdisciplinarity, as well as specific focus on PHE and it is specific role at the national and regional levels
- Foster cooperation by implementing quadruple helix projects for strengthening synergies between governments, industry, academia (including all types of institutions) and communities
- Promote flexible and diverse methods of national funding for RDI
- More relevance to the professional quality of RDI project applications
- Simplify tenders and research grants and reduce the bureaucracy of research funding
- Facilitate access to online research databases and their dissemination
- Promote the development of RDI culture in business fields
- Invest in research competencies of research staff
- Creating some permanent research chairs (French-speaking Belgium)
- Provide preferential access to tenured positions for people working in research or with a PhD/research CV (French-speaking Belgium)
- Financing of the PHE institutions should include both the financing of the initial education, but also of the research activities of the teachers, an essential condition for updating courses over the long term

4.8 Challenges of RDI in PHEIs at the European level

At the European level, there are several challenges that impact RDI projects in PHE institutions. In this consultation, we gathered some of those obstacles (fig. 15) that will be further developed below.

Fig 15 - Challenges on research processes felt by your organization at EU level

- Lack of sharing of good practices, opportunities and partnerships
- Lack of transparency in research grants
- Little experience with consortia required for collaboration at EU level
- Uneven possibilities to carry out RDI activities due to difficulties in getting granted EU financial support
- Low level of participation of Eastern European participants/partners and need to build a consortium from at least one partner institution from a Central European country (e.g. Germany or France)
- Unequal funding of projects in different EU eligible countries
- Lack of capacity and familiarity of research peers about research mobility programs and EU project application processes and to follow the developments and opportunities at EU level
- EU wide cooperation and consortia scarcely reach the level of PHE institutions
- Limited level of English in some countries to apply to projects and join international teams
- Complex forms to apply for RDI projects and EU funding and lack of time and motivation to fill them
- Administrative burden can be a challenge to getting started as a lead partner

4.9 Recommendations to improve research processes at the European level

Previously, we identified the major EU level challenges as results of the consultation process. The current sub-chapter will list recommendations to improve the research processes at the European level.

- Foster EU tender and research grants support and transparency

- More user-friendly data portal with EU policies, tenders, calls and partnerships and sharing of experiences
- More cooperation (wider Western and Eastern, and high level of cooperation)
- Foster the flexibility of EU level grant systems that are also suitable for cooperation between PHE's in RDI
- Focus on RDI in PHE institutions in programmes and calls
- Fostering the investment in language skills for research staff
- Development of Common research in European University Networks

5. Conclusions

RDI should be applied to real problems. Therefore, there is a strong need to establish or strengthen the development of RDI ecosystems. Smart Specialisation processes are key for engaging RDI with the communities and facilitating the relationship with the labour market. The recognition of PHE-business cooperation is keen as an enabler for RDI and further application of the potential of RDI in regions for social and economic development.

Moreover, PHE institutions must understand and have the means to improve the capacity and support of RDI staff resources (e.g.: adapted training for skills development and knowledge/expertise & infrastructure/technology). There must be disrupted disadvantages of PHE institutions compared to traditional universities, in order to reinforce the value of RDI in PHE. Continuous support to research staff is an asset for improving RDI in those institutions. Regional centres of RDI intended to accumulate intellectual and technological research potential, and the research results would be useful for each regional PHEIs for intellectual and economic development.

Further actions must be taken at institutional, national and European levels to foster the investment of RDI in PHE institutions, bearing in mind its particular values, particularities and position towards the HE sector. PHE institutions must be research driven as the graduates' professional future will be volatile. PHE students must develop skills fit for digital and green transitions and Applied Research is a great example of how to put into practice real case scenarios. Businesses and PHE should be integrated into clusters for applied scientific RDI, internships, as well as better resource sharing for fundamental RDI. To enable and facilitate the relations between PHEIs, labour market and business as reverse feedback in adjusting the curricula to the real-time needs of the developing market and societies.

Additionally, more emphasis should be put on the importance of establishing strategic alliances between academia - mostly PHE institutions and Standardization Bodies - so the first can use the second as a hub:

1. to identify societal/market needs in terms of innovation, which can be addressed through applied research conducive to pre-normative work;
2. for knowledge transfer into the society/markets, enhanced dissemination and sustainable future exploitation, of research deliverables.

To this end, the European Commission (2022a, 2022b) has taken a few steps in the right direction by publishing, in 2022, the European Standardization Strategy and the (draft) Code of Practices for Researchers in Standardization. These documents should, therefore, be considered by PHE institutions when defining their own institutional strategies and their

recommended approaches should be adopted and implemented when deploying those strategies through objective action plans.

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Annex 1 - RECAPHE Experts' list for IO1 & IO2 Consultation

RECAPHE Partner	Expert Name
KIC	Christine Fenech
KIC	Carlos Maio
KIC	António Moreira Teixeira
UJ	Radek Rybkowski
UJ	Lucjan Chmielarz
ITS	John Bartlett
ITS	Anne Jordan
DHBW	Ulf-Daniel Ehlers
DHBW	Gerhard Götz
VIKO	Andrius Juškys
VIKO	Jolanta Preidienė
IPS	Luís Coelho
IPS	João Martins
Eurokreator	Rafal Kunaszyk
Eurokreator	Agnieszka Sekułowicz

Annex 2 - RECAPHE survey

RECAPHE

Research, Development and Innovation (RDI) for Professional Higher Education (PHE)

The RECAPHE project intends to broaden insight and awareness of applied research & innovation activities within Professional Higher Education Institutions in Europe and to create a platform for imparting further competencies to research staff and students related to their specific experiences and needs. It aims to strengthen the profile of applied RDI in PHE in Europe, by:

• Gaining insight into the scope and nature of applied RDI activities within PHE institutions in Europe
• Distinguishing the different competencies required of applied researchers
• Assisting researchers in RDI to enhance their capacities
• Providing a clear future vision for applied RDI in Europe and a strategy on how to achieve it

The completion of this survey is going to support the formulation of policy recommendations on Research, Development and Innovation (RDI) for Professional Higher Education (PHE) related to the distinct profile of RDI research.
We rely on your profile and valuable knowledge and experiences for contributing to bringing suggestions on how this profile may be strengthened within institutions, regions, countries and on the European level, as well as the identification of future challenges and opportunities for applied research & innovation in Europe.

RECAPHE is the first project to systematically consider applied research competencies with a focus on PHE and to propose a concise competence framework: The RECAPHE Research Competence Framework is designed to build the research capacity of different target groups in Universities of Applied Sciences and specifically in Professional Higher Education Institutions, that is available for you to look into detail: https://recaphe.eu/competence-profiles/

For more information on the project, please consult https://recaphe.eu/

We would greatly appreciate your completing this form **by 30 November.**

1. Name of your institution *

2. Please, indicate your role(s) in the institution *

3. Please, indicate your gender *
- ○ Feminine
- ○ Masculine
- ○ Non-binary
- ○ Prefer not to say

4. Please, indicate your age *
- ○ <31
- ○ 31-40
- ○ 41-50
- ○ 51-60
- ○ 61-70
- ○ >70

5. Please, indicate your level of education *
- ○ Bachelor Degree
- ○ Master Degree
- ○ PhD
- ○ Other

6. Please indicate your level of education if you selected"other" in question 5.

7. Please rate your level of interest in the following competence clusters. (For more detailed information about each cluster, please check https://recaphe.eu/competence-profiles/) *

	Very low interest	Low interest	Medium low interest	Medium high interest	High interest	Very high interest
Research Design for Innovation	○	○	○	○	○	○
Research Management	○	○	○	○	○	○
External Cooperation and Knowledge Transfer	○	○	○	○	○	○
Teamwork	○	○	○	○	○	○
Research Based Teaching	○	○	○	○	○	○
Leadership, Scientific Guidance and Supervision	○	○	○	○	○	○

RESEARCH AREAS & TARGET GROUPS in RDI

8. Below you will find a list of PHE & University of Applied Sciences (UAS) Research Areas.
   Please rate the amount of research carried out in your institution. (For more detailed information about each research area, please check https://recaphe.eu/competence-profiles/) *

	Very low amount	Low amount	Medium low amount	Medium high amount	High amount	Very high amount
Research with cooperation partners	○	○	○	○	○	○
Applied research in contrast to foundational research	○	○	○	○	○	○
Research based on regional issues	○	○	○	○	○	○
Research with students as mediators between theory and practice	○	○	○	○	○	○
Research for practical innovation	○	○	○	○	○	○
Research with interdisciplinary approaches and research methods	○	○	○	○	○	○

9. Below you will find a list of target groups/stakeholders in PHE & University of Applied Sciences (UAS) Research.
   Please rate the level of influence in research of these target groups in your institution. *

	Very low influence	Low influence	Medium low influence	Medium high influence	High influence	Very high influence
Institutional academic leaders	○	○	○	○	○	○
Educational and research professionals	○	○	○	○	○	○
Administrative and supporting staff	○	○	○	○	○	○
Teachers and research staff	○	○	○	○	○	○
Students/learners	○	○	○	○	○	○
Policymakers	○	○	○	○	○	○

10. If you indicated a low amount of research in your institution in any area and/or a low influence of any target group, please explain why and provide suggestions for improvement. Please describe the challenges your organization is facing, if any. *

FACTORS INFLUENCING RDI in PHE

11. Below you will find a list of drivers and obstacles to RDI in PHE.
    Please rate the influence each of these have in the research carried out in your institution.

	Very low influence	Low influence	Medium low influence	Medium high influence	High influence	Very high influence
Economic growth	○	○	○	○	○	○
Legislative environment	○	○	○	○	○	○
Technology diffusion and proliferation	○	○	○	○	○	○
Competitive capacity	○	○	○	○	○	○
Pandemics/Natural disasters/Wars	○	○	○	○	○	○
Technological level of the market	○	○	○	○	○	○
Financial resources	○	○	○	○	○	○
Research capacity (human resources)	○	○	○	○	○	○
Level of cooperation with stakeholders	○	○	○	○	○	○

12. Please explain your selection in question 10. If you believe other factors influence RDI in PHE, please also explain them. *

RDI in your country

13. Please name your country and describe the challenges on research processes felt by your organization at national level. *

14. Please provide some suggestions on how to improve research processes at national level *

RDI in the EU

15. Please describe the challenges on research processes felt by your organization at EU level. *

16. Please provide some suggestions on how to improve research processes at EU level. *

17. Please share your vision on the future of RDI in PHE. *

About the RECAPHE Project and this publication

Professional Higher Education Institutions play an important role in enhancing European competitiveness and innovation capacity, especially on the regional level where they act as connectors and crucial links between the regional SMEs, regional organisations and society.

However, further support is needed for development and enhancement of staff capacity to engage into applied research & innovation activities, link these to teaching and develop relevant ways for engagement of students in these activities.

The RECAPHE project, therefore, aims to broaden insight and awareness of applied research & innovation activities within Professional Higher Education Institutions in Europe and to create a platform for imparting further competences to research staff and students related to their specific experience and needs.