D2.1: STATUTES OF THE SMART-ER PILOT INSTITUTE

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Abstract

This document presents the statutes of the SMART-ER Pilot Institute which aim to establish the main principles of the governance and decision-making structure for the SMART-ER joint virtual research institute. This Research Institute of Smart European Regions aims to explore the implementation of a common shared R&I instrument (Virtual Research Institute) and those related inter-institutional policies and procedures (shared infrastructures, affiliated researchers, decision processes, sustainability...) that could allow participating universities to achieve one of the main goals of the ECIU University's SWAFS Project, namely, to enable research groups across all member universities to jointly address complex societal challenges under the framework of SDG11. A review of relevant national and international experiences, governance structures and outcomes with respect to the university consortia of joint research institutes (virtual as well as physical) was conducted as a basis for the development of these statutes identifying the main environments from which contribution will be sought. Followed by a thorough consultation process, this document presents the creation of the ECIU University Virtual Research Institute on SMART-ER European regions including its procedures and management in relation to the activities and research and innovation agenda decided for the pilot phase.

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Symbols, abbreviations and acronyms

AAU	Aalborg University
CoP	Community of Practice
CS	Citizen Science
CSO	Civil Society Organisation
D	Deliverable
DC	Dublin City University
DO	Development Objective
EC	European Commission
ECIU	European Consortium of Innovative Universities
ET	Executive Team
EU	European Union
FTE	Full Time Equivalent
HR	Human Resources
H2020	Horizon 2020
IDTP	Innovative Doctoral Training Principles
IO	Immediate Objective
INSA	Institut National des Sciences Appliquées
KPI	Key Performance Indicator
KTU	Kaunas University of Technology
LCP	Local Contact Point
LiU	Linköping University
M	Month
MS	Milestone
PE	Pubic Engagement
PM	Project manager
Q	Quarter
RF	Research Field
R&I	Research and Innovation
SAB	Scientific Advisory Board
SDG	Sustainable Development Goal
SMART-ER	ECIU University Research Institute for Smart European Regions
SME	Small/medium enterprise
SwafS	Science with and for Society
TAU	Tampere University

ToR	Terms of Reference
TUHH	Hamburg University of Technology
UAB	Universitat Autonoma de Barcelona
UAVR	Universidade de Aveiro
UiS	University of Stavanger
UN	United Nations
UNITN	Università degli Studi di Trento
UPE	Unit for Public Engagement
UT	University of Twente
VP	Vice President
VRE	Virtual Research Environment
VRI	Virtual Research Institute
WP	Work Package

1 Introduction

ECIU kicked-off the ECIU University in November 2019. The ECIU University is a European University alliance that focuses on United Nations Sustainable Development Goal 11 (UN SDG 11) 'Make cities and human settlements inclusive, safe, resilient and sustainable'. Learners at the ECIU University will be tackling real-life problems. Through these actions, the ECIU University will pioneer challenge-based education on a European scale. This challenge-based approach underpins the regional embeddedness of ECIU member institutions.

In addition to education, the ECIU University will undertake excellent, challenge-based research within the same overall framework of the SDG 11. The basis of this is the ECIU White Paper from October 2019 titled "A Smart Regions Agenda for Europe – A Networked University's Perspective" (ECIU, 2019), in which four key themes are identified requiring specific attention for the successful achievement of SDG 11 as well as the transition towards Smarter Regions:

1. Energy and sustainability
2. Circular economy
3. Transport and mobility
4. Resilient communities

SMART-ER is a project to support establishment of the Virtual Research Institute (VRI) within ECIU University to support SDG 11 research. Nearly 5.000 researchers within SMART-ER institutions work on topics related to SDG 11 (as reported in Deliverable 1.1).

In 2020, the White Paper was adopted as the ECIU University Long Term Joint Research Strategy[1] and on this basis, the SMART-ER project initiated consultations with local research environments at all partner universities. The resulting outcome is a co-created research and innovation agenda (Deliverable 1.2), outlining both the importance of the fields of research and gaps to be addressed during the coming years. Simultaneously, the concept of challenge-based research in ECIU University was defined within Erasmus+ WP2 as:

> *'Challenge-based research (CBR) is doing research with partners from industry/business, education, government, civil society and citizens (societal partners), using the challenges they face in reality as point of departure, with the objective of arriving at solutions to these challenges.'*

Dedicated implementation of the ECIU long-term research strategy and advancement CBR will be facilitated through the formal creation, structuring, budgeting, and functioning of SMART-ER VRI under the aegis of ECIU University, in order to align and to bring together research capacities, both academic and managerial, and to share a common vision and a research agenda focused on societal challenges. Alignment with the ECIU Strategic Roadmap towards Vision 2030[2] commenced during the first physical SMART-ER Executive Team (ET) meeting in Barcelona, November 2021, and via direct meetings with the project coordination team. The ECIU Strategic Roadmap remains under development with continued consultation and input across Erasmus+ and H2020 projects.

As the interim operational framework to realising the SMART-ER VRI, this document describes the main principles of the decision-making processes and organisational structure in relation to the activities conducted during the pilot phase (M13-M30). These principles were also developed based on an in-depth review of existing VRIs (Appendix I) which identified some best practices and the main recommendations for the VRI to follow after the initiation phase (M0 – M12), including:

- Defining and reviewing the objectives of the VRI at an early stage
- Developing internal procedures and agreements with partner institutions including the process for potential researcher affiliation to the VRI.

[1] https://media.dcu.ie/media/ECIUsummary/
[2] https://www.eciu.org/news/eciu-university-2030-connects-u-for-life

- Developing efficient communication channels and social media to be used by the partners in order to allow the visibility of the VRI and effective collaboration among partner institutions.
- Develop local organisational structures to support and embed commitment at partner institutions rather than a reliance on single researchers, individuals or groups.

2 Objectives and Structure of the document

The objective of this deliverable is to serve as a status update for ongoing project work and to outline the approach to testing operations of the future VRI. The content of this document therefore remains adaptable with final decisions regarding the formal creation of the VRI to be made during the Establishment phase (M31 – M36) following the experiences and lessons learned during this pilot period.

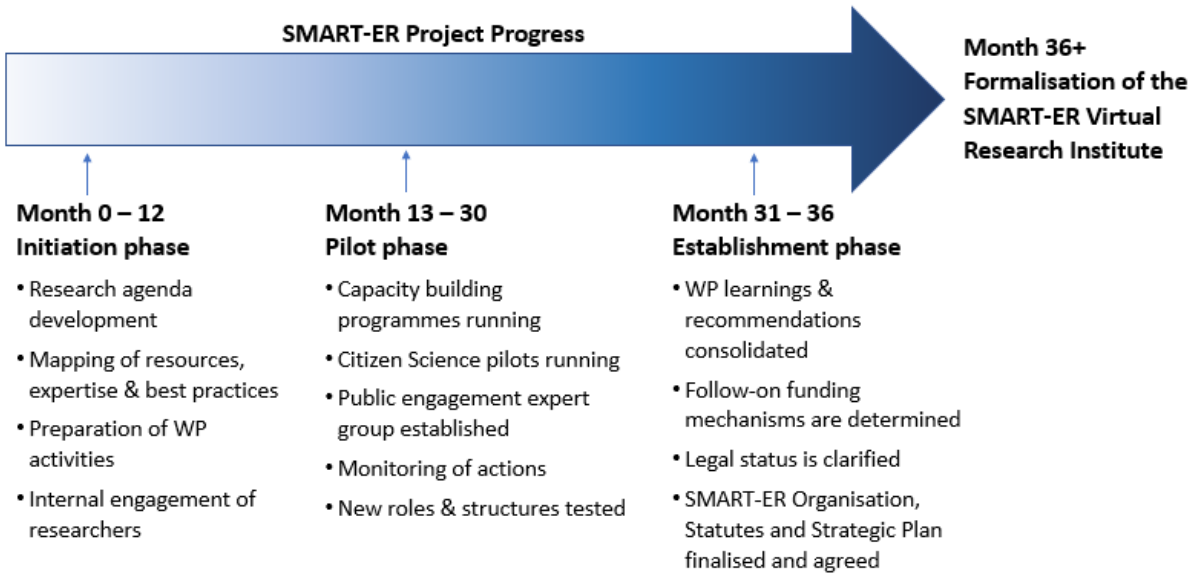
This document has the following structure:

- Define the Vision and Mission of the SMART-ER Pilot Institute.
- Describe the activities to be conducted by the SMART-ER Institute during the Pilot phase (M13-M30) and the financial plan for the period.
- Define the decision-making structures (governance and management bodies) and overall organisation of the SMART-ER Pilot Institute.
- Identify the role of new, associate and external partners, the rules for their engagement and researcher affiliations to the VRI.
- Summarize the SMART-ER Action Plan for the 18-month period (M13-30)

This results in a comprehensive summary of the main activities, elements of the decision-making processes of the VRI and its organisational structure during the pilot phase. Appendix 1 presents the review conducted on existing VRIs in order to identify best practices from which these statutes can be sought.

3 Timeline and phases

Figure 1. Timeline to establishment of the SMART-ER Virtual Research Institute



4 Vision and Mission of the SMART-ER Pilot Institute

As outlined in the project proposal, the **vision** of the SMART-ER institute is to create 'a *strong alliance in research, innovation and education, enabling all member universities to jointly address complex societal challenges under the framework of the UN SDG 11 (Make cities and human settlements inclusive, safe, resilient and sustainable).'*

SMART-ER's **mission** is to '*develop and implement a model of transformation of R&I at the ECIU University…that can generate radial new alternatives to current practices and systems*.'

SMART-ER's original vision and mission remain timely and well aligned with important EU initiatives such as the Horizon Europe Missions for EU Research and Innovation[3], and the European Research Area's Policy Agenda actions 2022-2024[4].

It is also important to ensure that SMART-ER's leadership and ambitions in improved research competence, capacity building, and collaboration within and across our regions' many stakeholders from business, industry, public institutions, civil society, and academia.

The SMART-ER Pilot institute will therefore build upon the core Vision and Mission set out by the proposal, in recognition of its long-term commitment to realising these statements. Minor revisions will be adopted to clear reflect SMART-ER's leadership and ambitions in capacity building, integration with society and pan-European collaboration.

The updated **Vision of the SMART-ER Pilot Institute** is therefore:

'*To create* a *strong alliance in research, innovation and education, enabling all member universities* ***and stakeholders across industry, government and society*** *to jointly address complex societal challenges under the framework of making cities and human settlements inclusive, safe, resilient and sustainable.'*

Similarly, the updated **Mission of the SMART-ER Pilot Institute** is:

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[3] https://ec.europa.eu/info/research-and-innovation/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/eu-missions-horizon-europe_en

[4] https://ec.europa.eu/info/sites/default/files/research_and_innovation/strategy_on_research_and_innovation/documents/ec_rtd_era-policy-agenda-2021.pdf

'To *develop and implement a model of transformation* ***for research assessment and careers, institutional and regional cooperation and citizen science*** *at the ECIU University that can generate radial new alternatives to current R&I practices and systems*.'

5 Objectives of the Pilot VRI

The interviews with other VRIs conducted for Task 2.1 highlighted the importance of clarifying the short and long-term objectives of the SMART-ER Institute. The objectives of the Pilot VRI are given at two levels: Development Objectives (DO) giving the long-term goals, and Immediate Objectives (IO) giving the specific and immediate targets of the first phases up to 36 months.

5.1 Immediate Objectives (Short-term)

Three main objectives for the first phases of the SMART-ER project (0-36 months) have already been defined and the Pilot VRI will continue the work towards achieving the operational sub-objectives set out within each.

Table 1 Immediate objectives of the SMART-ER project (M0 – M36)

Main Objective 1. To develop a common Research & Innovation agenda and convergence action plan, in synergy with education strategies and regional engagement, sharing infrastructures and resources		
Operational objectives	**WP**	**Status update**
O1.1. To develop and to implement a shared R&I agenda.	1 (3, 5)	- Development via co-creation with the ECIU research community completed in Task 1.2/1.3 (D1.2). - Implementation underway via Seed Programme guidelines and scope (D3.2) and CS pilot topics (T5.2)
O1.2. To design and to implement a shared R&I infrastructure plan	1	- Shared online platform for collaborator and infrastructure access completed in Task 1.5 (D1.4) and integrated into official website https://www.eciu.org/smart-er-for-researchers#about-research
O1.3. To articulate effective R&I responses to societal challenges that contribute to the SDG 11	1 (3, 5)	- Agenda topic areas identified by research community (D1.2) - Responses to challenges facilitated via Seed Programme funding (D3.2) and CS pilot projects (T5.2) - Planned establishment of transnational Communities of Practice for SDG 11 research areas during Pilot phase
O1.4. To set up research infrastructure and implement joint structures for a common science agenda pooling expertise, platforms, data, infrastructure, and resources together	2 (1, 3, 4, 5)	- Shared online platform for collaborator and infrastructure access completed in Task 1.5 (D1.4) - Sharing of training and resource capacities via SMART-ER Academy (D3.1) - Pooling of Public Engagement expertise through SMART-ER Community of Practice (WP4) - Launch of virtual Citizen Science Hub as a collaborative portal for pooling expertise, data and resources (T5.1) Lessons learned compiled during Establishment phase to provide recommendations for deeper integration in the future VRI as will set out within

		D2.2.
O1.5. To develop strategies to strengthen quadruple helix cooperation (public-private-academia-civil society) in research and innovation ecosystems and knowledge-transfer capacity, mainstreaming an entrepreneurial mind set amongst scientists.	2 (1, 3, 4, 5)	- SMART-ER KPIs on citizen science and co-created research grant applications with non-academic stakeholders defined (D1.5) - Inclusion of external partners strongly encouraged in Seed Programme calls (D3.2) - Relevant training modules included in Academy training programme (D3.1) - Public Engagement Community of Practice established (WP4) - Development and funding of transnational Citizen Science pilot projects underway (T5.2) Evaluation of the success of activities during the Establishment phase will inform future approaches of the VRI as will be set out within D2.2.
O1.6. To mainstream open science practices and institutionalise the FAIR data principles	2	- SMART-ER KPI on OA outputs defined (D1.5) - Open Science modules developed in Academy training programme (D3.1) - Open science costs supported in Seed Programme funding (D3.2)
Main Objective 2. To develop and implement strategies for **strengthening human capital in research and innovation**		
O2.1. To develop a programme to incentivise joint research initiatives, networking and collaboration within SMART-ER	3	- SMART-ER Seed Programme calls developed for different types of collaborative research engagements and Round One successfully launched (D3.2) - Development of collaborative CS Hub and transnational pilots (T5.1/5.2)
O2.2. To devise a programme for the professional development of researchers	3	- SMART-ER Training Academy programmes for PhD students and researchers developed and launched, with first intake of students completed (D3.1)
O2.3. To run pilots to test and improve both programs	3	- SMART-ER Seed Programme and Academy running during Pilot phase (D3.1/3.2)
O2.4. To develop recommendations for implementation of the strategies at SMART-ER	3	- Not started until completion of Pilot phase (D3.3)

Main Objective 3: To promote and integrate dialogue with society in R&I activities of SMART-ER			
O3.1.	To Provide a comprehensive overview of current public engagement practices, and specifically of citizen science, in the context of SMART-ER	4	- Review of current PE practices and co-created vision and agenda for PE in SMART-ER completed (T4.1)
O3.2.	To develop guidelines and a toolbox for public engagement practice for SMART-ER that will be transferable and can be applied coherently across ECIU members.	4	- PE Expert Group established to provide expertise in guidelines and toolbox development (T4.2/4.3)
O3.3.	To Establish a ECIU University Virtual Research Unit on Public Engagement (UPE), to act as a centre of expertise in assessing and supporting public engagement initiatives for SMART-ER.	4	- It has been agreed a change of terminology to Community of Practice for Public Engagement will be established, guided by the recommendations of the PE Expert Group during the Pilot phase (T4.2/4.3)
O3.4.	To integrate tools and resources for promoting Citizen Science (CS) initiatives within SMART-ER, to create online communities of CS, for sharing resources, data and projects, and to increase the impact and visibility of projects.	5	- The virtual Citizen Science Hub has been developed and launched to create an online CS community, develop joint projects and share expertise, data and resources (T5.1)
O3.5.	To design and run pilots of Citizen Science Projects in SMART-ER.	5	- Pilot projects under final development using CS hub and will run during the SMART-ER Pilot phase (T5.2)
O3.6.	To develop recommendations for the implementation and assessment of CS projects for the SMART-ER Institute and ECIU University.	5	- Not started until completion of Pilot phase (D5.2)

5.2 Development Objectives (Long-term)

The general DO of the VRI is to increase and unite the knowledge base towards solving complex societal challenges. The current focus of SMART-ER centres around the United Nations' Sustainable Development Goal No. 11, Sustainable Cities and Communities[5]. As ECIU University prepares to enter its next phase (in part via Topic 1 'Intensification of prior deep institutional transnational cooperation' Erasmus+ call for European Universities), it intends to explore the possibilities and opportunities for expanding its activities in education, research and innovation beyond SDG 11. As per the SMART-ER Vision and Mission defined in Section 5, UN SDG 11 will remain a priority focus for the Pilot VRI until a formal decision has been agreed within ECIU University.

The SMART-ER VRI will harmonise with the overall directional development of ECIU University as it continues to define its Strategic Roadmap towards Vision 2030[6]. Therefore, the concrete development goals for the SMART-ER VRI will be specified in Deliverable 2.2 as part of the future Strategic Plan, and will include critical input from the Roadmap and the learnings and outcomes of the SMART-ER Pilot phase.

6 Shared Research & Innovation Agenda

Related to the objectives of the VRI, recommendations from Task 2.1 also included the development of a shared research agenda to ensure a united and common vision between members of SMART-ER. This R&I agenda has already been achieved in Deliverable 1.2 and is available publicly on the ECIU website[7]. Importantly, the agenda was co-created with members of the research community across the ECIU network and defines topic areas under the four priority research areas set out by ECIU's long-term research strategy[8]: Energy and sustainability, Transport and mobility, Circular economy, and Resilient communities. The topics identified serve as areas of particular interest and inspiration for the pilot VRI, but researchers are also welcome to address SDG 11 challenges beyond those suggested during this phase.

The adoption of the SMART-ER R&I Agenda was immediately enacted during the project initiation phase and is achieved through the defined scope of the SMART-ER Seed Programme calls (WP3) and focus of the Citizen Science webinars and co-created pilot projects with remain ongoing during the Pilot phase. The agenda will be further embedded during the Pilot phase through the recruitment of Research Field Coordinators for each priority area (Section 10.1.4).

7 Activities and outputs

7.1 Initiation phase (Month 0 – 12)

A number of important tasks/deliverables have been completed during the initiation phase of the project in preparation for the VRI pilot. These include:

- Research Area and Expertise mapping (D1.1)
- Digital co-creation of a shared Research & Innovation Agenda for UN SDG 11 (D1.2)
- Internal engagement and promotional activities across the network (D1.3)
- Collaborative and Infrastructure Access Platform (D1.4)
- Development and approval of key performance indicators for evaluation of the SMART-ER VRI (D1.5)
- Mapping of training capacities and content development for the SMART-ER Academy (D3.1)
- Call development for the Seed Programmes (D3.2)

[5] The UN targets and indicators for 2030 are available at https://sdgs.un.org/goals/goal11
[6] ECIU Vision 2030 is available at https://www.eciu.org/news/eciu-university-2030-connects-u-for-life
[7] https://www.eciu.org/smart-er-for-researchers#about-research
[8] https://media.dcu.ie/media/ECIUsummary/

- Mapping of practices for public engagement (T.4.1 ongoing)
- Citizen Science webinar series and development of a virtual CS Hub (D5.1 ongoing)
- Communication and dissemination plan (D6.1)

7.2 Pilot Phase (Month 13 -30)

To continue meeting SMART-ER's Immediate Objectives during the pilot phase of the VRI, activities will be undertaken under work packages and other general development.

Table 2 Work package activities and targets during the SMART-ER Pilot phase

Work package activities	Output indicator	Target number of researchers engaged or reached
WP3 SMART-ER Academy		
Online PhD training This fully on-line programme aims to train PhD researchers with the skills needed to face an unpredictable and changeable future. It will include skills in alignment with the EC Innovative Doctoral Training Principles (IDTP), the New Skills Agenda and the Modernisation Agenda and based on the challenge-based learning approach. Number of modules: 9 Expected capacity: 10 – 25 per course (Total 90 - 225)	Yes	150
Research leadership with open science This programme is targeted towards Principal Investigators and senior academics and researchers focusing on leading multidisciplinary challenge-based research teams. Delivered online and in-person, courses include research communication, public engagement and interdisciplinarity. Number of modules: 8 Expected capacity: 10 – 25 per course (80 - 200)	Yes	100
WP 3 Seed Programme		
Co-tutelle of PhD students and industrial doctorates to promote joint supervision This call supports the initiation, preparation and establishment of joint supervision agreements, namely co-tutelle programmes of PhD students and joint supervision under industrial doctorates involving different ECIU institutions. Anticipated number of awards: 5 Minimum number of institutions per award: 2 Minimum number of researchers per award: 1 PhD student and two supervisors (one per institution)	Yes	15
Blended mobility funding to create networks and promote inter-institutional collaboration This call supports the development of networks on the basis of a joint research and innovation plan, including, but not limited to, the submission of future collaborative proposals to other European funding programmes. Anticipated number of awards: 4	Yes	32

Minimum number of institutions per award: 4 Minimum number of researchers: 1-2 per institution		
SMART-ER seed project funding to scale up high-quality research outputs This call promotes high-quality research outputs within SMART-ER through the funding of inter-institutional and inter-sectoral research and innovation seed projects directly linked to the SDG 11 challenges defined under ECIU University. Total number of awards: 5 Minimum number of institutions per award: 3 Minimum number of researchers per award: 1-2 researchers per institution	Yes	15
WP4 Public Engagement		
WP4 will set out a SMART-ER Framework for Public Engagement following on from the co-created R&I agenda. A key output is a shared vision and agenda of public engagement for the SMART-ER Institute based on an exploratory study across ECIU. A Public Engagement Expert Group has been established with participation from at least one individual per partner expected. A toolbox of PE activities suited to the SDG 11 domains of research will be developed, all leading to a SMART-ER Institute Community of Practice for Public Engagement that will work centrally across the VRI to include academics, publics, SMEs and CSOs in future challenge-based research.	Yes	12
WP5 Citizen Science in practice		
A Citizen Science webinar series took place during the project initiation phase to establish a ECIU CS community and promote participation in the CS pilots during the Pilot phase. At least two co-created transnational pilots will be facilitated by SMART-ER. The pilots will run for a maximum of 18 months with total funding of €360.000 for activities supported by a platform for citizen science. The pilots will provide the test-bed from which a document of recommendations will be created that will guide any changes needed at ECIU Universities to allow for citizen science to grow and consolidate in the SMART-ER framework. Minimum number of pilots: 2 Minimum number of institutions per pilot: 4 Number of researchers per pilot: 1-3 per institution	Yes	24
WP6 Communication and Dissemination		
Researchers working on SDG 11 across network based on mapping data: >4500 Current number of engagements based on available data (D1.4): 1344	Yes	1800

The target numbers outlined for the SMART-ER activities above should also be recognised within the wider objectives, indicators and values of the ECIU University from the pilot (Erasmus+ award 2019 -2022) to the Start-up and Expansion phases (Erasmus+ proposal 2022 - 2026). Key contributions to ECIU University data are given in Appendix 3.

Table 3 Other activities to be tested during the SMART-ER Pilot phase

Other Activities		
Research Field coordinators		
The recruitment of SMART-ER Research Field (RF) Coordinators will take place during the first months of the Pilot Phase to establish Communities of Practice (CoPs) in each priority area (Energy & sustainability, Transport & mobility, Circular economy, Resilient Communities and Citizen Science). The RF Coordinator roles must be taken up by active researchers within the network, allowing a deeper involvement of researchers in the SMART-ER pilot organisation (Section 11). Once in place the coordinators will establish the Terms of Reference for each Research Field Group and initiate collaborative and community building activities. The role and requirements for RF Coordinators are outlined further in Section 10.1.4. Time dedication for the RF Coordinator roles must be provided by the researcher's home institution and provides an opportunity for testing the required time dedication of staff on a small scale during the pilot phase.		
Proposal Development for External funding		
The establishment of CoPs for each research area is intended to facilitate an increase in high-quality, collaborative activity across the network. The momentum of these groups will be tested during the pilot phase through the submission of at least one joint SMART-ER proposal to external funding bodies in each area. Additionally, if and where appropriate, the inclusion of the ECIU Foundation as a partner in these proposals can also be tested in this way.		
External Scientific Advisory Board (Citizen Science specific)		
To assess the Citizen Science pilots, an external panel of three international experts was assembled by WP5 to form a once-off external Scientific Advisory Board (SAB), providing impartial recommendations and comments on each of the pilot proposals. Following the success of this approach and the importance of Citizen Science within the SMART-ER Institute, it is recommended that the SAB remain in place throughout the Pilot phase. Given there is no budgetary provision to facilitate this activity, the mechanisms and opportunities to support additional activities of this nature will be explored.		

8 Pilot financial plan

The financial plan and procedures have been approved by the SMART-ER Executive Team and represents only those activities allocated central monetary funds for the 18-month pilot phase of the project. It is important to note that in-kind contributions of the partners such as time dedication in person months are not captured.

Work Package Activities CENTRAL BUDGET

During the pilot phase (18 months), the following budget applies:

1. Capacity Building
   - *SMART-ER Academy* — ***EUR 71,500***
     - Common Courses (4) — EUR 22,750
     - PhD Training (5) — EUR 29,250
     - Open Science and Leadership (4) — EUR 19,500
   - *SMART-ER Seed Programme* — ***EUR 384,000***
     - Co-Tutelle (5) — EUR 28,000
     - Blended Mobility (4) — EUR 103,000
     - Seed Projects (5) — EUR 253,000
2. Citizen Science in Practice
   - *SMART-ER Citizen Science Pilots (2-3)* — ***EUR 360,000***
3. Funds to be allocated follow 1st round of Seed Programme) — ***EUR 40,155***

Total: **EUR 855,655**

Following the pilot phase, the financial and in-kind support and time dedication in Person Months needed for the SMART-ER VRI will be discussed and agreed in advance of the formalisation of the institute in the longer-term (Deliverable 2.2).

9 Pilot monitoring

A number of Key Performance Indicators (KPIs) have been identified and agreed through an iterative consultation process, described in Deliverable 1.5, that intrinsically reflect the core objectives of the SMART-ER VRI (Section 6.2). The selection of several non-traditional indicators demonstrates SMART-ER's commitment to implementing a new barrier-free model of research, specifically supporting open access, collaboration and embedding citizen science and/or co-creation processes.

SMART-ER Key Performance Indicators

1. Number of researchers engaging with SMART-ER activities at all career stages
2. Number of joint ECIU/SMART-ER research grant applications submitted for funding with participation of at least two ECIU partner universities
3. Percentage of joint ECIU/SMART-ER research grant applications submitted for funding co-created with one or more non-academic stakeholder groups (industry, government, civil society)
4. Number of joint ECIU/SMART-ER research projects awarded external funding (with participation of at least two ECIU partners universities)
5. Number of citizen science projects supported by SMART-ER across ECIU institutions
6. Percentage of open access outputs derived from SMART-ER research projects

The SMART-ER KPIs will operate over the pilot phase and assessed during the establishment phase of SMART-ER (31-36 months). As it is not possible to register and collect information of this nature from institutional reporting systems, data sources and collection methods have been identified in line with specific activities in WPs 3-6. As lead of Task 2.4, UAB will hold primary responsibility for monitoring and reporting of this data during the pilot phase. Performance monitoring during this first period will not be benchmarked against pre-defined targets as the virtual environment remains in its initial pilot phase. However, the output indicators for specific work package activities (Section 8.2) will be measured. Upon formal establishment of the SMART-ER VRI these pilot data can be used as a baseline in determining appropriate KPI targets during consolidation of the institute, and can also inform the implementation of an affiliation mechanism (Section X).

The adoption of the above KPIs during the pilot phase establishes a core component of the evaluation and monitoring model for the VRI. Looking beyond the pilot, the KPIs themselves may be revised in line with the institute's future Strategic Plan, to be adopted as part of Deliverable 2.2. Furthermore, integrating qualitative assessments of performance will be critical for a more holistic approach to monitoring the evolution and success of the SMART-ER Institute (36+ months), with scope for developing an appropriate framework as part of SMART-ER's wider Impact Model.

10 SMART-ER Organisation

For the initiation phase of the SMART-ER project (Month 0 -12), a number of roles and bodies have been defined as per the Project Handbook (Deliverable 7.1) for management and governance of the project, with close alignment with the Erasmus+ ECIU University project structures (Deliverable 7.2).

At present this includes:

- ECIU University Board (Governance)
- Vice-Presidents for Research (Advisory)
- SMART-ER Executive Team (Management)

- Coordination Team - 2 coordinators (Project and scientific) and 2 project managers (technical and administrative)
- Local Contact Points (University-level)
- Work package leaders and task leaders (Project-level)

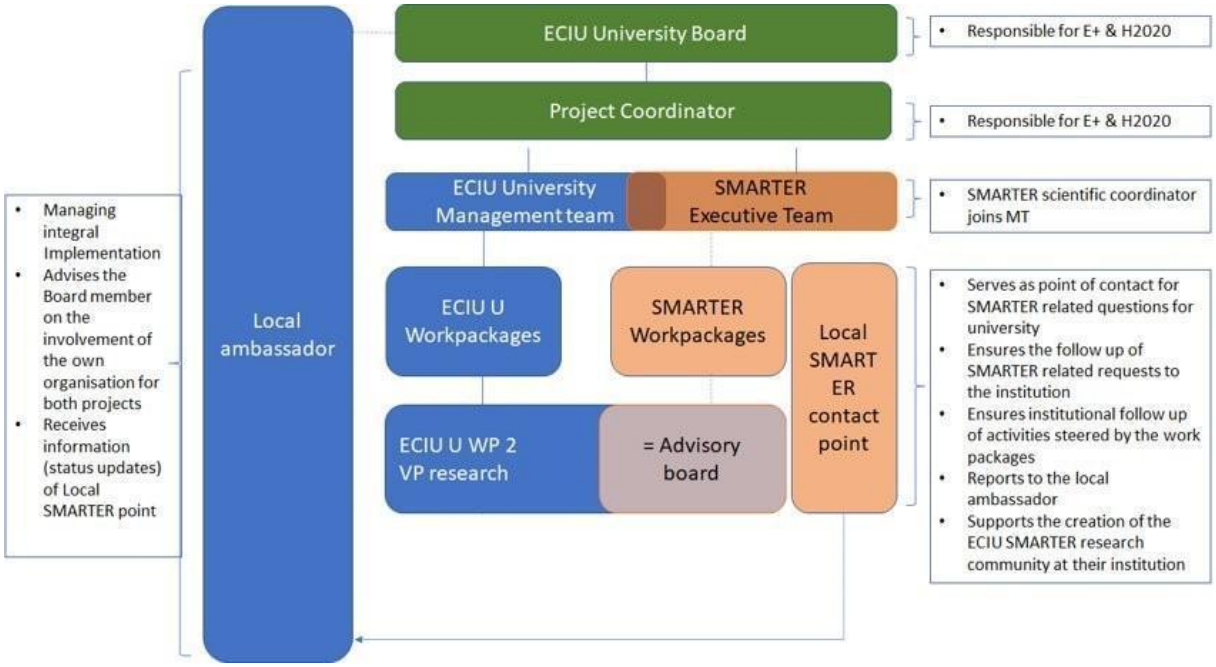

Figure 2. Governance bodies from ECIU Erasmus + project (called ECIU University) in blue and the SMART-ER project in the brown. Overarching governing bodies are green. Figure taken from Deliverable 7.1.

This organisational model functions well from a project-based perspective, however, operation of the VRI in the long-term a **requires a more resilient organisational structure** that integrates institutional roles beyond time-limited work packages.

Transitionary activities are proposed during the pilot phase of the VRI that will maintain current structures while beginning to incorporate elements that will be sustainable in the longer-term.

10.1 Organisation of the SMART-ER Pilot Institute

10.1.1 Governance level

ECIU Board

During the Pilot phase that the ECIU Board will maintain its role as the overarching governance body of SMART-ER. The ECIU Board will receive and discuss an annual report from the SMART-ER Executive Team to determine if the objectives of the project are being met and will be consulted on the operations of the SMART-ER Pilot VRI as required.

In the longer term (36+ months) it is envisioned that upon formal establishment of the SMART-ER VRI, governance of the organisation will be decoupled from the current project-based governance bodies and representatives. At this point primary governance will move towards a research-oriented body, with representation from the ECIU Board to maintain active links across education, research and innovation.

Vice-Presidents for Research Expert Group

The Vice-Presidents for Research will maintain their role as a top-level advisory body for the SMART-ER Pilot VRI and may be incorporated into a more significant governance role in the longer-term (36+ months). The composition of the future governance board will be agreed and set out in Deliverable 2.2.

10.1.2 Management level

During the Pilot phase that the Executive Team will maintain its role in the overall management of SMART-ER. All full partners as set out in the SMART-ER project proposal are represented in the Executive Team via Work Package Leaders or Local Contact Points and are supported by the Coordination Team.

In the longer term (Month 36+) one consideration could be for the future VRI management team to be comprised mainly of active (R2 – R4)[9] researchers with central roles beyond specific work packages or institutional functions. However, it is first necessary to build the organisational structure and an established community within the VRI. To achieve the latter, the current ET will lead the recruitment of 5 Research Field (RF) Coordinators (active researchers - Section 10.1.4) to test central oversight and steering of SMART-ER content and to initiate cross-institutional communities of practice. The RF Coordinators do not hold a formal management role during the pilot phase and will report to the ET. Their precise role and mandate within the organisation will be re-evaluated during the Establishment phase.

10.1.3 Operational level

As the SMART-ER Pilot VRI continues to operate within the SMART-ER Horizon 2020 project, work package and task leaders supported by work package Points of Contact will continue to drive the implementation of SMART-ER activities during the pilot phase. General awareness building and engagement with SMART-ER across institutions during the pilot phase will continue to be coordinated by the SMART-ER Local Contact Points (LCPs). During the pilot, LCPs can begin to work within the appointed Research Field Coordinators to bring together the communities of practice (Research Field Groups) across each area.

10.1.4 Community Level

For the Pilot phase, SMART-ER will introduce and test Research Field Coordinators to head each of the priority research areas for the institute. The RF coordinators must be active researchers and their general role will encompass:

- Creating 5 ECIU communities of practice ('ECIU Research Field Groups') within **and** between the four SDG 11 pillars (Energy and sustainability, Circular Economy, Transport and Mobility, Resilient Communities) and Citizen Science.
- Sharing common concerns, problems or interest and come together to fulfil both individual and group goals.
- Collaborating regularly to share information, improve skills, and actively work on advancing the general knowledge of the area.

The appointed coordinators must have an agreed time dedication provided by their institution during the pilot phase. Initially, it is estimated the duration of the role will be 12 months with 1.1 Person Months required. This will be evaluated after this period and the roles may be extended or adapted depending on the success of the approach. Testing the capacities and time dedication of RF coordinators during the pilot phase will assist in determining the minimum and appropriate FTEs/PMs for any SMART-ER staff in equivalent roles defined upon formalisation of the VRI (M36+).

The recruitment of the RF Coordinators is planned for Q2 2022 (Month 14 – 16). Coordinators will work closely with one another to ensure Research Field Groups do not operate in an isolated way and that the SMART-ER

[9] Research profiles descriptors | EURAXESS (europa.eu)

Pilot VRI offers a dynamic and cross-cutting collaborative environment. Upon recruitment, the Coordinators will be invited to join the meetings of the current ET whenever relevant to do so, however they are not considered formal members of the ET. RF Coordinators will act as Community leaders. During the Pilot phase the objectives of the RF Coordinators are to 1) Actively participate in the second round of the SMART-ER Seed Programme (if in post), and 2) Develop at least one collaborative SMART-ER proposal per research area for external funding.

10.1.5 Project Support

The SMART-ER Coordination Team consisting of the Project Coordinator, Scientific Coordinator, Administrative and Technical Project Managers will remain in place for the Pilot Institute. They will continue to support the ET and ensure all project-related matters are discussed and fulfilled across work packages and between partners. They will also support the functioning of the RF Coordinators.

10.2 Other inputs

Cooperation, advice and input is expected on an ad hoc basis from numerous sources across the ECIU ecosystem to assist in the operations of the SMART-ER Pilot Institute. These include:

Expert Group/Community of Practice for Public Engagement – Following its establishment (Deliverable 4.2), it is intended the CoP will act as a central support and driver of SMART-ER public engagement initiatives and will advise the ET and RF coordinators in their activities as needed. However, CoP activity may be of limited nature during the pilot phase during to a lack of dedicated budget available during this period. Therefore, the needs and mechanisms for sustainability of the CoP will be evaluated during the Establishment phase.

Strategic European Projects Office – SEPO will coordinate with the Executive Team as needed regarding strategic follow-on or supplementary funding opportunities to support the continued development of SMART-ER. SEPO will also determine any appropriate opportunities for ECIU Foundation to be included as a partner in grant applications. RF Coordinators will also provide feedback to SEPO on any funding calls they may identify as relevant *at a strategic level.*

Scientific Advisory Board (Citizen Science) - To assess the Citizen Science pilots, an external panel of three international experts was assembled by WP5 to form a once-off external Scientific Advisory Board (SAB), providing impartial recommendations and comments on each of the pilot proposals. Following the success of this approach and the importance of Citizen Science within the SMART-ER Institute, it is recommended that the SAB remain in place going forward. However, there is no budget available to support a defined role for the SAB during the upcoming period, and as such the mechanisms and opportunities to maintain involvement or to facilitate a future role will be explored during the Pilot.

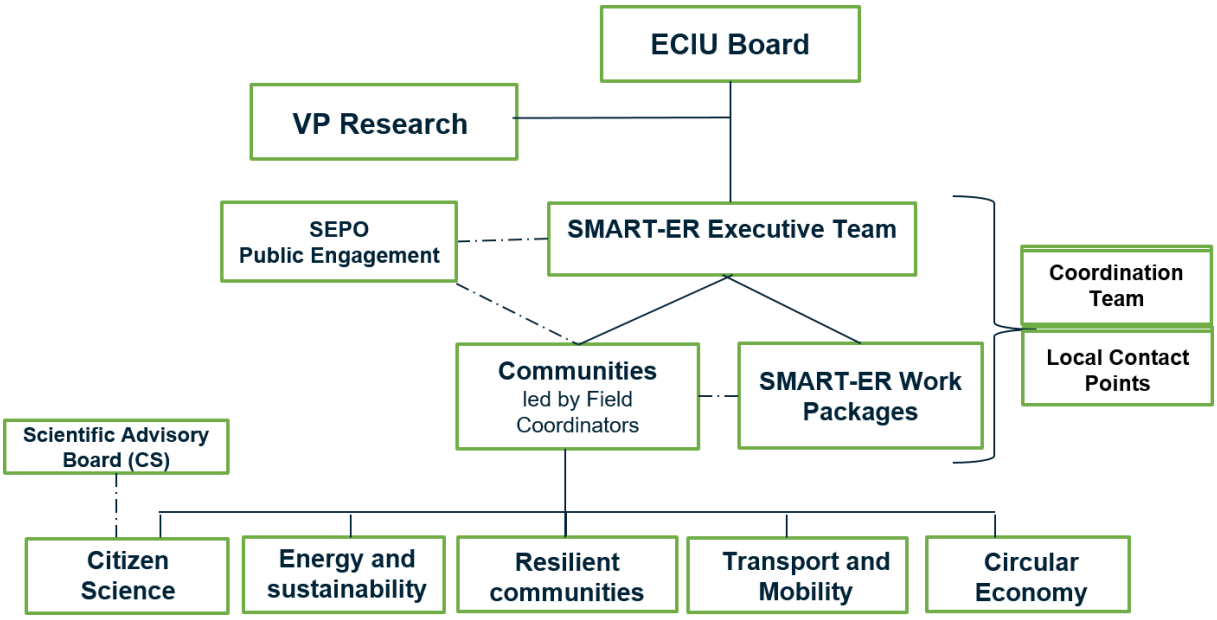

Figure 3. Organisational structure of the SMART-ER Pilot Institute

11 Rules of Engagement and Affiliation

11.1 New and associate ECIU partners

Due to funding restraints and data protection issues outside of the EU, participation in the Seed Programme, Training Academy and Citizen Science pilots cannot be made available to new (Lodz University, Poland) and associate (Tec de Monterrey) partners during the VRI pilot phase. General participation of the partners is strongly encouraged through active observation in activities, input into discussions for the future organisation, and opportunities for researchers to collaborate in new external funding proposals. In the case of current and any future associate partners outside of the EU, a clear pathway for closer collaboration in the SMART-ER VRI (36+ months) is being prototyped within WP5 and its implementation will be outlined in Deliverable 2.2.

11.2 External partners

Numerous external public and private stakeholders have committed their support to ECIU University in achieving its ambitions.[10] SMART-ER continues to facilitate bottom-up involvement of external EU partners in its activities through the Seed Programme and CS Pilots. In this context, any agreements with external partners are the responsibility of the proposal coordinator's home institution. External partners do not have access to SMART-ER funds if participating in VRI activities. If any future SMART-ER proposals developed for strategic advancement of the institute involve one or more external partners, a cooperation agreement will be required outlining intellectual property rights, responsibilities, data handling etc.

11.3 Researcher affiliations

The developments and outputs from work package activities outlined in Section 6 have been successful to date due to the bottom-up, co-creative spirit that exists across the contributing partners. While the SMART-ER tasks have been set out and carefully managed throughout these processes, where researchers and their teams worked on specific SDG 11 or Citizen Science projects across institutions, these affiliations have occurred relatively organically, with existing projects linking up with partners from another ECIU institutions who were designing complementary research and/or engagement projects.

[10] For Industry & Society (eciu.org)

It is for this reason that we recommend that the pilot phase of SMART-ER allows the model of *organic affiliation* to remain. In other words, across the project networks now created following the launch of the seed funding and CS pilots, research collaborations and teams need to naturally emerge based on the scientific and/or engagement needs of our collective communities. During the establishment phase (Months 31 – 36), the SMART-ER executive team will review the strength of ongoing researcher engagement with the VRI and decide the next route to take with regards affiliation and closer alignment. Formal affiliation will also be dependent on the legal considerations outlined in Section 12 below.

12 Legal Entity status

The European Commission recommendation on building bridges for effective European higher education cooperation includes the following quote:

'Ambitious higher education alliances should benefit from the legal certainty of a legal statute that enables them to share common financial, human, digital and physical resources, and services, to operate virtual inter-university campuses and interoperable platforms for joint digital or blended activities.'

To achieve this seamless transnational cooperation, ECIU University has highlighted how a legal statute for European University alliances can help to overcome many of the barriers currently faced.[11]

ECIU's current legal body – the ECIU Foundation registered in 2012 – is set up under Dutch law. To ensure sustainable, efficient, and agile developments towards the ambitious goals of 2030, going forward the ECIU Foundation will play a stronger role as the legal entity in the overall governance structures of ECIU University as agreed by the ECIU Board in November 2021. ECIU University will also participate in the EU's pilot scheme to work towards a legal statute for European Universities beginning in summer 2022, and ECIU University's activities within this pilot will directly inform the SMART-ER Statutes developed for Deliverable 2.2.

On account of these developments, during the pilot phase, if appropriate, the ECIU Foundation may be itself be considered a candidate partner in new funding applications for the SMART-ER Institute.

13 Pilot Action Plan

In summary, the Pilot Action Plan for the SMART-ER Pilot Institute is as follows:

- Responsibility for ongoing work package activities will remain with the WP leaders and task leaders as set out at the beginning of the project unless otherwise agreed at management level (ET) during the SMART-ER Pilot Phase (WPs 2, 3, 4, 5 & 6)
- Responsibility for newly defined Pilot activities (Research Field Coordinators, External proposal development and Scientific Advisory Board) will be delegated or actioned by the Executive Team accordingly.
- Targets for the SMART-ER Academy, Seed Programme, public engagement activities, CS pilots and the general engagement of researchers will be incorporated into the pilot monitoring and evaluation to be undertaken in Task 2.4 and contribute towards wider ECIU University objectives.
- Established governance, advisory and management bodies will remain in place for the SMART-ER Pilot.
- Transnational research communities will be further developed through the recruitment of Research Field Coordinators during the Pilot Phase. RF Coordinators will be supported by the Coordination Team, WP Leaders and other inputs as needed and will report to the SMART-ER Executive Team.

[11] Why Europe needs a Legal Statute for universities (eciu.org)

Appendix 1: Review of other (past and present) 'VRIs' (task 2.1)

1. Introduction

The main objective of the SMART-ER project is to establish a joint Virtual Research Institute (VRI) showcasing and working in accordance with a shared research and innovation agenda. This Research Institute of Smart European Regions aims to explore the implementation of a common shared R&I instrument and those related inter-institutional policies and procedures (shared infrastructures, affiliated researchers, decision processes, sustainability...) that could allow participating universities to achieve one of the main goals of the ECIU University[1] , namely, to enable research groups across all member universities to jointly address complex societal challenges under the framework of SDG11[2].

The objective of this report is to explore the relevant national and international experiences, governance structures and outcomes with respect to other university consortia, joint research institutes (virtual as well as physical), etc. to identify potential best practices.

VRIs are often associated with a Virtual research environment (VRE). However these two differs considerably by definition:

- "Virtual research environment (VRE)" is an online system helping researchers collaborate. Features usually include collaboration support (Web forums and wikis), document hosting, and some discipline-specific tools, such as data analysis, visualisation, or simulation management"[3].
- Virtual Research Institute (definition from SMART-ER[4] proposal)[5] : an organization to align and bring together research capacities, both academic and managerial; for sharing resources and infrastructures, faciliated collaboration (joint research project), for sharing a common vision and strategy to drive the research and innovation agenda on SDG 11[2].

This report will focus only on existing VRIs in order to identify best practices.

2. Litterature review on Virtual Research Institutes

According to Candela et al. (2013)[6], Virtual Research Environments are innovative, web-based, community-oriented, comprehensive, flexible, and secure working environments conceived to serve the needs of modern science. They overviewed the existing initiatives developing these environments by highlighting the major distinguishing features. They envisaged a future where regardless of geographical location, scientists will be able to use their Web browsers to seamlessly access data, software, and processing resources that are managed by diverse systems in separate administration domains via Virtual Research Environments. They listed three major issues to be resolved to realise the above vision as well as to a implement sustainable Virtual Research Environment: (i) large scale integration and interoperability, (ii) sustainability, and (iii) adoption.

According to existing litterature, sustainability appears to be one of the major challenges affecting VRI's development. VRIs require effort and money to be built and maintained according to the communities of practice needs. As proposed in Carusi & Reimer (2010)[7], there are three key strategies for sustainability that

might be put in place either singly or in combinations: (i) acquire further funding from diverse research bodies; (ii) develop business models aiming at self-sustainability; and (iii) rely on community support. However, given the volatile nature of communities of practice the sustainability issue remains a challenging problem.

Concerning the adoption factor, it is important to standardize practices, tools, and research protocols used by real life communities[8]. This reluctance to migrate from traditional and consolidated research practices and facilities to the innovative ones promoted by VRIs is among the most difficult barriers. As recognised by Carusi and Reimer (2010), among the factors causing this issue are: (i) the lack of support of both technical and instructional (e.g., training – especially in early stages) nature; (ii) the gap between the community of practice needs and the actual service implemented by the VRI; (iii) the reliability of the technology (very often VRIs are based on cutting edge and evolving technologies); (iv) legal, ethical, and cultural issues (the willingness to "share" research outputs and participate in web based research investigations might be nullified by fear for ownership and attribution); and (v) interdisciplinarity (differences in "languages" and working practices are a need, a potentiality and an issue as well). Thus Virtual Research Environments creation and management then appear to become a societal and organisational process rather than a technological one.

Luo et al. (2010)[9] defined VRIs as a kind of organization that is formed by the penetration of virtual organization to science research organization with the development of computer science, network technology and other communication techniques. They enlighted that VRI has an extensive application in enterprise and research institute for its flexibility and dynamic characteristics. Hellström et al. (2003)[8] had studied the implementation of a virtual research institute (Institute for Management of Innovation and Technology, IMIT) located physically at three of Sweden's largest universities, with en-compassing researchers from all over Sweden and including some in Finland and Denmark. They concluded to not reduce stakeholders to research objects, but rather taking them seriously as contributing members in collective research [10]. It also implies being willing to negotiate and renegotiate the borders of this collective. In this case, a VRI could appear to be nothing more than a place to engage in research activity, without the articulation and boundary work that is prevalent in disciplines or departments. Good (2000) has referred to such disciplined frameworks of inquiry as "assemblies". The case of a VRI may be said to feature a fairly coherent assembly of problems, worldviews, tools, interest groups and institutional forms supporting academic action.

Unlike the classical research organisation in which collaborations are induced by funding policies, Hellström et al. (2003) recommended that research proposals should be devoid of ideological frameworks such as Triple Helix that advocate and legitimatise collaboration. VRIs appeared to them as a bridge[11] that researchers have voluntarily constructed as a retreat in order to span boundaries between disciplines, universities and practice.

> From the literature, it appears that a Virtual Research Institute should be designed, from the beginning to promote **uptake (adoption & community building[12])**, ensure **usability[13] & visibility,** and guarantee **sustainability**. These three aspects form a virtuous circle that, if properly managed, ensure the success of a specific VRI. The integration of stakeholder is also seen as an opportunity to build a different way of working **without a disciplinary framework** to unleash innovation and collaboration.

3. Mapping of existing VRI initiatives

As a first step of the work, mapping of known-VRIs was established from web research and crowdsourcing from the Point of Contact of each University for Work Package 2 of the SMART-ER project. This mapping exercise is non-exhaustive but provides a good overview of the most visible existing VRIs (mainly in Europe).

The mapping is presented in Table 1 with the name of the Institute, its acronym, and its web address. They have been classified in 4 different geographic areas: local, national, European, and Global. It is worth noting that the disciplines covered by these VRIs are large: from social science, language and education to fundamental science or applied science with a large number of first-interest topic such as energy, climate, resilience, sustainability, etc.

It is important to note that a number of these institutes are established at a European or a national level. This can be explained by the significant amount of funding available at the European and national levels to connect researchers together (national funding agency, European union, etc). There are fewer VRIs at the global level, due to the absence of a global funding agency for such funding. Global VRIs are more driven by inter-ministerial/governmental groups and their development is more complex to implement and regulate. Finally, there are few VRIs at the regional level because of the smaller budgets of the regions or the desire to set up strong regional universities that can absorb this type of system.

Table 1. Mapping of referenced VRIs

Virtual Research Institute			
Name	**Acronym**	**Website**	**Geography**
Consortium of European Social Science Data Archives	CESSDA	https://www.cessda.eu/	Europe
Common Language Resources and Technology Infrastructure	CLARIN	https://www.clarin.eu/	Europe
The Virtual Institute for Responsible Innovation	VIRI	https://www.virinetwork.org/	Europe
EIT Climate-KIC: Drivers of climate innovation in Europe and beyond	KIC	https://www.climate-kic.org/	Europe

Virtual Research Institute			
EIT Digital: For a strong, digital Europe	Digital	https://www.eitdigital.eu/	Europe
EIT Food connects businesses, research centres, universities and consumers.	Food	https://www.eitfood.eu/about-eit-food	Europe
EIT Together for healthy lives in Europe	Health	https://eithealth.eu/ Europe	Europe
EIT InnoEnergy: Pioneering change in sustainable energy	InnoEnergy	https://www.innoenergy.com/	Europe
EIT Manufacturing: Strengthening and increasing the competiveness of Europe's manufacturing	Manufacturing	https://eitmanufacturing.eu/about-us	Europe
Smart, green and integrated transport urban Mobility	Urban Mobility	https://www.eiturbanmobility.eu/	Europe
EIT Raw Materials: Developing raw materials into a major strength for Europe	Raw Material	https://eitrawmaterials.eu/	Europe
Urban Climate Change Research Network	UCCRN	https://uccrn.ei.columbia.edu/	Global
Transregional Virtual Research Institute. Media, Activism and the New Political	TVRI	http://tvri.ssrc.org/	Global
Global Resilience Research Network	GRRN	https://globalresilience.northeastern.edu/programs/global-resilience-research-network/	Global
Global Resilience Institute	GRI	https://globalresilience.northeastern.edu/	Global
Joint Programming Initiative on Antimicrobial Resistance	JPIAMR	https://www.jpiamr.eu/	Global

Virtual Research Institute			
United Generators	United Generators	https://www.gsi.de/en/work/wissenschaftliche_netzwerke/helmholtz_virtuelle_institute/unigen	National
Helmholtz Virtual Institute Dynamic Pathways in Multidimensional Landscapes	HVI	https://www.helmholtz-berlin.de/projects/hvi/index_en.html	National
Nuclear Astrophysics Virtual Institute	NAVI	https://www.gsi.de/en/work/wissenschaftliche_netzwerke/helmholtz_virtuelle_institute/nuclear_astrophysics_virtual_institute/home	National
Internet of Plants	Plantenna	https://www.4tu.nl/plantenna/en/	National
Insight SFI Research Centre for Data Analytics	Insight	https://www.insight-centre.org	National
Virtual Research Institute [Polish: Wirtualny Instytut Badawczy – WIB]	WIB	https://wib.port.org.pl/en/about-the-wib-program/	National
Centro de Investigación Biomédica en Red	CIBER,	https://www.ciberisciii.es/en/about-us	National
Commonwealth Scientific and Industrial Research Organisation	CSIRO	https://www.csiro.au/	National
The Baltic University Programme	BUP	https://www.balticuniv.uu.se/	Regional
University of California Institute of Transportation Studies	UCITS	https://www.ucits.org/	Regional
Fluids, Energy, Materials and Transfer	FERMAT	https://www.federation-fermat.fr/	Regional

Besides the VRIs listed previously, the European Universities includes also VRIs. The results of the two calls of the European Universities are available below:

- Results of the first call 17 European University alliances involving 114 higher education institutions from 24 Member States[14]:
    - UNA Europa
    - The 4EU+ Alliance

- ARQUS European University Alliance
- CHARM European University
- CIVICA -The European University in social sciences
- CIVIS -a European civic university alliance
- European University for Smart Urban Coastal Sustainability
- **ECIU University**
- European Digital UniverCity
- European Partnership for an Innovative Campus Unifying Regions
- Alliance for common fine arts curriculum
- European University Alliance for Global Health
- European Universities Transforming to an Open, Inclusive Academy for 2050
- Fostering Outreach within European Regions, Transnational Higher Education and Mobility
- The European University of the Seas
- University Network for Innovation, Technology and Engineering
- Young Universities for the Future of Europe

- Results of the second call : 24 new European Universities alliances have been selected involving 165 higher education institutions from 26 Member states[15]:
    - Advanced Technology Higher Education Network Alliance
    - Aurora Alliance
    - Circle U. European University
    - Engaged and Entrepreneurial European University as Driver for European Smart and Sustainable Regions
    - European Campus of City-Universities
    - European Engineering Learning Innovation and Science Alliance
    - The European University engaged in societal change
    - European Universities of Technology Alliance
    - European University Network to promote Equitable Quality of Life, Sustainability, and Global Engagement through Higher Education Transformation
    - European Reform University Alliance
    - EUNICE -European University for Customised Education
    - European University for Well-Being
    - The European University Alliance on Responsible Consumption and Production
    - EuroTeQ Engineering University
    - European University of Technology
    - FILMEU -The European Universities Alliance for Film and Media Arts
    - INnoVations of REgional Sustainability: European UniversiTy Alliance
    - European University of Brain and Technology

- Regional University Network –European University
- Transform4Europe –T4E: The European University for Knowledge Entrepreneurs
- Ulysseus: An open to the world, persons-centred and entrepreneurial European University for the citizenship of the future
- The European University of Post-Industrial Cities
- UNITA -Universitas Montium
- European Space University of Earth and Humanity

A list of other international alliance of Universities is also provided:

- Texas ATM University at Qatar
- AITU (Association of Independent Technological Universities)
- University Consortium International - UCI:
- AAU - Association of American Universities
- Consortium of Universities for Global Health (CUGH)
- Consortium for North Americans Higher Education Collaboration (CONAHEC)
- Universitas 21 (U21)
- Association of American Colleges & Universities (AAC&U)
- International Alliance of Research Universities (IARU)
- Worldwide Universities Network (WUN)
- GlobalTech Alliance
- Group of Canadian Research Universities (U15)
- Center for Structural Genomics of Infectious Diseases (CSGID)
- Joint Center for Energy Storage Research (JCESR)
- University of the Artic (UArtic)
- Oak Ridge Associated Universities (ORAU)

Unfortunely, for all these international alliances or European Universities, access to detailed information about the implementation of corresponding VRIs was not possible. Therefore the interviews carried out were based on the list presented in table 1.

4. List of interviewed VRIs

In this part, more information about interviewed VRI will be given such as the number of researchers, the budget, the objectives, and the organization of the institute. The objective of the interviews was to identify best practices applicable for the establishment of SMART-ER Virtual Research Institute in terms of internal organisation, governance system, communication and activities carried out. The question template used to guide interviews is provided in Appendix I.

a. Regional level VRIs

Toulouse	Research Federation **FERMaT**	**Interviewee**:

	Fluids, Energy, Material & Transfer	Martine MEIRELESS (Head of the federation between 2015 and 2020)
	https://www.federation-fermat.fr/ Located in Toulouse and Albi, Occitanie, France	**180 researchers** from 4 different University/Research institute. Shared Equipment (4 M€) **Budget**: 120 000 €/year

The first regional institute which was interviewed was the FERMAT Research Federation (Fluids, Energy, Reactors, Materials and Transfers- Region France – shared Research Institute), that aims to promote the emergence, the sustainability, and the visibility of multidisciplinary or interdisciplinary collaborative projects between project-teams from nine laboratories in the Engineering domain of the Toulouse Federal University.

In January 2021, the FERMaT research federation brought together the activities of more than 180 permanent researchers (researchers, teacher-researchers, engineers) from three academic universities and a research center (CNRS), resulted in some 40 projects systematically involving at least two laboratories of the federation. The heart of the scientific activity is located within the research projects proposed by the project-teams. The generic characteristic of these projects is the inter-laboratory collaboration which is generally based on the methodological or technical complementarity of the project-team. The project-teams can have variable life spans, some last 3 to 4 years, others have been collaborating for more than 10 years. These projects are divided into 5 major thematic fields or research themes: Multiphase flows, Engineering for the living, Materials and Applications, Microfluidics and microreactors and Porous Media and Colloids. The FERMaT Federation has acquired scientific equipment distributed across the member sites, constituting shared instrumentation platforms dedicated on the one hand to the structural study of materials and organized systems, both liquid and solid, and on the other hand to the study of complex fluid flows, often multiphase and sometimes reactive. Today the whole represents a value of about 4 M€.

	University of California Institute of Transportation Studies (UC ITS)	**Interviewee**: Gil TAL (Director, The Plug-in Hybrid & Electric Vehicle Research Center)
UNIVERSITY OF CALIFORNIA Institute of Transportation Studies	https://www.ucits.org/ Located in Berkeley, Davis, Irvina and Los Angeles, California, USA.	**Approximately 185 researchers** from 4 UC campuses Annual core funding: USD 6 million; additional multi-million dollar funding for various research and study initiatives

The second regional institute interviewed was the University of California Institute of Transportation Studies (UC ITS). UC ITS aims advancing the state of the art in transportation engineering, planning and policy. It was established in 1947 and has branches at the four UC campuses of Berkeley, Davis, Irvine and Los Angeles.

Each branch is semi-autonomous and with their own organisation and management, and has both a research and an education platform. Core funding is split between the branches; each also attracts additional funding for research activities and student stipends. The amount of funding varies but is multi-million each year. One example is the establishment of the National Center for Sustainable Transportation, which was founded in 2013, led by ITS-Davis, and has awarded more than USD 30 million to research (90%) and graduate student work (10%; dissertation and thesis work).

WIB	Virtual Research Institute Wirtualny Instytut Badawczy	**Interviewee**: Andrzej Dybczyński Head of the VRI
	https://wib.port.org.pl/ Poland	Establishment and funding of virtual team-project in Poland. 10 million € /year – **300 employees**

b. National VRIs

The first National VRI interviewed was the Virtual Research Institute [Polish: Wirtualny Instytut Badawczy – WIB], that is an innovative nationwide formula for conducting research with high potential for social and economic applications. The area of WIB research is medical biotechnology – oncology. The amount of 100 M€ has been allocated to support research teams. The Virtual Research Institute program is a tool for distributing funds from the Polish Science Fund. Its aim is to finance the work of selected, internationally competitive research teams, conducting scientific activities with high potential for social and economic applications, under the guidance of a leader of recognized scientific achievements, whose aim is to commercialize its results.

The program allows for the possibility of carrying out tasks located in various scientific units in Poland. The entity managing the Virtual Research Institute program for the area of medical biotechnology – oncology is the Łukasiewicz Research Network – PORT Polish Center for Technology Development based in Wroclaw. The role of the entity managing the WIB program is performed by the Łukasiewicz Research Network – PORT Polish Center for Technology Development based in Wroclaw. The managing entity is responsible for organizing and conducting open call for proposals for the selection of research teams, organizing the work of experts, signing contracts for financing, supervision and support for the implementation of research tasks, distribution of fund resources, coordination of the process of commercialization of new technologies and products.

	Virtual Research Institute The Insight SFI Research Centre	**Interviewee**: A Prof Noel O'Connor CEO, INSIGHT

SFI RESEARCH CENTRE FOR DATA ANALYTICS	for Data Analytics	Centre, Ireland
	https://www.insight-centre.org/ Ireland	€88 million in funding, between exchequer and private sources

The second National VRI interviewed was the Insight SFI Research Centre for Data Analytics which is a VRI, founded in 2013. It is funded by Science Foundation Ireland, which is the main STEM RFO in Ireland. Insight is one of 16 linked STEM-based research centres housed across various higher education institutions across Ireland, with some co-funding from other agencies and industry. Insight has €150m in funding, between exchequer and private sources, since its last round of awards. The budget system is centralised – with in-house reporting and finance systems- but operating in devolved environments within each institution as is mentoring and support for excellent science at personnel level. There are "give and takes" for each organisation: getting funded means an obligation to deliver for the centre and look for more funding. A collective means commitment and involvement with a prioritisation of Insight work.

Insight conducts high impact research in data analytics and AI for industry and society. The Insight motto is "Empowering Citizens, Smarter Societies" making engaged research a significant part of what it does to, as the organisation says, "enable better decision-making". Using Big Data techniques, Insight is one of the largest data analytics centres in Europe. Research areas include the Fundamentals of Data Science, Sensing and Actuation, Scaling Algorithms, Model Building, Multi Modal Analysis, Data Engineering and Governance, Decision Making and Trustworthy AI. There are 4 broad strands:

- Augmented Human
- Smart Enterprise
- Smart Communities
- Sustainability

Because of the nature of Insight's work and Ireland's small size, it made sense for multiple higher education institutions to organically form one VRI. Most work focused on data analytics. The main driving force of the VRI is that it transcends institutional boundaries. The aspiration then was to become a truly national centre, co-led by 4 institutional sites, not just one, with participation from the other Irish institutes. This was considered important – it meant that it was not a case of just one partner institution setting terms or using local systems of governance. In this regard, the main challenge was for all partners – including the contributing ones that were not leads - to work for the good of the collective rather than self-interest- removing the competitive element of the partners.

Even for virtual working environment, however there is still importance granted to establishing personal relationships, building trust. The goal is moving from "host university" concept to a collective, and being dynamic while doing this. There is centralised governance meaning a central unit comprising of

- Central operations unit
- Chief Executive Officer (Noel, the interviewee)

- Chief Operating Officer
- Central reporting team
- Central business development team
- KPI management leads and operatives
- Central research strategy support

This structure is then also replicated in all 4 co-lead institutions so that there is constant and transparent workflow between the institutions, with similar roles and responsibilities.

Covid-19 facilitated online participation and demonstrated more than ever the need for a VRI. However physical networking is still needed, "making people feel part of something" The CEO has to travel to meet locally face-to-face, even though a functioning VRI – an important part of help, support and engagement. The goal is to have PhD researcher that has affinity to the centre as well to Faculties and Schools in each higher education institution.

It is worth mentioning that each institution follows national Research Ethics and Integrity protocols. Any research involving humans or personal data needs to be approved at institutional level, with signed consent forms, plain language statements and observing strict standards of GDPR, confidentiality and data protection.

SFI centres employ teams of Education and Public Engagement (EPE) personnel that plan, design and carry out science communication/public engagement functions for that centre, and align with other centres. Insight was allocated funding for three EPE managers but the organisation decided this was not sufficient. To move beyond "ad hoc communication" Insight set out a sustainable strategy and appointed an EPE committee, chaired by a PI with the EPE managers on the committee, also used engaged research champions, who were best practice PIs for engaged research. This, in Insight's view, was the best use of limited EPE resources and allowed them to set a long-term vision for engagement with larger EPE involvement. Engaged research is also a central platform for Insight and is one of the few centres that has this so central to its operations, not just and add-on or dissemination effort.

c. European VRIs

The European Institute of Innovation and Technology (EIT) is an Agency of the European Union established in

eit InnoEnergy	EIT InnoEnergy: Pioneering change in sustainable energy (Europe KIC)	**Interviewee**: Christine Durand Learning solution manager
	https://www.innoenergy.com Europe	Investment and coordination of innovation for energy transition **€560 million** in 10 years **100 own-staff** in 6 offices in Europe

2008 to strengthen Europe's ability to innovate. The EIT's Innovation Communities (Knowledge and Innovation

Communities – KICs) bring together businesses (industry and small and medium-sized enterprises), research centres and universities as partners. They allow innovative products and services to be developed and launched on the market, new companies to be started and existing ones to be scale, a new generation of entrepreneurs to be trained. There are currently eight Innovation Communities, and each focus on a different societal challenge. EIT InnoEnergy: Pioneering change in sustainable energy was the first European VRI interviewed.

EIT InnoEnergy brings people and resources together, catalysing and accelerating the energy transition. It connects worldwide, bringing together innovators and industry, entrepreneurs and investors, graduates and employers. As a result, in ten years they have built the largest sustainable energy innovation ecosystem in the world with €560 million has been invested into more than 480 sustainable energy innovations, all on track to generate €16 billion in commercial revenues by 2026, 90% of their start-ups already work with global brand names including ABB, BMW, EDF, Engie, Tata Steel and Vattenfall, and finally, EIT InnoEnergy Master School has attracted students from almost 100 countries (1,200 graduates and 1,500 students enrolled).

CLARIN	CLARIN Common Language Resources and Technology Infrastructure	**Interviewee**: Francesca Frontini Director
	https://www.clarin.eu/ Europe	Total investment: 165 million € **300 researchers** in 60 centers

The second European VRI interviewed was CLARIN (Common Language Resources and Technology Infrastructure). It is a research infrastructure that was initiated from the vision that all digital language resources and tools from all over Europe and beyond are accessible through an online environment for the support of researchers working in humanities and social sciences. CLARIN was established in 2012 and took up the mission to create and maintain an infrastructure to support the sharing, use and sustainability of language data and tools for research in the humanities and social sciences. Currently CLARIN provides easy and sustainable access to digital language data (in written, spoken, or multimodal form) for scholars in the social sciences and humanities, and beyond. CLARIN also offers advanced tools to discover, explore, exploit, annotate, analyse or combine such datasets, wherever they are located. This is enabled through a networked federation of centres: language data repositories, service centres and knowledge centres, with single sign-on access for all members of the academic community in all participating countries. Tools and data from different centres are interoperable, so that data collections can be combined and tools from different sources can be chained to perform complex operations to support researchers in their work.

tic University Prog		**Interviewee**:

	The Baltic University Programme www.balticuniv.uu.se	Madeleine Granvik, Ph.D. Associate Professor Director The Baltic University Programme Uppsala University
		Budget: grant from the Swedish government and 1,000 euros membership/year

The Baltic University Programme, established since 1991 aims to support building strong regional educational and research communities, find novel ways of interaction by promoting openness, internationalization and mobility and to foster knowledge and co-operations in the field of sustainable development (SD) and Education for SD. It gathers 95 Member Universities, 12 National Centres with Centre Directors, 3 Associated Secretariats and 1 Coordinating Secretariat. Since the start in 1991, the BUP has developed a way of working in co-operation, to have teams of colleagues from the 12 BUP countries at the 95 member universities. Colleagues from different disciplines and academic cultures contribute with their knowledge to develop courses, course material, as well as conducting research in co-operation. BUP working model is based around inter-disciplinary, sustainable development, based on research, in the context of the Baltic Sea Region.

jpiamr	Joint Programming Initiative on Antimicrobial Resistance,	**Interviewee**: Édith Brochu Project Manager - Strategic Initiatives
	https://www.jpiamr.eu Global – based in Canada	International collaborative platform Budget: **200 000 euros/year** **28 country-member**

d. Global

The Joint Programming Initiative on Antimicrobial Resistance, JPIAMR, is an international collaborative platform engaging 28 nations and the European Commission to curb antimicrobial resistance (AMR). The JPIAMR coordinates national research funding and supports collaborative action for filling knowledge gaps on AMR with a One Health perspective. Their shared Strategic Research and Innovation Agenda outlines the key areas to be addressed and provides guidance for countries to align their AMR research agendas nationally and internationally. JPIAMR coordinates national public investments and funds for transnational research with the overarching goal to curb antimicrobial resistance (AMR) on a global scale. In a broad range of activities

interlinked with the six priority areas of the shared JPIAMR Strategic Research and Innovations Agenda, SRIA, JPIAMR is seeking and supporting solutions to decrease the transmission of resistant bacteria. This is done in close collaboration with the 28-member countries and support from the European Commission. JPIAMR is one of the few global collaborative research funding platforms with a One Health approach.

	Consortium of European Social Science Data Archives (CESSDA)	**Interviewee**: Ron Dekker, director of CESSDA
	https://www.cessda.eu/	International collaborative platform Budget: **2,8 Million euros/year** **23 country-member (approximately 200 researchers involved)**

CESSDA provides large-scale, integrated and sustainable data services to the social sciences. It brings together social science data archives across Europe, with the aim of promoting the results of social science research and supporting national and international research and cooperation.

The CESSDA Strategy 2018-2022 has four pillars:

- Building on TRUST
- Renown for TRAINING
- Proficient in TECHNOLOGY
- User-friendly TOOLS & SERVICES.

CESSDA builds trust in social science research by ensuring its quality and that it is available for future research. By acquiring the status of a trust repository, CESSDA Service Providers demonstrate their reliability to researchers as well as national and international research funders. CESSDA supports continuous learning and training of its Service Provider staff and the social science user community. The areas covered include research data management, data discovery and reuse, digital preservation and data archiving, as well as CESSDA tools and services.

	Urban Climate Change Research Network (UCCRN)	**Interviewee**: Somayya Ali Ibrahim Coordinator
	https://uccrn.ei.columbia.edu/ New York/Global	20-30 active members/entities around the world (in Hubs/Nodes), and a resource base of more than 1000 researchers, who can be activated more or less immediately.

UCCRN aims to deliver high-level research and become the main entity for climate change action for cities. Its flagship work is the Assessment Report on Climate Change and Cities. The first editions, ARC3, was published in 2011; second edition, ARC3.2, in 2018; and now a third, ARC3.3., is in progress and expected to be published as 12 Element Series (Cambridge University Press) in 2022 and 2023.

5. Recommendations issued from the interviews

a. Objectives of the VRIs

The interviews carried out highlighted the necessity for all the member institutions of a VRI to work in complementarity. The absence of competition between the different members is a prerequisite for effective collaboration. Besides, it is essential to mitigate and communicate about possible competition factors between members of the VRI. For this reason, clarifying in a partnership agreement and in the research agenda about what is expected from each member as part of their activities to the VRI should be the first step in the development process in order to avoid any tension and misunderstanding between members.

b. Internal organization

The internal organisation should also be carefully designed. Indeed, it was highlighted from the interviews that in order to keep it manageable, the size of the structure should be decided beforehand (the size of the structure might grow with time). Besides, it is important to develop a managing structure in which heads of each theme targeted by the VRI are involved in a decision-making council (in addition to or instead of involving directly heads of the member structures). Besides, in order to cope with difficulties in engaging researchers in joint activities (even for long-established VRIs), it appears essential to involve them in small groups of work targeting specific objectives around the common research agenda.

Several of the respondents also highlight the benefits of hybrid organisation, i.e. that a local branch or hub is established with its own organisation and structure in order to support community and local institutional embeddedness and buy-in. This reportedly minimises the fragility or vulnerability of the VRI; it is less reliant on individuals – who may decide to change or quit their job – and their commitments, interests and ability to contribute their time, and more reliant on the institutional commitment.

In case there are contributions or collaborations established with researchers outside the institute, a Memorandum of Understanding should be systematically signed by both sides.

Besides, it was also highlighted in the interviews that the contractual agreement regarding membership should be signed by the rectors of each university members of the VRI with a clear mention of the objectives of the VRI, roles of members and contribution requested.

In this regard as well, having a research / educative approach might also be envisioned in order to attract more stakeholders in the VRI.

Finally, from the interviews carried out, as part of the internal structure and in order to get members actively onboard, it is highly recommended that sustainability of the VRI should be analysed from the start including the envisioned long-term objectives.

c. Communication

In terms of communication, it was highlighted from the interviews carried out that the objectives of the VRIs should be clarified from the start and clearly visible to all the members including the related tasks and contributions from each one. This is the role of the management team to also clarify the missions and vision associated with these objectives, highlighting the added value of funding such structures. This investment in management and HR appears to be essential in order to keep the VRIs system active and sustainable.

In addition to the inter - and intra-institutional communication roles, the importance of engagement more generally between organisations sets up an ethos that facilitates interdisciplinary research while reporting to an emerging entity that is beyond one single institution. This engagement also extends outwards beyond the institutions themselves, where it appears to be more straight-forward to set up public engagement initiatives and include non-academic actors in VRI research.

Finally, effective communication channels and social networks should allow more visibility and reinforce the essential collaborative objective of the VRI. In this regard, several interviewees recommended to have a dedicated communication officer in order to carry out these tasks and in order to liaise with members and potential new members on a regular basis.

d. Teambuilding

The interviews also highlighted the importance of a mixed approach in regards to events. Indeed, although the digital aspect is an essential part of a Virtual Research Institute, the physical meetings are necessary in order to keep researchers engaged and to generate more collaboration. It was also highlighted from the discussions that keeping a variety of different activities (forum, agora or internal social network etc) will strengthen this engagement from VRIs' members and allow for the flexibility which is necessary in regards to the different types of institutions involved. It was also recommended for the activities carried out to include systematically an innovation component.

Finally, some of the long-established VRIs interviewed mentioned the development of an engagement strategy as part of their global strategy mentioning clearly the stakeholders targeted by the VRIs and how they can join the consortium.

e. Budget & Funding

The VRIs surveyed have very different budgets and funding; ranging from small core grants of EUR 25,000 to 50,000 per year to grants of several million euro. However, the common story told through the interviews is that the most important aspect is having dedicated budget, e.g. through a core grant, to be able to undertake the necessary organisational as well as community-building and information/communication activities.

Additional funding and budget dedicated to actual activities, whether they be infrastructure, mobilities (of students/researchers), or actual research, may lie with the VRI but this is not necessary. That is, such budgets could just as well be managed by institutional members and not the VRI, depending on how the VRI is set up organisationally.

If a dedicated, core budget is not available, the VRI may become vulnerable – 'those who pay the salaries, dictate what work is carried out', as one informant put it.

f. VRI's tools and types of activities

On the technical side, the platform to be used shouldn't be omitted and should be simple to use for members. Some of the interviewed VRIs mentioned Basecamp as a good internal tool. It is preferable to use existing tools already familiar to the members instead of looking for new ones.

Among the types of activities supported by the VRIs, the following ones were mentioned from the interviews:

- Mobility Grant for young researchers
- PhD Award
- Course platform
- PhD student training
- Research conferences and seminars
- Scientific Council
- Research Notes Letter
- Research Networks
- User Group in LinkedIn
- Symposium- research forum
- Paper Award young researchers
- Special issues scientific journals
- Public engagement and citizen science teams
- Institutional ethics committees

The activities carried out by the VRI should rely mainly on the interest and needs from the members and following an interdisciplinary approach. In this regard it appears essential for the VRI to keep its domain of research as open as possible.

Besides, activities should foresee reasonable KPIs and expectations considering the different academic culture from the VRIs members. As mentioned by one interviewed VRI, testing the KPIs with a small number of VRI members could be beneficial in setting up achievable goals and activities for the virtual institute.

6. Conclusion and recommandation for good practices for the implementation of SMART-ER's VRI

Virtual Research Institutes represent innovative working environments that aim at enhancing the cooperation and collaboration among researchers in all modern research scenarios. They promote novel approaches and facilitate global and timely sharing of research findings, expertise, and any research supporting "asset" across organizational and operational boundaries and barriers. Because of these potentialities, their development should be guided by a number of principles and best practices aiming at promoting efficiency and effectiveness of the resulting services. Although the VRIs interviewed differ in size, budgets, and objectives, it appears essential for SMART-ER VRI to follow the recommendations mentioned above in particular:

- Clarifying the objectives of the VRI at an early stage (both short term and long-term objectives including the sustainability strategy of the VRI) including the incentives for members to join the VRI
- Develop internal procedures and agreements with members including also the process for potential members to join the VRI
- Develop efficient communication channels and social media to be used by the partners in order to allow the visibility of the VRI and effective collaboration among members.
- Develop local organisation to support **institutional** rather than **individual** commitment.

These initial best practices will be used for the development of the SMART-ER Institute Procedures and Management which will follow this review.

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