



A2.3, O4: Roadmap for further alternative research metrics roll-out for ECIU University



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Beneficiaries

- Aalborg University, Denmark
- Dublin City University, Ireland
- Kaunas University of Technology, Lithuania
- Linköping University, Sweden
- Tampere University, Finland
- Hamburg University of Technology, Germany
- University of Aveiro, Portugal
- Autonomous University of Barcelona, Spain
- University of Stavanger, Norway
- University of Trento, Italy
- University of Twente, The Netherlands
- Institut National des Sciences Appliquées, France

Abstract

Following a consultation process on the feasibility of implementing ECIU recommended metrics across the network, a pilot procedure was developed for the collection and reporting of a subset of metrics specifically relating to joint funding awarded and scholarly publications. This report follows on from the previous work to examine the remaining ECIU metrics that are not as easily captured by widely available or well established mechanisms. This final deliverable for Activity 2.3 highlights the barriers for implementation of these metrics during the pilot phase and considers the possibilities for future roll-out across ECIU University.

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Abbreviations and acronyms

AAU	Aalborg Universitet, Denmark
DCU	Dublin City University, Ireland
DMP	Data Management Plan
DOI	Digital Object Identifier
DORA	Declaration on Research Assessment
EC	European Commission
EEA	European Education Area
ERA	European Research Area
ESR	Early Stage Researcher
ECIU	European Consortium of Innovative Universities
GDPR	General Data Protection Regulation
EU	European Union
H2020	Horizon 2020
HEU	Horizon Europe
HRS4R	Human Resources Strategy for Researchers
INSA	Institut National des Sciences Appliquées, France
JIF	Journal Impact Factor
KPI	Key Performance Indicator
KTU	Kauno Technologijos Universitetas, Lithuania
LA	Local Ambassador
LEAR	Legal Entity Appointed Representative
LiU	Linköpings Universitet, Sweden
MS	Member States
OA	Open Access
PI	Principal Investigator
R&I	Research & Innovation
RFC	Research Field Coordinator
RMF	Researcher Mobility Fund
RPO	Research Performing Organisation
SEPO	Strategic European Projects Office
SMART-ER	ECIU University Research Institute for Smart European Regions
TAU	Tampereen Yliopisto, Finland

TecM	Tecnológico de Monterrey, Mexico
TORA	DCU Research Costing Management Tool
TUHH	Technische Universität Hamburg, Germany
UA	Universidade de Aveiro, Portugal
UAB	Universitat Autònoma de Barcelona, Spain
UiS	Universitetet i Stavanger, Norway
UNITN	Università di Trento, Italy
UN SDG	United Nations Sustainable Development Goal
UT	Universiteit Twente, Netherlands
VPR	Vice-Presidents for Research
VRI	Virtual Research Institute

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1. Introduction

ECIU University is committed to developing and piloting a suite of alternative research metrics that move beyond traditional indicators and recognise a broad range of research-related activities, focussing on societal impact by addressing the United Nations Sustainable Development Goals (UN SDGs), stakeholder engagement, citizen science and open science practices. As determined by earlier consultation with the ECIU research community, ECIU University metrics are intended to assess the success of the alliance in bolstering these initiatives, and do not evaluate the performance of individual researchers or member institutions. As such, ECIU metrics go beyond the typical nature of data currently collected and monitored at the individual institutions. By piloting the reporting at a central level, it has become apparent that ECIU-wide metrics data will need to be collected through a variety of different mechanisms, and will require agreement on a coordinated approach moving forward. The information available through online funding and publication databases was explored in A2.3 O3 and a methodology was developed for the extraction of relevant ECIU-related data. This approach could sufficiently address a subset of recommended ECIU metrics however a number require further consideration. This follow-on report will therefore examine the remaining metrics endorsed by the ECIU research community (i.e. those with no data reported in the pilot as shown in Appendix I) and explore the possibilities for future roll-out across the university alliance.

2. Objectives

Following the piloting of an approach based on widely available resources and databases, this deliverable will detail the barriers faced in implementing the remaining ECIU metrics that were not reflected in the pilot. It will also explore the potential sources and methods for capturing this data going forward and the resource requirements anticipated in order to successfully do so. Finally, the wider policy reform of research assessment in Europe will also be considered.

3. Avenues for further roll out of ECIU metrics and incentives

The preceding deliverable A2.3 O3, piloting the collection of ECIU metrics data, addressed clear mechanisms for monitoring indicators relating to European research awards with at least two ECIU partners and joint scholarly publications using online databases. The summary table of results as previously reported in A2.3 O3 are shown in Appendix I, providing baseline information on current levels of collaboration between partners from which future monitoring and the impact of ECIU University can be benchmarked. While demonstrated in principle, a number of limitations were identified in reporting these relatively standard metrics despite them being the most conventional of those recommended for ECIU.

This follow-on report serves to reflect the remaining metrics not previously addressed and typically more unique to ECIU University activities. However, the introduction and use of these indicators in reality will require significantly more consideration beyond the pilot phase. The barriers and potential avenues identified in this deliverable will serve as a starting point for this discussion moving forward

and an indicative timeline for their roll-out and adoption should be considered in line with the wider ECIU strategic developments and refinement of the Research Roadmap up to the ECIU start-up phase in September 2023.

3.1 Research collaborations

As noted above, baseline data on joint awarded projects was successfully obtained in the previous deliverable A2.3 O3. However, this does not capture in full the overall level of collaboration across the network, as many researchers will work together on proposals that may not prove to be successful in a given funding call. Also understanding the number of unsuccessful joint proposals across the network will provide a wider picture of ECIU research collaborations and indeed can indicate the quality of those collaborations based on the ratio of successful vs unsuccessful and the number of unsuccessful applications that receive a score above threshold.

3.1.1 Joint applications for funding

ECIU metric:

- Number of ECIU University research projects submitted for external funding which receive a score above threshold.

Barriers to data collection in pilot:

Unsuccessful grant applications cannot be captured through the online databases which were used to collect statistics on external funding for the metrics pilot. Given the sensitive nature of this type of information, the Horizon Dashboard provides aggregated data including success rates on submitted R&I proposals down to the regional level but further details on institutional statistics are not publicly available. The Erasmus+ Projects Platform does not provide any information on submitted applications.

Options for future roll out:

It is likely that three separate approaches will be required to determine the full number of joint grant applications submitted for external funding.

1) SEPO-tracked (top-down) proposals

The Strategic European Projects Office (SEPO) has recently been established (February 2022) and among its aims is to support the development of strategic proposals to further the objectives of ECIU University. Therefore, proposals that are initiated by SEPO or those which are developed specifically within the framework of ECIU (e.g. ECIU Foundation is a partner or provides a Letter of Support, requires ECIU resources, etc.) are directly tracked and the outcome and evaluation score can be recorded. Thus reporting on the number of submitted proposals and those which receive a score above threshold can easily be fulfilled for projects of this nature.

2) ECIU-supported (bottom-up) proposals

ECIU University also aims to strongly support bottom-up collaborations and connect researchers across the network through initiatives such as those within SMART-ER (e.g. the Seed Programme), the Researcher Mobility Fund (RMF) and specific requests channelled through ECIU Local Ambassadors (LAs) or dedicated groups such as the R&I Policy & Programmes Expert Group and the Educational

Cooperation Expert Group. External funding applications arising from these targeted activities can be considered genuinely ECIU-linked, and should be recorded through appropriate monitoring or follow-up by responsible persons within each initiative. For example, SMART-ER is currently developing a robust Monitoring & Evaluation Model. RMF contact points should record outcomes of awards to researchers within their university, and institutional representatives should follow-up on specific collaborations developed through direct request. For funding applications recorded in this way, it may not be possible to determine if unsuccessful proposals received a score above threshold as sharing such information is typically at the discretion of individual applicants.

3) Partner collaborations beyond ECIU

It will also be relevant to understand the levels of wide scale collaborations across the network, even if joint proposals between two or more member institutions arise independently of ECIU itself. As was the case in analysing successful joint awards shared between partners in A2.3 O3, the most feasible mechanism for the collection of data pertaining to joint grant proposals remains with common EU funding programmes at present. While excessive manual data review at institutional level is to be avoided, a relatively straightforward tool and process for reporting submitted Horizon 2020/Horizon Europe (H2020/HEU) proposals is available:

1. Within each institution, the Legal Entity Appointed Representative (LEAR) and any Account Administrators¹ may extract all past (from 1st January 2014) and/or current proposals into Excel through their access rights on the Funding & Tenders portal. Note the downloaded data does not contain the names of other beneficiaries involved in each proposal.
2. The LEAR/Administrator can anonymise the data for their institution by only providing the project ID and/or acronym.
3. An appointed individual or central entity responsible for reporting ECIU metrics collects the list of anonymised proposals from each institution and cross-checks across all partners to identify joint proposals. Further checks can be completed to ensure there is no duplication with proposals recorded in Methods 1 & 2 above.
4. For each joint proposal, particularly if in an ECIU priority area, the appointed individual can enquire further with the relevant ECIU partners through a defined process e.g. via the R&I Expert Group to disclose further details, if available.
5. Similarly, it will likely not be possible to determine threshold scores in this instance, but rather will provide a ratio of all joint proposals versus funding awarded by comparison with Horizon project data collected in A2.3 O3.

The collection, storage and manipulation of anonymized data provided by member institutions will depend on shared trust and the definition and agreement of internal rules.

To initiate this action, discussion should be brought forward to the Vice Presidents for Research (VPR) Group for approval and to provide each institution's Grants Office/LEAR with the necessary mandate to proceed with this activity.

Notably, each of the approaches outlined above needs to be carried out in parallel and coordinated centrally with significant capacity required to conduct such extensive data reviews. Consideration of the necessary resource requirements to facilitate this work is addressed in Section 3.5 below. Given the strategic importance in understanding the level of research cooperation and the H2020/HEU topics and pillars currently covered by collaborations between partners for further developing the

¹ [Roles and access rights - Online Manual - Funding Tenders Opportunities \(europa.eu\)](https://ec.europa.eu/euroopa/europa/europa_en)

ECIU research roadmap, the Strategic European Projects Office (SEPO) including the R&I Expert group² in particular may play a key role in this process.

3.2 Dissemination and events

ECIU metrics:

- Number of webinars and public lectures discussing ECIU University research projects
- Number of challenge-based events organised by researchers (education, research, innovation)

Barriers to data collection in pilot:

As demonstrated in deliverable A2.3 O3, while there are numerous research projects (H2020/HEU) and projects in educational cooperation (Erasmus+) involving member institutions, the majority cannot necessarily be defined as true ECIU University joint projects in which the objectives of the alliance are pursued or where ECIU is used as a framework for the collaboration. Given this limitation with the current data available, in general it is not possible or of relevance to monitor the public dissemination of the projects identified as they are not linked directly to the alliance.

In the case of researcher-driven challenge-based events, ECIU University has been working during this pilot phase to define CBR and to introduce this concept to the research community. Embedding such an approach requires time and first nurturing the initial engagement of researchers in the network. This work is currently ongoing and will also need a clear value proposition and incentives at ECIU (addressed in Section 3.4) and at institutional level to support researchers in participating and leading such challenge-based activities.

As a result, it cannot be expected at this present time for ECIU University to be in a position to meaningfully deliver on these types of dissemination and engagement metrics during the pilot phase, but they will be important for determining impact in the longer term.

Options for future roll out:

The ECIU SMART-ER project is dedicated to developing the research dimension of ECIU University going forward and is undertaking a number of concrete initiatives to support bottom-up collaborative projects. It is therefore most logical for the reporting of webinars and public lectures discussing joint research projects supported by SMART-ER to primarily fall under its dedicated Monitoring & Evaluation model, which is currently under development for the Virtual Research Institute (VRI).

On the reporting of challenge-based events, SMART-ER also aims to embed a challenge-based approach in the research community and such activities could also be captured. In particular, the recently appointed Research Field Coordinators (RFCs) and their respective communities can play a key role in the organisation of challenge-based events in each of the SDG 11 priority areas. The aim of the RFCs is to develop transnational bottom-up research communities supporting CBR, citizen science and public engagement initiatives through community-building activities and the development of joint ECIU funding proposals.

² <https://www.eciu.org/eu-affairs#sep0>

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It is also important to recognise that researchers may also be involved in events focussed on or arising from education or innovation activities, in line with ECIU University's vision of an integrated challenge-based model. A joined-up approach therefore needs to be adopted at the wider ECIU level to ensure that researcher involvement is also captured outside of just the SMART-ER framework. This will be crucial to understanding the widespread engagement of researchers across the network, particularly as a number of strategic ECIU projects are underway or emerging to support the various dimensions of ECIU University as a whole. While the onus should remain with individual projects to track and record their own dissemination activities and challenge-based events, ECIU central management will need to oversee the amalgamation of these data to most accurately reflect the involvement of researchers in events across challenge-based learning (CBL), challenge-based research (CBR), and challenge-based innovation (CBI).

3.3 Impact

ECIU metrics:

- Impact case studies for ECIU University research projects related to relevant UN SDGs.
- Impact case studies measuring the degree and impact of researchers' engagement with non-academic stakeholders (e.g. students, citizens, local communities, industrial partners) via dissemination.

Barriers to data collection in pilot:

Impact case studies are an important qualitative tool for both assessing and showcasing the progress, transformation and achievements of researchers and research projects that are not easy to quantify, and should be incorporated into an overarching assessment model to ensure the most holistic view of ECIU research performance. As the impact of research projects or activities can only be truly determined in the medium to long-term, it is not feasible in this pilot phase for robust case studies to be conducted when ECIU University research projects and stakeholder engagement initiatives have only just commenced. Furthermore, a clear framework for capturing this type of qualitative data across ECIU partners would first need to be defined.

Options for future roll out:

The philosophy of ECIU University and the SMART-ER Institute is to go beyond traditional measures of quality, such as publications in high impact factor journals, and to recognise and emphasise the wider and societal impact of research. As noted above, the SMART-ER Monitoring & Evaluation model is currently under development. Within this, an Impact Model, including case studies and other narrative approaches, will also be developed and formally adopted to support the wider R&I framework for ECIU University and can be expected in 2023.

Despite their inclusion here as an ECIU 'metric', impact case studies are not quantifiable in themselves. However other alternative and impact-related metrics may also be implemented to support overall assessment of research impact across ECIU University.

To explore policy impact, Overton (<https://www.overton.io/overton/>) an online searchable database linking policy documents to the original research outputs or researchers, could be an effective tool.

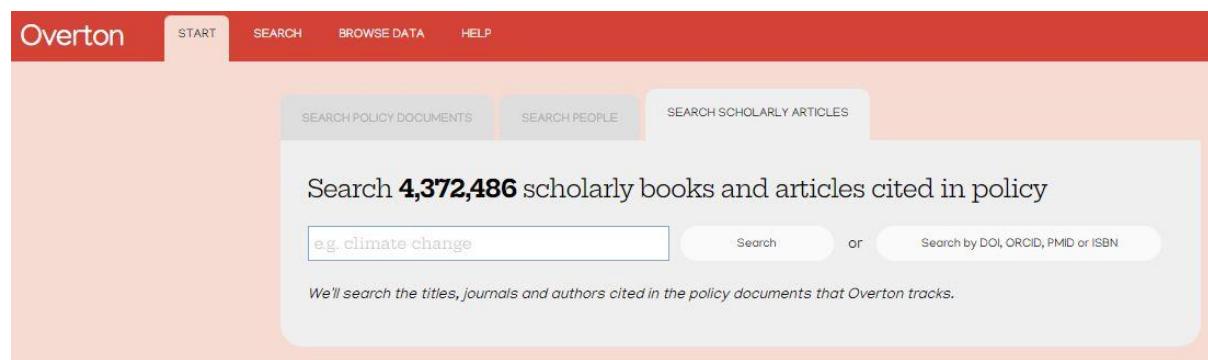


Figure 1. Overton homepage for searching policy citations

For example, by searching the publication DOIs from joint outputs previously obtained from SciVal (A2.3 O3), of the 668 joint publications between partners captured since November 2019, 20 publications (3%) were cited in policy documents. This data can be further interrogated, for example through analysis of the citing countries and policy source types as shown in Figure 2 & 3 below.



Figure 2. Interactive Overton map illustrating the countries where joint publications with ECIU partners are cited in policy (since Nov 2019)

Citing policy source types

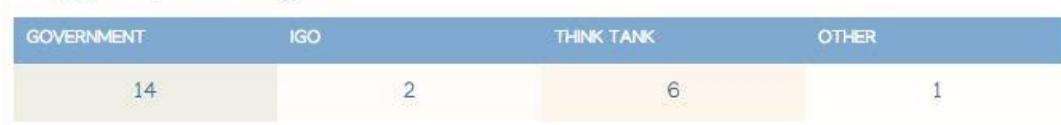


Figure 3. Sources of policy citations identified in Overton for joint publications with ECIU partners (since Nov 2019)

To better understand impact and impressions beyond the academic community, Alt-metric (<https://www.altmetric.com/>) is a common and powerful tool for tracking the quantity and quality of attention that research outputs receive across a variety of channels online, including mainstream media coverage, social media mentions, blogpost discussions, etc. Alt-metric data are captured in an interactive 'donut', often displayed alongside other traditional publication metrics such as citations. In the donut each colour strand represents a different source of online attention as shown in Figure 4. The central score is calculated via a weighted approximation. Capturing these 'Alt-metrics' can supplement analyses of research impact, demonstrating the levels and breadth of dissemination and reach.

The Colors of the Donut

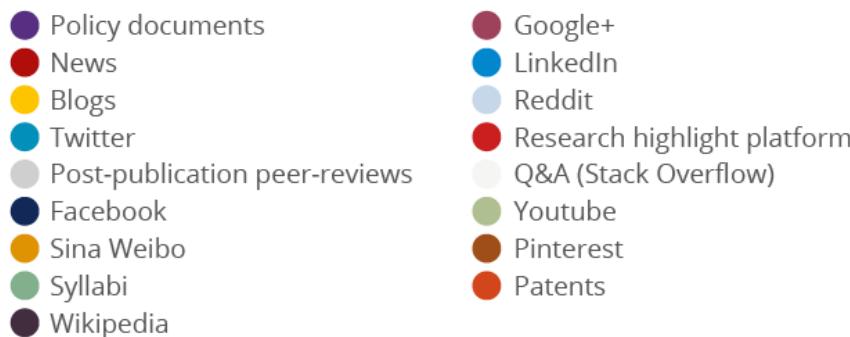


Figure 4. Colours key representing the online sources captured in the Alt-metric donut for each publication³.

Both Overton and Alt-metric require paid subscriptions, usually via institutions, for the use of their databases. Recently, SciVal have launched a new Impact module⁴ as part of their service to also identify policy citations, and it can be expected that this module will be expanded to include additional 'alt-metrics' in future. Therefore, a number of options for capturing impact-related data to support and enrich impact case studies or other qualitative methods can be considered by ECIU University going forward.

3.4 Researcher survey and recommended incentives

ECIU metric:

- ECIU University to send an annual survey to researchers involved in ECIU University research projects (with questions related to age group, gender, career stage, type of contracts)

Barriers to data collection in pilot:

On account of General Data Protection Regulation (GDPR), it is not possible to share contact details and to send surveys or other communication to researchers across the network without their prior consent. Particularly given the sensitive nature of some of the suggested questions that assist in understanding research career development and researcher needs across the network and those that

³ Figure 4 Altmetric image sourced from <https://www.altmetric.com/about-our-data/the-donut-and-score/>

⁴<https://www.elsevier.com/solutions/scival/impact#:~:text=The%20SciVal%20Impact%20module%20provides,research%20programs%20and%20funding%20strategies>

also relate specifically to each institution's employment and career frameworks, further consultation and agreement on the content and a compliant process for the collection and analysis of survey data needs to be established.

Options for future roll out:

Researchers across the network have already been engaging in SMART-ER activities that support research projects, including the Seed programme and the Citizen Science pilots, and certain data is available from these initiatives which can provide initial anonymised information relating to gender balance and career stages of those actively participating in network activities. However, these researchers cannot be contacted beyond the scope of the activity they are engaged in, and so in future any application procedures for SMART-ER or ECIU research-related activities should be expanded to include an opt-in option to receive wider ECIU research communications, including an invitation to the annual researcher survey. Additionally, expansion of the survey to include challenge owners should be considered to gain the perspective of the external actors that also contribute to and benefit from CBR and better track the impact of the alliance.

Responsibility for these general communications will need to be organised at a central level or coordinated between institutions to ensure equal participation and representation as much as possible across partner institutions to facilitate ECIU best serving the research community as a whole. In future, as research offerings and activities become integrated into the ECIU Digital eXperience Platform (DXP), the researcher survey could be rolled out to researchers and stakeholders who have signed up to this platform.

Regardless of the approach, widespread participation in the survey will be needed to allow for well-informed planning of future activities and supports. A number of recommended incentives have previously been identified in A2.3 O2, several of which are already being fulfilled by SMART-ER initiatives, as shown in Appendix II. An annual researcher survey will help to ensure those which have been identified can undergo a regular review process and can be retained or refined to remain relevant to addressing research needs.

3.5 Resource requirements

It is apparent that a significant amount of coordination and time commitment will be needed to accurately monitor the success of ECIU University in supporting co-created, impact-driven, challenge-based research across the network using the metrics identified in WP2.3. Numerous individuals, groups and newly developed ECIU virtual support structures currently provide exceptional contributions to developing and driving the research ambitions of the alliance. However, the expectations on these parties must be carefully managed when work is typically carried out on a voluntary or in-kind basis, and where dedicated support is available the current capacity for serving such a large community across the network is limited at present. Specifically, key actors in ECIU University and SMART-ER include the recently appointed Research Field Coordinators, and the Strategic European Projects Office which includes the ECIU Funding Advisor (full-time central role), the Educational Cooperation Expert Group (EduCoop Group) and the Research and Innovation Expert Group (R&I Expert Group). The EduCoop and R&I Group members consist of institutional Research Office or other staff representatives that participate on a voluntary basis. It is not feasible to assign additional responsibilities across these and other groups without providing dedicated support, should the implementation of the tasks or incentives identified in this report fall within their remit. For

example, the potential addition of further full- or part-time central positions within SEPO, and institutional commitments to facilitate more formal and long-term engagement of staff to support joint initiatives would be greatly welcomed. The potential to integrate specific research metric related functions at the design and specification phase of the planned ECIU DXP should be explored as this is the best opportunity to leverage of commitments already made to develop this platform for ECIU activity management.

4. EU policy considerations

Considering the wider landscape of research metrics and assessment practices, there is growing momentum in Europe for a reform in research assessment to take a more holistic approach towards recognising and rewarding the diversity of outputs and impacts arising from research activity at all levels, from individual researchers and research projects, research units or centres and research performing organisations (RPOs). Currently, traditional and narrow metrics such as H-index and the use of Journal Impact Factors (JIFs) are deeply embedded and do not value the vast array of scholarly contributions and broader impact of research. The use and dominance of these indicators strongly dictates behaviours and supports the still prevalent ‘Publish or Perish’ culture within the R&I system. While many positive advances have been made in the promotion and uptake of open science practices, inter- and transdisciplinary research, stakeholder engagement and citizen science approaches in recent years, more incentives and recognition are needed to support widespread adoption of these approaches. Greater acknowledgement of the contributions already strongly integrated with an academic career, such as teaching and mentoring, is also needed.

Some research funding agencies and academic institutions are already working to improve their own research assessment criteria and practices⁵, but in order to effectively implement the change that is needed, a significant coordinated international effort is required and has recently been initiated at European level. The political and policy context at European level driving this reform includes the following (non-binding) statements and commitments:

- European Commission (EC) Communication on ‘A new ERA for Research and Innovation’ (September 2020)⁶ setting out a European framework for research careers and improvements to the current research assessment systems as strategic objectives;
- Council Conclusions on ‘The new European Research Area’ (December 2020)⁷ and ‘Deepening the European Research Area: Providing researchers with attractive and sustainable careers and working conditions and making brain circulation a reality’ (May 2021)⁸
- Council Recommendation on ‘A Pact for Research and Innovation in Europe’ (July 2021)⁹ as a key pillar for the new European Research Area (ERA) in which a number of priority areas were defined. The proposal was adopted in November 2021.

⁵ <https://sfdora.org/dora-case-studies/>

⁶ <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2020%3A628%3AFIN>

⁷ <https://data.consilium.europa.eu/doc/document/ST-13567-2020-INIT/en/pdf>

⁸ <https://www.consilium.europa.eu/media/49980/st09138-en21.pdf>

⁹ <https://www.eumonitor.eu/9353000/1/j9vvik7m1c3gyxp/vlkjge4d2jzo>

In line with the above developments, the ERA Policy Agenda: Overview of Actions for the Period 2022-2024 (November 2021)¹⁰ has proposed a number of concrete actions addressing the ERA priorities and will be implemented based on whether support for each action is received from the majority of EU Member States (MS). The relevant actions for addressing research assessment and careers, which have received support from MS in the first semester of 2022, are:

- Action 3: Advance towards the reform of the Assessment System for research, researchers and institutions to improve their quality, performance and impact
- Action 4: Promote attractive and sustainable research careers, balanced talent circulation and international, transdisciplinary and inter-sectoral mobility across the ERA. Note: Action 4 received the largest number of MS commitments (25/27).

On the reform of research assessment, the Commission has initiated the voluntary signing of an agreement by individual research funders, research performing organisations and assessment agencies to move towards a common understanding and a set of shared principles within a European framework, whilst still providing flexibility and respecting the autonomy of individual institutions. The Agreement was finalised in July 2022¹¹ and outlines the specific commitments and timeframe for reform. European University alliances have also been invited to join this 'Coalition of the willing' as potential testbeds for reforming these practices. Alliances can demonstrate many parallels with the wider landscape given the deep levels of collaboration within these networks while still preserving national and institutional identity and autonomy. The ECIU University is a member of the coalition and as the largest European University alliance is prepared to offer expertise and utilise the network to advance the implementation of new or revised practices going forward, including qualitative assessment and responsible use of quantitative indicators. In the short-term ECIU University is interested in participating as a stakeholder association within the ERA Forum in the implementation of Action 3. The University of Twente and Tampere University are also included independently as signatories of the Agreement.

On account of this, the metrics identified by ECIU University in the pilot phase therefore will most likely serve as transitionary and evolving indicators, reflecting the vision and values of ECIU while still facilitating data to be captured as much as possible and utilised effectively within the current system. It is expected that ECIU research metrics will continue to be adapted to best support this wider drive for reform and to facilitate the adoption of the outcomes identified in this movement both within and beyond the network.

To demonstrate continued leadership in this area and support wider developments in research assessment reform, an **ECIU Position Paper on alternative research metrics** could be considered for publication in the near future.

5. Conclusion

The report for Activity 2.3 O1 previously highlighted that over half of ECIU partner institutions are constrained in the assessment of their research and researchers by regional and/or national

¹⁰https://ec.europa.eu/info/sites/default/files/research_and_innovation/strategy_on_research_and_innovation/documents/ec_rtd_era-policy-agenda-2021.pdf

¹¹ https://research-and-innovation.ec.europa.eu/news/all-research-and-innovation-news/reforming-research-assessment-agreement-now-final-2022-07-20_en

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legislation, and thus Activity 2.3 O2 identified a number of recommended metrics that can measure the success of the ECIU University in supporting the development of research collaborations and wider engagement practices. By assessing the performance of the alliance, and not individual institutions, research groups or researchers, the recommended indicators do not incite competition or one-dimensional perspectives on performance, but rather have the potential to quantify the added value of ECIU to its members over time, as well as fostering a culture across the network that recognises and values open science, co-creation and societal impact. However, the challenges faced in collecting this data demonstrate the barriers that exist in implementing new approaches, with many different systems and methodologies in effect across institutions.

This need for a more unified system and the widespread adoption of broader assessment criteria and principles is relevant to all types of research and disciplines. It is particularly significant for embedding a challenge-based approach, which looks to find solutions to complex problems faced by society often with unpredictable outcomes. CBR is defined by the quadruple helix model, with inter-disciplinary collaboration, co-creation and engagement with stakeholders at its core, to maximise the impact and benefit to society. ECIU University therefore supports greater recognition and value attributed to these and other activities as important elements of assessment. The ECIU metrics identified and explored in WP2 can serve as foundational work in this area, which may continue to be adapted to test new integrative models that emerge from wider reforms.

Appendix I

	Recommended ECIU metric (A2.3 O2)	Adjusted metric for pilot phase (A2.3 O3)	Results (Nov 2019 – July 2022)
1	Number of awarded ECIU University research projects across the Alliance	Number of joint projects with two or more ECIU partners awarded European funding	H2020/HEU: 15 Erasmus+ KA2: 11
2	% of awarded ECIU University research projects in each institution (as compared to overall number of externally funded research projects)	% of joint EU-funded projects with two or more ECIU partners in each institution (as compared to overall number of EU-funded projects)	H2020/HEU: 6 – 36% (Median 11%) Erasmus+ KA2: 0 – 38% (Median 11%)
3	Number of ECIU University research projects submitted for external funding which receive a score above threshold		
4	% of outputs related to UN SDGs deriving from ECIU University research projects (as opposed to non-SDG focus)	% of joint publications related to UN SDGs with two or more ECIU partners (as opposed to non-SDG focus)	33%
5	% of awarded ECIU University funding applications focusing on UN SDGs	% of joint EU-funded projects focusing on ECIU SDG 11 thematic areas	H2020/HEU: 40% Erasmus+ KA2: 36%
6	Impact case studies for ECIU University research projects related to relevant UN SDGs		
7	% of Open Access publications derived from ECIU University projects relative to overall number of publications, including Diamond, Gold, and Green Access routes	% of Open Access publications relative to overall number of ECIU joint publications, including Diamond, Gold, and Green Access routes	70%

8	% of ECIU University research projects with openly available data sets (as compared to overall number of ECIU University research projects)		
9	Number of webinars and public lectures discussing ECIU University research projects		
10	Impact case studies measuring the degree and impact of researchers' engagement with non-academic stakeholders (e.g. students, citizens, local communities, industrial partners) via dissemination		
11	Number of industry partners involved in ECIU University research projects	% of joint EU-funded projects with external stakeholder involvement	H2020/HEU: Industry – 87%; Public body – 40% Erasmus+ KA2: SME – 11%; NGO – 11%; Other societal partner – 9%
12	Number of challenge-based events organised by researchers (education, research, innovation)		
13	% of awarded ECIU University research funding applications involving citizen science	% of joint EU-funded projects involving citizen science	H2020/HEU: 20%
14	ECIU University to send an annual survey to researchers involved in ECIU University research projects (with questions related to age group, gender, career stage, type of contracts)		

Table 1. Summary of ECIU metrics addressed during the pilot phase

Appendix II

Recommended incentives and supports available during the Pilot Phase		
1	The ECIU Researcher Mobility Fund (RMF) supporting short visits to other ECIU member institutions	The RMF was relaunched in late 2021 across the network and been successful in initiating and further developing numerous research collaborations across ECIU partners. https://www.eciu.org/for-university-staff/researchers-mobility-fund
2	Seed funding for the joint development of research proposals	Seed funding focussing on the four SDG 11 priority areas has been successfully implemented within SMART-ER. The Seed Programme launched and ran two calls supporting three types of collaboration: PhD co-tutelles, thematic research networks and seed projects in challenge-based research. https://www.eciu.org/smart-er-for-researchers#research-funding
3	Development of a shared research strategy focused on UN SDGs and challenge-based research	The development of a joint research strategy was delivered through Activity 2.5 and resulted in the launch of the ECIU long-term joint strategy on Smart Regions in September 2020 https://www.eciu.org/news/eciu-university-launches-long-term-joint-research-strategy-on-smart-regions A strategic approach to developing CBR was also defined and published as an ECIU position paper in May 2022 https://www.eciu.org/news/the-future-of-research-is-challenge-based
4	Joint training on Open Access for researchers, including list of recommended OA journals, existing international, institutional and national OA platforms for publication	A dedicated short training course has been developed and delivered by the SMART-ER Academy https://www.eciu.org/courses/open-science An SMART-ER policy on open access for research will be developed as part of the statutes of the Virtual Research Institute going forward.

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5	Training for researchers on communicating research outside academia, including in the media	A dedicated short training course has been developed and delivered by the SMART-ER Academy https://www.eciu.org/courses/professional-communication
6	Training for researchers on citizen science methodologies	A dedicated short training course has been developed and delivered by the SMART-ER Academy https://www.eciu.org/courses/citizen-science-and-public-engagement
7	Development of an ECIU Citizen Science Hub, with local supports based in each institution	A virtual Citizen Science platform has been developed and successfully implemented by SMART-ER WP5 (https://www.csinitiative.eu/) The platform has been utilised by researchers across the network to co-create a number of transnational CS pilot projects. Dedicated local supports within each institution are not currently available, however a CS community (research field) has been established within SMART-ER and local contact points may be appointed in future through this approach.
8	Dedicated research development supports for funding applications with several ECIU partners, including support with matchmaking	This support is currently provided within SEPO by the ECIU Funding Advisor for calls of a strategic nature to support ECIU objectives. The dedicated capacity of SEPO would need to be further expanded to provide RD support for bottom-up research proposals within the research community. Support with match-making is already taking place through the R&I Group (part of SEPO), however a clear process needs to be further defined.
9	Information sessions on ECIU University for researchers	This has been carried out at institutional level with material developed by ECIU WP9 and SMART-ER WP6.
Recommended incentives and supports awaiting further development		
10	ECIU joint communications on relevant calls	A regular e-newsletter, for example via SEPO, could be established to highlight relevant European calls in SDG 11 areas. In the start-up phase, functionality to support the notification of relevant calls for researchers should be incorporated as a key feature into the DXP environment.
11	Joint training for researchers on how to apply to Horizon Europe funding	General training on proposal development and funding strategy has been developed and delivered by the SMART-ER Academy (https://www.eciu.org/courses/research-grants-from-the-project-idea-to-the-funding).

		To focus on Horizon Europe specifically, arrangements could be made to open current training opportunities delivered internally within ECIU partners, allowing both the sharing of expertise and alleviating training workload for institutional Research Office staff. Formal agreement by the Vice Presidents for Research Group would be required.
12	Training on impact for researchers	<p>A number of relevant SMART-ER Academy courses have been developed that relate strongly to research impact such as the Introduction to Challenge-based Research and Citizen Science and Public Engagement. Training on research impact could be addressed more broadly in future SMART-ER Academy programmes.</p> <p>Training on impact in the context of funding proposals could jointly be addressed by providing access to resources currently delivered at institutional level, as noted in #11 above.</p>
13	Training on data management for researchers	Training on data management in the context of funding proposals could also be considered as a joint workshop run by the R&I Group as a SEPO initiative. Or Training on DMP in the context of funding proposals could jointly be addressed by providing access to resources currently delivered at institutional level, as noted in #11 and #12 above.
14	Training for researchers on technology transfer	Coordination with BOOGIE-U is needed to explore how training on innovation, entrepreneurship and technology transfer can be adapted or developed to support researchers.
15	Follow-up funding for research projects with strong impact potential	Internal follow-on funding initiatives for SMART-ER seed projects or other joint ECIU collaborations will be reliant on the future support secured for continued development of the R&I dimension of ECIU as a European University alliance. Regardless of this current uncertainty, dedicated support to identify external opportunities for SMART-ER/ECIU initiated projects could be considered as an offering.
16	ECIU members to share best practices related to policy engagement at EU level	A formal group does not currently exist within ECIU University but could be established to support the work of the ECIU Brussels Office.
17	Dedicated contact points for researchers to support data management in funding applications	Dedicated central capacity (not yet defined), the joint development or sharing of resources, or a formal agreement to offer specific support from expertise within institutions would be needed to fulfil this incentive.

18	Promote public engagement stories on the ECIU website and relevant channels of communication	Coordination with the SMART-ER Public Engagement Community of Practice and direct follow-up on SMART-ER Seed programme awards and any other ECIU joint research initiatives should be carried out routinely to identify case studies for PE. A process for developing stories for online showcasing and public dissemination needs to be agreed and could be developed as part of the SMART-ER Impact Framework. This could also be linked with the ECIU central role of Communication Manager once instated.
19	Working groups on citizen science, technology transfer, and consultancy collaborating to share best practices and align services	Sharing best practices on citizen science has been successfully supported within SMART-ER by building a community of researchers within the Citizen Science Hub and establishing a thematic research field dedicated to citizen science. The need for working groups on technology transfer and consultancy in order to align services requires further consideration and agreement at central and institutional level before these are initiated.
20	Member institutions required to sign the European Charter and Code of Researchers:	Consideration and agreement from the Vice Presidents for Research group is needed for this incentive to be supported and enacted across all ECIU member institutions.
21	ECIU University to consider signing the DORA declaration (https://sfdora.org/) on behalf of the member institutions	Endorsement from the Vice Presidents for Research group is needed followed by consideration and agreement from the ECIU Presidium and ECIU Board in order to arrange signature of the DROA declaration by ECIU University.
22	Creation and signature of a shared statement on the Responsible use of Research Metrics	A shared statement or position on the responsible use of research metrics could be developed within the statutes of the SMART-ER Institute. Endorsement from the Vice Presidents for Research group is needed to ensure alignment across member institutions.

Table 2. Recommended incentives and supports to promote researcher engagement with ECIU University