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SHAPE-ID: Shaping Interdisciplinary Practices in Europe

Deliverable 3.1: Matrix for integration of learning cases and framework of analysis

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Abbreviations

AH – Arts & Humanities

AHSS – Arts, Humanities and Social Sciences

EC – European Commission

ELSI – Ethical, Legal, Social Impact

ERC – European Research Council

ETH – Swiss Federal Institute of Technology (partner)

H – Humanities

H2020 – Horizon 2020

IBL PAN – Institute of Literary Research, Polish Academy of Sciences (partner)

ID – interdisciplinarity

IDR – interdisciplinary research

JSTOR – Journal Storage

LW – Learning Workshop

MD – multidisciplinarity

MDR – multidisciplinary research

MIT – Multi-Inter-Transdisciplinary

MIT4RRI – Multi-Inter-Transdisciplinarity for Responsible Research and Innovation

MSC – Most Significant Change

RRI – Responsible Research & Innovation

SHAPE-ID – Shaping interdisciplinary practices in Europe

SS – Social Sciences

SSH – Social Sciences & Humanities

STEM – Science, Technology, Engineering and Mathematics

STEMM – Science, Technology, Engineering, Mathematics and Medicine

TD – transdisciplinarity

td-net – Swiss based Network for Transdisciplinary Research

TCD – Trinity College Dublin (partner)

TDR – transdisciplinary research

WP – Work package

1 Executive summary

SHAPE-ID has been funded by the European Commission to explore the challenge of how to better support the integration of Arts, Humanities and Social Sciences (AHSS) perspectives into interdisciplinary research with Science, Technology, Engineering and Mathematics (STEM) and other scientific disciplines, including Medicine (we use 'STEMM' hereafter to refer to STEM + Medicine), particularly in the context of addressing societal challenges.

In this context, SHAPE-ID Work Package 3 (WP3) is organising a series of workshops to learn directly from the experiences of researchers from across disciplines, as well as policy makers, funders and representatives from research performing organisations, industry and the cultural sector. This deliverable comprises two parts:

- Section A illustrates the matrix for integration of learning cases and the framework of analysis that was co-designed with the SHAPE-ID partners at the Co-Design Workshop, held at ISINNOVA, in Rome, on 13-14 June 2019.
- Section B illustrates a challenge-oriented research evaluation framework, criteria and tools proposed to evaluate research projects, as well as an evaluation methodology proposed for the learning workshops.

1.1 Section A summary: workshop design, focus, schedule and planning of activities

The SHAPE-ID Co-Design Workshop took place in Rome from 13-14 June 2019. Its purpose was to develop a common understanding and approach for workshop design and a schedule of Learning Case Workshops, including the focus of each workshop. A Co-Design Workshop Report was prepared as an internal working document by ISINNOVA, Work Package 3 leader, with input from all partners hosting workshops. This report forms the basis of Section A, which presents the design and planning decisions arrived at in this workshop.

Workshop Design: it was agreed that a common framework will be adopted for each workshop, within which partners would select the most appropriate methods for each workshop session or activity. Each workshop will be designed as a learning journey, commencing with a 'Downloading' or 'Sharing' session in which participants will present case studies, vignettes or examples of projects, followed by a 'Listening' session in which participants will discuss in small groups a series of key questions related to the workshop challenge and presented by the organisers, and finally a more forward-looking 'Envisioning' session in which participants will engage in activities around imagining the emerging

future. This approach is intended to bring participants on a journey from understanding their own perspectives, to understanding more deeply the relation of their own perspectives to those of other participants from different backgrounds or areas, to working together to explore pathways to change. Within this broader structure, each workshop will select its own methodologies for structuring individual sessions. For example, the World Café is a suitable option for the 'Listening' session as it facilitates in-depth small group discussion on several topics; and the 'Envisioning' session may include group activities on critiquing and redesigning funding calls or missions to better integrate Arts, Humanities and Social Sciences (AHSS).

Workshop Focus: during the Co-Design Workshop, each partner engaged in group activities to develop the focus of the workshop they will host. The overall proposals were then discussed collectively to evaluate the topical coverage of the workshops. The overall schedule for the six workshops is as follows:

Workshop	Date	Location	Partner in charge[1]	Challenge-oriented focus
Workshop 1	2-3 Dec 2019	Dublin	Trinity College Dublin	Positioning the Arts and Humanities to Lead Research Addressing Societal Challenges
Workshop 2	20-21 Jan 2020	Edinburgh	University of Edinburgh	Bringing an Environmental Humanities lens to bear on interdisciplinary collaboration among AHSS and between AHSS and STEM
Workshop 3	17-18 Feb 2020	Turin	ISINNOVA (Politecnico di Torino)	Inter/Trans-Disciplinary educational models and approaches that support sustainable urban transformation
Workshop 4	23-24 Mar 2020	Bilbao	ISINNOVA (University of Deusto)	Artificial Intelligence (AI) challenges and scenarios of collaborative learning, working and living with machines (co-robotics)
Workshop 5	20-21 Apr 2020	Warsaw	IBL PAN	Streamlining Digital Humanities research and infrastructure in the cultural heritage domain
Workshop 6	14-15 May 2020	Zurich	ETH Zurich	Intersections or reconfigurations? Arts and Humanities integration in inter- and trans-disciplinary research

Table 1 Workshops overview

Because of the significant underrepresentation of the Arts and Humanities in collaborative research projects integrating AHSS more generally, the opening and closing workshops focus on the Arts and Humanities. The first workshop addresses the overarching question of how the Arts and Humanities can play a greater role, as leader or equal partners, in research focused on societal challenges (mission-

[1] Including external collaborator where relevant

oriented research, SDG-inspired research or other socially relevant research challenges). The final workshop revisits this question but focuses more on exploring concrete tools and guidelines, drawing also on the outcomes of other workshops, and places a greater emphasis on bringing together funders and academic policy makers. This also reflects the shift in context, from the first workshop in Ireland where IDR and TDR are not well supported at funding and policy level, to Switzerland, where evidence will be produced to support a strong history of funding IDR and TDR.

The second and fifth workshops take up two areas within the humanities that have developed into strong new IDR clusters: the Environmental Humanities in response to the significant environmental challenges facing the world today, and the Digital Humanities in response to emerging collaborations with ICT researchers and the availability of new methods for cultural transmission, analysis and preservation. Lessons can be learned from these areas about how ID collaboration emerges from disciplines and how these two areas interact with Science, Technology, Engineering, Mathematics and Medicine (STEMM) disciplines and funding opportunities.

The third and fourth workshops focus on two highly relevant and established areas of IDR between AHSS (particularly SS) and STEMM: urban sustainability education and Artificial Intelligence (AI) societal challenges and scenarios of collaborative learning, working and living with machines ('co-robotics').

Participant Selection: each workshop will invite participants from across the project stakeholder groups, with an emphasis on researchers who have experience in IDR/TDR projects. Policy makers, funders and end users will also be represented. Each workshop will invite participants from the region to explore regional perspectives across Europe in the different workshop locations and will balance this with experienced participants from interesting projects or initiatives outside of the host country. Each partner will host a workshop in an area where they have existing strength and critical mass so that more local participants may be invited if necessary, to mitigate the risk of struggling to draw participants from further afield.

1.2 Section B summary: Challenge-oriented research evaluation framework, tools and learning workshops evaluation methodology

A new challenge-oriented research evaluation framework, operational criteria and tools to evaluate challenge-oriented research projects, and the learning workshops' evaluation methodology are presented in Section B of this deliverable. The conceptual evaluation framework identifies four evaluation dimensions:

- Who?: composition, quality of accumulated IDR/TDR experience, pertinence to the challenge in focus, and balance across academic and non-academic categories of the participants.
- What? (the knowing dimension): degree of integration of different disciplines and perspectives achieved in the workshop.
- How? (the learning dimension): depth achieved in the learning process and learning objectives achieved with the participants.
- Why? (the forward-looking dimension): clarity and consensus achieved on future visions and intention (e.g. recommendations about the IDR/TDR contribution to the challenge in focus).

The evaluation of the first element will be straightforward, based as it is on the list of participants, their affiliations and research experience.

The knowing dimension is about 'what we know'. The context where we assume this is more evident, is within each disciplinary field. Obviously, there are unsolved issues within each discipline, the 'what we still don't know' dimension that continuously motivates the discovery and experiential process internal to each disciplinary field. The first 'mode of knowing' considered in the evaluation framework is therefore the scientific or deontological integrity of the disciplinary knowledges or practices which contribute to the collaborative research experience. However, our focus here is on multi-, inter- and transdisciplinary research. While acknowledging the diversity of how these terms are defined, we follow a pragmatic approach here, adopting the operational definition proposed in LERU (2016): the different modes of cooperation between diverse scientific disciplines are classified according to their degree of integration, and the related methods of research and characteristics of produced outputs.

The learning dimension introduces a new mission for the challenge-oriented research: moving from understanding the challenge to learning how to cope with it, transforming personal behaviour and/or collective values and norms. The mission, along this dimension, is for the challenge-oriented research project to provide a learning experience to individuals coming from different backgrounds, collectives and cultures, to equip them with the necessary skills for deep (self-)knowledge, visionary ideas, higher values, and responsible practice leading to sustainable, liveable, inclusive futures, be those in academia, industry, NGOs, or any other community.

Transformative learning is associated with change, and this leads to the third dimension of our challenge-oriented research evaluation framework: the forward-looking dimension. In this dimension we ask why the research is performed, to achieve which changes in the real world, and what could be the intended and unintended consequences of the research outcomes for society as a whole – societal,

environmental, sustainability impacts and new problems that may arise from finding and implementing new technologies and solutions. The forward-looking dimension is grounded on two main pillars: the new Responsible Research and Innovation (RRI) paradigm and the use of participatory foresight methods to structure forward-looking exercises.

Criteria and tools are also proposed to make the conceptual framework operational and evaluate challenge-oriented research projects. These include:

- A synthetic tool to assess the challenge-oriented research projects and/or programs on the fundamental dimensions of responsiveness, inclusive reflexivity, anticipation and transformativeness;
- Analytic tools to assess factors that hinder or help knowledge integration, and to assess learning outcomes and participatory foresight processes.

These are all general-purpose tools to evaluate any research project or program addressing a challenge, and they are introduced to show the range of possible applications of the challenge-oriented research framework.

Finally, a variant of the Most Significant Change (MSC) approach is proposed to evaluate the learning workshops, by developing with the participants 'IDR/TDR learning histories'. A learning history is a process that results in a jointly told tale in multiple narratives, with illustrations and reflections on strategies, noticeable results, what happened and why. An evaluation questionnaire will be also distributed at the end of each workshop to all participants and collected before they leave (the questionnaire template is presented in Appendix C).

2 Introduction

SHAPE-ID: Shaping Interdisciplinary Practices in Europe addresses the challenge of improving inter- and transdisciplinary cooperation between the Arts, Humanities and Social Sciences (AHSS) and other Sciences, primarily but not limited to Science, Technology, Engineering, Mathematics and Medicine (STEMM) disciplines. Work Package 3 (WP3) of the project will organise six IDR/TDR integration learning case workshops, pursuing the following project objectives:

- O3.1 To test and validate the findings of the literature review and survey in interactive thematic workshops related to key societal challenges involving different stakeholders;
- O3.2 To enable comparisons of IDR/TDR practices and results with regard to key societal challenges and other emerging missions that Europe faces in the future;
- O3.3 To elicit insights from IDR/TDR project representatives and stakeholders and co-produce recommendations on the funding mechanisms and implementation of IDR in practice to provide effective responses to societal challenges;
- O3.4 To identify adequate and meaningful criteria and indicators to assess IDR/TDR, both *ex ante* (i.e. funding) and *ex post* (i.e. impacts on society with reference to societal challenges);
- O3.5 To facilitate exchange of best practices for IDR/TDR among existing projects and their practitioners and experts, as well to share common challenges and barriers, developing a network of existing IDR projects and their teams within and beyond H2020.

On June 13-14 2019 a Co-Design Workshop was held in Rome during which SHAPE-ID partners collaborated to decide on the purpose and structure of the IDR/TDR integration cases and learning workshop design. Section A of this document describes the results of the workshop and the design and planning of the workshops. Section B presents the challenge-oriented research framework proposed to evaluate the lessons learned from the six workshops, including the integration of insights from the emerging findings of the SHAPE-ID literature review presented in deliverable D2.1 Preliminary Report of Literature Review on Understandings of Interdisciplinary and Transdisciplinary Research.

3 Section A: Matrix for integration of learning cases

3.1 From ‘mission’ to ‘challenge-oriented’ learning cases

In the SHAPE-ID Description of Work the key concept of mission-oriented research was introduced to orient the WP3 IDR/TDR integration learning cases. ‘Mission-oriented’ research and innovation address

grand societal challenges (e.g. climate change, citizens' health and wellbeing, etc.) by transforming them into concrete, measurable and achievable missions. These must be bold, activating innovation across sectors, across actors and across disciplines. They must also enable bottom-up solutions and experimentation (European Commission, 2018). As such, they should be grounded in enhanced IDR/TDR practices, to be well designed and properly implemented, and deliver Responsible Research and Innovation (RRI) outcomes with a problem-solving approach (see Figure 1).

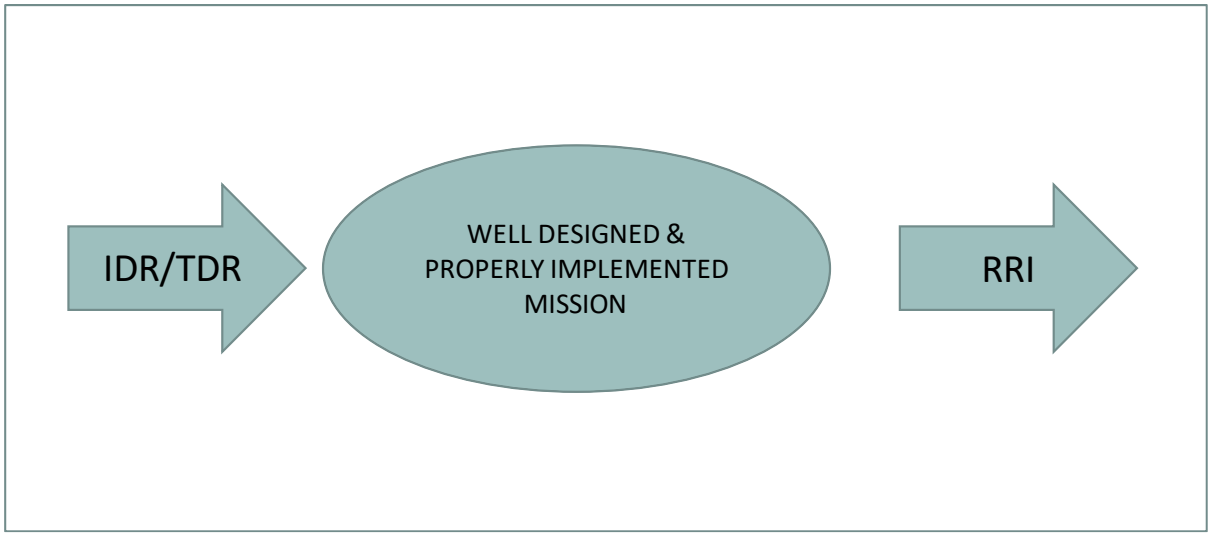


Figure 1 Scheme of IDR/ TDR for RRI outcomes

However, as discussed with SHAPE-ID partners before and during the Co-Design Workshop, the proposed 'mission-oriented' frame has been eventually found to be too narrow a lens for developing the IDR/TDR learning cases. The IDR/TDR learning scope should not be limited to combining existing disciplinary perspectives and knowledge to better achieve a given goal (mission). On the one hand, it should explicitly take care of the Ethical, Legal and Social Implications (ELSI) that achieving the mission may have, but on the other hand – and perhaps more importantly – it should go beyond the ELSI logic, to discuss the emergence of new modes of thinking, disciplines, 'ontologies' which may underpin and help to frame the research mission itself, and how different STEMM, AH and SS perspectives are represented in this. The latter 'post-ELSI' perspective is clearly presented in Balmer et al. (2015) and summarised in the box below.

The post-ELSI space of collaboration[2]

'Based on criticism of the 'ethical, legal and social implications' (ELSI) paradigm, researchers in science and technology studies (STS) have begun to create and move into 'post-ELSI' spaces.' (p.3)

'ELSI research makes use of a categorical distinction between 'the science' and its 'implications', enabling what Swierstra and Rip (2007) term a distinctive pattern of moral argumentation, where scientists do science and leave social, moral and ethical questions to experts – ethicists, theologians, lawyers and social scientists. This epistemological gap is enacted in ELSI practices as a division of labour, which reasserts the general assumption that having 'read off' the implications of innovations, these can be ameliorated by attending to safety precautions, risk management, and public opinion. [….] All together, ['post-ELSI'] critiques form the basis of an argument for building forms of social science scholarship and public engagement into the development of new technologies that overcome the limitations of ELSI. […]

There are a number of approaches here, which represent a response to these problems, including, but not limited to:

i. Upstream public engagement (Wilsdon & Willis, 2004)
ii. Constructive Technology Assessment (Schot & Rip, 1997)
iii. Anticipatory Governance and Real Time Technology Assessment (Barben et al., 2008)
iv. Critical neuroscience as an exploration of coproductive knowledge production (Choudhury & Slaby, 2011)
v. Human Practices as an expressly 'post-ELSI' approach (Rabinow & Bennett, 2012)
vi. Responsible Innovation (Owen et al., 2013)

The development of new research protocols and codes of conduct that mandate the inclusion of social science in technoscience research and innovation practices, variously enacted through the above programmes, speaks to the implicit expectations of contemporary governance and funding regimes, and also to the efforts of social scientists to get involved in scientific practices in more productive ways.' (Balmer et al., 2015, pp.7-8)

On this basis, and considering especially RRI as the potentially mainstream approach, a more articulated vision of the SHAPE-ID challenge-oriented learning cases approach has been elaborated and is presented in Figure 2 below.

[2] Excerpts from Balmer et al. (2015)

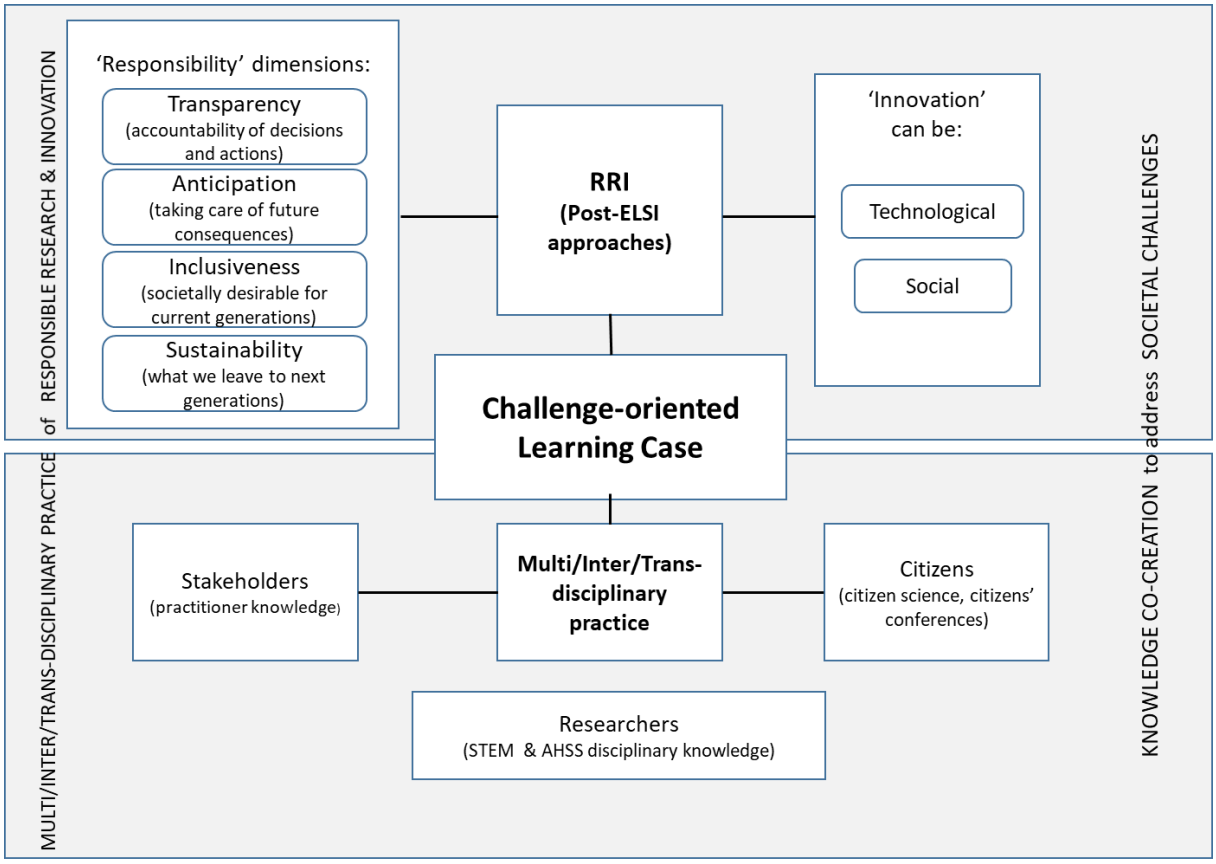


Figure 2 Challenge-oriented learning cases – Conceptual framework

This conceptual framework is named the 'MIT4RRI Framework', and it underpinned the co-design of the learning workshops aims, scope and process.

The practice of MDR/IDR/TDR in the lower part is combined with the purpose of addressing societal challenges in the upper part.[3]

In the upper part, the Responsible Research and Innovation (RRI) approach is taken as the new paradigm of collaboration in a post-ELSI space, including challenge-oriented research and innovation projects and programs. In this space, on the one hand, the focus on 'innovation' can include discussing different forms of technological and social innovation processes and outcomes; while on the other

[3] SHAPE-ID is mostly focused on inter- and transdisciplinary research. However, in this deliverable we consider a broader scope of 'challenge-oriented research', including in principle the whole range of research activities oriented to address grand societal challenges, whatever mode of investigation they entail: disciplinary, multidisciplinary, interdisciplinary or transdisciplinary.

hand, 'responsibility' is represented as a multi-faceted concept guiding research collaboration, including four dimensions:

- Transparency, to build trust based on greater accountability of decisions, actions and intentions;
- Anticipation, to take care of the possible consequences in the future, intended and unintended, and reflect on their ethical acceptability;
- Inclusiveness, taking care of what is societally desirable for the current generations;
- Sustainability, to ensure the possibility of future generations being able to meet their needs.

In the lower part of the framework, the MDR/IDR/TDR practice engages different categories of actors – stakeholders, researchers in different STEMM, Arts, Humanities and Social Sciences fields – in challenge-oriented research activities.

Operational definition of MDR/IDR/TDR

To define MDR/IDR/TDR we follow a pragmatic approach, adopting the operational definition proposed in the LERU Report on Interdisciplinarity (LERU, 2016): the different modes of cooperation between diverse scientific disciplines are classified according to their degree of integration, and the related methods of research and characteristics of produced outputs (see Figure 3).

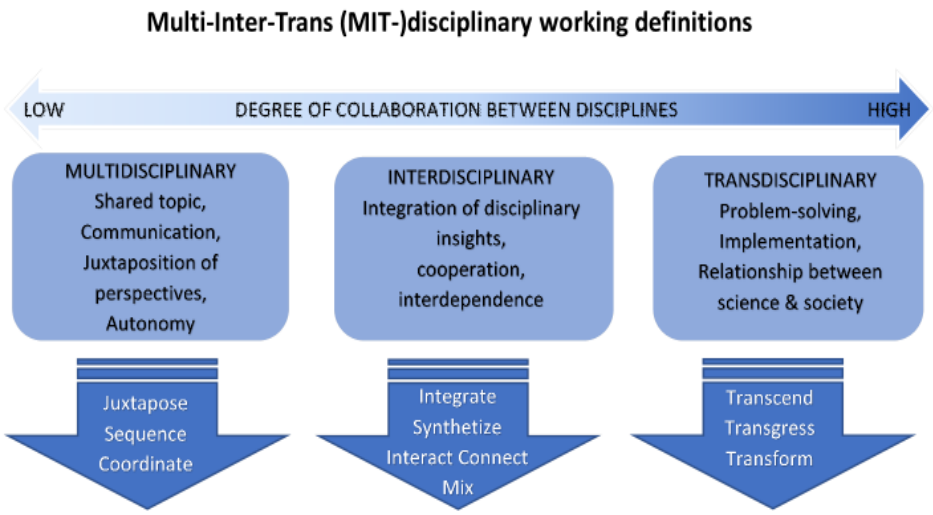


Figure 3 Multi-Inter-Trans disciplinary working definitions (adapted from LERU 2016)

Finally, the challenge-oriented learning case is placed at the core junction of the framework, and it aims to learn from past and existing MDR/IDR/TDR practices to what extent and how these can help challenge-oriented research to better achieve its purpose.

3.2 Challenge-oriented learning cases: structured process

SHAPE-ID partners agreed to structure each IDR/TDR integration learning case with a common process – culminating in a learning workshop. The steps are described in detail below.

1. **Identify the challenge in focus**, and define the learning workshop statement, i.e. what is the research field and question you want to focus on in the workshop?

2. **Search for the research projects** (closed or on-going) and initiatives pertinent to the mission and detect the interdisciplinary practices applied in the projects. The SHAPE-ID learning cases will include portfolios of projects and researchers sharing the learning workshop focus, to stimulate interaction, experimentation and shared learning. Ideally, a full range of disciplinary (STEM, SS, AH) and non-disciplinary (i.e. stakeholders, policy makers, citizens) knowledge perspectives should be represented.

3. **Invite participants from the portfolio of selected projects and initiatives**. Participants invited to the learning workshop are identified from the list of selected research projects and initiatives (the latter could include also stakeholders or citizen-led initiatives, or ambitious funding or policy initiatives). While inviting participants, every effort will be made to ensure gender balance among participants. Participants in the learning case workshops will be selected choosing the pertinent projects from the following pools:

    - 'Live' IDR/TDR projects including H2020 projects (funded across the 'Societal Challenges') and projects funded by other funders/initiatives that also encourage IDR/TDR both within AHSS disciplines and between AHSS and other disciplines. These include the networks NORFACE (New Opportunities for Research Funding agency), HERA (Humanities in the European Research Area), Joint Programming Initiative (JPI) Cultural Heritage and infrastructures like DARIAH (European Digital Research Infrastructure for the Arts and Humanities) and CLARIN (Common Language Resources and technology Infrastructure), and others funded by private foundations, such as Wellcome Trust.

- Researchers from AHSS disciplines who are not actively undertaking IDR/TDR but whose insights are important to understand in order to capture the epistemic and methodological barriers some disciplines face over others in taking part in IDR/TDR.[4]
- Researchers who are producing knowledge outside the academy: because of the EC's ultimate aim that H2020 will contribute to achieving the aims of the Innovation Union (which include transforming the way public and private sectors work together) it is imperative to include the voice of industry and other non-academic actors (Non-Governmental Organisations (NGOs) and Civil Society Organisations) in the learning case workshops where possible.

4. **Prepare the learning workshop**. The first factor for success is to invite the right people to the learning workshop (see previous step). The second factor is to carefully prepare all aspects of the learning experience, including: 1) adequate logistics for the meeting and support to the invited participants; 2) quality of the information provided to the participants on the scope, purpose and attendance of the workshop; 3) adequate structure and programme of the event, to ensure a fair IDR/TDR focused dialogue, exchange of knowledge and contribution from all participants; 4) adequate facilitation tools and staff, provided by the SHAPE-ID consortium partner in charge of the learning workshop.

5. **Run the learning workshop**. Each learning workshop is expected to run over two days (from lunchtime to lunchtime). It will be normally managed by a team of 2 facilitators, and structured with an opening plenary session, small group sessions (using, for instance, the World Café methodology) and a plenary session for conclusions.

6. **Reporting and evaluation of the learning workshop**. The partner in charge of the workshop organisation will draft a workshop report, based on a template provided by ISINNOVA. Each

[4] The inclusion of this cohort in the learning cases will allow us to better account for and understand that all things are not equal in the broad AHSS grouping. In general, Social Science disciplines have fared much better in integrating themselves into H2020 proposals than Arts and Humanities researchers as evidenced by the 2017 evaluation exercise on integration in the H2020 programme (Birnbaum et al., 2017), and more recently also in the 4th Monitoring report on SSH flagged projects funded in 2017 under the Societal Challenges and Industrial Leadership priorities (European Commission, 2019). Within the Arts and Humanities there are further distinctions, with Arts researchers often struggling to have their research outputs (such as musical compositions, dramatic and artistic productions) given the same recognition or legitimacy as more traditional research outputs (publications, journal articles). By including individuals who represent these kinds of disciplines from organisations like EASSH (European Alliance for Social Science and Humanities) and other umbrella groups in each of the learning case workshops we can hope to learn from their perspectives and better understand the factors for potential successful future engagement with IDR.

workshop will be attended by representatives of Work Package 3 leader ISINNOVA. The evaluation methodology applied in the workshops is discussed in Section B of this deliverable.

3.3 The matrix of challenge-oriented learning journeys

As a result of the Co-Design Workshop discussion, the SHAPE-ID partners agreed on structuring the workshops as 'learning journeys', focusing on different challenges while all following a similar process.

The six challenges in focus and a common 'U-shaped' learning process are shown in the following figure, as a 'matrix' crossing different stages of the process – which are the same for each workshop – with six different topics in focus and expected learning outcomes.

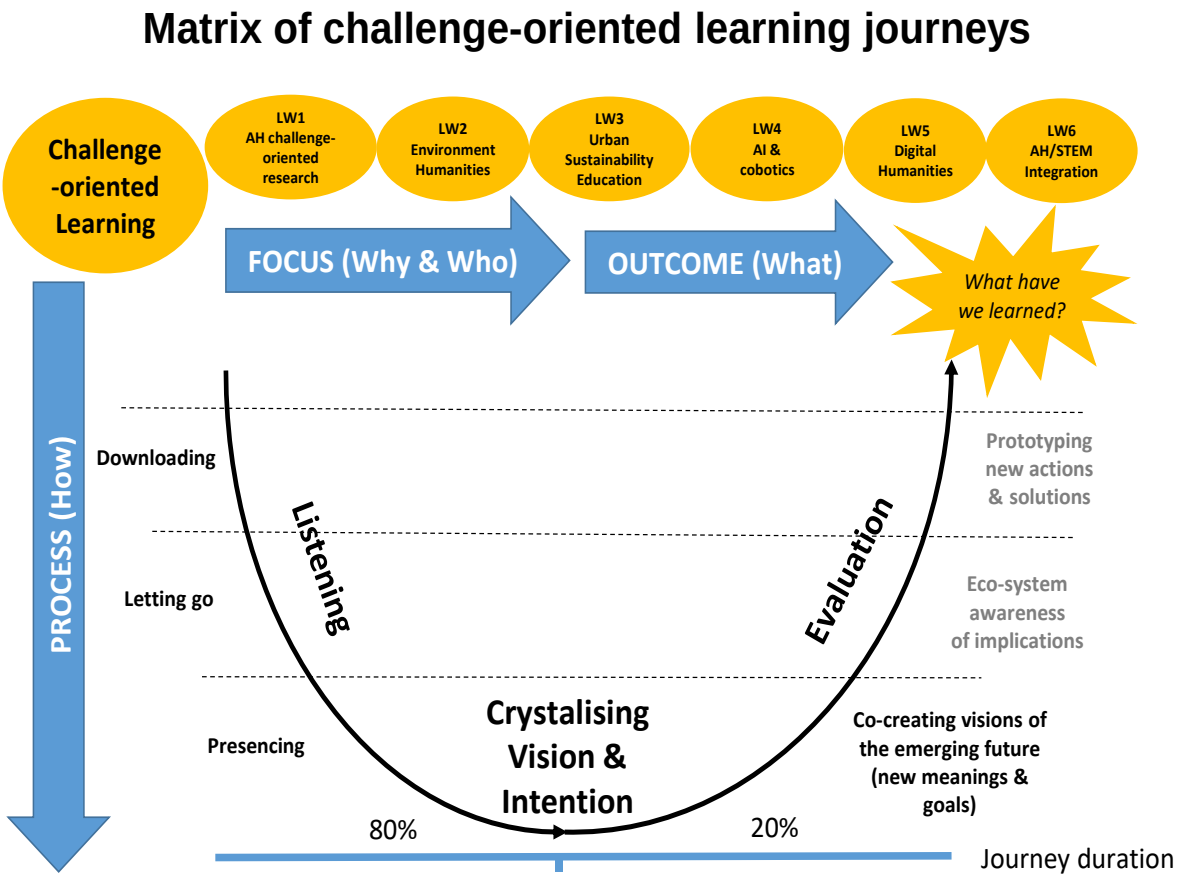


Figure 4 Matrix of challenge-oriented learning journeys (own elaboration)

The U path of the learning journey is inspired by the Theory U approach for transformative learning articulated by Scharmer (2018) (see box below). In a nutshell, a 'U-shaped' learning journey with the participants engaged in the workshop starts from 'downloading' the diverse perspectives different actors may have of the same challenge/topic. After downloading their own perspectives, participants are encouraged to listen to each other, letting go their own perspectives and developing a mutual

understanding of the others' perspectives as well. The third – and deeper – stage is for the participants to co-create a new perspective of the emerging future for the challenge/topic of interest, generating new visions which merge old individual perspectives into a new one. After this 'listening to each other' process – the downward slope of the U – participants evaluate what emerges as a new knowledge and wisdom about the challenge, crystalising their vision and intention in the bottom part of U, and evaluating implications in the upward slope of the U. Broadly, the learning journey is slower on the downward side – to gradually overcome the barriers to listening and mutual understanding – and faster on the upward side, as a new shared eco-system awareness of the challenge and its implications emerges, and solutions may come more quickly to the participants' minds. We have reflected this in the structure of the workshop, where the time is approximately 80% devoted to 'listening' and 20% to the 'evaluation' of lessons learned.

Theory U

The 'Theory U' framework (Scharmer, 2018) provides a systematic approach for transformative learning, represented as a U-shaped journey. The theory suggests shifting from a personal, individual-centred approach to a collective, group-centred one in order to move towards a more sustainable, healthy life. It suggests that society should strive for 'eco-system awareness'-driven forms of cooperation. Scharmer refers to this process as the 'journey of the U'. On the left side, the U-model demonstrates the move downwards, away from past convictions and prejudices. At the bottom of the U, there is a crucial moment of 'presencing' between letting go the past and getting ready for the future to emerge, a moment of intentional silence and reflection. On the right side, we can see the upward part. Here, we let the answers come to us, so that we can find ourselves and create a better world in cooperation with others.

Theory U introduces the neologism 'presencing': presencing blends 'sensing' (feeling the future possibility) and 'presence' (the state of being in the present moment). It signifies the ability to find and develop emerging solutions to overcome disruptions by 'acting from the presence of what is wanting to emerge'. Theory U explains the meaning of co-creation as a general process of prototyping new forms of economic and social action. It introduces co-creation as a tool to overcome existing economic, social, cultural and personal crises, thus aiding the process of global transformation.

The dialogue with the workshop participants is hoped to deliver – as a result of the learning journey along the three stage of downloading, letting go and presencing – new visions of the emerging future, eco-system awareness of the implications ('awareness from the whole system perspective') for all participants involved, and the capacity to eventually deliver innovative perspectives. The latter in the form of new inclusive narratives (as they include the contributions from all participants), recommendations, prototypes of new actions or solutions, or simply as new learning and mind-set/attitude change on the part of participants, which is evaluated at the end of the journey with the method presented in Section 5.4 of this deliverable.

3.4 Background paper and foreground workshop report

Each learning workshop leader is committed to producing a short **background paper and foreground report** for their workshop.

The aim of the background paper is to inform the participants and provide contextual elements for the debate before the workshop, and normally these are distributed after participants have accepted the initial invitation (at least one month before the event).

Background papers will follow a standard model for all the workshops to ensure the homogeneity of contextual information provided to all the participants. The agreed table of contents includes:

- Introduction (to SHAPE-ID's aim and context)
- The Opportunity (for the workshop to have an influence)
- Your Contribution (to learning)
- The Workshop Scope (the challenge on stage)
- How Will Participants Contribute? (overview of workshop participants and contribution)
- Workshop Format (structure of the process)
- Workshop Outcome (what the workshop aims to deliver)
- Draft Workshop Program (agenda including triggering questions for the debate)
- Background Context
- References

An example of the background paper prepared for the first learning workshop in Dublin, on 2-3 December 2019, is presented in Appendix A. This will be taken as a model for the other learning workshops' background papers, showing the expected depth and length of the different sections.

It is important to note that the draft workshop program included in the background paper will introduce participants to the research questions proposed to trigger the debate. In this way, we will already offer

them before the workshops the opportunity to comment and provide any suggestion on the research questions, to better fit the triggering questions to the expectations of the audience. This should also contribute to enhancing the interest and potential commitment of the participants, who we see as co-creators of knowledge through the workshop process.

The same structure of the background paper will be used – with some obvious changes (e.g. reporting actual outcomes instead of expected) – as a model for the foreground reports each learning workshop leader is committed to deliver such a report within one month of workshop completion.

The six foreground reports will be collated by ISINNOVA in Deliverable D3.2 Report of workshops and integrated with the results of the evaluation undertaken for each single learning workshop by ISINNOVA, using the challenge-oriented research evaluation framework presented in Section B of this deliverable.

3.5 Planning of the six learning workshops

The practical planning of the six learning workshops was also discussed at the Co-Design Workshop, fixing:

- The overall planning of the six workshops, including date, place, partner in charge and challenge-oriented focus;
- A common structure for the workshops' agenda;
- The timeline of preparation, running and post-workshop activities.

These elements are presented in the following sections.

3.5.1 Schedule of the six workshops

Workshop	Date	Location	Partner in charge[5]	Challenge-oriented focus
Workshop 1	2-3 Dec 2019	Dublin	Trinity College Dublin	Positioning the Arts and Humanities to Lead Research Addressing Societal Challenges
Workshop 2	20-21 Jan 2020	Edinburgh	University of Edinburgh	Bringing an Environmental Humanities lens to bear on interdisciplinary collaboration among AHSS and between AAHS and STEM
Workshop 3	17-18 Feb 2020	Turin	ISINNOVA (Politecnico di Torino)	Inter/Trans-Disciplinary (ITD) educational models and approaches that support the sustainable urban transformation
Workshop 4	23-24 Mar 2020	Bilbao	ISINNOVA (University of Deusto)	Artificial Intelligence (AI) challenges and scenarios of collaborative learning, working and living with machines ('co-robotics')
Workshop 5	20-21 Apr 2020	Warsaw	IBL PAN	Streamlining Digital Humanities research and infrastructure in the cultural heritage domain
Workshop 6	14-15 May 2020	Zurich	ETH Zurich	Intersections or reconfigurations? Arts and Humanities integration in inter- and transdisciplinary research

Table 2 Workshops overview

3.5.2 Common workshop structure

Day 1	▪ Welcome lunch ▪ Introduction to SHAPE-ID and LW purpose ▪ Ice-breaker ▪ 'Downloading': SHAPE-ID research questions and objectives; sharing case studies/ examples of IDR/TDR projects ▪ 'Letting go': Group exercise to tackle research questions, listening to answers from different perspectives (each workshop will select its own methods to achieve this) ▪ Evening experience: each workshop may consider an evening experience (e.g. poster session) coupled with a light networking evening reception
Day 2	▪ 'Presencing/Envisioning': Activity to generate a new perspective and IDR/TDR vision (each workshop will design appropriate activities for this session depending on context) ▪ Evaluating the learning outcomes: Most Significant Changes approach ▪ Close: SHAPE-ID next steps ▪ Lunch and further networking

Table 3 Workshops Structure

[5] Including external collaborator where relevant

3.5.3 Timeline of preparation, delivery and post-workshop activities

TIME [T0 = DATE OF THE LEARNING WORKSHOP (LW)]	LW LEADERS	ISINNOVA (WP3 LEADER)
15 June to 15 July	By the end of June Mapping of LW spheres of control, influence, impact LW (mission) statement Implementation processes (based on the shared framework)	By 15 July: Co-Design Workshop report
T0 – 6 to T0-3	Identify and invite project experts/stakeholders Book the venue Start engaging the necessary resources (external facilitators if needed etc.)	Letter of Invitation template
T0 -5 to T0-3	Get participant confirmation and book travel and accommodation	Gathering of participants lists
T0-3 to T0-1	Design the detailed programme	Check the programmes
T0-1	Fix logistics details (catering, room, equipment, etc.)	
T0 (LW date)	Run the learning workshop	Attending all the workshops
T0 + 1	Draft workshop report	Report template Check the drafts
June 2020	Final Workshops report	Deliver the report (for peer-review)

Table 4 Timeline of actions

3.6 Learning workshops' scope and mapping of expected outcomes

In the Co-Design Workshop, the SHAPE-ID partners used a Theory of Change (ToC) outcome mapping tool (Earl, Carden & Smutylo, 2001) to map the expected results of their IDR integration learning cases. As illustrated in the following figure and the box below, this tool conceptualises the change process by means of:

- a relatively declining influence of an intervention over time and space, within spheres of control, influence, and impact
- outcomes defined as behaviour change that is influenced by changes in knowledge, attitudes, skills, and relationships of key actors in the system.

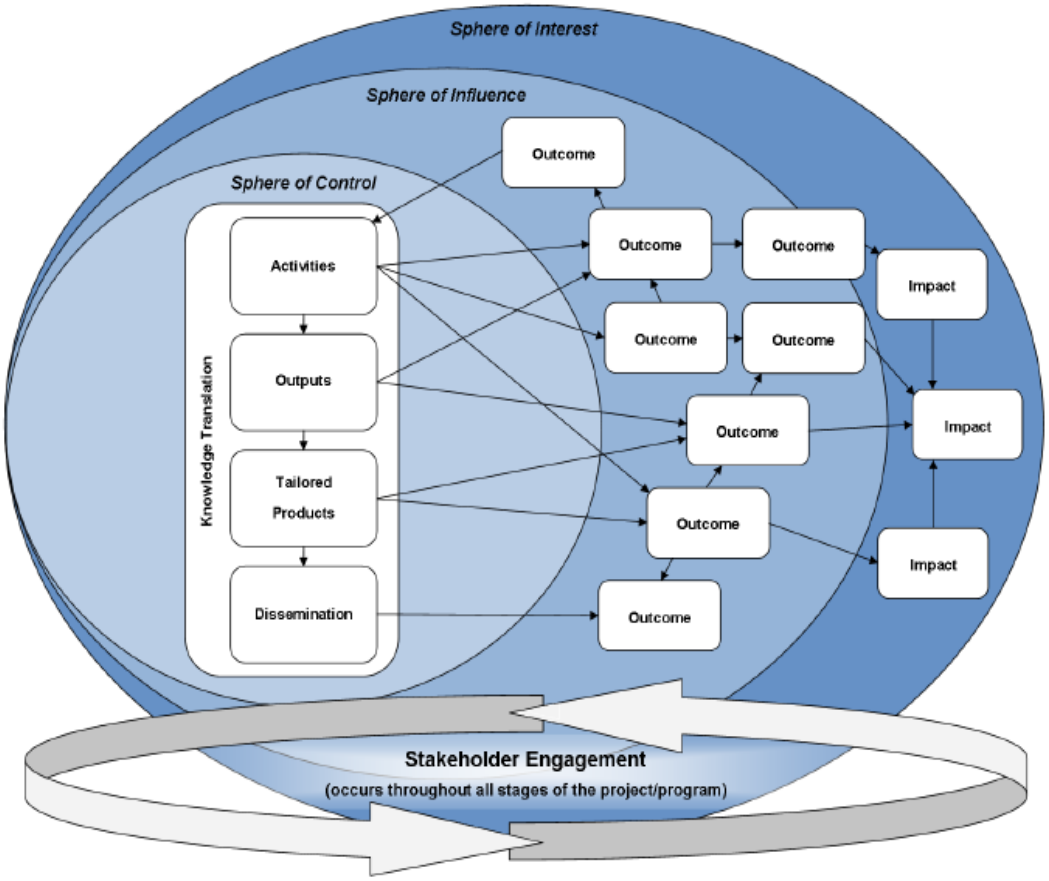


Figure 5 Theory of Change Conceptual Overview

Source: Sustainability Research Effectiveness, 2018

Theory of Change Spheres

'The Theory of Change spheres are defined as follows:

The **Sphere of Control** includes activities that are conducted by the project.

- **Activities:** Actions undertaken by the project/program; in a research context, this includes background scoping and preparation work, definition and design of the research questions and project, literature review, fieldwork, and planned communication or engagement with relevant stakeholders or boundary partners (i.e. expert consultations, workshops, fieldwork, etc.)
- **Outputs:** Knowledge, fora, and processes generated by the research project/program activities; they may include tailored products that package knowledge for specific audiences (e.g. peer reviewed publications, policy briefs, videos, etc.)
- **Dissemination:** How knowledge produced is communicated to target audiences
- **Knowledge translation:** A dynamic and interactive process that includes synthesis, dissemination, exchange, and ethically-sound application of knowledge and mutual learning to improve social, economic and/or environmental conditions.

The **Sphere of Influence** is where the project aims to influence or bring about change via the actors the project works with and through.

- **Outcomes:** Changes in knowledge, skills, relationships, and attitudes that manifest as changes in behaviour during and after the project/program. To be effective, a project may need to influence several or many different actors, often in different ways.

The **Sphere of Interest** models indirect impacts that fails outside of the direct influence of the project. These changes may manifest as desired or unintended changes in the social, economic or environmental conditions.

- **Impact:** Changes in system flow (e.g. higher annual income; increased water discharge from a watershed) of state variables (e.g. socio-economic status; water quality in a reservoir) resulting wholly or in part from a chain of events to which the research has contributed.'

(Sustainability Research Effectiveness, 2018)

An example of ToC map elaborated for the first learning workshop is presented in Appendix B. Similar maps have been elaborated for all learning workshops by the leader in charge, to support the identification of the categories of stakeholders to involve. The scope and draft programme for each workshop is presented in the following sections.

3.6.1 Learning Workshop 1: Positioning the Arts and Humanities to Lead Research Addressing Societal Challenges

Date: 2-3 December 2019 **Location:** Trinity College Dublin

Workshop Scope

The need for meaningful AHSS involvement in societal challenges research has never been greater if we wish to put the human at the centre of an increasingly technologically-driven society facing major crises on multiple fronts, from climate and environmental devastation to declining faith in democratic governance and the rise of disruptive technologies. This workshop, within the context of the SHAPE-ID project as a whole, aims to identify practical solutions to overcoming the barriers to AH integration and consider how to build confidence and competence in the AH community to contribute in appropriate ways to addressing these challenges alongside STEMM colleagues and other stakeholders.

Acknowledging the significant underrepresentation of the Arts and Humanities in particular in interdisciplinary research with STEMM disciplines, this workshop focuses on the wider context of integrating the Arts and Humanities into societal challenges research, broadly understood as research addressing Sustainable Development Goals, Missions, or other societal challenges such as those forming the different work programmes in Pillar 3 of Horizon 2020 or the emerging clusters in Pillar 2 of Horizon Europe. Rather than start from the current state of play, the workshop adopts the framing device of a more ambitious hypothetical scenario where AH disciplines lead societal challenges research instead of adopting subordinate or auxiliary roles.

This approach is used to pursue the following objectives: explore the relevance of AH disciplines for addressing societal challenges; identify the mindsets and organisational cultures that act as barriers to this and develop a roadmap of potential ways of overcoming these obstacles. The workshop will also engage participants in a forward-looking exercise to consider the potential for mission-oriented research with AH leadership or significant involvement.

2 December 2019	
13.00 - 13.45	Lunch
13.45 - 14.00	Welcome & Orientation
14.00 - 14.50	Ice-breaker & Participant Introductions
14.50-15.50	Scene-setting: short presentations: SHAPE-ID, IDR Case Studies & Discussion
15.50-16.00	Coffee break
16.00-17.30	World Café discussion in breakout groups. Three rounds discussing the following three indicative questions followed by feedback session to 'harvest' insights: 1) What role can or should AH play in addressing societal challenges? 2) What helps or hinders successful collaboration between AH and STEM disciplines? 3) What steps can AH disciplines take to better prepare and advocate for taking more significant roles in interdisciplinary research addressing societal challenges?
17.30-18.15	Reception and Early Career Researcher Poster Session, Trinity Long Room Hub
18.30-20.30	Dinner
3 December 2019	
9.00 - 9.30	Reflection & Day 2 Orientation
9.30 - 12.00	Breakout groups engaging in design activities around conceptualising mission-oriented research with AH leadership or significant involvement, including definition, stakeholder mapping, possible projects/policy initiatives, roadblocks and enablers. Anticipated focal areas: 1) Adaptation to Climate Change, including Societal Transformation (existing Horizon Europe mission area) 2) Healthy Ageing (informed by All European Academies (ALLEA) proposed mission on Growing Up and Ageing in Europe[6]) 3) Crises of Democracy (intersection of culture, technology, environment) 4) Open mission (TBC by participants emerging from discussion)
12.00-13.00	Evaluation and forward-looking session on practical recommendations emerging from workshop
13.00-14.00	Lunch and networking
13.30-14.30	Tour of the Book of Kells, Long Room Library and Dublin Science Gallery (TBC)

Table 5 Learning Workshop 1 draft schedule

[6] https://allea.org/portfolio-item/living-together-missions-for-shaping-the-future/

3.6.2 Learning Workshop 2: Bringing an Environmental Humanities lens to bear on interdisciplinary collaboration among the AHSS disciplines and between AHSS and STEM

Date: 20-21 January 2020 **Location:** Edinburgh Centre for Carbon Innovation (ECCI)

Workshop Scope

The Edinburgh workshop will analyse what bringing an Environmental Humanities lens adds to interdisciplinary collaboration among the AHSS disciplines and between AHSS and STEM. The research questions of the second workshop are the following: What brings disciplines together in the environmental humanities? What can discussions with colleagues (scholars, funders and policymakers) who share a broad interest in the Environmental Humanities reveal about the motivations for undertaking research in this field and the models and styles of such research? How are Institutes of Advanced Studies (mainly) in Northern Europe influencing – and being influenced by – policy instruments to promote interdisciplinary research across disciplines that associate with the environmental humanities?

The Environmental Humanities is establishing itself as an interdisciplinary research field supported by peer review journals, international conferences and centres of excellence. Collectively, as a consortium and as a wider community of scholars, we have quite a lot of experience of interdisciplinary topics that span the social and environmental and natural sciences. How does this experience compare with that of the Arts and Humanities disciplines, given their typically different working styles and concerns (e.g. lone scholar vs. research teams; conceptual/philosophical vs. instrumental framings, etc.).

In the UK, national research funders (UK Research and Innovation, UKRI) are placing considerable emphasis on the £1.5 billion Global Challenges Research Fund which is driving the interdisciplinary research agenda across all UKRI funding domains. Then, how are (largely) Northern European Institutes of Advanced Studies (mainly) in Northern Europe influencing – and being influenced by – policy instruments to promote interdisciplinary research in this area? But have the Arts and Humanities learned from the Social Sciences in their previous engagements with the natural sciences regarding the roles they might play in such interdisciplinary research (e.g. Barry et al., 2008; Balmer et al., 2015) or do the instrumental drivers of innovation, public engagement and problem-solving for the 'real world' still prevail? To what extent are the Arts and Humanities able to set the research agenda within the Environmental Humanities?

		20 January 2020
12.30-13.15	Lunch	Registration
13.15-13.30	Orientation	Introduction to SHAPE-ID
13.30-14.00	Ice-breaker	Possibly using postcards or other artefacts to draw out participants' experiences/knowledge of IDR
14.00-14.45	Sharing [Downloading]	Short presentations to share case studies /vignettes of AHSS involvement in IDR. The Environmental Humanities Network and AHRC IDR lead will be consulted for suggestions of speakers, as well as the AHRC A Unique Contribution and contacts from AHRC GCRF town hall meeting. Speakers will be asked to highlight barriers and enablers and to consider the benefits (and possible disbenefits) to Environmental Humanities research of an IDR approach.
14.45-15.00		Linking to SHAPE-ID's research questions
15.00-16.15	Listening	A group exercise to expand on what participants have heard from presenters and share their own experiences, aspirations and disappointments of IDR (refreshments available). Discussion outcomes will be captured to enable groups to build on it in Day 2.
16.15-16.30		Introducing evening discussion topic and plans for Day 2
16.30-18.30	Evening activity	Free time to check into hotel, possibly do Curious Edinburgh walking tour depending on weather
		21 January 2020
9.00-9.30	Welcome coffee	
9.30-12.15	Pre-sensing Visioning Coffee break	Group activity, possibly a Carousel format or using Story Wall or Scenario Integration tools to redesign an IDR call and proposal development and peer review processes that are fit for purpose for AHSS.
12.15-13.15	Evaluation	An opportunity to reflect using Most Significant Change tool
13.15-14.00	Light Lunch	

Table 6 Learning Workshop 2 draft schedule

3.6.4 Learning Workshop 3: Inter/Trans-Disciplinary (ITD) educational models and approaches that support the sustainable urban transformation

Date: 17-18 February 2020 **Location:** Turin

Workshop Scope

The workshop is organised by ISINNOVA, partner of SHAPE-ID, in collaboration with the TrUST project (Politecnico di Torino). In this workshop we combine two increasingly challenging issues, to ask ourselves to what extent and how interdisciplinary methods, tools and practices of education and research could and should contribute to address the challenges of urban sustainability. To introduce the education challenge, we borrow from Charles Fadel, Project Director at Harvard's Graduate School of Education, the statement that education is becoming not only about content knowledge, but everyday more about skills development and character building. The world no longer rewards people just for what they know - search engines 'know' everything - but for what they do with what they know, how they behave in the world and how they adapt. Education is becoming more about creativity, critical thinking, communication and collaboration, about modern knowledge- including our capacity to recognise and exploit the potential of new technologies, and about the character qualities that help fulfilled people live and work together and build a sustainable humanity.

On the other hand, we consider the 'urban sustainability' challenge as primarily a matter of radically improving the urban governance, to effectively realise the agenda of Sustainable Development Goals (SDGs) at the urban level, with the help of renovated – and interdisciplinary – education and policy learning methods. The challenge, in this respect, is to evolve from the 'silos' mentality and practice of addressing separately the different urban challenges – energy, transport, water, waste, local economy, social inclusion, to name a few – to a systemic perspective of the city as a 'systems of systems'.

The interdisciplinary methods, tools and practices, at stake here, include a wide range of approaches, addressing different levels of education (primary, high, university, post-docs) and typologies (formal and informal training, long-life learning, coaching). To name a few of these methods: sustainability courses based on ecological principles; design-based research; deep, affective and transformative sustainability learning; sustainable change agents training; project-based learning, flexible teaching and learning (e.g. flipped classes).

The scope of the workshop will be to learn from the experience of participants with different sustainability learning approaches, for the purpose of developing key competencies in sustainability, including problem-solving skills and the ability of researchers to collaborate successfully with experts and stakeholders in urban settings. The participants will be engaged in a 'writing exercise', structured

around research questions in gradually deeper stages, and aiming to formulate a collective position statement about what kind of inter/trans-disciplinary (ITD) educational tools and approaches can support and improve sustainability education in the realm of urban transitions. This will include practical recommendations on the ITD educational approaches useful for the concrete realization of Sustainable Development Goals (SDGs) in the urban context, usable by all actors of urban transformations. To enhance the workshop impact, the position statement can be further developed in a co-authored paper on a high-impact factor journal.

The workshop will benefit, amongst others, of the legacy of the INTREPID Cost Action[7], which focused on interdisciplinary curricula and case studies of urban research, and the vision of a future university supporting 'whole-system' transformation as a third mission – beyond education and research – contributing to the sustainable development agenda.

	17 February 2020
9.00 – 10.00	Introduction - Keynote speech
10.00 - 11.00	Orientation with ice-breaking exercises, coffee break
11.00 - 12.40	Writing session on the initiation of inter- and trans- disciplinary collaborative processes and the implementation of ITD methods, processes, tools and social technologies.
12.40 - 14.00	Lunch
14.00 - 14.30	Writing session on weakness and obstacles of ITD learning processes
14.30 - 15.30	Keynotes speech
15.30-16.00	Coffee break
16.00-16.30	Writing session on triggering factors of an ITD education for a sustainable urban transformation
17.00-17.30	Valentino Castle guided tour
19.30-21.30	Italian Happy Hours
	18 February 2020
9.00 - 9.30	Liberating Structure exercises
9.30 - 12.15	Writing session of case clinics on: ● Current challenges and opportunities for ITD labs, projects and experiences. ● Metrics to evaluate ITD educational performance, considering the funding opportunities conceptual frame.
12.15-13.15	Evaluation and forward-looking session on practical toolbox for ITD educational methods
13.15-13.30	Wrap up and next steps

Table 7 Learning Workshop 3 draft schedule

[7] http://intrepid-cost.ics.ulisboa.pt/

3.6.5 Learning Workshop 4: Artificial Intelligence (AI) challenges and scenarios of collaborative learning, working and living with the machines ('co-robotics')

Date: 23-24 March 2020 Location: Bilbao

Workshop Scope

This SHAPE-ID learning workshop is a collaborative effort between ISINNOVA and the University of Deusto that aims to provide a space for various stakeholders to come together and reflect on the societal impact of artificial intelligence from a transdisciplinary and inter-sectoral perspective. While the incremental developments in digital technologies have thus far aligned with human projection of progress, the risk is looming of a disruptive change that will radically challenge the social and economic fabric of the old industrialised countries. The combined effects of globalisation and robotics ('globotics') and the emergence of more sophisticated autonomous artificial agents and social robots pose new scenarios that could generate both opportunities and threats as to the ethics, politics, and dynamics of our social and working lives. This workshop will engage the participants in a foresight exercise to debate, assess, and imagine a future that maximises the benefits and minimises the risks of this impending reality.

The learning workshop is the product of the two institutions' shared vision of a research and innovation field that is oriented towards positive social impact through open, responsible, transdisciplinary, and participatory dialogue. It embodies the social dimension of research both in terms of the topic choice (societal impact of artificial intelligence; the intersection between technology, social sciences, and humanities disciplines) and the workshop's approach (knowledge co-creation among a wide range of stakeholders at different levels). Ultimately, it seeks to envisage a human-centred future for artificial intelligence through a participatory foresight and knowledge co-creation exercise, which will include the following elements:

- The implementation of the 6i model that employs six dimensions (international, interdisciplinary, inter-sectoral, impact, innovation, and inclusion) in the selection of participants and the guiding principles surrounding the topics and questions that will be posed during the event;
- Co-identification of societal needs and challenges specifically related to AI development;
- Co-definition of research questions as a product of transdisciplinary and inter-sectoral reflection on the potential challenges of AI in order to help anticipate and explore future trends and drivers for strategic societal impact planning;

- Proposing transformations and scenarios of 'collaborative robotics' focused on the potential complementarity between AI agents, robots and humans in learning, working, and everyday life activities.

The expected outcome of the workshop is a forward-looking Joint Position Statement that will deliver key messages and recommendations generated during the event.

	23 March 2020	
13.00-13.45	Lunch	
13.45-14.00	Welcome & orientation	ISINNOVA and University of Deusto introduction to workshop aims and organisation
14.00-14.45	Ice-breaker & introductions	Identifying challenges (Mentimeter) (2 min x 20)
14.45-15.45	**Sharing** [Downloading]	AI & AHSS addressing societal challenges (10 min x 2) Flash presentations: exemplar projects of interaction with robots (5 min x 5) Discussion & questions (15 min)
15.45-17.25 (1 h 40 min)	**Letting go** (with coffee)	World Café format: participants discuss 3 key questions designed to reflect the challenge of the workshop, over 3 rounds, followed by a 'Harvest' session to share insights
17.25-17.45	Evening exercise	Present prompt question for reflection (to feed into Day 2)
17.45-18.45	Reception	Wine reception at University of Deusto
	24 March 2020	
9.00-9.30	Reflection on Day 1 & evening exercise	1-2-4-All exercise to respond to evening exercise and prompt
9.30-11.15 (1 h 45 min)	Envisioning [Presencing] 11.00-11.15 Coffee break	Breakout groups (5x5) focused on social & technological innovation readiness for responsible, sustainable and inclusive development implications for: a) design learning/working/living co-robotics scenarios b) learning and collaborative processes (MIT & 6i)
11.30-12.45	Evaluation	Standard Evaluation using Most Significant Change Tool
12.45-13.00	Close	SHAPE-ID next steps
13.00-14.00	Lunch	

Table 8 Learning Workshop draft schedule

3.6.6 Learning Workshop 5: Streamlining the digital humanities research and infrastructure in the cultural heritage domain

Date: 20-21 April 2020 **Location:** Warsaw

Workshop Scope

The emergent status of digitally-enabled research complicates inter- and transdisciplinarity cooperation. Due to the lack of understanding of how such methods may be incorporated into disciplinary workflows, DH practitioners (incl. research infrastructures) may not be receiving enough feedback to tailor their services to actual and potential users both in the arts and humanities disciplines, and in the CH sector. Digital Humanities allows for better societal impact (new modes of scholarly communication, public humanities) - potential impact larger than non-D Humanities.

Digital humanities (DH) has become a field in which interdisciplinary arts & humanities scholarship engages in transdisciplinary dialogue with ICT and STEM. However, integration of such inter- and trans-disciplinary cooperation in cultural heritage (CH) projects often challenged by systemic obstacles on the institutional, and policy & funding level (e.g. institutional structure, disciplinary panels in funding calls, research evaluation mechanisms). Also, research, preservation, and public-facing/dissemination components of collaboration between DH and CH are difficult to balance. These barriers hinder interdisciplinary cooperation, which would be otherwise beneficial for both sides and should be addressed, given the importance of CH in the next framework programme.

The workshop will address the following research questions:

What are the systemic (i.e. institutional, funding, policy) obstacles for the uptake of interdisciplinary, digital humanities approach in the cultural heritage domain? How could they be overcome? What are the policy measures that could be undertaken to achieve better integration of digital humanities into both humanities scholarship and cultural heritage projects?

- What measures should be undertaken to facilitate cooperation between cultural heritage experts and humanities researchers working with digital sources and employing digital research methods?
- How to strengthen the generative role of cultural heritage projects in providing new data and research questions for digital humanities scholarship and vice versa, how digital humanities can better serve the preservation and public-facing aims of cultural heritage projects?

	20 April 2020	
13.00-13.45	Lunch	
13.45-14.00	Welcome & orientation	Welcome and introduction to SHAPE-ID, consortium and project goals, and workshop objectives
14.00-14.45	Ice-breaker & introductions	Participants introduce themselves and briefly describe their experience with cooperation between DH and CH.
14.45-15.45	Sharing [Downloading]	Contextualising presentation of the DARIAH report on facilitating cooperation between DH researchers and CH institutions. A showcase of examples of successful collaboration.
15.45-17.30	Listening (with coffee)	World Café format: participants map the 3 questions designed to reflect the challenge of the workshop and try to define the main areas of interest over 3 rounds, followed by a 'Harvest' session to share insights and define challenges
17.30-18.30	Evening exercise	Short presentations of local projects relevant to the workshop topic and focus on challenges (4 x 10 minutes), followed by discussion and reception.
	21 April 2020	
9.00-9.30	Reflection on Day 1 & evening exercise	1-2-4-All exercise to respond to evening exercise and prompt
9.30-12.15	Envisioning [Presencing] 11.00-11.15 Coffee break	PART1. Defining. Breakout groups (5x5) focused on designing actions responding to the challenges on the policy and funding level. Sharing insights. PART2. Prototyping. Groups take one of the actions and try to prototype a very concrete solution (e.g. policy measure, funding call). Sharing insights and difficulties.
12.15-12.45	Evaluation	Standard Evaluation using Most Significant Change Tool
12.45-13.00	Close	SHAPE-ID next steps
13.00-14.00	Lunch	

Table 9 Learning Workshop 5 draft schedule

3.6.7 Learning Workshop 6: Intersections or reconfigurations? Arts & Humanities integration in inter- and transdisciplinary research

Date: 13-14 May 2020 **Location:** ETH Zürich

Workshop Scope

The workshop will be organised by ETH Zurich, partner of SHAPE-ID, in cooperation with the transdisciplinary network Swiss academies of arts and sciences and the USYSTdLab. The workshop will focus on two key questions:

- How can Arts and Humanities be fruitfully part of inter- and transdisciplinary research?
- What are the most suitable criteria, tools and strategies for that?

The aim of the workshop is to co-produce recommendations for Arts and Humanities (AH) integration in inter- and transdisciplinary research (IDR/TDR), by:

- Opening a space for exchange and networking.
- Discussing instruments and strategies for AH integration in IDR/TDR funding.
- Identifying necessary transformations (concepts, institutional models, funding, etc.) for ITR and policy.

The discussion during the LCW will take the following as guiding questions:

1. Why and with what purpose is it necessary to integrate AH in IDR/TDR? How does this influence the process and results of IDR/TDR?
2. Where is the beauty of the balance between Arts, Humanities and STEM disciplines in IDR/TDR? Are intersections or reconfigurations among disciplines needed?
3. What are the factors that hinder or help AH integration in IDR/TDR?

	14 May 2020
12.00 - 13.00	Registration and Lunch
13.00 - 13.15	Introduction to SHAPE-ID
13.15 - 14.00	Icebreaker – To map participants' understandings of ITR / factors that hinder or help AH integration in ITR. Linking to SHAPE-ID's research questions
14.00 - 15.30	*Downloading* – Case studies/vignettes of AH involvement in ITR & Artistic interventions.
15.30 - 16.00	Coffee
16.00 - 17.30	*Listening* – Group exercise to discuss inputs coming from SHAPE-ID project and participants experiences/aspirations/disappointments towards ITR.
17.30 - 18.00	Wrap-Up & Introducing discussion topic and plans for Day 2
19.00	Apéro
	15 May 2020
09.00 - 9.15	Highlights on Day 1 and Day 2 Agenda
09.15 - 10.30	*Pre-sensing/Visioning* – Group activity to discuss on two different calls and the role of AH. We will use two calls from different funders as input for the discussion. How the call can better address AH integration in ITR?
10.30 - 11.00	Coffee
11.00 - 12.30	*Evaluating* – Group activity What should be changed and how? What intersections, interfaces or reconfigurations are needed to better develop integrative processes in which A & H are represented?
12.30 - 13.00	Wrap-Up & SHAPE-ID next steps
13.00	Lunch

Table 10 Learning Workshop 6 draft schedule

5 Section B: Challenge-oriented research evaluation framework, tools and learning workshops' evaluation methodology

5.1 Our evaluation perspective and task

According to the SHAPE-ID Preliminary Report of Literature Review on Understandings on Interdisciplinary and Transdisciplinary Research (D2.1), the literature reveals that IDR and TDR represent contested discourses and are categorised and conceptualised in a wide variety of ways.

The approach in D2.1 was to consider three levels of understanding and investigation of the ID/TD concepts and practice: 1) studies **on** ID/TD; 2) interdisciplinary/transdisciplinary theories and methodologies; 3) case studies **of** ID/TD applied in specific contexts.

The approach used in D2.1 to deal with the complexity and potential ambiguity of the matter was considering IDR/TDR strongly dependent on the context of application. The latter is investigated framing the literature review according to a number of dimensions:

- **What?**: Definitions of ID and TD and their conceptualisation, how disciplines are understood and how they relate to ID and TD.
- **Who?**: Subjects that develop IDR and TDR whether researchers, funders, policy makers, and stakeholders, as well as communities and teams.
- **How?**: Methods and tools applied to achieve IDR and TDR. Integration as a central process.
- **Why?**: Motivations and logics behind IDR and TDR. This dimension considers what drives IDR and TDR or their study. It addresses the question 'Under what circumstances IDR and TDR are possible, and what are their consequences?'
- **When?**: Time and timing as central topics to better understand these practices.
- **Where?**: Spaces for IDR and TDR that allows consolidation of pertinent environments. They can be individual or collective endeavours.

In D3.1 we propose a similar approach to frame the evaluation of the learning experiences undertaken in the six SHAPE-ID learning workshops. The dimensions of 'when' and 'where' are fixed in our case, as the dates and venues of each workshop.

The other dimensions – who, what, how and why – are considered instead from a different perspective: the perspective in D2.1 was 'looking back' to the existing literature on ID/TD, the D3.1 perspective is 'looking forward' to the learning experiences in the forthcoming workshops, all focusing on specific

challenges and the contribution IDR/TDR can bring in the context of so called 'challenge-oriented research'.

From the above perspective, our evaluation task will include now:

- Designing a general-purpose challenge-oriented research evaluation framework (section 4.2);
- Elaborating out of the framework criteria and tools for the evaluation of challenge-oriented research projects and programs (section 4.3);
- Designing the specific evaluation methodology that will be applied in all six SHAPE-ID learning workshops (section 4.3).

5.2 Challenge-oriented research evaluation framework

A new challenge-oriented research evaluation framework is therefore proposed and presented in Figure 6 below.

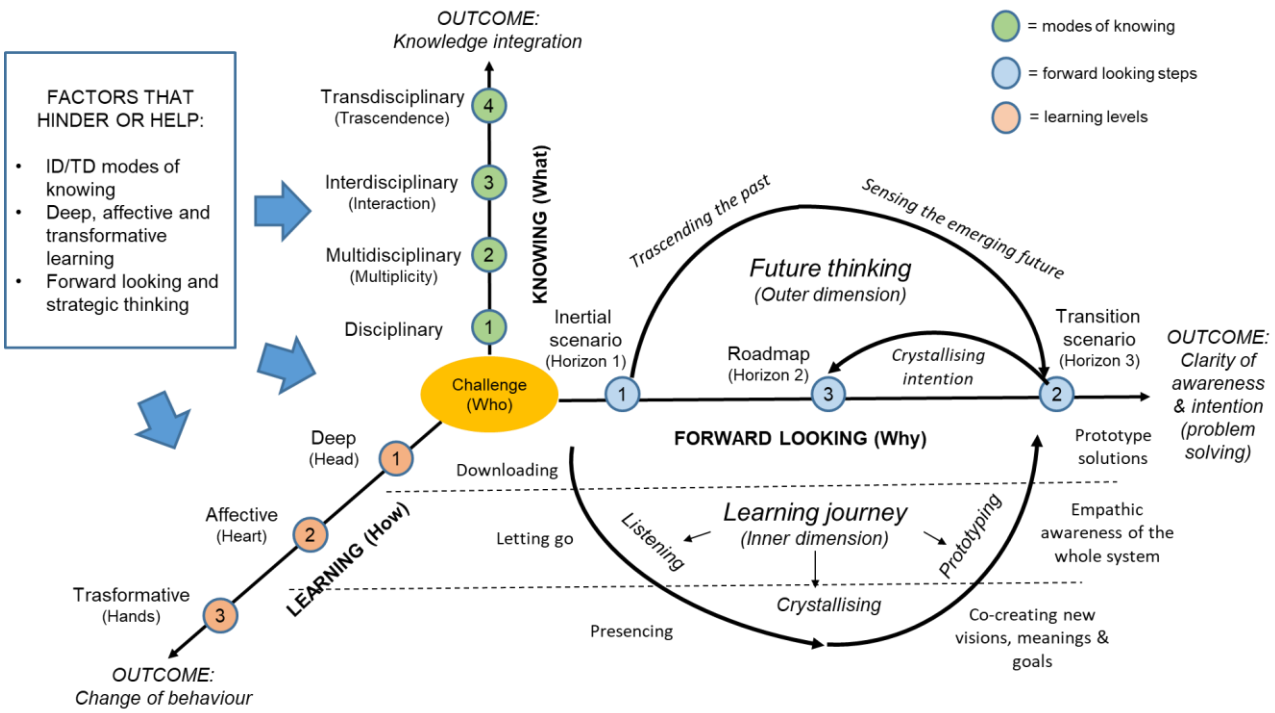


Figure 6 Challenge-oriented research framework

The 'who?' question is at the origin of the framework (orange circle): the first step – antecedent to any other aspect of the learning experience – is to identify who to engage in the ID/TD learning process, in relation to the challenge that each workshop intends to address.

The first thing to evaluate, then, will be the composition and quality of the group of invited participants. This, depending on the challenge and the context of application, may include researchers, stakeholders,

citizens, or a subset of these categories. What is important is to ensure the presence and right balance of perspectives – disciplinary and experiential (e.g. that from stakeholders and/or the citizens' lived experience) – deemed relevant for the context and the purpose of the learning event.

From this point of departure (the 'origin') we consider three 'axes' or dimensions for the evaluation of the learning experience:

- The 'knowing' dimension – the what
- The 'learning' dimension – the how
- The 'forward-looking' dimension – the why

These dimensions are illustrated in the following sections.

5.2.1 The 'knowing' dimension

The knowing dimension is about 'what we know'. The context where we assume this is more evident, is within each disciplinary field. Obviously, there are unsolved issues within each discipline, the 'what we don't know still' dimension that continuously motivates the discovery and experiential process internal to each disciplinary field. The first 'mode of knowing' considered in the evaluation framework is therefore the **integrity of the disciplinary knowledges or practices which contribute to the collaborative research experience**. **However, our focus in the challenge-oriented framework is on multi-, inter- and transdisciplinary research (MDR/IDR/TDR)**.

5.2.1.1 Multi-disciplinary research

The **multidisciplinary approach** consists in having several disciplines co-operate without emphasising a collective work of integration and synthesis of language, concepts, tools or information specific to each. The research problem is 'fragmented'. Each specialist addresses an 'autonomous' research object, related to this problem, according to the modalities specific to their discipline of origin. This generally results in a juxtaposition of the data produced in each discipline. Coordination work is then necessary to synthesise the data produced by the specialists of the respective disciplines.

5.2.1.2 Interdisciplinary research

The **interdisciplinary approach** is a process that emphasises the development of the capacity of a multidisciplinary collective to conduct a work of analysis of integration and synthesis from the perspectives of several disciplines and therefore to install itself as an ID team. The National Academies in the USA (2005, p.2) have defined IDR as: ' a mode of research by teams or individuals that integrates information, data, techniques, tools, perspectives, concepts, and/or theories from two or more

disciplines or bodies of specialized knowledge to advance fundamental understanding or to solve problems whose solutions are beyond the scope of a single discipline or area of research practice.' The aim here is to deal with a problematic as a whole, by identifying and integrating all the relationships between all elements involved. This new capacity makes it possible to link the disciplinary approaches a priori according to the research problem addressed and thus to place it in a broader systemic context. From the 'pragmatic' point of view, interdisciplinarity refers to a research practice according to which open and competent specialists in their respective disciplines: 1) work as a team to co-construct a problem or a research object and make recommendations to solve or address it in a common language; 2) bring their experience, disciplinary knowledge, concepts, methods and instruments to work in an interaction that is at the heart of the project.

5.2.1.3 Transdisciplinary research

The **transdisciplinary approach** aims to transcend the boundaries of each discipline and to bring together knowledge beyond these borders. It sets itself a priori objectives of cooperation between disciplines more 'ambitious' insofar as this cooperation is likely to go as far as transcending or transgressing these borders. Its essential principle is therefore a refusal to break down the problem of research treated along the borders specific to each discipline. It is a matter of defining a research object that does not belong to a given discipline and to construct contents and methods that are specific to the problematic defined. In the context of challenge-oriented research, the 'research object' is often the challenge itself, which is addressed from different disciplinary or experiential knowledge angles in a problem solving approach.

5.2.2 The 'learning' dimension

The learning dimension introduces a new mission for the challenge-oriented research: moving from understanding the challenge to learning **how** to cope with it, transforming personal behaviour and collective values and norms. The mission, along this dimension, is for the challenge-oriented research project to provide a learning experience to individuals coming from different backgrounds, collectives and cultures, to equip them with the necessary skills for deep (self-)knowledge, visionary ideas, higher values, and responsible practice leading to sustainable, liveable, inclusive futures, be those in academia, companies, NGOs, or any other community.

Learning is 'a **process** that leads to **change**, which occurs as a result of **experience** and increases the potential for improved performance and future learning' (Ambrose, A. et al. 2010). Therefore, learning is a process not a product, is a personal experience, something a person does themselves, and involves change. The change in the learner manifests as the acquisition of skills: intellectual, cognitive skills, what

we can call 'literacy' (such as literacy in maths, in history, in law, in economics, in biochemistry, scientific inquiry, or problem-solving capacity on paper), and/or action-oriented skills, what we can call 'leadership capacity' (including intrapersonal, interpersonal-social, executive skills, which are often termed soft skills). The output of learning is often a credential of some kind (for example, an academic degree, a recognition of completion of an executive program, or a digital badge). However, the result of learning, the outcome, is that the learner is equipped and trained to see themselves, nature and others differently, and to act and perform in the world accordingly.

The following sections describe the three learning levels – deep (the 'head'), affective (the 'heart') and transformative (the 'hands') – in greater detail.

5.2.2.1 The 'head': deep learning

Deep learning involves paying attention to underlying meaning. It stimulates learners to **think profoundly** about the subject in focus. It is associated with the use of analytic skills, cross-referencing, imaginative reconstruction and independent thinking. In contrast, surface learning strategies typically place more emphasis on rote-learning and simple description.

Deep learning is dependent on a learner's level of engagement with the topic (Ramsden, 1997). Deep learning is internally motivated and is associated with an intention to understand, rather than to simply pass an assessment task (Marton and Saljo, 1997). Thus, a priority for enabling deep learning is to provide an environment where learners develop a strong personal interest in a challenge-oriented issue. Significantly, it is not possible to induce learners to adopt a deep learning approach merely by telling them that it is required.

Pask and Scott (1972) provided evidence for different styles of deep learning. They distinguished between a holistic (global) style that attempts to create a picture of the whole task (comprehension learning) and a serialist (step by step) style that pays more attention to details and processes (operation learning). Students and researchers with a science background are more likely to emphasise operation learning while those coming from the Arts and Humanities tend to emphasise comprehension learning, and these approaches to learning are reinforced by differences in culture and teaching style in contrasting disciplines (Ramsden, 1997). To be successful, challenge-oriented collaborative research must help students and researchers to develop a versatile style of learning that balances operation and comprehension learning – thereby reducing the chance that some researchers (e.g. from science) are unable to describe the meaning of what they know, while others (e.g. from the Arts and Humanities) are incapable of deductive reasoning (Ramsden, 1997).

Deep learning strategies cannot be externally imposed and must be interest-led. Interest can be stimulated by placing more emphasis on contextual interpretation. The challenge for challenge-oriented collaborative research projects is not simply to produce evidence of concrete facts about the challenge in focus, but to create an active, transformative process of learning that allows values to be lived out and debated, and permits a unification of theory and practice (Gunnell and Dyer, 1993; Dyer, 1997; Smith and Williams, 1999/2000). These activities are enhanced through small group discussions, with tutors or facilitators providing guidance and encouragement as needed.

Deep learning can be encouraged by emphasising principles and concepts rather than accumulated facts (Hounsell, 1997). Given the unusual breadth of the challenge-oriented research agendas, it is important to provide focus in the form of a unifying framework that permits meaningful dialogue across conventional disciplines. This can be done by identifying key concepts and considering interpretations and implications of each concept in the environmental, social and economic spheres. Similarly, a single real-world issue can be addressed from different perspectives, with hands-on examples. Conceptual frameworks should be developed in a clear and graphic fashion. Through enquiry, discussion and problem-based exercises participants in a deep learning exercise can make connections between key concepts and visualise these relationships in two-dimensional space as lists, networks or mind-maps.

Summing up, deep and long-lasting learning involves understanding, relating ideas and making connections between prior and new knowledge, independent and critical thinking, and the ability to transfer knowledge to new and different contexts. At the same time, it requires guidance, monitoring and assessment, evaluation and self-evaluation; sharing, communicating and exchanging of ideas and approaches; in-field testing, prototyping, validation and confrontation; etc.

5.2.2.2 The 'heart': affective learning

The affective domain is about our values, attitudes and behaviours. Affective learning stimulates learners to feel the sentiments raised by the subject in focus. It includes, in a hierarchy, an ability to listen, to respond in interactions with others, to demonstrate attitudes or values appropriate to particular situations, to demonstrate balance and consideration, and at the highest level, to display a commitment to principled practice on a day-to-day basis, alongside a willingness to revise judgement and change behaviour in light of new evidence. Learners' motivation and their emotional state whilst learning are also elements of the affective domain (Beard et al., 2007).

Affective learning is relevant when, in the context of challenge-oriented research, there is an explicit or implicit intention to not only inform groups and individuals but also to influence them to subsequently behave in a particular manner. However, Bloom et al. (1971) in their seminal work identified a

hierarchical nature of affective learning outcomes: this may prove to be important as it emphasises that, as with cognitive skills, some outcomes may be easier to achieve than others. This hierarchy is relatively straightforward to apply to the 'challenge aware' learner. We start with a willingness to listen, to read and to acquire information. We progress to discuss challenge-oriented issues with others and then formulate our own views on the issues to develop opinions that shape our own interactions with others, and with our environment. Later, we start to make life choices and experiment with prioritising 'good for us', 'good for our dependants' and 'good for our descendants'. At some point, and at the top of this particular hierarchy, we emerge showing self-reliance, an ability to cooperate or even lead, the confidence to live our life in the way that we chose and a commitment to constantly seek new ways to achieve and to reassess our decisions.[8]

The early research by Bloom et al. suggests that the design of learning activities does need to ensure that learners progress through the hierarchy of affective outcomes so as to avoid values being entrenched rather than developed (Krathwohl et al., 1973). It is also possible to use Bloom et al. (2017)'s affective domain to design realistic and assessable learning outcomes in this domain in the same way as the cognitive domain is used to design cognitive outcomes. At all levels of affective learning, it should be apparent that knowing how to perform in relation to a challenge – e.g. sustainable development - and having the skills to do so, are not on their own sufficient to ensure that individual and group behaviours are in fact addressing the challenge. Measuring critical thinking, problem solving, group work and communication abilities may not be enough without clearer articulation of the link between ability and behaviour.[9]

5.2.2.3 The 'hands': transformative learning

Transformative learning can be understood as a process of effecting change in a particular frame of reference (Mezirow, 1997), often with an underlying assumption that individual and social change may result through transformative group learning (Cranton, 1994). In particular, this level of learning is concerned with perspective transformation (Mezirow, 1985) where the ultimate goal of transformative

[8] In education, the hierarchy also allows higher educators to address values, attitudes and behaviours to different extents, depending on their own stance towards these complex issues. Many educators are comfortable with teaching processes that emphasise a willingness to listen, to discuss and to acquire information. But, they may not be comfortable with a quest for higher order outcomes relating to opinions and behaviours, as described by Lemkowitz et al. (1996).

[9] One area where affective outcomes are now openly and successfully sought is health sciences. Doctors, nurses and related health professionals are trained to heal but their training also seeks to ensure that they display caring attitudes towards their patients. Educating professionals to care involves setting learning outcomes that include affective attributes and using learning and teaching activities that promote their attainment; ensuing that role models act appropriately; and using appropriate and effective assessment practices (Howe, 2003).

learning is to empower individuals to change their frames of reference or worldviews, and their behaviour. The ultimate aim of transformative learning is behavioural change, providing the skills and the impulse to do and enact change to align with the new frames of reference.

As shown in Figure 7 below, transformative learning can be considered the last, more profound step of a learning strategy which integrates learning processes rooted in participants' heads (cognitive domain; engagement, e.g. through academic study and understanding of sustainability and global citizenship), hearts (affective domain; enablement of values and attitudes to be translated into behaviour, e.g. developing a learning community with individual and group responsibilities) and hands (psychomotor domain; enactment of theoretical learning through practical skill development and physical labour, e.g. building, painting, planting).

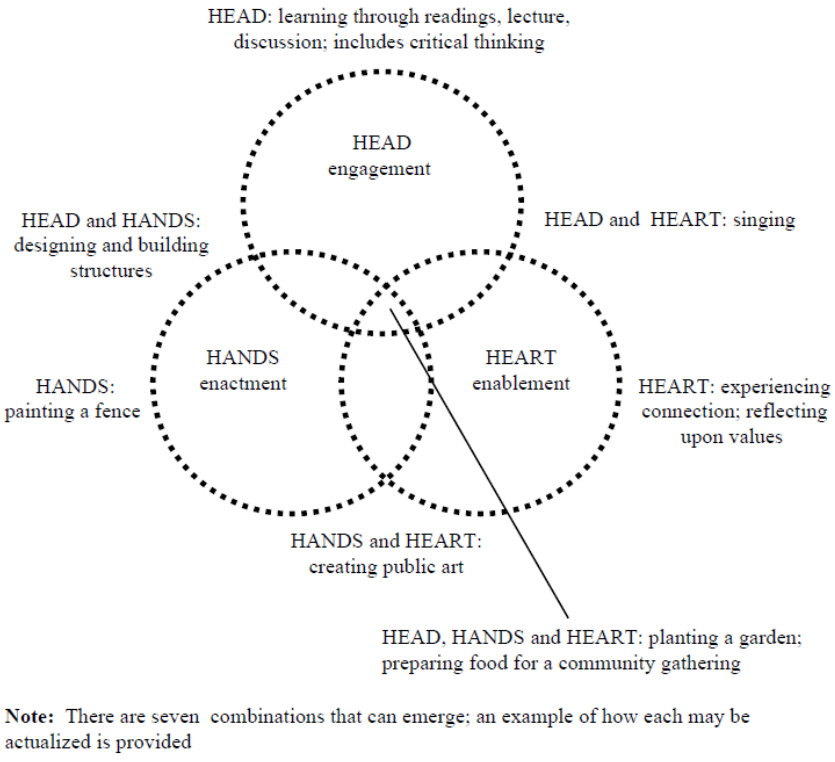


Figure 7 Head, Hands and Heart transformative process

Source: Y. Sipos, B. Battisti, K. Grimm (2008), Achieving transformative sustainability learning: engaging head, hands and heart.

Transformative learning can emerge by implementing pedagogical models that enable ID/TD, experiential, and place-based learning. Some of the most relevant examples of these pedagogies are: action learning, community service-learning, critical emancipatory pedagogy, environmental education, participatory action research, pedagogy for eco-justice and community, problem-based learning, and traditional ecological knowledge.

5.2.3 The 'forward-looking' dimension

Transformative learning is associated with change, and this leads to the third dimension of our challenge-oriented research evaluation framework: the forward-looking dimension.

In this dimension we ask **why** the research is performed, to achieve which changes in the real world, and what could be the intended and unintended consequences of the research outcomes for society as a whole – societal, environmental, sustainability impacts and new problems that may arise from finding and implementing new technologies and solutions.

The forward-looking dimension is grounded on two main pillars: the new Responsible Research and Innovation paradigm and the use of participatory foresight methods to structure forward looking exercises.

5.2.3.1 First pillar: Responsible Research and Innovation paradigm

A new paradigm of 'Responsible Research and Innovation' (RRI) highlights the need to be more broadly accountable for the consequences of research and innovation projects and initiatives for society. The forward-looking dimension is explicitly called in as one fundamental aspect of the RRI paradigm.

There are several definitions of RRI. The most popular was introduced by Von Schomberg: 'RRI is a transparent, interactive process by which societal actors and innovators become mutually responsive to each other with a view to the (ethical) acceptability, sustainability and societal desirability of the innovation process and its marketable products' (Von Schomberg 2012). The definition adopted in the context of the European Union research framework is as follows: 'RRI seeks to better align the process of research and innovation and its outcomes with the values, needs, and expectations of European society. This requires different actors including citizens and third sector actors to work together to collectively reflect on and discuss the question of: What do we want research and innovation to achieve? What are promising paths to achieve these purposes?' (European Commission's RRI website).[10]

Several RRI frameworks of analysis have been proposed following these definitions, to structure responsible research and innovation processes. The most popular identifies four necessary RRI capacities: anticipation, reflection, deliberation and responsiveness (Stilgoe et al., 2013). In more detail:

- **Anticipation** (our forward-looking dimension) involves systematic thinking about any known, likely, plausible and possible implications of the innovation that is to be developed, which requires that

[10] https://ec.europa.eu/programmes/horizon2020/en/h2020-section/responsible-research-innovation

innovators understand the dynamics that help to shape the innovation. The aim is to envision desirable futures—because futures cannot be predicted—and organise resources to steer the innovations in the right direction. This requires early inclusion of stakeholders and the wider public who engage in a dedicated attempt to anticipate potential problems and assess available alternatives.

- Reflexivity is about critically scrutinising one's own activities, commitments and assumptions, and being aware of the limits of knowledge and the fact that one's reality might not be universally held. Furthermore, innovators are expected to engage in second-order reflexivity, where they scrutinise how their underlying value systems and beliefs influence the development of the innovation. In the end, innovators should not only live up to their role responsibility but also their wider moral responsibilities. Reflexivity can be enhanced by early inclusion of stakeholders and the public who deliberate about the innovation at stake.

- Inclusion resonates in all articles on responsible innovation, as they are associated with the other dimensions. It is about the upstream engagement of stakeholders and the wider public to open up discussions and to interrogate the social, political and ethical implications that the development of the innovation would bring. One could say that responsible innovation involves an active engagement of stakeholders for the purpose of substantively better decision-making and mutual learning.

- Responsiveness is about having the capacity to change the shape or direction of the innovation in response to the values of stakeholders and the wider public. Furthermore, it requires a collective response and co-responsibility for responsible development of the innovation in the light of new knowledge, perspectives, views and norms that emerge during the innovation process. In other words, there should be a willingness among all participants to act and adapt according to these ideas.

RRI is itself an emerging topic of research within academia, but presently there is no clear agreement or understanding of what it encompasses and how it relates to well established disciplines such as technology assessment and business ethics. After years of working in silos, industry, academia, and policy makers need to create opportunities for dialogue to discuss and clarify the important key issues and challenges that are not only a focus for RRI, but are also those faced by innovators and wealth creators in responding to the needs of society.

There is therefore an increasing need for dialogue among researchers, innovators, policymakers, business and governance organisations, users and citizens about responsibility issues raised by research

and innovation, with a collective concern to take care of possible future consequences and learn how to improve choices and actions in the present. As a corollary, there is an increasing need for capacity building to feed and sustain responsible research and innovation dialogues, in different fields and contexts, with forward looking structuring and facilitation abilities. These responsible research and innovation dialogues should engage the right people (all concerned stakeholders, users, citizens), at the right time (to consider the challenges ahead), with the right methodology (to ensure the appropriate duration and running of the experience) and for the right purpose (exploring possible outcomes and impacts and formulating scenarios and strategies for driving change).

Engaging experts, stakeholders and citizens from different walks of life in RRI dialogues makes sense especially for dealing with transformative technologies and potentially disruptive innovation.[11] In such circumstances, thinking ahead to the impacts and effects of new scientific advancements and radical innovations will help to anticipate possible effects – good, bad, or neutral – and alter the research and innovation goals and implementation design, to minimise risks in advance, identify alternative paths forward, and build support.

Broader responsible research and innovation dialogues should eventually involve all concerned societal actors to consider – beyond better economic performance – the dimensions of sustainability, societal desirability and ethical acceptability of future scenarios of change:

- Sustainability: do not harm the next generation (children < 10 years old). Research and innovation should meet the needs of the present without compromising the ability of future generations to meet their own needs. This concept has been operationalised in the UN Sustainable Development Goals (SDGs) Agenda 2030.
- Societal desirability: do good for the present and next generations. This requires research and innovation to have the potential to benefit humankind as a whole, and also to address the research and innovation needs of marginalised and low-income populations. It has been partially operationalised with some social SDGs.
- Ethical acceptability: reflect on the moral consequences of your actions. This is governed by legal instruments and deontology guidelines (e.g. ethical requirements in medical research). However, a broader concept of 'acceptability' should include the moral dimensions of empathy and

[11] 'Transformative technologies' have the potential to alter the very societal values that organisations engaged in research and innovation contribute to, since they might transform existing modes of production, living and social organisation.

compassion, social justice and resilience to change (i.e. the capacity of adapting) associated with any choice and action.

Engaging people in a responsible research and innovation dialogue requires:

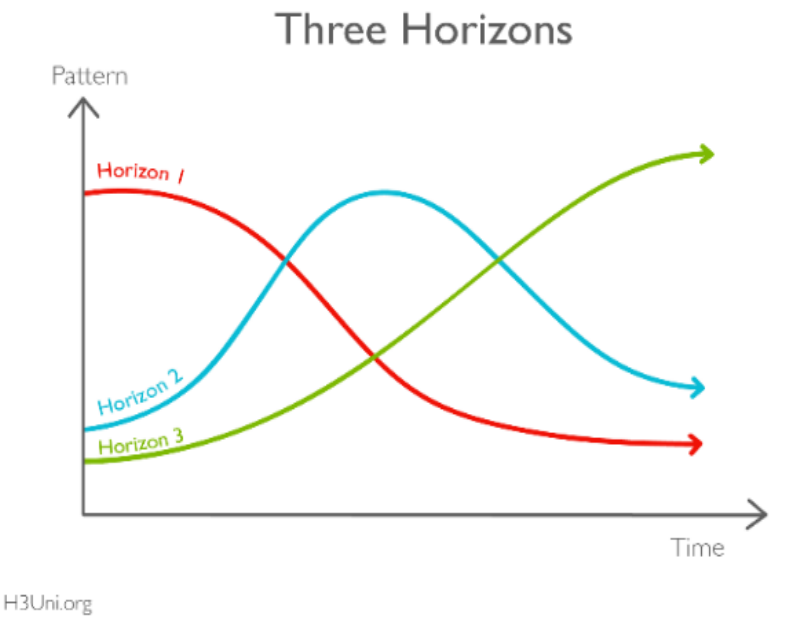
- Mapping the stakeholders to invite to participate in the responsible research and innovation dialogue;
- Framing the dialogue with the help of fine-tuned methodologies of knowledge co-creation and participatory foresight;
- While looking ahead to the medium to long term possible scenarios, coming to conclusions that are of immediate, practical use in the present (recommendations, action plans, policy roadmaps to drive change).

5.2.3.2 Second pillar: participatory foresight methods

Learning is based traditionally on the transmission and application of existing knowledge within which there is expertise and authority. However, in the face of an unknown and uncertain future, the relevance of expertise based on the past is limited to those aspects of life which repeat themselves, while the future holds emergent properties that are inherently unknown. Expert knowledge on its own therefore is insufficient in the face of this. The question is: what is the optimal form of knowledge that can be applied in these new conditions? Essentially, we need to switch from an emphasis on content knowledge to an emphasis on process knowledge.

Process knowledge here means ways of structuring the exploration of partially known uncertain situations, to understand and realise new possibilities. This is a different type of knowledge to content knowledge, although it includes the capacity to operate with content knowledge. Process knowledge is essentially practice; it involves creating the conditions for groups to work together to harness their creative capacities to the full, so they can take steps forward while remaining open to the emerging future.

Examples of structured knowledge process practices include several **participatory foresight methods**. A meta-model of participatory foresight – a method which helps to frame in one coherent format and sequence of steps any specific participatory foresight exercise – is the so-called **Three Horizons approach** (Sharpe, B. 2013). This helps to structure the engagement of experts, stakeholders and citizens in a challenge-focused dialogue, e.g. involving a group of invited participants in a workshop to think together and discuss future scenarios. Participants are first presented with the 3H simple diagram and concept (See Figure 8), and a set of questions.



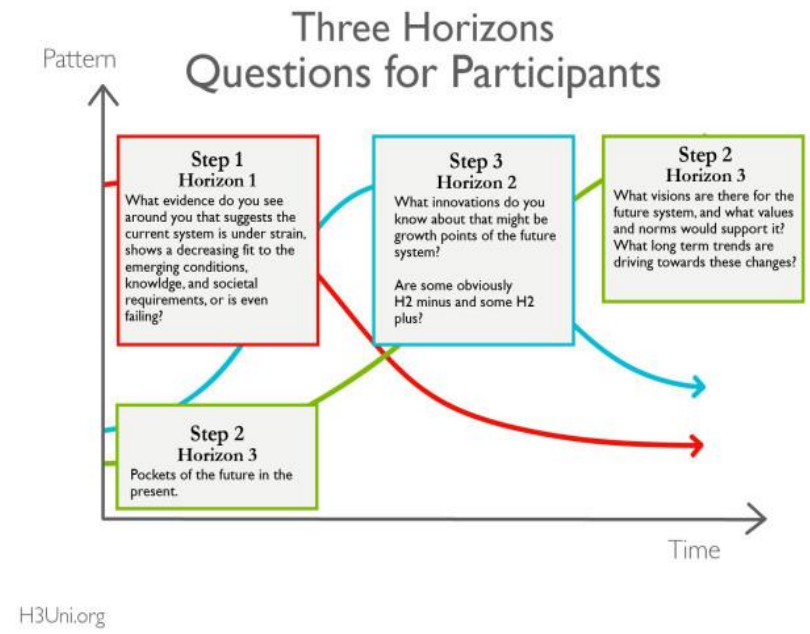


Figure 8 Three Horizons approach (Source: Three Horizons University website)

The horizontal axis is 'Time', from now – the present – to a long-term end point – it may be for instance 2030 or 2050, it depends on the scope and context of the foresight exercise. The vertical axis is usually labelled as 'Pattern', 'Viability', 'Prevalence' or 'Strategic Fit', which captures the idea of a shift, moving over time, of the dominant pattern. All three horizons are always present over time, and their dynamics interact. Some aspects of H1 will persist over time, even if a new paradigm will become dominant; on the other hand, aspects of H3 can be already evident in current discourses and in activities on the fringes of the dominant system; while H2, like a moving border between past and future, represent the

wave of innovations, strategic policies, governing ideas flourishing, and realising the transition to the new H3 dominance. In more detail:

- The First Horizon – H1 – is the dominant system at present. It represents the inertial scenario, i.e. where the system will stand if current drivers and trends will continue unchanged. We rely on the current system being stable and reliable but as the world changes, so aspects of business as usual begin to feel out of place or no longer fit for purpose. Eventually the inertial scenario will be superseded by new ways of doing things, and this is shown by the red curve going down – reducing its strategic fit over time.

- The Third Horizon – H3 – starts in the present, with some visible 'seeds of change' or 'pockets of future', i.e. early manifestations of transformation and shift of the current paradigm towards a new emerging paradigm that is thought to become the long-term successor to business-as-usual. It grows from fringe activities in the present that introduce completely new ways of doing things, but which turn out to be much better fitted to the world that is emerging than the currently dominant H1 system.

- The Second Horizon – H2 – is the pattern of innovations, strategic roadmaps, governing ideas that are tried out in response to the ways in which the landscape is changing. Some of these innovations will be taken up by the H1 system to prolong its life while some will pave the way for the emergence of the radically different H3 system.

While thinking about the horizons and their interaction, participants are asked to follow a forecasting-back casting sequence of forward looking steps (H1 → H3 → H2): first consider what will happen if nothing in the current system operation change (inertial scenario), then imagine the sustainable and desirable scenario emerging as a possible future (transformative scenario), and finally take a step back to consider what is needed to help the future scenario to emerge (recommendations and action roadmaps).

Bringing all three horizons together as interrelated patterns it is possible to eventually develop with the participants a shared narrative of possibilities for navigating towards a better future – a mature perspective that accepts the need both to address the challenges to the First Horizon and nurture the seeds of the Third. This is not an either/or, good/bad discussion. We need both to 'keep the lights on' today, and to find a way of keeping them on in the future in very different circumstances.

Summing up, challenge-oriented research includes as a key dimension engaging the concerned actors in forward-looking exercises to develop responsible research and development strategies. To evaluate

the coherence and completeness of these exercises, we suggest applying the Three Horizons logic, to assess their capacity to improve the understanding of current drivers and trends and their implications (Horizon 1 inertial scenario), to include possible scenarios of transition to radically different and desirable scenario options (Horizon 3 transformative scenario), and to elaborate strategic agendas, action plans, policy roadmaps for the implementation of desirable scenarios (Horizon 2 roadmaps).

Finally – as 'responsibility' means taking care of the future consequences of what we do now, for us (individual life), for others (at societal level) and for the planet (our local and global environment) – responsible strategies steering technological transformations should be always associated with transformations in the personal awareness of the actors partaking in the system, as well as in the social sphere (e.g. governance rules, behavioural and cultural norms). There would be no impactful, sustainable transition in the outer (real) world without transformation in the inner dimension of engagement of the people involved in the system. In short, it is essential to accompany the implementation of technological changes with the change of mindsets, beliefs and values in the people' inner dimension, in order to see new practice and behaviour shaped in the outer world.

5.3 Criteria and tools for the evaluation of challenge-oriented research projects

The challenge-oriented research evaluation framework presented in the previous Section can be made operational in designing evaluation tools. In the following Sections we introduce:

- A synthetic tool to assess the challenge-oriented research projects and/or programs on the fundamental dimensions of responsiveness, inclusive reflexivity, anticipation and transformativeness (Section 4.3.1);
- Analytic tools to assess factors that hinder or help knowledge integration, learning outcomes and participatory foresight processes (Section 4.3.2).

These are all general-purpose tools to evaluate any research project or programme addressing a challenge, and they are only introduced here to show the range of possible applications of the challenge-oriented research framework.

They are offered as possible criteria and indicators to assess IDR/TDR, both ex-ante (i.e. funding) and ex-post (i.e. impacts on society with reference to societal challenges – one of the key objectives of SHAPE-ID where these tools will be discussed and elaborated in greater detail.

5.3.1 Synthetic assessment of challenge-oriented research dimensions

A synthetic assessment of the fundamental dimensions of challenge-oriented research can be based on four 'evaluation questions' presented in Figure 9 below:

Challenge-oriented research: Evaluation questions

RESPONSIVENESS: To what extent does the research project/program contribute to improve the understanding and/or shape the response to the challenge from all actors involved? (overall evaluation)

Please rate on a scale from 1 (not at all) to 5 (very much)

O	O	O	O	O
1	2	3	4	5

INCLUSIVE REFLEXIVITY: To what extent does the research project/program include all relevant disciplinary, experiential and sensemaking perspectives in an integrated knowledge process? (knowing dimension)

Please rate on a scale from 1 (not at all) to 5 (very much)

O	O	O	O	O
1	2	3	4	5

ANTICIPATION: To what extent does the research contribute to assess trends, drivers, alternative scenarios, desirable solutions and roadmaps for their implementation? (forward looking dimension)

Please rate on a scale from 1 (not at all) to 5 (very much)

O	O	O	O	O
1	2	3	4	5

TRANSFORMATIVENESS: To what extent does the research contribute to transform meanings, attitudes, behaviors and socio-cultural values and norms? (learning dimension)

Please rate on a scale from 1 (not at all) to 5 (very much)

O	O	O	O	O
1	2	3	4	5

Figure 9 Challenge-oriented research: Evaluation questions

Another synthetic tool is what we call – in analogy to the Technological Readiness Level (TRL) widely used to frame the ambition of research and innovation projects – the Co-creation Readiness Level (CORL), illustrated in Figure 10 below:

Challenge-oriented research Evaluation Grid & Co-creation Readiness Levels

Forward Looking Dimension (D1)	Knowing Dimension (D2)	Learning Dimension (D3)	CO-creation Readiness Levels (D1+D2+D3)
1 Understanding the challenge (inertial scenario)	1 Single disciplinary perspective		**CO2** Disciplinary understanding of the challenge
	2 Multi-disciplinary perspective	1 Deep learning	**CO4** Multi-disciplinary understanding of the challenge and meanings (i.e. different interpretations, consequences, impacts)
2 Understanding the response to the challenge (transformative scenario)	3 Interdisciplinary collaboration		**CO6** Interdisciplinary creation of new meaning and understanding for addressing the challenge
3 Crystalising intention (Action roadmap)	4 Transdisciplinary integration	3 Affective & Transformative learning	**CO10** Transdisciplinary creation of new reality responding to the challenge

Figure 10 Challenge-oriented research: Co-creation Readiness Levels

The indicator is based on the scores achieved by a given research project or program for the three dimensions of the challenge-oriented research framework shown in Figure 6.[12] Summing by rows the scores of forward looking, knowing and learning dimensions, we have four Co-creation Readiness Levels:

- CO2: Disciplinary understanding of the challenge
- CO4: Multi-disciplinary understanding of the challenge and its different meanings
- CO6: Interdisciplinary creation of new meaning and understanding for addressing the challenge
- CO10: Transdisciplinary creation of new reality responding to the challenge (i.e. translation of research into real implementation of policies, behavioural changes, etc.)

These levels can be used (e.g. by a funding agency) to set the ambition required by the research projects to address the scope of a challenge-oriented research program.

5.3.2 Analytic tools to assess factors that hinder or help knowledge integration, learning outcomes and participatory foresight processes

More analytic evaluation tools are proposed for the single dimensions of the challenge-oriented research framework:

- The knowing dimension (section 4.3.2.1)
- The learning dimension (section 4.3.2.2)
- The forward-looking dimension (section 4.3.2.3)

5.3.2.1 Assessment of factors that hinder or help knowledge integration

For the knowing dimension we propose an analytic evaluation tool based on the framework of factors identified in the literature of IDR/TDR, as presented in Deliverable 2.1.

The aim of the evaluation will be in this case to check how these factors are expected to play (or have played) out, influencing the collaborative research experience positively or negatively, facilitating or

[12] The 'who' dimension – shown at the origin of the three axes in fig. 6 – can be considered as an 'eligibility' criteria for accessing to the 'challenge-oriented' research category, related to the minimum number of diverse partners necessary to ensure adequate inter- and/or transdisciplinary scope of the research.

hindering the process. Special attention can be paid to examples of and implications for AH and SS integration.

The evaluation table (Table 11) is inspired by a similar table included in D2.1, showing the same factors by row[13]:

Factors	Definition[14]	Facilitates IDR/TDR (positive)	Hinder IDR/TDR (negative)	Examples & implications for AHSS
Academic tribalism				
Assumptions about other disciplines				
Career path				
Change				
Cognitive				
Collaboration				
Communicative				
Community building/ Identity				
Current policies				
Dealing with complexity				
Division of scientific labour				
Dynamics of power				
Emotional				
Epistemological				
Ethical				
Institutional				
Interactional				
Motivations for ITR				
Mutual ignorance on collaboration				
Non-epistemological values				
Objectivity *vs* subjectivity				
Ontological				
Qualities of ID/TD researchers				
Social				

Table 11 Factors that hinder or help knowledge integration

5.3.2.2 Assessment of learning outcomes

Learning outcomes (LOs) are statements of what it is expected that a learner will be able to do as a result of a learning activity. Considering the three levels of learning in our challenge-oriented research framework, we can say that:

- **Deep learning outcomes** often include systemic and holistic thinking as a means to cope with complexity and finding balance between different dimensions. Both concepts relate to the idea that

[13] We have not included here the 'evaluation' factor listed in D2.1, as IDR/TDR evaluation is the purpose of the whole table.
[14] definitions taken from the literature review can be found in D2.1, pages 31-34.

everything interacts with the things around it and that the world therefore consists of a complex web of relationships. The system exhibits properties that cannot be found only in the parts that form it. Analytical thinking is about breaking the things apart while synthetic thinking is about putting things together. Systemic thinking, on the other hand, is about combining these two skills to discern the patterns in a larger system and be able to understand cause-effect chains, understand conceptual models of a system, and create changes within and across systems. Related to systemic and holistic thinking is the integration of different perspectives into collaborative research projects. Finally, skills that are often mentioned as deep learning outcomes are problem-solving, critical thinking, creative thinking, self-learning and skills related to communication, teamwork and becoming an effective agent of change to shift policies, practices and societal norms.

- Affective learning outcomes: LOs do not refer only to knowledge and skills but also to awareness, attitudes and values. Addressing attitudes and values is normally seen as a means to create commitment and concern that motivates active participation, to achieve lifelong learning and self-discipline and to change behaviour.

- Transformative learning outcomes: Wals and Blaze Corcoran (2006) have described the outcomes of transformative learning as the competence to integrate, connect, confront, and reconcile multiple ways of looking at the world and the need for learners to be able to cope with uncertainty, poorly defined situations, and conflicting or at least diverging norms, values, interests and reality constructions. They emphasise the learners' dynamic qualities or competencies. They talk about the need to be able to change or shift perspectives related to cultures, disciplines, geographical conditions and time frames. This includes the ability to go from local to global considerations, from short-term to long-term, and to realise that the world has been, is, and will be changing over time, and that this changes the conditions for people of different generations. The indicated transformation is achieved when you go beyond factual and instrumental learning and are changed by what you learn. In order to achieve transformational learning, you must critically reflect on your knowledge and experiences, continuously question your assumptions, beliefs and values, and act accordingly in your personal life, professional life and community life.

To evaluate the learning outcomes at all levels, for a given challenge-oriented research project, we propose to use the evaluation matrix elaborated to assess the full range of 'transformative sustainability learning' (TSL) by Sipos, Battisti and Grimm (Yoria Sipos, Bryce Battisti, Kurt Grimm, 2008) – including deep cognitive engagement (head), affective growth in feelings or emotional areas (heart) and transformative psychomotor involvement through manual or physical skills (hands). The matrix is a

simple assessment tool. The learning objectives that inform this matrix are a combination of guidelines, strategies, outcomes and assessment criteria, derived from a review of existing pedagogical models. The matrix arranges learning objectives in the rows and uses the columns to assess the achievement of 0-4 score on each learning objective for a learning programme or event (in our case this would be a learning workshop). A mark of 4 indicates that the programme met a certain objective to the best of its ability while a mark of 0 indicates that the programme has not addressed that area. If appropriate, learning objectives can be weighted in a manner that indicates their hierarchy within the assessment process. The matrix is reproduced below (see Table 12).

Learning objective	Description[15]	0 Not addressed	1 Beginning	2 Developing	3 Accomplished	4 Exemplary
Head (think)						
Cognitive engagement						
Transdisciplinary curriculum						
Critical thinking						
System thinking						
Heart (feel)						
Empowering						
Creative						
Fun						
Values-focused thinking						
Inclusive						
Place-based						
Hands (deliberate; do)						
• Personal level						
Experiential learning						
Applied learning						
• Classroom/group level						
Participatory learning						
Conflict resolution						
• Community level						
Collaborative learning						
Service learning						

Table 12 Learning objectives and users experience matrix

[15] Descriptions elaborated from a review of pedagogical models can be found in Yoria Sipos, Bryce Battisti, Kurt Grimm, 2008, Table II.

5.3.2.3 Assessment of participatory foresight processes

As mentioned at the end of Section 4.2 above, a sound participatory foresight process should combine the 'outer' real world dimension of change with the 'inner' dimension of personal transformation, behavioural and cultural change.

This approach has been presented at the final conference of the INTREPID Cost Action[16], to elaborate the so-called **'Transition & Transformation (T&T) foresight evaluation framework'**, which combines several elements into one 'recipe' to design sound participatory foresight processes. The recipe reads as follows: 'Take your **time** to reflect on the emerging future, and be aware that there is no technological **transition** without **transformation** of meaning – and so the need of **transcending** the past and **taking action** into the future, integrating perspectives with a truly **transdisciplinary** engagement of different people (innovators, stakeholders, users, citizens) in mutual understanding and **tuning** of their intentional and empathic motivations, building **trust** to unlock the will to change and **touching down** to the source of eco-system awareness – and the whole thing does not exist unless **told** with a powerful narrative describing the new responsible (personal and social) practice'.

In the context of this framework, on the one hand we define 'transition' as a movement from system behaviour A to system behaviour B. Behaviours A and B are radically different forms of a system's operation. On the other hand, 'transformation' involves instead a real change in the blind patterns of thought, feeling and action, a radical change in the roots from which everything emerges. More concretely, 'transitions' can be understood as tangible changes in the techno-sphere, e.g. the transition in energy, production and consumption patterns of the economy, while 'transformations' include associated cultural changes, in personal awareness and behaviours, as well as in the social sphere. The evolutions in the technical and social spheres are thus to be seen as intertwined in a dynamic co-evolution process, and this in any context the analysis is focusing on – i.e. the system boundaries (geographical, sectoral, a single organisation, etc.).

The participatory foresight process is evaluated by taking care of **10 'T' key elements**. If properly implemented, these elements help to frame the foresight exercise as a journey where participants develop a collective awareness of the whole system (eco-system awareness)[17] (See Figure 11)

[16] http://intrepid-cost.ics.ulisboa.pt/

[17] Source: Igor Campillo, presentation at the INTREPID Final Conference, Lisbon, 27-29 March 2019

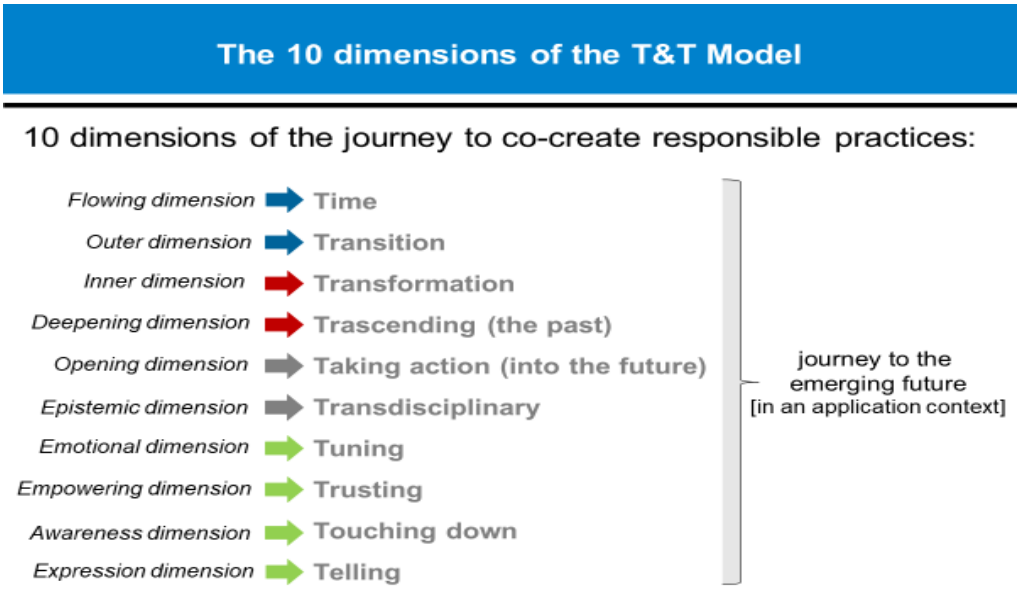


Figure 11 The 10 dimensions of the T&T Model

The elements are listed as '10 Ts' standing for

- Time: the flowing dimension, the time-scale, time-frame and timing of the transition-transformation process which engages the group of people reflecting on responsibility and responsible practice.
- Transition: the outer dimension, what we can perceive, the visible system behaviour evolution.
- Transformation: the inner dimension, the blind spots, and the revolution in the invisible system patterns, assumptions, and values.
- Transcending: the deepening dimension, transcending the past, suspending judgements, ideas, pre-conceptions and letting go of them all to see and sense with fresh eyes.
- Taking action: the opening dimension, taking action into the future, testing new emergent possibilities and crystallising new ways of operation.
- Transdisciplinarity: the epistemic dimension, overcoming judgements and discipline niches, opening our minds to other forms of understanding and knowledge generation, bringing together scientific, lay, local, indigenous-traditional, institutional, political and ethical knowledge.
- Tuning: the emotional dimension, overcoming our cynicism, opening up from our vulnerability, as the only way for mutual engagement.

- **Trusting**: the empowering dimension, building trust in the self and in the collective, which helps to overcome our fears, opening and activating our will to let the emergent future come.
- **Touching down**: the awareness dimension, connecting our beings to whole-system being, enabling thinking from the whole, sensing the whole and acting from the whole, bridging all possible scales of action: individual, local, regional, national, and global.
- **Telling**: the expression dimension, which is not simply about documenting and accumulating data, but about the narrative of the process and the outcome – an inclusive narrative of the responsible practice ahead – to communicate knowledge and stories that help people to change their mind, empathy and behaviour.

It is obviously possible to emphasise some elements in this list more than others. For example, a special emphasis can be given to creating trust, the empowering dimension. On the other hand, Transition, Transformation, Transcending the Past and Telling could be considered the key ones, with the 'telling' being important in order to spread the message and achieve a wider impact. However, the ten elements are all equally necessary 'ingredients' of what can be considered a 'good recipe' for participatory foresight processes aimed to cultivate responsible research and innovation practice.

5.4 Evaluation methodology applied in the SHAPE-ID learning workshops

While in the previous Section we have presented general-purpose tools to evaluate, at synthetic and analytical levels, challenge-oriented research projects, in this Section we illustrate the evaluation methodology that will be applied to assess the learning experience and outcomes of the six SHAPE-ID learning workshops.

The evaluation will be undertaken with the support of the ISINNOVA team present at all the workshops, in the last session, using the **Most Significant Change (MSC) approach**. This involves generating and analysing personal accounts of change and deciding which of these accounts is the most significant – and why.

There are three basic steps in using MSC:

1. Deciding the types of stories that should be collected (stories about what – for example, about practice change in collaborative research);
2. Collecting the stories and determining which stories are the most significant;
3. Sharing the stories and discussion of values with stakeholders and contributors so that learning happens about what is valued.

MSC is not just about collecting and reporting stories but about having processes to learn from these stories – in particular, to learn about the similarities and differences in what different groups and individuals' value.

5.4.1 Learning histories

In practice, in the short time available for evaluation in each workshop (1 hour at the end of the second day), we will implement a variant of the MSC approach by developing with the participants **'IDR/TDR learning histories'**.

A learning history is a process that results in a jointly told tale in multiple narratives, with illustrations and reflections on strategies, noticeable results, what happened and why. A learning history is also a product: a document, or any other form of (multimedia) presentation, to be spread and discussed on a large scale. A learning history can have the form of an ongoing story, continuously renewed, in the form of a collective journal or learning log, or as a website.

The history is performed by people who are involved in the central issue of the history – in our case the challenge on focus in each learning workshop. Making a learning history together with the participants will be a process of creating collective memory and of sensemaking. It will stimulate reflection in a natural way: by storytelling and looking for emerging patterns in the stories.

Concretely, learning histories will be developed in each workshop related to the challenge on focus, and engaging participants to reflect on IDR/TDR success or failure experiences. A 2x2 grid will be used to frame the evaluation process (See Figure 12), combining:

- The knowing dimension, with IDR understanding of meaning on one extreme and TDR transforming reality at the other extreme (horizontal axis);
- The forward-looking dimension, with the continuation of the current barriers hindering collaborative research (H1 inertial scenario) at one extreme and the seeds of change in collaborative research practice enabling success (H3 transformative scenario) at the other extreme (vertical axis).

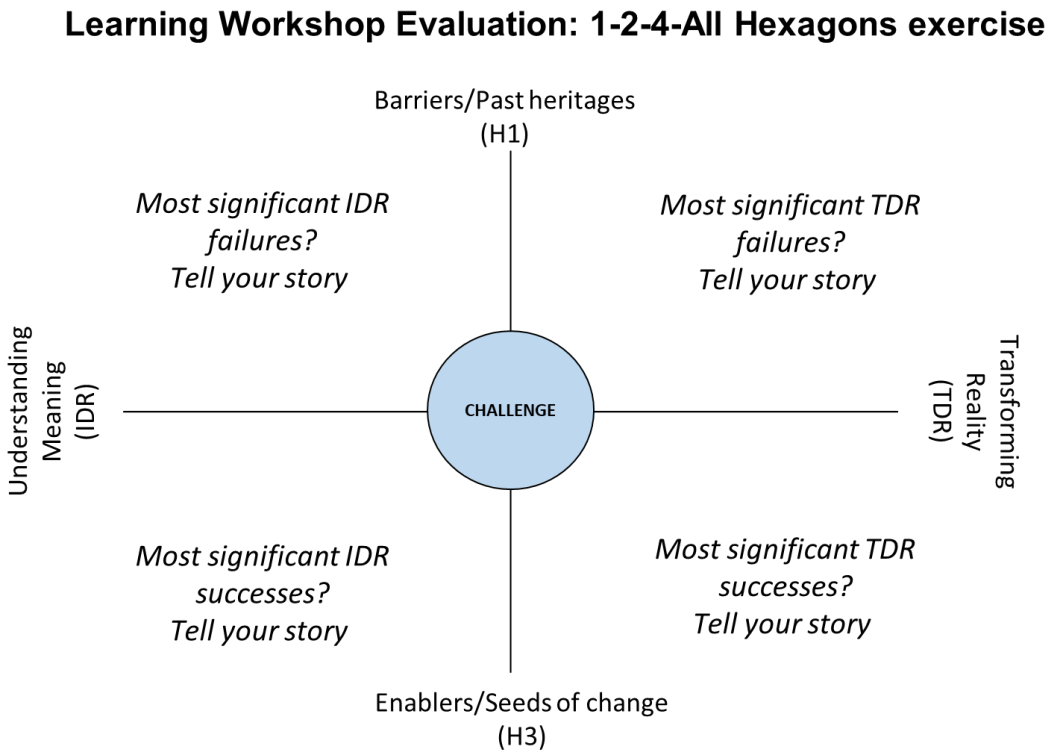


Figure 12 Mapping learning histories

The process of idea collection and learning history development will use the hexagons technique to collect and cluster the ideas in order to draw a first blueprint of the collective learning history. The use of hexagons goes far beyond creating a checklist of ideas because it enables the finding of relationships between ideas very quickly and flexibly, and this also makes it very easy to work with ideas collected from different participants.[18]

The evaluation session will be structured using the 1-2-4-All liberating microstructure of interaction with the participants (see box below).

[18] A tutorial explaining the Hexagons technique and its application is available from the Three Horizons University web-site: https://www.h3uni.org/project/facilitate-hexagons/ (Accessed 21 Oct 2019)

Liberating Structures[19]

The method – illustrated in Lipmanowicz H., McCandless K., (2013) - distinguishes two levels of structures that shape our understanding and accomplishments: 'macrostructures' and 'microstructures'. If office buildings, strategies and policies are part of the macrostructures, and generally difficult to change, then, on the contrary, microstructures, such as meeting rooms, the order of tables, and the way we facilitate discussions, are easy to change and their role is highly underestimated. Everything becomes important in this respect: the invitation, how space is arranged, how participation is distributed, how groups are configured, and the sequence of steps.

The liberating structures method and practice has shown in several occasions that the group – if the interactions between participants are properly structured - is smarter than the individuals. To promote collective intelligence and creativity, it is crucial to set the agenda of the meeting together, because pre-set agendas can demotivate participants. Face-to-face interaction must be guaranteed through the organization of small round tables or even informal chats.

The most simple and popular microstructure is the **1-2-4-All scheme**:

- **1** - Start reflecting alone and write down your thoughts (1 minute)
- **2** - Share/compare/improve/expand in pairs (2 minutes)
- **4** - Share/compare/improve/expand in groups of four (2 minutes)
- **All** – One group at a time shares one important answer/finding with the whole group moving quickly from group to group and avoiding repetitions (3 minutes)

5.4.2 Learning workshop evaluation questionnaire

Finally, an **evaluation questionnaire** will be distributed at the end of each workshop to all participants, giving them 10 minutes to complete, and collect before they leave.

The evaluation questionnaire is structured in four sections:

- Quality of the workshop experience
- Quality of the discussions and materials
- Quality of the place and logistic
- Quality of the learning outcomes

[19] http://www.liberatingstructures.com/

The evaluation questionnaire template is presented in Appendix C.

5.5 Conclusion and the way forward

The challenge-oriented research evaluation framework, criteria and tools will be further considered in the context of SHAPE-ID, as a toolkit to:

- Detect factors that facilitate or hinder IDR and TDR in concrete learning environments and cases (the knowing dimension);
- Identify learning outcomes at different levels – cognitive, affective, transformative (the learning dimension);
- Assess the soundness of the participatory foresight process used to frame a responsible research & innovation dialogue, to build shared visions and strategic research and policy agendas addressing societal challenges (the forward-looking dimension).

The results of the learning workshops evaluation will be summarised in the next deliverable D3.2 Report of workshops and the lessons learned from the whole exercise will respectively feed the two final WP3 deliverables: D3.3 Recommendations and measures to maximise IDR impact on society and D3.4 Policy brief.

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Appendix A – Model of learning workshop background report

SHAPE-ID Dublin Workshop Background Paper

Introduction

SHAPE-ID has been funded by the European Commission to explore the challenge of how to better support the integration of Arts, Humanities and Social Sciences (AHSS) perspectives into interdisciplinary research with Science, Technology, Engineering and Mathematics (STEM) and other scientific disciplines, including Health Sciences, particularly in the context of addressing societal challenges. The first stage of this process is an evidence-gathering phase. We are conducting a systematic literature review and extensive survey, and organising a series of workshops to learn directly from the experiences of researchers from across disciplines, as well as policy makers, funders and representatives from research performing organisations, industry and the cultural sector. SHAPE-ID reports directly to the European Commission's Directorate-General for Research and Innovation and thus has an opportunity to influence the Commission's thinking and practice on this issue.

The Opportunity

The difficulties in enabling meaningful AHSS involvement in societal challenges research are well documented (see Background Context section below), yet the need for this has never been greater if we wish to put the human at the centre of an increasingly technologically-driven society facing major crises on multiple fronts, from climate and environmental devastation to declining faith in democratic governance and the rise of disruptive technologies. SHAPE-ID's ultimate aim is to produce a toolkit and policy briefs which will provide practical guidance to help stakeholders in different contexts achieve better pathways to AHSS-STEM integration, with appropriate roles for AHSS disciplines.

Your Contribution

This workshop, within the context of the SHAPE-ID project as a whole, aims to identify practical solutions to overcoming barriers to Arts & Humanities (AH) integration and consider how the AH community can contribute in appropriate ways to addressing societal challenges alongside STEM colleagues and other stakeholders in the context of interdisciplinary research. We have invited you to participate in this workshop to enable us to learn from your significant experience and expertise and offer you the opportunity to contribute, through an interdisciplinary co-design process, to shaping these recommendations and helping inform the future of AHSS integration in Europe. The workshop will be a forum for sharing understandings and learning from the experiences of both AHSS and STEM perspectives, with valuable insights from funders, policy makers and others.

Workshop Scope

Acknowledging the significant underrepresentation of the Arts and Humanities in particular in interdisciplinary research with STEM, this workshop focuses on **the wider context of integrating the Arts and Humanities into societal challenges research**, broadly understood as research addressing Sustainable Development Goals, Missions, or other societal challenges such as those forming the different collaborative work programmes in Pillars 2 and 3 of Horizon 2020 or the emerging clusters in Pillar 2 of Horizon Europe. The Dublin workshop is the first of a series of six SHAPE-ID workshops addressing this overarching question in the context of different challenges. Five more workshops will be hosted by SHAPE-ID partners in the first half of 2020, in Edinburgh (Environmental Humanities), Turin (Urban Sustainability Education), Bilbao (Artificial Intelligence), Warsaw (Digital Humanities and Cultural Heritage) and Zurich (AH Integration Approaches).

How Will Participants Contribute?

The workshop will be a participatory co-design event structured around group discussion and design activities and will bring together researchers in the Arts and Humanities and STEM disciplines, as well as representatives of funding agencies, policymakers, higher education institutions, industry and the cultural sector, to explore how to better position AH disciplines as leaders and equal partners in research addressing societal challenges. The workshop aims to learn from participants with a wide range of understandings and experiences of inter- and transdisciplinary research and of conducting research relevant to societal challenges. This combination of perspectives will be valuable in expanding understanding beyond discussions that take place between those already persuaded of the value of cooperation, and it is hoped that participants and the SHAPE-ID project will learn from the interdisciplinary perspectives brought to bear on the discussions and activities.

Workshop Format

Participants will actively contribute to group discussions and activities designed to explore, from a variety of perspectives, the potential of AH disciplines to contribute to or lead interdisciplinary research addressing societal challenges; the mindsets and organisational cultures that act as barriers or supports to AHSS-STEM integration; and pathways to overcoming these obstacles. Following discussion of these, participants will engage in collaborative design activities to envisage how existing or potential 'Missions' could be structured to incorporate AH leadership and substantial contributions. In keeping with the participatory nature of the workshop, we welcome any input from participants on the topics referenced for discussion in the Draft Workshop Program below, in particular on the indicative questions and proposed mission focus areas.

Workshop Outcome

On the basis of the workshop discussions and activities, participants will co-create a series of recommendations for improving meaningful AH involvement in societal challenges research. These recommendations will inform SHAPE-ID's ongoing research, reports, policy briefs and final toolkit.

Draft Workshop Programme

Monday 2 December 2019	
13.00 - 13.45	*Lunch*
13.45 - 14.00	Welcome & Orientation
14.00 - 14.50	Ice-breaker & Participant Introductions
14.50-15.50	Scene-setting: short presentations: SHAPE-ID, IDR Case Studies & Discussion
15.50-16.00	*Coffee break*
16.00-17.30	World Café discussion in breakout groups. Three rounds discussing the following three indicative questions followed by feedback session to 'harvest' insights: 1) What role can or should AH play in addressing societal challenges? 2) What helps or hinders successful collaboration between AH and STEM disciplines? 3) What steps can AH disciplines take to better prepare and advocate for taking more significant roles in interdisciplinary research addressing societal challenges?
17.30-18.15	*Reception and Early Career Researcher Poster Session, Trinity Long Room Hub*
18.30-20.30	*Dinner at Dunne & Crescenzi, South Frederick St*
Tuesday 3 December 2019	
9.00 - 9.30	Reflection & Day 2 Orientation
9.30 - 12.00	Breakout groups engaging in design activities around conceptualising mission-oriented research with AH leadership or significant involvement, including definition, stakeholder mapping, possible projects/policy initiatives, roadblocks and enablers. Anticipated focal areas: 1) Adaptation to Climate Change, including Societal Transformation (existing Horizon Europe mission area) 2) Healthy Ageing (informed by ALLEA proposed mission on Growing Up and Ageing in Europe (ALLEA et al., 2017)) 3) Crises of Democracy (intersection of culture, technology, environment) 4) Open mission (TBC by participants emerging from discussion)
12.00-13.00	Evaluation and forward-looking session on practical recommendations emerging from workshop
13.00-14.00	*Lunch and networking*
13.30-14.30	*Tour of the Book of Kells, Long Room Library and Dublin Science Gallery (TBC)*

Background Context

A multitude of reports and recommendations over the years have highlighted the value and necessity of including perspectives from the Arts, Humanities and Social Sciences in a more meaningful way in research and innovation policy and funding initiatives. More often than not calls for interdisciplinary integration are driven by a conviction that publicly funded research needs to address and be seen to address significant issues of societal interest – 'Grand Challenges' – and that such complex challenges require understanding and expertise drawn from those disciplines that study individuals and societies, and not only those that pursue scientific and technological solutions. As the authors of the Vilnius Declaration argued on the cusp of Horizon 2020, innovation is 'driven not only by technological advances but also by societal expectations, values and demands' (Nowotny et al., 2013). European Commission publications and independent reports from the League of European Research Universities (LERU), All European Academies (ALLEA) and many others have continued to insist on the importance of this principle, but its implementation has remained a challenge. This is no surprise given the significant investment of time, money and infrastructure needed to reshape institutional cultures to overcome long-established disciplinary structures.

There has been significant effort to integrate the 'Social Sciences and Humanities' (SSH) into the Societal Challenges and Industrial Leadership Pillars of Horizon 2020, with the EC identifying funding topics across a range of work programmes – from health and food to energy, Information and Communications Technology (ICT) and security – where a contribution from the 'Social Sciences and Humanities' (SSH) would be encouraged. They have also carefully monitored the projects funded under these calls in a series of SSH Monitoring Reports. The 2019 Report (Kania et al., 2019) shows that the share of the overall annual budget going to SSH partners has gone up from 7% in 2016 to 8.5% in 2017. For topics flagged for SSH the share of programme budget went up from 20% to 23% for this period. While this is encouraging it is also partly misleading, since integration is heavily weighted towards the Social Sciences, particularly Economics and Political Science, and hardly engages the Humanities, let alone the Arts.

ALLEA (2019) have recently argued that this lack of engagement ensures a technocratic and instrumental attitude towards societal challenges on the part of the Commission, with 'Horizon 2020 calls containing off-putting language and inadequate understanding of the issues faced' inhibiting greater involvement from AHSS researchers. As Pedersen (2016) has succinctly observed, this reflects the 'politics of interdisciplinarity':

> … funding for interdisciplinary research is rarely concerned with citizens' deep-seated preconditions for behaviour (sense-making, interaction, or culturally embedded values or attitudes) and more concerned with incentives, policy design, institutional solutions and so on. The research called for in funding programmes, such as Horizon 2020, tend to presume a problem-solving model of research over more theoretically oriented and reflexive approaches to human agency, culture and history.

These same limits remain worryingly evident in preparation for the Horizon Europe Missions. While the Commission's LAB-FAB-APP Report (Lamy et al., 2017) committed in 2017 to full integration of the SSH in Missions, including missions initiated and led by SSH researchers, LERU's response (LERU, 2017) already highlighted the near total absence of the word 'humanities' in the Report and the relatively peripheral role the SSH were imagined to play in the pursuit of innovation in Europe. In the five Mission areas now proposed by the Commission for Horizon Europe (European Commission, 2019), and in particular in the list of disciplines encouraged in the call for experts for the Mission Boards that will lead the design of the Missions, the Arts and Humanities are notably absent.

Challenges to meaningful and appropriate AH integration for addressing societal challenges arise not only from a misalignment of research cultures and policy agendas. There are barriers at the level of language, methodology and scholarly culture that make AHSS-STEM collaboration challenging. AH researchers' training is more often an apprenticeship in individual scholarship and collaboration is less embedded in AH disciplinary cultures than in STEM cultures. Many AH researchers understand their own role as that of critic rather than problem-solver. Furthermore, where AH researchers do want to influence policy with their research, the institutional structures and pathways for reaching decision-makers are not as well established as they now are for the sciences and social sciences (Brom, 2019).

These challenges form the background against which the workshop will endeavor to discuss barriers, share experiences and chart pathways to better AHSS integration.

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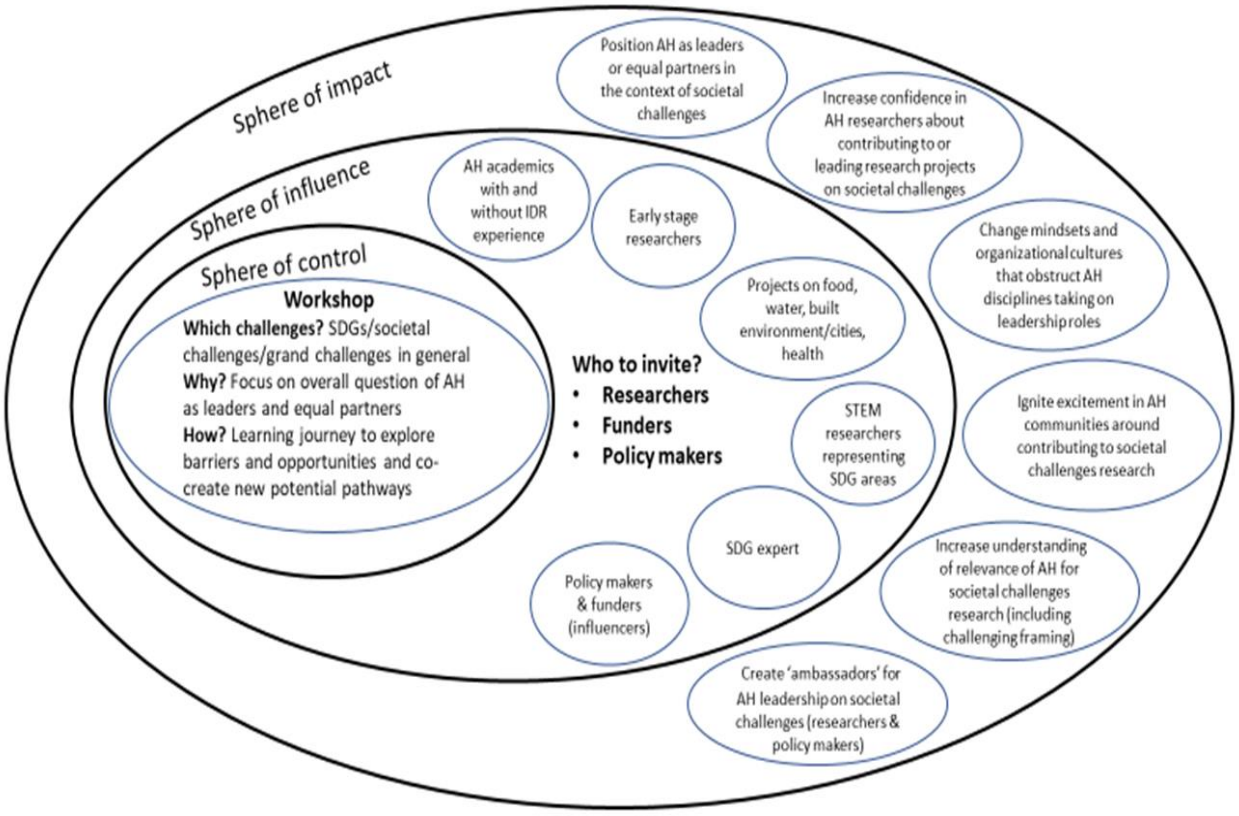
Appendix B – Learning Workshop 1 – Expected Outcomes Mapping



Appendix C – Learning Workshop Evaluation Questionnaire

The purpose of the questionnaire is to tap on your impressions of the SHAPE-ID Learning Workshop ……. – so that we can learn to do better in the subsequent planned events. We welcome all inputs, positive and negative. In order to safeguard your privacy and confidentiality, your answers will remain anonymous. Please answer the questionnaire, enclose in the attached envelope and return to the ISIN-NOVA staff at the end of the workshop.

Quality of the experience …

1. How satisfied are you with the workshop sessions? Please rate on a scale of 1 (not at all) to 5 (very much)

Overall satisfaction

○	○	○	○	○
1	2	3	4	5

Scene setting

○	○	○	○	○
1	2	3	4	5

First Day World Café session

○	○	○	○	○
1	2	3	4	5

Reconnection on Day 2

○	○	○	○	○
1	2	3	4	5

Second Day World Café session

○	○	○	○	○
1	2	3	4	5

Final Evaluation and forward looking session

○	○	○	○	○
1	2	3	4	5

Quality of discussions and materials …

2. How satisfied are you with the discussion elements of this workshop? Please rate on a scale of 1 (not at all) to 5 (very much)

Overall satisfaction

○	○	○	○	○
1	2	3	4	5

Moderator

○	○	○	○	○
1	2	3	4	5

Inputs to the discussions (presentations and other documents and communication tools)

○	○	○	○	○
1	2	3	4	5

Quality of discussions

○	○	○	○	○
1	2	3	4	5

Discussion outputs

○	○	○	○	○
1	2	3	4	5

Quality of the place and logistic …

3. How satisfied are you with the logistics of this workshop? Please rate on a scale of 1 (not at all) to 5 (very much)

Overall satisfaction

○	○	○	○	○
1	2	3	4	5

Location of the workshop

○	○	○	○	○
1	2	3	4	5

Organization of the workshop

○	○	○	○	○
1	2	3	4	5

Quality of the learning outcomes …

4. Did the workshop outcomes meet your learning expectations? Please rate on a scale of 1 (not at all) to 5 (very much)

○	○	○	○	○
1	2	3	4	5

Help us improve our workshops …

5. Name one thing you liked especially about this Learning Workshop and one thing you did not like so much

I very much liked ….

I did not like …

6. What recommendations do you have for future workshops?

Thank you!