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Co-design for Interdisciplinary Research Communities

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Complex research challenges facing society today require an integrative approach, therefore, interdisciplinary research is now required more often. By creating interdisciplinary research communities, we facilitate communication, collaboration, and knowledge sharing between researchers from different fields. It can however be difficult to create interdisciplinary communities within universities, but co-design methods have been seen as being beneficial in doing so. Reporting and reflecting on three case studies (including N=130 participants), this paper aims to explore the use of co-design methods in creating interdisciplinary research communities In this paper, we focus on two main characteristics of co-design workshops. 1. Design/ Scheduling and Planning and 2. Workshop Formats, specifically co-design canvases. In doing so it seeks to 1. Offer a report and reflection on the three different co-design workshop approaches informing future co-design research and practice. 2. Understand how different formats of co-design help enhance interdisciplinary research communities in universities. It found that there were trade-offs in selecting approaches. Structured co-design approaches offer clear expectations and organisation but may limit creativity, while semi-structured approaches provide flexibility but may lead to reduced focus. Similar trade-offs were seen in the differing fidelities of canvas design. Low-fidelity canvases are inclusive but may lack detail, while high-fidelity canvases may limit creativity. Medium-fidelity canvases strike a balance between visual appeal and detail. It was found the best approach depends on the specific context and goals of participants; therefore, it is important to prepare in advance to tailor workshops to the needs and preferences of the participants involved.

Keywords: Co-Design; Interdisciplinary Research; University; Research Community

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1 Introduction: Need to create interdisciplinary research communities

Interdisciplinary research approaches are now required more often. Its commonly noted that complex real-world research problems require an integrative approach (Davoudi, 2013) and many of the most pressing global research challenges facing society today, such as climate change, health, and ageing require them (Meisner et al., 2020; White et al., 2021). Interdisciplinary research is the integration of knowledge and methods from different disciplines, using a real synthesis of approaches (Stember 1991; Jensenius, 2012). Addressing a question, problem, or topic that is too broad or complex to be dealt with adequately by a single discipline, interdisciplinary research communities bring together scholars from different fields to work collaboratively on a common research agenda or question (Repko, 2008). There are many advantages to interdisciplinary work, researchers with diverse backgrounds and expertise have been proven to contribute unique insights and skills to complex problems, and collaboration between disciplines can help address knowledge gaps and generate new ideas (Jensenius, 2012).

By creating interdisciplinary research communities in universities, we can facilitate communication, collaboration, and knowledge sharing between scholars from different fields (White & Deevy, 2020). These communities can also promote the development of new academic programs and courses, as well as the advancement of interdisciplinary scholarship more broadly (De Greef et al., 2017). Bringing together researchers who may not typically interact, can foster a sense of shared purpose, promote innovative thinking, and lead to new opportunities for research funding and outputs (Dahm et al., 2021). In terms of a mandatory requirement, many research-funding bodies seek interdisciplinarity within award applications, seeking a diversity of researchers across disciplines with varied skillsets and methodological approaches (Government of Canada, 2018; White & Deevy, 2020)

With all the positives around interdisciplinary research approaches, it can in reality be difficult to create and embed interdisciplinary communities within universities. MacLeod cites the difficulty in this in the complex interdependencies essential to specialisation i.e., methods, technologies, stable lab environments, and cognitive structures (2018). There can be difficulty in embedding an interdisciplinary research culture, in this regard Brown et al. state the importance of institutional support, shared missions and implementation into the policy (2015).

2 Co-Designing and Methods

Co-designing, according to Sanders and Stappers is bringing together the creativity of designers and people not trained in design to work together in the design development process (2008, p. 6). Co-design encourages non-designers to become part of the design process (Shore et al., 2018; White & Kennedy 2022) and methods have been seen as beneficial in creating interdisciplinary research communities in universities (White et al., 2021; White & Deevy, 2020). Designers are suited to assist with creating within interdisciplinary contexts as they are seen to be able to work broadly across disciplines and deeply within their discipline (Kelley & Littman, 2006).

Co-design can be beneficial in creating interdisciplinary research communities for several reasons: Firstly, in improved understanding: Co-design can help team members from different disciplines understand each other's perspectives and ways of thinking, leading to more effective communication and collaboration. Secondly in increased creativity and innovation: By working together, team members can combine their diverse knowledge and skills to develop more creative and innovative solutions to complex problems (Zallio et al., 2022). However, there is a lack of both reporting and describing in the process of co-design and understanding how collaboration is achieved (Borgstrom & Barclay, 2019; Slattery et al., 2020).

In this paper, to address this knowledge gap, we report on 3 case studies using co-design to grow interdisciplinary research communities. Each case study is based on universities starting the process of creating interdisciplinary research communities. We use these case studies to compare, report and reflect on different co-design workshop approaches and report on formats of co-design to help enhance interdisciplinary communities.

We focus on two main characteristics of co-design workshops. 1. The Design/ Scheduling and Planning and 2. Workshop Formats: specifically, how workshop design tools (in these instances co-design canvases) are presented and used with participants.

The following is an outline of the 3 Case Studies:

- Co-Design Case Study 1: (IT Carlow). Semi-Structured Design/Scheduling/Planning, **with** Medium Fidelity Canvas
- Co-Design Case Study 2: (McMaster University). Structured Design/Scheduling/Planning, **with** High Fidelity Canvas
- Co-Design Case Study 3: (SETU) Structured Design/Scheduling/Planning, **with** Low-Fidelity Canvas

This paper will seek to:

1. Offer a report and reflection on 3 different co-design workshop approaches informing future co-design research and practice.
2. Understand how different formats of co-design help enhance interdisciplinary research communities in universities.

2.1. Co-Design Case Study 1: Institute of Technology Carlow (Semi-Structured Design/Scheduling/Planning with Medium Fidelity Canvas)

2.1.1 Background Context: Institute of Technology Carlow: Embedding Interdisciplinary Collaborative Communities in Policy Formation

Established in 1970, The Institute of Technology Carlow (IT Carlow) was the first third-level institute of its kind in Ireland. In response to the demand in growth for apprentice-based training and education its primary role was to "...educate for Trade and Industry" (Mulcahy et al., 1967). Research activity in Carlow started to develop from the 1990s into the 2000s. In 2013, the publication of the *Institute of*

Technology Carlow Strategic Plan 2014 – 2018 sought to expand research capacity and to "…develop expertise within specific core domains [within] …themes in line with national and European objectives, and maximise opportunities for new inter-disciplinary links and initiatives" (Mulcahy, 2013, p. 18)

Due to an increase in research activity and industry research-led projects (Gaynor et al., 2018)., the establishment of formal research centres was required, and the 'CORE' (Centres of Research and Enterprise) title was implemented across research groupings (Dempsey & White, 2015). Five research areas of specialisation and national competency were identified across the institute, these were:

1. designCORE - Design research in policy, society, and industry research-led projects
2. enviroCORE – research in environmental technologies and biotechnologies
3. healthCORE – research in health science and men's health
4. gameCORE – research in engaging people with technology
5. engCORE - research in advancing technology through engineering

In an Institute now in rapid cultural change, interdisciplinary research has become a fundamental developing community at Carlow (White & Deevy, 2020). In late 2015, IT Carlow sought to revise and update institutional policy in research. This provided an opportunity to co-design an interdisciplinary collaborative community, across COREs. Co-Design workshops were created to establish a strong research strategy for the Institute. The main aim was to involve members of the research community in interdisciplinary collaboration to collectively develop a vision of research policy direction from a bottom-up approach. The workshops (3 workshops with total N=30 participants) were intentionally designed to encourage impartial contributions and open, collaborative thinking without predetermined outcomes.

2.1.2 Co-design Workshop Format

The format of these co-design workshops involved semi-structured design/scheduling/planning (table 1) with participants working on medium fidelity co-design canvas. To guide the teams in their collaborative efforts, the co-design canvas (Figure 1) was created. Before the workshops, EU research clusters and national research priorities were classified and mapped against I.T. Carlow's current research pillars 1. Jobs and the Economy, 2. Dissemination and Impact and 3. Capacity and Culture. The workshops addressed three non-discipline-specific clusters: Healthy and Secure Societies, Sustainable and Secure Environments, and Smart and Secure Systems.

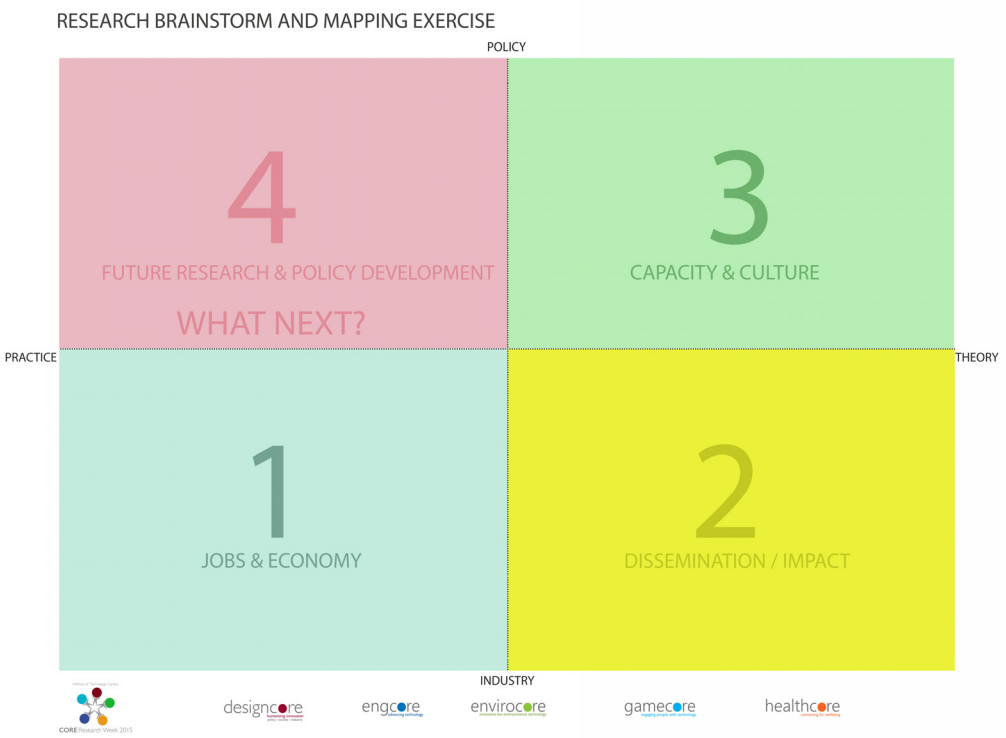

Figure 1: Canvas used in Co-Design Case Study 1 for Mapping Collaborative Ideas

To address the 3 pillars, 3 break-out rooms were provided with a mix of interdisciplinary researchers in each room (N=10 per room). 1 Co-design Facilitator and 1 Rapporteur were appointed to each of the 3 rooms. The facilitator's role was to 1. Provide introductions into the session and offer an overview of the research Framework. 2. Support and moderate the session schedule and 3. Debrief. The Rapporteur's role was to 1. Support the Facilitator 2. Capture inputs from group 3. Report back to the main session. Table 1. Shows the schedule and planning of these workshops

Table 1. Schedule and planning Co-Design Case Study 1

11:15-12:15	Room 1	*Horizon 2020/National Research Priority Cluster-A* **Healthy & Secure Societies** Intro to Framework Mapping Exercise
11:15-12:15	Room 2	*Horizon 2020/National Research Priority Cluster-B* **Sustainable & Secure Environments** Intro to Framework Mapping Exercise
11:15-12:15	Room 3	*Horizon 2020/National Research Priority Cluster-C* **Smart & Secure Systems** Intro to Framework Mapping Exercise
12:15-12:45	All Rooms	Rapporteur Feedback
12:45-12:55	All Rooms	Group Discussion on what happens next
12:55-13:00	All Rooms	CLOSE

In groups, participants were instructed to ideate using short notes using a quantity of post-its (Figure 2) to address the four quadrants:

- Quadrant 1: Jobs & Economy, how individual research contributes to collaborative action to build and sustain the regional industry.
- Quadrant 2: Dissemination and Impact seeking strategies on how we do it, measure it and improve it; within discipline-specific and collective action/s.
- Quadrant 3: Capability & Culture mapping how to extend research reach, capabilities and networks, and the internal constructs required to enhance it.
- Quadrant 4: Future Research Policy Direction framing strategies and supports. (White & Deevy, 2020)

Figure 2: Canvas in use at the workshop by participants when mapping collaborative ideas

2.2. Co-Design Case Study 2: McMaster University (Structured Design/Scheduling/Planning with High-Fidelity Canvas)

2.2.1. Background Context: McMaster Institute for Research on Aging

McMaster University, located in Hamilton, Canada, is a research-intensive institution ranked among the top 100 universities worldwide (McMaster University, 2023). The university has recognised ageing as a research priority and building research capacity in this area, creating the McMaster Institute for Research on Aging (MIRA) in 2016. (MIRA McMaster, 2022). MIRA members comprise over 170 faculty

members from 46 departments spanning all six McMaster faculties. These researchers are engaged in research related to ageing, including but not limited to falls and frailty, exercise and nutrition, social isolation, smart monitoring systems, and more (MIRA, 2020). This focus is timely as the Canadian population of older adults continues to grow, with more people over 65, 2014 older people represented 15.6% of Canada's population, in 2030 this will grow to 23% (Government of Canada, 2021)

Historically, ageing research at McMaster was concentrated within disciplines. In recent years, with support from MIRA, ageing research has expanded into many new disciplines at the university, becoming more interdisciplinary. This is partly due to the establishment of McMaster Institute for Research on Aging (MIRA) in 2017 where the aim is to administer funding to research that supports interdisciplinary work to create knowledge, interventions, and policies benefiting older adults and their families (MIRA, 2020). MIRA funds require interdisciplinary teams to work together to develop research questions, methodologies, and intended outcomes.

MIRA identified co-design to address complex research questions within ageing through interdisciplinary actions. The rationale was to use a co-design approach to support and develop a culture and community of interdisciplinary research and to commence research proposal writing. (MIRA, 2020).

2.2.2. Design to Enhance Interdisciplinary Communications at MIRA

Within any academic context, achieving deep interdisciplinary engagement across differing domains is difficult. Wear contends that the challenges to interdisciplinary discourse are "…learning how to separate the major from the minor debates, the debatable from the given, and most importantly, learning the language" of each disciplinary domain (1999, p. 299). Therefore, to cultivate an interdisciplinary culture and community, an enhanced understanding and communication between research teams is essential. Thus, in framing a co-design activity, the focus was on the challenge of interdisciplinary communication, leading to interdisciplinary research proposal writing.

The co-design approach in this instance would seek open communication, sharing, and exchange, enhancing understanding among researchers, and encouraging constructive alignment among different disciplines. Time-restricted co-design workshops were designed to provide a starting point in framing interdisciplinary research proposal writing. To begin communication across disciplines, the initial focus would be to draw researchers into a plain English conversation about research (workshop 1). Once communication was established, the group could then move toward the second step in ideating and co-creating a collective vision for an interdisciplinary research proposal (workshop 2). The co-design workshops were delivered by 2 Design facilitators. The format of these co-design workshops involved structured Design/Scheduling/Planning, with participants working on high-fidelity canvases.

2.2.3. Co-design Workshop 1. Plain English Communication through the Research Visual Canvas

Workshop 1 sought to begin communication across disciplines, drawing researchers (N=80) into a plain English conversation about their research. A *Research Visual Canvas* (Figure 3) was designed to facilitate this based on a simple word Venn diagram. In this workshop, each participant communicates themselves, their research, and their capabilities as succinctly as possible. Using only limited use of words forced brevity, to speak clearly and avoid discipline-specific jargon.

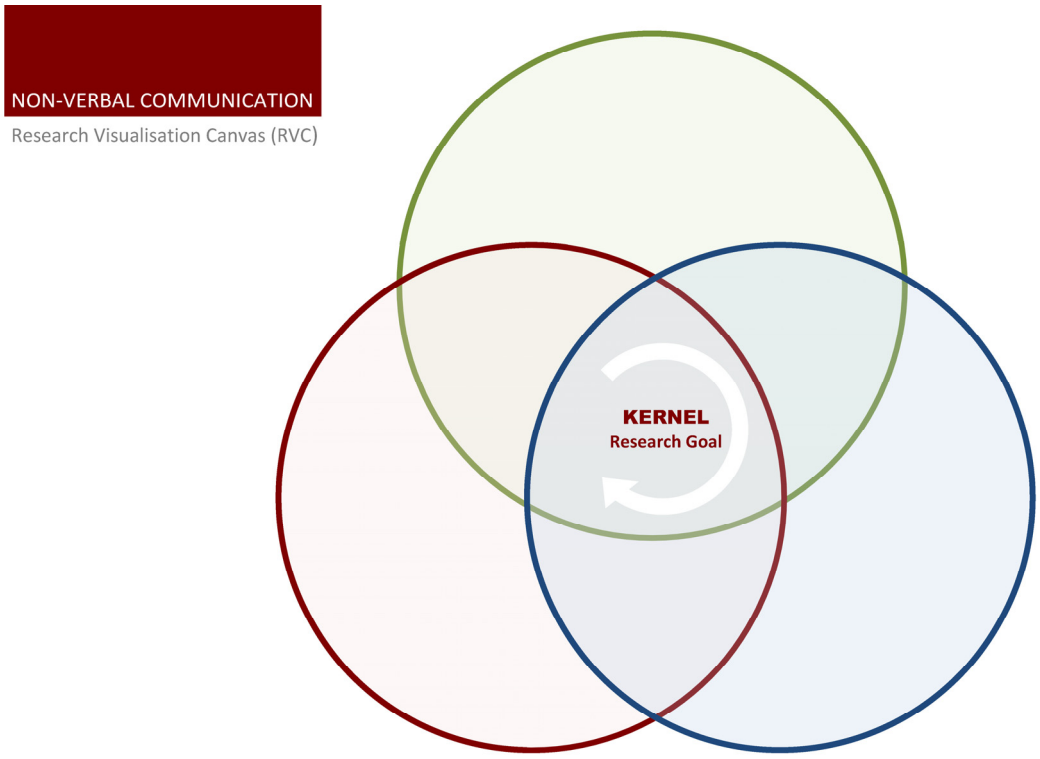

Figure 3: Research Visual Canvas

***Research Visual Canvas* Instruction to Participants**

1. You have 10 minutes to complete this exercise.
2. Communicate your research area to others using only 3 succinct words.
3. Use one word or linked term per Venn diagram circle.
4. Use jargon-free plain English.
5. One additional word may be used if it refines and links your research with the words in the: - green & red circles, - green & blue circles, - red & blue circles.
6. Frame central 'kernel' or research goal

2.2.4. Co-Design Workshop 2. Interdisciplinary Research Proposal Canvas

Once the *Research Visual Canvas* was complete in Workshop 1, the group could then move toward Workshop 2 and co-create a collective vision for an interdisciplinary research proposal. This workshop was based on a group co-design activity, and the *Interdisciplinary Research Proposal Canvas* (Figure. 4&5) was designed to facilitate this. The aim of designing this canvas was to allow the collaborative sharing of personal research goals; moving to frame one collective goal as a group.

The workshop and canvas aimed to engage participants in framing potential research proposals. Participants use the research 'kernel' created on the *Research Proposal Canvas* to communicate individual goals, working towards a group goal within a global problem in ageing. This broad area is one which all participants could agree to coalesce their collective resources around. The purpose was to ensure that as the process unfolds, there was participant buy-in from the outset, as each person proactively chose the problem they most want to work on. The participants then work through detailed steps on the canvas.

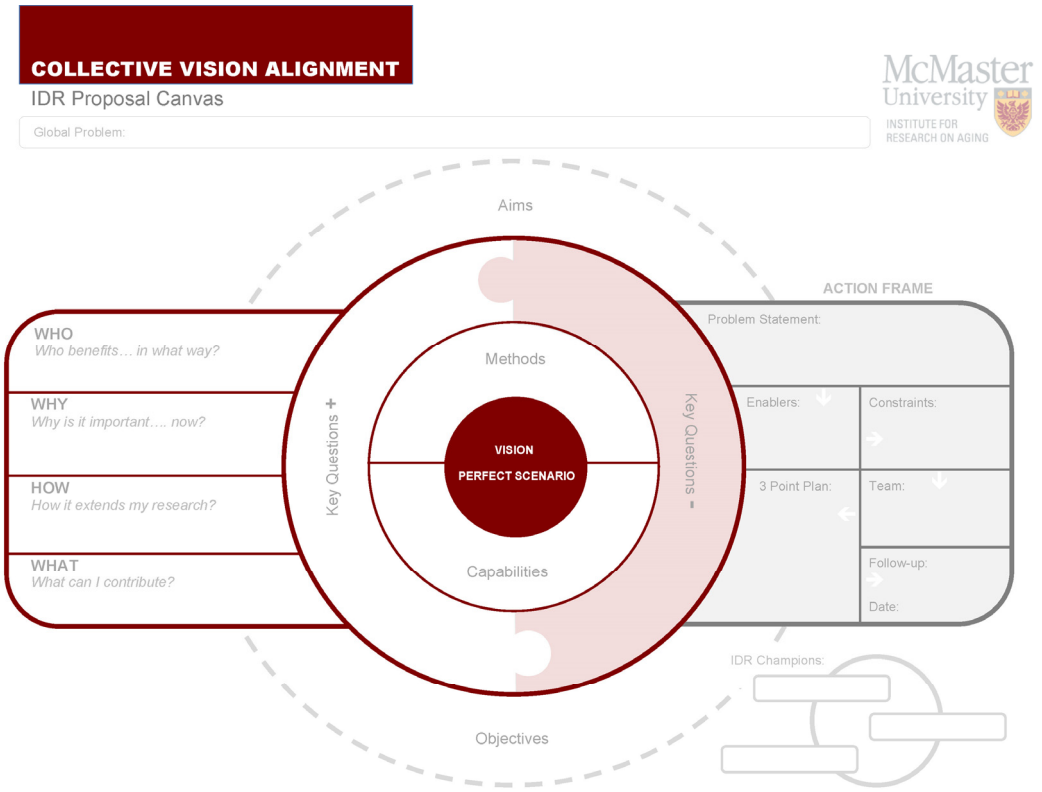

Figure 4: Interdisciplinary Research Proposal Canvas

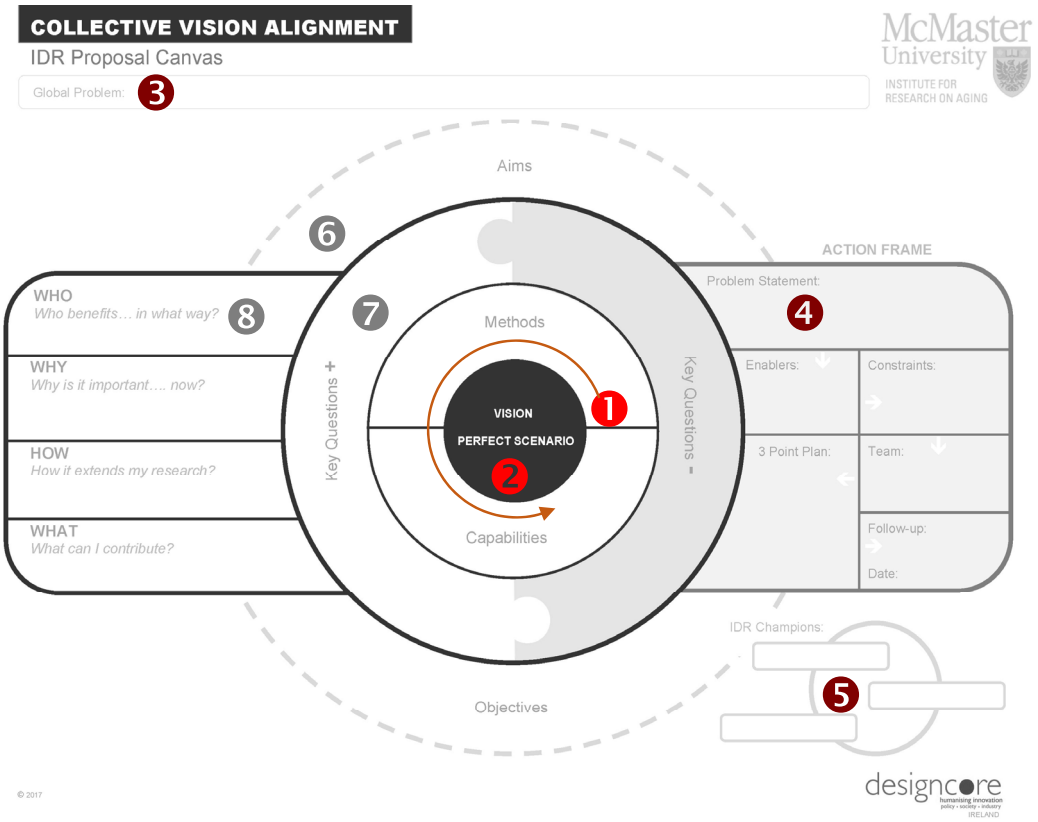

Figure 5: Instructions for Interdisciplinary Research Proposal Canvas

Instructions on using the Interdisciplinary Research Proposal Canvas

- Using your own 'Research Goal KERNEL' from workshop 1, cluster your individual goals around the centre of the canvas (1)
- On ONE post-it, agree a draft 'Common Goal', (VISION / PERFECT SCENARIO) (2), which the group can focus on, and quickly identify 'Methods and Capabilities' which are available to the group. All members should actively engage, while always keeping a focus on the agreed 'Vision / Perfect Scenario'.
- From the agreed 'Vision / Perfect Scenario', state what Global Problem this addresses (3). Example: If the common goal is 'older adults' understanding of diabetes information', the global problem is 'Diabetes for older adults'.
- Through the 'Action Frame,' a draft problem statement is created (4) identifying interdisciplinary research champions (5)
- The group can use areas 6, 7, and 8 of the canvas to compete for proposal parameters of Aims, Key questions and Who, Why How and What details.

2.3. Co-Design Case Study 3 South East Technological University (Structured Design/Scheduling/Planning with Low Fidelity Canvas)

2.3.1. Background Context: South East Technological University (SETU): Interdisciplinary research community in a new multi-campus university.

The South East Technological University (SETU) was established in May 2022, amalgamating two third-level institutes in the South East region of Ireland: Waterford Institute of Technology and the Institute of Technology Carlow. The establishment of SETU marked a milestone as the first-ever technological university in the southeast region of Ireland (SETU 2022). SETU is a multi-campus university with campuses across 3 counties in the southeast region. Its primary goal in formation is to position itself in the community as a hub for innovation, growth, and development. Its focus is on exceptional learning, and research collaboration to realise a transformational change in the Southeast region and beyond (SETU 2022).

In terms of research, SETU seeks to be "…a home for knowledge and innovation, with leading academics collaborating with institutes and industries worldwide" (SETU 2023). For this to happen, and to attract and grow research, SETU research management recognises that interdisciplinary research communities are required. In the most recent SETU research strategic plans, (WIT 2018; ITC, 2019), increasing interdisciplinary research and growing international and European funding is a crucial goal for the new university. From their perspective, it is seen that when implemented effectively, interdisciplinary research can address societal grand challenges in the southeast region of Ireland and beyond.

2.3.2. Interdisciplinary Research Co-design Workshop

To inform the development of interdisciplinary research communities at SETU, it was seen as important to develop an expert point of view and build communities from the ground up. Specifically, to understand how communities could be developed from the researcher's perspective. To act on this and to commence interdisciplinary engagements across all the new campuses, the Research Support Unit at SETU planned to host an in-person *Interdisciplinary Research Co-Design Workshop*. The workshop brought together researchers (N=20) from across campuses and a variety of disciplines, (from business and humanities to science, health, and engineering) to discuss their research, create connections, and identify potential opportunities for collaboration.

Organised as a half-day event, the co-design workshop was designed and delivered by 2 co-design facilitators with assistance and input from research management at SETU. In the planning of the co-design workshops, the format was iteratively evolved. Firstly, the purpose was drafted for participants. This being to:

1. Offer an understanding of the what why and how of interdisciplinary research benefits and challenges including case studies.
2. Co-design an interdisciplinary future at SETU, to start the process of interdisciplinary research community building within SETU and understand how to support interdisciplinary research in the short to medium term.

3. Create an opportunity for an informal networking event, meeting fellow SETU researchers from other campuses.

For this half-day event, participants were asked to register interest through the university research office via email and social media. The workshop was capped at 20 participants to ensure tight active engagement and selected based on cross-disciplinary perspectives. Researchers at all stages that were interested in understanding interdisciplinary research and developing an interdisciplinary research community at SETU were encouraged to join. Table 2. Shows the half-day schedule. This schedule was designed to be purposefully structured to allow for optimum use of participants' time.

This event consisted of:

1. **Presentation:** Title: Interdisciplinary Research, What How, Why

This presentation introduced the concept of interdisciplinary research, what it is, what it constitutes, and why it is important. It outlined the benefits and challenges, showing examples of international best practice cases and the findings of these.

2. **Co-design Workshop** Understanding how interdisciplinary research communities can be developed at SETU

Through mixed discipline groups (5x groups of N=4), participants are asked to actively draw on their experiences and provided input to inform and further the development of an interdisciplinary research community at SETU. The format of this workshop involved Structured Design/Scheduling/Planning, with participants working on a low-fidelity canvas.

Firstly as an introduction to the workshop, the format and purpose were outlined. It was explained that the workshop will be interactive, collaborative and researcher focused. Following this, the workshop 'rules' were outlined i.e. There are no wrong answers, a quantity of ideas are required, listening to other participants and being honest in responses were key. In terms of documentation, participants were asked to document one idea/comment per post-it note, and these notes are anonymised.

The following was the format of questions and timing for the workshop:

- Main Workshop Question: How do we create an Interdisciplinary Research culture/community at SETU? The question will be answered in interdisciplinary groups through the following steps:
- Ice breaker: What does interdisciplinary research mean to you? (Word association) (15 mins)
- Exposure: What are the Challenges? (15 mins)
- Invert: What are the Opportunities? (15 mins)
- Enablers: What are the Enablers? (15 mins)
- Initiatives: What initiatives might there be to encourage IDR at SETU? (15 mins)

these questions were purposefully designed in sequence so that one question could naturally build and develop on from the other. At the final question, participants were asked to rank and prioritise 3-5 initiatives to move ahead with. This proved to be a useful exercise to help the facilitators in coding results later.

Table 2. Schedule and planning Co-Design Case Study 3

Time (Time Allocated)	Stage
10:00 **(30 mins)**	**Introduction and Welcome**
(15 mins) (15 mins)	Coffee Welcome and Introduction
10:30 **(40 mins)**	**Interdisciplinary Research Presentation and Q+A**
(30 mins)	Purpose and outline of the days format IDR: What it is, Why it's important, Who does it, How is it created, and How can we create IDR for SETU? (Leading to workshop questions and co-design approach)
11:00 (10 mins)	Questions and Answers
11:10 (20 min)	Coffee Break/ Room and group set up.
11:30 **(90 mins)**	**Co-Design Workshop**
	Introduction to Co-Design Workshop: Format and purpose will be explained. The workshop will be interactive, collaborative and researcher-focused (10 mins) Main Workshop Question: *How do we create an Interdisciplinary Research culture/community at SETU?* The question will be answered in interdisciplinary groups through the following steps: Ice breaker: What does interdisciplinary research mean to you? (Word association) (15 mins) Exposure: What are the Challenges? (15 mins) Invert: What are the Opportunities? (15 mins) Enablers: What are the Enablers? (15 mins) Initiatives: What initiatives might there be to encourage IDR at SETU? (15 mins) Groups wrap up. (5 mins)
13:00 **(30 mins)**	**Group Discussions, Next actions close**
	Discuss groups discuss outcomes 5 mins each x4 (20 mins) Next Actions to Progress and Close (10 mins)
13:30 (30 min)	Brown Bag Lunch, Stay and chat or finish up

2.3.3. Canvas format

The co-design canvas for the workshop (Figure 6) followed a simple format design and low-fidelity, consisting of 6 x A1 sheets of Flipboard paper, and 1 sheet for each question. Also provided was a 'car park' sheet to allow participants to 'park' any notes that were considered important, but not directly related to the question and maybe divert the group off the question at hand (White, Casey, et al., 2023; White, Okello, et al., 2023)

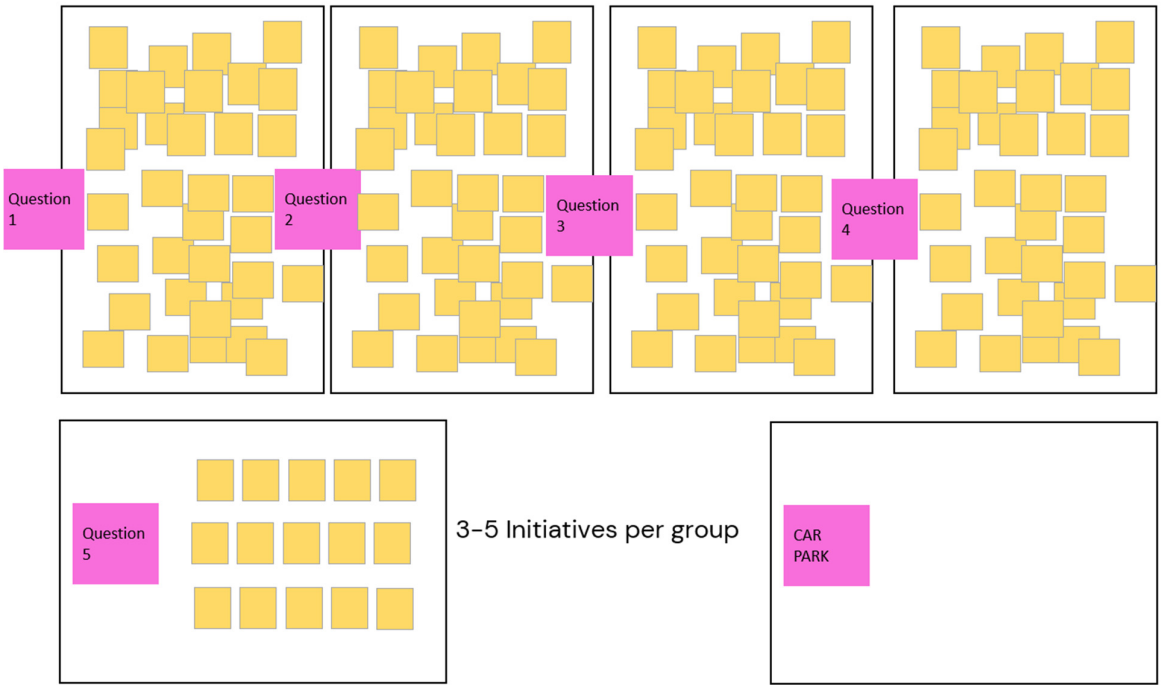

Figure 6: Low-fidelity canvas format used in Workshop 3

3. Findings and Feedback

Outlined to this point has been a report on three different co-design workshop approaches. Now, a reflection on these approaches is required to understand how different formats of co-design help enhance interdisciplinary research communities in universities. The following are the positive and negative points that were concluded by the 3 workshop facilitators evaluating and analysing descriptions and feelings using Gibb's reflective cycle (Gibbs, 1988). Also included are some participant feedback quotes on the overall process of Co-design.

3.1. Findings

Table. 3 Interdisciplinary Co-design Workshops: Structured Design/Scheduling/Planning versus Semi-Structured Design/Scheduling/Planning

Semi-Structured Design/Scheduling/Planning

Positives	Negatives
Flexibility Can allow for more flexibility and creativity in interdisciplinary workshops	**More Digression** Can lead to digression off topic leading to time-wasting, particularly when a diverse range of disciplines are involved
Ownership With less structure from facilitators, participants can feel more ownership over the workshop and be more invested in the outcomes.	**Understanding** With less structure, participants may not have a clear understanding of what is expected of them or what to expect from the workshop.
Less time-intensive for facilitators to plan and execute.	**More Facilitation or guidance** Maybe required to ensure that the workshop stays on track, particularly when a diverse range of disciplines are involved.

Structured Design/Scheduling/Planning

Positives	Negatives
Clear Expectations With more structure, participants from differing disciplines can have a clear understanding of what to expect from them and the workshop, with oversight of outcomes	**Flexibility/ Creativity** A structured approach may not allow for as much flow, flexibility or creativity. Especially when creative communication across disciplines is required
Planning and Organisation A structured approach can help to ensure that all steps are completed in a logical and organised manner.	**Constraints** Participants may feel constrained by the structure and unable to contribute their best ideas.
Keeping on Topic A structured approach can allow for more time efficiency keeping participants on topic.	**Time to prepare** A structured approach requires much more time in the pre-planning stage

Table. 4 Low Fidelity, Medium Fidelity, High Fidelity Canvas in Interdisciplinary Co-Design Workshops

Low Fidelity

Positives	Negatives
Quick and Inexpensive to create allowing for more time to prepare other aspects of the workshop	**Detail and Appeal** may not capture as much detail, be as professional looking or be as visually appealing as higher fidelity canvases.
More Inclusive Can be more accessible to participants in disciplines not familiar with design tools.	**Engagement** Participants may not take the exercise as seriously or engage as deeply if they feel that the exercise is oversimplified or feel that the exercise is too generic.
Flexibility and creativity Can be easily modified during the workshop as new ideas arise.	

Medium Fidelity

Positives	Negatives
Balance Can strike a balance between being visually appealing, professional-looking, and quick to create.	**Longer to create** than low-fidelity canvases and can be more expensive to produce requiring specialist software and knowledge.
Participants Explore in more detail than low-fidelity canvases while still allowing for flexibility.	**Participant Buy-in** Participants may feel that they need to have more design expertise to participate effectively
Engagement Medium fidelity canvases may be more engaging for participants across disciplines, as they can feel that they are contributing to a more refined final product.	

High Fidelity

Positives	Negatives
Professional High-fidelity canvases can be visually impressive and communicate a sense of professionalism	**Time to create.** may take a long time to create and can be resource-intensive. Requiring specialist software and knowledge
Can capture a high level of detail and communicate a clear vision of the outcome.	**Engagement** maybe intimidating to participants who feel that they do not have design expertise and may reduce engagement.
Maintaining specific focus may help participants to feel focused on a specific outcome in a staged approach.	**Limit Creativity** Too much structure may limit creativity or exploration. When this occurs, it was noted that participants tend to revert to simpler formats to communicate across disciplines. (Figure 7) shows participants adapting the *Interdisciplinary Research Proposal Canvas* to a simpler low fidelity canvas.

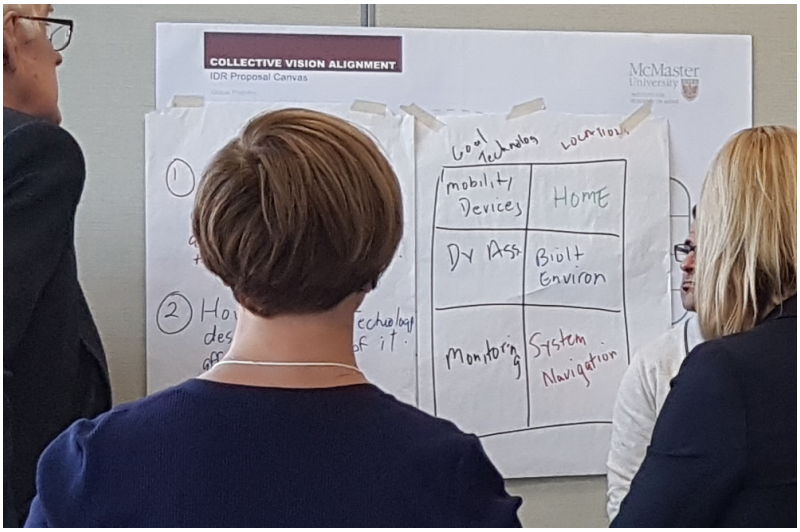

Figure 7: Participants from workshop 2 adapting the hi-fidelity *Interdisciplinary Research Proposal Canvas* to a simpler low-fidelity canvas

3.2. Participant Feedback Quotes

"Input from the new connections has made the methodology and the goals **more realistic** and yet **more meaningful**."
Postdoctoral fellow, Department of Surgery

"[The project] allowed me to gain exposure to learn from an interdisciplinary team that has **enriched my master's training** and galvanized my pursuit of a PhD."
Master's student, Kinesiology

"A strong partnership with the YMCA **provided the infrastructure and access** to physical space and instructors already equipped to provide our programming tailored to the needs of older adults."
Postdoctoral fellow, Department of Medicine

Conclusions

In this paper, we report on 3 case studies using co-design to grow interdisciplinary research communities in universities. We use these to compare different co-design workshop approaches and reflect on the positives and negatives of different formats to help enhance interdisciplinary communities.

It was found that there are trade-offs between structured and semi-structured design approaches. While structured approaches provide clear expectations, keep participants on topic, and ensure planning and organisation, they can also constrain creativity and require more time to prepare. Semi-

structured approaches provide flexibility and encourage ownership but may lead to digression off-topic and require more facilitation.

The fidelity of canvases used in interdisciplinary co-design workshops also holds positives and negatives. Low-fidelity canvases are quick and inexpensive to create and can be more inclusive but may not capture as much detail or be as visually appealing. Medium-fidelity canvases strike a balance between visual appeal and detail but can be more time-consuming and require more design expertise. High-fidelity canvases can be visually impressive and communicate professionalism but may limit creativity. Participants in interdisciplinary co-design workshops can have varying levels of engagement based on the fidelity of the canvases used. Low-fidelity canvases may be seen as oversimplified or generic, while high-fidelity canvases may be seen as overly complex. Medium-fidelity canvases may strike a balance and be more engaging for participants.

Overall, like many co-design workshops, there is no one-size-fits-all approach to interdisciplinary co-design workshops. The best approach depends on the specific context and goals of participants; therefore, it is very important to prepare in advance and tailor bespoke workshops to the needs and preferences of the participants involved.

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