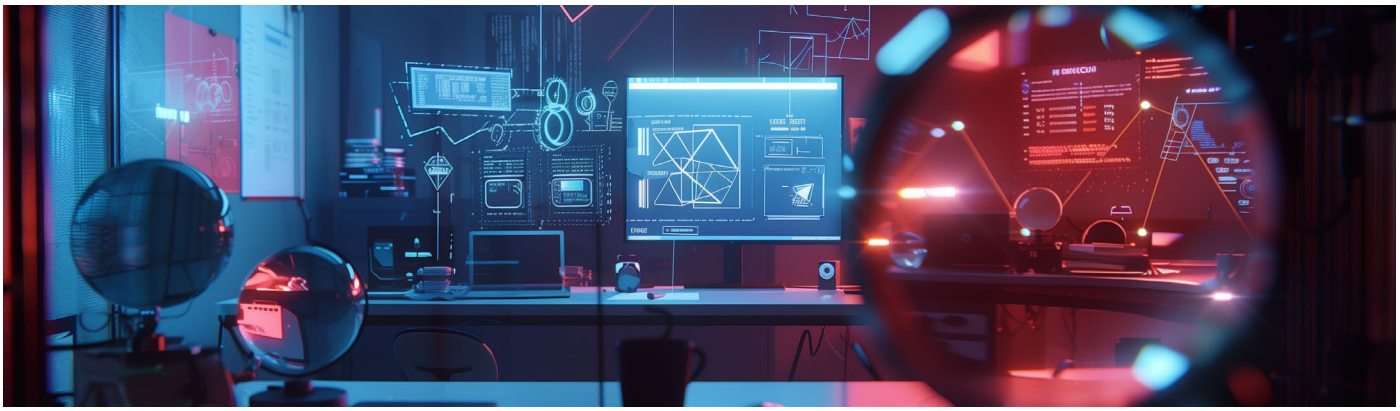
Bureau de Change Laboratory

Homepage: **https://ojs.library.lancs.ac.uk/bcl/**



Technical Report

Tools for transformation: Selecting a suite of digital tools for an online Change Laboratory

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Abstract: This technical report describes the set of digital tools that were used in a fully online Change Laboratory conducted over seven workshops in 2024 as part of the author's Ph.D. Project "The Sustainability Change Laboratory." The purpose of this report is to document the choices and design decisions the author made in the set-up of the digital space for the research project, to provide a categorisation of tools required to enable the various interactions between Change Laboratory participants, and to share the user experience of both participants and the researcher. The report also includes a set of criteria intended to assist other researchers planning a fully online Change Laboratory in their selection and choice of a digital toolset to be used.

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1. Introduction

In the first quarter of 2024, I facilitated the "Sustainability Change Laboratory" as part of my Ph.D. project with the aim to explore how sustainability integration can be accelerated at my institution, a university of applied sciences in Austria. My group of participants consisted of seven students and ten staff members who worked over a series of seven workshops in a Change Laboratory setting that was conducted entirely online without the participants ever meeting in person.

The Change Laboratory (CL) is a participative and interventionist research method based on the principle of expansive learning (Engeström, 1987), where a group of usually ten to twenty participants gather in a series of collaborative workshops over a period of time, usually between six and twelve workshops over several months, to affect change in a given work, study, or other life situation (Virkkunen & Newnham, 2013; Bligh & Flood, 2017). First developed by the Center for Activity Theory and Developmental Work Research at the University of Helsinki (Engeström et al., 1996), Change Laboratory is based on Cultural Historical Activity Theory (CHAT), where activity is conceptualised as a collective and sustained human effort. The CL methodology draws on a tradition of interventionism and activism and aims to support collective change efforts and transformation (Sannino, 2011). It would go beyond the scope of this paper to describe the theoretical and methodological foundations of CHAT and expansive learning, which can be found elsewhere (Yamagata-Lynch, 2010; Bligh & Flood, 2015).

Change Laboratory projects aim to facilitate (organisational) change and innovation by collaboratively identifying and addressing deep-seated problems in current practices. They involve relevant stakeholders in systematic analysis, promote collective reflection, and empower participants to design and implement sustainable, innovative solutions. Their goal is not only to enhance organisational practice, but also to foster a culture of continuous improvement and to generate theoretical insights into organisational change and collective learning dynamics (Engeström, 2011; Virkkunen & Newnham, 2013).

Change Laboratories are highly collaborative ventures, where the participants work through a number of stages in a dialectical manner to examine a given situation, process, or issue (often conceptualised as an activity) that has been determined as problematic or requiring change. Following the cycle of expansive learning (see Figure 1), participants start by questioning the problem and then analysing it from both historical and actual-empirical perspectives. Based on the outcomes of these analyses, they then model possible new processes, approaches, or solutions, examine these and plan for implementation, in many cases also implementing the new model and evaluating its effectiveness. Despite the seeming linearity of this process, the collaborative and highly interactive nature of Change Laboratories means that the steps taken are often cyclical rather than linear.

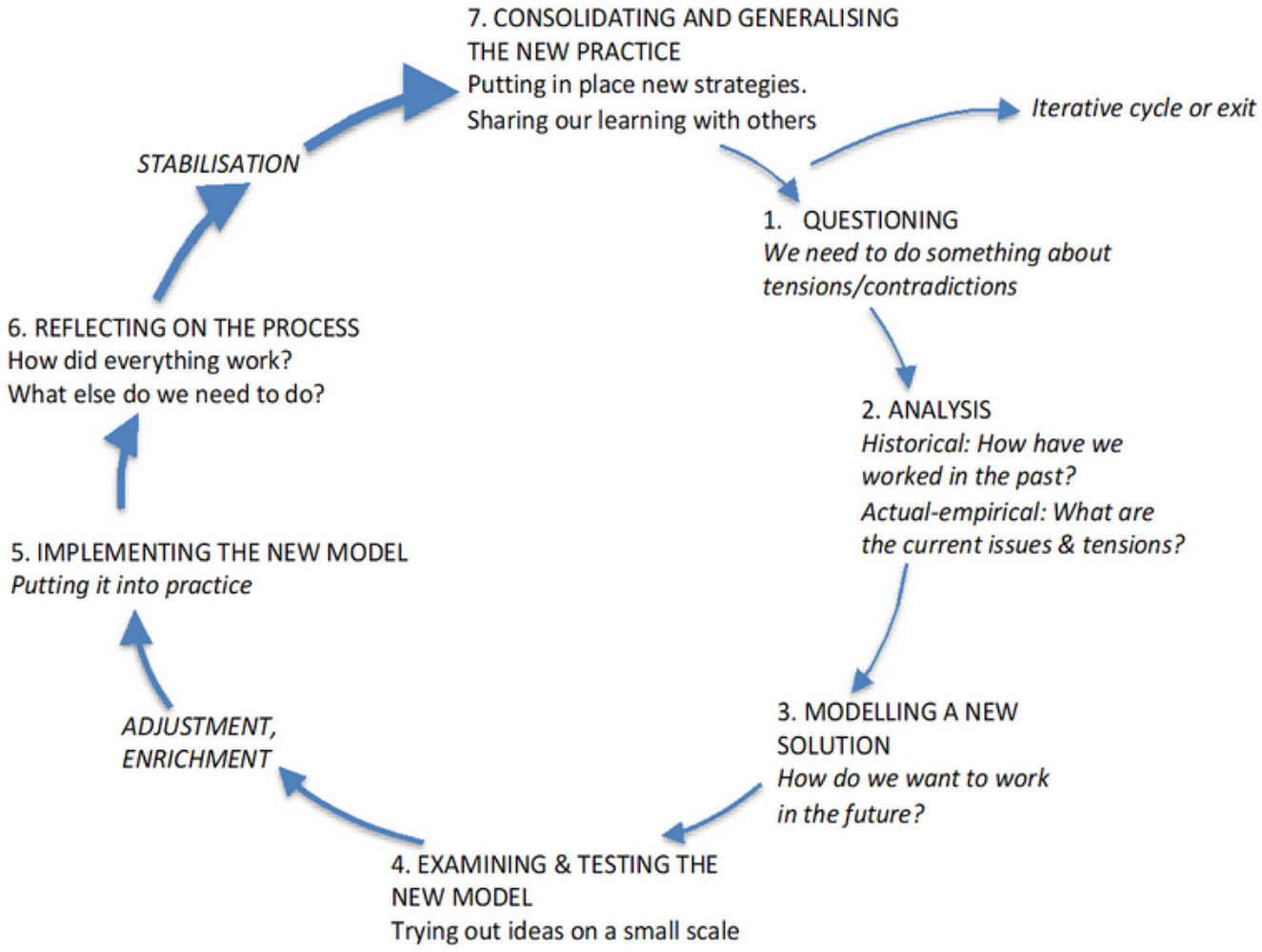


Figure 1. Cycle of Expansive Learning (Engeström, 1987, cited by Nodder, 2023).

Originally, Change Laboratory workshops were conceptualised as face-to-face sessions, and the associated tools were developed for on-site settings. The "bible" of Change Laboratory design, Virkkunen & Newnham's book *The Change Laboratory: A tool for collaborative development of work and education* (2013) proposes a concrete physical set-up of the room where workshops are held, describing clearly where participants, scribes, etc. should be located and pointing to analogue technology such as whiteboards, video cameras, etc. to facilitate the interaction. Over the past decade, however, the shift to online communication, working and learning has also meant that Change Laboratories have started to employ digital technology to enhance various aspects (see e.g. Miles, 2023, who used OneNote as a knowledge management tool in his CL) or moved fully online, with synchronous online workshop replacing face-to-face meetings (see e.g. Moffit & Bligh, 2024). The key aspects of online Change Laboratories specifically are discussed by Spante et al. (2023).

The main benefit of a fully online CL is of course that a much wider circle of participants can be reached. In the project described here, this flexibility of access and convenience was critical to many participants, who would otherwise not have been able (or wanted) to take part. In addition, there are several other advantages of online CLs, in particular in terms of collecting the data necessary for the researcher for preparing the next workshop and for the overall

research endeavour. Being able to record all workshops online, including breakout room sessions, means that transcriptions can be created for all interactions between participants, which is a significant advantage compared to face-to-face workshops, where this would require significant logistical efforts when video-recording also the conversation taking part in breakout-groups. Group work results could be captured immediately on an interactive online whiteboard for presentation and discussion in the plenary, leaving an exact record for the researcher who was able to use both the written notes of the group prepared by the scribe, and the transcript of the discussion that produced them. The collaborative software was also used for other group facilitation tasks such as voting and time keeping.

Due to the need for participants to be highly engaged in the process, it is critical particularly in online Change Laboratories to employ tools that enable and enhance fruitful collaboration and support the process, including the collection of research data, effectively. It can be a challenge significantly jeopardising the success of the Change Laboratory if the tools chosen do not have the required features, are difficult to use, do not perform as expected, or do not support seamless collaboration. In other words, if the digital tools used to facilitate the Change Laboratory are not fit for purpose, the required active and often involved discussions, creative collaboration and sometimes uncomfortable exchange between participants will suffer. It is therefore essential that the suite of tools selected to enable the process is chosen with a clear understanding both of the tools' capabilities but also of the way they will be used to support the activities within and between workshops. This is where the present report intends to contribute to the knowledge and practice of designing and running CLs in fully online mode. Based on the experience of running such a CL and focussing on the technology used, the remainder of this report provides:

- an overview of the types of tools necessary to facilitate an online Change Laboratory and to record or document the process and outcomes
- a description of the specific suite of tools I used in my project, including a commentary about the experiences made with these
- a list of criteria I found helpful to inform the selection of tools.

2. Types of digital tools: Overview, functions and features

Change Laboratories are designed as highly interactive, collaborative workshops with the aim of collectively moving through an expansive learning cycle. The researcher-facilitator designs and prepares each session, using first and second stimuli, i.e. tasks and conceptual tools provided to the participants in order to structure and guide each workshop and to stimulate the individual and collective thinking, discussion and analytical and creative work. Another feature of Change Laboratories is Mirror Data, i.e. data that is used as input for the participants' activities. As workshops progress over time, Mirror Data often consist of the results of previous sessions in order to progressively advance the dialectical collective work.

The following table provides an overview of the types of tools necessary for an online Change Laboratory, including the function the tool supports and the features it requires. The sequence of the tools reflects their importance in enabling CL activities to be carried out, i.e. the most important tools are listed first.

Table 1. Types of tools, functions and features for a Change Laboratory.

Type of tool	Function	Features
Web-conferencing Tool	Online meeting room for plenary and breakout/ group workshops	• Video and audio features for communication for all participants • Chat • Breakout rooms capability • Ability to record workshops (including breakout rooms for group work) • Download of workshop recordings and Chat • Further collaboration and voting capabilities can be helpful
Advanced online collaboration tool / whiteboard	Supports collaborative work during workshops, especially during group work Provides first and second stimuli (e.g. tables, activity system template, brainstorming tools) for participants to work with Records outcomes of group sessions	• Ability to view and write on board for all participants (e.g. using post-its or text) • Ability to include a range of formats (e.g. tables, diagrams, graphics, videos, templates for stimuli, etc.) • Ability to document process over time and download / save results for later analysis • Management features such as timer, editing permissions, voting, etc. can be helpful. • Permissions management to restrict access to CL participants only
Online project workspace	Provides space for information about the overall project and each workshop, including resources such as slides, workshop summaries, resources, etc. Space to provide instructions (first stimuli) to participants about online activities (both collaborative and individual), as well as homework. Space to upload resources created by participants (e.g. homework).	• Text editor • Ability to upload resources in a range of file formats (text, video, graphics, etc.) • Permissions management to restrict access to CL participants only • Ability for participant to upload files
Transcription software	Transcription of workshop recordings	• Ability to transcribe video and audio files • Ability to cut video and audio files • Ability to determine multiple speakers in transcription • Ability to edit transcription, including speed control of video/audio player • Inclusion of time stamps and speaker labels in transcribed text • Export function to suitable text format

In addition to the core tools mentioned above, general productivity tools such as e-Mail, PowerPoint, MS Word, Excel, etc. are also useful to communicate with participants, keep various records, prepare workshops slides, etc. Depending on the type of activities planned for a Change Laboratory workshop, there are other tools that could be employed, for example specialised tools for brainstorming, word clouds, polls, survey tools etc. In this case, for example, Google forms was used to collect participant feedback after workshops 1, 3 and 6. These tools are often

incorporated as features in the "advanced collaboration tools" mentioned above, and it is worth considering these capabilities when selecting collaboration tools.

Each Change Laboratory is different, and the toolset used depends on a range of factors, including rather pragmatic issues such as access to tools for researcher-facilitator and participants, the design of the workshops, costs, etc. in addition to the features available in the tools selected. In order to assist Change Laboratory facilitators with the assessment and selection of tools, the following section provides an overview of the selection criteria I considered when choosing the toolset for my Change Laboratory.

3. Specific tools and features used in the Sustainability Change Laboratory

The Sustainability Change Laboratory was based on three key tools: a project site in the university's centrally managed Learning Management System Sakai (https://www.sakailms.org), the web-conferencing tool Big Blue Button (https://bigbluebutton.org), and the digital collaborative whiteboard Miro (https://miro.com). Figure 2 provides an overview of the workflow these tools supported for the Sustainability Change Laboratory.

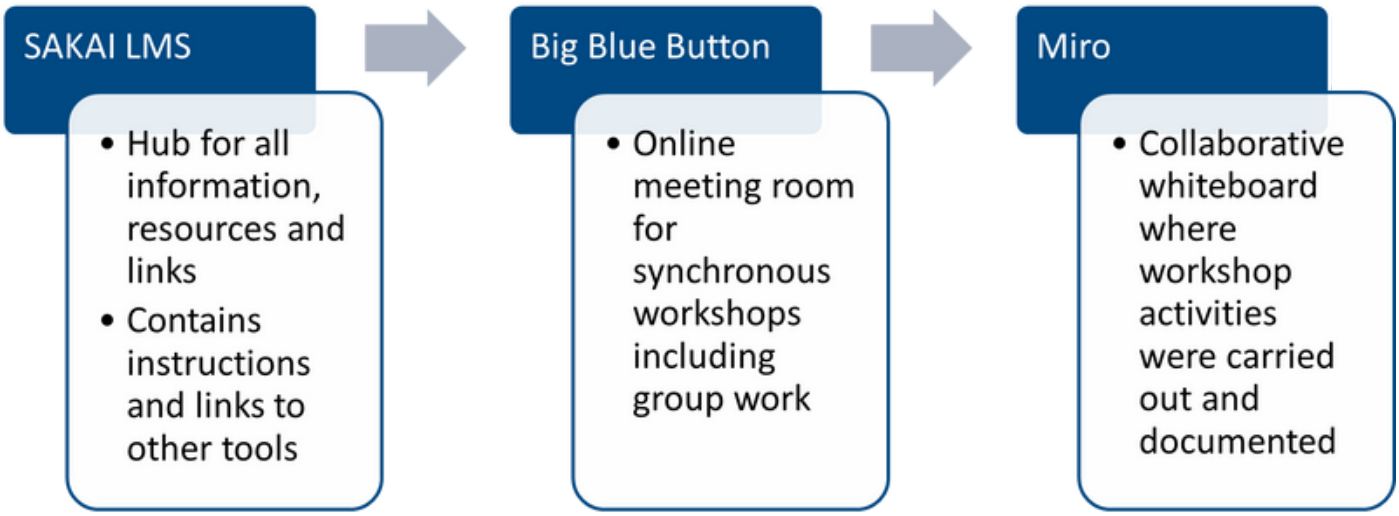


Figure 2. Key tools and their functions in a Change Laboratory.

My choice of this suite of tools was very much based on fitting the CL to my local context: participants and myself were familiar with all tools bar Miro; it was easy to provide access to all systems for both staff and student participants; there were no licensing costs involved in using the tools; and data protection and privacy concerns could be handled with more confidence. When choosing tools to support a CL, other facilitators might wish to consider these advantages of using existing institutionally supported technology.

In terms of the flow of each workshop, participants logged on to the Sakai workspace, from where they accessed the Big Blue Button Main room. Using information on each of the pertinent workshop pages, participants then accessed Miro, again through a link directly embedded in Sakai, to work on their individual and group tasks. The following section describes in detail how

these tools were used and how they supported and enabled the processes carried out in the Change Laboratory.

3.1 Sakai project site: The Hub

The project site on Sakai was used as a central hub for all the information provided to participants and as a launch-pad for the other tools. My intention was to create an online "home" space or hub, where participants would know to go for anything related to the CL, where they would find all relevant resources, and from where they could launch all other tools required.

Sakai is my university's centrally supported Learning Management System, which made it an obvious tool to use in order to provide a common digital space for all participants. They were all familiar with the tool and had active accounts. Creating the project site and adding the participants was easy and quick, and I could be assured that the data were secure and private, only accessible to the participants, myself and one IT staff member. Having worked with Sakai for many years, I find it very intuitive to use and it was easy for me to create an appropriate structure and the necessary content as well as manage files and users.

I furnished the home page with a welcome message and some basic information about the Change Laboratory and pointed participants to the content section where each workshop had a separate subpage, structured along the stages of the cycle of expansive learning as shown in Figure 3.

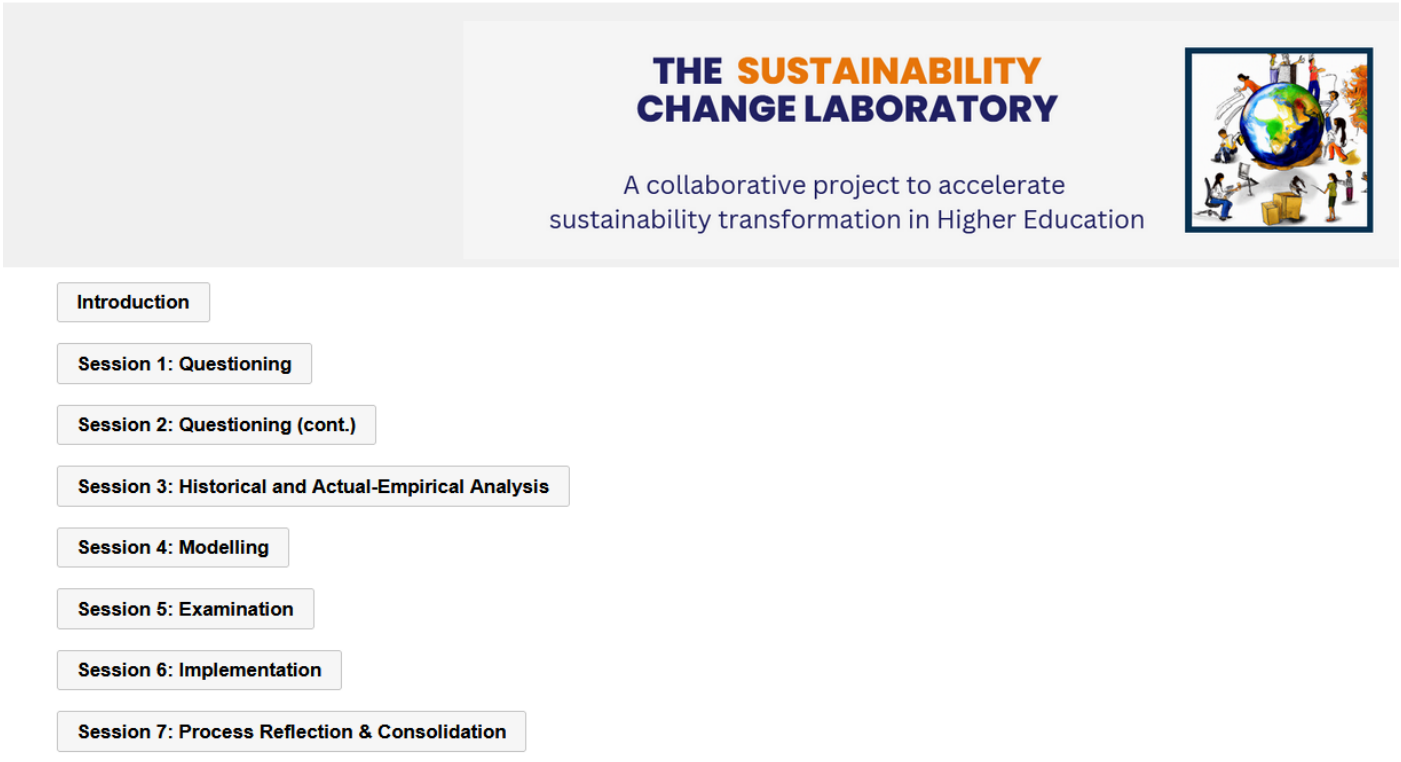
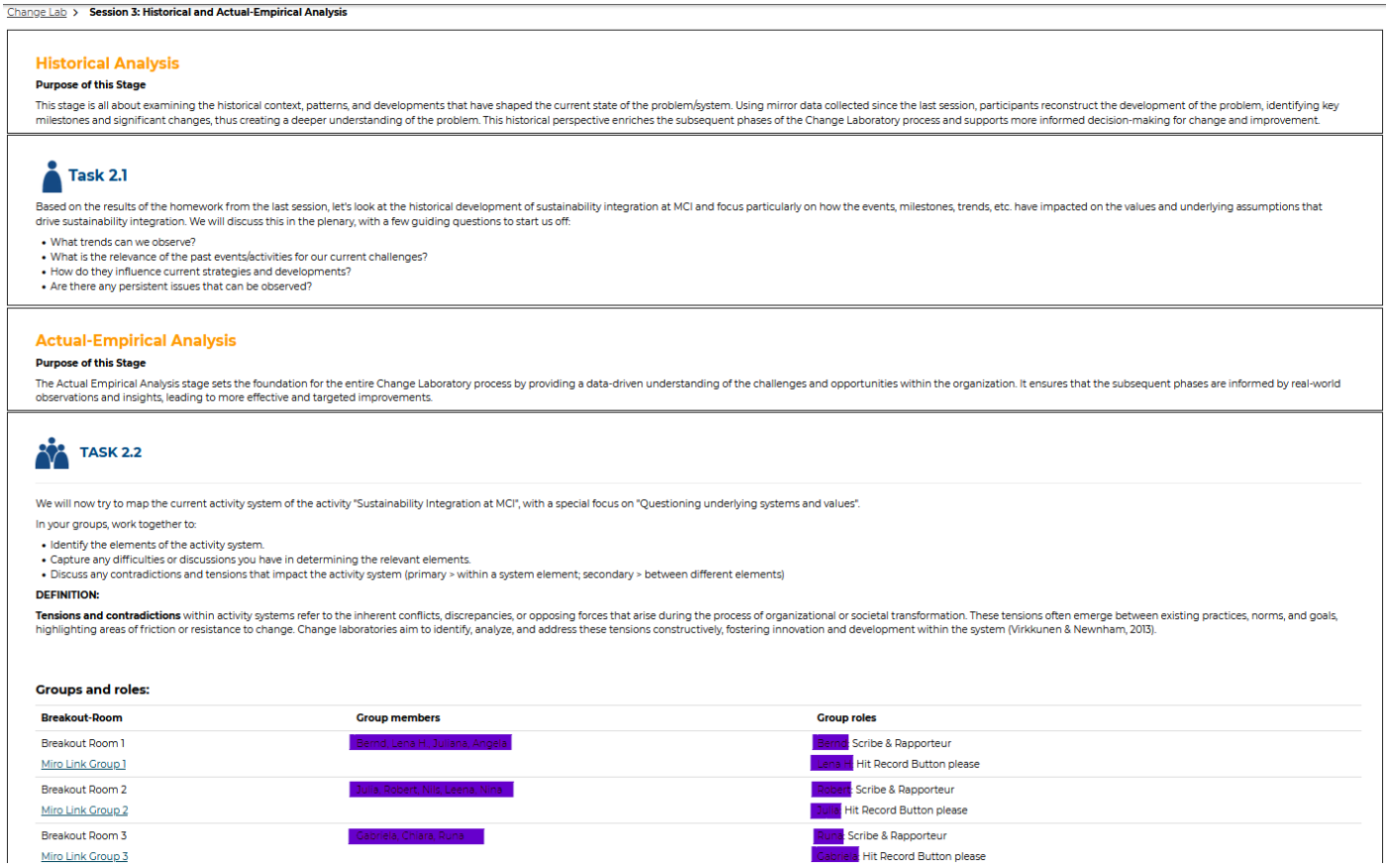


Figure 3. Overview workshop pages on Sakai.

Each of the workshop pages (see Figure 4 for an example) contained a short overview of the purpose of the relevant stage, followed by instructions for the tasks to be carried out during the various group and individual activities (first stimuli) and resources used during the tasks if provided (mirror data)undefined. I also included a table with the group allocation and roles

(scribe/rapporteur and recorder) when relevant, and a link to the frame of the Miro board (only one board was used for the entire project) which contained conceptual tools (second stimuli) and where groups documented their results.



Change Lab > **Session 3: Historical and Actual-Empirical Analysis**

Historical Analysis

Purpose of this Stage

This stage is all about examining the historical context, patterns, and developments that have shaped the current state of the problem/system. Using mirror data collected since the last session, participants reconstruct the development of the problem, identifying key milestones and significant changes, thus creating a deeper understanding of the problem. This historical perspective enriches the subsequent phases of the Change Laboratory process and supports more informed decision-making for change and improvement.

Task 2.1

Based on the results of the homework from the last session, let's look at the historical development of sustainability integration at MCI and focus particularly on how the events, milestones, trends, etc. have impacted on the values and underlying assumptions that drive sustainability integration. We will discuss this in the plenary, with a few guiding questions to start us off:

- What trends can we observe?
- What is the relevance of the past events/activities for our current challenges?
- How do they influence current strategies and developments?
- Are there any persistent issues that can be observed?

Actual-Empirical Analysis

Purpose of this Stage

The Actual Empirical Analysis stage sets the foundation for the entire Change Laboratory process by providing a data-driven understanding of the challenges and opportunities within the organization. It ensures that the subsequent phases are informed by real-world observations and insights, leading to more effective and targeted improvements.

TASK 2.2

We will now try to map the current activity system of the activity "Sustainability Integration at MCI", with a special focus on "Questioning underlying systems and values".

In your groups, work together to:

- Identify the elements of the activity system.
- Capture any difficulties or discussions you have in determining the relevant elements.
- Discuss any contradictions and tensions that impact the activity system (primary > within a system element; secondary > between different elements)

DEFINITION:

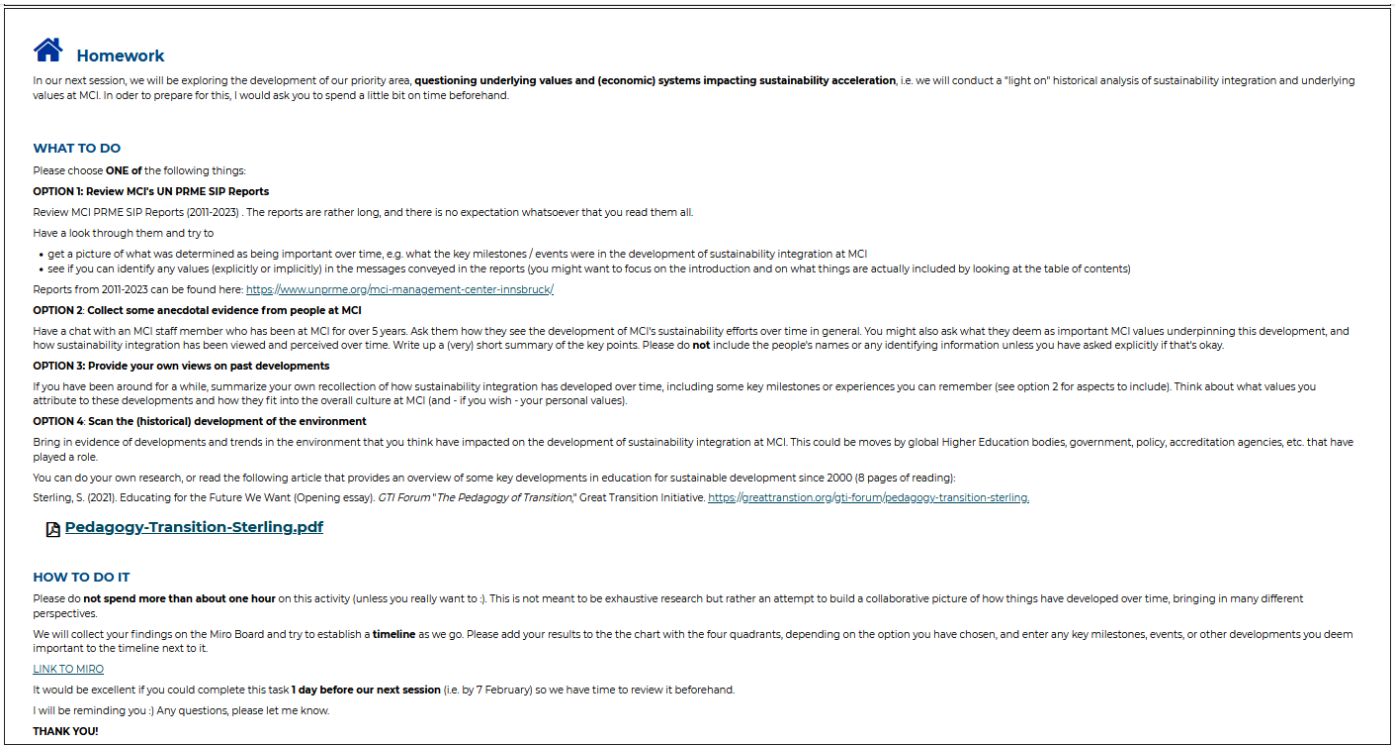
Tensions and contradictions within activity systems refer to the inherent conflicts, discrepancies, or opposing forces that arise during the process of organizational or societal transformation. These tensions often emerge between existing practices, norms, and goals, highlighting areas of friction or resistance to change. Change laboratories aim to identify, analyze, and address these tensions constructively, fostering innovation and development within the system (Virkkunen & Newnham, 2013).

Groups and roles:

Breakout-Room	Group members	Group roles
Breakout Room 1	[redacted]	[redacted] Scribe & Rapporteur
Miro Link Group 1		[redacted] Hit Record Button please
Breakout Room 2	[redacted]	[redacted] Scribe & Rapporteur
Miro Link Group 2		[redacted] Hit Record Button please
Breakout Room 3	[redacted]	[redacted] Scribe & Rapporteur
Miro Link Group 3		[redacted] Hit Record Button please

Figure 4. Workshop page on Sakai (obscured passages cover participants' names for data protection purposes).

Homework instructions were also provided in this space, and participants uploaded their homework files to the Dropbox of this site (Figure 5).



Homework

In our next session, we will be exploring the development of our priority area, **questioning underlying values and (economic) systems impacting sustainability acceleration**, i.e. we will conduct a "light on" historical analysis of sustainability integration and underlying values at MCI. In oder to prepare for this, I would ask you to spend a little bit on time beforehand.

WHAT TO DO

Please choose **ONE of** the following things:

OPTION 1: Review MCI's UN PRME SIP Reports

Review MCI PRME SIP Reports (2011-2023) . The reports are rather long, and there is no expectation whatsoever that you read them all.

Have a look through them and try to

- get a picture of what was determined as being important over time, e.g. what the key milestones / events were in the development of sustainability integration at MCI
- see if you can identify any values (explicitly or implicitly) in the messages conveyed in the reports (you might want to focus on the introduction and on what things are actually included by looking at the table of contents)

Reports from 2011-2023 can be found here: https://www.unprme.org/mci-management-center-innsbruck/

OPTION 2: Collect some anecdotal evidence from people at MCI

Have a chat with an MCI staff member who has been at MCI for over 5 years. Ask them how they see the development of MCI's sustainability efforts over time in general. You might also ask what they deem as important MCI values underpinning this development, and how sustainability integration has been viewed and perceived over time. Write up a (very) short summary of the key points. Please do **not** include the people's names or any identifying information unless you have asked explicitly if that's okay.

OPTION 3: Provide your own views on past developments

If you have been around for a while, summarize your own recollection of how sustainability integration has developed over time, including some key milestones or experiences you can remember (see option 2 for aspects to include). Think about what values you attribute to these developments and how they fit into the overall culture at MCI (and - if you wish - your personal values).

OPTION 4: Scan the (historical) development of the environment

Bring in evidence of developments and trends in the environment that you think have impacted on the development of sustainability integration at MCI. This could be moves by global Higher Education bodies, government, policy, accreditation agencies, etc. that have played a role.

You can do your own research, or read the following article that provides an overview of some key developments in education for sustainable development since 2000 (8 pages of reading):

Sterling, S. (2021). Educating for the Future We Want (Opening essay). *GTI Forum "The Pedagogy of Transition,"* Great Transition Initiative. https://greattransition.org/gti-forum/pedagogy-transition-sterling.

Pedagogy-Transition-Sterling.pdf

HOW TO DO IT

Please do **not spend more than about one hour** on this activity (unless you really want to :). This is not meant to be exhaustive research but rather an attempt to build a collaborative picture of how things have developed over time, bringing in many different perspectives.

We will collect your findings on the Miro Board and try to establish a **timeline** as we go. Please add your results to the the chart with the four quadrants, depending on the option you have chosen, and enter any key milestones, events, or other developments you deem important to the timeline next to it.

LINK TO MIRO

It would be excellent if you could complete this task **1 day before our next session** (i.e. by 7 February) so we have time to review it beforehand.

I will be reminding you :) Any questions, please let me know.

THANK YOU!

Figure 5. Example homework.

After each workshop, I added the slides and a summary of the workshop outcomes at the bottom of this page.

3.2 Big Blue Button: The live meeting room

In an online Change Laboratory, a web-conferencing system serves as a vital tool for facilitating real-time communication and collaboration among participants, enabling them to engage in collective analysis and discussion. Through video, audio, chat, screen sharing, and other features, participants can collaboratively identify problems, brainstorm solutions, and design new practices. The web-conferencing system also supports recording sessions for later review and continuous reflection, ensuring that the collaborative process remains dynamic and inclusive despite physical distances.

I used the web-conferencing tool Big Blue Button (BBB), the centrally supported synchronous online teaching tool used by my institution (see Figure 6). BBB comes with full audio and video capability for all participants, and there is a chat function for public and private chat, a participant list with various status symbols, the ability to share files and screen, as well as interactive tools such as whiteboard, polling, and raise hand. I used these collaborative features on one occasion to determine priority areas. However, since the Miro digital whiteboard was much more powerful in this regard, I used the features of Miro rather BBB in further workshops. Whilst this meant that participants had to use an additional tool, this trade-off was well warranted due to the superior features of Miro, which are described in the next section.

Big Blue Button was used for all workshops from the start, with a main room serving as the principal meeting room and three additional rooms being used for group discussions.

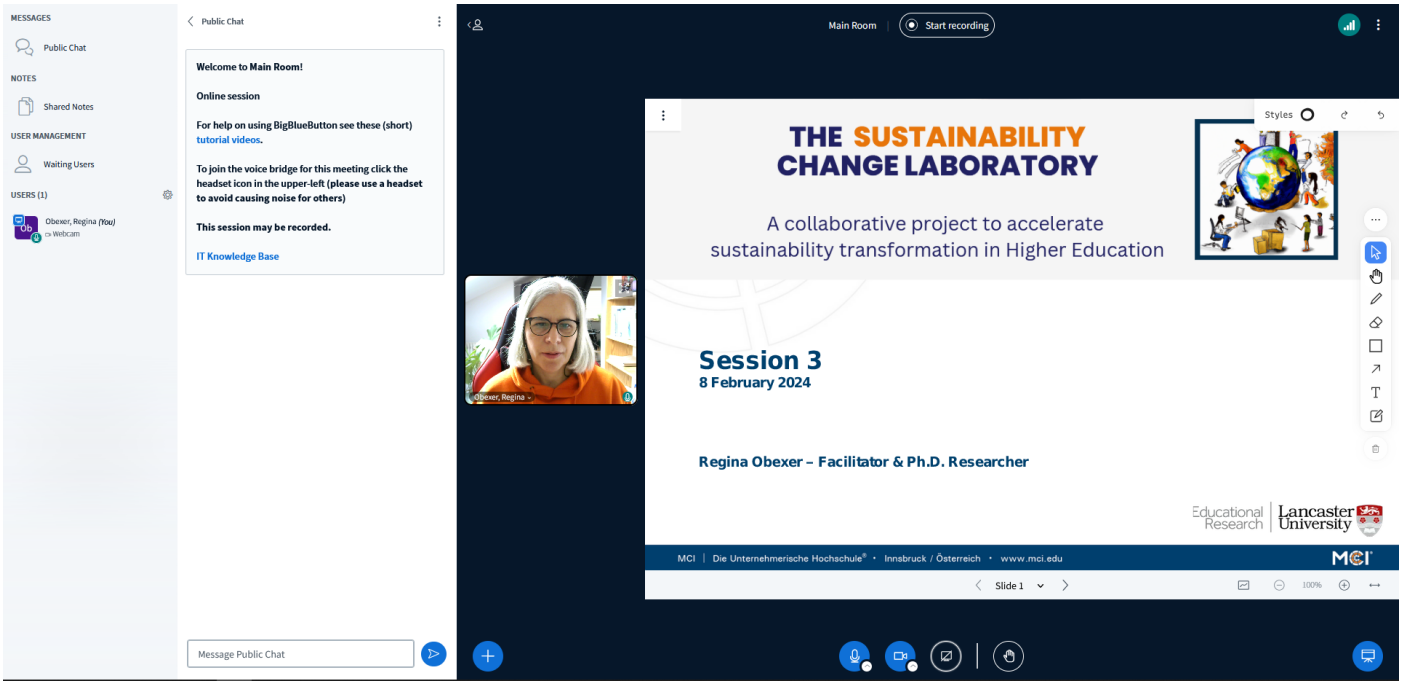


Figure 6. Interface of BBB meeting room.

When planning the Change Laboratory, I considered other tools such as Zoom and MS Teams as alternatives, but in the end decided to use BBB because it was familiar to all participants, it is embedded in the LMS, there is central technical support and the tool complies with the General Data Protection Regulation (GDPR). There were some issues I had to find workarounds for, however. For example, it is not possible to record break-out rooms in BBB. I therefore created three additional rooms for group work and assigned a person in each group to hit the record button in their room. This required additional communication to ensure that participants actually left the main room and accessed the assigned break-out room, and there were a few participants who got lost in the second workshop. After that, they knew the process and there were no further issues. Recordings were made of each individual plenary and group session, and I exported both the video files and the chats for data analysis in mp4 format.

3.3 Miro: The collaborative whiteboard

In an online Change Laboratory, a digital whiteboard is an essential tool for visualizing ideas and facilitating collaborative problem-solving. It enables participants to brainstorm, organize, and synthesize information in a shared, interactive space. Users can work on diagrams, write notes, and post digital sticky notes to map out their ideas and discussion points. The whiteboard's visual and interactive nature helps to clarify complex concepts, track the progression of ideas, and document the collective thought process.

Miro is a collaboration tool with a range of features designed for teams to work together. I used it as a core tool to enable and support group work and also individual activities. Miro has many features, including a range of templates and flexible annotation tools such as sticky-notes, text, images, and others. There is also a polling tools which can be added to any of the elements created, and a timer which I used regularly for break-out sessions.

For the Sustainability CL, I created one Miro board for the entire CL and added new frames for each workshop. Similar to the subpages in Sakai, I structured the Miro board along the different phases of the expansive learning cycle, one workshop after the next. Since Miro boards

do not have space limitations, this led to the effect that the entire process was recorded step by step, and the result is a Miro board that contains all outcomes of the various tasks and impressively documents the process we went through.

Miro allowed me to create and provide a range of conceptual tools (second stimuli) to the participants. When preparing the workshops, I created appropriate frames with the relevant tools for the various activities, and participants then used these both individually and in groups first to stimulate discussion and then to document their results here. A more detailed description of the design and use of these cognitive tools can be found elsewhere (Obexer, forthcoming).

Examples of second stimuli that were included in the Miro Board are presented below.

3.3.1 Workshop 1: A simple brainstorming activity with post-its

During the first workshop, participants first watched two videos with interviews discussing different perspectives on the role of higher education institutions when it comes to supporting and advancing sustainable development. Participants then identified the activities they saw as most important based on the aspects discussed in the video, using sticky-notes on Miro (Figure 7).

Figure 7. Brainstorming activity to determine priorities for questioning on Miro.

3.3.2 Homework for Workshop 2: Quadrants to record research results

Participants were asked to gather different types of data to create a collective picture of the historic development of the activity, i.e. the integration of sustainability at their university. I divided a frame in Miro into four quadrants for different types of data participants were to collect. They used sticky-notes to add their contributions to the appropriate quadrant (Figure 8).

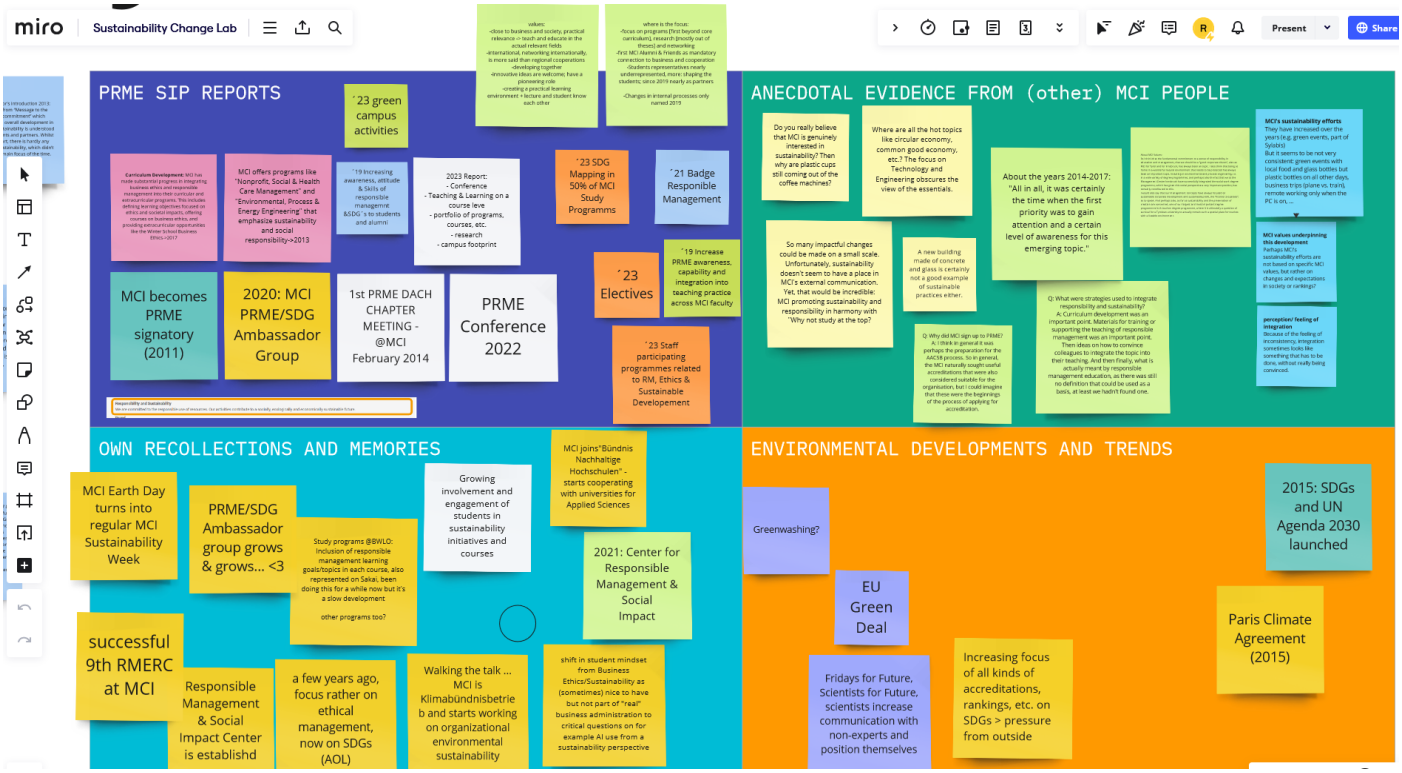


Figure 8. Historical analysis data collection on Miro.

3.3.3 Workshop 3: A timeline for the historical analysis

A timeline is a frequently used tool in the historical analysis phase of Change Laboratories. In this activity, I used a template already available in Miro and asked participants to add milestones, events and trends based on the previous data collection to show the progression of sustainability integration over time (Figure 9).

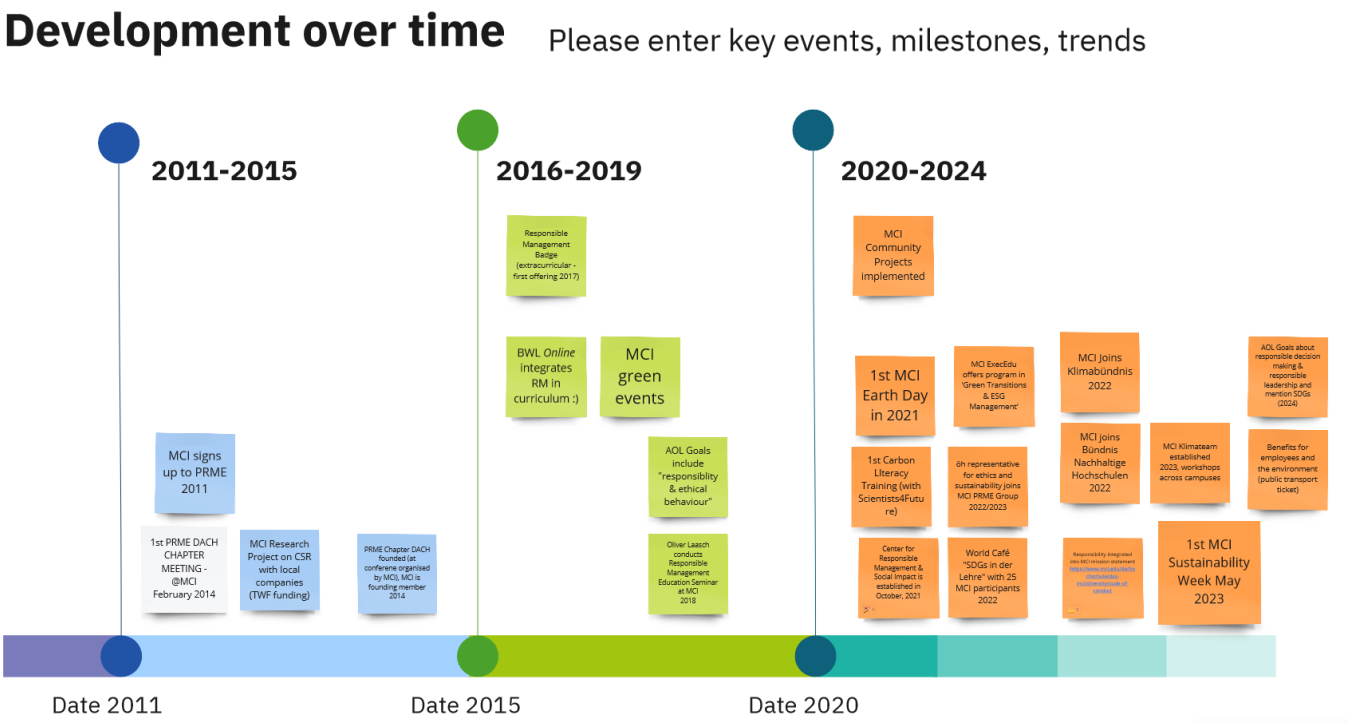


Figure 9. Timeline for historical analysis on Miro.

3.3.4 Workshop 3: The activity system triangle for mapping different elements of the system

In this workshop participants were asked to identify the elements of the activity system and any contradictions they could determine. This was facilitated by providing each group with an image of the activity system triangle, including symbols for contradictions, and asking them to use sticky-notes to add details (Figure 10). Considering the frequent use of Activity Systems in Change Laboratories, I created a template on Miro to be able to pull this second stimulus in easily without having to re-create the triangle.

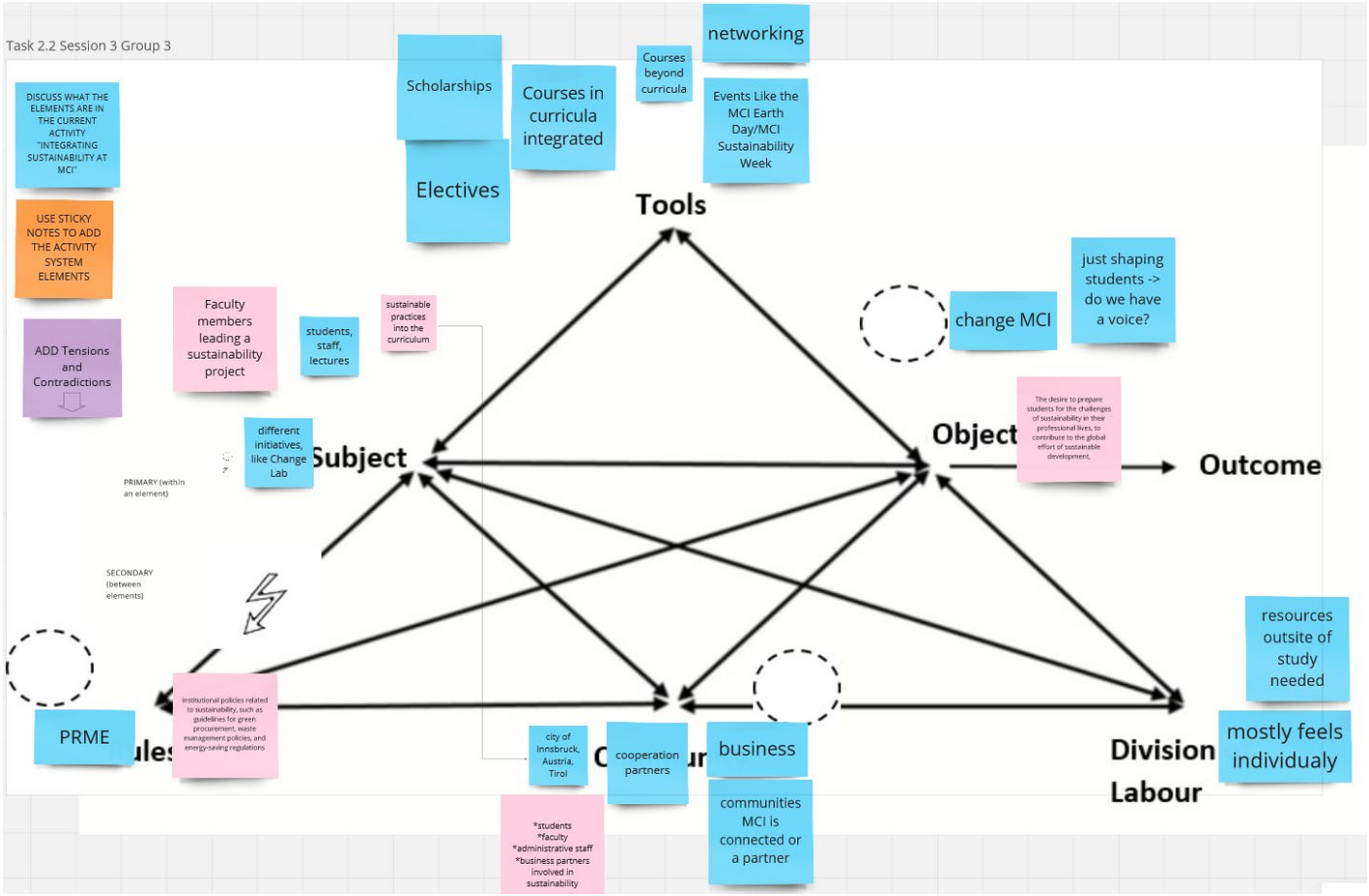


Figure 10. Activity system determining system elements and contradictions on Miro.

3.3.5 Workshop 4: Tables listing work results from previous workshops (e.g. defined contradictions) as a basis for further work

This activity used data from the previous workshop, i.e. contradictions identified in each group's activity system, to create a second stimulus in the form of a table where those contradictions were captured (Figure 11). Participants were then asked to brainstorm ideas which would make the contradiction / issue even worse in preparation for the modelling phase. Miro's sticky-note feature was again very useful here.

TASK 4.1. REVERSE BRAINSTORMING

Using Sticky Notes, please think about THINGS THAT WILL MAKE THE ISSUES IDENTIFIED EVEN WORSE.
Add at least 3 Sticky-Notes to the Miro-Board in the appropriate section (more is better). When you are finished, read the other posts.
This is a creative activity, so feel free to add any crazy ideas that might come to your mind.
You have 10 minutes for this task.

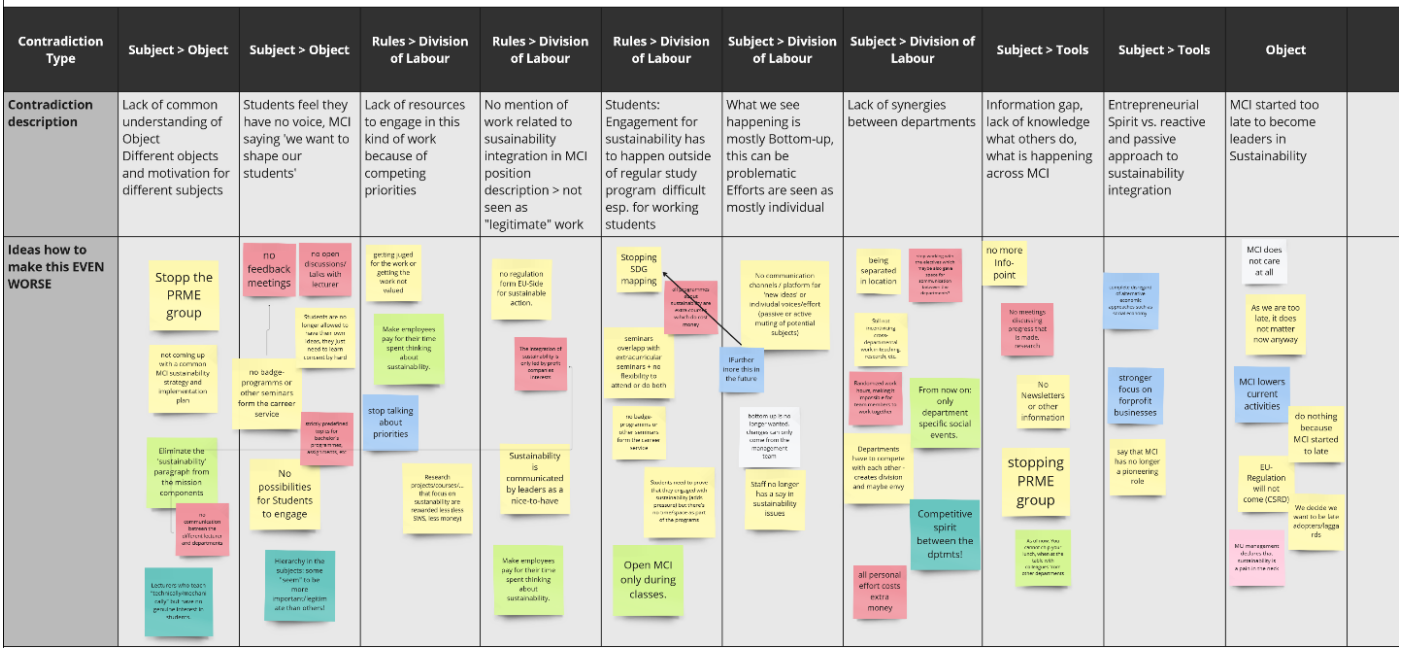


Figure 11. Table listing contradictions as a basis for reverse brainstorming activity on Miro.

3.3.6 Workshop 6: Rating impact and feasibility of models

In this activity, Miro was used to capture how participants rated the solutions discussed in the previous workshop, where they had developed a range of ideas in an attempt to model new activities. These ideas were coded with letters and numbers (e.g. G1.2 indicates idea 2 developed by Group 1). In a homework task, participants used a rating tool I had created in MS Excel to assess the feasibility and the impact of the three ideas they found most interesting and promising. The rating was done using defined criteria for each dimension and assigning up to 3 points for each criterion, which resulted in a feasibility score (maximum 12 points) and impact score (maximum 15 points) for each of the ideas prioritised by participants. At the beginning of Workshop 6, they then mapped those ideas, which were coded as described above, onto the chart (Figure 12).

Figure 12. Feasibility-impact mapping on Miro.

In summary, Miro was a flexible and useful tool that enabled the easy creation of a range of cognitive tools. Participants found it easy to use the tool, and no formal introduction was required. The fact that the results of previous activities were always present during subsequent workshops made it easy to go back and check on items discussed, and the phases the group went through were documented quite impressively step-by-step. Group work results were brought back into the plenary room by rapporteurs who shared their screen for report-back on group discussions.

3.4 Descript: The transcription tool

In Change Laboratories, workshops usually build on the work results of previous workshops, and it is crucial for the researcher-facilitator to be able to analyse data quickly and efficiently after each workshop in order for the outcomes to be used in subsequent workshops, often as mirror data. This requires effective tools to assist in this process, so data can be transcribed, analysed, summarised and prepared for presentation in the next workshop, which in my case was scheduled with a two to three weeks break in between sessions. I used the transcription software Descript for this purpose. After each workshop, I downloaded the plenary and breakout room recordings from Sakai in mp4 format and imported the files into Descript, where they were automatically transcribed into text.

I chose Descript from a range of other options mainly because of its intuitive design, accuracy, and functionality, which include multi-speaker recognition and video/audio editing options, but also because it has an affordable student licence I could acquire. Since I had used the free version of Descript before for smaller projects, I was already familiar with its features and found it easy and quick to use. Descript has a very useful speaker recognition feature where during the transcription process the software asks how many speakers were in the discussion and performs a labelling process where clips are played of the different speakers and the user can assign names to each. This worked reasonably well and meant I could assign pseudonyms at this stage. Descript offers an in-App replay-option with correction capabilities, however for me it was quicker to export the transcription to MS Word files and then listen to the recording, making corrections in the Word file where necessary. Overall, this worked well and was quite time efficient. I could, of course, only have used the work outcomes recorded by the different groups on Miro and in the report backs in plenary sessions, however I realised very soon that the details of each group discussion were essential to understanding the deeper meaning of what was being discussed. Reviewing the detailed discussions each week in preparation for the next workshop added depth and complexity to the analysis which was lost in the notes and also report-backs of the rapporteurs.

At this point, it is important to mention ethical implications of conducting online Change Laboratories. As Change Laboratories are a collective process, full anonymity cannot be guaranteed to research participants. Gaining informed consent from the participants before the CL started was therefore important, and all participants received a written information sheet and signed the consent form before the first session. Importantly, participants were made aware of the fact that the CL would take place online, that data would be recorded using the web-conferencing tool, and that excerpts from their contribution to the workshops, including in the form of video clips, would be used as input (Mirror data) in subsequent sessions. Participants were also made aware that the discussions and contributions of individuals in the workshops were confidential and not to be shared with others, unless the group agreed to discuss aspects of the work in the CL with other stakeholders, which was the case in several instances where input from others was gathered. I also reiterated at the beginning of the first session that this was a safe space and that it was important we could trust each other.

In many Change Laboratories, video clips play an important role, especially as mirror data showing work processes or other observations in practice, or also to include particularly relevant statements. Often, crucial discussion elements from previous workshops are selected and brought into the discussion as a basis for further work and to spur thinking and debate. Moffit & Bligh (2021) argue that the immediacy of video is an important aspect that adds relevance and can provoke deeper engagement. In my project, I was planning to use this strategy and had this use of data also included in the informed consent documentation participants had to sign in order to take part. However, due to a number of reasons I decided against this in the end. First of all, there was a power imbalance between the participants due to the fact that both lecturers and students were part of the group, which required sensitive facilitation from the start. Secondly, at my institution there is a strong sense that data privacy is important, especially since the GDPR came into effect. Despite having permission from participants, it felt wrong to show certain people's contributions via video. Instead, I opted for using selected quotations in text format, and in many cases referred participants back to previous Miro entries. Having said this, Descript is able to cut and edit video, which makes it a suitable tool also for researchers wanting to use this method.

4. Lessons learned and participant feedback

Overall, the suite of tools selected for the Sustainability Change Laboratory worked well, and there are not many changes I would make in hindsight. There are, however, several aspects worth considering in terms of the actual use of the tools.

4.1 Lessons learned regarding the online project space

Having a central launch-pad made it easy for participants to know where to go. Because all tools (apart from Miro) were familiar to participants, there were hardly any usability or technical issues. The only difficulty reported by participants was the fact that they had to use three different systems at the same time. This was particularly felt when they had to switch from the main BBB room to group sessions as they had to 1) leave the main room and enter their correct assigned group room, then activate microphone and camera; 2) find the task instructions on Sakai as well as the link to the Miro board; 3) access Miro to find the second stimuli and tools required to complete the task. Apart from the cognitive load (which eased as the workshops progressed) this was difficult for those who had only one screen, and particularly for mobile device users. In some instances, participants in the groups copied the instructions from Sakai (or the slides I used to explain them in the main room) to the Miro frame so the team had them in front of them. Over time, I started to include the task information also on the Miro frame for each activity. While this led to the Miro board to become quite full, in future iterations I would focus on providing all the task information in one place, where the participants need it (in this case Miro).

4.2 Lessons learned regarding the web-conferencing tools

Big Blue Button worked well overall, and I would use the tool again for future sessions. A big advantage was the ability to record discussions in the break-out sessions through the use of dedicated group rooms. There are some observations worth sharing regarding the use of the camera in the web-conferencing tools. While we started the first workshop with an introduction round where everyone had their web-cameras and microphones enabled, this soon changed, and in most workshops, I was the only person with the video activated in plenary sessions. Many participants also preferred to contribute to the whole-group discussion via chat rather than audio. In report-backs from the group work scribes I asked them to enable audio and video, which worked fine. Most participants activated audio and video in the break-out workshops, but not all. There were also occasional difficulties with sound not working well, in which case participants resorted to contributing to the group discussion via chat.

Overall, the tool itself worked reasonably well, even though it would have been good to have more presence of participants in the plenary sessions, where discussions where not as active as in group sessions. I am not sure if the fact that participants did not enable their webcams was a big factor in this respect. I did not force the issue, partly also because—this being a Sustainability Change Laboratory—we had discussed the issue of additional bandwidth (and thus energy) requirements with video activated in webinars. In hindsight, I would recommend to have a stricter policy on web-camera activation in order to increase engagement and commitment during plenary discussions.

4.3 Lessons learned regarding the digital whiteboard

The use of Miro was very effective in the Sustainability Change Laboratory. I decided to use only one board from the start in order to have the entire Cycle of Expansive Learning

represented (albeit in a linear fashion, phase by phase). For each session, I then generated Miro frames with the necessary information and cognitive tools, and these were linked to directly from the project hub in Sakai, so participants could get to where they needed to be in one click, but they still had the entire record of their previous work available by scrolling up. Over the seven workshops, the outcomes of all activities were available in their entirety, which allowed participants and myself to go back to previous work very easily on the one hand, but also gave orientation with regards to where we were in the process, and what we had already achieved.

CL sessions usually generate a large amount of data. In my case, much of this data was recorded on Miro, and it was necessary to manage this data in order to ensure that it was available in subsequent sessions on the one hand, but presented succinctly so that participants would not be overwhelmed by too much information. I dealt with this challenge by a) summarising the results of each workshop and sending this summary to participants before the next meeting to remind them of the previous work and b) by transferring the key data into the conceptional tools used in the next session where relevant, e.g. by presenting them in a table, a chart, or other summary or visualisation. The availability of pre-existing templates made the preparation of tools easier in several instances, and creating my own template for the Activity System was efficient as this was used in several workshops. I also regularly made back-up copies by simply coping the entire board to a Miro space accessible only to me to ensure that all data was kept safe.

5. Selection criteria for digital tools in a Change Laboratory

This report describes a specific set of tools I employed in the course of planning, designing and conducting the Sustainability Change Laboratory. Based on my experience, there are a number of criteria I deem important when selecting the suite of digital tools for an online Change Laboratory. This section describes these criteria, which might be useful for other researcher-facilitators when they assemble their own toolset in the planning and design stages of their CL.

Importantly, the researcher-facilitator should ensure that the tools can be used effectively by herself and by the participants, that they support the activities designed in a smooth and seamless way, allow for efficient recording of work processes and outcomes, and comply with all necessary legal and institutional requirements. Ease of use is imperative to ensure that the participants and the facilitator can focus on the task as hand rather than on technical or usability issues.

If the Change Laboratory is carried out in the context of an organisation, it makes sense to consider the tools which are already in use for other communication and collaboration purposes in order to limit the effort in learning to use new tools. This was the case in my project, where participants were internal staff, students, and external lecturers. All of them were familiar with the institution's learning management system (Sakai) and the web conferencing system (BBB). This also meant that I did not have to ask participants to create accounts or sign up to tools, as their existing accounts were used to enrol them in the project site, which provided seamless access to the web-conferencing system.

The only tool not all participants were familiar with was Miro. There was, however, no need to introduce the tools as it is intuitive to use and enough participants were familiar with the tools to help others during working groups if any questions arose. There was also no need to create accounts for each participant since Miro can be used by anyone with the link to the board with the settings I decided to use.

The technology was stable and performed well overall, and I felt secure with regards to privacy and data safety as all systems bar Miro were backed up and supported by the university.

In summary, my selection of tools was based on the criteria listed in Table 2 below.

Table 2. Selection criteria for Change Laboratory tools

Tools	Criteria to be considered
All tools	• Are the tools intuitive and easy to use? Are all participants able to use the tools selected easily without the need for training? • Are you able to use the tools efficiently and effectively as a facilitator? • Can you manage participants' access to the tools without too much effort? • Can participants access the tools without having to create (an undue number of) additional accounts? If they do need to sign up or create new accounts, are the terms of use acceptable? • Do the tools provide sufficient access restrictions to support data protection and privacy requirements? • Are the data secure with regards to data loss? Are there back-up options you can put in place?
Web-conferencing Tool	• Can you effectively communication with participants and can they communicate with you and each other, both in the plenary and in break-out sessions? • Does the system allow for reliable recording of both plenary and break-out sessions? • Can the recording be exported in a format compatible with the transcription tool used? • Can elements other than video be exported (e.g. chat)? • Can video be edited / cut to allow for the selection of video clips as mirror data?
Advanced online collaboration tool / whiteboard	• Are you able to create and make available to participants various cognitive tools and data in a range of formats and media? • Are participants able to use cognitive tools and work with them / manipulate them as needed? • Are you able to record all relevant work results for later analysis and data preparation? • Does the tools have advanced features such as timer, polling, chat, etc. that help with group management or collaboration? • Can you back-up or archive the information?
Online project workspace	• Are you able to provide information and instructions to participants in a structured and easily accessible way? • Are participants able to upload or contribute their own files / content, e.g. homework? • Can you easily link to other tools from this space?
Transcription software	• Is the transcription tool easy to use? • Can the transcription tool deal with multiple speakers in a recording? • Does the transcription tool support the file formats produced by the other tools used? • Is the transcription accurate and does it include all the necessary elements (e.g. time codes, structure, labelling, etc.) needed to produce a sound transcript?

6. Conclusion

To conclude, I would like to stress the importance of careful selection of the tools to be used in an online Change Laboratory during the preparation phase of the project, and of thorough testing of their functionalities in the selection process. I hope that my experiences and the criteria described in this report will assist others with assessing possible tools from different perspectives and help them identify the key functions the tools need to support, including effective information provision, communication, collaboration and creative work during the workshops as well as reliable and efficient recording of data. Providing suitable tools will ensure that the valuable time of participants is used to carry out the tasks and work with the stimuli

provided by the researcher-facilitator rather than battle with technical or usability issues, as a seamless online experience is crucial for the online Change Laboratory to be successful.

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