

Living Lab Toolkit

This toolkit contains a conceptual framework for an adaptable Modern Energy Cooking Services (MECS) ‘Living Lab’ with guidelines for set up, application, and adaptation to specific contexts.

The Modern Energy Cooking Services (MECS) programme is a £40 million (\$50.5 million) UK Aid supported initiative aimed at promoting modern energy cooking services in the Global South. The programme works through a multi-partner program of activities, led by Loughborough University in the UK, to catalyse the transformation of the clean cooking and electrification sectors that can enable widespread uptake of modern energy cooking services. This could generate inclusive environmental and development benefits for the poor by enabling technological, institutional, and market innovations. The MECS programme is designed to leverage the enormous progress that has been made globally on access to electricity to drive forward the clean cooking sector. Electric cooking (eCooking) has long been considered ‘inappropriate’ for use in development programs. However, the landscape of electricity access has changed, with many more people now connected to both grid and off-grid electricity and the quality of supply becoming increasingly more reliable. What is more, an array of new energy-efficient electric cooking appliances is now available, opening a myriad of new opportunities for access to cost-effective and convenient modern energy cooking services.

This data and material have been funded by UK AID from the UK government; however, the views expressed do not necessarily reflect the UK government’s official policies.

An updated and more usable version of this working paper is planned for publication in the year 2022. Please contact Dr. Marianna Couliantanos for further information.

Contents

What is a Living Lab?	2
Living Labs for MECS	2
A LL in practice	4
Living Lab Framework	8
Creating the Tools for MECS LL	13
Example LL tool creation: interviews for the CREST trial	14
Spectrum of Participation	19
Further reflections on Living Labs	23
Further resources relevant to Living Labs	25
References	26
Appendix: LL manifesto template	27
Appendix: LL framework template	28
Appendix: Stakeholder maps	29

What is a Living Lab?

A Living Lab (LL) is an open innovation environment located in a real-life setting in which human-driven innovation drives the co-creation of new products and services [1,2]. Within LLs, people, such as target users and other stakeholders, help to shape innovations through using products or prototypes in their real-life daily environments. The LL approach prioritises understanding of **use in context** and seeks to maximize the involvement of end users in the process of design.

Key components of a LL include [2]:

- **multiple stakeholders involved,**
- **real-life environment,**
- **co-creation innovation activities.**

Living Labs for MECS

The MECS LL seeks to empower everyday cooks to become co-creators of aspirational modern energy cooking services by testing innovative new products and services at home in their 'kitchen laboratories'. Outcomes from MECS LL support the optimisation of both the design of modern energy cooking services and the experiences of everyday cooks and other key stakeholders in MECS field trials and beyond.

LLs can generate rich data that enables deeper understanding of the lived experiences of real users. As the authors of the iDE Cambodia MECS-TRIID report state: "*vivid stories paired with rigorous analysis are more insightful and compelling than either on their own*" [3]. The MECS LL is designed to dig deeper into the lived experience of field trial participants to uncover the 'why' behind the trends observed in quantitative data collected. It adds rich qualitative data that tells the stories of the research participants and joins the dots with quantitative datasets collected by other field methods. Most importantly, it provides a platform for co-creating innovative solutions with end users by enabling them to reflect upon their experiences and share potential solutions to the challenges they have faced.

LLs can create a strong feedback loop from the field, generating key insights into the experience of modern energy cooking that can be used to understand and test, for example: consumer preferences and aspirations; mechanisms to accelerate adoption and sustained use; appropriate marketing strategies and financing (payment) mechanisms; the iterative development of hardware and the services it delivers around local cooking practices. Ultimately, LLs help uncover tacit knowledge and latent needs that can be used to inform innovate solutions and identify new opportunities.

LLs are an established innovation platform in developed countries. However, few studies exist concerning their adaptation to and implementation in developing countries [4]. This toolkit aims to tailor the LLs approach to the demands of innovation in the Global South to overcome various barriers to more active involvement of everyday cooks in technology-driven research projects. The barriers include language, lack of infrastructure, COVID-19, and power dynamics between international research teams and low-income households. For example, in the case of the latter, although the issue of power dynamics between UK-based teams and the research participants in Global South countries is partially mitigated by working through MECS Partners in each country, UK-based teams must research, develop, pilot, reflect on and refine further bespoke and culturally appropriate approaches to balancing power relations.

Example from the CREST field trial LL: Manifesto and Framework.

Service Design for MECS (SD4MECS) used the CREST field trial of 120 battery-supported electric cooking devices in East Africa as a live ‘test site’ to develop and apply the MECS LL framework. The detailed LL protocols and materials can be found in the document [CREST Living Lab documents and materials](#).

THE MECS LIVING LAB AIMS TO:

- 1. ENSURE A POSITIVE AND MEANINGFUL TRIAL EXPERIENCE, IN WHICH PARTICIPANTS FEEL HEARD, ABLE TO LEARN, AND EMPOWERED TO INFLUENCE THE TRIAL AND TRIAL OUTCOMES.**
- 2. MAKE VISIBLE THE COMMUNITY'S SHARED STRENGTHS, BARRIERS, AND PROCESSES FOR CHANGE RELATED TO E-COOKING.**
- 3. ENGAGE USERS AS CO-CREATORS OF AFFORDABLE, RELIABLE AND MODERN ENERGY COOKING SERVICES.**



Figure 1: Manifesto and framework for the CREST field trial LL, led by SD4MECS

A LL in practice

In this section, we illustrate some of the activities that happened as part of the CREST LL, to give readers a sense of what organizing and implementing a LL might look like in practice (Figure 2; Figure 3; Figure 4; Figure 5). Some of the activities we carried out to support research partners implementing the LL included: Participating in WhatsApp conversations and emails with Country Partners (CPs); instilling excitement in local research teams about discussing their cooking habits; created 'buy in' for these research tools to be used by collectively practicing interviews, workshops, and mobile research on WhatsApp; building connections between the CPs; Developed a close working relationship with SCODE (a CP in Kenya) via regular Microsoft Teams meetings .



Figure 2: Remote co-working sessions with SCODE team to test and co-create the tools for the LL. Top left: Anastacia (SCODE) sharing her cooking journey map (we organized an 'introduction to journey mapping' workshop with the SCODE team to familiarize them with one of the main methods we would be using in the LL). Top right: Marianna (Loughborough) interviewing Mercy (SCODE) about her cooking experience (testing interview 1 protocol). Bottom left: Jon (Gamos) being interviewed by Mercy (testing interview 1 protocol). Bottom right: Francis (SCODE) and Mercy sharing their cooking journey maps.

<p>I am the main cook for my family of 5, but my husband sometimes cooks too and helps with chores. I cook breakfast (tea) and supper, sometimes I also cook lunch. I have an improved biomass cookstove, an LPG stove, and a basic biomass cookstove. I use firewood, charcoal, and LPG. I think cooking is important for healthy bodies and for the growth of my kids. I enjoy cooking for my family. When cooking, it is important for me to have leftovers that can be eaten the next day, and to cook food that my children like.</p>		
<p>Before (planning, shopping, storing, finding time...)</p> <p>Actions</p> <ul style="list-style-type: none"> I buy mandazis and bread, the rest I cook myself. Sometimes I buy some chips from the streets when in town and I find myself hungry. I always start by looking for mixed vegetables 	<p>During (preparing ingredients, using appliances, waiting, accidents, burning...)</p> <p>Actions</p> <ul style="list-style-type: none"> I cook supper around 7pm when I close my grocery. I wash and prepare vegetables then I light the jiko, and start heating the water. As it heats up, I am cutting the vegetables. When the water boils, I add maize flour and I stir it till it's firm. I then give it time to cook. As it cooks, I now prepare the onions, tomatoes and other spices. When the Ugali is ready, I start cooking the vegies with the same jiko. I usually use one jiko so after I am done with Ugali, I add charcoal and then cook the vegetables.. 	<p>After (washing, storing, serving, eating, leftovers...)</p> <p>Actions</p> <ul style="list-style-type: none"> when ready, I heat water on the jiko for cleaning the utensils. After am done with the utensils I am now done, I relax at around midnight. We have leftovers that we eat at breakfast and lunch the next day.
<p>Likes / positive emotions</p> <ul style="list-style-type: none"> I use three stone jiko because it's locally available, with my 50Kshs I can access firewood. 	<p>Likes / positive emotions</p> <ul style="list-style-type: none"> I love chopping vegetables I like cooking rice because it is so easy Cooking with wood cooks the food soo quickly and it's fast. Compared with charcoal it saves time. 	<p>Likes / positive emotions</p>
<p>Dislikes / problems</p> <ul style="list-style-type: none"> When it comes to LPG gas, it is costly. So accessing it is not easy and I can't cook all the meals with LPG. 	<p>Dislikes / problems</p> <ul style="list-style-type: none"> I don't like lighting the jiko. I don't like stirring Ugali, it makes my arm ache. Cooking with wood creates smoke, inhaling the smoke gets me sick, I am Asthmatic that disturbs me. Charcoal the same. The carbon affects me a lot .putting the jiko inside the house brings alot of carbon that also affects my kids when they are asleep. I have also tried baking cake but it has not made me happy. 	<p>Dislikes / problems</p> <ul style="list-style-type: none"> The whole process makes me feel tired I don't have a fridge so I usually place the leftovers somewhere safe because of rats. Sometimes the food spoils and we give it to the dogs. If the food is not cooked enough and I have visitors, I become very frustrated.

Figure 3: Example Journey Map created from the first interviews with study participants in the CREST field trial.



Figure 4: Researcher Dr. Jon Leary carrying out a workshop activity with the SCODE team in Nakuru, Kenya, in Summer 2021. Researcher Dr. Marianna Couletianos is on the computer screen observing. The workshop activities were modified and adapted on the spot to make them more relevant to the study context and participants, and to leverage the SCODE teams' skills.



Figure 5: Pictures of the LL in practice. Please note that pictures of participants are anonymized while awaiting usage authorization. Left (top to bottom): Workshop 2 mock-up 'shop' for e-cooking appliances and accessories (Kenya); installation of PowerHubs in participant's home (Tanzania); Workshop 2 likes and dislikes exercise (Kenya); Workshop 2 individual brainstorm (Kenya). Right (top to bottom): Workshop 1 set up (Tanzania); participant cooking with the EPC and PowerHub (Tanzania); Workshop 1 restitution after collaborative exercise (Tanzania); Example of post-it comments (Kenya).

Living Lab Framework

Developing a LL implies setting out its foundations and the core components. The following framework (Figure 6) for a MECS LL, created based on a review of the literature on LL by Hossain et. al., 2019 [2], accompanies researchers in setting out the foundations for the LL: stakeholder, real-life environments, activities, resources, challenges, approaches (theory of change TOC), environmental sustainability, and outcomes. The LL approach is iterative, the methods and parameters of the LL should evolve as the LL is implemented. This framework should therefore become a working document.

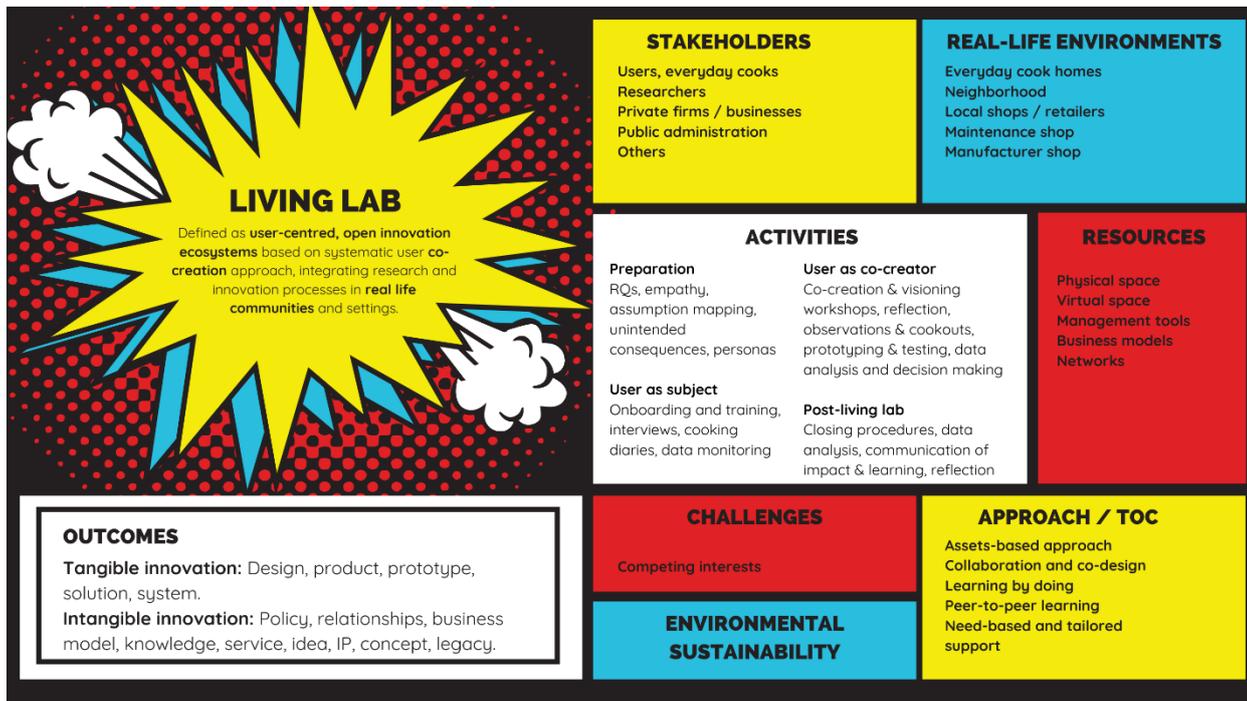


Figure 6: LL framework

To get started with the LL template, we suggest that you first summarize the goals and the values of the project into a manifesto (see Appendix: LL manifesto template). The LL Manifesto will be your guiding star in designing and implementing the LL. The fillable templates are printable from the Appendix: LL manifesto template.

Once you have a manifesto, we suggest you conduct a brain dump exercise for all the template categories (see Appendix: LL framework template). Use the scoping questions provided on the next page. For example, when thinking of LL stakeholders: who are all the stakeholders related to the questions you are trying to answer? Who are the stakeholders who should be involved according to your established values? (Here you could use stakeholder mapping as a tool to explore stakeholders, see the Key Results and Findings: Stakeholder Maps section in the SD4MECS report, also included in Appendix: Stakeholder maps).

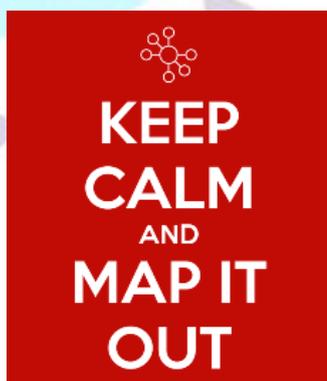
Scoping questions (from [ENOLL LL online course](#) [5])

- What will the LL do for whom & why?
- Which problem are we trying to solve?
- What kind of activities are we going to perform?
- Who do we need?
- Why do we need them?
- What's expected from them?
- When and how often?
- What's in for them?
- How will we measure success?
- Who are the participants? (General public, govt, research, companies, SMEs, society, etc.)
- Who is paying/contributing with what? (Project manager, personnel, budget, in kind)
- How are decisions taken in the diff levels? (Project strategy, project implementation, day-by-day decisions)
- What forms of communication are likely to be most effective? (internal/external)
- What does each participant get? (Money, social impact, prototypes, products or services, IP)

To brain dump: have your team each fill out as many post-it notes as possible with anything that comes to mind for each category, for a 3-5 minutes per category. Next, put them all together on a wall and organize the notes by similarity (a process called affinity mapping). You will now have a great picture of all the potential LL building blocks related to your manifesto.

Once you have brain dumped, you will be ready to start narrowing down the possibilities: what activities will you do with what stakeholders, and in which environments? Multiple options could emerge, notably depending on the level of participation you will be aiming for (see next section '**Error! Reference source not found.**').

At this point, creating a homogeneous trial experience (- as opposed to a hodgepodge of different data collection methods that serve disjointed research interests of researchers) that follows LL principles, while gathering all data and information necessary to answer the research questions, and following the manifesto, might seem like a messy and near-impossible task. We would suggest various mapping activities:



1. You can map the study activities back to the manifesto to make tangible the levers available to the research team to achieve the goals set out in the manifesto (example from the CREST trial in Figure 7).
2. Figure 7).
3. You can use journey mapping and service mapping to create a timeline for the LL and to understand the study experience from various stakeholder perspectives (example from the CREST trial in Figure 8 and Figure 9).
4. You can make sure your methods are complementary by mapping the type of data to be collected from each method to the overall research questions you have (Figure 10; Figure 11).

At this point, you'll have a first draft of a LL manifesto, framework, stakeholder map (optional), and journey map of the study. Next, you'll evaluate your plan against the levels of participation you are striving for, before looking at how to create the tools you'll need to carry out the LL activities (section Creating the Tools for MECS LL).

Example from the CREST field trial LL: Mapping the manifesto to study activities.

The three sentences of the Manifesto were broken down into the individual objectives and the study activities were mapped to the respective objectives they would help achieve. For example, interviews were considered a key moment during which participants could feel heard.

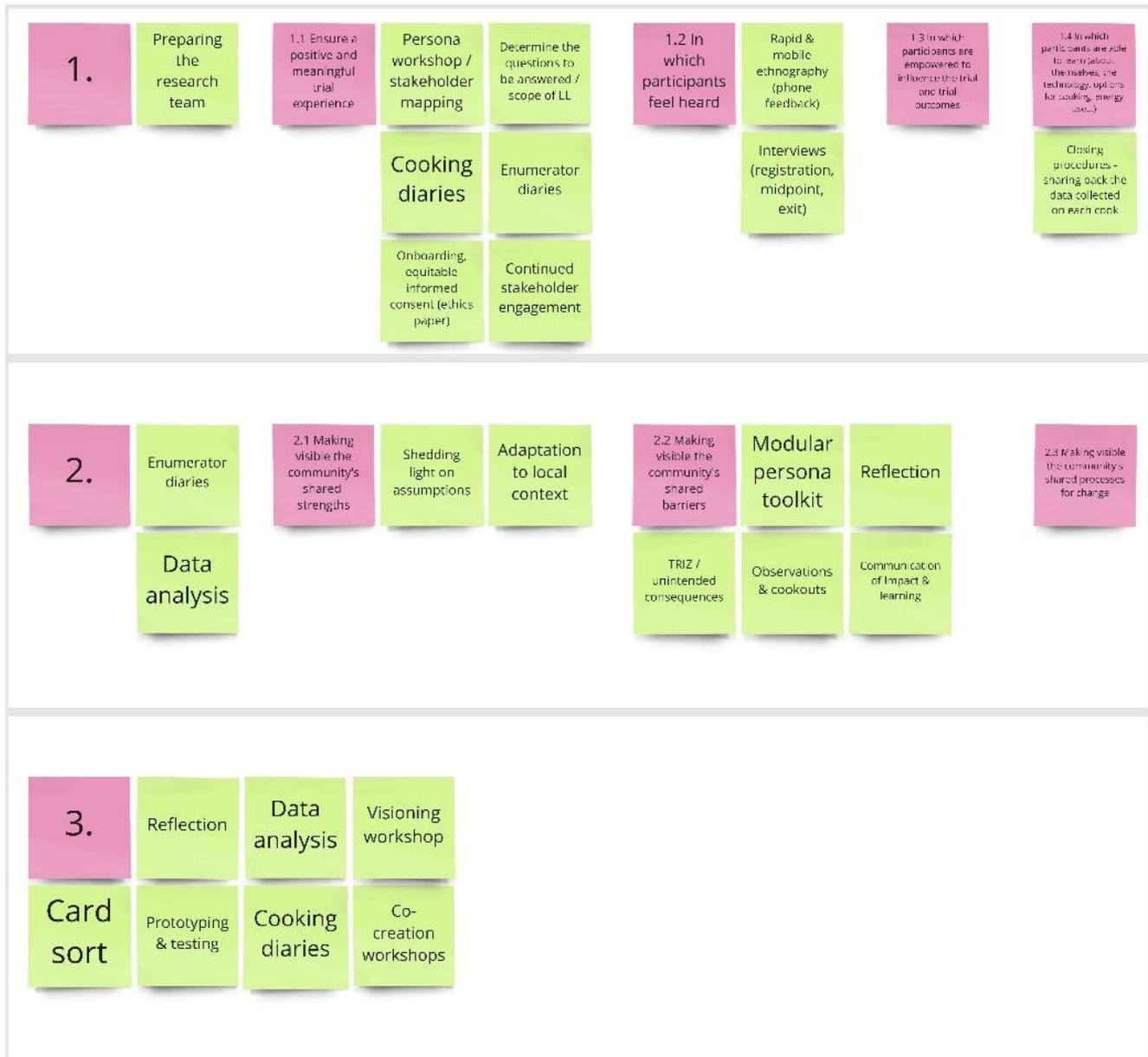


Figure 7: Mapping the study activities to the Manifesto objectives.

Example from the CREST field trial LL: journey map of the study.

Based on a study journey map that represented the trial as a journey experienced by participants, SD4MECS asked: *Are we asking too much of participants? Are we engaging with participants in meaningful ways across the entire duration of the study? Are we forgetting critical points of engagement? How can we make the study a pleasurable experience?* Through the process of creating a journey map for the trial experience, we were able to think through these questions and make meaningful changes to the study activities and their sequence. You too can learn to make journey maps with the SD4MECS Journey Mapping Toolkit!

	AWARE	JOIN	BASELINE PARTICIPATION	E-COOKING	NEW INITIATIVE	LEAVE
PARTICIPANT ACTION	I AM CONTACTED BY AN ENUMERATOR	INFORMED CONSENT; INTAKE SURVEY; TRAINING	DAILY VISIT OF ENUMERATOR; DATA COLLECTION; DAILY ENGAGEMENT	POWER SYSTEM INSTALLED; TRAINING; COOKOUT; DATA COLLECTION; DAILY ENGAGEMENT; WORKSHOPS	WORKSHOP; DATA COLLECTION; DAILY ENGAGEMENT	EXIT SURVEY; COOKING COMPETITION; UN-INSTALLATION; GOODBYE; REPORT OF LEARNINGS
TOUCHPOINTS	ONE-ON-ONE CONVERSATION	COOKING DIARY; SMARTPHONE; INCENTIVES	DIARY; SMARTPHONE	NEW APPLIANCE; EVENT; DIARY; SMARTPHONE; SUPPORT	NEW APPLIANCE; EVENT; DIARY; SMARTPHONE	INCENTIVES
PAIN POINTS	WHY SHOULD I PARTICIPATE?	I DON'T UNDERSTAND THE INFORMED CONSENT OR EXPECTATIONS	DATA MISRECORDED; DEMANDS OF THE STUDY ARE TOO HIGH	I GET COVID; I DON'T LIKE E-COOKING; IT BREAKS; BURN ACCIDENT	I DON'T HAVE TIME; I CAN'T TRAVEL TO THE WORKSHOP LOCATION; I DON'T WANT TO PARTICIPATE ANYMORE	I WANT TO KEEP THE POWERSTATION
EXPERIENCE	INTRIGUED	OVERWHELMED; EXCITED	TIRED	EXCITED; AFRAID; CONFUSED	EMPOWERED; DISCOURAGED	SAD; RELIEVED

Figure 8: Synthesized version of the User Journey map for CREST, used in a presentation.

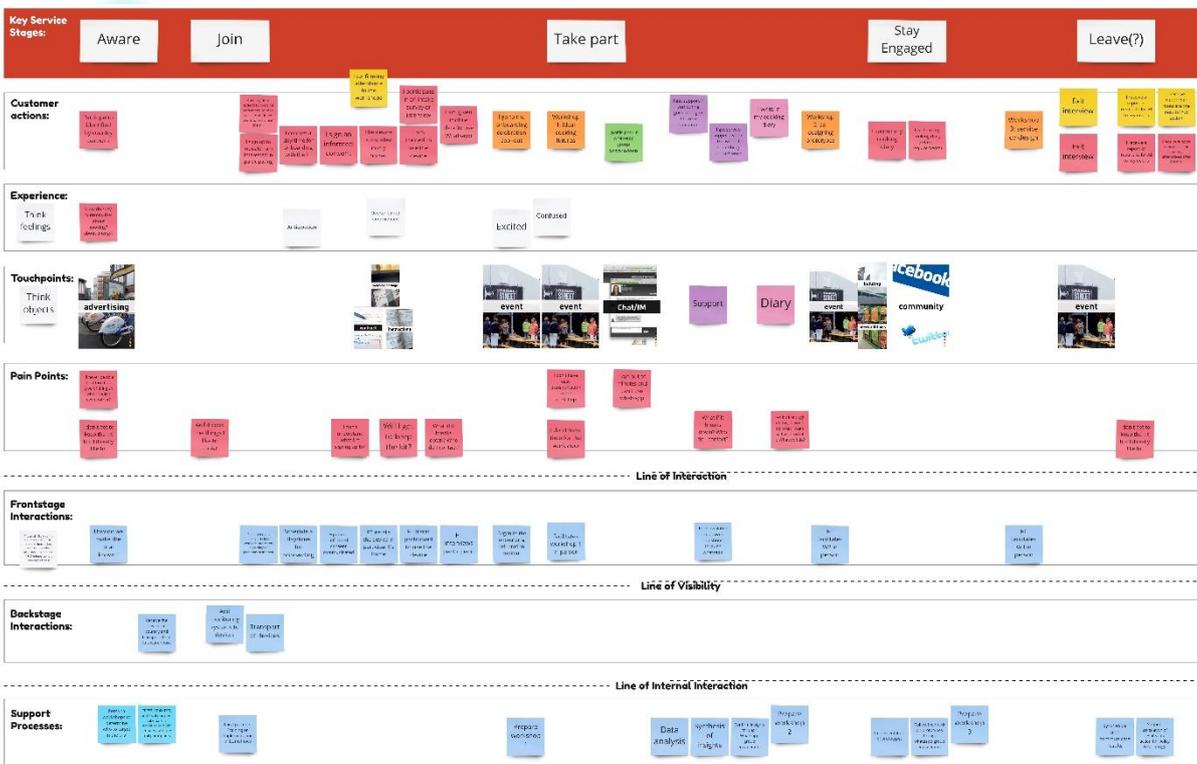


Figure 9: Study participant journey map enhanced with elements from 'service blueprint' tool (in blue) which depicts the back-end actions necessary to provide the trial as a 'service'. In this case, those activities include all actions of the enumerators, CPs, and Loughborough researchers. This added section helped us identify bottlenecks in the work (such as rapid turnover of translations and transcriptions) that we needed to account for in the laying out of study activities.

Example from the CREST field trial LL: mapping LL methods to frameworks for data collections.

The SD4MECS team used two frameworks to unify the data collected through the LL: (1) journey maps and (2) domestication theory.

(1) Journey maps were selected as an analysis tool, with three methods of data collection (interviews, mobile research, and workshop) each complementing each other and iteratively helping to create more complex, in-depth, and accurate representations of the everyday cooks' journeys as the trial unfolds. The template depicted in Figure 10 was selected from the Nielsen Norman Group [6].

	SPECIFIC USER + SCENARIO + GOALS		
Interviews	PHASE 1	PHASE 2	PHASE 3
	1. _____ 2. _____	3. _____ 4. _____ 5. _____ 6. _____	7. _____ 8. _____ 9. _____
Mobile Research			
Workshops	OPPORTUNITIES + INTERNAL OWNERSHIP		

Specifically, the data from qualitative interviews helped create personas (specific user + scenario + goals) and understand the cooking journey maps of everyday cooks. The mobile research helped clarify and focus on the emotions associated with different steps in the cooking journey. The workshops were deep dives into the opportunities based on the pain points identified in the cooking journeys.

Figure 10: LL methods matched to the framework of the NN Group journey map

(2) Domestication theory [7] was used to unify the data collected across time by the LL methods (interviews, mobile research, workshops). In green, we mapped out the core tenants of domestication theory and in yellow we mapped out the LL methods. In orange, we filled in any gaps we found.

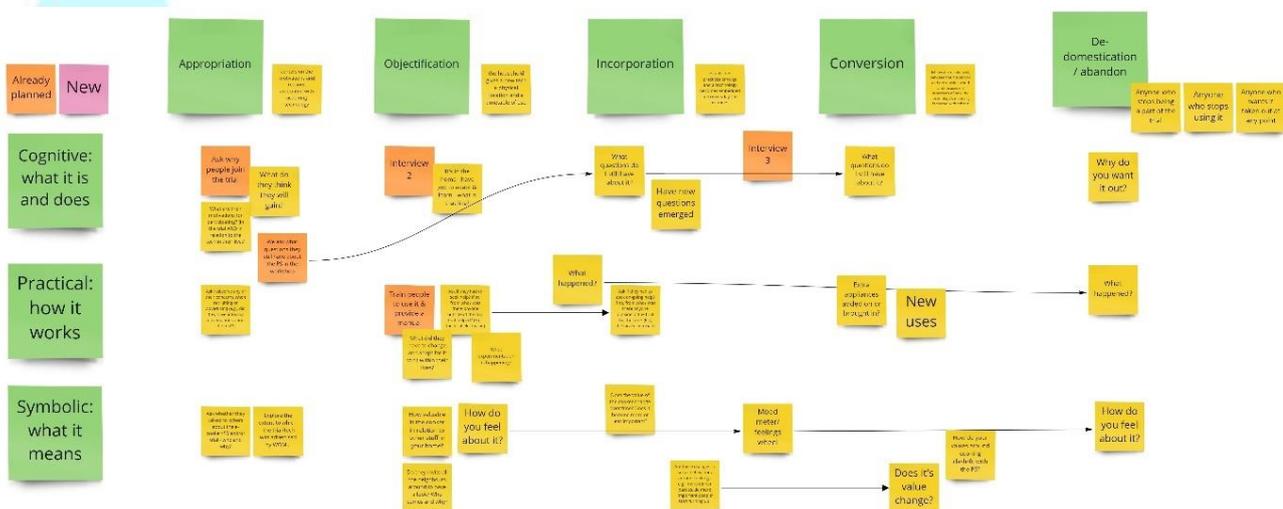


Figure 11: LL methods matched to the framework of domestication theory (the image is a working snapshot and should be read as an example of a useful internal exercise).

Creating the Tools for MECS LL



Creating tools for a MECS Living Lab

Scope

Determine the goals and topics for the tool.

STEP
01

Diverge

Get generative, create a garden of ideas, a place where potential pieces of the tool are generated freely, with no constraints of topic or time. Use this garden to keep all ideas generated, for posterity (it often happens that some might be used later in the study activities). Use whiteboards (Miro).

STEP
02

Try it out

Practice using the protocol and iterate each time (example: try with a friend, a colleague, try with study stakeholders such as CPs and enumerators and with proxies to your audience). Translate and try it out in local language (local translations may be different).

STEP
03

STEP
04

STEP
05

STEP
06

STEP
07

STEP
08

STEP
09

STEP
10

Context

Contextualize the tool within a framework of the study, within the goals of the study and the research questions.

Converge

Keep the best ideas, develop them, and organize them into a protocol.

Train

Train the people who will be carrying out the tool / activities (e.g., enumerators) and have them practice it.

Record

Record, transcribe (& translate). These activities can be intensive and expensive – be clear on translation expectations from the get-go.

Analyze

Do some preliminary data analysis right away that can feed back into the study.

Use it

Trust CPs for how to conduct, make sure the protocol accommodates the logistics of the field. Iterations are encouraged perpetually, unless there is a compelling reason not to change anything, you can always make changes.

Learn

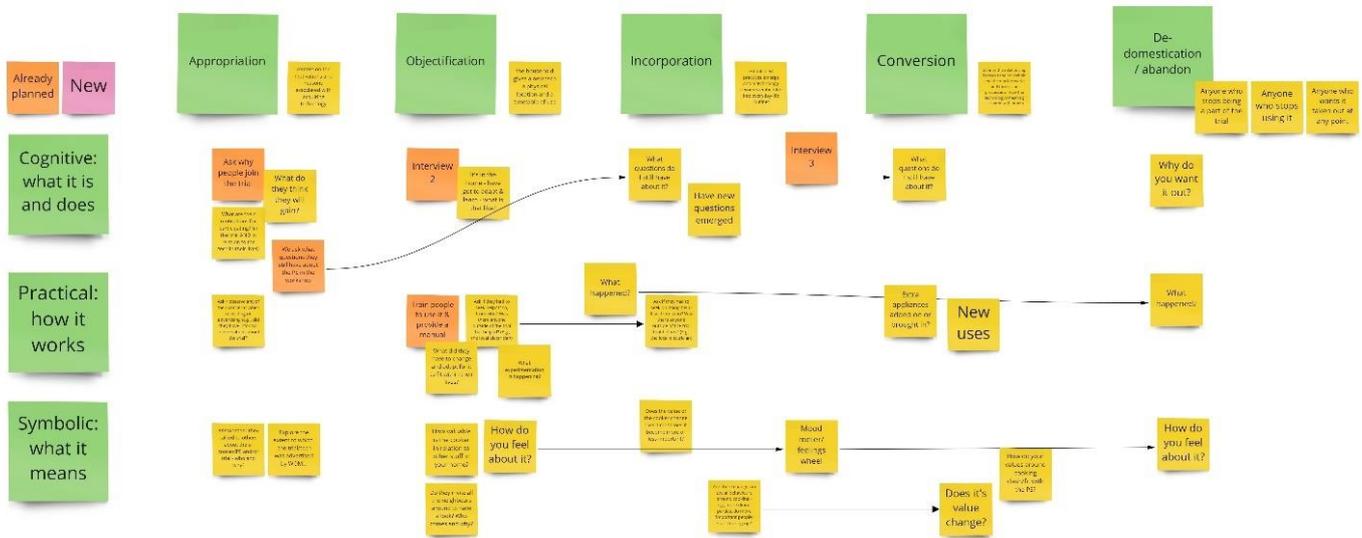
Ask for feedback from enumerators on how the implementation went. Provide a synthesis of feedback and what you notice in the data (to help improve interview skills). Encourage exchange of learnings between everyone (CP-CP, CP-you, enum-you...).

Example LL tool creation: interviews for the CREST trial

The interview guides used in the CREST trial are available in the 'CREST Living Lab documents and materials'.

1. **Scope the tool:** we determined the topics of each interview, considering when they would happen within the timeline of the study, what the participants would be doing.
2. **Contextualize the tool:** we used domestication theory to understand the various steps of adopting a new technology and what questions we should be asking at different stages of domestication. We also kept the manifesto in mind and mapped (see Matching Study Activities to Research Objectives and Guiding Frameworks).

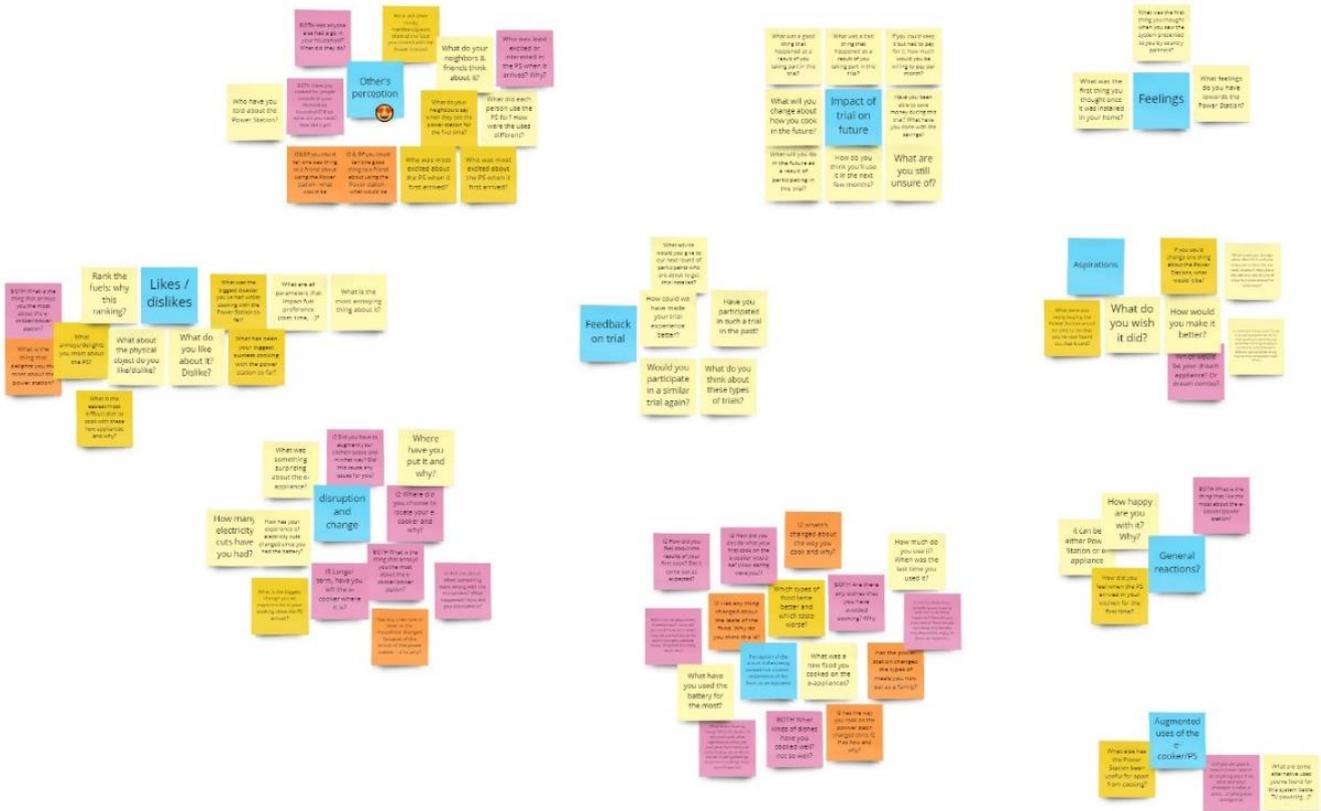
Domestication



3. **Get generative and diverge:** we used the methods of the purge (or silent brainstorming [8]) and brainwriting [9] to generate many questions.



4. **Converge:** to converge, we clustered the many questions we had come up with into themes and voted on the most important questions to include in the protocol.



5. **Try it out:** for each interview protocol, we tested the protocol with a family member who had experience with an EPC (they served as a 'proxy interviewee'), we tried the interview with team members (both Loughborough researchers and CPs), we tried the interview with enumerators, and once the protocol was translated into Swahili, the CPs conducted a couple of interviews with community members who weren't a part of the study. After each test interview, we iterated the protocol. For example, we refined our warmup questions to be more fun and natural ("What is your favourite food?") as the ones we had prior turned out feeling very dry and too intense to start with ("What is important for you with regards to cooking?"). Some questions also felt repetitive so we added some hints of intro sentences to make them feel less so ("Earlier, you mentioned ..., could you say more about that? Specifically, could you tell us more about how you...").

Things to think about as you practice the interview in Kiswahili.

Suggested use: we suggest that you conduct two practice interviews in Kiswahili, with interviewees who have little to no knowledge about the study goals. We suggest that for each interview, there be one person interviewing and one person observing and taking notes. The goal of these practice interviews is to see how participants might react to the questions, to see if they understand the questions, and to see if the flow of the interview makes sense. After each interview, we suggest that the interviewer and note taker together answer the following questions and make some changes to the interview guide. Please document the changes to the protocol.

Practice interview information

Who was the participant? Who was the interviewer? Who was the notetaker? When/where did the interview take place?

Questions

General

- What are some general remarks about the interview?
- What went well?
- What could have gone better?

About the interviewer

- For each question, did the interviewer feel comfortable asking the question?
- Did the interviewer know what the question was trying to elicit?
- Were there additional questions that you would have liked to ask? (Feel free to add more questions) Where there questions that were not useful / repetitive?
- How did you feel about the follow-up questions? (Enough, not enough, too confusing?)
- Anything else you noticed as an interviewer?

About the participant

- Were there any questions that the participant did not understand? Were there questions where the participant said something like “I don't know what you're asking”?
- Were there questions where the participant answered something unexpected? Did the participant not answer a question as expected?
- What questions didn't yield a lot of response (very short answers)?
- Were there questions where the participants visibly changed their body language or their tone? Was there a question that made them feel uncomfortable and they didn't want to share?
- What questions was the participant excited / happy to answer?
- Were there any questions for which the language was too formal? How could we make the questions more informal to match how people speak in casual conversations?
- Anything else you noticed about the participant?

Protocol changes

What changes to the interview questions & flow will you make based on this practice interview?

6. **Train:** see the document “CREST Living Lab documents and materials” for the enumerator training slides we made for interviewing.
7. **Use the tool in the field!** We encouraged CPs to spread out the interviews, these can be exhausting to carry out as enumerators. Max 3 1-hour interview a day.
8. **Record, transcribe (& translate):** these tasks had not been accounted for properly (we did not communicate the burden of transcribing and translating well enough) and this caused unnecessary stress and strain on the enumerators.
9. **Learn:** we asked enumerators for feedback on how the first interview went and based on the data collected and the feedback received, created a short re-training resource to avoid key mistakes in the next round of interviews (see “Tips for interviewing” on next page).
10. **Analyse:** the first interviews were rapidly analysed and journey maps for each participant were created and given back to participants during the first workshop.

WhatsApp message to ask for feedback from enums:

“We're currently working on the interview number 2 and number 3 and we want to make them as best as possible, so we need your help! Since you have all interviewed participants with the questions from interview 1, I was wondering if you could each share 3 questions that worked really well, and 3 questions that didn't work so well. Please also say why you think those questions worked well & why they didn't. This is so that we can create better questions for the next interviews! Feel free to answer in Swahili or English!”

Tips for interviewing, based on the results from interview 1

Thank you to all enumerators who contributed to the creation of this document by providing feedback about how the first interviews with participants went.



1. Try starting with open-ended questions as much as possible, even if the participant answers something unexpected. Closed questions bias the response. Use closed questions as follow-ups.

Example of an open-ended question

Interviewer: How do you decide what to cook?

Example of a closed question

Interviewer: Do you normally plan what to cook? Or it just comes accidentally?



2. If participants are shy and not very talkative, you can try asking them to describe how they cook as if it were a movie. You could also give examples of your own life to help participants understand the type of answers you are looking for.

It can also help to think of a scenario, for example: if you were to move, that are three things you would take with you / want your new kitchen space to have? What are three things that you would not want to take with you / would not want your new kitchen space to have?



3. Questions that have a moral judgement, are emotional, or are about abstract ideas are harder for participants to answer, but those are the questions with the most important information! Asking for factual information is easier so you can use factual questions as a warm up.

Example of a factual question

Interviewer: How often do you cook in a day?



Abstract question (notice the interviewer repeats back previous answers to help the participant)

Interviewer: Okay, thank you for the detailed explanation about your favorite food, your choices and important things you consider when cooking your favorite food. What other important things do you consider when it comes to daily cooking?



4. **Asking “why?” can help us understand the reasons behind answers.** For example, cleanliness of the kitchen could be important because of health reasons or because having a clean kitchen is a sign of status, or having specific cooking utensils could be important because of efficiency and speed of cooking, because of cost of cooking, or because they make the food taste a certain way according to the participant.

Interviewer: Why are you prepare in the afternoon and then eat for the evening?

Interviewer: Why don't you prefer LPG?



5. **It is possible to both like and dislike something at the same time:** I like having a clean kitchen but I don't like washing dishes; I like fulfilling my duty but parts of my duty are a bit boring. Making it okay for the participant to feel both ways about something can help them discuss the nuances of what they like and dislike in cooking.



6. **There are no right or wrong answers.** Never make the participant feel like what they said was wrong, or make them feel like they didn't understand correctly. It is your job to be clearer and ask follow up questions to find information.



7. **Give participants time to think:** if a participant has never thought about a question before, it might take them some time to come up with the answer. That's fine! It's very good to give participants space to think, and time to sit silently when they are thinking.



8. **Bringing up past responses makes the interviewee feel heard.**

Interviewer: Well, I remember you said at the beginning of the study that there are two cooks in your house, that is you and your sister. Who now decides what to cook?

9. **If a question feels repetitive, you can skip it!**



Add any additional tips you may have here:

Spectrum of Participation

Figure 12 depicts different levels of collaboration that might be employed in a MECS research study (adapted from [10]). We propose critically reflecting on which level of participation is being aimed for and with which ‘stakeholders’ as a first step towards building more participatory research projects.



SD4MECS Spectrum of Participation (from IAP2 Spectrum of Public Participation)

The Spectrum assists with the selection of level of participation that defines the non-Western actors' roles in MECS research, including Country Partners, Enumerators, and Participants. The influence that each group has on the process of knowledge creation and outcomes of the process are described along the Spectrum.

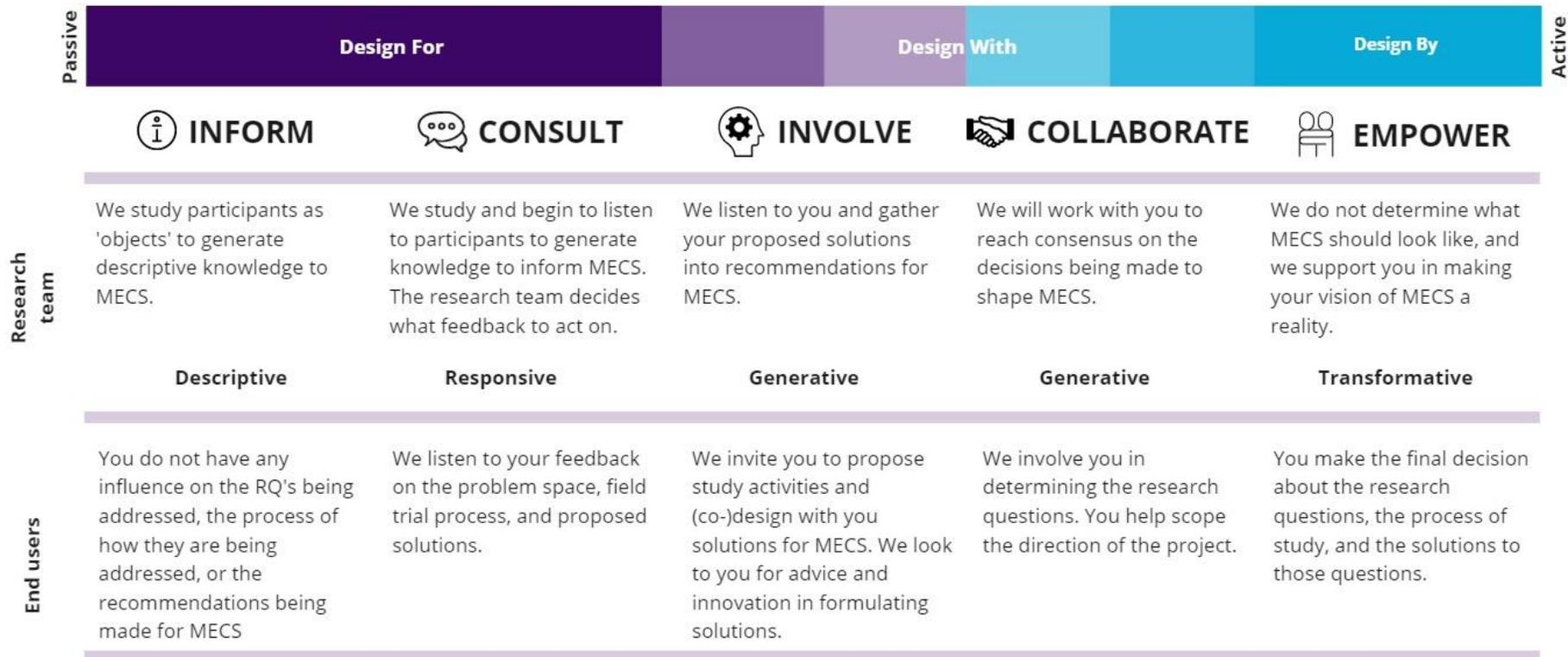
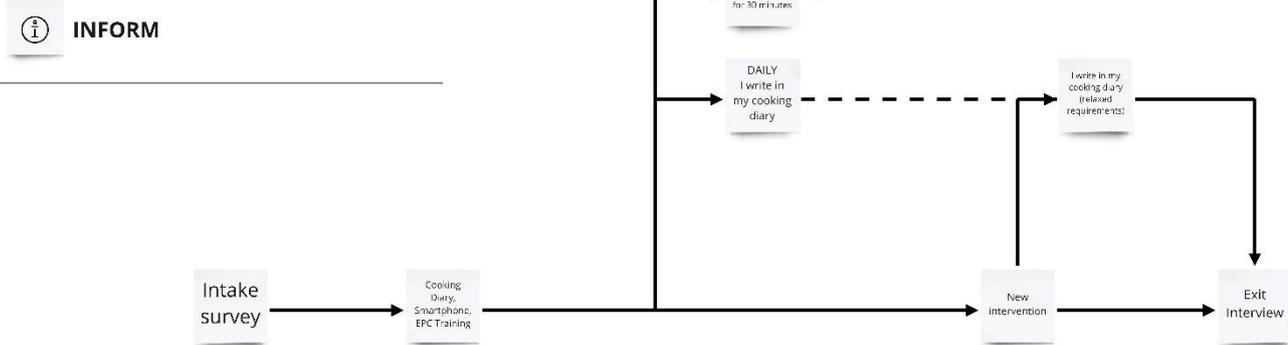


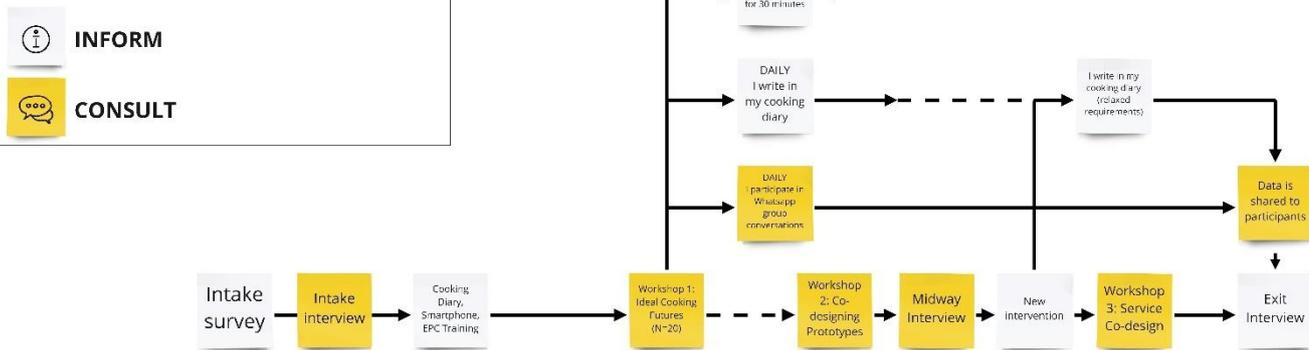
Figure 12: SD4MECS Spectrum of Participation

Figure 13 depicts how the CREST field trial would have looked like without the LL (inform, in white) and some proposed incremental steps to increase the level of active participation of various stakeholders in the research, aiming for a full transformation into a truly participatory LL (in red, empower). While new ‘activities’ are depicted in different coloured post-its, simply adding new and more participatory activities would not suffice, all activities would have to have their underlying approach changed to move from a ‘consult’ approach, towards an ‘empower’ approach.

The Technology-Driven Field Trial



The Technology-Driven Field Trial augmented to include HCD



The Field Trial augmented to include HCD and participatory design methods

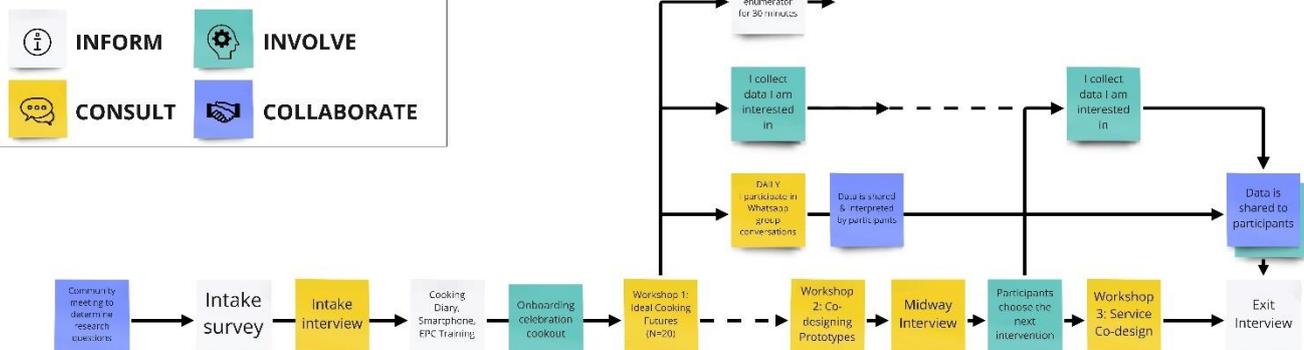


Figure 13 (part 1): Spectrum of participation applied to the CREST LL

The Field Trial as a Living Lab

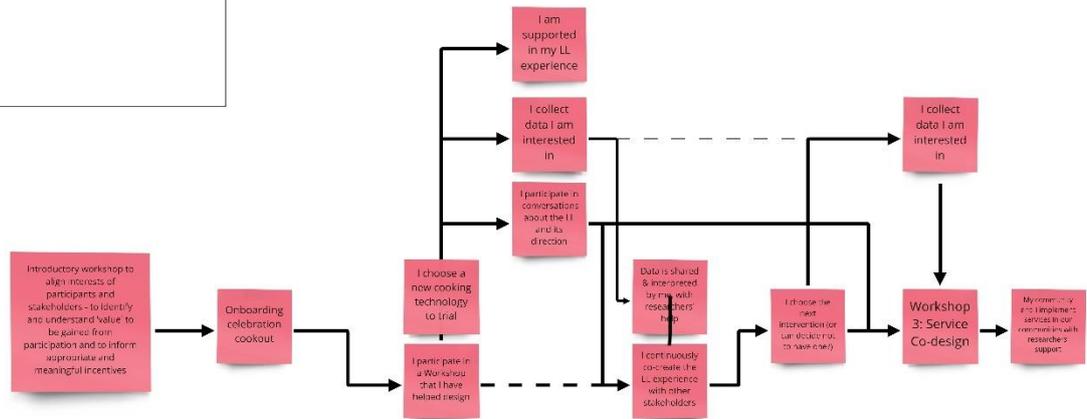


Figure 13 part 2 (continued): Spectrum of participation applied to the CREST LL

The SD4MECS team estimates that we were able to modify the CREST field trial to reach the ‘consult’ stage (yellow), as depicted in Figure 13, achieved, with some touchpoints and activities that tended towards the levels of involve, consult, and empower. Several examples are illustrated below.

Participants choose the next intervention	In Workshop 2 carried out by SCODE in Kenya, participants were given the opportunity to choose which additional e-cooking device they wanted to buy. This workshop activity was co-designed with the SCHODE team. Should participants’ choices actually be implemented by the SCODE team, this workshop activity would align with aspects of the levels ‘involve’ and ‘collaborate’.
Onboarding celebration cookout	Demonstrations of the technology were organized with potential participants to showcase the technology that would be part of the trial. A participatory cooking day was organized at the start of the field trial, with a tutorial of how to cook their favourite foods with the PowerStations.
I collect data I am interested in	The method of mobile research allowed participants to share content in the way they wanted to (video, text, photo...) about what was interesting to them at a time that was convenient to them. Mobile research also put participants in contact with each other which provided exchange and learning opportunities outside of the interventions of the study enumerators.
Data is shared & interpreted by participants	The methods of mobile research WhatsApp groups and the workshops were set up for participants to create their own data and have the opportunity to own it and interpret it, as people shared experiences collectively and synthesized data. One additional step could have been to ask participants to summarize the mobile research conversations on a regular basis rather than having enumerators summarize interactions weekly.
Community meeting to determine research questions	While research questions were largely driven by UK-based researchers, the SD4MECS team did intentionally create space for CPs to ask additional research questions as the LL methods were being created.

The main reasons we consider the ‘involve’ level was not achieved included the fact that little data was shared with participants as the trial unfolded (due in part to the limited capacity of the SD4MECS team and the broader CREST trial team to conduct data analysis concurrently with the trial implementation and their inability to travel to the field sites); the top-down development and implementation of the qualitative methods of interviewing and workshops; the inflexibility of the trial vis-à-vis the initial set up due to contracting constraints; technology, methods, budget allocation; participant incentives; and others; which hindered more flexible innovative approaches and activities. For example, the Terms of References issues by Loughborough University at the start of the trial imposed a very rigid structure for CPs, which by their very nature restricted the shape of the trial. An alternative approach which instead uses collaboration agreements with CPs with a fixed budget but open schedule of activities, we could have reached the empower level. Ultimately, a participatory approach necessitates a lot of person-power and involvement which was a major challenge due to the budget cuts, COVID-19 travel restrictions, and many delays to the timeline that saw SD4MECS run out of their allocated time on the project long before most of the participants had even begun the field trial.

A significant conclusion for the SD4MECS team that emerged from this reflection, is that to reach the ‘empower’ level, the trial would have had to have been designed as a LL from the outset, rather than augmenting an existing field trial to become a LL. Furthermore, while moving towards ‘empower’ is a laudable goal, it is not always appropriate. True empowerment is often much more time consuming and resource intensive and many CPs and participants may not want this level of responsibility.

A second significant finding was that while moving along the spectrum of participation for everyday cooks was sometimes impossible, changing our engagement practices with CPs was equally important, impactful, and was sometimes very attainable. Several examples: while we had hoped that a member of the SD4MECS team could have been in the field, the absence of UK researchers from the field resulted in a lot of decision-making being led by CP; after several months of working with SCODE, SCODE became a natural co-designer of the workshops; the mobile research being conducted in Kiswahili, CPs had total leadership of this activity, following some guiding documentation created by the SD4MECS team at the start of the field trial. So whilst we may not have reached the ‘empower’ stage for participants, we were able to achieve it in some aspects with respect to the CPs, who were also key stakeholders in the LL.

A last key learning is that with little experience in conducting participatory research, the transition to more participatory methods, including the implementation of a full LL, cannot happen from one day to the next. We would like to caution readers that even after applying this toolkit, your field trial might still be quite far from realising the complete vision of a LL. Rather than trying to jump several steps at once, we would encourage you to consider where your next MECS field trial or research project sits on the spectrum of participation, where more participation could benefit the goals of the research and stakeholder engagement more broadly, and how you might change your research design to be more equitable and participatory. Without discouraging ambitious goals of setting up a LL, where appropriate, the SD4MECS team adopts a humble stance of embracing continuous learning, iterating, and improving, while proceeding with extreme care for the wellbeing of participants and CPs.

Further reflections on Living Labs

The LL team is participating in a individual reflection activity, following the reflection guide which can be found in “CREST Living Lab Documents and Materials.” p.217 The following questions are explored in the guide: *Who is part of the Living Lab? What do they contribute? Why do they participate? How are decisions made? How do we communicate? How do you feel? What are three highlights and three hurdles of the living lab planning and implementation?*

From the SD4MECS experience with the CREST trial, several methodological insights have been gathered and are summarized below.

- People are never ready for the intense resources needed for transcription and translation necessary for qualitative methods, especially if expected to take place synchronously with the study. Make sure ample time and resources are set aside for transcribing and translating. The heavy burden of translation can be avoided in part if HCD is designed and implemented by local organisations.
- Keeping up with the data as it floods in is hard, feeding it back into the study is even harder. Prepare in advance what analysis is needed to run on quantitative data and prepare examples for synthesis of qualitative data so that analysis can run faster as the data is collected.
- Early on, working out ways to prioritise different parts of the analysis so that those that are most likely to yield outcomes that will change how future parts of the trial are implemented are done first can drastically change how impactful the trial ends up being. If data is not analysed and shared rapidly, by the time it is shared (on academic timelines, several years after the study is over), the results will be much less useful. Figuring out ways to distil out the most influential findings early on is paramount to successful trials.
- Scheduling regular meetings with CPs, even if you don't have a clear agenda, it is still beneficial: unknown unknowns will surface (examples of unknown unknowns that occurred within the one same week: solar panels were installed in urban households; timeline, sequence, duration of activities misunderstood/miscommunicated; technology malfunction; unexpected participant behaviour reported back).
- Creating cross-country-partner communication is a goldmine: they will ask each other questions that they would not ask you (probably because you wouldn't know the answer).
- Daily updates and feedback were very difficult (impossible) to maintain once the study was running, and feedback on the implementation of a qualitative research method, which typically benefits from iteration as it is being implemented, was not possible for us to achieve without being physically present in country.
- CPs deploying activities at the same time meant we lost the opportunity to learn from one deployment to the next. But the delay in getting DC EPCs in country presented a new opportunity for iteration – use delays and unforeseen changes as opportunities to improve the trial.
- Auto-ethnography: Have you tested the method/tool/survey on yourself and a couple laypeople? Has the test occurred away from your desk/computer? If not, your method/tool/survey is not ready. We depict an example of auto-ethnography tests that were run early on and helped the SD4MECS team familiarize themselves with the context of the CREST field trial (technology and data collection tools that would be used).

As the trial is not yet finished, our teammembers find themselves in various stages of the 'life of a project' (Figure 14), a useful reflection tool to handle the emotion ups and downs throughout a project.

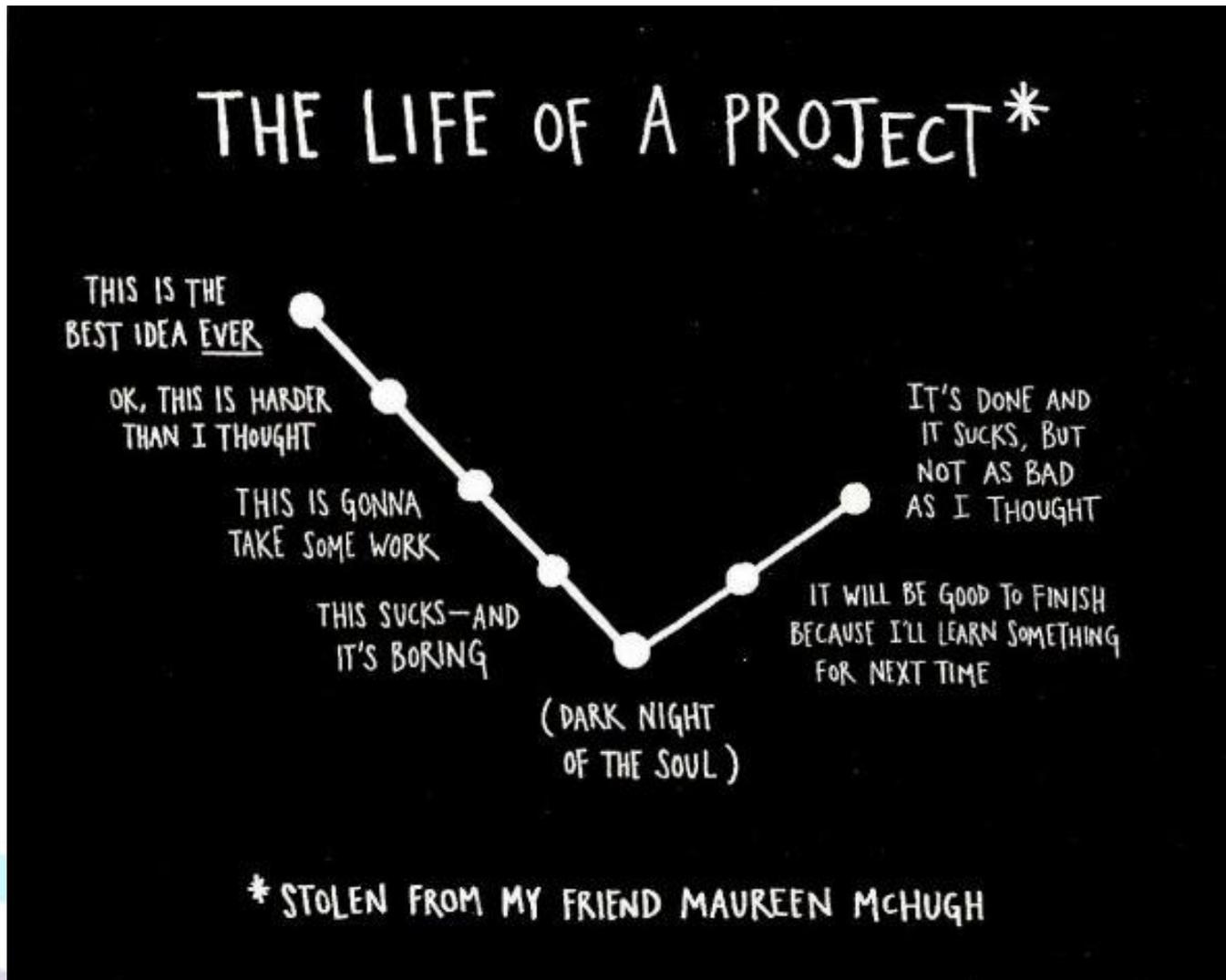


Figure 14: The Life of a Project, from [11]

Further resources relevant to Living Labs

Energy Research & Social Science
Volume 70, December 2020, 101754

Opening the black pot: A service design-driven approach to understanding the use of cleaner cookstoves in peri-urban Kenya

Fiona Lambe ^{a, R}, Ylva Ran ^a, Elvine Kwamboka ^a, Stefan Holmlid ^b, Karin Lycke ^c, Susanne Ringström ^d, Jenny Annebäck ^e, Emily Ghosh ^f, Margaret O'Conner ^g, Rob Ballis ^h

Show more

+ Add to Mendeley + Share 99 Cite

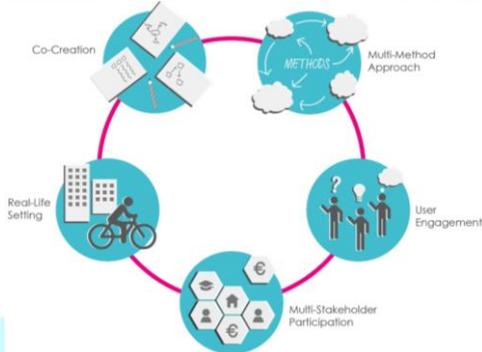
<https://doi.org/10.1016/j.erss.2020.101754> [Get rights and content](#)

Under a Creative Commons license [Open access](#)

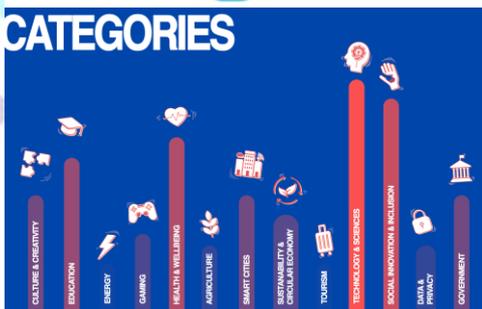
Check out [this academic article](#) about using Service Design tools to understand how different stakeholder archetypes might transition to cleaner cookstoves. This paper is a good example of the type of data and learnings that might emerge from using SD methods, and how they might complement other data collection methods one might be more familiar with [12].



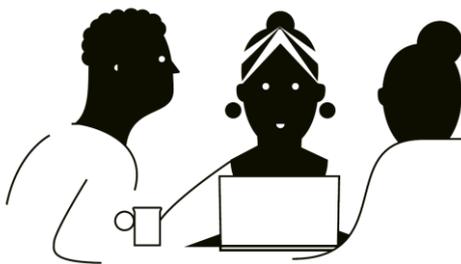
[Knowle West Media Centre \(KWMC\)](#), an official member of the [European Network of Living Labs](#), “supports people to make positive changes in their lives and communities, using technology and the arts to come up with creative solutions to problems and explore new ways of doing things.” KWMC runs a Living Lab in Bristol based off of which they have created [20 tips and Trick for LLs Working With Citizens](#) [13], a set of useful principles that can complement this toolkit.



The [U4IoT LL Methodology Handbook](#) introduces LL research and “serve as a practical guidance for researchers and practitioners on Living Lab methodologies, co-creation and user engagement.” It contains many lessons learned through the implementation of LLs that speak to the reality of setting up a LL. The topical area of the report is Internet of Things and makes the link between the LL approach and innovation in that field [14].



[ENOLL SISCODE 2019 LL Projects report. Scaling for Impact: Policy. Growth. Change.](#) [15] This resource presents a diversity of LL that are part of the European Network of LLs, thereby helping the reader understand the diversity of projects and approaches that can use a LL methodology.



The [HCD Africa toolkit](#), written by two white men with experience working in the Global South, has useful tips for how to adapt and implement traditional HCD methods in a cross-country context. [16]

References

- [1] Bergvall-Kareborn, B., and Stahlbrost, A., 2009, "Living Lab: An Open and Citizen-Centric Approach for Innovation," *International Journal of Innovation and Regional Development*, **1**(4), pp. 356–370.
- [2] Hossain, M., Leminen, S., and Westerlund, M., 2019, "A Systematic Review of Living Lab Literature," *Journal of Cleaner Production*, **213**, pp. 976–988.
- [3] iDE Cambodia, 2020, *MECS–TRIID: Exploring Futures of Alternative Cooking in Cambodia*.
- [4] Hooli, L., Jauhiainen, J. S., and Lähde, K., 2016, "Living Labs and Knowledge Creation in Developing Countries: Living Labs as a Tool for Socio-Economic Resilience in Tanzania," *African Journal of Science, Technology, Innovation and Development*, **8**(1), pp. 61–70.
- [5] 2021, "E-Courses," European Network of Living Labs [Online]. Available: <https://enoll.org/e-courses/>. [Accessed: 30-Mar-2022].
- [6] Experience, W. L. in R.-B. U., "Journey Mapping 101," Nielsen Norman Group [Online]. Available: <https://www.nngroup.com/articles/journey-mapping-101/>. [Accessed: 24-Feb-2022].
- [7] Juntunen, J. K., 2014, "Domestication Pathways of Small-Scale Renewable Energy Technologies," *Sustainability: Science, Practice and Policy*, **10**(2), pp. 28–42.
- [8] "Brainstorming" [Online]. Available: <https://www.designmethodsfinder.com/methods/brainstorming>. [Accessed: 30-Mar-2022].
- [9] "Method 635" [Online]. Available: <https://www.designmethodsfinder.com/methods/method-635>. [Accessed: 30-Mar-2022].
- [10] 2019, "Spectrum of Public Participation," Organizing Engagement [Online]. Available: <https://organizingengagement.org/models/spectrum-of-public-participation/>. [Accessed: 22-Oct-2021].
- [11] Kleon, A., 2012, *Steal Like an Artist: 10 Things Nobody Told You About Being Creative*, Workman Publishing, New York.
- [12] Lambe, F., Ran, Y., Kwamboka, E., Holmlid, S., Lycke, K., Ringström, S., Annebäck, J., Ghosh, E., O'Conner, M., and Bailis, R., 2020, "Opening the Black Pot: A Service Design-Driven Approach to Understanding the Use of Cleaner Cookstoves in Peri-Urban Kenya," *Energy Research & Social Science*, **70**, p. 101754.
- [13] "Tips & Tricks," KWMC.
- [14] "U4IoT LivingLabMethodology Handbook | PDF | Innovation | Experiment," Scribd [Online]. Available: <https://www.scribd.com/document/366265932/U4IoT-LivingLabMethodology-Handbook>. [Accessed: 22-Mar-2022].
- [15] ENOLL, *SISCODE 2019 Living Lab Projects*.
- [16] "HCD Africa Toolkit | Future By Design."
- [17] Hanington, B., Martin, B., Hanington, B., and Martin, B., 2019, *Universal Methods of Design : 125 Ways to Research Complex Problems, Develop Innovative Ideas, and Design Effective Solutions*, Rockport Publisher, Quarto Publishing Group USA, Beverly, Massachusetts.

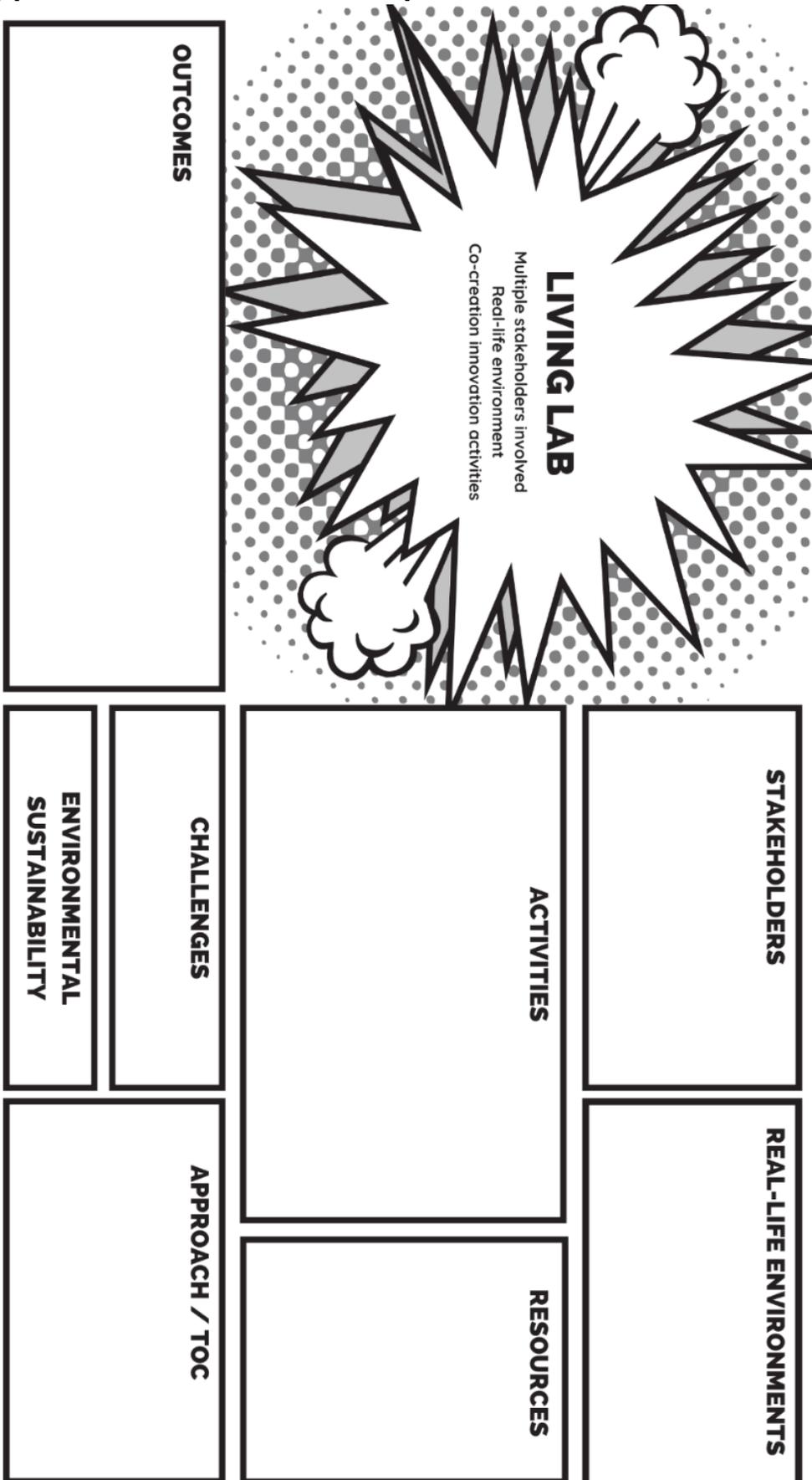
Appendix: LL manifesto template

Vertical dashed lines for writing.

THE LIVING LAB AIMS TO:

Large grey area with a grid of dots for writing.

Appendix: LL framework template



Appendix: Stakeholder maps

What? “Stakeholder maps help to visually consolidate and communicate the key constituents of a design project, setting the stage for user-centred research and design development.” [17], p208. SD4MECS used stakeholder maps to explore who were the actors of the CREST LL (Figure 15) and created a speculative map for the everyday cook (Figure 16). A 1-page description of the Stakeholder Mapping method is presented in **Error! Reference source not found.**

- Core Team**
Full time on the project/team (e.g., PMs, engineers, designers)
- Involved**
Regularly providing input or helping to move work forward, but this project is not their sole focus
- Informed**
Wants to stay up to date and will provide feedback/input when necessary

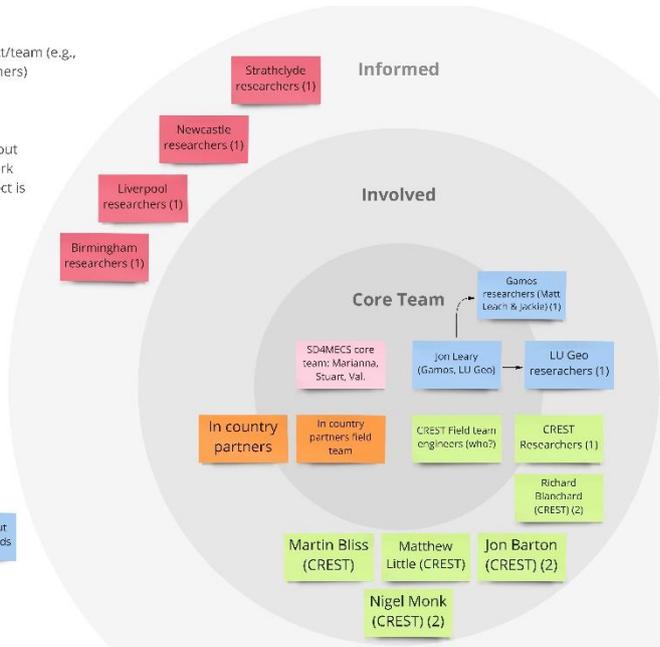


Figure 15: CREST field trial stakeholders

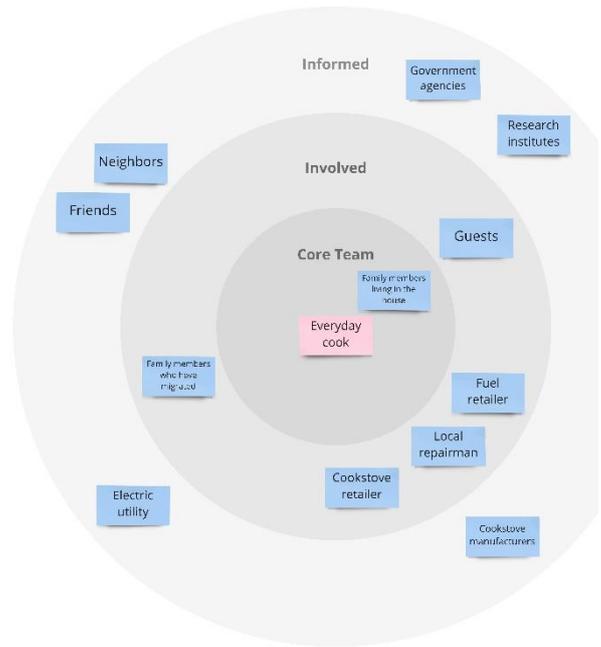


Figure 16: Everyday cook stakeholder map

So what? The above-mentioned stakeholder maps helped SD4MECS consider a wide variety of stakeholders when developing tools. For example, when developing the qualitative interview protocols, the team looked at the everyday cook stakeholder map to make sure questions were being asked about the people who ‘surround’ the cook on the map and their experience with the technology being tested as it related to the everyday cook (the study participant).

Now what? Creating actual maps of the stakeholders surrounding the CREST LL stakeholders and the everyday cook, based on the data collected in the field trial, will reveal which stakeholders were overlooked and which were included by mistake. This process could help researcher identify blind spots and self-reflect on biases that will have affected the study and could provide avenues for future research. Knowledge and templates for creating Stakeholder Maps are accessible through the School of Design and Creative Arts (Figure 17).



Figure 17: Aperçu of a Miro template for Stakeholder Mapping