

Ankara, Turkey

Generative Design Research for Sustainability: Exemplary Cases for the Adaptation of the EC Guide Tool and the ERM Method

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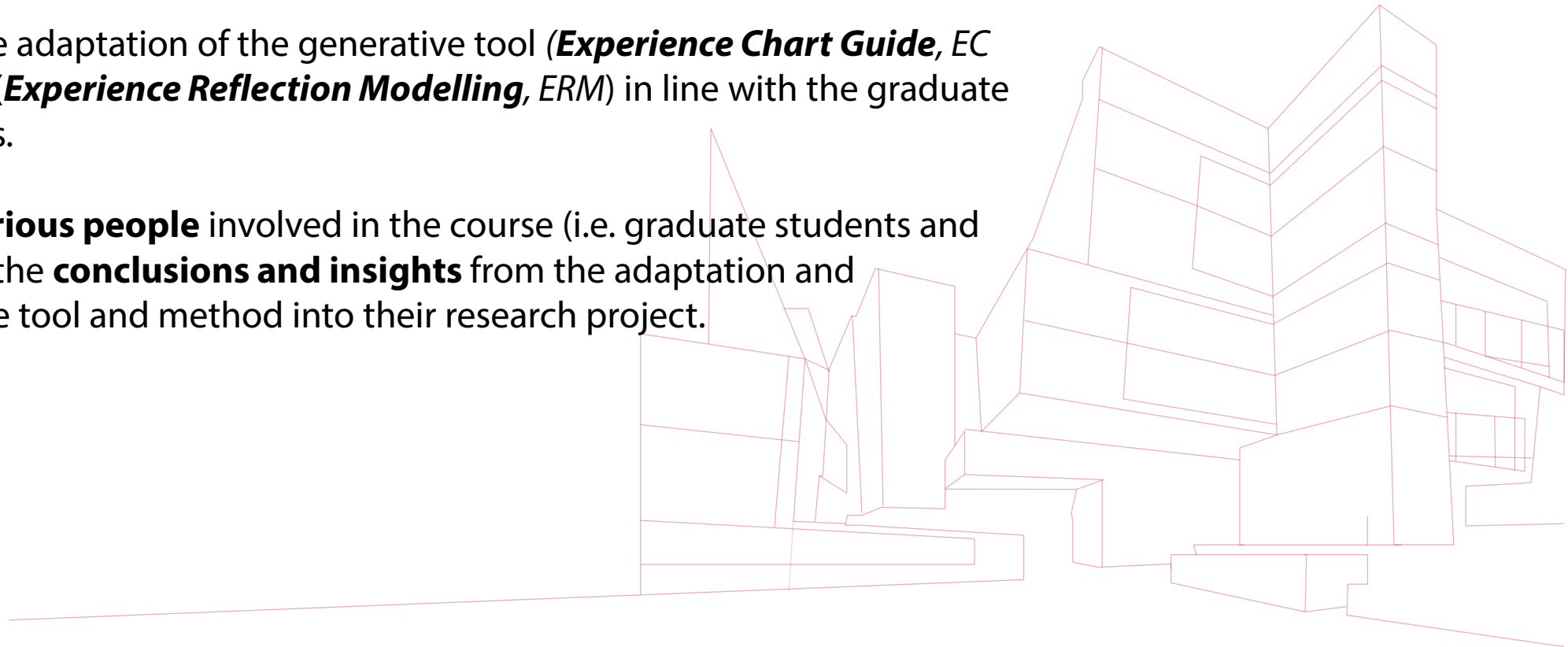
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The main process of a graduate course '*Generative Design Research for Sustainability*' offered in the DID at METU through **exemplary design research cases** conducted by the graduate students at the doctoral level.

These cases focus on the adaptation of the generative tool (***Experience Chart Guide, EC Guide***) and the method (***Experience Reflection Modelling, ERM***) in line with the graduate students' research topics.

The **perspectives of various people** involved in the course (i.e. graduate students and two course tutors), and the **conclusions and insights** from the adaptation and implementation of these tool and method into their research project.



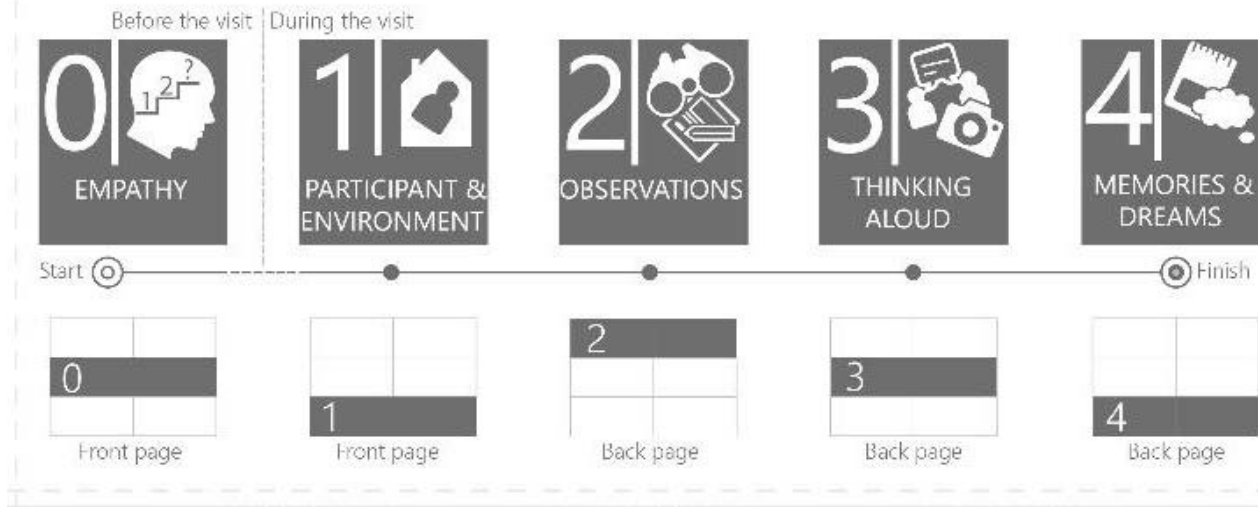
Experience Chart (EC) Guide for User Observations

to guide design students while capturing and documenting user observations

to inspire and inform their early design decisions

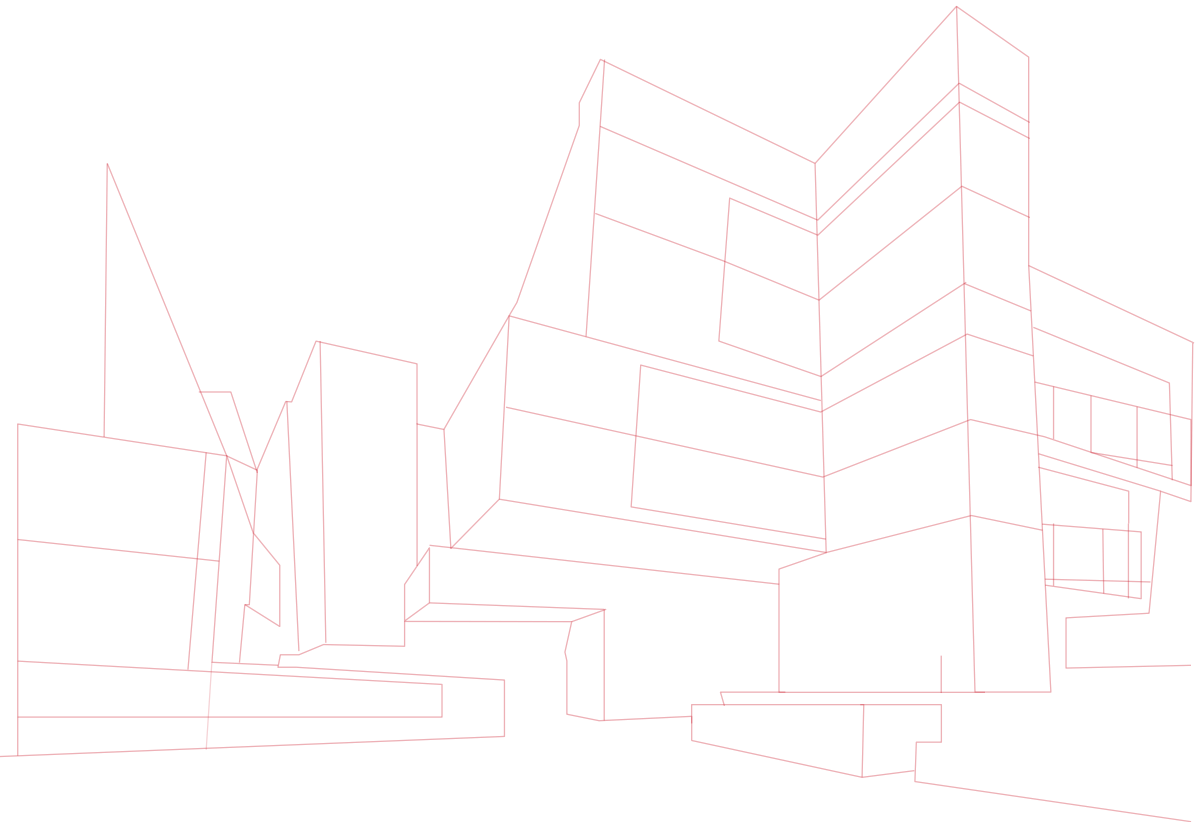
to help them remember and pay attention to important considerations before, during and after the user observations

Map of Experience Chart Guide



The stages of the EC Guide:

- the empathy
- participant & environment
- observations
- thinking aloud
- memories & dreams



EC Guide

Experience Chart Guide
for User Observations

Researcher(s)

Activity

Map of Experience Chart Guide

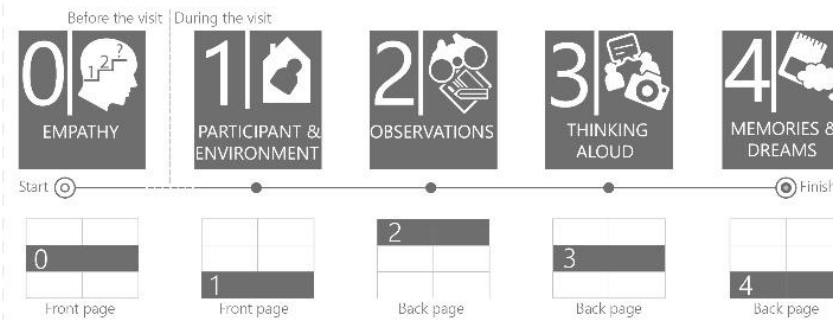


Figure 1. Front page of
the EC Guide



Experience and explore the activity by yourself to get familiar with.

Note down activity phases on timeline along with your personal experiences.



Start



Note down and visualize your general impressions about the participant and the activity environment.

Pay attention to people, objects, activities and their relation to their environment.

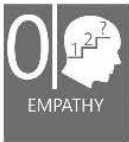
PARTICIPANT

ACTIVITY ENVIRONMENT



Finish





EMPATHY

Experience and explore the activity by yourself to get familiar with.

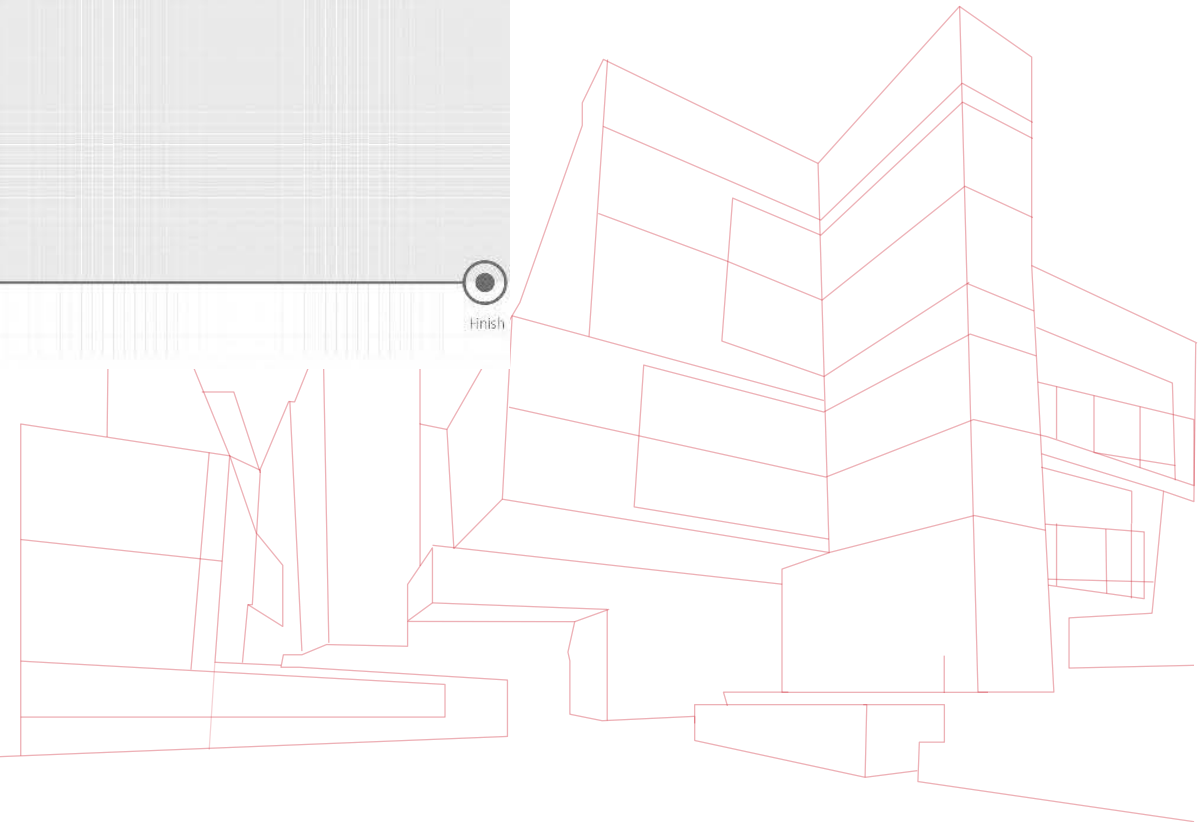
Note down activity phases on timeline along with your personal experiences.



Start



Finish





Note down and visualize your general impressions about the participant and the activity environment.

Pay attention to people, objects, activities and their relation to their environment.

PARTICIPANT

ACTIVITY ENVIRONMENT

2 OBSERVATIONS

Observe and note down activity phases and related insights on the timeline.

Pay attention to positive-negative experiences and relevant feedbacks

Try not to interrupt the participant.



3 THINKING ALOUD

Go through your observation notes with the participant. Ask for explanations and clarifications.

Ask participant to enact the phases take photographs of these phases and relevant details.



Indicate the nature of experience here with +, 0, -.

4 MEMORIES & DREAMS

Ask the participant about her/his past experiences (memories) and their future expectations (dreams) in relation to the activity of focus.

Utilize 'visualization area' in the middle to better represent and relate insights with sketches, diagrams, etc.

MEMORIES	VISUALIZATION AREA	DREAMS
complaints, accidents		suggestions
appreciated qualities, alternative uses		further ideas

Figure 2. Back page of the EC Guide.





OBSERVATIONS

Observe and note down activity phases and related insights on the timeline.

Pay attention to positive-negative experiences and relevant feedbacks

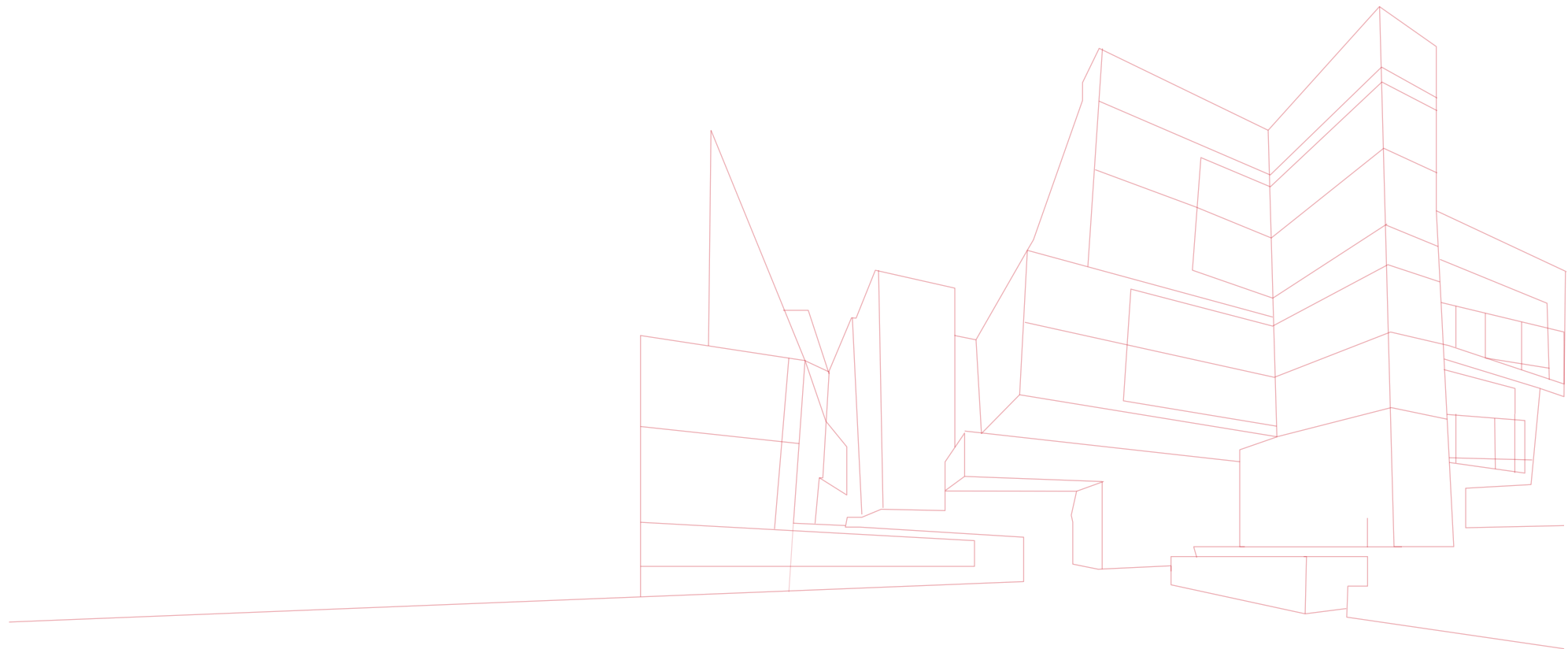
Try not to interrupt the participant.



Start



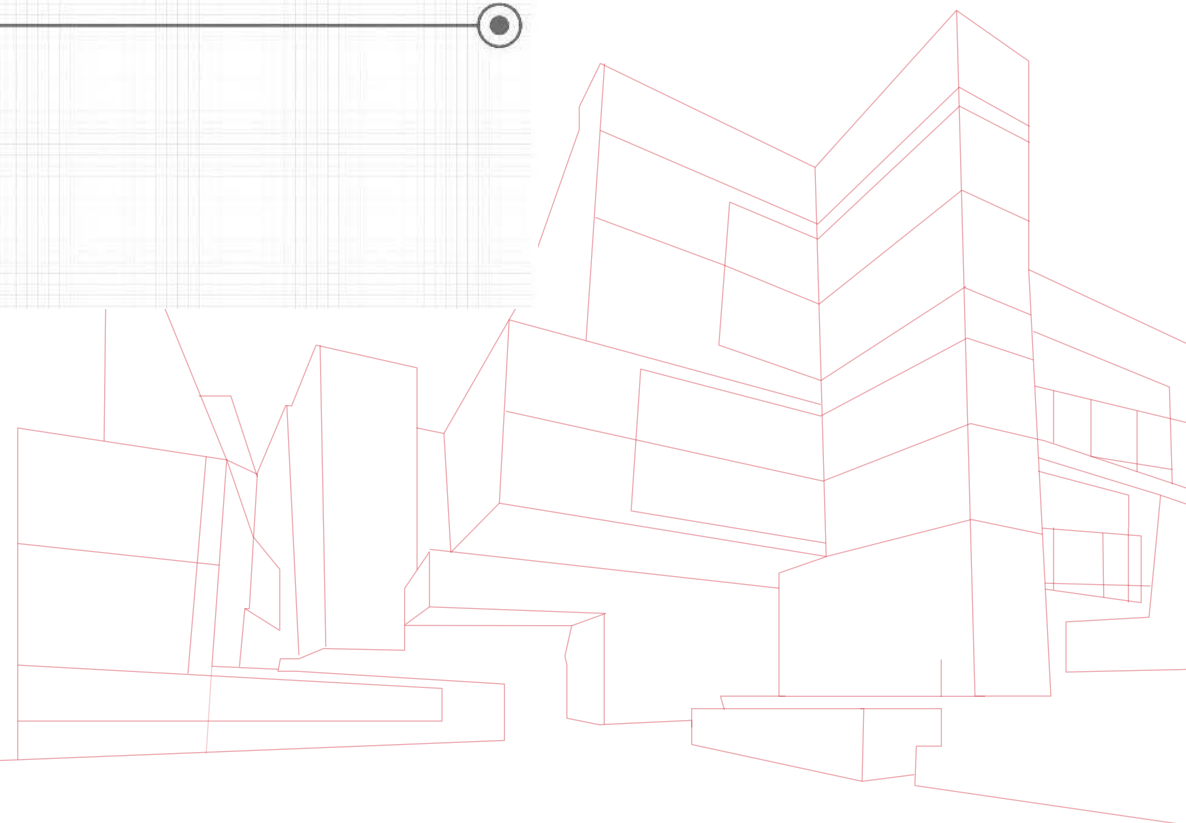
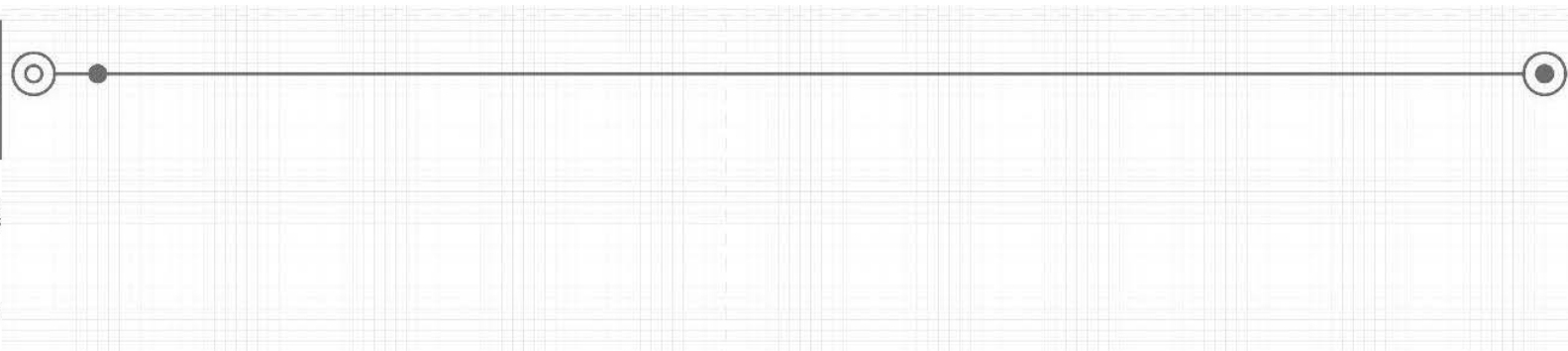
Finish



3 | THINKING ALOUD

Go through your observation notes with the participant. Ask for explanations and clarifications.

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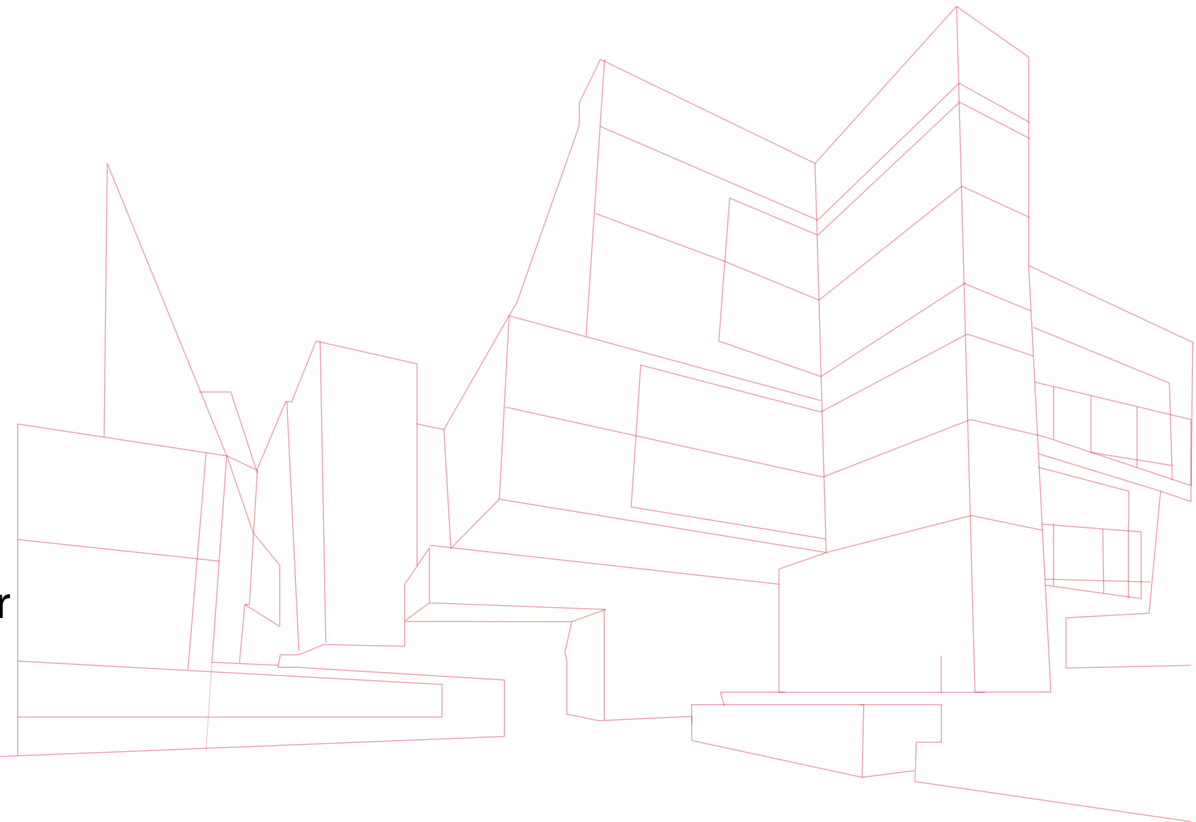


Experience Chart (EC) Guide as a Generative Tool

The graduate students evaluated the EC Guide tool and their experiences with it during user observations and developed it as a generative tool for gaining more insights into user needs and preferences for their specific research topic.

They focused on a specific activity (e.g. lighting experiences in domestic environments) and rethought the research steps from the recruitment of participants to the distribution of the tool, collecting the filled-out tools, and to the analysis and presentation of the findings and insights.

In line with their research topic, they included new phases, and omitted or combined others to be able to capture the participants' experiences and insights that would be essential for their particular research.





Experience Reflection Modelling

ERM enables people's involvement in the early stages of the design process. It helps design researchers better understand people's needs, expectations and preferences regarding an activity or product through creating a medium for knowledge transfer.

The phases of and components of ERM:

- Developing the interview schedule
- Developing the ERM toolkit and the drawing file
- Conducting the ERM session

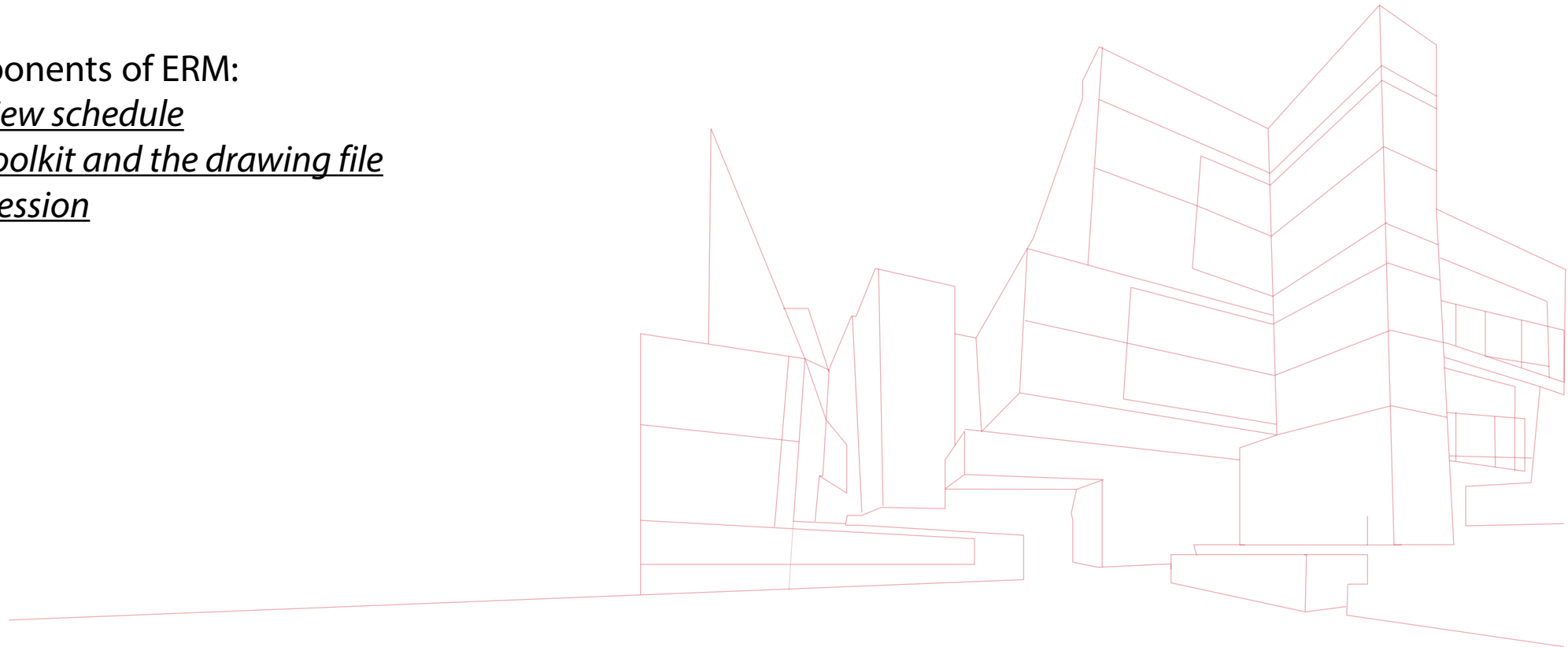
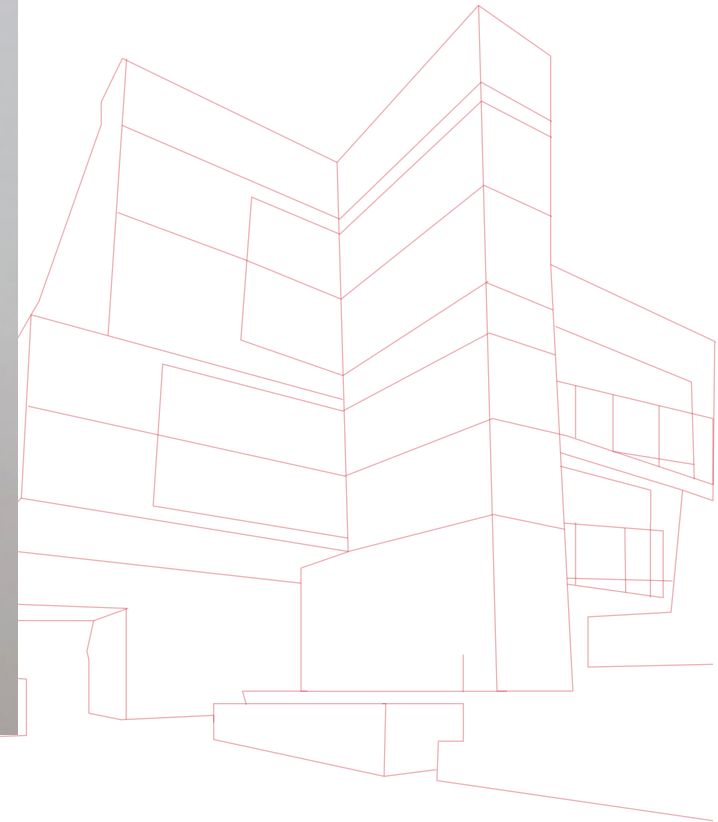




Figure 3. An example of the ERM toolkit prepared for blender/mixer product category including laser-cut parts and additional materials



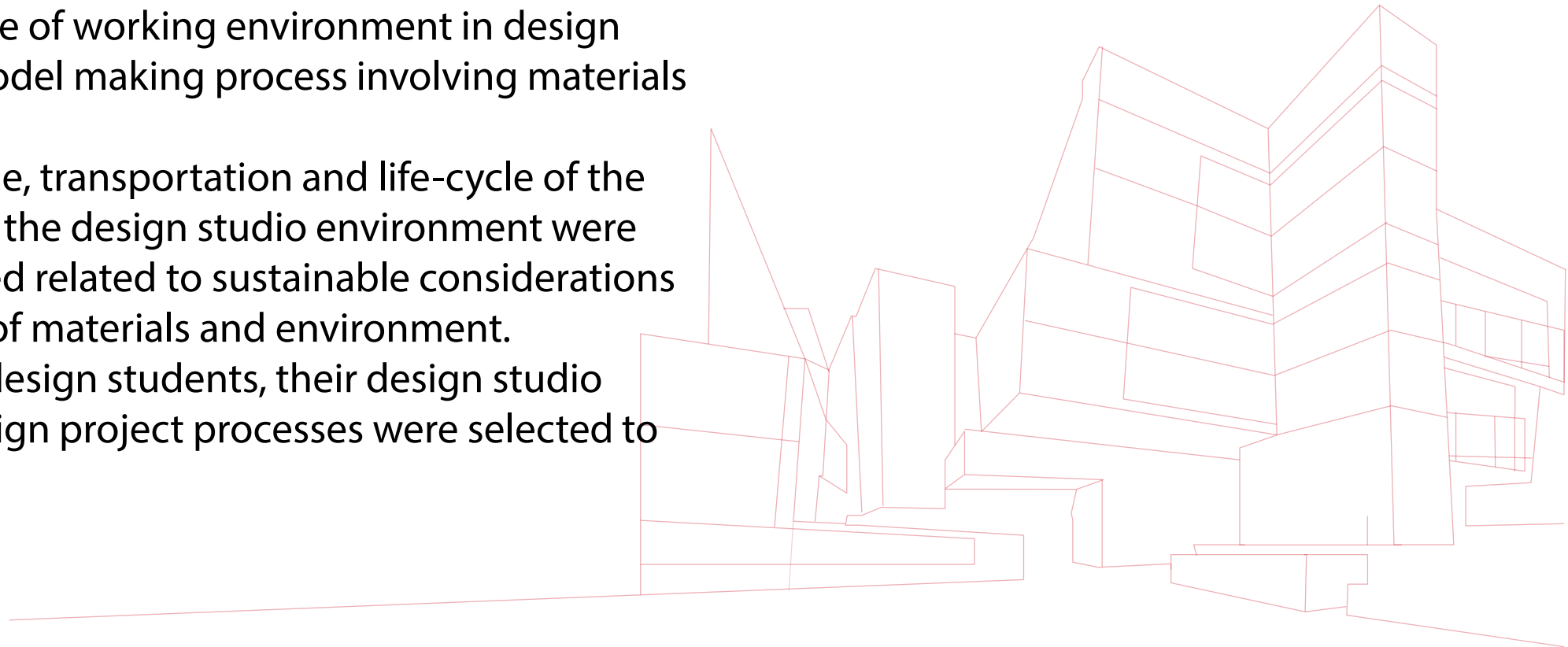
The Adaptation of the EC Guide Tool and the ERM Method

Case 1: Efficient use of Working Environment in Design Studios

focus: the efficient use of working environment in design studios in terms of model making process involving materials and tools

approach: The storage, transportation and life-cycle of the materials and tools in the design studio environment were observed and analyzed related to sustainable considerations such as effective use of materials and environment.

Third-year industrial design students, their design studio environment and design project processes were selected to be explored.



Case 2: Lighting Practices in Kitchen Environment

focus: lighting practices in kitchen environment to gain insights into the users' diverse needs, experiences, expectations and concerns related to electricity consumption

approach: participants' use patterns and insights were acquired and analyzed in line with the related sustainability considerations including resource effectiveness, clarity of feedback and adaptability to user needs, preferences and use behaviors.





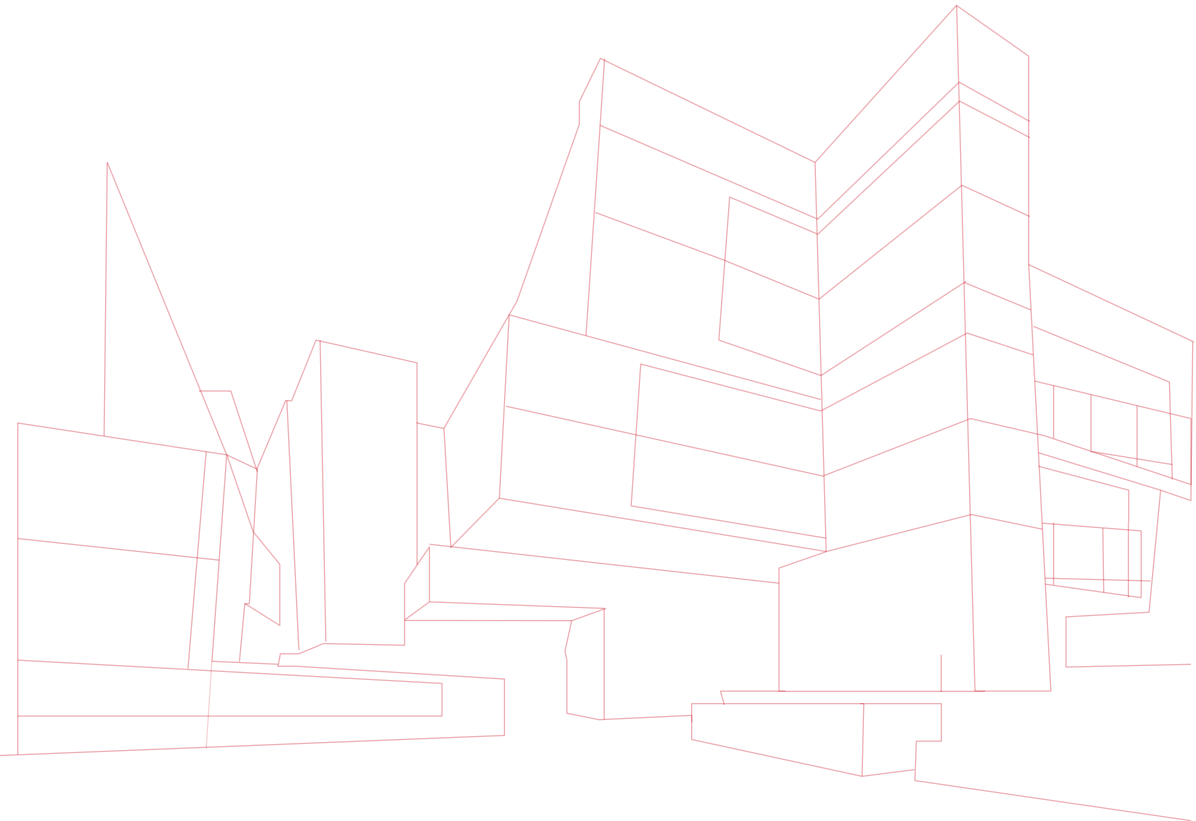
Case 2: Lighting Practices in Kitchen Environment

The EC Guide as an Observation tool

participants: two diverse households were observed while participants performing activities such as preparing food, serving tea and cleaning dishes.

Empathy stage: enabled the researcher to recognize the potential interactions and use patterns to be further explored through the observations, and to develop probe questions

Observation stage: as the main activity continued for a long period of time, the researcher preferred to take photographs without interrupting the activity and explored these further in the following stage.





Case 2: Lighting Practices in Kitchen Environment

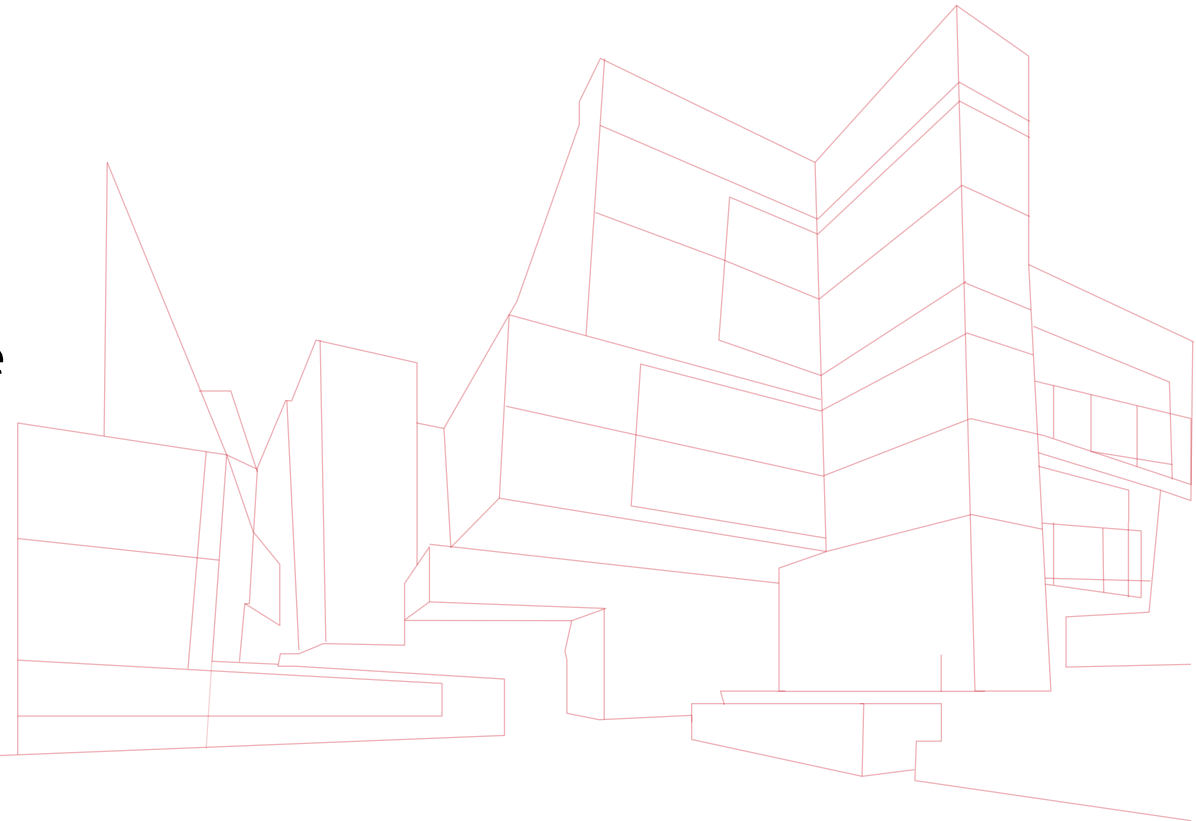
The EC Guide as an Observation tool

Thinking aloud stage complemented the observations, and revealed detailed information about the participants' concerns and insights that were difficult to receive solely through observations.

Memories and dreams stage, the data received from the participants was quite detailed, yet often irrelevant to the main focus of the study.

Visualisation stage, both participants hesitated to visualize as they felt uncomfortable with the quality of their sketches.

The design of the EC guide, including interrelated phases, enabled an effective analysis process. The documented data was easily transferred into the EC Poster



Case 2: Lighting Practices in Kitchen Environment

The EC Guide as a Generative tool

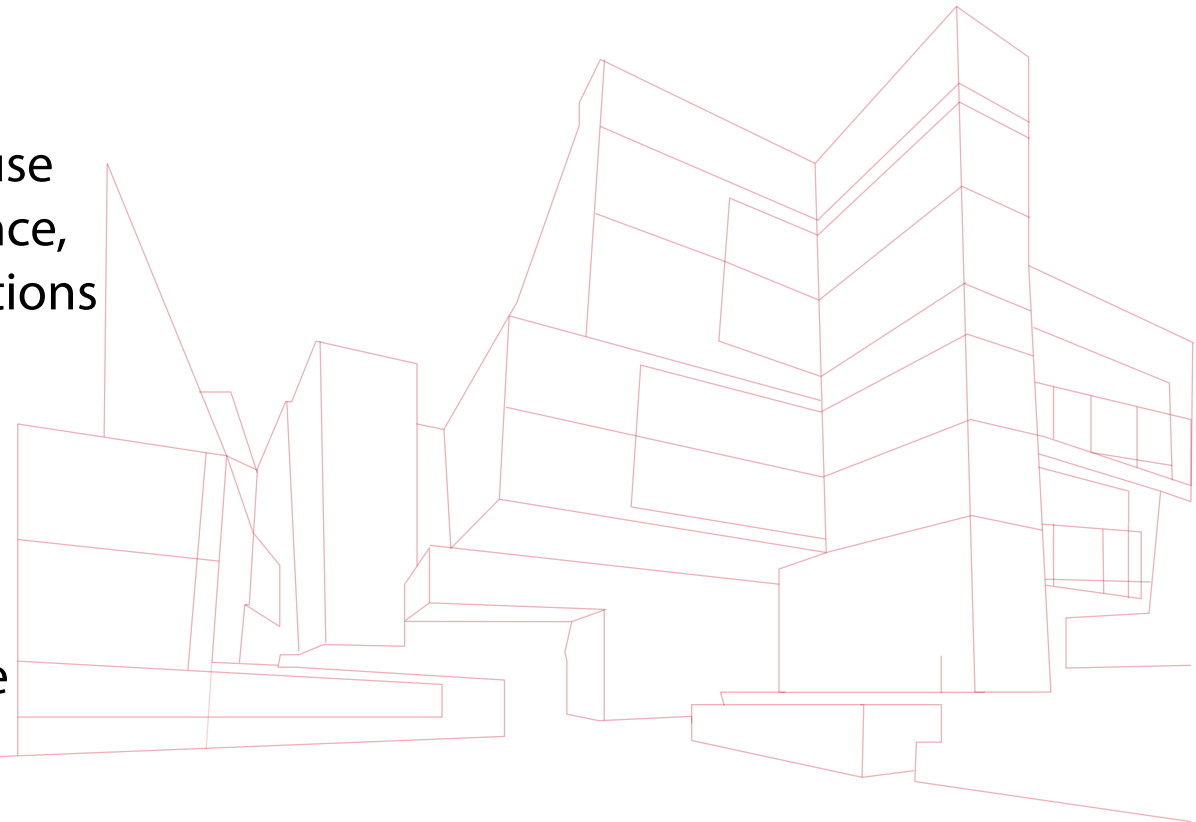
participants: two participants

Reconsidering the main focus of the research and limitations of the previous phase, the guide was revised through including new phases (i.e. frequency and duration of use, electricity consumption, etc.) and omitting (i.e. empathy phase) or combining others (e.g. problem areas).

The adopted generative tool included six stages that are use environment, frequency and duration of use, use experience, resource consumption, problem areas and design suggestions

A complementary semi-structured interview session was carried out to probe into the participants' statements documented on the tool.

The EC Poster format was revised to be able to present the findings and insights effectively.





AYDINLATMA DENEYİM ÇİZELGESİ

*Bu araştırmanın amacı kullanıcıların mutfak ortamında aydınlatmayla ilgili davranışlarının anlaşılması ve elektrik tüketimine ilişkin düşüncelerinin alınmasıdır. Sorular bilgi ölçme amaçlı değildir. Lütfen günlükte verilen talimatları takip ediniz ve günlükü tamamladıktan sonra araştırmacıya ulaştırınız. Katılımınız için teşekkürler :)



1 KULLANIM ORTAMI

kullanım alanınızın fotoğraflarını çekerek ortamın genel özelliklerini, perspektifin konumu ve boyutu, zıllı kaymakların konumu, mobilyaların yerleşimi, vb.) ve zıllı kaymakların sayısını ve türünü not ediniz.

fotoğraflar

ortamın genel özellikleri

özellikleri konumu

aydınlatma 1 ☐

aydınlatma 2 ☐

aydınlatma 3 ☐

aydınlatma 4 ☐

2 KULLANIM SIKLIĞI & SÜRESİ

mutfak ortamında kullanıldığında aydınlatma ürünlerinin kullanım sıklığına ve süresine verilen günlükte aynı ayrı not ediniz.

aydınlatma 1

kaç kere kullandım?

ne kadar süre kullandım?

aydınlatma 2

kaç kere kullandım?

ne kadar süre kullandım?

aydınlatma 3

kaç kere kullandım?

ne kadar süre kullandım?

aydınlatma 4

kaç kere kullandım?

ne kadar süre kullandım?

Figure 4. Adapted version of the EC Guide as a generative tool for Case 2 – front page



3 KULLANIM DENEYİMİ

Gün içerisinde muhtel ortamlardaki aydınlatma kullanım uygulamaları ve bu süreçlerle ilgili deneyimlerinizi çizgi üzerinde belirtiniz (ne zaman hangi aydınlatma açıldı, neden aydınlatmaya ihtiyaç duyuldu, ne zaman neden kapatıldı, vb.).

4 ELEKTRİK TÜKETİMİ

Bu uygulamada elektrik tüketiminin nasıl değiştiğini düşünüyorsunuz? Hangi uygulamaları yoğun ya da gereksiz elektrik tüketimine yol açtığını düşünüyorsunuz? Bu değişimleri çizgi üzerinde çizebilirsiniz.

5 PROBLEM ALANLARI

Aydınlatma problemlerinden kaynaklanan yoğun veya gereksiz elektrik tüketimine ilişkin (ne çıkan problemler alanlarını kısaca belirtiniz).

6 TASARIM ÖNERİLERİ

Aydınlatma problemlerinden kaynaklanan elektrik tüketiminin azaltılmasına yönelik fikir ve önerilerinizi paylaşınız.

Figure 4. Adapted version of the EC Guide as a generative tool for Case 2 – back page



Case 2: Lighting Practices in Kitchen Environment

The ERM method

participants: two participants

ERM method was adopted through a scaled model of a kitchen environment and one-to-one model of the light switches.

Prior to the sessions, an interview schedule was prepared encompassing use experiences, concerns related to the electricity consumption to guide the sessions effectively.

The 3D modelling toolkit was prepared including materials such as cardboard parts, colored pens, play dough, tape, tack-it, acetate, and rope.

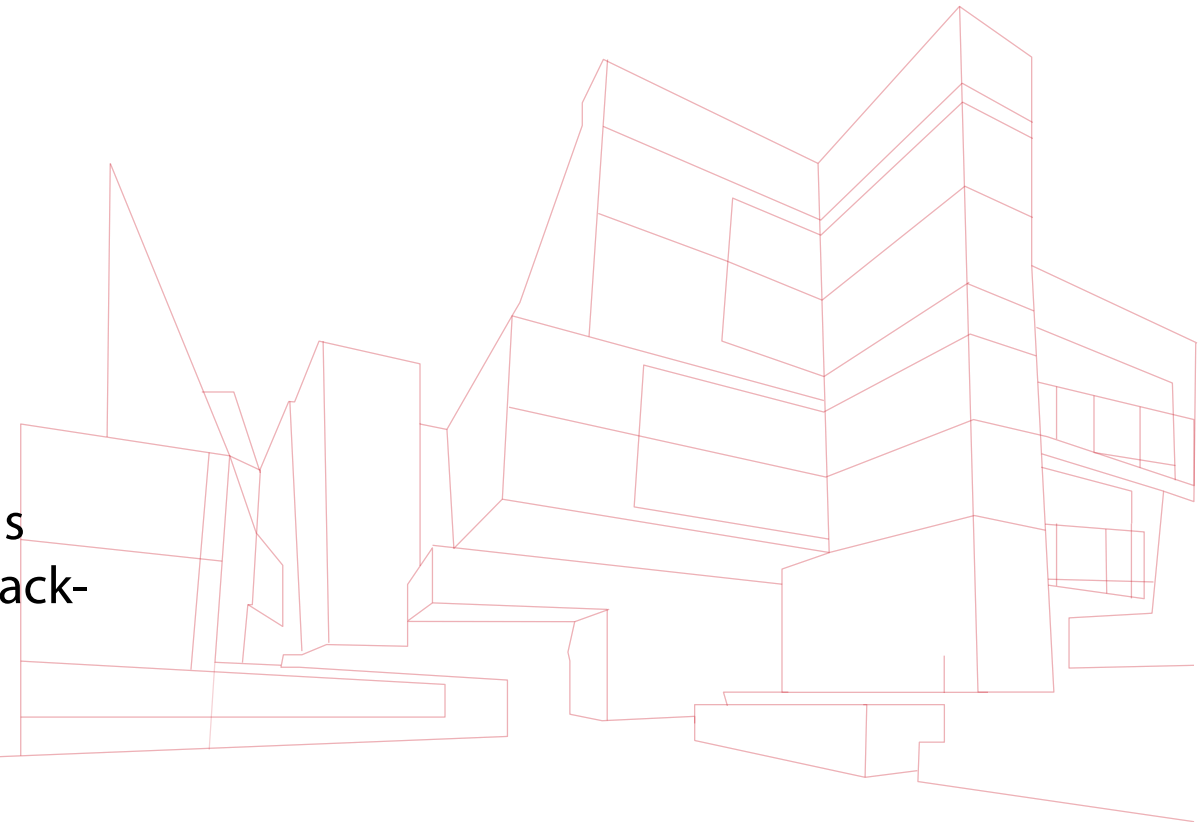
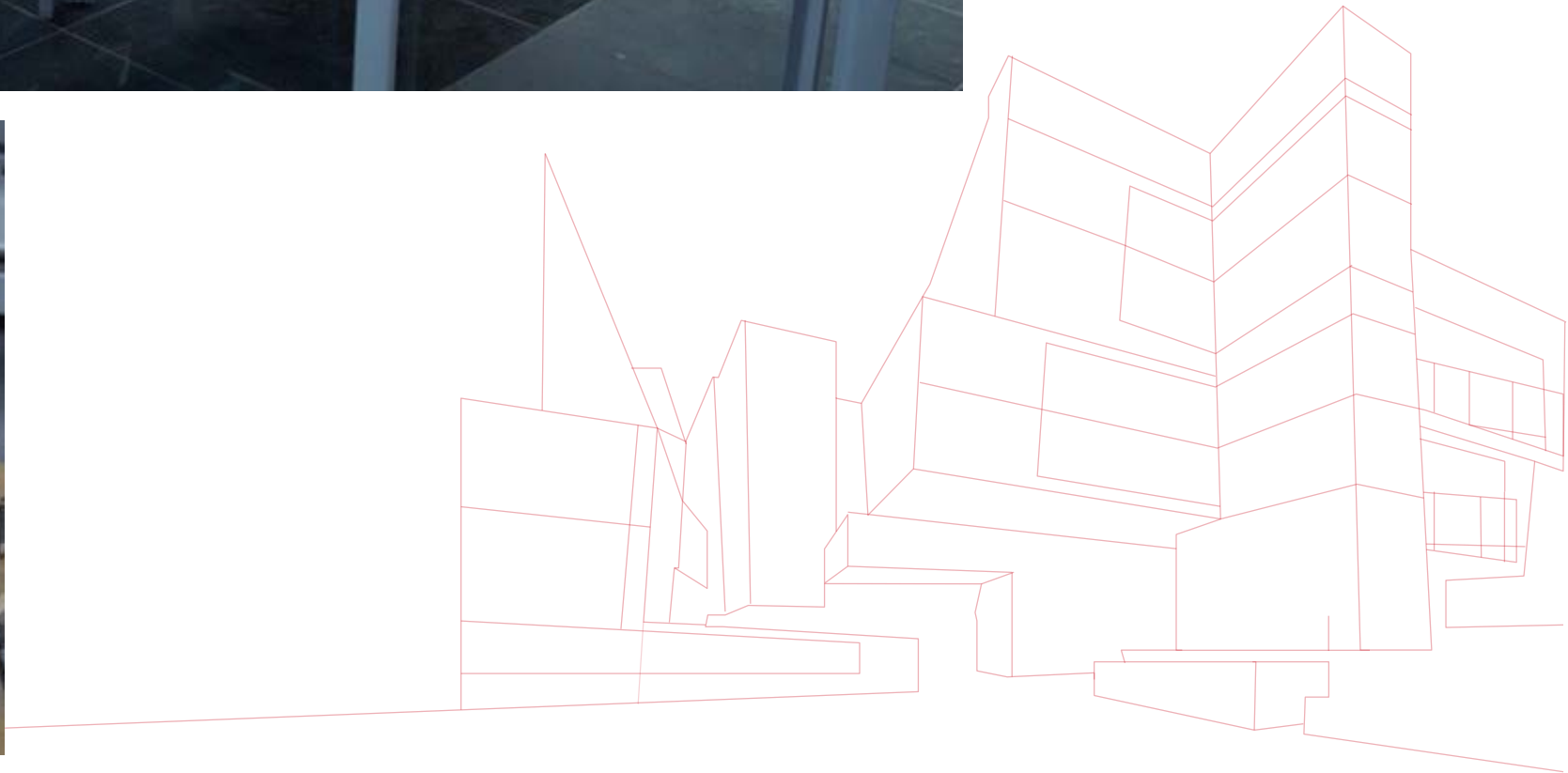




Figure 5. The ERM toolkit for Case 2 (above), an example from an outcome of the session (below)



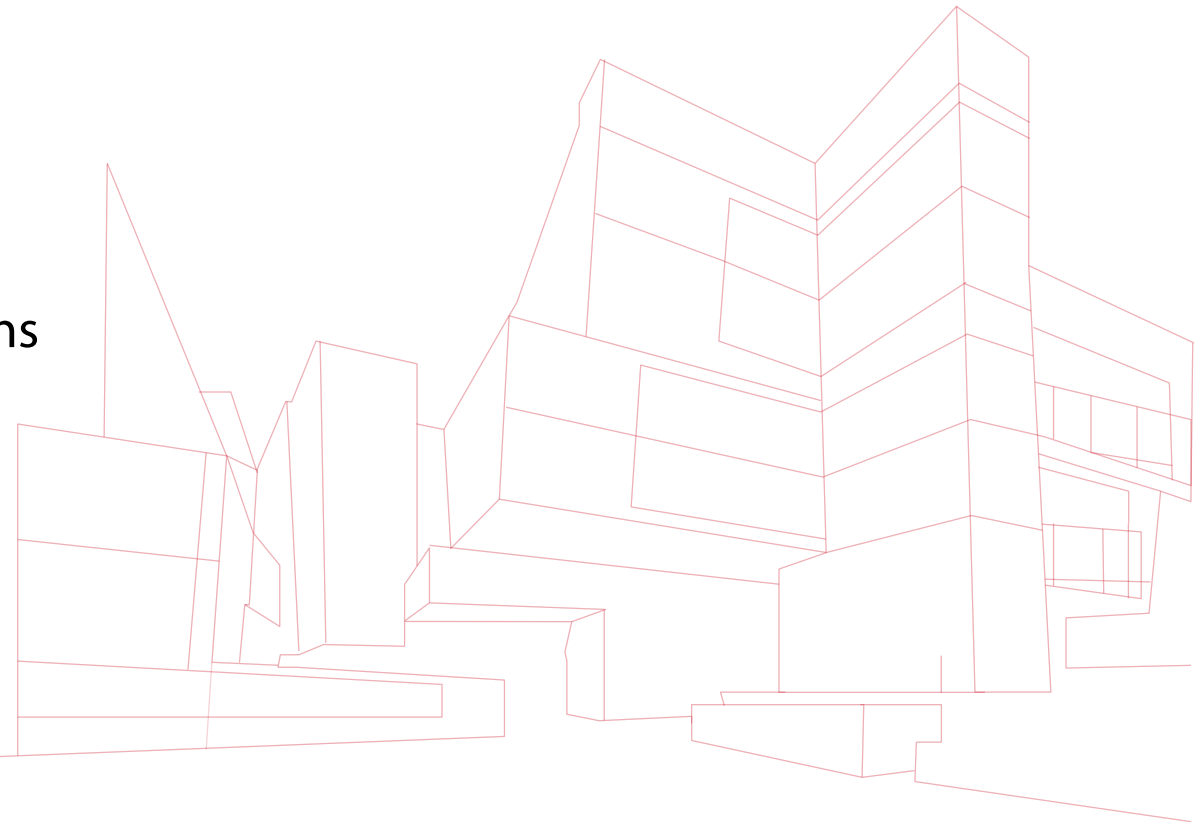


Case 2: Lighting Practices in Kitchen Environment

The ERM method

As engaging with the toolkit, the participants used the parts quite effectively and even unexpectedly.

The video recordings were verbatim transcribed and interpreted to develop sustainability considerations and themes and then the findings from the sessions were transferred to a poster through demonstrating the relations between the considerations, themes, insights and images from the sessions.



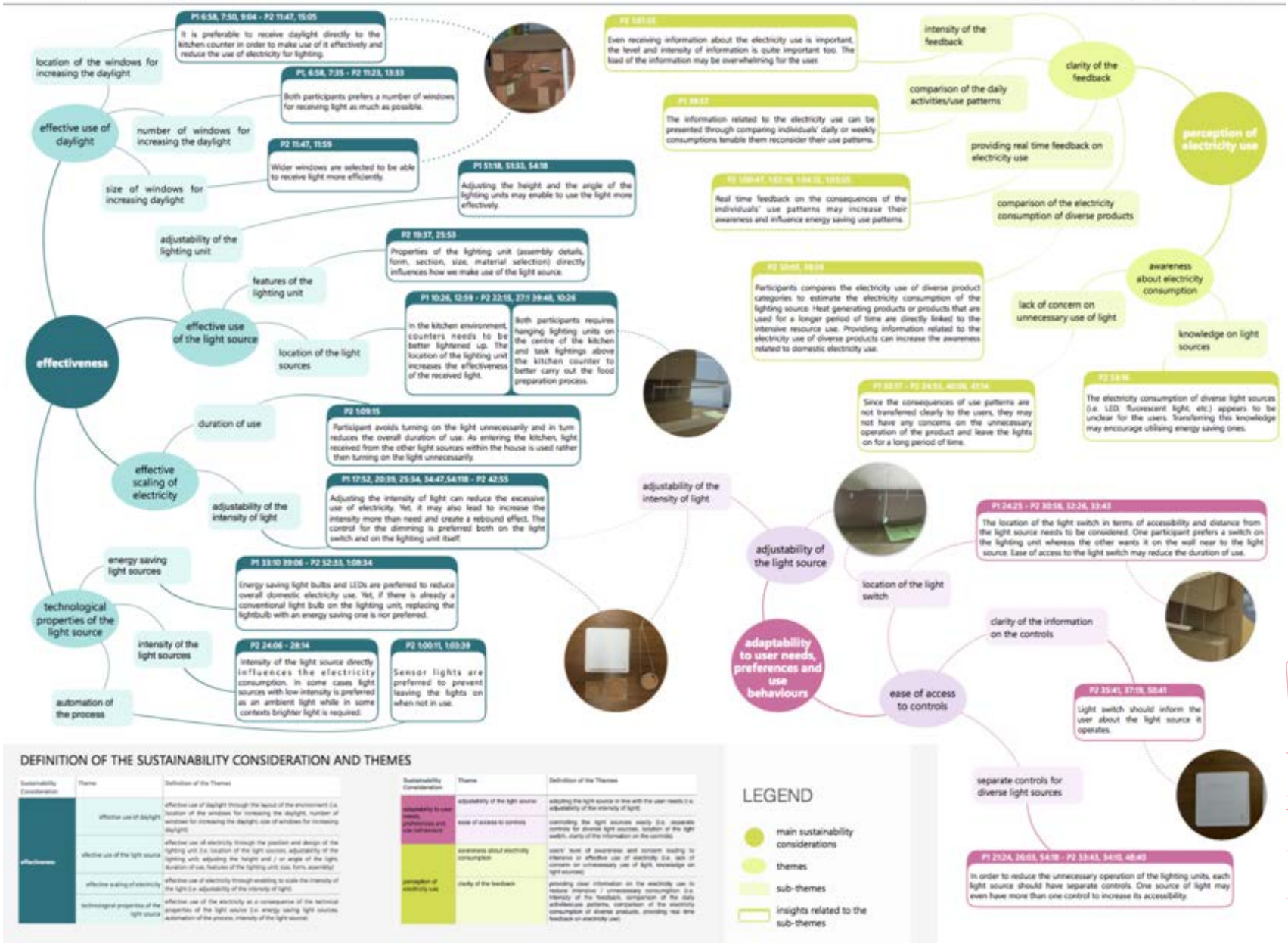


Figure 6. ERM Poster presenting the findings from the sessions



Case 3: Interactive Prototyping Practice

The EC Guide as an Observation tool

focus: investigate skills, knowledge acquisition and storage habits of industrial design students practicing open-source interactive prototyping tools

approach: participants' use behaviors and experience were acquired and analyzed to gain insights about the causes of material waste during the prototyping activity.



Case 3: Interactive Prototyping Practice

The EC Guide as an Observation tool

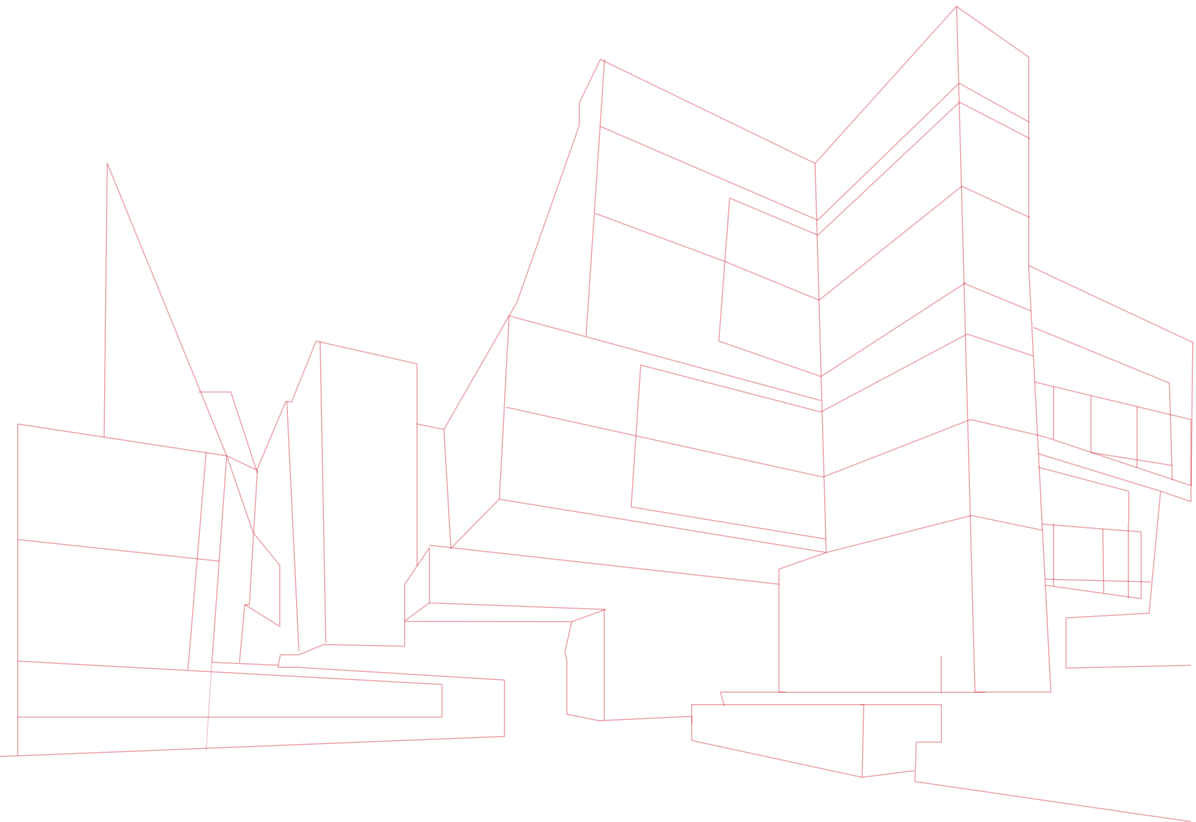
participants: two participants were selected who were asked to make a simple interactive prototype of a product of their own choice

Empathy stage: enabled the researcher to get familiar with the phases in order to develop the questions to be asked in the next stages of the study

Participant & environment stage, was challenging for the researcher to observe the environment, taking photographs and asking question all at once

Observation and thinking aloud stage: most of the observation process went flawlessly in terms of data collection and provided considerable amount of data.

Memories and dream and visualization stage, useful for visualizing the participants' experiences, expectations, and to summarize all the cons and pros.





Case 3: Interactive Prototyping Practice

The EC Guide as a Generative tool

participants: four participants which were third-year industrial design students

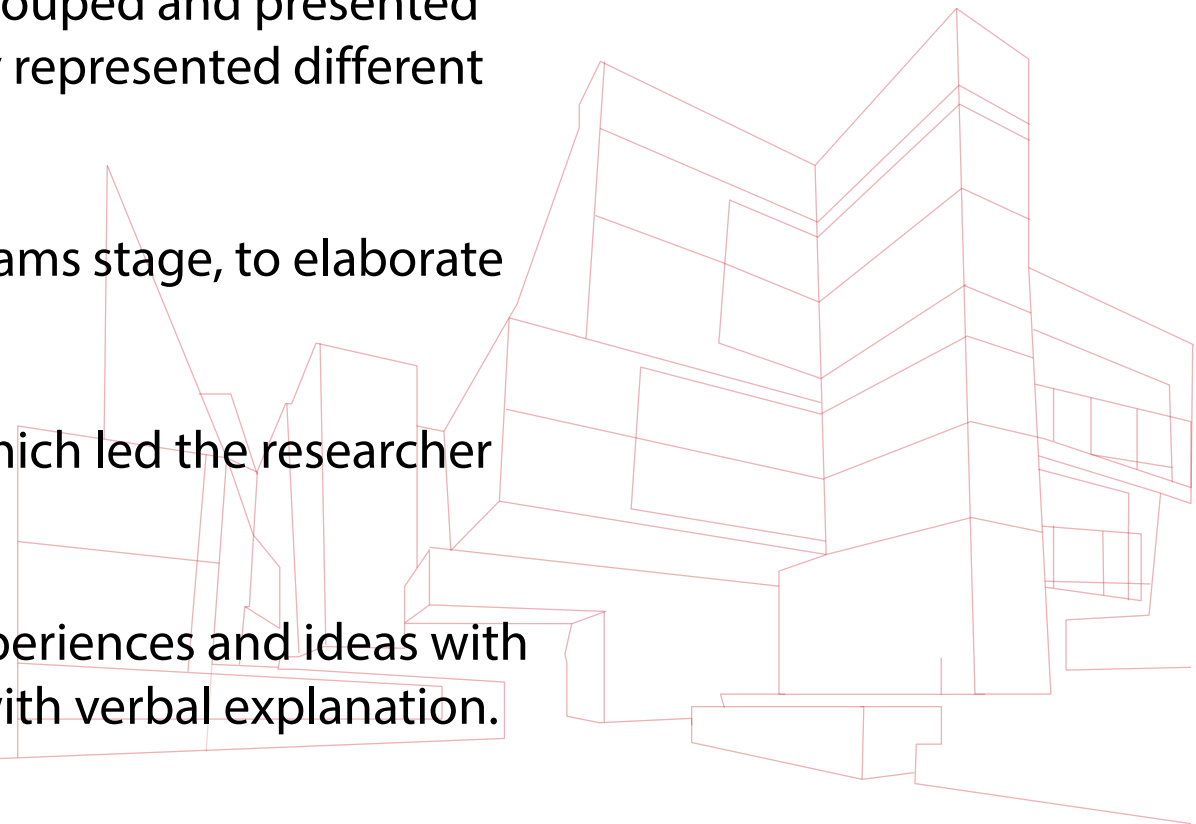
The flexible nature of The EC guide allowed the researcher to adopt it considering the previous phase to fit the needs of prototyping activity. It included new stages and combined or omitted others.

Activity timeline stage included three different timelines grouped and presented together, which were physical, phigital and digital, as they represented different aspects of prototyping activity.

Follow up talk stage was added to replace memories & dreams stage, to elaborate more on the conducted study.

The participants were encouraged to take photograph, which led the researcher to collect more data from prototyping activity.

The participants had the opportunity to visualize their experiences and ideas with simple sketches, most of the insights were made clearer with verbal explanation.



Interactive Prototyping Practice Guide

The research is intended to investigate inquiry, documentation and storage habits of students who are practicing interactive prototyping tools. Please read instructions of each section before writing out. This study is composed of four subsections. The last subsection will be conducted with the presence of the researcher. You can mail yavuzpaksay@live.com for any questions, any time.

- ① Use one of the following signs as a bullet point when mentioning about the certain type of experience:
- ☺ Positive 😐 Neutral ☹ Negative

Researcher(s) _____
Participant ID _____ Age _____ Department _____ E-Mail _____
Starting Date _____ Ending Date _____ Total Duration (hours) _____

front page				back page
you are here	0		2	
		1		
				3
Titleblock	Memories	You&Environment	Activity	Follow Up Talk

0 Memories

This section is intended for you to recall past memories behindward the actual activity. You are expected to note down activity phases on timeline along with your personal color Phases, touch, and negative signs in bullet points. You can sketch to clarify certain moments of your memory.

start

Phases

Timeline

1 You & Activity Environment

Note down and "visualize" your general impressions about the view and the act and your activity environment. Pay attention to the sketch, activity and their relation to the environment. Take photographs to document important moments. You can also sketch to illustrate certain point.

You

Environment

3 Follow Up Talk

Do not fill this area until follow-up meeting.
Follow Up meeting Date and Time: _____

2 Activity Timeline

Start your prototyping activity. Note down activity phases and related insights on the timeline. Pay attention to the sketch, activity and their relation to the environment. Take photographs to document important moments. You can also sketch to illustrate a certain point. Pay attention to the sketch, activity and their relation to the environment. You can also sketch to clarify certain moments of your memory.

Digital

Phigital (Digital + Physical)

Physical

Figure 7. Adapted version of the EC Guide as a generative tool for Case 3



Case 3: Interactive Prototyping Practice

The ERM Method

participants: 2 participants who have experience in interactive prototyping

The 3D models of the essential standard components, storage units, tools and a laptop computer were produced.

Pens, tape bands, adhesives, cutting tools and many other transformation tools were utilized during the sessions for the participants to modify their models by the toolkit, to show where the problems are, and the key points of how the enhancements can be made.

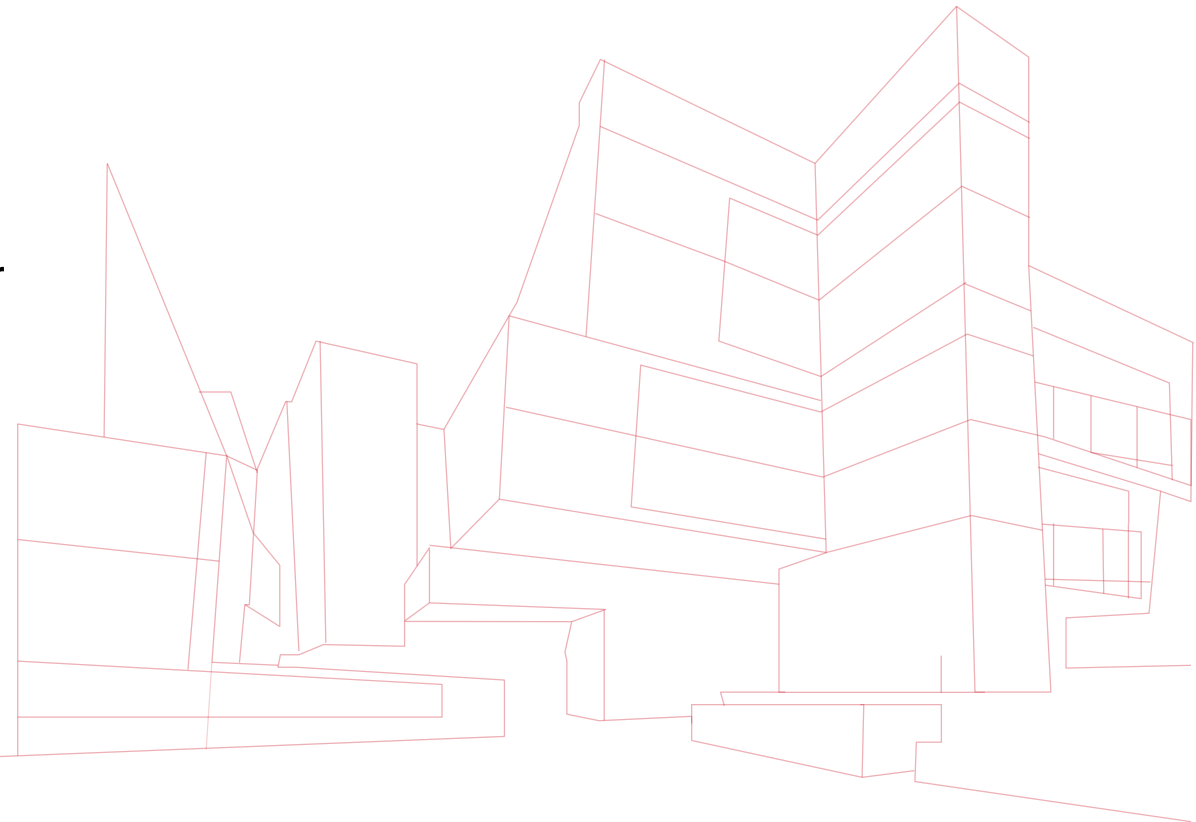




Figure 9. An example from an outcome of the session (left), The ERM toolkit for Case 3 (below)

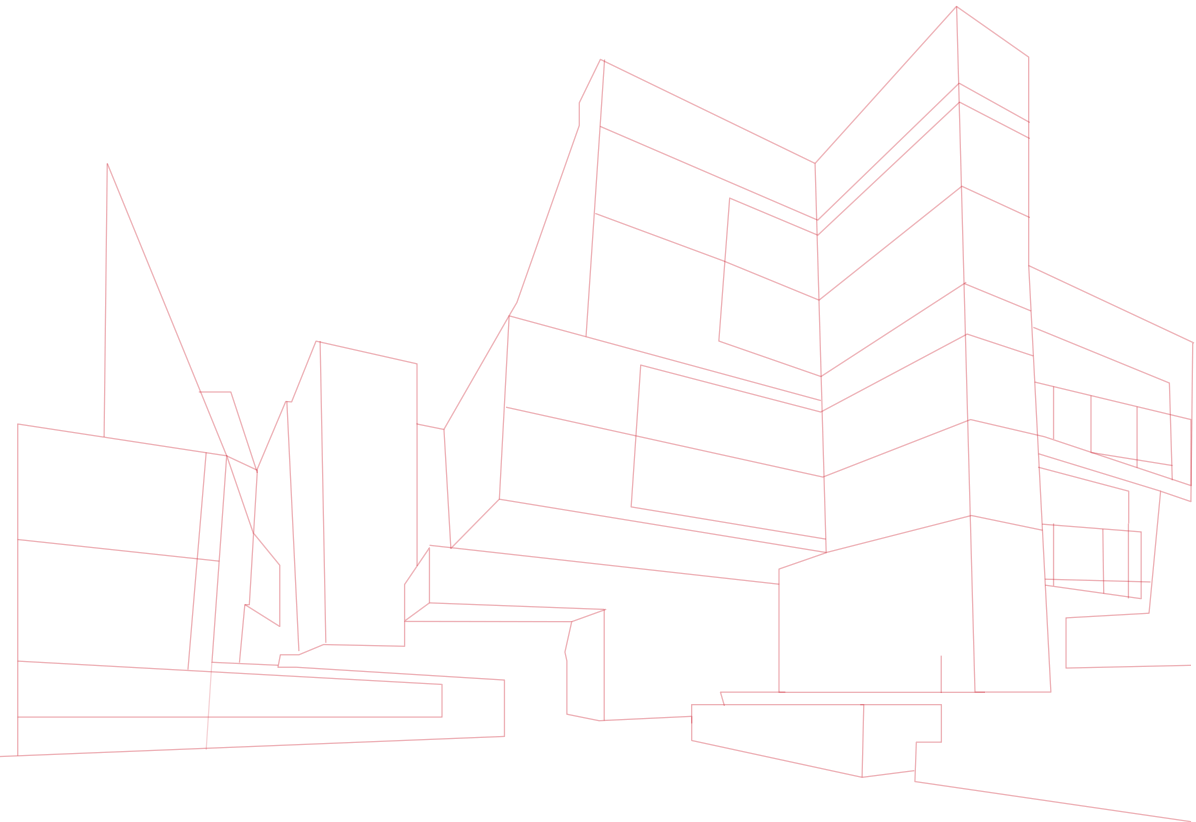


Case 3: Interactive Prototyping Practice

The ERM Method

The key insights and solutions provided by the participants were rephrased. Main research themes were generated according to the data extracted from the sessions.

The presentation board was developed around three different strands of the main research considerations; *storage practices, skills and knowledge acquisition* and *waste/leftover materials and/or parts*. The insights were placed on the board through relating the insight, solution areas and consideration.



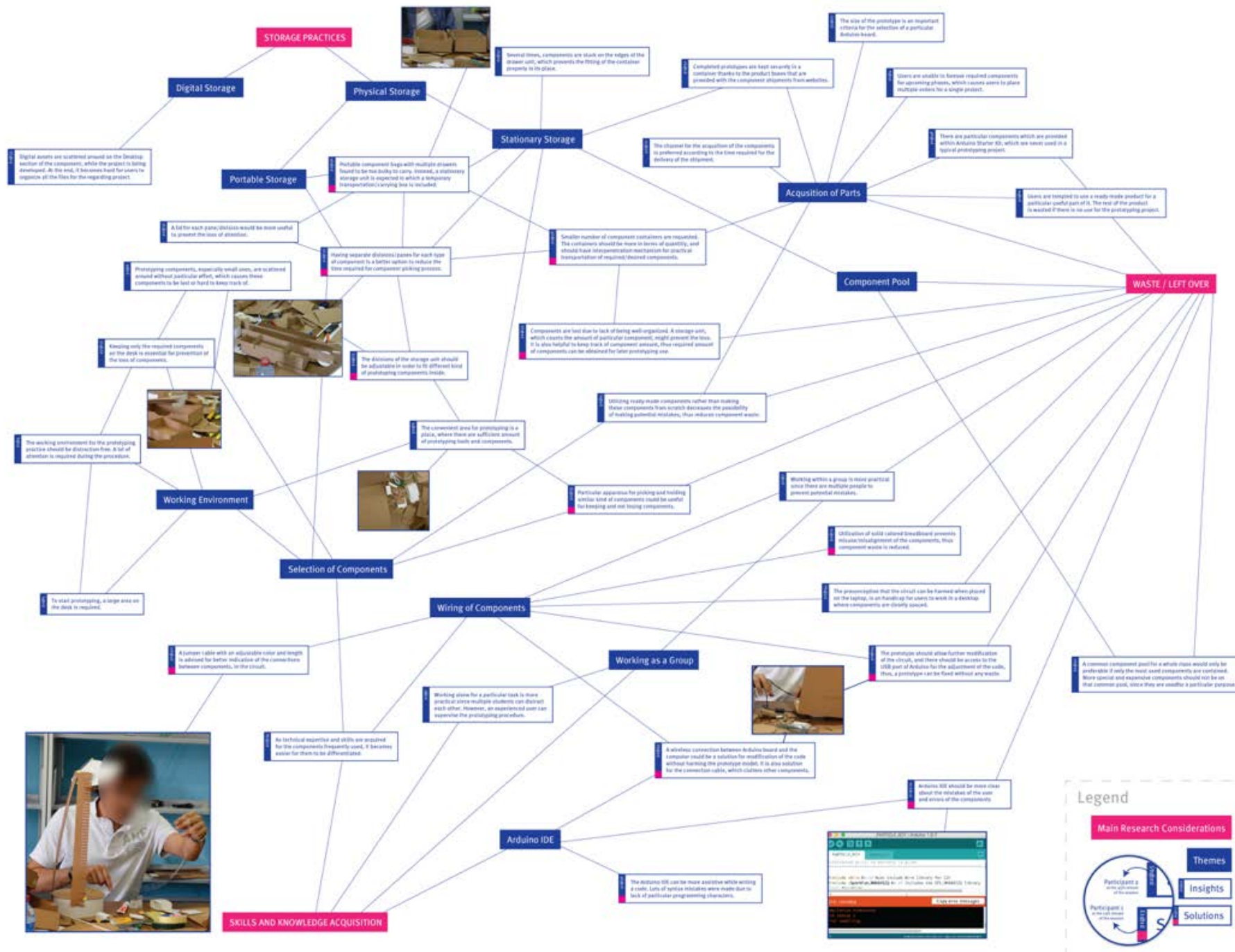


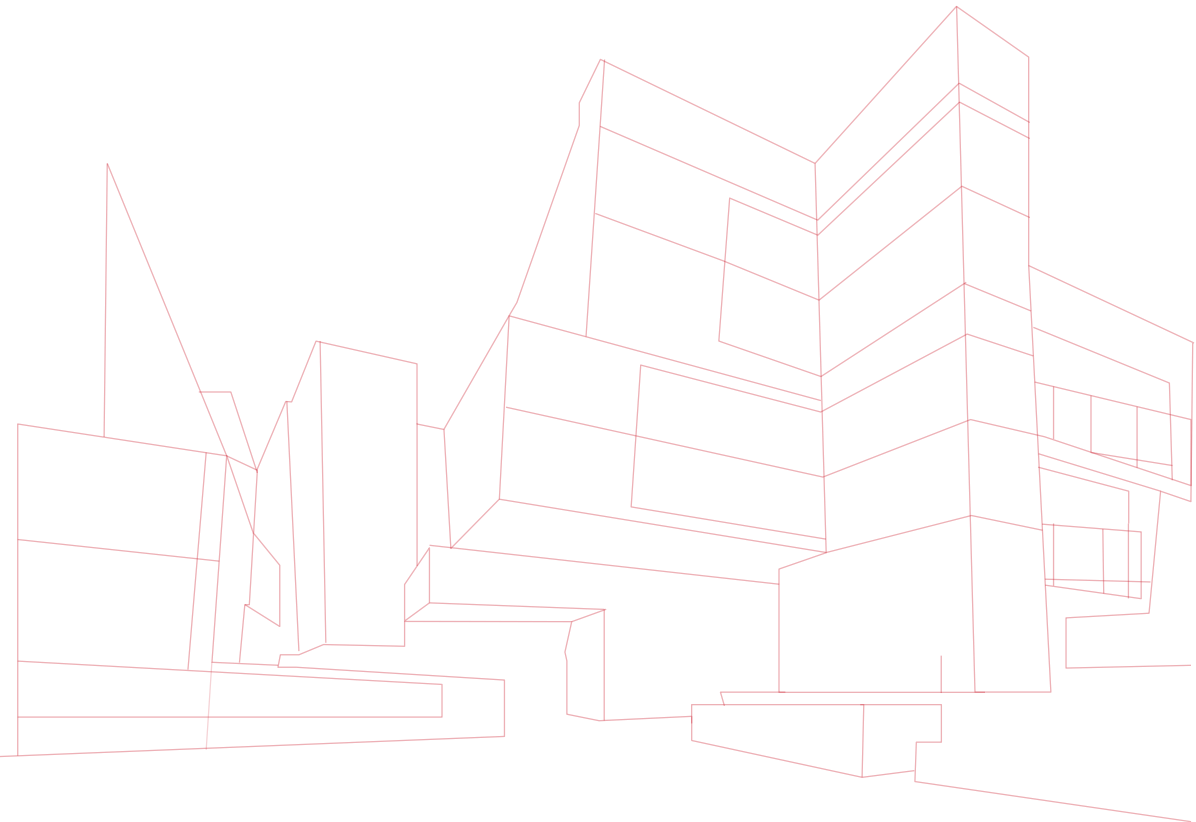
Figure 10. ERM Poster presenting the findings from the sessions





Conclusions and Insights

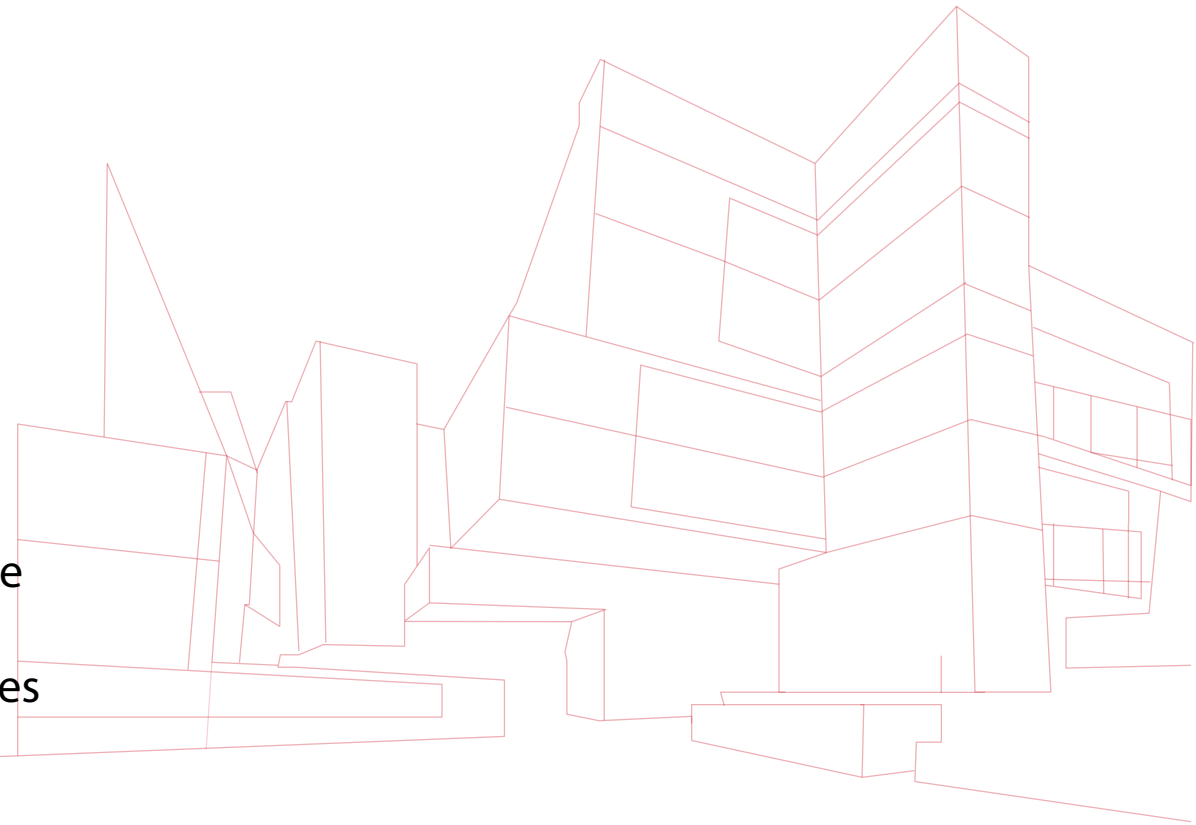
- encouraged the graduate students to adapt diverse tools and techniques, and to develop their own methodology in their future design research projects.
- using templates for the adaptation of tool and method appears to be helpful and engaging for the students
- The EC Guide mainly follows a linear process which is effective for more specific activities but difficult for the research topics to be explored in the long run.
- The adaptation of EC Guide led to the alternative and new stages to be included in this tool such as model making processes and design solution areas for the first case, resource consumption for the second, and physical/digital prototyping stages for the third one.
- Encouraging the participants to take photographs for documenting their experiences was challenging for the researchers, and alternative means of doing this could be searched
- Areas for visualisation is challenging for the participants with no or limited skills for sketching and/or drawing





Conclusions and Insights

- Within the time limitation of the course, the researchers were only able to understand and experience initial constraints of the tool and method, which could be further explored with additional researches or pilot studies.
- For the ERM adaptation, the researchers developed very detailed and thoroughly designed toolkits involving many parts which could be tailored to the participants' needs and preferences for personalization.
- Some of the components of the toolkit can be co-developed and adapted through a more collaborative approach. Some toolkit parts, for instance the waffle structure, was mutually incorporated into the ERM toolkit by diverse researchers. This might also decrease the number of toolkit parts remained unused.
- Need for help while conducting the ERM sessions in terms of audio-visual recordings.
- The adaptation and incorporation of these engaging EC Guide tool and ERM method into the course schedule could potentially help them plan and facilitate their future researches through adapting a more participatory and generative approach.



Thanks a lot.

