

Tourism co-design.

a collaborative design catalogue with design methods, tools and techniques

Nielsen, Tanja; Liburd, Janne

Publication date:
2025

Document version:
Final published version

Document license:
CC BY

Citation for pulished version (APA):
Nielsen, T., & Liburd, J. (2025). *Tourism co-design. a collaborative design catalogue with design methods, tools and techniques*. Syddansk Universitet.

Go to publication entry in University of Southern Denmark's Research Portal

Terms of use

This work is brought to you by the University of Southern Denmark.
Unless otherwise specified it has been shared according to the terms for self-archiving.
If no other license is stated, these terms apply:

- You may download this work for personal use only.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying this open access version

If you believe that this document breaches copyright please contact us providing details and we will investigate your claim.
Please direct all enquiries to puresupport@bib.sdu.dk

TOURISM CO-DESIGN. A Collaborative Design Catalogue with Design Methods, Tools and Techniques

Nielsen, Tanja; Liburd, Janne

Publication date:
2025

Document version:
Accepted manuscript

Document license:
CC BY-NC

Citation for published version (APA):
Nielsen, T., & Liburd, J. (2025). *TOURISM CO-DESIGN. A Collaborative Design Catalogue with Design Methods, Tools and Techniques.*

Go to publication entry in University of Southern Denmark's Research Portal

Terms of use

This work is brought to you by the University of Southern Denmark.
Unless otherwise specified it has been shared according to the terms for self-archiving.
If no other license is stated, these terms apply:

- You may download this work for personal use only.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying this open access version

If you believe that this document breaches copyright please contact us providing details and we will investigate your claim.
Please direct all enquiries to puresupport@bib.sdu.dk



Open access

TOURISM CO-DESIGN

A Collaborative Design Catalogue with Design
Methods, Tools and Techniques

Tanja K. Nielsen and Janne Liburd



CENTRE FOR TOURISM, INNOVATION AND CULTURE (TIC),
UNIVERSITY OF SOUTHERN DENMARK (2019).

TIC is University of Southern Denmark's multidisciplinary research centre with focus on tourism, innovation and culture. The centre is based at the Kolding campus. TIC strives to transform the university to an engaged, collaborative institution where academics and students pursue an unrelenting examination of knowledge, and its uses. TIC defines the university as a centre for a higher order knowledge development, and for collaboration with, and for society. We do this through research-based education, education-based research, and collaborative engagements. We aim to charter new territory in international academe, as well as in multi-level collaboration based on interdisciplinary research with a strong foundation in the Humanities.

TIC engages in research dialogues through both a traditional peer-review publication strategy and through free access to knowledge in progress. Supplementing traditional journal articles, TIC TALKS is TIC's contribution to open access sharing and collaborative development of knowledge.

To cite:

Nielsen, T. K. & Liburd, J. (2019). *TOURISM CO-DESIGN. A Collaborative Design Catalogue with Design Methods, Tools and Techniques*. Kolding: University of Southern Denmark. Center for Tourism, Innovation and Culture. ISBN 978-87-85268-66-2 [CC BY NC](#).

TIC TALKS are provided by Centre for Tourism, Innovation and Culture, University of Southern Denmark

Universitetsparken 1, Kolding, DK-6000

http://www.sdu.dk/en/Om_SDU/Institutter_centre/C_Tik.aspx

Contents

PURPOSE	I
CONTENT.....	I
A TOURISM CO-DESIGN APPROACH.....	II
LIST OF CO-DESIGN METHODS	III
01 CONTEXT MAPPING	4
01 EXAMPLES OF CONTEXT MAPPING TOOLS AND TECHNIQUES	5
02 CREATIVE/GENERATIVE TOOLKITS	6
02 EXAMPLES OF CREATIVE/GENERATIVE TOOLKIT TECHNIQUES	7
03 CULTURAL/DESIGN PROBES.....	8
03 EXAMPLES OF CULTURAL PROBE TOOLS AND TECHNIQUES.....	9
04 DESIGN GAMES	9
04 EXAMPLES OF DESIGN GAME TOOLS AND TECHNIQUES	11
05 DRAMA AND PROPS	12
05 EXAMPLES OF DRAMA AND PROPS TOOLS AND TECHNIQUES	13
06 HACKATHONS	14
06 EXAMPLES OF HACKATHONS TOOLS AND TECHNIQUES	15
07 INSPIRATION CARDS	16
07 EXAMPLES OF INSPIRATION CARDS TOOLS AND TECHNIQUES	17
08 ROLEPLAYING	18
08 EXAMPLES OF ROLEPLAYING TOOLS AND TECHNIQUES.....	19
.....	19
09 SCENARIOS	20
09 EXAMPLES OF SCENARIO TOOLS AND TECHNIQUES	21
10 VIDEO AS DESIGN MATERIALS	22
10 EXAMPLES OF VIDEO AS DESIGN MATERIALS TOOLS AND TECHNIQUES.....	23
REFERENCES	24

Purpose

This open access catalogue presents co-design methods that can engage university students and other actors in collaborative design (or co-design) activities.

The methods in this catalogue provide the opportunities to facilitate conversations and design practices in collaborative projects between, for example, companies, government bodies, NGOs, students and other actors who will ultimately benefit from identifying latent possibilities in existing practices and possible futures.

The power of the design methods and techniques come forth when they are tailored for specific events, purposes and contexts. The catalogue describes and exemplifies design methods such as scenarios, inspiration cards and design games. The catalogue aims to encourage use of the methods and techniques by adapting them to specific events, situations and contexts.

Content

The catalogue contains ten design methods and examples that can be used together or separately. Each description mentions benefits and limitations and how the methods can engage people and materials in a co-design activity. After each description of the method, a page follows with examples of tools and techniques that can be used in the method, including visual representation and with reference to the seminal work.

Each method is presented on a separate page, accompanied with references for further reading and structured alphabetically.

An info-graphic (Martin & Hanington, 2012) on the top right of each page characterises the methods according to the elements of being:

Explorative, generative and/or evaluative in tis primary purpose

Quantitative and/or qualitative approach

User-/human centred, Problem driven, Solution driven, Opportunity oriented, Learning oriented.

These elements do not exclude one another but oftentimes co-exist depending on the context use.

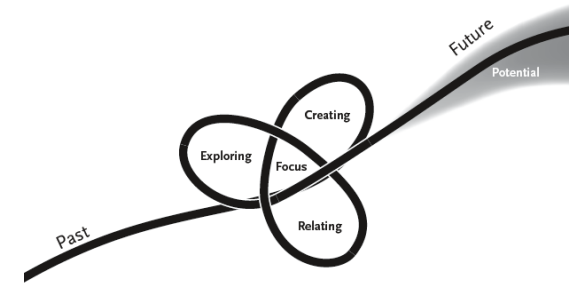
A tourism co-design approach

Collaborative design (co-design) and participatory design (Buur & Matthews, 2008; Sanders & Stappers, 2008) are design approaches that can widen the methodological repertoire of design in tourism research and practice (Heape & Liburd, 2018; Liburd, Nielsen, & Heape, 2017). At the University of Southern Denmark, the MA in International Tourism and Leisure Management and European Master in Tourism Management have successfully adopted and adapted a co-design approach, which educates the master students in future oriented research with departure point in identifying latent opportunities in the interplay between current practices and unknown future practices (Heape & Liburd, 2018).

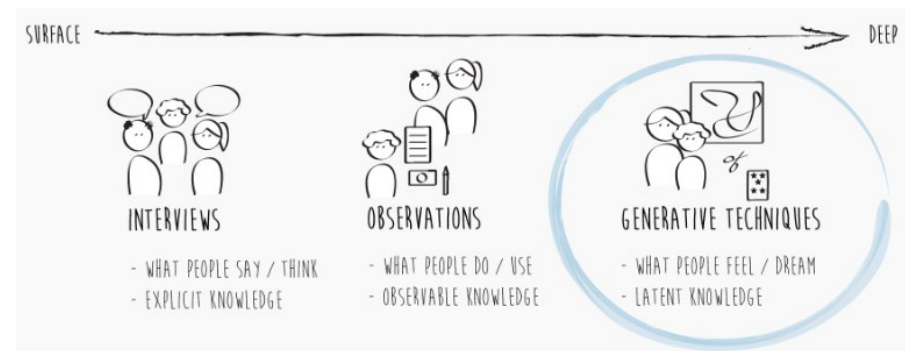
Tourism co-design is practice-based research approach between students, teachers, tourism professionals and other relevant stakeholders, using generative design methods, sometimes in combination with social science or ethnographic approaches, such as interviews and observation studies.

Generative tools (e.g. Sanders, 2000) for co-designing move away from reductionist, product-focused tourism development towards a learning environment that is critical and speculative with a focus on designing *with* others, not *for* them (Heape & Liburd, 2018; Liburd et al., 2017).

Conventional user study techniques, such as interviews involve people in a study but not in an engaging way. The limitation of conventional techniques is that they tend to offer views on people's current or past experiences. Generative techniques focus on potential future experiences by revealing tacit knowledge and identifying latent opportunities, needs, dreams and aspirations (Sanders, 2000).



The illustration is a framework of the aspects of designing. Source: Ylirisku & Buur (2007, p. 17). In the centre is “Focus” bring together the aspects of: Exploring, relating and creating. “Exploring” relates to people’s thoughts on discovery into past, present and future practices. “Relating” refers to activities of connecting the discoveries explored to other materials that are already known and studying the relationships. “Creating” is the activity of forming new ideas and concepts and combine them into concrete structures. The process of designing through and with these aspects are intertwined and iterative (Ylirisku & Buur, 2007).



An illustration of generative research. Courtesy: Priscilla Esser and Interaction Design Foundation, Adapted from Froukje Sleswijk-Visser, Pieter Jan Stappers, Remko van der Lugt, and Elisabeth Sanders, 2005. [Accessed on interaction-design.org]

List of co-design methods

01 Context mapping

02 Creative/generative toolkit

03 Cultural probes

04 Design games

05 Drama and props

06 Hackathons

07 Inspiration cards

08 Roleplaying

09 Scenarios

10 Video as design materials

01 Context Mapping

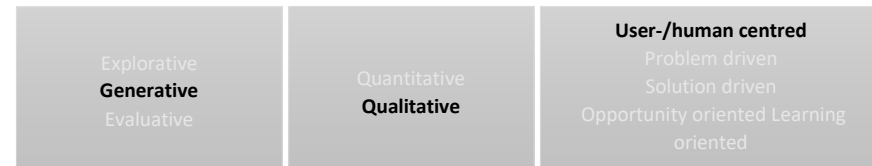
Context mapping is a user-centred approach focused on context use of a product, service or experience which helps a design team and researchers gain deeper insight into needs, dreams and prospects of users. This method is useful for developing existing tourism practices *with* people instead of *for* them.

Mapping the contexts of tourists' interaction with a tourism product, service or experience and the role of contextual information can drive a design process. Context mapping engages (potential) users in a participatory design practice where users and other stakeholders participate in a design process to ensure the resulting tourism products fit the way people actually use the product (experience or service) in their traveling activities.

The method is not merely evaluative by testing existing products or prototypes of developed concepts but explores context and latent needs, dreams and aspirations using generative research, which inspires and informs the early phases of a design process (Visser, Stappers, van der Lugt, & Sanders, 2005). Context mapping activities may explore the contexts of a variety of topics, addressing social, ethical, emotional and functional attributes of user-product interaction in different tourism situations with a product, service or experience.

Further reading

Visser, F. S., Stappers, P. J., van der Lugt, R., & Sanders, E. B.-N. (2005). Contextmapping: experiences from practice. *CoDesign*, 1(2), 119–149.



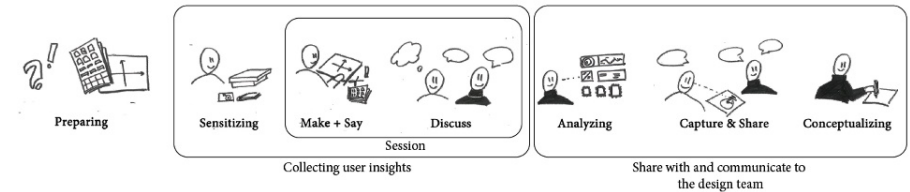
Context mapping activities may explore the contexts of a variety of topics, addressing social, ethical, emotional and functional attributes of user-product interaction in different tourism situations with a product, service or experience.

Context mapping is suitable for university projects, because the design work is done with industry partners to develop real-life cases. The basic principles of context mapping have many components besides time and space as it includes all factors that may influence the experience of context use. These factors depend on its user and on a variety of factors in the environment (Visser, Stappers, van der Lugt, & Sanders, 2005). Identifying the factors requires preparation of mapping out the potential factors with users. Research with real users intends to provide a richer and more dependable view on situations in which tourism products are or will be used. This human centred approach helps (design) researchers to gain empathy with users, avoid fixation on present assumptions about the user or the product (Visser, Stappers, van der Lugt, & Sanders, 2005) and to co-design innovative tourism concepts. The engaging role of users and other stakeholders challenges the design team in finding people willing to become involved and the need for identifying who should be involved and selecting the suitable tools and techniques.

01 Examples of context mapping tools and techniques



Generative techniques elicit emotional responses using cultural probes (for more information see example 03 about cultural/design probes). Collaging toolkit as a generative technique used in practice by SonicRim. See Visser, Stappers, van der Lugt, & Sanders (2005, p. 129).



Stages in the Context Mapping process. Access on contextmapping.com.

The collection of insights is about feelings rather than facts. There is a focus on participants think about the future and what they would like to see differently in the future

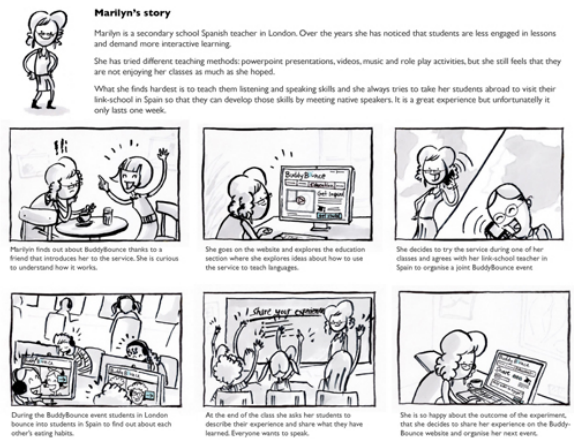
Preparing includes selecting and developing appropriate (cultural) probes) see example 03. Creating a toolkit for design sessions, see example 02, using cultural probes to engage (potential) users and other stakeholders.

Sensitising is a process where participants are triggered and encouraged to think of, reflect on and explore aspects of their personal context.

Sessions are meetings with stakeholders where the design participants do generative exercises, such as a workshop.

Analysis involves the insights gathered from the sessions which may include artefacts created by participants, it may contain stories and anecdotes, photographs and is usually audio or video recorded.

Communication involves sharing the insights as a way to communicate the context mapping process. Instead of traditional written reports, it, the insights are communicated effectively with interactive techniques such as workshops, prototypes and persona displays (see Visser, Stappers, van der Lugt, & Sanders, 2005, p. 123).



Storyboards guide the participants without being prescriptive. Depending on the stage of the design task and research question, the story boards can be developed collaboratively presented with some pre-defined elements and letting the participants add conversations and text in each slot or vice versa. [Accessed via xmag.com.]

02 Creative/generative toolkits

Creative or generative toolkits represent physical packaging elements of several participatory, generative design methods and techniques organised to engage stakeholders (e.g. potential users) in a design activity and to inform and inspire design teams.

Creative toolkits represent packaging elements with a focus on physical design materials, visualisation and creative play between people. Using visual tools, such as Lego (seriousplay.com), can engage people in a creative process of expressing thoughts, experiences, desires, emotions and tacit knowledge in a design activity (Martin & Hanington, 2012; Sanders, 2000).

Creative toolkits are useful for idea generation, activating participants in dialogues and to perform possible use situations or imagine possible scenarios for future tourism situations/activities.

The content of a toolkit is determined by the aim of the design activity and what it aims to encourage. For example ambiguous design elements, such as displaying information that is physically or conceptually blurred can be added or removed to the toolkit to provoke or evoke emotional responses that are intriguing, mysterious and delightful (Gaver, Beaver, & Benford, 2003), sometimes even frustrating to move beyond conventional paths.

Further reading

Sanders, E.-N. (2000). Generative tools for co-designing. In *Collaborative design* (pp. 3–12). Springer.
Sanders, E. B.-N., & Stappers, P. J. (2014). Probes, toolkits and prototypes: three approaches to making in codesigning. *CoDesign*, 10(1), 5–14.
www.maketools.com



Generative tools can be both literal and abstract and the visual components are diverse in the appearance, made up of two-dimensional components (e.g. paper, sketches and photographs) and three dimensional (e.g. Lego or Velcro buttons) (Sanders, 2000).

The challenge for the design researcher or the design team is thus to acquire enough insights into what design tools and methods that exist and adapt and develop a toolkit suitable for a specific context and design task. Creating and refining the toolkit is a design process in itself (Sanders, 2000). It takes time, resources and research.

When using the tools in a design session, the toolkits often require a facilitator to encourage the participants to explore, use and experiment with the tools in a design activity.

02 Examples of creative/generative toolkit techniques

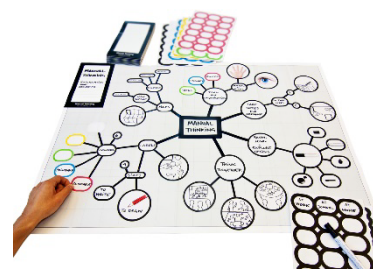
The following examples are used together with other methods in different design activities that draw on marketing research (what people say), applied anthropology (what people do), and participatory design (what people make, tell and enact (cf. Sanders & Stappers, 2014).



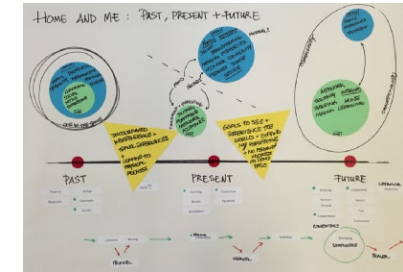
This is an image of “Tools for Dreaming” using shapes and stickers to make spaced for your ideal home experiences. Courtesy: Sanders, 2000.



This is an image of a Velcro-modelling toolkit by SonicRim. Modelling enables participants to embody their ideas, thoughts and emotions or give form to unmet or latent needs and desires (cf. Visser, Stappers, van der Lugt, & Sanders, 2005).



The image to the left: Free mind mapping tool using a few words and symbols . Source: Arrowscan.com.



The image to the right: Past-Now-Future-Mapping. Source: medium.com.



An idea roundtable. Source: medium.com.

03 Cultural/design probes

Cultural probes are used in User-centered design, Co-design and Human Computer Interaction (HCI) communities (Boehner, Vertesi, Sengers, & Dourish, 2007; Sanders & Stappers, 2014).

Probes have been interpreted broadly, for example as an umbrella term that covers different design materials, tools and techniques, such as photo diaries (Boehner et al., 2014), inspiration cards (see example 07) and scenario templates (see example 09). Tools and techniques used in probes and generative toolkits (see example 02) often overlap, because both approaches can serve as a means for dialogue with future users (Sanders & Stappers, 2014).

Probes aim to engage and sometimes provoke design participants (Mattelmäki, 2005). Probes do not have to be cultural. Boehner et al. (2014, p. 1078) call it “x-probes” meaning that “cultural” can be replaced with another topic of interest or to indicate a different style. This could, for example be value probes, empathy probes (e.g. (Mattelmäki, 2005), urban probes, digital probes or other topics relevant to tourism.

Technology probes, in particular, have been influential, designed to collect information around use, usability issues and providing inspiration for designers (Boehner et al., 2014; Sanders & Stappers, 2014).

Further reading

Boehner, K., Vertesi, J., Sengers, P., & Dourish, P. (2007). How HCI interprets the probes. Proceedings of the SIGCHI Conference on Human Factors in Computing Systems - CHI '07, 1077.

Mattelmäki, T. (2005). Applying probes – from inspirational notes to collaborative insights. *CoDesign*, 1(2), 83–102.

Sanders, E. B.-N., & Stappers, P. J. (2014). Probes, toolkits and prototypes: three approaches to making in codesigning. *CoDesign*, 10(1), 5–14.
www.maketools.com



Technology probes are relevant for digital and smart tourism development. Technology probes can be used both in a design process of moving toward a specific design application or tourism product or more broadly to open up new design spaces of latent possibilities in co-design process.

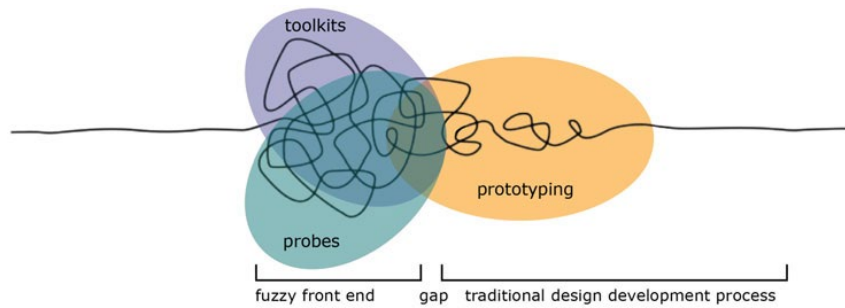
Probes can be used as a means of data collection framing an alternative account of knowledge production (Boehner et al., 2014). Probes are thereby used as a way to collect information, such as feedback on particular needs and design applications.

Probes can be used as a supplement to social science or ethnographic approaches, helping to understand a particular context, user needs, environments and technology use, in ways that engage people with the design process. The probes become a participatory design exercise, when introducing them in a group exercise to facilitate discussion and reflections and help people articulate aspects of, for example, traveling and tourism that they ordinarily do not reflect on. These insights can thereby be used in research and used to redefine ideas for potential tourism offers.

While probes are participatory, they are sometimes in too much control of the designer’s hands (Boehner et al., 2014). However, probes have been described as more enjoyable than traditional surveys and interviews, because they are more engaging, playful and creative in its nature, often focusing on emotional aspects of designing.

03 Examples of cultural probe tools and techniques

Probes are useful in the fuzzy front end of co-designing, for example new tourism concepts before entering the phase of prototyping (e.g. Matthews & Wensveen, 2015).



Source: Sanders & Stappers (2014, p. 9). The original framework: Three approaches to making are located along a timeline of the design process.



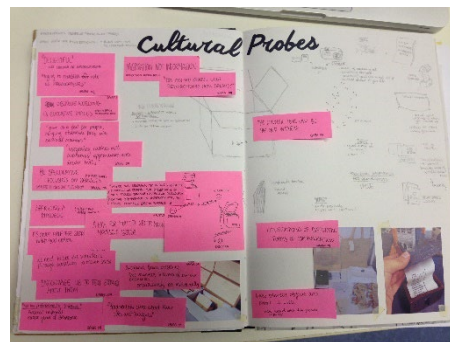
Cultural probes. Source: Pinterest.com



Cultural probes. Source: Medium.com



Cultural probe kit. Source: Medium.com



Cultural probe box. Source: Leannefishler.co.uk

04 Design games

Design games originate from the tradition of participatory design and co-design. The word “game” indicates something playful, sometimes inspired by board games with explicit rules and tangible game pieces (Brandt, 2006). However, design games are not always straight forward with a clear end-goal. Often the outcome of a design game is unknown, depending on the particular context and aim of the game (Vaajakallio, 2012).

Design games can help to stage participation, dialogue and collaboration among participants. Design games aim to make a good foundation for mutual learning between designers and stakeholders (e.g. potential users of a service) (Vaajakallio & Mattelmäki, 2014).

A learning driven design process is often experimental and less about competing. A design team using a design games jointly explores various design possibilities and future alternatives (Vaajakallio & Mattelmäki, 2014).

There are various kinds of exploratory design games (Brandt, 2006). For example, design games can be “negotiation and work-flow oriented”, meaning that they facilitate design practices that intend to explore existing use of a technology or tool in a work setting or work practice (Ehn, 1988).

Further reading

Sanders, E.-N. (2000). Generative tools for co-designing. In *Collaborative design* (pp. 3–12). Springer.
Sanders, E. B.-N., & Stappers, P. J. (2014). Probes, toolkits and prototypes: three approaches to making in codesigning. *CoDesign*, 10(1), 5–14.
www.maketools.com



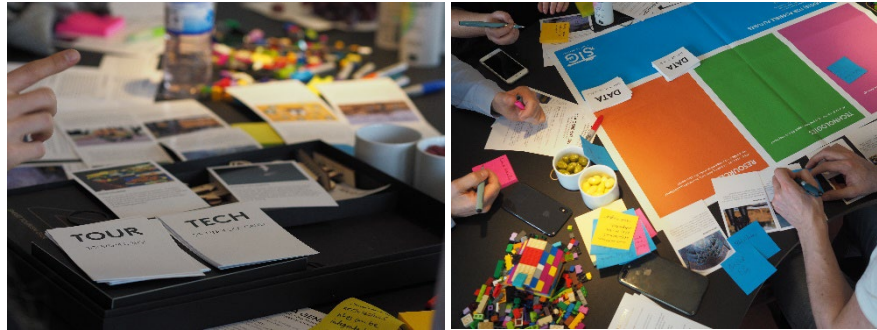
Design games can also be “scenario-oriented” (also see example 09 in the catalogue). These types of games explore “what could be” through imagination and speculation (e.g. Dunne & Raby, 2013) without fixating on complete solutions. Scenario-oriented games often produce several scenarios to change and negotiate new meanings and new possible futures by the players (Brandt, 2006). Consequently, this type of game often holds elements of uncertainty and ambiguity when iterating between existing practices and speculating on new ones (e.g. Dunne & Raby, 2013 on speculative design).

Games can also be used to “conceptualise designing” with the aim to understand, conceptualise and improve designing as a practice, for example, related to building and urban planning (Brandt, 2006, p. 57).

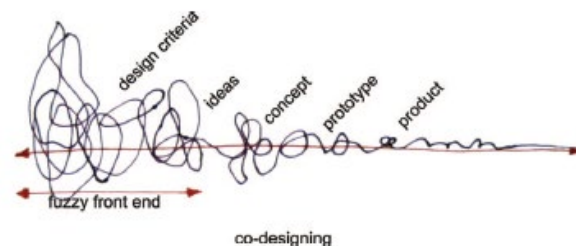
Design games can be constructed by several design methods and tools, such as cultural probes (03) and inspiration cards (example 07) depending on the context and aim. Consequently, there is not one generic exploratory design game (Brandt, 2006).

It can be time-consuming to create a design game and decide what methods and tools that are suitable. However, “making” a design game is a creative design process in itself and oftentimes rewarding, especially in a research context and purpose.

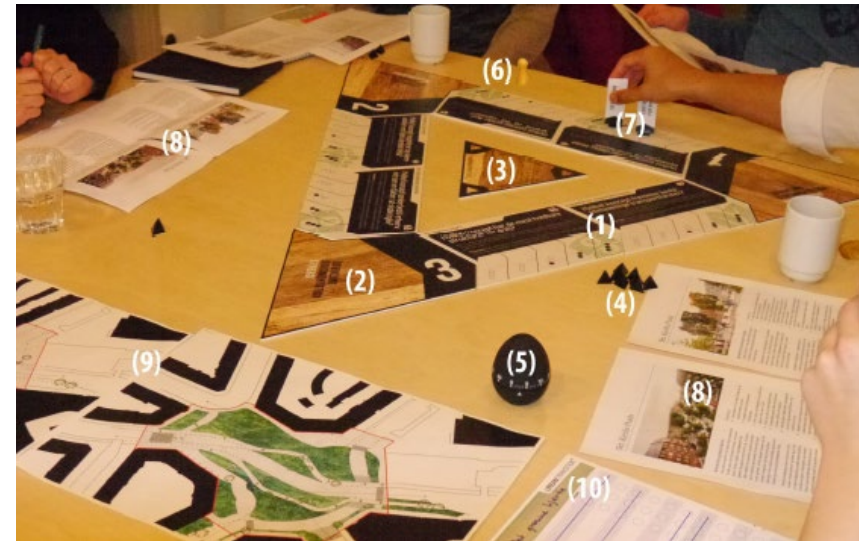
04 Examples of design game tools and techniques



The Smart Tourism Game (STG). Courtesy: Nielsen, 2019. The game aims to facilitate a co-design process in the space of smart tourism. By collaboratively identifying latent opportunities in sociotechnical relations, the game works with elements of experimentation and speculation of possible smart tourism futures. The game includes design methods and techniques such as inspiration cards (see example 07), scenario building (see example 09) and tokens. The game elements are developed to evoke a sense of curiosity and ambiguity. In den games, ambiguity is not negative but can be a resource in design (Gaver, Beaver, & Benford, 2003, p. 233). Design that is evocative can open up to participatory forms of meaning making between players.



The Smart Tourism Game concentrates on the fuzzy front-end of co-designing, also referred to as early stage innovation. Source: Sanders & Stappers (2008, p. 6). The game facilitates a process of co-constructing ideas, understanding current practices, identifying and speculating on latent potentials that guide and inform the remaining co-design process (Nielsen, 2019).



The Urban Transition design game in the specific play situation. Courtesy: Eriksen, Brandt, Mattelmäki, & Vaajakallio (2014, p. 103). The game was played at a municipal renewal office in a “climate change” neighbourhood. A large local square was going to be redesigned as a showcase adapting to future climate change such as torrential rain. An architect from the renewal office was the project manager of the collaborative redesigning process with local citizens, colleagues from his office, and other municipal departments (Eriksen, Brandt, Mattelmäki, & Vaajakallio, 2014, p. 103)..



The Landscape Game. Courtesy: Brandt, E. (2006).

The Landscape game intends to create context for the persons created in a User game (See Brandt, 2006, p. 61). In the Landscape game the task is to create as-if-landscapes for the persons highlighting physical surroundings or elements that augment various activities in the person’s everyday life (Brandt, 2006, p. 62).

05 Drama and props

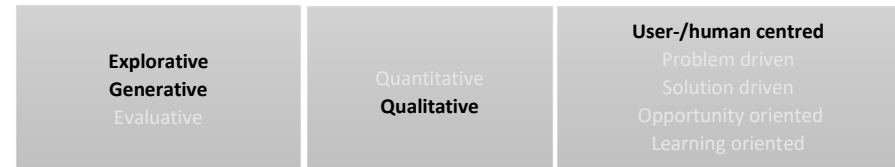
Drama and props can be used for collaborative generation and exploration of design ideas (Brandt & Grunnet, 2000). Drama and props are inspired by theatre techniques as a way of turning the audience (or users in design) from being passive receivers into active participants of a dramatic situation (Brandt & Grunnet, 2000).

Acting techniques, such as roleplaying (see example 08) are important sources of inspiration in design work, known for focusing on empathy for the (potential) user when creating a persona and understanding specific users.

Within the Scandinavian participatory design tradition, the use of drama and props is an approach that engage participants (e.g. users) directly in a design process. Through collaborative meetings between designers (or design researchers) users and other stakeholders, drama can bring different voices in the design process and simple props, such as boxes and chairs can be used when setting the stage for the acting (Brandt & Grunnet, 2000).

Further reading

Sanders, E.-N. (2000). Generative tools for co-designing. In *Collaborative design* (pp. 3–12). Springer.
Sanders, E. B.-N., & Stappers, P. J. (2014). Probes, toolkits and prototypes: three approaches to making in codesigning. *CoDesign*, 10(1), 5–14.
www.maketools.com



When involving participants with different backgrounds, competences and professional language in a design task, a prop can function as a shared object with a core that the people involved in a design situation can relate to and at the same time interpret differently (Brandt, 2006). Props thereby become “things-to-think-with” as they open up for interpretation and reflection from different design participants (Brandt, 2006), for example using props as game pieces in design games (see example 04).

Drama and props can dramatize scenarios (also see example 09 about scenarios) in a simple setting based on field studies incorporated with designers’ own ideas (Brandt & Grunnet, 2000) or the (potential) users can be directly involved in the dramatization, if the users are clearly defined before the scenario construction.

It is easier to improvise when having a specific user in mind. Consequently, this method requires a prior definition of the user or user-context, which is not always the starting point in co-design tasks.

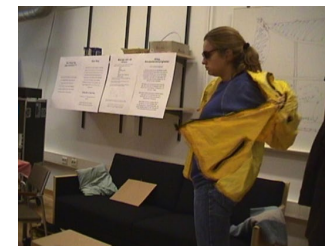
05 Examples of Drama and props tools and techniques



“Things-to-think-with in a Smart Tourism Game (Nielsen, 2019) (also see example 04 about design games). A player is looking for materials to communicate an answer to a question card. The players use selected items as a way to reflect on and articulate their (latent) experiences, feelings and attitudes (Mattelmäki, 2005; Sanders & Stappers, 2014).



Using drama for a Smart Tool project to develop a design concept of a future electronic service tool for refrigeration technicians servicing cooling systems in supermarkets. The participants are able to get a bodily understanding of the work of refrigeration technicians by performing “frozen images”. Courtesy: Brandt & Grunnet, 2000, p. 3. They use drama to understand work situations and to build up characters.



Eric comes home after a long day at work



He watches television. Is the Dynabook part of this situation?

Exploring the sensitivity of modern living. In a simple setting a designer acts out a scenario. “. Courtesy: Brandt & Grunnet, 2000, p. 5.

06 Hackathons

Hackathons are event-based design activities with roots in Silicon Valley. The name stems from a contraction of the word “hack” and “marathon” signifying an intense workshop, often in a short timeframe of one to three days. Hackathons were originally problem solving events for computer programmers and software developers working in large technology companies, hence the name “hacking” (Karlsen & Løvlie, 2017; Porter, Bopp, Gerber, & Volda, 2017). However, hackathons are not about hacking per se. The events intend to gather people in small groups to solve problems and produce (hard/software) prototypes, code, physical artefacts and new concepts with the help of open data and other existing resources (Götzen & Morelli, 2016; D’Ignazio, Hope, Michelson, Churchill, & Zuckerman, 2016).

Today, hackathons are co-design events for rapid innovation adaptable to different settings and problem areas (Briscoe & Mulligan, 2014). Experimental hackathons invite people with various professional backgrounds to form cross-sectoral, interdisciplinary teams (Porter, Bopp, Gerber, & Volda, 2017). Consequently, hackathons do not only produce new code, but also more abstract and intangible outcomes to, for example, support technical expertise, design process experience, social networks, affect, and identity (Porter, Bopp, Gerber, & Volda, 2017, p. 810).

Further reading

Briscoe, G., & Mulligan, C. (2014). Digital Innovation: The Hackathon Phenomenon. 14.
 Komssi, M., Pichlis, D., Raatikainen, M., Kindstrom, K., & Jarvinen, J. (2015). What are Hackathons for? IEEE Software, 32(5), 60–67.
 Taylor, N., & Clarke, L. (2018). Everybody’s Hacking: Participation and the Mainstreaming of Hackathons. 1–12.



Tech-centric hackathons	Focus-centric hackathons
Single-Application hackathons: focus on improving a single application, for example a content management system, an operating system or new programming language.	Socially-oriented hackathons: aim to address or contribute to an issue of social concern, such as public services or crisis management. E.g. improving city transit systems.
Application-type hackathons: focus on a specific platform (genre) such as mobile apps, video game development, or web development.	Demographic-specific hackathons: are intended for programmers from specific demographic groups, such as women, students or teenagers. E.g. addressing gender imbalances.
Technology-specific hackathons: are focused on creating applications that use a specific language, framework or Application Programming Interface (API). E.g. using HTML5.	Company-internal hackathons: aims to encourage new product innovation by their engineering staff. For example, the <i>Like button</i> of Facebook was created as part of their company-internal hackathons.

Sub-categories of hackathon focus. Source Briscoe & Mulligan (2014., p. 5).

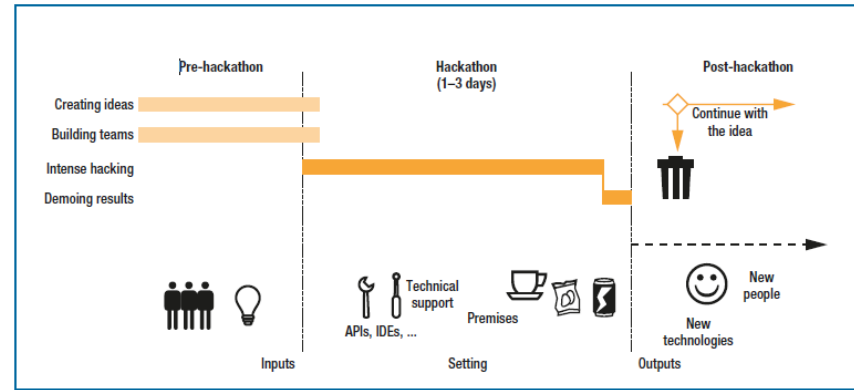
Hackathons can help to foster new partnerships and meaningful connections between stakeholders of the event and encourage teams to engage more deeply with social issues and marginalised user groups.

Hackathons typically require comprehensive planning and resources to put together a successful event with different stakeholders, hackathons participants and sometimes research institutions. This requires a long preparatory process, particularly if participants of collaborating groups include non-IT-skilled people and may need design tools and techniques to work with open data (Morelli, De Götzen, & Simeone, 2018).

06 Examples of Hackathons tools and techniques

“Hack the outdoors” was a hackathon aiming to invent new possibilities for outdoor tourism. In Northern Denmark, this hackathon explored how open data and other data sources might enable new services, possibilities and business cases for enhancing outdoor tourism. The participants worked with local stakeholders who inspired them to work with topics like food, cultural heritage, hiking routes, mountain biking, and other local challenges (Baida, 2018; Morelli et al., 2018).

Hack the outdoors used diverse design tools and techniques such as inspiration cards (see example 07, roleplaying (see example 08) and scenarios (see example 09).



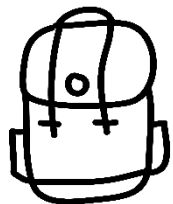
<p>Data techniques DT-01</p> <p>Text analysis</p> <p>Basic text analysis can reveal common words and phrases.</p> <p>INPUT: Longer texts, textfiles, tweets, etc. (paragraphs, topics, etc.)</p> <p>OUTPUT: Word cloud, word count, bigrams, trigrams, etc.</p>	<p>Data techniques DT-02</p> <p>Network analysis</p> <p>Networks can be formed when unique things (like people, companies) are connected to each other.</p> <p>INPUT: Unique values, such as names, companies, etc.</p> <p>OUTPUT: Graphs, network, connectivity maps, etc.</p>	<p>Data techniques DT-03</p> <p>Comparison</p> <p>Comparing two datasets and focusing on the parts that are unique in each, and shared in both.</p> <p>INPUT: At least two target data.</p> <p>OUTPUT: Shared words, unique words of each input.</p>	<p>Data techniques DT-04</p> <p>Map visualization</p> <p>Plotting dots on a map. Data can differ in size/shape based on another data.</p> <p>INPUT: Geolocation, additional data (e.g. number, category, size, unique value).</p> <p>OUTPUT: Map visualization.</p>
<p>Data techniques DT-05</p> <p>Graph visualization</p> <p>Relations between numerical data can be easily shown with common graphs, like bar charts.</p> <p>INPUT: Numbers.</p> <p>OUTPUT: Charts visualization.</p>	<p>Data techniques DT-06</p> <p>Correlation</p> <p>How two variables relate to each other?</p> <p>INPUT: Multiple numbers.</p> <p>OUTPUT: Level of relation.</p>	<p>Data techniques DT-07</p> <p>Basic stats</p> <p>Mean, average, minimum, maximum, total, median, deviation: all basic descriptors of numerical data.</p> <p>INPUT: Big bunch of numbers.</p> <p>OUTPUT: Numbers.</p>	<p>Data techniques DT-08</p> <p>Classification</p> <p>Based on a criteria, categorize different datapoints. Classification is typically done via machine learning algorithms.</p> <p>INPUT: All sort of unsorted data.</p> <p>OUTPUT: Categorized datapoints.</p>

Data cards. This image illustrates data cards used as a tool for the participants in the hackathon: Hack the outdoors, to understand open data, figure out techniques to work with them and negotiate a practice in a group of hackathon participants. Source Morelli, De Götzen, & Simeone (2018, p. 5) retrieved from open4citizens.eu.

The image above is a template for a hackathon process, in terms of the essential activities, phases, and supporting elements. Source: (Komssi, Pichlis, Raatikainen, Kindstrom, & Jarvinen, 2015, p. 61).



Cyclehack is an annual international series of hackathons around cycling, aiming to address barriers to greater uptake of cycling. Rather than an app, a Cycle Hack team produced stencils that could be shared online. The team focused on a less technology-focused idea: a set of stencils that could be used to transform cycle boxes at traffic lights into starting points for races between waiting cyclists. Source: Taylor & Clarke, 2018, p. 3, 6).



Hack the outdoors

3 - 4
November 2017

Aalborg University
Create Building

Surfers, entrepreneurs, gamers,ologists, software developers, travelers, artists, fishermen, scriptwriters, open data enthusiasts, bloggers and our nice citizens... join us for a hackathon that aims to create, inspire and connect our most loyal of outdoor tourists in Northern Denmark! We provide free food, inspiration, concrete ideas, a stack of open data, non-plastic water bottles and pizza!

SPRINTS, OPEN4CITIZENS, GAMERS, COLLEGE, OPEN4CITIZENS, OPEN4CITIZENS

Source: hacktheoutdoors.com

07 Inspiration cards

Inspiration cards function as a generative tool in co-design workshops. Inspiration cards are both visual and verbal, however predominately visual, such as photographs, sketches, three-dimensional materials and stickers to express thoughts, feelings and ideas (Sanders, 2000). They are thereby low-tech, tangible design materials. The cards are instantly recognisable for most participants, because they can be similar to cards in, for example, family board games. The cards bring visual stimuli, sometimes with descriptions and contextual understanding.

Inspiration cards can be used at various stages of a design process, from initial idea generation through ongoing concept development towards implementation and evaluation of design concepts (Lucero, Dalsgaard, Halskov, & Buur, 2016). Inspiration cards are useful to identify latent opportunities in existing and future practices, products, services and other tourism offers.

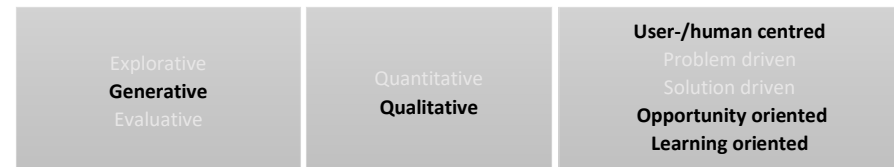
A design team can use inspiration cards to draw upon repertoires of tacit knowledge and prior experiences they have encountered in the past (Nielsen, 2019).

Inspiration cards can facilitate collective creativity between collaborating design participants (Sanders & Stappers, 2008) and bring various sources of inspiration into a design process (Halskov & Dalsgård, 2006).

Further reading

Halskov, K., & Dalsgård, P. (2006). Inspiration card workshops. *Proceedings of the 6th ACM Conference on Designing Interactive Systems - DIS '06*, 2.

Lucero, A., Dalsgaard, P., Halskov, K., & Buur, J. (2016). Designing with Cards. In *Collaboration in Creative Design* (pp. 75–95). Springer.



This makes inspiration cards great tools in co-design, such as functioning as tangible idea containers, triggers of combinatorial creativity, and collaboration enablers (Lucero, Dalsgaard, Halskov, & Buur, 2016).

Inspiration cards can function as props (see example 05) that encourage and support design practices in a visible way, and they are open to ongoing reconfiguration and manipulation in a straightforward manner (Lucero, Dalsgaard, Halskov, & Buur, 2016, p. 75). Inspiration card may also be considered a cultural probe (see example 03) in a toolbox of multiple design tools (see example 02).

An inspiration card can represent, for example, a specific technology (e.g. a smart speaker) and its application. Technology cards are typically created by designers or design researchers for the purpose of a specific project, but they can often be reused or adapted to other projects (Halskov & Dalsgård, 2006).

Inspiration cards can be categorised in (at least) three design card types: PLEX cards, Inspiration Card workshop and Video Card Game (see Halskov & Dalsgård, 2006 for individual descriptions). Also see example 10 in the catalogue about Video Card Game). The three types of design cards may be combined and used in a complementary way at the initial stages of a design process.

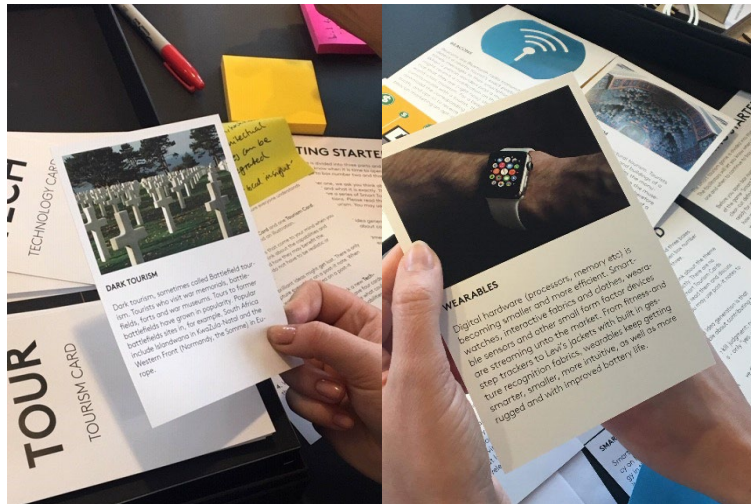
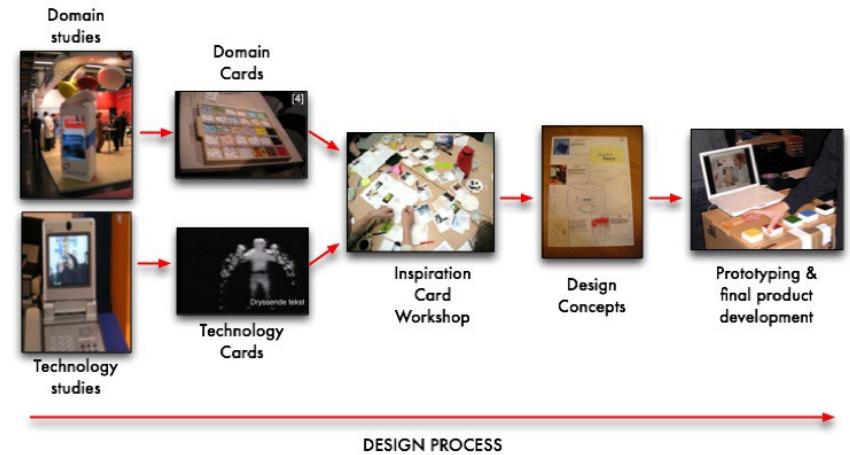
There is a preparatory stage of creating the inspiration cards, so they are ideal for planned co-design workshops.

07 Examples of Inspiration cards tools and techniques



Combining inspiration cards.
 Courtesy: Halskov & Dalsgård, 2006, p. 4)

An Inspiration Card Workshop in the Design Process
 Courtesy: Halskov & Dalsgård, 2006, p. 5).



Tech and Tour cards exercise from a Smart Tourism design Game using an inspiration technique. Source: Nielsen, 2019. (Also see example 04 in the catalogue about design games).



Future scenarios and personas can be co-designed in the form of stories with the use of inspiration cards. In the image above, the participants can construct a story with the cards by positioning them on a large a wall in the order they prefer. Courtesy of Uxmag.com

08 Roleplaying

Roleplaying is an acting technique and bodily design approach that can be used as an important source of inspiration in design work. Roleplaying is future oriented when design participants enter a creative process of asking “what if this character was in this or this situation – how would he/she react (Brandt & Grunnet, 2000, p. 2). And “what if we at this and this element to the situation – what would happen?”. Such questions explore possible scenarios (also see example 09) and possible solutions to accommodate certain needs, desires and aspirations.

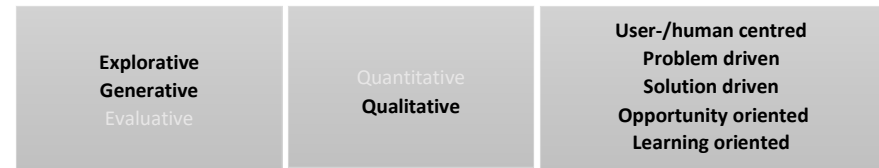
Roleplaying can be used in design games (see example 04) to play different roles such as a tourist and it can be applied in combination with storytelling and prototyping. Roleplaying can be used to create personas for tourism marketing and generate lots of ideas in the beginning of a design process and later on when making prototypes.

A design team can use different design props (see example 03) to stage a “scene” with simple artefacts. For example scenarios (see example 09) can be built collaboratively as a tangible way to discuss qualities and challenges of proposed future situations (Eriksen, 2012). Roleplaying can create a flow of new situations in the interplay between current situations and creating future/potential ones.

Further reading

Eriksen, M. A. (2012). *Material matters in co-designing formatting & staging with participating materials in co-design projects, events & situations.*

Martin, B., & Hanington, B. M. (2012). *Universal methods of design: 100 ways to research complex problems, develop innovative ideas, and design effective solutions.* Beverly, MA: Rockport Publishers.



Roleplaying is a relatively low-cost activity using, for example, simple props (see example 05 about drama and props), such as chairs and a coffee cup. However, sometimes it is enough with the people in the room (Martin & Hanington, 2012). If more complex props are necessary to simulate a situation, then it might be necessary to combine roleplaying with other design methods in a creative toolkit (see example 02) and the documentation may involve video recording, photos and notes.

One of the challenges in roleplaying is to create creditable characters that are not stereotyped, so it remains realistic (Martin & Hanington, 2012). Improvisation is needed and encouraged to assess genuine feelings, which may require the design participants collect enough information to guide the exercise through research, such as interviews and observation studies, or the design team invites (potential) users to participate in the roleplaying.

Furthermore, it can be challenging to use roleplaying when designing for contexts that are unknown in the outset (Brandt & Grunnet, 2000) or when the design participants cannot familiarise themselves with the user or persona. This is when contextual research is deemed necessary.

08 Examples of roleplaying tools and techniques



These are images of members in a design team engaged in roleplaying. In this co-design situation, the participants are enthusiastically roleplaying services for parents with young children. Courtesy: Elizabeth Gerber. Available in Martin & Hanington (2012, p. 149)



03

Group 1 stays – with one of the hard-foam mock-ups

In this group they are the local project manager, the physiotherapist, an industrial design PhD student and a sociologist from two different partner-universities. They rearrange the room, and as it says in the agenda, when roleplaying scenarios, the staff – here the physiotherapist – ‘plays’ himself, while the one from the Malmö team ‘plays’ a patient. The others (and I) observe.



Courtesy: Eriksen, 2012, p. 98. Using roleplaying in co-designing.

09 Scenarios

Scenarios can make design ideas and concepts explicit and concrete. Scenarios help a design team to empathically envision possible futures in which a product, service can be used or how a certain experience or situation can take place. Scenarios can therefore help a design team to focus on actual day-to-day human activity and what technology enables rather than the details of the technology itself (Martin & Hanington, 2012).

Scenarios are flexible and take shape in many variations (Martin & Hanington, 2012). Sometimes they emerge from in-depth analysis in order to identify patterns showing what tourists can do or are likely to do. Scenarios in design activities are (often) intuitive and improvised, represented in narratives with possible future contexts.

Scenarios are anchored in a context and close to existing practices as possible. As a performance, scenario building iteratively moves between the “virtual and real worlds”; in and out of performative worlds and ordinary worlds (Foverskov & Binder, 2009, p. 2). In practice, this is manifested of actions when design participants begin rehearsing and make the first attempts of building up scenarios. Also what is called “make-believe” has been compared to when children dress out and pretend that they are somebody else (Foverskov & Binder, 2009, p. 3), however, not to confuse scenario building with a childish act.

Further reading

Carroll, J. M. (2000). Making use: scenario-based design of human-computer interactions. MIT press.

Selin, C., Kimbell, L., Ramirez, R., & Bhatti, Y. (2015). Scenarios and design: Scoping the dialogue space. *Futures*, 74, 4–17.



Rather, scenarios are shaped by playful performances (Bogers & Sproedt, 2012), by imitating characters, exploring the roles and possibilities and after a while changing to “make-belief” where participants have shaped scenarios and roles so they feel realistic and authentic (Foverskov & Binder, 2009). In these “make-belief” situations, the participants are no longer pretending or imitating but reacting as herself (ibid.)

Scenarios can be acted or written from a persona point of view, for example from a tourist perspective, to frame specific persona’s point of view and reinforce the value of the persona. Scenarios can begin with a trigger event or a certain need or desire.

Scenarios are concrete rather than vague and they are therefore useful to decide what to include or omit from the design. This makes scenarios and design important in shaping and influencing development and strategy work, both for businesses and public policies (Selin, Kimbell, Ramirez, & Bhatti, 2015).

Scenario building in design is a collaborative effort shaped by the field of participatory design (Selin et al., 2015) and co-design. Co-design centred on scenarios has been inspired by, for example, provisional drama and roleplaying (also see example 08 in the catalogue). This can be challenging for people who are not comfortable with theatrical performances or do not take it seriously.

09 Examples of scenario tools and techniques

Scenarios are often supported by design materials and templates such as story boards (e.g. Martin & Hanington, 2012) and by theatrical inspired techniques, such as roleplaying (see example 08) and “what-if” strategies for improvisation. Asking “what-if” provides entry to the “virtual world” (Foverskov & Binder, 2009, p. 4) and generates possible futures in relation to, for example, a (future) product, service or experience.

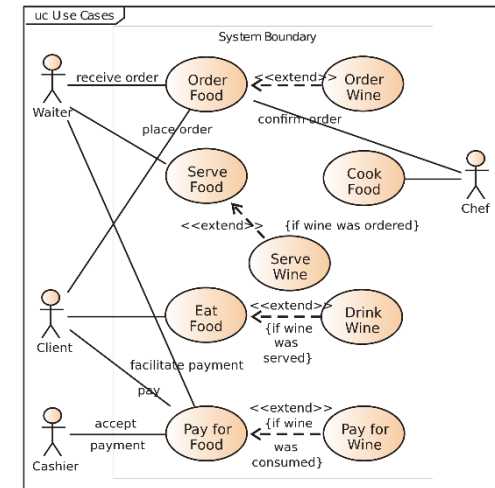


This is a “Scenario poster” in a Smart Tourism design Game (also see example 04 about design games). Courtesy: Nielsen, 2019. In a design game, the players gradually move from ideation and concept search towards concept definition with the help of a scenario poster. Scenarios related to concept definition do not have to be well-crafted solutions. Scenarios can instead function as an extended concept search that goes in details with preliminary design ideas.

The image to the right is a scenario tool for a hackathon event: Hack the outdoors – data driven tourism development in Northern Denmark. Courtesy: Antropologerne (The Anthropologists). Available in Nielsen, 2019. Also see Example 06 in the catalogue about Hackathons. The tool guides the participants in a structured yet flexible and improvised process.

An UML (Unified Modelling Language) as seen here can be used to illustrate user scenarios.

Courtesy: Kishorekumar 62



Projects SCENARIO

By creating the scenario you will outline your thoughts on:

- 1 what challenge you are addressing
- 2 how the solution ideally will function and be used in a situation
- 3 the next steps as to how to get there in praxis

In the three parts of the scenario there are supporting questions for inspiration as to what to describe and illustrate.

- Attempt to make the scenario as visual as possible.
- Feel free to use different medias to illustrate your thoughts on the future scenario, e.g. drawing or a flip over or making as a digital presentation.
- You are welcome to use more than one sheet of paper for each part of the scenario, but aim to keep the scenario simple and to the point.
- The scenario is an early attempt at pitching your idea by describing how it will work.

1

PART 1: THE CHALLENGE

2

PART 2: THE IDEAL SCENARIO

3

PART 3: HOW TO GET THERE

10 Video as design materials

Videos are used as ethnographic material to document field studies and to convey understanding of ‘what is going on’ and studying what people do (Ylirisku & Buur, 2007). Where does video fit into design?

Video is a useful tool in user-centred design and co-design to collaboratively build conceptions of design opportunities while considering real-life context. User-centred design is a design approach to designing products, systems or services *with* people who will use the product instead of *for* them. The development efforts promote active involvement of potential users. This way, designers or design researchers can approach a design task in diverse ways in the context of everyday life surrounding instead of perceiving the product in isolation (Ylirisku & Buur, 2007).

There are no strict structure on the order that the design task follows when designing with video. Ylirisku & Buur (2007, p. 17) suggest a dynamic framework that accommodates the main activities in a user-centred design process while staying connected with real projects. More information on aspects of designing on page ii in the catalogue.

Experiments with video design allow practitioners and researchers to watch a user centred design practice “through the keyhole” and use what they see to evoke reflections on their own practices and how it might be improved (Iversen & Buur, 2003, p. 2).

Further reading

- Buur, J., Fraser, E., Oinonen, S., & Rolfstam, M. (2010). Ethnographic video as design specs.
- Buur, J., & Soendergaard, A. (2000). Video card game: an augmented environment for user centred design discussions. 63–69.
- Caglio, A., & Buur, J. (2012). Creating engagement with old research videos.



Video brings design participants close to the actual design action and the video helps to convey richness of a practice or a particular situation. Video is used as a reflective medium within a design team to enable group work collaboratively, because it establishes materials for dialogues and reflections.

Using video as a design tool can be done in different ways depending on the design task and context, but video documentation can in general be used in a design session to move from discussing observations and interpretations of what participants see in the video clips towards discussing general issues (Iversen & Buur, 2003) and identifying latent potentials of a particular context by learning from what they see. Consequently, design practices with video iterate between current practices and future opportunities.

There are some challenges in the work with video design cases. Unlike business case stories, video sessions cannot easily be turned anonymous in terms of whom appears on in the videos. This requires permissions from designers and participants to use and show the activities to a wider audience. Moreover, a video design case may hold 100 hours of video, in varying quality, which requires editing and analysis when video serves as empirical base for a design activity and research.

10 Examples of video as design materials tools and techniques



The video roadmap provides an overview of 15 video documentaries of 2-3 min duration. The three rows describe activities relating to user involvement (upper row), product functionality (middle row), and interaction experience (lower row) (Iversen & Buur, 2003, p. 5)

Video card game setup

- Work space for 4-15 people
 - a screen or projector for viewing video
 - a table large enough for all to fit
 - a wall for attaching theme posters
- Video cards
 - one card per each video clip
- Video clips
 - 10-15 clips per participant
 - duration of each clip 30 s - 2 min.

Example of video card game setup. Source: Ylirisku & Buur (2007, p. 110).

It is important to provide the participants some broader context, because the only see snippets of the full video material.

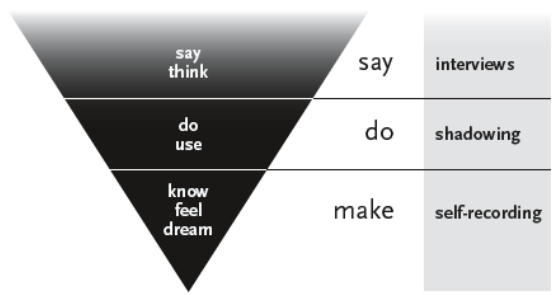


The image to the left is from a Video Card Game by turning video into tangible materials Courtesy: Buur & Soendergaard (2000, p. 63, 105). The cards on the table represent smaller chunks of video materials. The Video card game players construct themes with the video cards.

The image to the right is an example of a video card used in the Danish component manufacturer Danfoss A/S to build a shared understanding through collaborative viewing and discussing the materials without imposing analytical coding categories (Buur & Soendergaard, 2000, p. 64).

Video cards support design discussions, but they have physical limitations such as the participants sitting opposite to the cards will see it upside down and when a person holds a card in their hand, others are not able to see them.

The figure to the right is a framework of integrating video in user-centred design. Courtesy: Sander's (1999) . A "say, do, make" framework and how video study methods relate to it. A refined model is available in Visser et al. (2005).



Available in Ylirisku & Buur (2007, p. 56)

Observing what people do moves into tacit issues that are otherwise hidden in, for example, interviews.

References

Arrowscan: Available on: <https://www.arrowscan.com/difference-between-flow-chart-and-minda-mapping/12-free-mind-mapping-tools-for-a-data-scientist-to-enhance-2/>

Baida, N. (2018, March 31). Designing a workshop series to build and improve citizen data literacy.

Boehner, K., Vertesi, J., Sengers, P., & Dourish, P. (2007). How HCI interprets the probes. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, 1077–1086. ACM.

Bogers, M., & Sproedt, H. (2012). Playful Collaboration (or Not): Using a Game to Grasp the Social Dynamics of Open Innovation in Innovation and Business Education. *Journal of Teaching in International Business*, 23(2), 75–97. <https://doi.org/10.1080/08975930.2012.718702>

Brandt, E. (2006). *Designing Exploratory Design Games a framework for participation in participatory design?* 10.

Brandt, E., & Grunnet, C. (2000). Evoking the future: Drama and props in user centered design. *Proceedings of Participatory Design Conference (PDC 2000)*, 11–20.

Briscoe, G., & Mulligan, C. (2014). *Digital Innovation: The Hackathon Phenomenon*. 14.

Buur, J., & Matthews, B. (2008). Participatory innovation. *International Journal of Innovation Management*, 12(03), 255–273.

Contextmapping.com (2019). Available on: <http://contextmapping.com/about/> [accessed May 23, 2019].

D'Ignazio, C., Hope, A., Brugh, W., Raymond, D., Michelsen, B., Archituv, T., & Zuckerman, E. (2016). *Towards a Feminist Hackathon: The "Make the Breast Pump Not Suck!" Hackathon* » *The Journal of Peer Production. Journal of Peer Production, New perspectives on the implications of peer production for social change*, 16.

Dunne, A., & Raby, F. (2013). *Speculative everything: design, fiction, and social dreaming*. Cambridge, Massachusetts ; London: The MIT Press.

Ehn, P. (1988). *Work-oriented design of computer artifacts* (PhD Thesis). Arbetslivscentrum.

Eriksen, M. A. (2012). *Material matters in co-designing formatting & staging with participating materials in co-design projects, events & situations*.

Foverskov, M., & Binder, T. (2009). Rehearsing the Future: in and out of Scenarios in a Reflective Practicum. *Proc. of the Nordic Design Research Conference*.

Hack the outdoors – data-driven tourism development in Northern Denmark. Available on: <https://hacktheoutdoors.wixsite.com/hacktheoutdoors>. [accessed June 4, 2019].

Halskov, K., & Dalsgård, P. (2006). Inspiration card workshops. *Proceedings of the 6th ACM Conference on Designing Interactive Systems - DIS '06*, 2.

Heape, C., & Liburd, J. (2018). Collaborative Learning for Sustainable Tourism Development. In *Collaboration for sustainable tourism*

development Edt. Liburd, J. & Edwards, D. Oxford, UK: Goodfellow Publishers Limited.

Interaction-design.org (2019). Available on: <https://www.interaction-design.org/literature/article/probes-for-context-mapping-how-to-design-and-use-them> [accessed May 23, 2019].

Karlsen, J., & Løvlie, A. S. (2017). 'You can dance your prototype if you like': independent filmmakers adapting the hackathon. *Digital Creativity*, 28(3), 224–239.

Leannefishler.co.uk (Cultural probes). Available on:

<http://leannefishler.co.uk/?nor-563213c7f20e4=crafting-cultural-probe-boxes>. [accessed June 9, 2019].

Liburd, Nielsen, T., & Heape, C. (2017). Co-Designing Smart Tourism. *European Journal of Tourism Research: Volume 17, Year of Publication: 2017*, 28–42.

Lucero, A., Dalsgaard, P., Halskov, K., & Buur, J. (2016). Designing with Cards. In *Collaboration in Creative Design* (pp. 75–95). Springer.

Martin, B., & Hanington, B. M. (2012). *Universal methods of design: 100 ways to research complex problems, develop innovative ideas, and design effective solutions*. Beverly, MA: Rockport Publishers.

Mattelmäki, T. (2005). Applying probes – from inspirational notes to collaborative insights. *CoDesign*, 1(2), 83–102. <https://doi.org/10.1080/15719880500135821>

Matthews, B., & Wensveen, S. (2015). *Prototypes and prototyping in design research*.

Medium.com. Available on: <https://medium.com/@chow0531/co-design-and-generative-tools-9fc2f9c699ff>

Medium (Cultural Probes). Available on: <https://medium.com/@catherinelegros/designing-cultural-probes-31f2c62b9dcf> [accessed June 9, 2019].

Morelli, N., De Götzen, A., & Simeone, L. (2018). A system of innovation to activate practices on open data: The Open4Citizens project. *Conference on Smart Learning Ecosystems and Regional Development*, 99–109. Springer.

Nielsen, T. K. (2019). Co-designing smart tourism – evoking possible futures through speculation and experimentation. PhD dissertation, Department of Communication and Design, University of Southern Denmark.

Open4citizens.eu. Available on: <http://open4citizens.eu/> [accessed June 3, 2019].

Pinterest (Cultural probes). Available on: <https://www.pinterest.dk/ideesbook/cultural-probes-design-probes-user-diaries-diary-s/> [accessed June 9, 2019].

Porter, E., Bopp, C., Gerber, E., & Volda, A. (2017). *Reappropriating Hackathons: The Production Work of the CHI4Good Day of Service*. 810–814.

Sanders, E. B.-N., & Stappers, P. J. (2008). Co-creation and the new landscapes of design. *CoDesign*, 4(1), 5–18. <https://doi.org/10.1080/15710880701875068>

Sanders, E. B.-N., & Stappers, P. J. (2014). Probes, toolkits and prototypes: three approaches to making in codesigning. *CoDesign*, 10(1), 5–14.

Sanders, E.-N. (2000). Generative tools for co-designing. In *Collaborative design* (pp. 3–12). Springer.

Selin, C., Kimbell, L., Ramirez, R., & Bhatti, Y. (2015). Scenarios and design: Scoping the dialogue space. *Futures*, 74, 4–17.

Uxmag.com (2019). Available on: <https://uxmag.com/articles/creativity-based-research-the-process-of-co-designing-with-users> [accessed May 23, 2019].

Vaajakallio, K. (2012). *Design games as a tool, a mindset and a structure*.

Vaajakallio, K., & Mattelmäki, T. (2014). Design games in codesign: as a tool, a mindset and a structure. *CoDesign*, 10(1), 63–77.

Visser, F. S., Stappers, P. J., van der Lugt, R., & Sanders, E. B.-N. (2005). Contextmapping: experiences from practice. *CoDesign*, 1(2), 119–149.

Ylirisku, S., & Buur, J. (2007). *Designing with video: focusing the user-centred design process*. London: Springer.