link is a digital platform *augmenting the process of sensemaking* within design research.

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»Where is the wisdom we
have lost in knowledge?

Where is the knowledge we
have lost in information?«

—Thomas Stearns Eliot 1934

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Table of Contents

Abstract

With a growing degree of responsibility getting imposed to design, the level of requirement also grows. First of all, design problems are complex problems. This is due to the nature of design problems themselves. If solving problems is trivial and obvious, the problems are no longer problems of design, but rather apparent tasks. (Alexander, 2002, p. 26)

Further, we experience how the complexity of the design problems is growing due to increasingly complex systems, cross-linked data sets, and incomprehensible boundaries, constraints, and coherence.

Navigating within this complexity and trying to make sense out of all the constituents of the corresponding problem space is a challenging task, or to put in the words of Jon Kolko (2015), a design researcher and design theorist, design is about organizing complexity and finding clarity in chaos (Kolko, 2010, p. 15). Finding this clarity, meaning making sense out of data is a crucial aspect for the process of innovation. Right here, design research as a discipline comes into play.

It is a discipline that deals with understanding and learning from human behaviors, drawing novel meaning from it and eventually informing decision-making.

With this project we want to investigate the process of sensemaking in the context of design research and aim to create a framework that enables designers to augment their capabilities in comprehending, managing, structuring and analyzing complex data — to subsequently be able to develop better insights. It is an approach to close the gap between the complexity of large design problems and the bounds to human's cognitive and creative capacity (Alexander, 2002, p. 5).

A Note on Naming

The following definitions are important terminologies in the context of this thesis. They are references helping to obtain shared understanding, rather than universal definitions.

Data

Data refers to any discrete unit of content that is gathered or produced during the process of design research. This includes written notes, transcripts, observations, photography, video, or audio files. The content of these mediums may be factual or opinion-driven.

Information

In contrast, *information* is processed data that is organized, structured or put into context. Information can be thought of as meaningful data deriving from the raw facts and details.

Insight

Insights refers to information that has been reorganized in a way that it reveals new perspectives, patterns, or ideas, all from which novel meaning can be drawn. The difference between a finding and an insight is not always apparent. Generally, insights should inform decision-making and inspire subsequent steps of the respective process.

Sensemaking

In the context of design research, sensemaking refers to the process of the designers' effort to construct sense out of all the collected data which offers vital progress for the problem solution, according to his understanding. Typically, sensemaking is an internal, personal, and subconscious process.

Design Researcher

Designer or *Design Researcher* refers to any person conducting and applying design research, whether based on formal training or not.

User

In the first part of this thesis — when we define the context and talk about research results — we refer to *users* as the primary subject of investigation of a design research project. Later on, when we describe our core concept and the user interface, we mean by the term *user* the design researcher himself, as he is then the subject of our project objective.

Context / Through secondary research, we got an overview of the many facets of design research and how it is being applied in practice. Moreover, we analyzed the current research on the process of synthesis, in order to grasp the challenges we want to tackle.

↳ Design Research

Design Research is a fundamental part of the human-centered design process. The discipline deals with understanding and learning from human behavior, drawing novel meaning from it and eventually inform decision-making. In order to understand and to frame the problem, we investigated the process of design research and defined what we mean by it.

A Brief Overview of Design Research

What we mean by design research

Design research is a research activity that is related to design — it is exploratory and is both a way of inquiring and a way of producing new knowledge (Frankel & Racine, 2010, p. 3). The term 'design research' itself comes with a variety of meanings, connotations, and expectations, all depending on the area of subject, but when designers nowadays refer to design research, they typically mean research, which constitutes an integral part of the design work itself, an investigation *for* designing and *not about* design (Chakraborty, 2017).

Overview of the process

In the context of human-centered design, the role of design research is mainly about learning from people and to emphasize people, rather than technology or business (Kolko, 2015, p. 34). By putting humans to the center of their design approach, design researchers can gain empathy for the people they are trying to reach, which enable them to uncover unmet needs and to understand their motivations.

Design research as an activity focuses largely on understanding the problem and the people one is designing for, in order to transform revealed insights into tangible and actionable solutions to challenge complex problems (Visocky O'Grady & Visocky O'Grady, 2017, p. 12).

»The goal of design research isn't to collect data — it's to synthezise information and provide insights and guidance that leads to action.«

(Suri & IDEO, 2015, p. 41)

Design research usually takes place at the beginning of every design process. It starts off by understanding and framing the problem from a human-centered perspective. The project goals are then translated into research questions, which will drive the data collection. Information is mainly gathered through qualitative methodologies, to then draw novel meaning from it. Design researchers try to uncover patterns within data and to develop insights that will inspire and inform decisions.

What design research can do

Design research activities can make problems transparent. They help all participants exploring the context, defining an audience, understanding the requirements, and providing a solid foundation for decisions, inspire them, reducing risk of failure, and measure the effectiveness.

»Informed decisions— based on research instead of an intuitive best guess—amplify the power of the artifacts they create«

(Visocky O'Grady & Visocky O'Grady, 2017, p. 12)

Furthermore, Design Research is used as a tool for communications and storytelling. »It can provide a platform for the client and designer to agree on project goals, scope, and audience« (Visocky O'Grady & Visocky O'Grady, 2017, p.12). Information developed out of design research helps to communicate the direction and vision, track the progress and helps outline concepts and support rationale with stakeholders and partners. This process cannot guarantee success, but it can predict and influence a project's success and be an indicator of imminent failure.

Design research is often overlooked

As stated in the previous paragraph, research is considered an essential factor when designing services or products from a human-centered approach. Nevertheless, it is often difficult to fully utilize and to communicate the value of design research.

In general, research wants to be actionable, influence decisions, and have an impact. However, this sounds more simple than it is. Frequently, design research results sit in a drawer, unused and unappreciated. (Torrey, 2017)

When communicating the result of a design or concept, designers often fail to emphasize on what drove the design decisions. In that sense, design research is often overlooked. There is a lack of transparency regarding the importance of conducting design research to inform decision making.

This lack results in a surface level-understanding on the client's side, which sometimes causes disagreement, misled or concepts and ideas which soon get lost in the customer's desk. Due to the fact that the role of design research still not gets recognized in most projects, design researchers have to advocate for their discipline and raise awareness for its relevance.

Types of Design Research

There are many approaches and types of design research that can be applied in a design project. For our thesis, we want to focus on the most common types, which also illustrate the variance of the different types the best — evaluative design research and generative design research. In practice, these two types differ quite a lot from each other, both in their approaches and methodologies being used, as well as in their application to the design process.

A *generative design research* approach is usually applied in the first stage of the design process. Its goal is to collect and to synthesize information and to generate insights that will inform the further decision-making process. Typical outcomes of this approach can be opportunity areas, principles, experience frameworks, personas or, journey maps.

An *evaluative design research* approach is applied to test and iterate on initial concepts or already existing solutions. Once the insights have been developed through synthesis, the ideation phase begins, in which initial ideas are being created based on hypothesis and the research findings. These initial concepts are then evaluated by testing them in an iterative process with potential users. The goal of this approach is to challenge potential solutions, to prove or to disprove hypotheses and assumptions, and to validate whether the needs of the users are met.

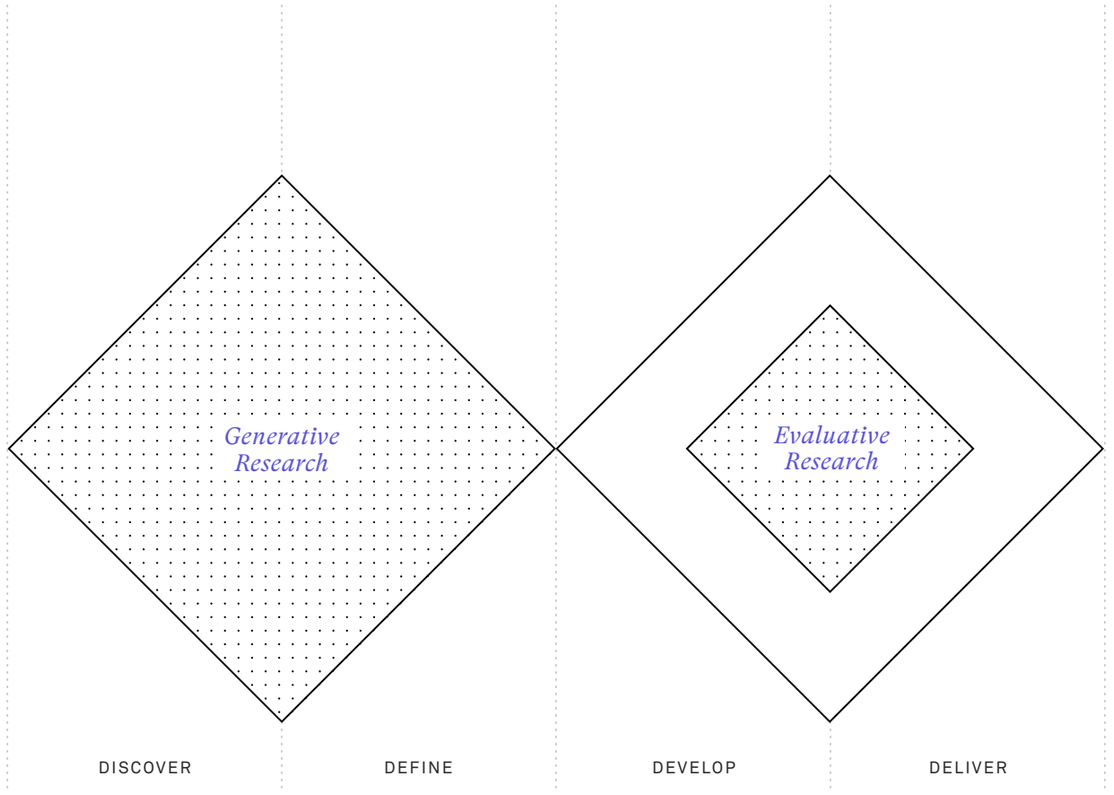


Fig. 01 **Types of design research**

↳ The Process of Design Research

The process of design research can be divided into multiple phases which cannot be seen separated from each other, but rather are interdependent and fluid in its transitions. The following chapter emphasizes the main activities and goals of each phase and provides an overview of the design researcher’s journey.

The Process of Design Research

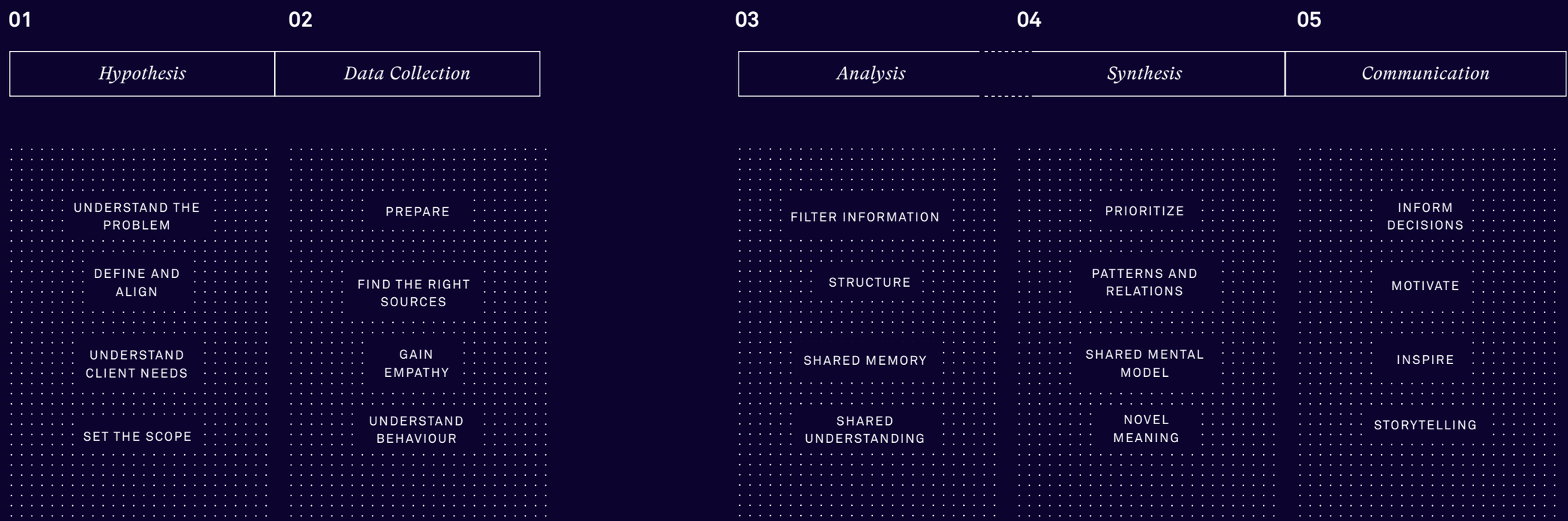


Fig. 02 **The process of design research**

01 Hypothesis

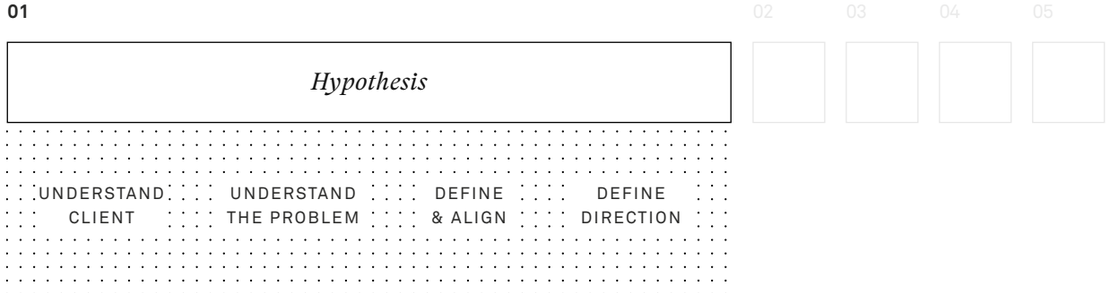


Fig. 03 **Phases of design research I**

The term *research* describes any »systematic inquiry directed towards the creation of knowledge« (Groat & Wang, 2013, p. 8) which, in the context of design research, aims to be the informing basis for the problem solution of a certain kind. In order to solve a problem, it must be defined whereby the spectrum of subsequent solutions gets influenced to a large extent: »The determination of the unfortunate initial state is a central component of the problem definition« (Schönwandt, 2013, p. 13).

In contrast to academic research, the objective is not to state an initial hypothesis, which subsequently gets proven or disproved by scientific substance.

Instead, this first step is a useful way to frame the direction of the research project, given the existing assumptions or early concepts. (Chipchase, 2017, p. 40 ff.)

In order to be able to define the project's goal and thus necessary strategies, the preliminary problem definition needs to be re-framed together with clients or further stakeholders. The purpose of this is to gain a shared understanding of both the scope and format of the outcome — everyone needs to move to the same direction.

Secondary research solely focuses on the analysis of already existing research e.g. reports, paper, articles

See also → **Interviews** (p. 53)

Preparation and Secondary Research

As the description of the term 'research' suggests, it is a planned investigation. Before going into the field and gathering data, it might be useful to do some preparatory work and planning.

On occasion, time and money allow conducting *secondary research* in the form of desk research (articles, papers, reports) in order to obtain a rough contextual understanding of the problem space one is dealing with. Though, the value created is rather small, as we noticed during our *field research* because the problem definitions one is facing are mostly too specific.

Based on the research objective and the knowledge gained through secondary methodologies, research questions are developed which should guide and inform the process of collecting primary research data in a systematic manner.

Therefore, the researcher has to choose the right strategy and methods to gather valuable data. In the context of Groat's and Wang's (2013) discussion on research, a strategy is the design of the research as an action plan which defines the road map between the research question and desired knowledge, whereas the methods refer to a more detailed application of specific techniques (Groat & Wang, 2013, p. 10).

The applied approach hardly differs depending on the type and scope of a project: From hypothesis to concept development, product testing or simple foundational research – conditional to the research strategy, it may be more appropriate to use several methods that provide quantitative, qualitative, or both types of data to answer a research question.

02 Data Collection

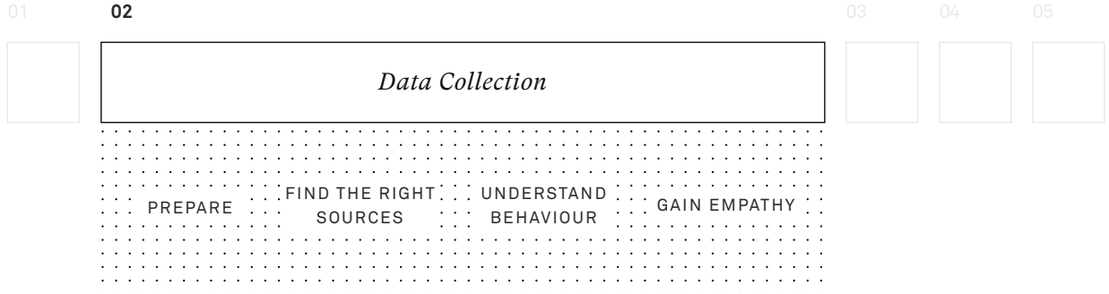


Fig. 04 **Phases of design research II**

During this phase, the researcher engages specifically with the subject of study - in the domain of human-centered design, this usually means observing and talking to people in their typical environment. The primary aim is to collect specific data the researcher otherwise could not have obtained from secondary research, like underlying motivations, challenges, subconscious fears, or simply needs the users themselves cannot articulate.

Whilst quantitative research data can help to answer questions starting with ‘What’, ‘Where’ or ‘How’, qualitative research data is specialized in answering ‘Why’. Both approaches can be symbiotically combined to benefit from each other. For instance, quantitative research can be used to cover a broad spectrum to function as a spotlight for qualitative methods. On the other hand, qualitative research can be utilized to develop new hypothesis and concepts, which then can be validated by qualitative methods. Both approaches have their pros and cons, though it has shown that qualitative research is more valuable for the process of innovation.

Quantitative Research

»Quantitative research involves objective and systematic data collection and analysis in the form of quantitative measures that are statistically valid« (Frankel & Racine, 2010, p. 5). The objective of quantitative research is to indicate a representation or set of statistically relevant predictions about what the investigated audience might do or what they might think (Kolko, 2015, p. 33). Quantitative research like, written surveys, demographics, statistical analyses, anthropometrics, structural testing, and standardized tests, are conducted indirectly or off-site and results in numbers or facts.

Qualitative Research

Qualitative activities in contrast study people and things »in their natural settings, attempting to make sense of, or interpret, phenomena in terms of the meanings people bring to them« (Denzin, Lincoln, & Sage Publications, 2005, p. 3). Qualitative research attempts to reveal the non-obvious that lies beneath the surface. It aims to discover and understand deeper perceptions, opinions, beliefs, and attitudes.

There are many different types of qualitative research methods such as focus groups, ethnographic research, cultural probes or participant diaries, all of which are used frequently. However, the most prominent activity, getting applied as part as almost every design research project is the practice of interviewing, may it be contextual, in-depth or exploratory. As mentioned earlier, these methods do not aim for universally valid, statistically correct or reproducible results, but carry significant value to the problem solution.

03 Analysis

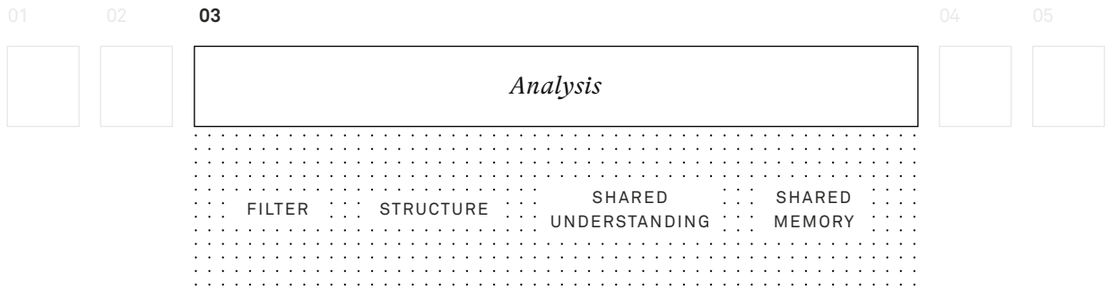


Fig. 05 **Phases of design research III**

The data collection produces a lot of information which Elizabeth Goodman, Mike Kuniavsky and Andrea Moed allegorically call »the wall of data« (Goodman, Kuniavsky, & Moed, 2012, p. 423). The next step in the process is then add meaning to the data and thereby transform it from data to information.

»Data analysis starts immediately as one (naturally) tries to identify patterns as soon as one has even a single unit of information« (Goodman, Kuniavsky, & Moed, 2012, p. 425). Collected Information residing in the head of the researcher needs to be shared and discussed after each session and day, which helps everyone within the team to immediately incubate and process it. Otherwise, significant details can be forgotten as data degradation immediately starts seconds after a session. *Downloaded* experiences and perceptions need to be as recent as possible in order to avoid presumptions and judgment.

Download refers to the act of extracting and summarizing information from notes taken after after a design research activity (e.g. an interview)

This involves sorting and processing notes, audio files, transcripts, sketches, and other research artifacts into a format which the design team can work on together. The analysis allows the team to systematically break down information to obtain an overview of its parts.

A **code** or label is a word or short phrase that describes a piece of data. Codes can indicate whatever makes sense for the analysis.

Facing the challenging comprehension and complexity of the research wall, the data needs to be organized and cleaned up. During debriefs, but also when the data collection is already completed, the shared information gets annotated or *coded* with descriptive labels. A well-managed data collection methodology allows to retrieve at a later point in time as well as to categorize into code groups forming the backbone of analysis.

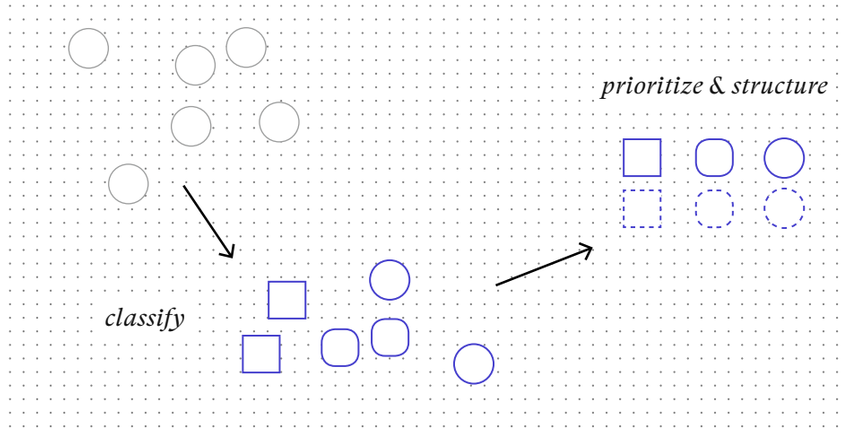


Figure 06 **A model of analysis**

04 Synthesis

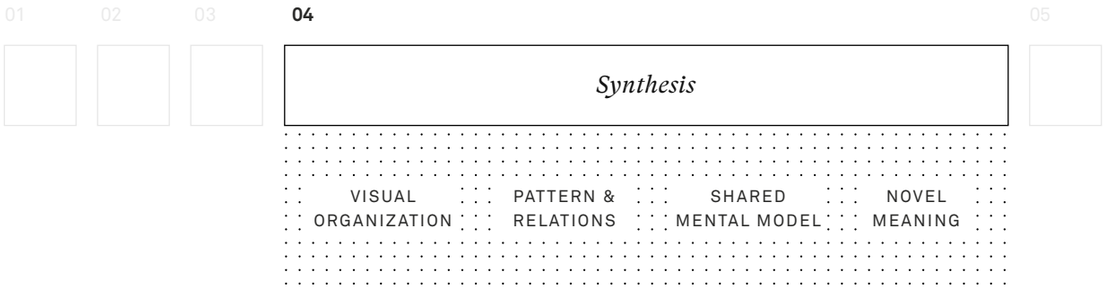


Fig. 07 **Phases of design research IV**

The preceding *objective* analysis of the research artifacts must be seen as a fundamental component, to continue with the more *subjective* synthesis. As the team has arrived at a state of common knowledge – slowly making sense of all the obtained data – it now can reorganize the data so that it reveals unseen patterns and abstract relationships.

»Synthesis requires a designer to forge connections between seemingly unrelated issues through a process of selective pruning and visual organization« (Kolko, 2010p. 18). This part of the design research process is extremely difficult and requires the most cognitive power as »filtering, organizing, and sensemaking of uncertain and ambiguous information is complicated and exhausting« (Gumienny, Lindberg, & Meinel, 2011, p. 1). These activities are not only grounded in the empirical realities of their observations and interviews but the researcher in person, plays a vital role in interpreting and making sense of that data (Groat & Wang, 2013, p. 219).

Encountered in practice, synthesis can be carried out at home or in the field, nevertheless, plenty of wall-space is needed in both cases. This way, the entirety can be seen at once, which will help to uncover implicit and hidden meanings. »Frameworks are proposed, and as connections become apparent, validity converges. The data wall has sufficient context to be shareable in distilled form and be understood outside of the research team« (Chipchase, 2017, p. 377). When reaching this point the ultimate goal of the research – insights – is not far anymore. The team finally has arrived »at a principle, a theory, or a story« (Kolko, 2011, p. 65) that desirably should be novel, inspiring, and further actionable for developing the concrete problem solution.

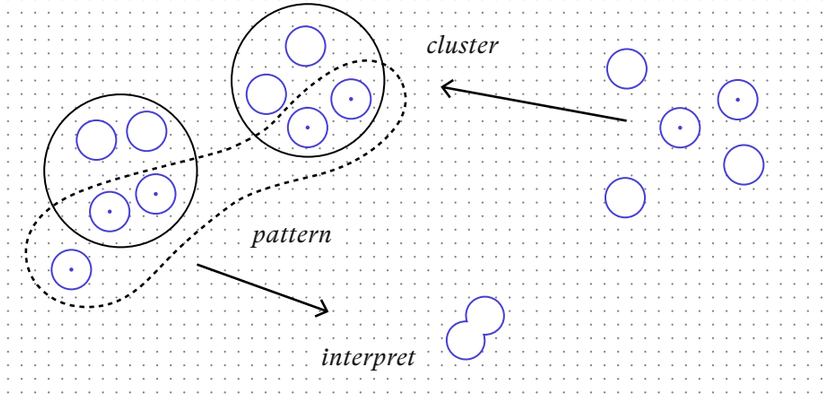


Fig. 08 **A model of synthesis**

05 Communication

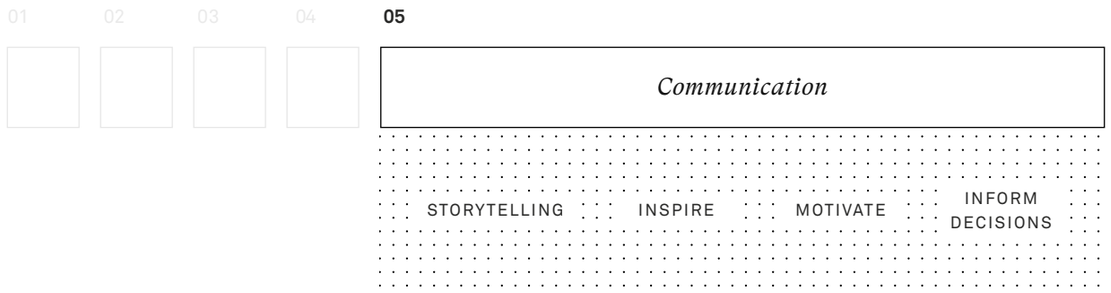


Fig. 09 **Phases of design research V**

Eventually, the last step involves handing over developed insights to the client or other stakeholders. This includes internal colleagues, that are staffed to continue with the project, doing ideation and implementation. In any case, the discovered is shared with other people. Jan Chipchase (2017) points out the importance of this part in order to be able to evangelize a point of view (Chipchase, 2017, p. 411).

Therefore the research findings need to be summarized in a coherent way that communicates to an audience and translates the vividness of the research into a strong motivation for creating concrete design solutions. Thereby it is »less important to be accurate and more important to give some abstract and tangible form to the ideas.« (Baylé, 2018)

The entire work of the team is rendered almost pointless by a poorly thought-out sharing process. The ability to tell a great story is an indispensable asset of the design research movement (Chipchase, 2017, pp. 411–412). However, incubating the story and how it came into being plays an important part in effective storytelling.

When presenting this story, several possibilities are available. Mostly the final delivery happens in the form of workshops with wall-sized posters, digital slide decks, and summarised research reports. »To understand the impact research can have requires an appreciation of how content ebbs and flows in an organization, how ideas are passed from person to person and adopted, and how institutions internalize information, politics, and an acute sense of [...] timing« (Chipchase, 2017, p. 411).

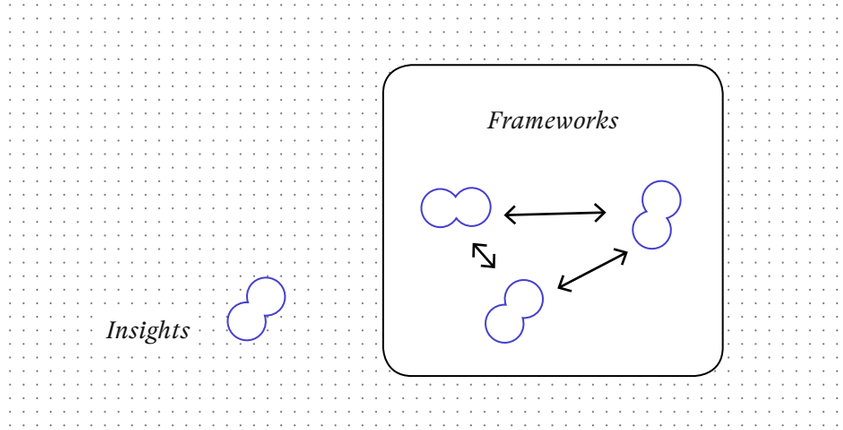


Fig. 10 **A model of communication**

Conclusion

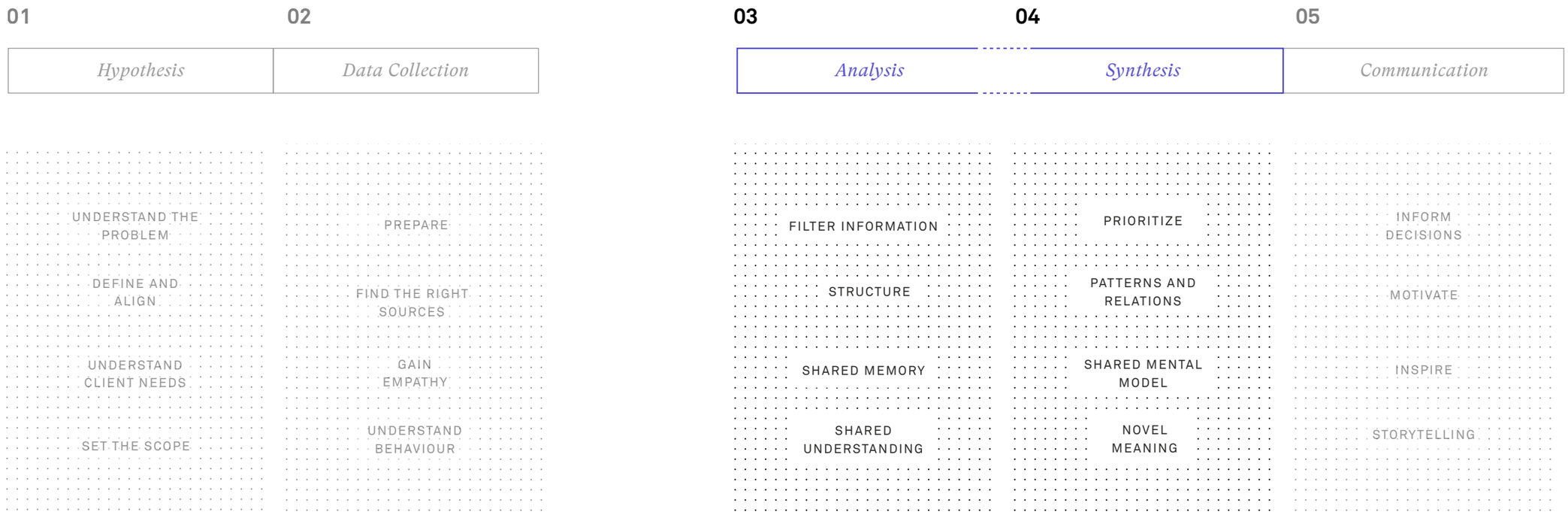


Figure 11 **Area of focus**

As mentioned above, the process of synthesis is the most complex and the one representing the most integral activity of design research. In order to highlight this part, we decided to further explore the underlying theory in the next chapter to fully grasp the nature of synthesis and understand where and how the majority of the problems occurring throughout the design process originate.

↳ A Theory of Synthesis

In practice, the process of synthesis is facing various challenges that are rooted in the theory of itself. Therefore, a thorough investigation of this theory is important, as it taps deeply into the way how designers think and work during design research.

The Nature of Synthesis

During analysis and synthesis, designers attempt »to organize, manipulate, prune and filter gathered data into a cohesive structure« (Kolko, 2007, p. 1) so that »it reveals new perspectives, patterns of behavior, ideas, and abstract relationships« (Chipchase, 2017, p. 377). »Yet despite the acknowledged importance of this phase of the design process, synthesis appears magical when encountered in professional practice« (Kolko, 2015, p. xi).

Due to the fact that the act of synthesis — to what Kolko (2015) further refers to as the »revelation of clarity« (Kolko, 2015, p. 3) — is often performed privately („in the head" or „on scratch paper"), the outcome is all that can be observed. To an outsider, typically a client, it can be challenging to comprehend how the output (insights themes and design ideas) was derived from the initial input (research data).

Even if the activities described above can be well structured (though they are commonly not), and strategy and methods can be repeated and explained, the absence of understandable documentation contributes to the sense of magic – as such design research sometimes appears for an external observer.

Additionally, synthesis has not been a major focus in the past of design research, although the importance of information synthesis is widely acknowledged which might explain a certain lack of formalized methodology and a general understanding of the process itself (Gumienny, Lindberg, & Meinel, 2011, p. 1).

Collective sensemaking

The understanding of synthesis as a form of information analysis is sometimes associated with the term sensemaking (Pirolli & Card, 2005, p. 2).

Sensemaking describes the natural human effort to construct sense of one's experiences and to embed these into their understanding of the world around them. This effort can be seen among people, places, and events focussing on their interplay or impact (Klein, Moon, & Hoffman, 2006, p. 71). In the case of the design researcher, the aim is to make sense of all the present data and information that — according to his understanding — can offer vital progress for the problem solution.

One of the characteristics of sensemaking is that it typically describes »an internal, personal process, while synthesis can be a collaborative, external process« (Kolko, 2010, p. 18). Personal formed thoughts that take place in the mind of each individual are implicit due to the cognitive psychological nature and only become accessible to others once they leave the head and are brought into a form of the physical world. This means that during synthesis one jumps between an individual and shared knowledge acquisition in order to gain a personal and collective understanding at the same time. The problem with this »jump« is that things have different meanings for different people: the understanding I've attained, might not be the same understanding for somebody else requiring continuous alignment throughout the whole process. Therefore, synthesis is a collective sensemaking process.

Types of Reasoning

Types of reasoning

Filtering, organizing, and prioritizing uncertain and ambiguous information is at its core decision-making. Deciding what unit of information is more related to a particular cluster, deciding why a post-it is treated with higher priority, deciding why a whole data set gets discarded – the underlying principle of decision-making is called reasoning (Holyoak & Morrison, 2013, p. 270). There are three types of reasoning that can be distinguished: Deduction, Induction, and Abduction.

Deduction is derived from a general rule and offers a guaranteed correct conclusion. If the premises are true, the conclusion is also true. This form of inference is mainly used in mathematics or other areas that make use of hierarchical logic.

Induction, on the other hand, applies a bottom-to-top approach. It tries to pile up evidence from single spotted observations to suggest a general rule that is likely, but not certain. If several premises are true, the conclusion is merely likely.

Unlike induction or deduction, abduction refers above all to the experience and thus intuition of the designer. This implies that decisions are not clearly based on sound evidence or general rules but instead guided by »learned understanding and respect of process, molded by experience and refined over a great deal of time and practice« (Kolko, 2011, p. 59).

Abduction is a more heuristic approach to explaining a phenomenon without guaranteeing to be solidly substantiated, logical or rational but offering the best possible explanation of how something might be.

Where the given data is incomplete, making the *one correct solution* is impossible. Designers then make their best guess based on what they saw (research) and what they know explicitly and implicitly (knowledge and intuition). Additionally, abduction differs in the means that it supports the gaining of novel knowledge and insight. »The abductive process can be creative, intuitive, even revolutionary. Einstein's work, for example, was not just inductive and deductive but involved a creative leap of imagination and visualization that scarcely seemed warranted by the mere observation[...]« (McKeever, 2016).

In the context of design synthesis, it is above all the latter method that is applied and tends to stand in opposition to the other types of interference. Therefore, synthesis is an »abductive sensemaking process« (Kolko, 2010, p. 19).

Deduction	**Induction**	**Abduction**
When it rains, things outside get wet.	The grass got wet numerous times when it rained.	When it rains, the grass gets wet.
The grass is outside. Therefore: when it rains, the grass gets wet.	Therefore: the grass always gets wet when it rains.	The grass is wet. Therefore: it **might** have rained. (also possible: sprinklers, floods, ...)
driven by general rules, laws	driven by sound evidence	driven by experience, intuition
General rule → Specific conclusion	Specific conclusion → General rule	Incomplete observation → Best prediction

↳ Challenges of Synthesis

The nature of synthesis and the way how design research is applied in practice leads to a set of challenges and problems that we identified through secondary research and on the basis of our own experience in this domain. These challenges represent the basis for our project, and they were the starting point for the research questions and hypothesis, that we used in the interviews we conducted.

Challenges of Synthesis

A Lack of Formality

While design synthesis can be very technical, it is still primarily a cognitive activity that mostly happens privately in the realm of one's head. Kolko (2015) describes the whole sensemaking process as chaotic and messy because insights are »usually drawn in the midst of deep and reflective thinking« (Kolko, 2015, p. xiii) and then shared with the team. The applied methods are rarely formalized, whereby inexperienced designers often face overload and stumble through the process without any guidance.

Also, working materials like sketches, incomplete phrases, or crude diagrams get mixed and refined over time. The results may appear incomplete as they often end in high-level themes and conceptual paradigms that »may be seen in retrospect as too abstract as to justify the time and resources spent« (Kolko, 2015, p. xv).

Because of the complexity of organizing and connecting so many data points at once, the whole synthesis is perceived as overly complicated or a tricky part of the process for which there is no universal recipe.

Synthesis is a black box

For outsiders, it may be hard to see the relationship between input and output as there is no »artifact-based procedural trail«. Often, not even the designer himself can articulate the exact origin of his insights which then, of course, leads to problems to rationally understand the procedure, also the results are not directly attributable to the respective facts (Kolko, 2015, p. xii). This is an inherent problem, »given the physical complexity of what's happening inside your head; it's not easy to trace a thought from beginning to end« (Dougherty, 2011).

This can affect how e.g., a client perceives produced outcome as arbitrary or magically derived. As there is no visible link from design to research, it is hard to argue a billable synthesis as it might seem a waste of resources to the client (Kolko, 2015, p. xiv). A client might reject the insights as for him they might seem unfounded or created through the creative flash, that has hit the designer. It's hard to show otherwise having almost no documentation of the working process that could serve as »evidence«.

Research findings are not sustainable

The two main components of research are, on the one hand, gathering data and asking the right questions, and on the other hand, further processing of this data by doing analysis and synthesis. But what happens afterward? We have noticed that in many projects, research results are not used sustainably - on the contrary, they are usually shelved after the project has been closed. But often they do not have lost their validity, especially in generative research projects.

Often researchers have to start from zero, even if they could remix insights, principles, trends or, personas from previous projects.

Operational barriers

Often no »formal period of time is allotted for design synthesis methods, and no formal deliverables are associated with these methods« (Kolko, 2015, p. xiv). When synthesis is done nevertheless, operational barriers like time-consuming transcription or poorly managed transition between digital and analog are growing ever more burdensome.

Conclusion

These problems are roadblocks to innovation, and they illustrate the importance of design methodologies and a structured process, as this aids to demystify the »magic of design synthesis« and to make the whole process more approachable. When using our intuition and acting on an informed hunch to take a decision, it is difficult for clients to see the value of design research and to buy into a project. Therefore, making the reasoning process more obvious and taking a more formalized approach, will make it is easier for outsiders to comprehend.

	A Lack of formality	**Synthesis is a black box**
Summary	Methods are rarely formalized, and the process provides no clear structure	Synthesis is usually performed in the head or on scratch paper. The process can't be observed by outsiders.
Symptom	Synthesis Is perceived as messy, fluffy, and vague. Novices flounder through the process.	Stakeholder can't comprehend insights. The value of design research is unclear.
Origin of Problem	There is no formality for cognitive processes.	Due to its nature, synthesis is based on abductive reasoning (→ p. 46)
Possible Solution	Give structure to the process by naming and dividing individual steps.	Visualize the procedural trail of raw data to interpretations or insights.

Findings are not sustainable	**Operational barriers**
Developed insights are shelved, and they will no longer be used (or maybe even reused).	Operative tasks are a burdensome and time-consuming factor during the process of design research.
Researchers have to start from zero every time they start a project → more unnecessary work.	The transition between tools or between digital and analog takes time → less time for actual sensemaking.
Poor data management and a messy project documentation.	Synthesis is usually carried out analogously.
A repository for research projects and (digital) ways of documenting.	Capitalize on the advantages of the digital realm.

Question Zero and Goals.

By uncovering the problems and challenges of synthesis, the vision for this project started to take shape. We prioritized the research findings, narrowed down the scope, and eventually developed three main goals that we want to cover within this project.

Managing, structuring and analyzing large and complex sets of qualitative data

Making the process of design research more structured and comprehensible

Enable designers to develop insights of better quality, by augmenting their capabilities

With these goals in mind, we framed an initial question zero, that would guide and inspire us throughout the next steps of the project.

How can we make the process of synthesis more comprehensible and augment designers in their capabilities?

Research / Proceeding from secondary research, we conducted interviews with design research experts, to study how the process looks like in practice and to discuss our assumptions. From that, we derived a set of principles, that would guide us when designing for this process. Further, we analyzed how current tools of this domain operate, to uncover possible opportunity areas.

↳ Interviews

To complement our investigation on the process of sensemaking, we conducted in-depth interviews with design research experts, to be able to validate or falsify the hypothesis we developed. Furthermore, we wanted to understand how the process of design research looks like in practice, which tools and methodologies are being applied, and what needs and challenges do occur throughout the process.

Preperation

In order to get the most out of the interviews, we prepared a questionnaire that would help us to cover everything that we would like to have answered. Additionally, we brought early hypothesis in the form of high-level concepts to the interviews, which we used to discuss and reshape our assumptions.

Hypothesis

With the knowledge we gained through secondary research and based on our own experience, we developed early hypothesis that we would use in the interviews to prove or to disprove our assumptions.

We believe that by giving structure and guidance to the process, we can make it more comprehensible and transparent.

We believe that by overcoming operational flaws, the process of design research can be streamlined.

We believe that by providing a research repository to teams and organizations, we can make research findings more sustainable.

We believe that the process can be designed less time-consuming, to make up more space for the actual sensemaking, which will ultimately lead to better insights.

Research questions

We wanted to find out how design research experts work in practice, what role design research plays in their organization, what tools and methodologies they use and if their way of working would match our initial hypothesis.

For the interview, we prepared a questionnaire that was basically structured into two parts — an examination of the process of design research and the review of our hypothesis. Even though many questions were already predefined, the structure still was loose enough to give room for ideas that would pop up.

In the first part, we aimed to get a better understanding of the process of design research in practice. We asked the interviewee to walk us through a typical project, so we could map out the steps and get an overview of their approach. In doing so, we put emphasis on the tools and methodologies being used, which we would later compare in a *benchmark analysis*. Further, we wanted to find out what challenges and pain points usually occur during the process, to then uncover potential opportunity areas.

Benchmark Analysis (p. 73)

For the second part, we focused on *sacrificial concepts* that we developed and brought to the interviews, in order to get as much feedback as possible on our hypothesis and assumptions.

Sacrifical concepts (p. 56)

Sacrificial Concepts

»Sacrificial concepts are early, raw, potentially flawed concepts made visual/physical and used as a medium for creating reaction, response, and discussion among users and design teams« (Chung, 2016).

We used sacrificial concepts in the interviews as a discussion piece and to bring our hypothesis to life. They helped us to get a shared understanding on the problem we were trying to investigate and to understand the hypothesis from the perspective of the interviewee.

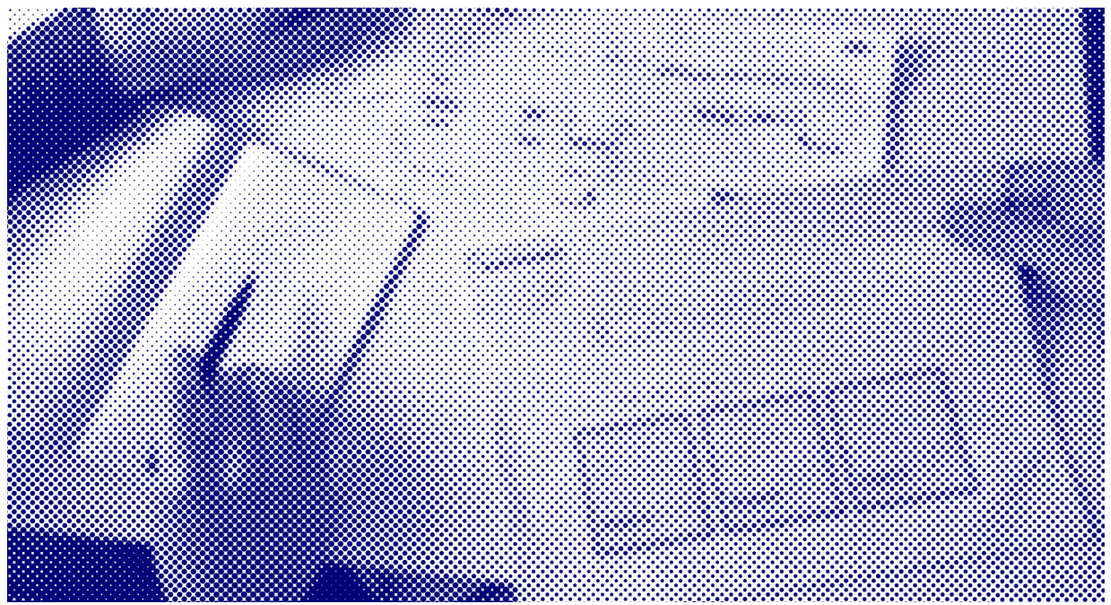


Fig. 12 **Sacrificial concepts**

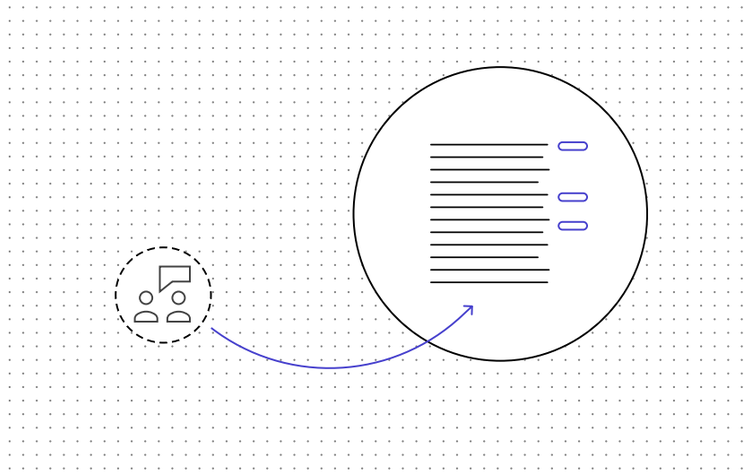


Fig. 13 **Interview Fellow** is a concept illustrating how overcoming operational barriers during interviews could lead to better results.

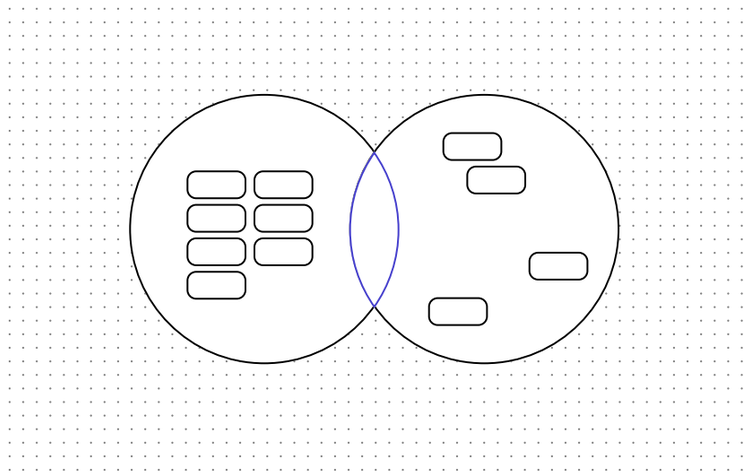


Fig. 14 **Research Environment** is a concept showcasing how qualitative data analysis could be combined with working freely on a canvas/research wall.

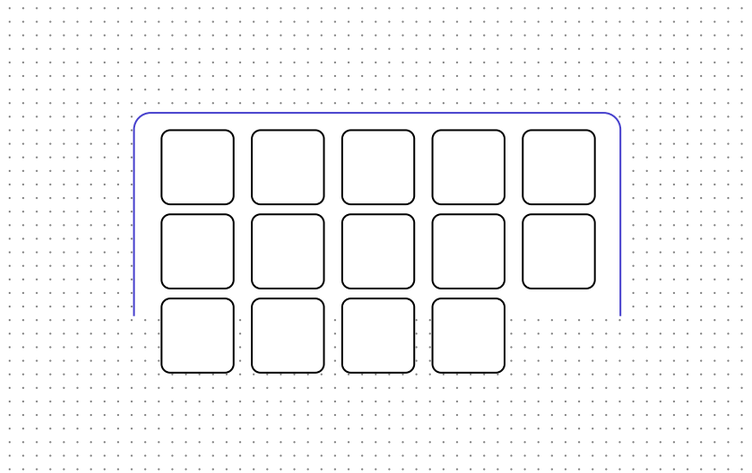


Fig. 15 **Research Repository** is a concept that is based on the idea of using insights and findings more sustainably across projects. The concept shows a repository where multiple projects, findings and data can be stored.

Interviews

For the interviews we went to speak with design research experts from all over Germany. We aimed for experienced design researchers with three different organisational backgrounds — small design consultancies, large design consultancies and in-house departments from design-driven enterprises.

The type of interview we conducted was a contextual inquiry, meaning we would visit the respondents in their offices to see where and how they work. The format of the interview was more like a casual discussion, rather than an interrogation and the conversation usually lasted for about ninety minutes.

Fig. 16 **Interview at PCH Innovations**

Company	Type	Role
Dark Horse	small design consultancy	Design Generalist
PCH Innovations	small design consultancy	UX Lead
FJORD	large design consultancy	Senior Service Designer
Designit	large design consultancy	Senior Design Researcher
IBM	in-house department	Senior Design Researcher
IDEO	large design consultancy	Design Researcher
Kaiser X Labs	in-house department	Design Research Director

Research Findings

The interviews have proven to be extremely valuable for us, as they helped us to understand design research as a discipline better — and it also emphasized the relevance of this topic.

Unfortunately, due to non-disclosure agreements, we are not able to name specific projects that we talked through in the interviews. Instead, we have summarised the findings and formulated them in general terms.

General Findings

The first thing we noticed throughout the interviews was that — even though size and scope of the projects would differ a bit — the overall process, tools and methodologies being used were basically always the same, no matter what type of organizational background the researchers had. It was really interesting to see, how many similarities we could identify.

A small disparity that we could spot was on the question of whether they prefer to work digital or analog. Where small consultancies favored working as long as possible analog, larger consultancies or in-house had a tendency to shift already early in the process to the digital space, as that would enable them to collaborate more easily and to document their process.

In general, we heard, that design research is always short of time. This often due to clients not willing to plan much time for research, but mainly due to time-consuming operational tasks.

Process of Design Research (p. 62)

Process of Design Research

A central outcome of the interviews was uncovering how the process of design research looks like in practice. Through the interviews we were able to develop a journey map, displaying all steps of a design research project — from hypothesis all the way to the communication of the research outcome. We mapped out which methodologies and tools being used and how and where data is stored, to get familiar with common process flows. Within that journey we could identify several pain points and needs, that would guide us for the subsequent steps. Later on in the process, the journey map served us as tool for reference and shared understanding.

Crucial Aspects of Synthesis (p. 65)

Crucial Aspects of Synthesis

Next to developing the journey map, our focus was on investigating the process of sensemaking and finding out how design researchers in practice conduct synthesis and develop insights. We wanted to find out what the important steps are during this process and what it is, that we have to watch out for when we are designing for this process. We summarized our findings within three main principles that we call »crucial aspects of synthesis«.

The Process of Design Research

	Hypothesis	Data Collection	Analysis	Synthesis	Communication
Operations	frame the scope of the project	conduct qualitative and quantiative research	manage, structure and analyse the obtained data	expose patterns and develop insights	build up frameworks and communicate research findings
Methods	scoping exercises, kick-offs, initial hypothesis, assumptions, concepts, hunches	surveys, ethnographic methodologies, analogous research, co-creation, focus groups	build up a »research wall« with clusters, themes and tags	ecosystem or journey mapping, insight combination, stakeholder maps, opportunity areas	rich frameworks, video or imagery, workshops with wall-sized posters, slide decks, research reports, storytelling
Objectives	understand and define the problem. align with stakeholders	find the right sources, ask the right questions and gain empathy towards the user	build up a shared memory and gain shared understanding	develop a shared mental model and create novel meaning	inform decisions, motivate and inspire others, communicate a vision
Needs	build up trust, involve all stakeholders, shared understanding of the scope	Being able to interpret the raw data in the right manner	locating information, sharing information with others, visualising thoughts	room for varying thoughts, consistent framework, interaction with teammembers, time	low processing power insights, bringing findings to live, evidence, suiting frameworks
Challenges	misconceptions, understanding what the client really wants, communicate the value of design research	bias, operational tasks, silos of understanding, transcriptions, confidence to filter	messy file management, tools are contraining, digital collaboration is a messs, silos of information	prioritization, messy non-linar process, iteration and speculation	lack of evidence, process documentation, comprehensibility of insights, transfering motivation
Tools	Keynote, Post-its	Typeform, Sawtooth, Qualtrics, Notebook	Excel, Trello, maxQDA, Dovetail, Atlas, Post-its, Whiteboard	Mural, Miro, Whimsical, Post-its, Whiteboard	Illustrator, Excel, Smaply
Opportunities	frameworks that support alignment and help to find the right scope	overcoming operational barriers, giving confidence to filter to researchers	a structured framework where all types of data can coexist without interference	make use of the digital realm and allow for speculation and iteration	give evidence and comprehensibility to insights by linking them to the original source

↳ Crucial Aspects of Synthesis

As a result of both, our investigation the process of sensemaking, and the in-depth interviews with design research experts, we developed three themes that illustrate important principles, mechanics and elements for the process of synthesis.

Giving Meaning to Data

Qualitative data alone has little value. Only when this data is interpreted, underlying needs are identified and novel meaning is created, the true value of qualitative research shows. In order to achieve this, the researcher applies abductive logic, to give meaning to data.

Confidence to filter

»Research inevitably produces a lot of information: not just notes, but audio files, transcripts, sketches, and video. Add collages, maps, and other artifacts from interviews, and you're facing what we call »the wall of data«. Faced with that wall, it's easy to panic. Suddenly, the sheer amount of information isn't inspiring—it's terrifying« (Goodman, Kuniavsky, & Moed, 2012, p.423).

To avoid cognitive overload, researchers want to move away as fast as possible from raw data. By sorting out redundant information, summarizing and interpreting the data, the researcher is starting to make sense out of the data. This process is what we refer to as »filtering«.

»I want to filter the obtained data as early as possbile, to avoid noise.« (Design Generalist / Dark Horse)

Filtering data can be a challenging task, as it demands designers to have high confidence in their actions, as they might lose important information or prioritize the wrong data. This confidence is informed by personal experiences and it allows the designer to form an opinion and then believe in it (Kolko, 2011, p. 59).

Personal bias

Research is only as good as its weakest link. There are numerous cognitive and behavioural biases that affect a participants responses to questions, how prototypes or other stimulus material are perceived, and how the team collects, manages, and processes data (Chipchase, 2017, p. 343). While making sense of data, interpretations or insights will always be influenced by the personal bias and the individual experience of the researcher.

»Due to background, experience or personal bias, each designer will have a different view on things« (Senior Design Researcher / Designit)

To be able to identify, level out the variation, and align on the findings with other team members, each interpretation needs to be traceable back to its »origin«.

An observation and the identified underlying need, or the root cause to a problem need to be seen separately, but at the same time they need to be linked to each other. The traceability of insights helps to make the whole process more comprehensible and transparent.

State of information

Throughout the process of sensemaking, research artifacts are are shifting between different abstraction levels. Each level represents a different state of information, like raw data, accumulated information, interpretations and insights. During this process it is important to recognize the different levels of information and clearly distinguish them from each other, as this helps to support the filtering process and the alignment with other team members. It must be clear at what stage the data is at.

Making Thoughts Tangible

Synthesis is about forcing an external view on data. By making thoughts tangible and transferring them to a physical space, they become part of a shared sensemaking process. Through the exposure of data, the individual incubation is supported.

Thinking with your hands

People's thoughts, choices and insights can be transformed by physical interaction with things. In the course of problem solving, we naturally tend to recruit artefacts and manipulate them to augment and transform our ability to think and to explain ourselves (Vallée-Tourangeau & Vallée-Tourangeau, 2016).

»I get inspired through visualised thoughts and actions of the other team members.«

(UX Lead / PCH Innovations)

In the context of design research, the designer is thinking with her hands when working with post-its or other physical research artefacts. It is an act of visualizing how we think and reason. It allows team members to interact with each others thoughts and to quickly align on them. By making the thought process visible, individual thoughts become more present and actions become more comprehensible and inspiring.

Spatial Memory

As the team gathers more and more data, each artifact is transferred to a research wall, a physical space where the artifacts are mapped out. By organizing these artifacts in ways that illustrate meaning, the researcher is able to build up a representation of his mental model.

This way of working is referred to as cognitive mapping — a combined process by which we learn, store, and use information relating to the spatial environment (Kitchin, 2001, p. 2120). By that, a spatial awareness for data, information & knowledge is created, which supports the process of incubation.

Externalization

In order to avoid cognitive overload and to be able to see the »big picture«, researchers want to unload their knowledge from the head and give it a tangible form. This usually done by writing post-its and gathering them on a wall. This process is called *externalization* and it is a vital step during data collection, as the natural limit of the cognitive capacity of a human might lead to a loss of information.

Furthermore, by giving a tangible form to thoughts, reflections and ideas, an external view on things is forced. They then become something that can be discussed, defined, embraced or rejected by any number of people and the ideas become part of a larger process of synthesis (Kolko, 2015, p. 16).

Sharing a Mental Model

Maintaining a shared understanding in all stages of the process is crucial. Initially, sensemaking is an internal, personal process. Only if views and thoughts get shared, the process can become collaborative and alignment with others can happen.

Collaboration is key

While sense making is an internal, personal process, the process of synthesis works best when it's done external and collaborative. The interaction and collaboration with other team members or stakeholders will uncover different views, spark new discussions and eventually promote inspiration.

»Working together in one room is always the best option, as it allows for unfettered co-creation« (Senior Service Designer / FJORD)

Therefore, an important aspect of design synthesis is to foster a collaborative workflow throughout the whole process. In general, design research is more powerful when everyone can get involved consuming and discussing (the occurrence of) insights, as it cultivates a better sense of understanding for design decisions throughout an organization.

Continous alignment

Developing and maintaining a shared understanding amongst the team members is crucial, as interpretations of research artifacts can vary and lead to misinterpretations or wrong assumptions. A framework for continuous alignment helps to cope with the dynamics of a shared understanding during design research and it will support the collective sensemaking process. Design synthesis requires to foster a work environment where silos of understanding cannot occur.

Storytelling

When sharing research findings with others — be it with other team members, the client or with other stakeholders — storytelling plays a crucial role in order to be able to evangelize a point of view on the research findings.

Therefore the research findings need to be summarized in a coherent way that clearly communicates to an audience and translates the vividness of the research into a strong motivation for creating concrete design solutions. Thereby it is »less important to be accurate and more important to give some abstract and tangible form to the ideas« (Baylé, 2018).

Further, it is important to address the context in which things happened. Further, motivations, stories and emotions help to embrace the insights and to keep the research findings alive.

↳ Benchmark Analysis

In order to get an overview on how current tools within the domain of design research operate, we conducted a benchmark analysis. Doing so, we put emphasis on the purpose they solve, when they are used in the process, and on their strengths and weaknesses. The purpose of this analysis was to uncover opportunity areas and to get inspired by existing solutions.

Types of Tools

Data Repositories

The main field of application of these tools is pre-structuring and storing of data . They focus on creating a large collection of information, mostly qualitative data gained from interviews, which can be jointly contributed and retrieved.

Providing clear and hierarchical structures that allow multiple participants to exactly know where to store and find data, these tools are mostly used to quickly externalize notes and unload thoughts after gathering qualitative data, though these tools can be used in any state of the process. Most of them give the ability to format and edit texts and embed several types of media. One of the most used tools mentioned during our interview sessions were conventional spreadsheet programs such as Microsoft Excel or Google Docs as they allow effortless arrangement of text-based information.

Trello. Originally a project management tool, it is also used as wiki or database due to its flexible board structures.

Dropbox Paper. Collaborative, web-based document editing program by Dropbox

Microsoft Excel. Most widely used program for spreadsheets of any kind.

Grounded Theory is a sociological approach to the systematic collection and evaluation of qualitative data with the aim of generating a coherent theory.

Tools for qualitative data analysis

Qualitative data analysis tools allow to systematically break down the masses of information by annotating and coding important data with specific labels. Research artifacts with low value get sifted out as soon as they move through these programs. This way of organizing and tidying up allotted data leads to a better overview of the truly relevant. At their core these tools provide the following as a main feature: Coding of text and other media to create constellations that reveal first correlations. Some of them offer complex nesting and tag structures. Atlas.ti for example can be used for extremely rigorous tagging as applied in the fields of Grounded Theory. This step can be described as the curation for the following, more interpretative synthesis.

maxQDA. Tool for computer-aided analysis, which facilitates the classification, organization and evaluation of qualitative data and text.

Atlas. Versatile workbench for in-depth analysis of large amounts of text, audio and video data. It offers a variety of sophisticated plug-ins.

Dovetail. Application for analysing qualitative data through coding. It also provides an insight repository.

Tools for sensemaking

Sensemaking in practice mainly is encountered in front of large post-it walls that provide enough space to freely move elements around. Digital solutions that try to support this process imitate analog working material such as sticky notes and function as infinite virtual whiteboards. Their open canvas empowers free arrangement of elements and visualizing one's thoughts immediately. As in its analogue counterpart they offer real-time collaboration for several team members (video and audio chat.)

Mural. Digital collaboration platform that allows users to work with virtual Post-its on a digital canvas. It is one of the first and most prominent digital »Post-it-tools«.

Miro. Similar to Mural, but with additional third party integrations and the possibility to work with frameworks like customer journey maps, business model canvas, etc.

Whimsical. Visual collaboration workspace with a focus on wireframes, flowcharts, sticky notes and mind maps.

Post-its. Sticky notes that can be used for almost everything. Their flexible field of application is one of the reasons why it is the most widely used tool for researchers.

Entities Position Maps

In order to be able to compare the tools with each other, we have mapped them in different configurations on Entities Position Maps using selected parameters. By combining two different dimensions in one diagram one can visually derive possible opportunity areas.

State of aggregation (Raw Data — Insights)
Describes the maturity of the data the tools works with. Example: Raw Transcript vs. Shippable Insights

Flexibility (Flexible Structure — Rigid Structure)
Describes the types of structure that are imposed by the program. Example: A rigid table vs. a free canvas.

Dynamics (Linked Data – Isolated Data)
Describes the dynamic connection between single elements. Example: A sticky note vs. linked cells in Excel

See also → **A framework for Data Analysis** (p. 113)

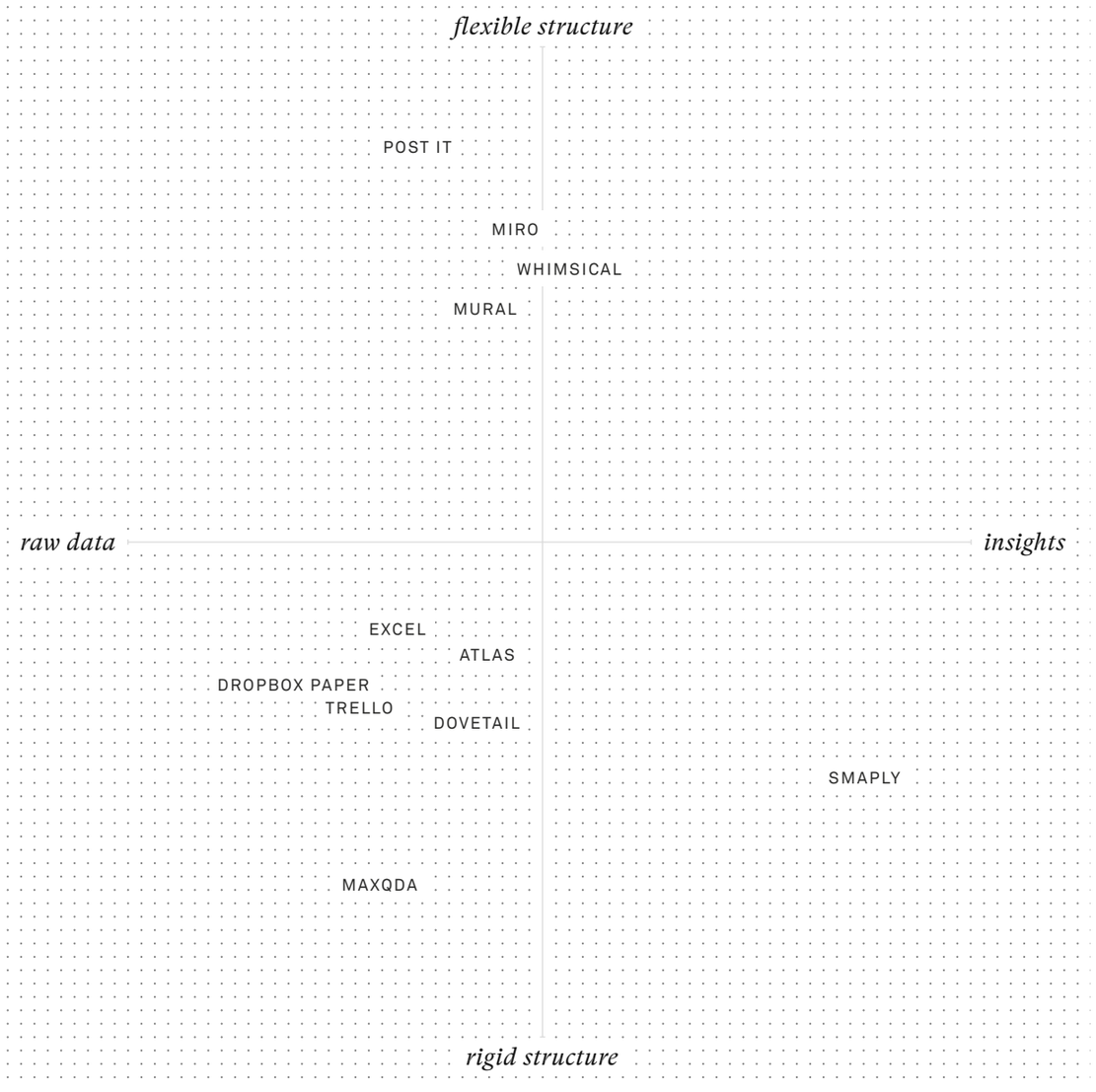


Fig. 17 **State of aggregation vs. Flexibility**

When we first compared the state of aggregation with the flexibility of structure, we noticed that there are currently not tools out there providing the possibility to create insights or frameworks, without limitations or constraints of the tools structure. Though, overall this graph was not very insightful for us and we continued with other comparisons

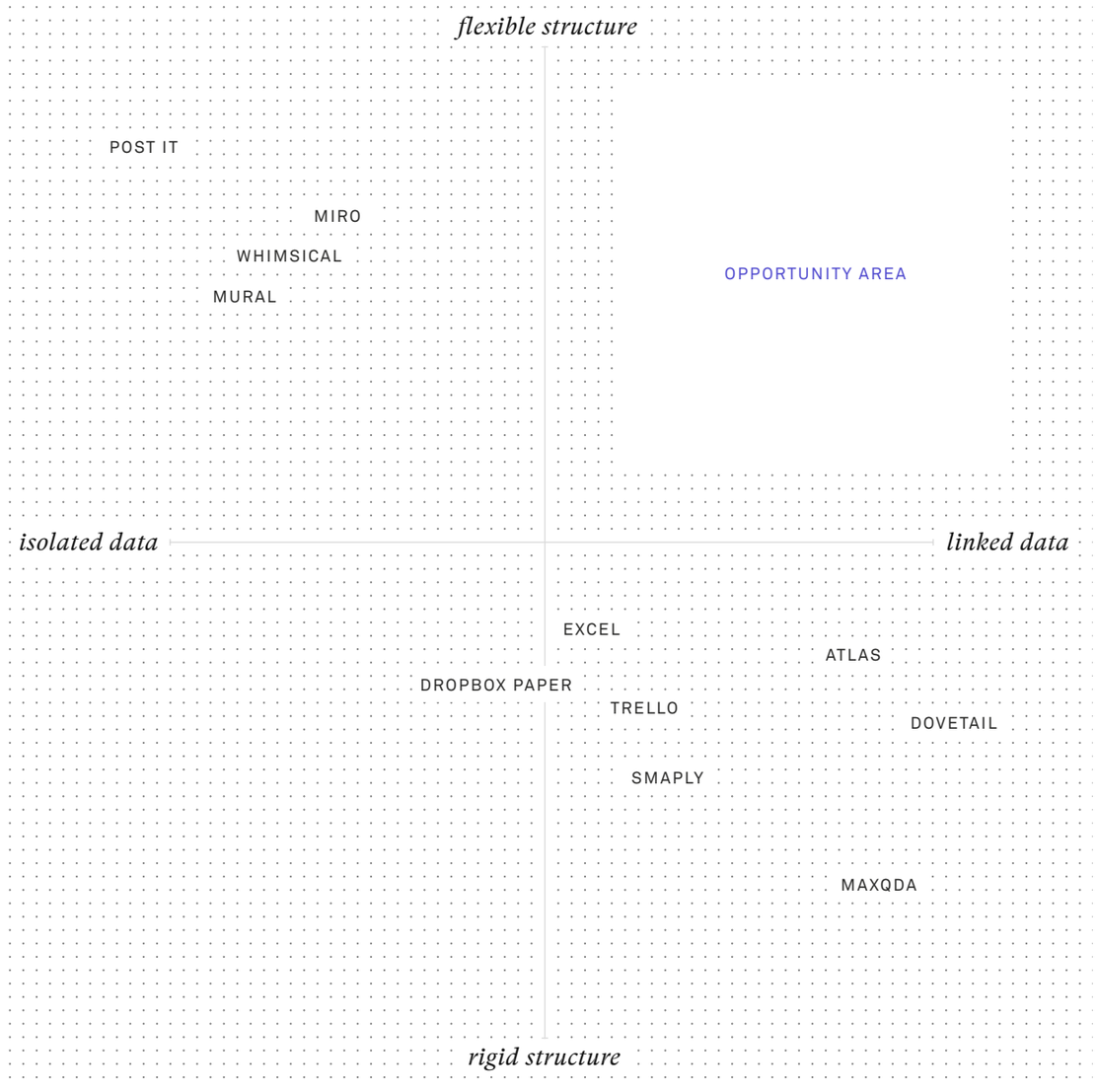


Fig. 18 **Dynamics vs. Flexibility**

Next we compared the flexibility of structure with the dynamics of data. We realized that there is a gap between tools that allow linked data but come with a rigid structure and tools that are flexible in their structure but do only operate with isolated data. Thus, for the researcher using one or the other tool it is always a trade off. The opportunity we see here is to close the gap between dynamic data and a flexible structure.

Ideation / Having completed the research phase, and with the principles we've developed in mind, we started to put our ideas into concrete terms. We explored concepts that already emerged during research and started ideating on possible solutions.

↳ Design Sprint

To start with the ideation phase, we conducted a design sprint, in order to quickly generate a large variety of ideas and develop concepts that already emerged during research further. Also, we used the design sprint to frame our objectives and to reconsider our vision.

Setting the stage

Fig. 19 **Design Sprint I**

The Design Sprint is a five-day process for answering critical business questions through design, prototyping, and testing ideas with customers that was developed by Google Ventures and was published in the book *Sprint* by Jake Knapp (Knapp, Zeratsky, & Kowitz, 2016).

It is usually planned as one week of co-creation between a cross-disciplinary team and the respective stakeholders. On Monday, the team maps out the problem and defines questions that should be addressed during the week. Tuesday is for ideating on the these questions and for generating first ideas. On Wednesday, the ideas get refined and the best solution is picked. Thursday is then used to build realistic prototype, that is then tested on Friday with real users.

Design Sprints are a intense process, but they can be valuable as one is able to shortcut many time consuming steps and get a proof-of-concept in just five days.

Fig. 20 **Design Sprint II**

Long term goals

To start of with the sprint, we reflected on our long term goals, and where we want to put emphasis on during the week. Before developing the »How Might We« questions, that we would try to address during the week, we also considered how the project might fail.

Make the process of synthesis more transparent and comprehensible.

Help researchers develop better insights.

Build a framework for managing complex data.

Streamline the transition between analog and digital data.

Sprint goals

The aim of the sprint was to build upon our research findings and explore the concepts and hypothesis that we developed so far, further on and break them down to one core framework, that would be the base for our solution.

Develop the ***core concept*** for a possible digital solution, that is founded on our preceding research findings

Find and define a ***realistic scope*** for the concept

How might we fail?

In addition to defining the objectives, it may be helpful to stake out what should not be achieved in the end. This can be valuable as it sharpens the focus for specifying the project's outcome and makes sure that no additional effort is spent on topics that wouldn't add value later.

If the solution would be yet another Post-it organizing application, that would bring no added value to the current pool of tools within the domain of design research.

If the scope would be too broad and we would solve ultimately nothing at all.

If we do not harness the power of digital tools.

How Might We Questions

We formulated several How-Might-We-Questions that launched our brainstorming session. HMWs create a seed for ideation that is broad enough to give room to a wide range of solutions but narrow enough not to get lost in the spectrum of possibilities. In the following we list most of our developed HMWs in order to provide an overview of all the conceptual ideas that were floating around until that point of the process.

How might we reduce friction of operational barriers?

Operational flaws are one of the main reasons why digital tools aren't used to their full potential. By lowering the barriers a more streamlined transition could be ensured.

How might we prevent information loss?

Due to the lack of communication, careless transcriptions or by simply forgetting information can get lost which can distort the process of sense-making undesirably.

How might we provide evidence to insights?

At the end of a design research project, the developed insights sometimes seem magically derived. By providing some sort of evidence that traces back to the raw data this could be prevented.

How might we encourage to try out different things?

Trying out and exploring several possibilities without fearing to make mistakes helps to uncover unexpected relations and thereby come up with new ideas.

How might we help to recognize a »good« insight?

Creating a good insight can depend on the experience of the designer. Adressing this issue could especially assist novices to deliver valuable insights.

How might we aid to see the »important« things?

The value of an interpretation depends on how much evidence is underpinned. When clustering and organizing artifacts it may help to communicate the value of each artifact in order to prioritize in a »more rational« manner.

How might we give the confidence to interpret, summarize and throw away data?

Filtering data and switching between different abstraction levels requires courage. This activity — though it is a soft skill — can be supported through frameworks or similar.

How might we give more expression to the thinking process?

Thinking is due to its biological nature an internal process. Often, thoughts remain in the realm of the brain, because expressing them is hard and requires abstraction. By making thoughts tangible it gets easier to understand and develop them further.

How might we support incubation?

In order to be able to organize, filter, prune or discard artifacts the available information needs to be internalized to some extent. Additionally, the obsolescence of falling back on stored data speeds up the process.

How might we help the mental models to adapt to the visual representation and vice versa?

During data collection, each person develops their own understanding of the obtained information — their own mental model. Expressing the underlying mental structures of one's knowledge through visual representations and adapting to these models vice versa helps to internalize effectively.

How might we enable real-time communication that conveys and addresses multiple senses?

Analog co-creation thrives on mutual exchange, inspiration and change. Humans interact with all their senses and use them as a medium to communicate actions, thoughts, and processes across the team. By making these channels available in digital collaboration a better alignment and understanding could be enabled.

How might we prevent silos of understanding?

When not shared, information and interpretations are inaccessible to others. Personal documents are silos that prevent the process of aligning and discussing on each other's ideas.

Crazy 8s

Crazy 8s is an ideation exercise that challenges the participants to sketch eight distinct ideas in eight minutes.

After having developed a broad range of HMWs, we decided to vote on them, to see which of them appear to us the most substantial and promising. Having that completed we ended up with six How-might-we questions that we would now use to start the ideations process. We started out with *Crazy 8's* to generate a large variety of ideas successively on each How-might-we question.

How might we give structure to a messy process?

Collecting data, ongoing reflection of thinking and unstructured mental models in a collaborative space are create mess during the externalisation. This downloading process of research data needs a given structure which allows a progressive escape from the confusion of collected content.

How might we fully exploit the advantages of digital realm?

Digital tools entail many downfalls but also unique advantages to the problems design researcher face. Realizing these advantages could compensate the negative aspects of analogue work.

How might we make digital externalisation feel like writing a post-it?

Writing on post-its is a beneficial activity – both the process of learning and also the communication with others. Digital externalisation of information needs to be achieved as convenient and fast as with post-its.

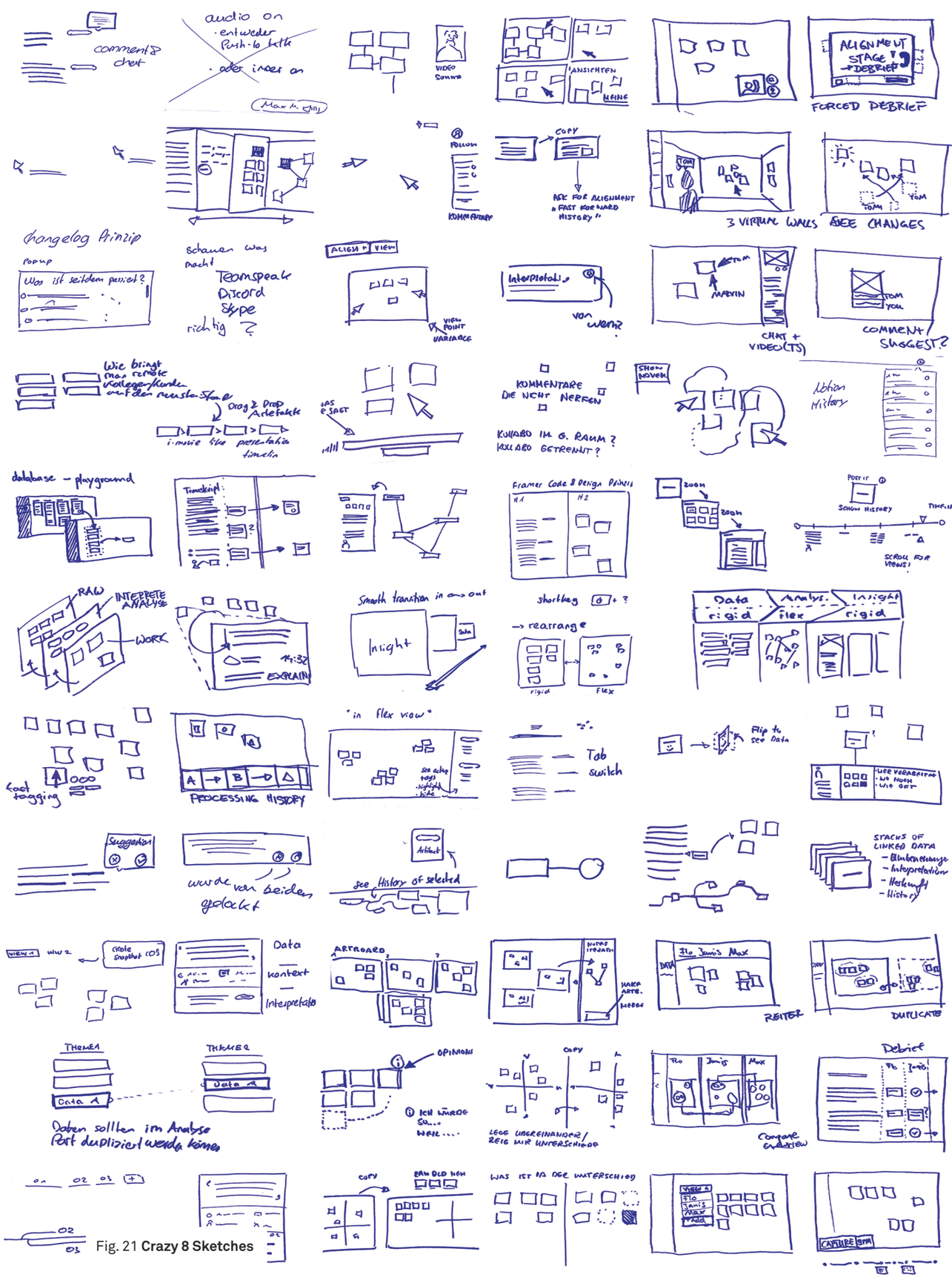


Fig. 21 **Crazy 8 Sketches**

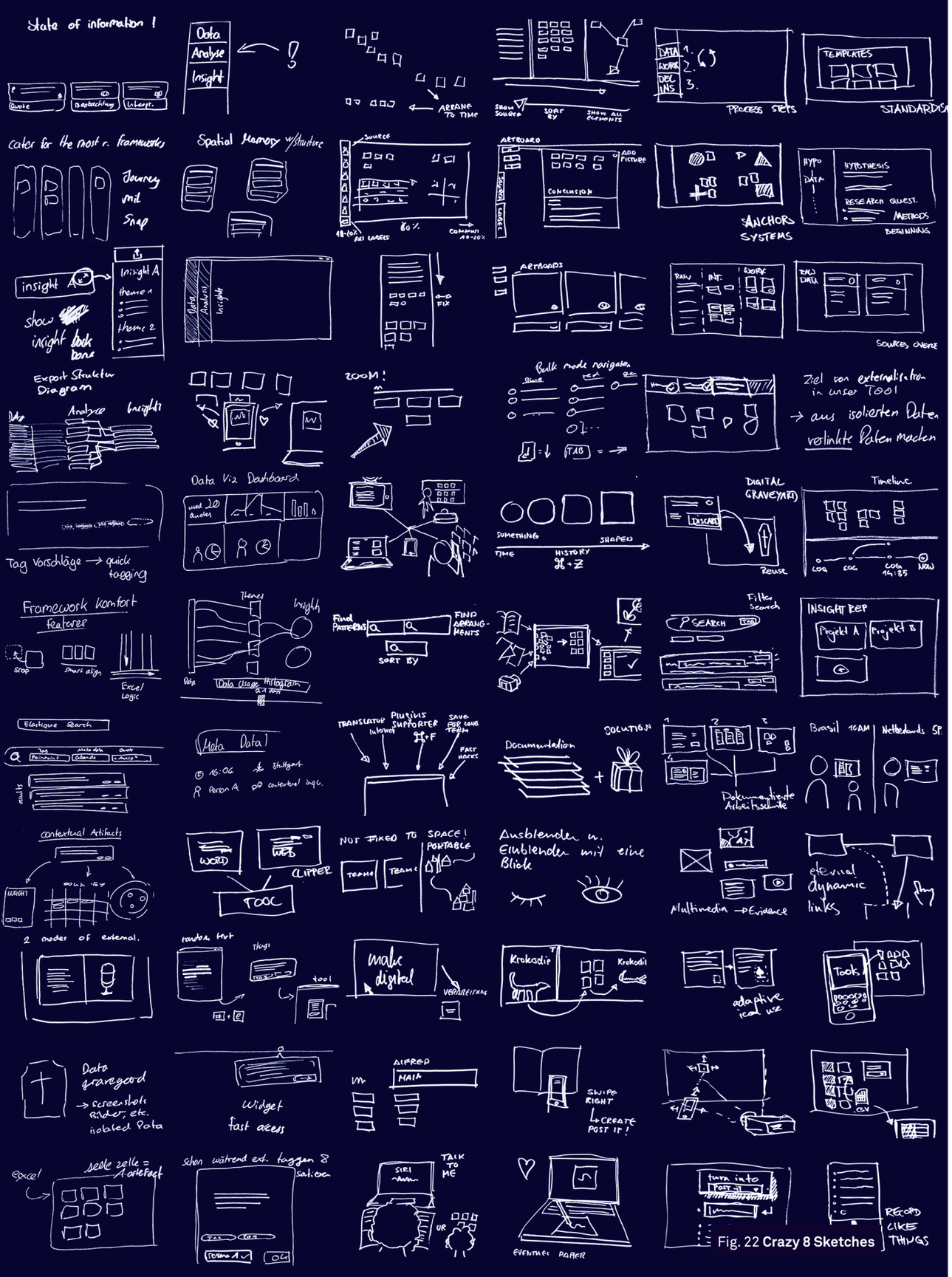


Fig. 22 **Crazy 8 Sketches**

How might we provide benefits of analog collaboration in a digital space?

Immediate feedback, easy externalization, a permanent overview of the research wall, etc. – working in the analog space offers many advantages. These points are crucial to the work of a design researcher and should be considered with particular emphasis.

How might we bridge the gap between isolated/flexible and linked/rigid structures?

Most digital tools are either providing linked information but too rigid structures or flexible structures but detached information. If it would be possible to harness the benefits of both types of tools (linked information and flexible structures) it could generate huge value for a design researcher.

How might we facilitate diverging opinions and encourage speculation?

Discussing diverging opinions is crucial to the process of synthesis. In some cases the team fails to build a shared understanding due to the dissent within the group hindering the collective progress. Giving them the power to express their interpretations, present their clusters and explore several own variations increases the possibility to reveal the underlying patterns faster.

Remixed Concepts

At this point, we left the conventional route of the Google Ventures' design sprint and adapted it to our own needs. Normally a concept is selected to be pursued, build and tested within the last day. In contrast, we attended the sprint in order to establish the core concept of our application. Every participant had to choose ideas from the "Crazy8-Sketches" and merge them into three coherent concepts that incorporate sufficient maturity to serve as overarching structures. These concepts were then discussed and again forged together uniforming the aspects everyone considered as crucial to the creation of the problem solution. This core concept can be found within the following chapter → Core Concepts (p. 103)

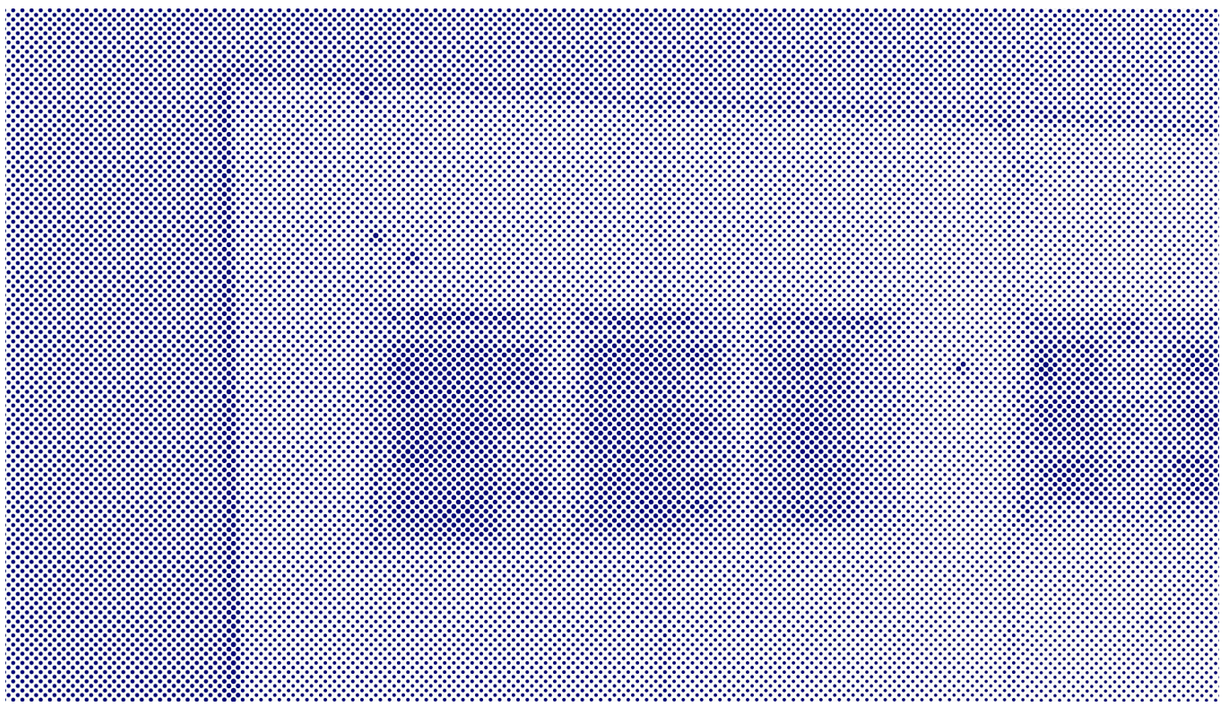
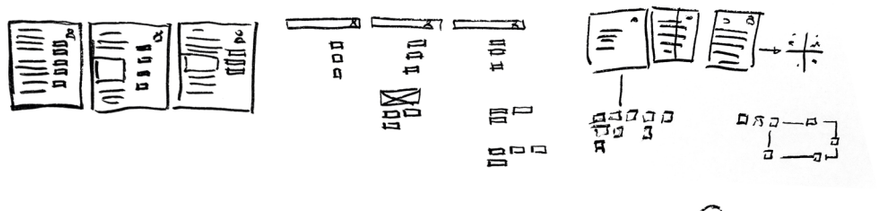


Fig. 23 **Good design is a tough job**

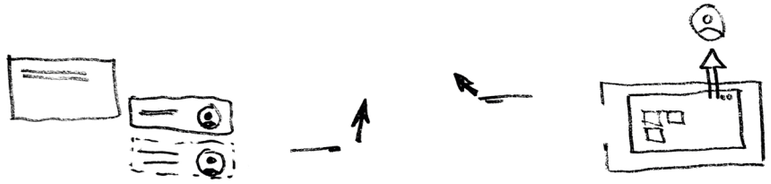
Fig. 24 **Solution concepts**

01 Container of states is visualizing how cognitive overload could be reduced and data could be structured.

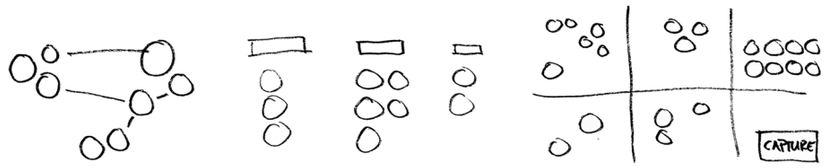
02 Attentive memory is a concept about supporting the cognitive process to increase incubation.



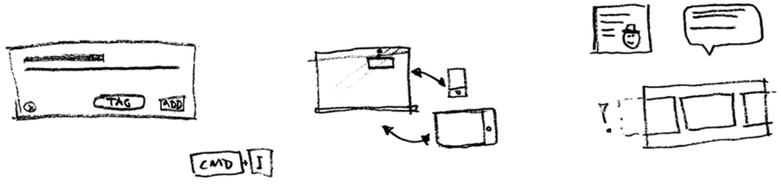
03 Integrated collaboration is showing how collaboration could be implemented in the digital realm



04 Flexible organisation is showcasing the idea of mixing a flexible structure with an open canvas approach



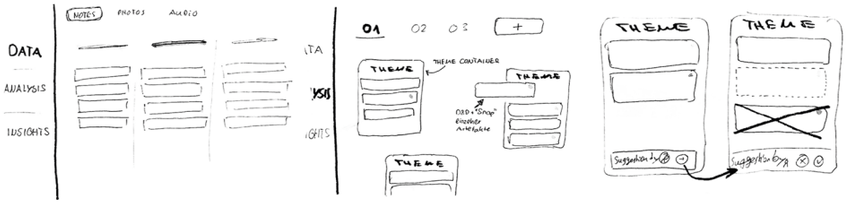
05 Rapid externalization is a concept about digital ways of unloading knowledge from the head.



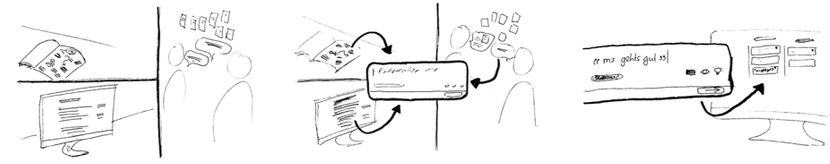
06 A framework for structure and context shows how the process of design research could be structured in a more formal manner

07 Giving meaning to data shows a way of enriching data with context and meta-data

08 Sharing a mental model is showing how different interpretations could be approached when working digitally.



09 Making thoughts tangible is a concept about giving research the possibility to quickly create data assets, without constraints.



↳ Design Goals

During the sprint, concepts were explored that yet remain on a very abstract level. The design goals describe how these conceptual ideas should be approached or designed addressing to develop a more actionable vision of our objectives.

Design Goals

We identified eight design goals that should guide us through the following process of transforming the concept into the tangible form of an application. Some of them nevertheless still represent conceptual parameters, but first and foremost those that deal with visual or interaction design.

Support Locating Information

The framework needs to be designed in a way that supports finding and retrieving information. When ideas or a hunch needs to be backed up with a piece of information, the information or data should be seamlessly accessible.

Fast and Immediate Interactions

The interactions of the framework have to match the internal sensemaking process of the researcher. Ideas, thoughts or insights can emerge in seconds. To not slow down the flow, the respective interactions must be quickly executable.

Access at Every Stage

Thoughts arise in the midst of deep reflective thought processes when the subconscious connects with the conscious. Thereby it is important to be able to externalize these thoughts to concretize one's thoughts. This interaction should be possible at every stage of the process.

Clear State of Assets

Research data can have many shapes and forms, and also different states of aggregation. It is important to recognize the different levels of information and clearly distinguish them from each other, as this helps to support the filtering process and the alignment with other team members. It must be clear at what stage the data is at.

Cater for the Relevant Frameworks

We learned through the interviews with design research experts about the importance of frameworks as a communication tool for research findings. In our framework, we want to take this into account and cater for the most relevant frameworks.

Avoid Barriers

Operational, but also technical barriers represent a pain point in the process of design research as they take away time from the actual sensemaking. Therefore, our framework should be designed in a way to avoid these barriers.

Design for Spatial Memory

As we already stated in the crucial aspects of synthesis, spatial memory plays an important role for sensemaking. We want to address that factor and design the framework in a way where a spatial memory can be build up.

Allow Variating Interpretations

The fear of losing progress is a main driver for not making iterations. We want to design a framework that encourages speculation, instead of the other way around.

Avoid Judgment

Even though collaboration is an important factor for design research, it also means that one is constantly being challenged by others. This is, without a doubt, a crucial factor for the process of design, but it can lead to problems when collaboration digitally. Our goal is, therefore, to design an environment where no negative judgment can happen.

Support Incubation

As we know through previous research, the process of incubation is supported through constant exposure and visual remembrance. For example, it can be seen that the representation of information through visually diverse elements such as symbols, different font sizes, and styles, etc., can lead to a better internalization of the perceived information.

Core Concepts / Fusing all the aspects from the preceding activities into a uniform concept that represents the central, innermost part of our approach, we established an overarching structure consisting of three complementary parts.

↳ A Scheme for Creating Meaningful Assets

The basis of our concept is what we call assets. An asset represents the smallest unit of information within the framework and at the same time, acts as the basic building block for all actions. With our framework we enable users to effortlessly create meaningful assets and harness the power of contextual metadata and descriptive tags.

01 Assets as Building Blocks

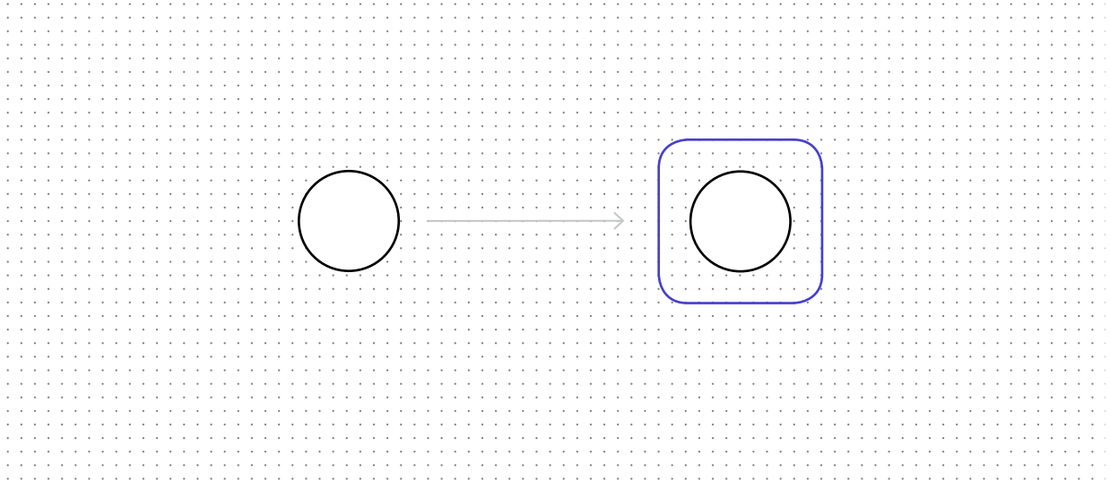


Fig. 25 **Assets as Building Blocks**

The building blocks on which our concept is constructed, are what we call assets. An asset represents the smallest unit of information within the framework. Every asset can contain several types of information representing a unit of meaning which the user considers valuable to the process of sense-making. There are different types of assets, depending on what type of data they are based on: qualitative, quantitative, and data from secondary research.

The content of an asset can be either factual or opinion driven, meaning that it contains either an interpretation that is stated by the researcher or a fact, observation or quote that needs no further explanation.

Exemplary asset Quote

»I need to plan ahead when going by public transportion «

Exemplary asset Observation

He is having trouble finding the right ticket at the ticket machine.

Tags (p. 110)

Aside from the explicit content, that is always present and visible, a data asset is further linked to its original sources, like digital notes, transcripts, observations, photography, video, or audio files. Also meta-data like context, location or time is attached it.

This means that interpretations — or in later stages of the process insights — can always be tracked down to its origin and the context in which they were created. In addition to that, assets can be assigned with *tags* to specify them more precisely or to presort or group them.

Exemplary asset origin, meta-data and tags

»I habitually take the same route on regular journeys«

Interview 01 | Respondent A | Commuter | Habits | 15.05.19

Externalization (p. 108)

Taking it all together, assets are in the first instance a simple, comprehensible and easy to grasp unit of information. However, with the linkage to its origin, the meta-data, and the tagging system, they become much more powerful and can be used in ways that have not been possible before.

For this reason, assets are forming the backbone of our concept — which is all about harnessing the potential, that comes with these rich, linked data points. Therefore, it will be crucial for our application, that these assets can be *created with ease*, and with the possibility to enrich them with data, without any constraints.

02 Intuitive and Effortless Digital Externalization

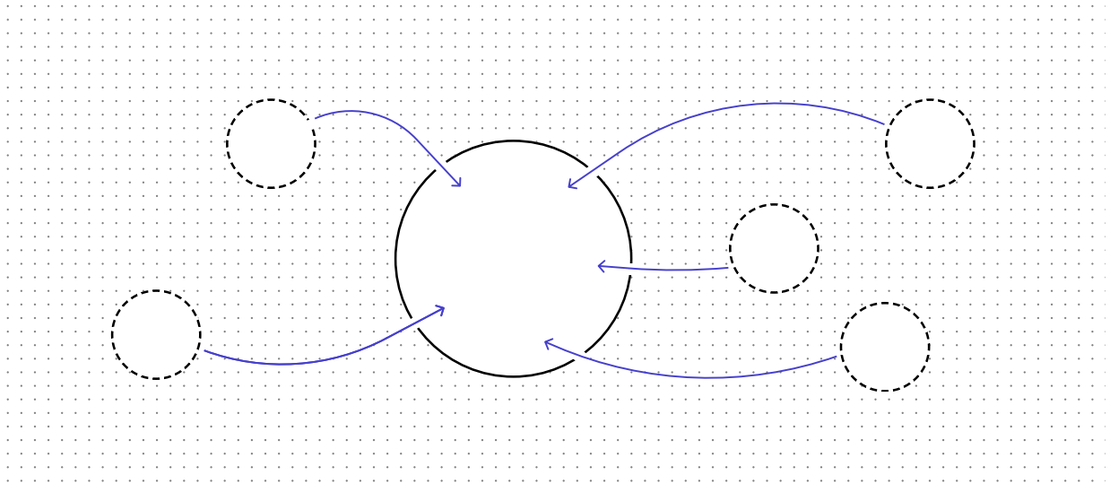


Fig. 26 **Digital Externalization**

Information, particularly in analog form, is often location-bound. Be it in the researcher's head, on sheets of paper, sticky notes, or even in digital form — research findings in the first instance are silos of information. In this form, it is difficult to develop a shared understanding of the data or to see the bigger picture. Hence, an important aspect of data collection is to unite all findings in one format. Furthermore, there is a natural limit to the cognitive capacity of the designer. To cope with that, one wants to constantly unload his knowledge from the head to the world (Norman, 2013).

In order to avoid cognitive overload and to be able to see the big picture, researchers want to move as fast as possible away from these silos of data. This is usually done by writing post-its and gathering them on a wall.

Making Thoughts Tangible
(p. 68)

And this is where the problem lies. Further processing of the information presupposes that, at some point, it is moved to the digital realm (again), which is a very time consuming and error-prone activity. The documentation of analog forms of content is usually done by photographing the respective material or by rebuilding the created content inside of digital programs. This limits the capability to work remotely and further dynamical processing of the information. In that sense, there is a need for an immediate and easy way of digital externalization.

With our concept, we want to satisfy this need. Our idea is to enable researchers to digitalize representations of meaning such as notes or Post-its, but also thoughts and observations in a *convenient* and *fast* manner. Further, the option for digital externalization should be permanently present and accessible, to not limit the user in his actions.

Usually, immediate thoughts can only be captured through tools by taking several steps. By removing these operation barriers and by shaping the process more efficiently, we want to encourage the designer to externalize information anytime he wants, without any limitations or constraints.

Asset creation as an act of externalization

The user needs to be able to digitalize research findings with as little effort as possible. The interaction should feel as easy and direct as writing a Post-it. Our approach to designing a way for digital externalization is a text input field that is reduced to the bare essentials, so the user is not distracted and can focus on putting in the information. It allows the user to quickly create multiple assets in a row without leaving the mode. Fast and intuitive interactions make this workflow more seamless, while contextual metadata that is added automatically makes it more convenient.

Within the text input field, keyboard interactions can speed up the process. The user can, for instance, quickly switch between different tags, by using the key arrows.

03 Context Through Tags

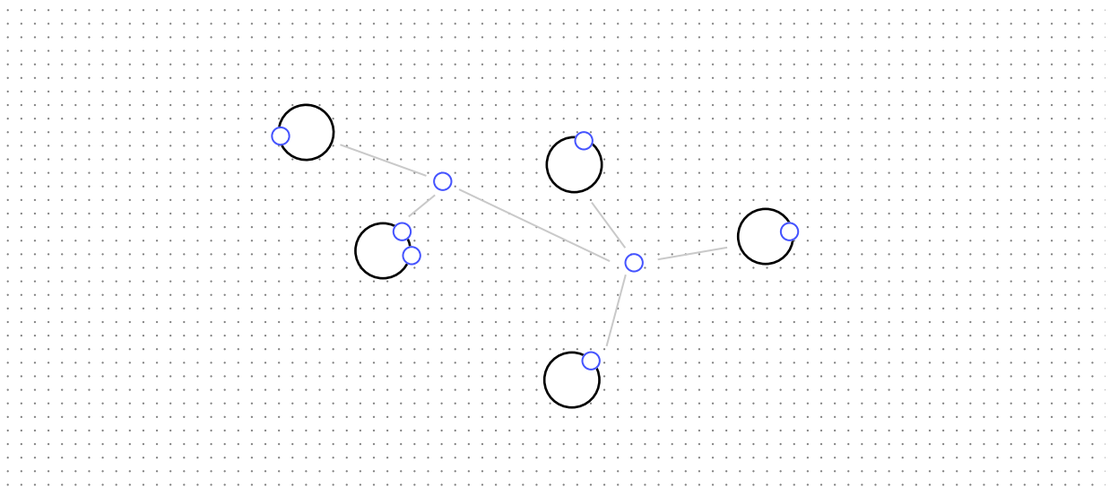


Fig. 27 **Context Through Tags**

Without context raw data isn't worth a penny. Only when interpretations, descriptions and contextual data is added the value is increased. As we heard in the interviews we conducted, data lone has no value to most researchers. It's only the context, the interpretations and the observation that make data valuable.

Giving meaning to data (p. 66)

As soon as information gets externalized from the researcher's head into a different medium it often loses the context it was embedded in before. Who said it? How was it said? Whose interpretation is it?

Building a database without this contextual meta-data is problematic, as it prevents comprehension and evidence and it leads to what we call *isolated data*.

Isolated data refers to research artifacts that have no connection or link to their origin

Also, conventional ways of data structuring are inflexible. In a design research project, the data structure often isn't clearly defined from the beginning or it can change over time. Here, a rigid data structure quickly becomes chaotic and redundant.

Our approach is to enrich assets with descriptive tags and contextual metadata. By giving context to the data, each finding and in the end each insight stays linked to its original source. In contrast to that, research findings that are stored on Post-its are isolated in that sense and can't provide evidence or comprehension.

When an asset is created, contextual meta-data like location, date or time can be assigned. Also, the type of data like quote, oservation or fact, can be selected.

Additionally, tags are a powerful tool for organizing and managing assets. With filtering and sorting mechanics, the assets are flexible in how they are displayed and can quickly adapt to unveil patterns or structures that haven't been visible before. With dynamic tags, the data structure can evolve with the process and one does not have to commit to a rigid taxonomy right from the start.

Assigning Tags

Tags are vital to the framework and to the way how assets work. There are multiple ways in which tags can be assigned to an asset. They either can be assigned directly to the asset when it's created, or later in the process, when the right tag has emerged or when something changed in the way the data is structured. Assigning or changing tags should be easy and fast to execute, as it represents a key interaction within our concept.

The team already identified a promising tag on the go after an interview. During the debrief, and already while externalizing the findings, the tag can be assigned to all assets created during this phase.

↳ A Framework for Data Analysis

We aim to bring structure to the otherwise so messy process of synthesis. Our vision is a framework that enables to manage, structure and analyze large amounts of qualitative data, allowing designers to quickly locate and retrieve information, without losing the overview.

01 Structure to a Messy Process

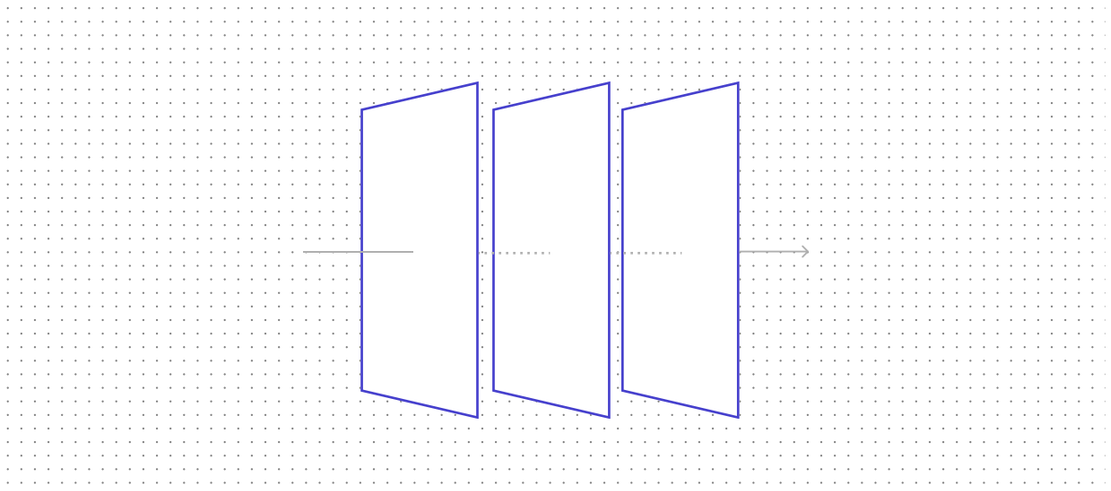


Fig. 28 **Structure to a Messy Process**

Lack of formality (p. 44)

State of information (p. 67)

Design Research is often perceived as messy, fluffy and vague. Due to the dynamics of the process of synthesis, one can quickly lose track of the current state of the research findings. Working materials like sketches, incomplete phrases or crude diagrams get mixed and refined over time and the results may appear incomplete. Therefore, it is not always clearly recognizable in which state of information the working materials are at complicating to maintain an overview of the bigger picture.

Because of the complexity of organizing and connecting so many data points at once, the whole synthesis is perceived as overly complicated or a tricky part of the process for which there is no universal recipe.

With our approach, we want to give structure to the otherwise so messy process of design research. By matching the navigation and data structure of our application with the phases that are run through during design research, we bring clarity to the process, calm down the dynamics, and allow for an easier overview.

We divide the process into three phases: data, analysis, and insight. Each phase will represent one section in the navigation of the application.

This allows for a much more focused way of working, but it still enables the designer to get an at a glance overview of the current state. Therefore, the designer can edit the individual research findings step by step without being overwhelmed by the sheer mass of data. In addition to that, also within each of the three sections, the elements are structured in a way to avoid cognitive overload.

02 Comprehensibility Through Context

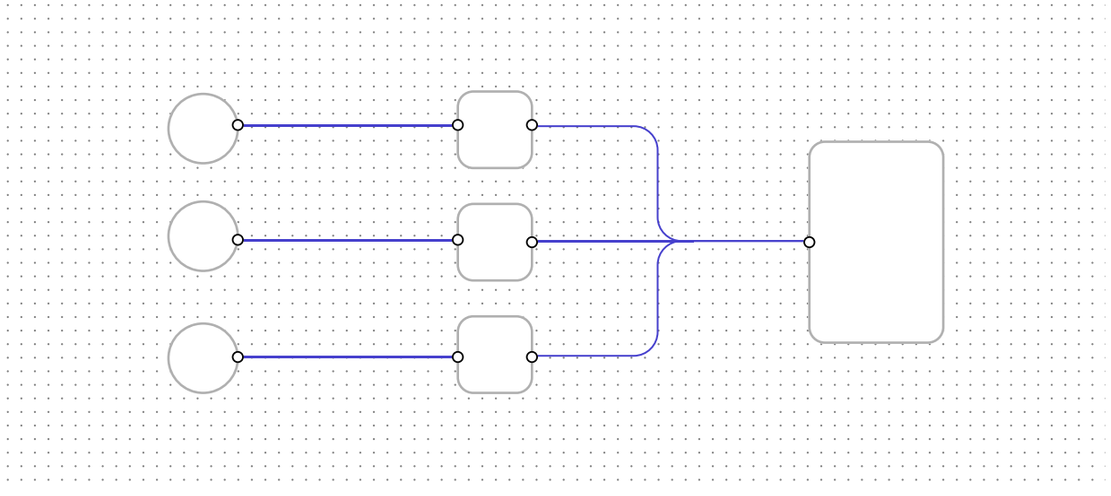


Fig. 29 **Comprehensibility Through Context**

Synthesis is a black box (p. 44)

Since synthesis is an abductive sensemaking process, there is usually no artifact-based procedural trail to track down relationships between input and output. This means that for outsiders, like clients or other contractors, the process is a *black box*. For them, it is incomprehensible how the research data lead to a certain insight. The lack of evidence that qualitative data usually entail makes it difficult to rationally argue the value of research.

More than that, working with isolated data leads to further issues. When sharing findings with other team members, it can be difficult for them to comprehend interpretations due to the lack of context. Knowing and understanding the context is crucial for a shared understanding of research findings.

Assets as building blocks (p. 106)

With our concept, we want to overcome this issue by linking interpretations back to its origin. This approach is based on the concept of *working with assets*. The moment an asset is created, all relevant metadata — like the type of observation, contextual data or origin — is attached to it. This means that researchers can always track down insights or interpretations back to the original source, or the other way around, in order to achieve a thorough comprehension.

By closing the gap between raw data and insights, we aim to resolve the lack of evidence, that qualitative data in this context normally entails.

When working with insights or other research outcomes, it should always be possible to »toggle« all linked origin data, to quickly get an overview of where the insight is coming from.

Further, due to this way of working with data, the documentation of a project can be done in a much more efficient manner and provides a broken down inference.

When exporting projects, all assets that have been used will be automatically attached to the respective framework, insights or deliverable.

03 Organizing Data Through Tags

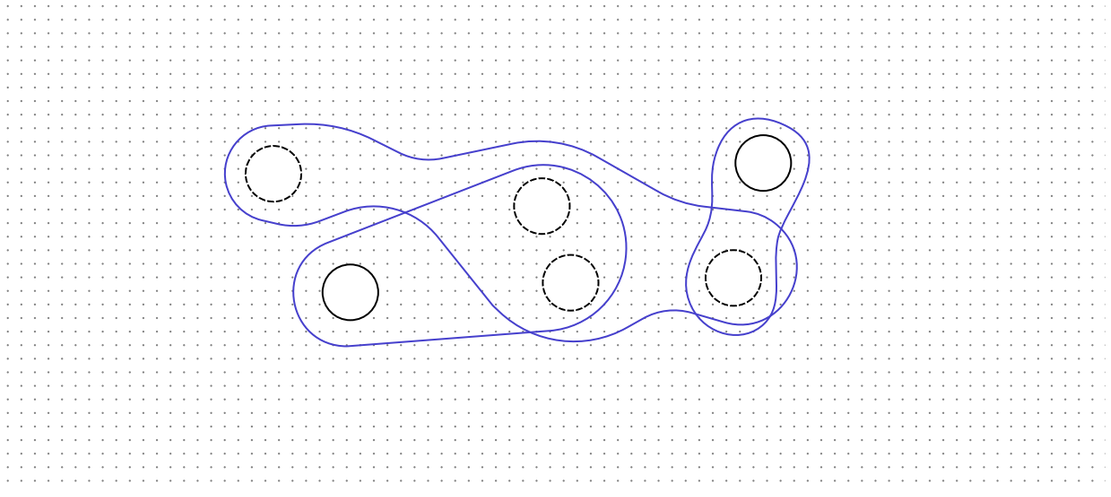


Fig. 30 **Organizing Data Through Tags**

Still, today most software that is used (also in the design domain) operate with more or less rigid folder structures that sometimes may seem arbitrarily imposed by the digital systems. Classes of certain semantic descriptions contain sub-classes with a subsidiary description and so on. When a file has been nested into a folder it can't be assigned to another folder unless one duplicates the file though presenting a mediocre option.

In the case of the design research, the equivalent to a file is a research artifact. Here, sorting into individual drawers turns out to be even more problematic, as the assignment is not always directly apparent. What a research artifact carries and which properties can be attributed to it sometimes becomes visible only after a phase of reflection. Folder structures would not do justice to this a dynamic process of refinement.

Instead of storing every asset in different folders our concept will give the user the possibility to organize their data through tags. The structure of the project's data pool will be constructed through the usage of tags itself whereby any item can have any number of tags assigned. The benefit of assigning tags lies in the ability to be more loosely and more flexible organized. Yet, describing single assets is often seen as cumbersome thus it is advisable to use objective, descriptive tags. Otherwise, chaos can occur quickly as team members haven't agreed upon a common definition regarding just what a specific tag expresses.

Given the coded set of data, the mass of data can be displayed in a structured way. Now, the user can sort, filter and use search queries, to rearrange the constellation and to uncover outliers or possible patterns. With coded assets as a backbone, the user can perform and combine many types of searches or filtering operations including tags or metadata.

The user is able to create custom data constellations by applying simple logic as they string together several filters (e.g. tag: pain point; and; location)

All of those features combined make the organization and analysis of the assets effortless and supports the user in locating and retrieving information.

↳ A Playground for Collective Sensemaking

As the term playground implies, the concept includes a place that allows sorting, organizing and clustering sets of qualitative data in a loose and flexible way. It enables designers to try things out and iterate, without fearing to destroy the created. It does not seek to imitate a physical experience – moreover, we enhance it by harnessing the manifold possibilities of digital to change how people work during design research.

01 Encouraging Speculation and Iteration

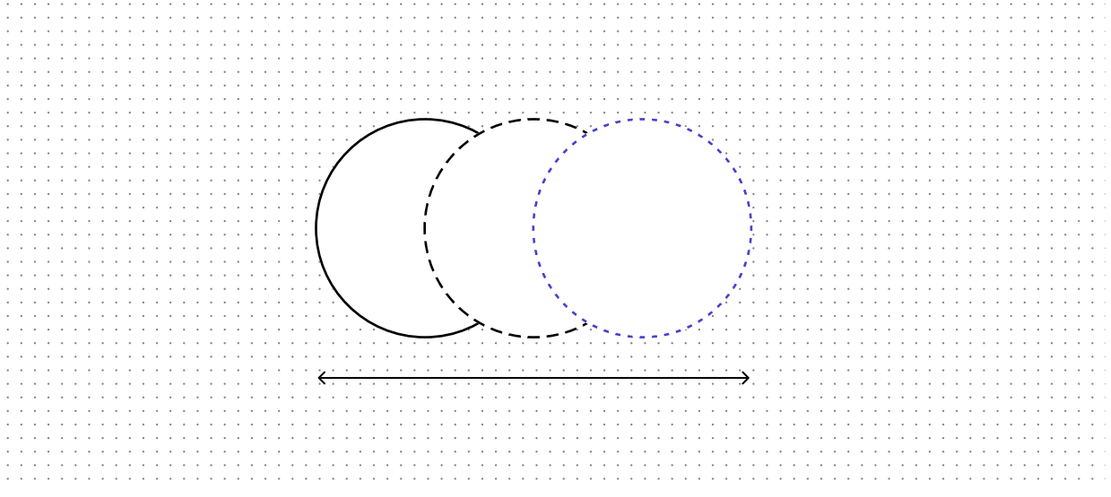


Fig. 31 **Encouraging Speculation and Iteration**

Whiteboards and sticky notes allow for flexible and immediate working. What happens if someone wants to create their own version of mapped out information? Team partners are occasionally at odds, but unfortunately, different interpretations elude the basis for discussion as long as only a single perspective is presented on the wall. As mentioned before, this is due to the inability to create other variants without destroying the existing one. Therefore, arrangement options remain conditional until they are tested and transformed into any tangible form.

Hereby, the fear of losing progress is the main driver for not creating iterations. First, you have to destroy created work in order to be able to create something novel. In case of emergency, a documenting photo is taken and all sticky notes are put on. At the same time, this implies further pitfalls as now comparability is lost or harder to achieve. The disadvantages of working analogously, as it usually takes place in practice, can be overcome by a digital solution: saving, duplicating, moving files, sorting them without further ado, restoring files — in the digital world, this is no problem at all.

Operational barriers (p. 45)

With our concept, we want to encourage the user to try out new things, without having to worry about losing progress or intermediate states. Several mechanisms come into play for this purpose:

On the one hand, the user does not arrange the original assets on the free canvas, but only visual representations of these and thus can be used without manipulating the original data pool. Inside the synthesis workspace, only this working model of an asset is utilized — therefore multiple uses or even deletion is no concern.

On the other hand, the concept puts emphasis on the possibility to create multiple arrangements and iterations. Every possible constellation can be saved as a variation, between which one can quickly toggle back and forth.

When several team members have different interpretations, they can create a new view and develop their own arrangement. By toggling certain tabs they can switch between different views and compare them against each other.

This allows every user to present their individual interpretation of things, while a fluid transition between several views provides more comparability. Each views' history can be accessed via a timeline function, so previous versions can be restored easily. It is kept so that users can quickly find different working states, without having to remember their exact title.

02 Free Organization and Spatial Memory

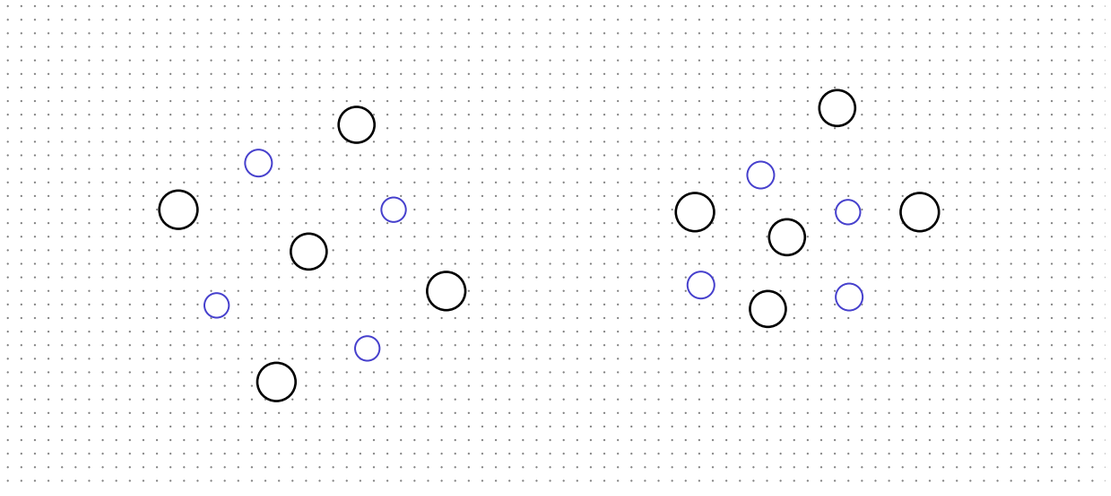


Fig. 32 **Free Organization and Spatial Memory**

See also → **Entities Position Maps** (p. 77)

Humans only have limited resources at hand for internalizing and memorizing information. It is hardly possible to incorporate all the important elements of data collection in a short time. The assets offer the possibility to outsource information in order to access it at a later stage. However, forms of data representation such as spreadsheets aren't an appropriate format to work with ambiguous information because the *given structures* are too rigid for that.

It is, therefore, necessary for the user to be able to loosely organize the working material and move it freely through an open canvas, as it is achieved in analog environments. The act of visual spatialization helps the team to build their very personal map of information — it slowly starts to represent the mental models and interpretations of the team. This way of working is referred to as cognitive mapping, a combined process by which we learn, store, and use information relating to the spatial environment (Kitchin, 2001, p. 2120).

Thinking with your hands (p. 68)

Our approach aids to group several assets into *clusters* that are also freely movable but provide further processing features such as transforming it into a framework or deliverable format. Cognitively, assigning an asset to these clusters is not as complex as rigidly assigning it to folders, since one does not have to commit to a hierarchical and predefined structure. The team can build its own fluid structure that empowers the stream of thoughts which often results in novel ideas and unusual interpretations and that by only placing two assets closer to each other compared to the others. Also, everyone can see and thus better understand the actions made by the team members.

To summarize, the underlying concern is about the risk of making mistakes or losing information which is naturally inherent to novice's interaction with research material, among them, pruning, sampling, and copying. By examining both the ability to iterate and taking the fear of failure, it gets clear that they represent an underlying need and as such of particular importance for the development of an application in this context.

03 Collaboration and Sharing

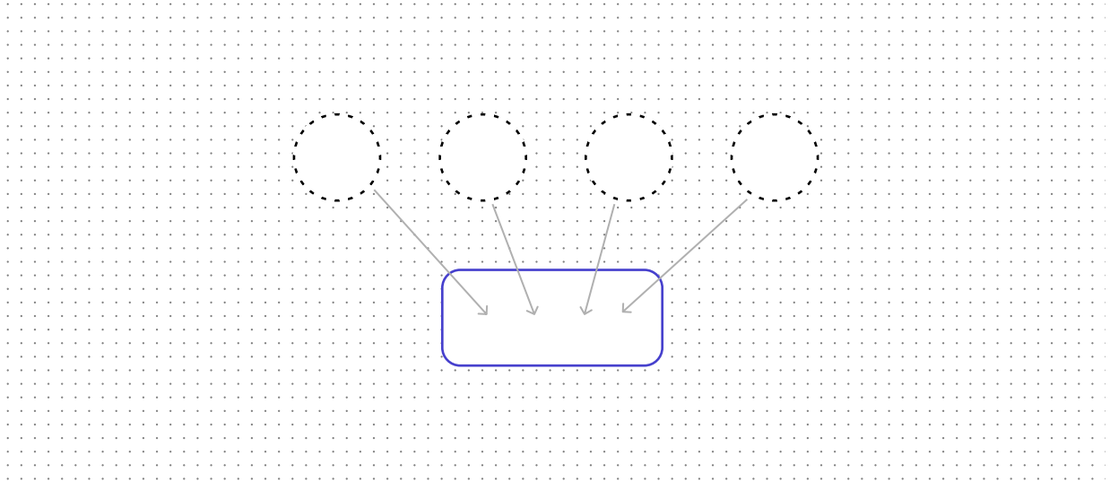


Fig. 33 **Collaboration and Sharing**

Collaboration (p. 70)

Thinking with your hands (p. 68)

As we have already identified through previous research, collaboration is an important factor in the process of design synthesis. Though distributed teams are more common than ever even if the demand for design research in both small and large companies is steadily growing. But it doesn't go together.

Yet it is still challenging for teams to work on the same project in the digital realm. Especially when doing synthesis, collaboration is a key element for approaching divergent interpretations. Despite all the freedom of a virtual and infinite canvas, it remains even more difficult to capture changes and updates made by team members, especially after unsynchronised working periods.

Our aim is to enable remote teams to collaborate closely on a project and to aid the progress of building up a shared understanding, and ultimately a shared mental model. We want to provide a digital workspace that enables asynchronous and synchronous collaboration — just as easily as if everyone were in the same room.

When multiple people work together on a project at the same time, they can see changes made by each other in real-time. In order to allow quick alignment users have the ability to exactly see where and what the teammates are working on. Additionally, collaboration could be manifested through live audio or video chat functions that help to inspire others and be more impactful as a result.

The project owner can invite external people to the project platform, in order to work together in a joint effort. He can also define and limit the access someone has if it is, for instance, a client.

Execution / Grounded in the findings from research, derived from the core concepts and inspired by notions of the ideation phase we developed a digital framework that we call *Link*.

↳ General Conditions

The final application is an embodiment of the concept itself and serves as a tangible representation of our ideas and vision. Therefore, it has been clear to us, that we would not reinvent the wheel when it comes to the visual style, not to mention user interface design paradigms. Nevertheless, we still had to consider some of the parameters that would interfere with the overall usability and purpose.

Platform and Accessibility

Considering the context (on the road, little time) in which design research is conducted this concept stage represents the vision of an application that guarantees access at all times and in all localities.

Therefore, we considered a platform-neutral, and a cloud/web-based approach, but which also allows working offline. With a cloud-based approach, we enable the user to log in from external devices without downloading a specific application, thereby providing a device-, and location-independent solution. Wrapped into native desktop applications they are able to convey the same robust feeling as of native applications.

To counteract a missing network connection, it is crucial that the application also can be used while being offline. With that in mind, we presume that working states are captured during offline mode and then are synced with other versions in the cloud when it is resumed back to online mode.

Visual Language

As we already know, design researchers have to deal with large amounts of data. When talking about visual design, this can be a challenge, as the number of assets displayed on the canvas, can quickly lead to visual overload. Moreover, the fact that most design researchers carry laptops with rather small screen sizes when in the field only amplifies this problem.

Because of this, the visual design demands reduction and utilitarian design, putting the focus on the content. Interaction mechanisms e.g. smart zoom levels or elements that adapt their style depending on working states can try to minimize the problems obtained by displaying content on small devices.

Since we would like to emphasize that the focus of this work does not insist on the development of an independent, visual language, this documentation does not extensively address the visual style of the application.

↳ Blueprint

The structure and the interaction model of the application are designed to support the user in working with large amounts of assets without losing the overview. Moreover, it does put emphasis on the concept of how these assets are altered throughout the workflow of the application.

Application Structure

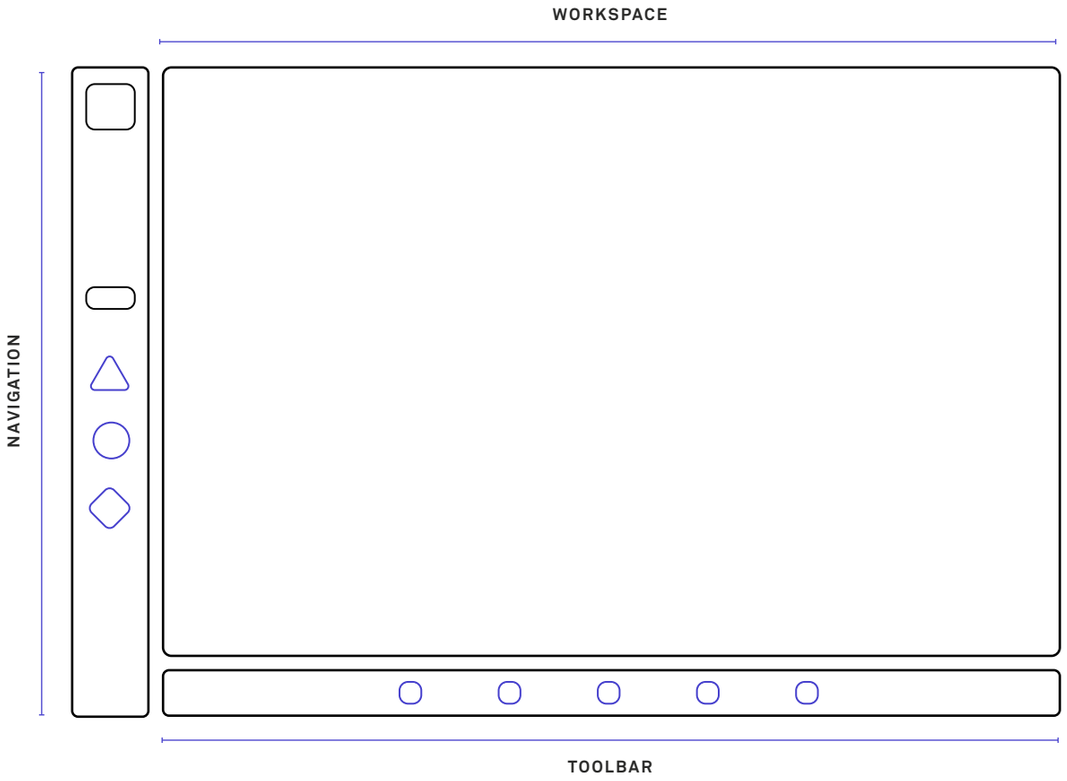


Fig. 34 **Application Structure**

To address our goal of enabling the user to handle large amounts of data, we structured the application in a clear and concise way, to avoid visual overload. We divided the workflow into three main workspaces, whereas each space is focused on one specific way of altering the data assets.

Fig. 35 **Workspace Data**

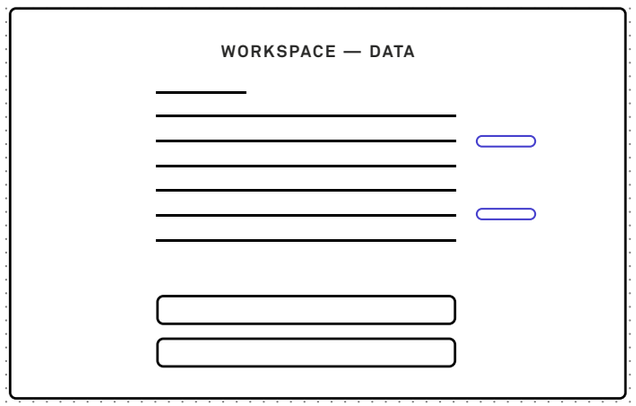


Fig. 36 **Workspace Analysis**

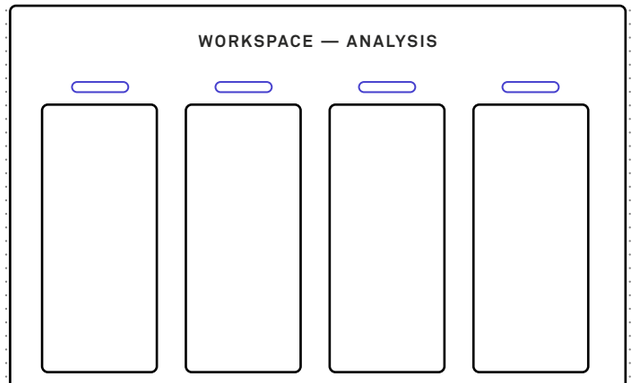
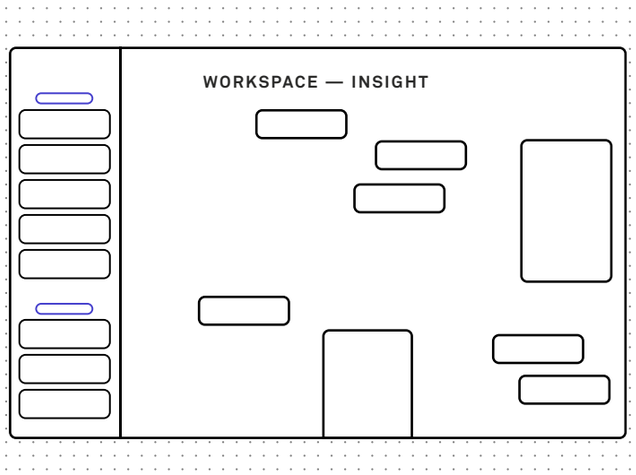


Fig. 37 **Workspace Insight**



Navigation and Key Functionalities

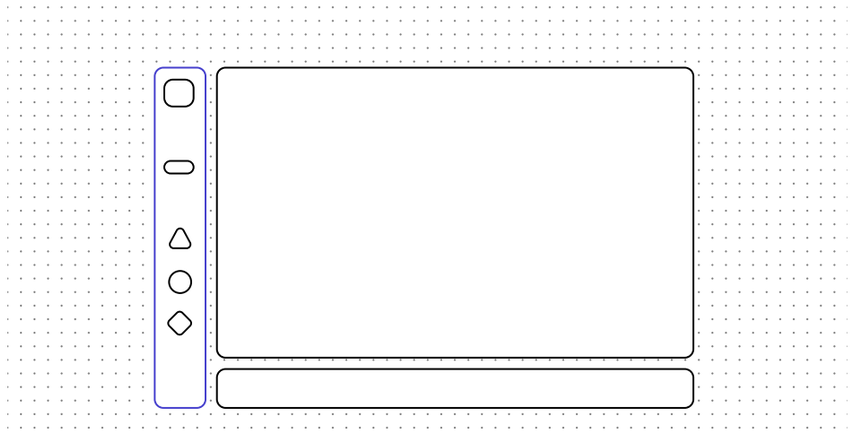


Fig. 38 **Toolbar**

The toolbar is the central element for all major functions within the application. Here, the user can access key functionalities, like creating an asset or searching and filtering mechanism. In every state of the application, the toolbar is present, although some of its elements do change when in use. The toolbar is designed to adapt to its context, meaning that for each part of the application, different functions are displayed. By only focusing on the bare essentials we reduce visual noise and support the user in his actions.

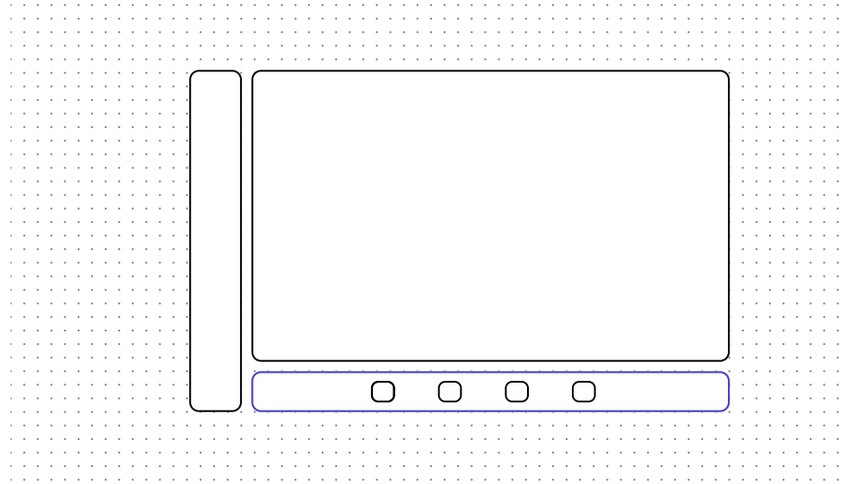


Fig. 39 **Navigation**

The navigation bar on the left side of the application serves as a central element to switch between the three main areas: Data, Analysis, and Insight. In addition to that, the user can access other navigation elements like project overview, workspace overview or, if available, research deliverables.

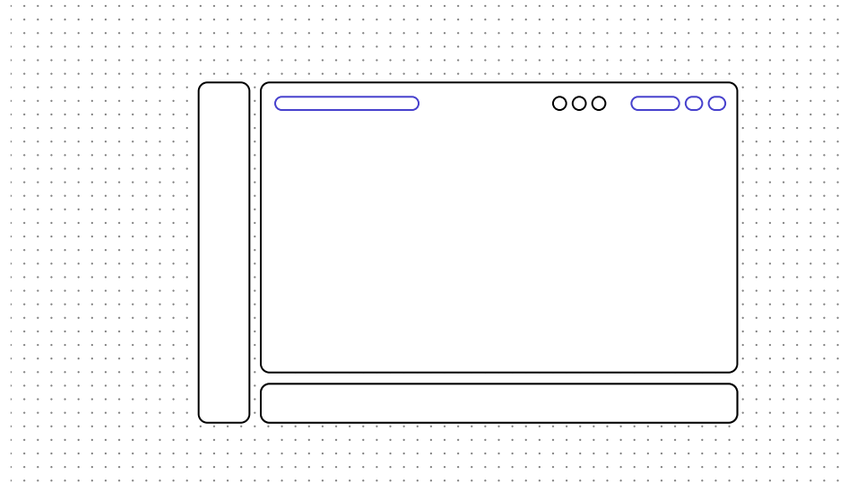


Fig. 40 **Floating Navigation**

At last the floating bar, which is responsible for secondary functions and is therefore placed and designed rather conservative.

Data Processing Model

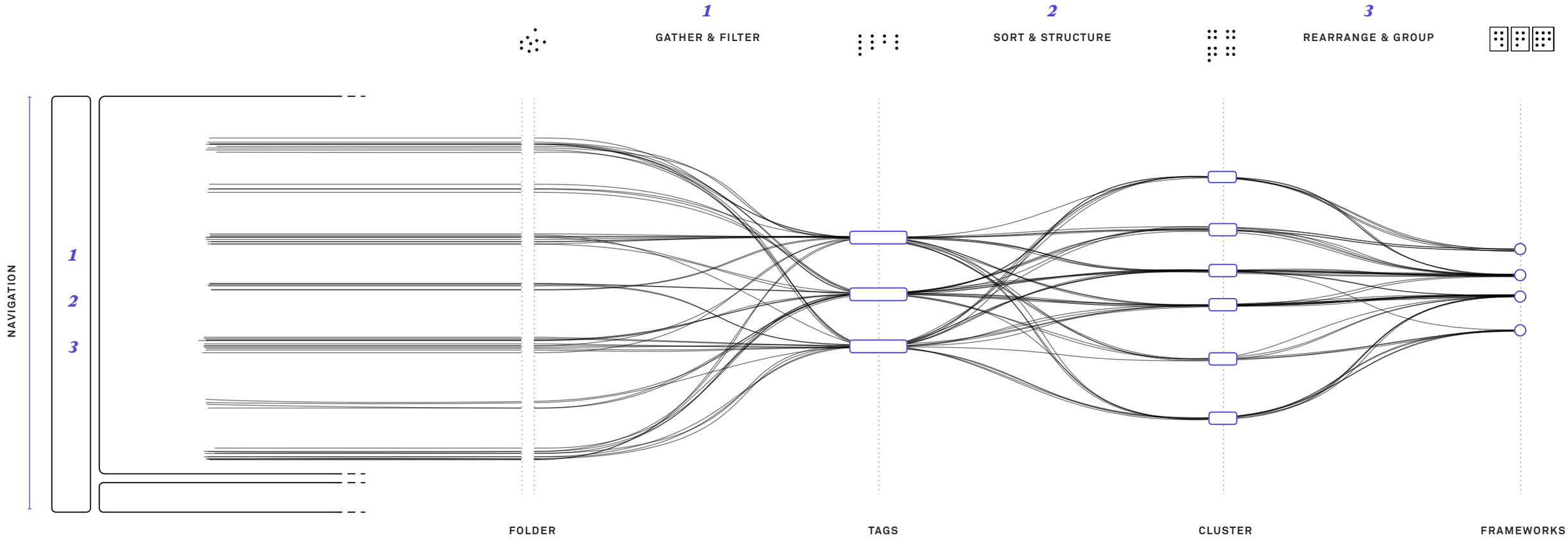


Fig. 41 **Data Processing Model**

This model represents the manipulation of data — so in our case, assets — within the workflow of our framework. The structure of this model describes the backbone of the application. At the beginning of the process, raw data in the form of digital notes, transcripts, observations or other media is stored in the application. This content is then converted to be an asset, attached with contextual meta-data, a link to its origin and a descriptive tag. The assets are then structured and organized, by utilizing the tags and meta-data attached to it. In the next step, these assets get rearranged and new groups or clusters are formed.

↳ User Interface Design

The structure and the interaction model of the application are designed to support the user in working with large amounts of assets without losing the overview. Moreover, it does put emphasis on the concept of how these assets are altered throughout the workflow of the application.

link

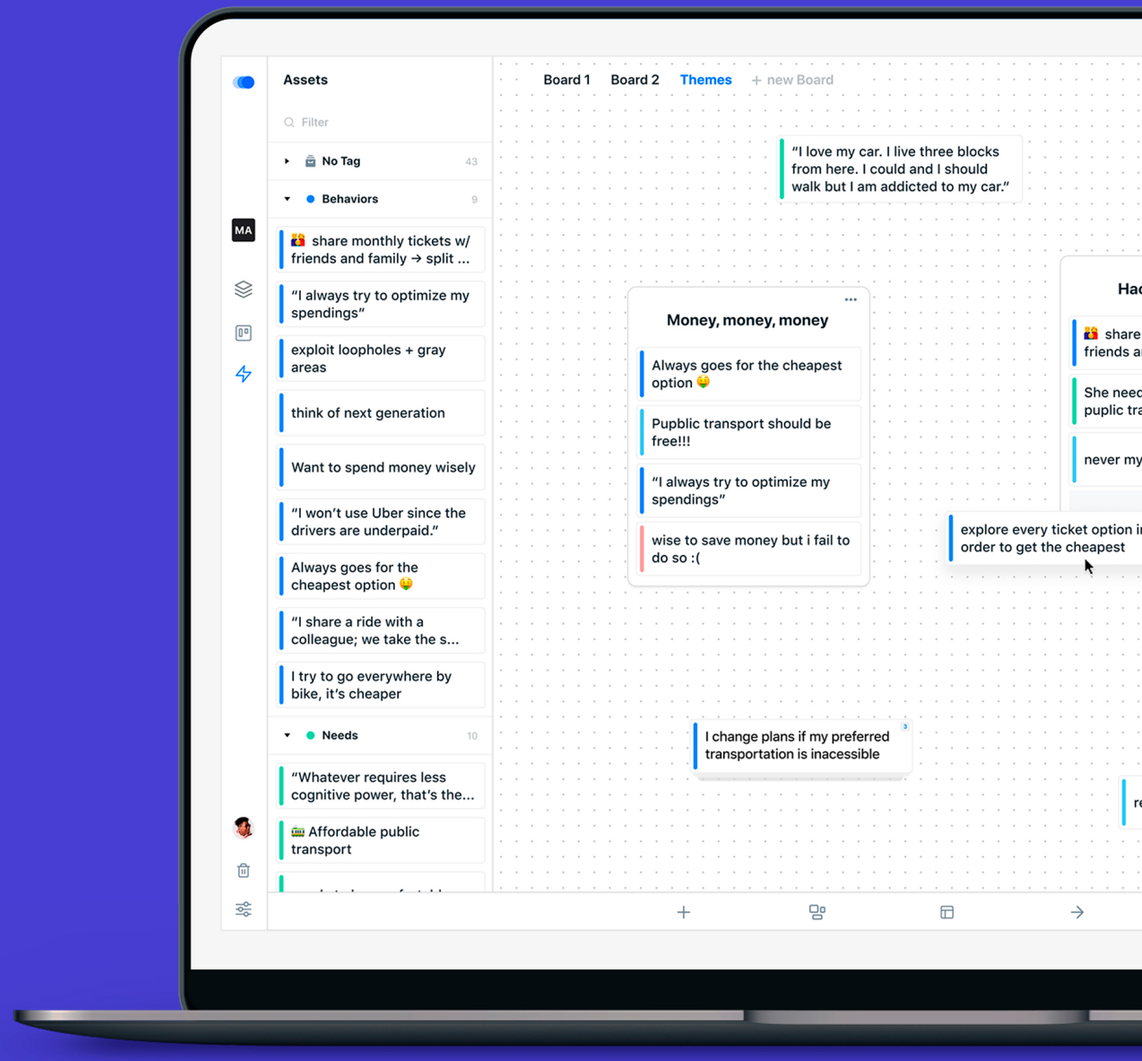


Fig. 42 **Link Icon**

Fig. 43 **Link Key Visual**

Key Elements

Fig. 44 **Key Elements**

Global Search

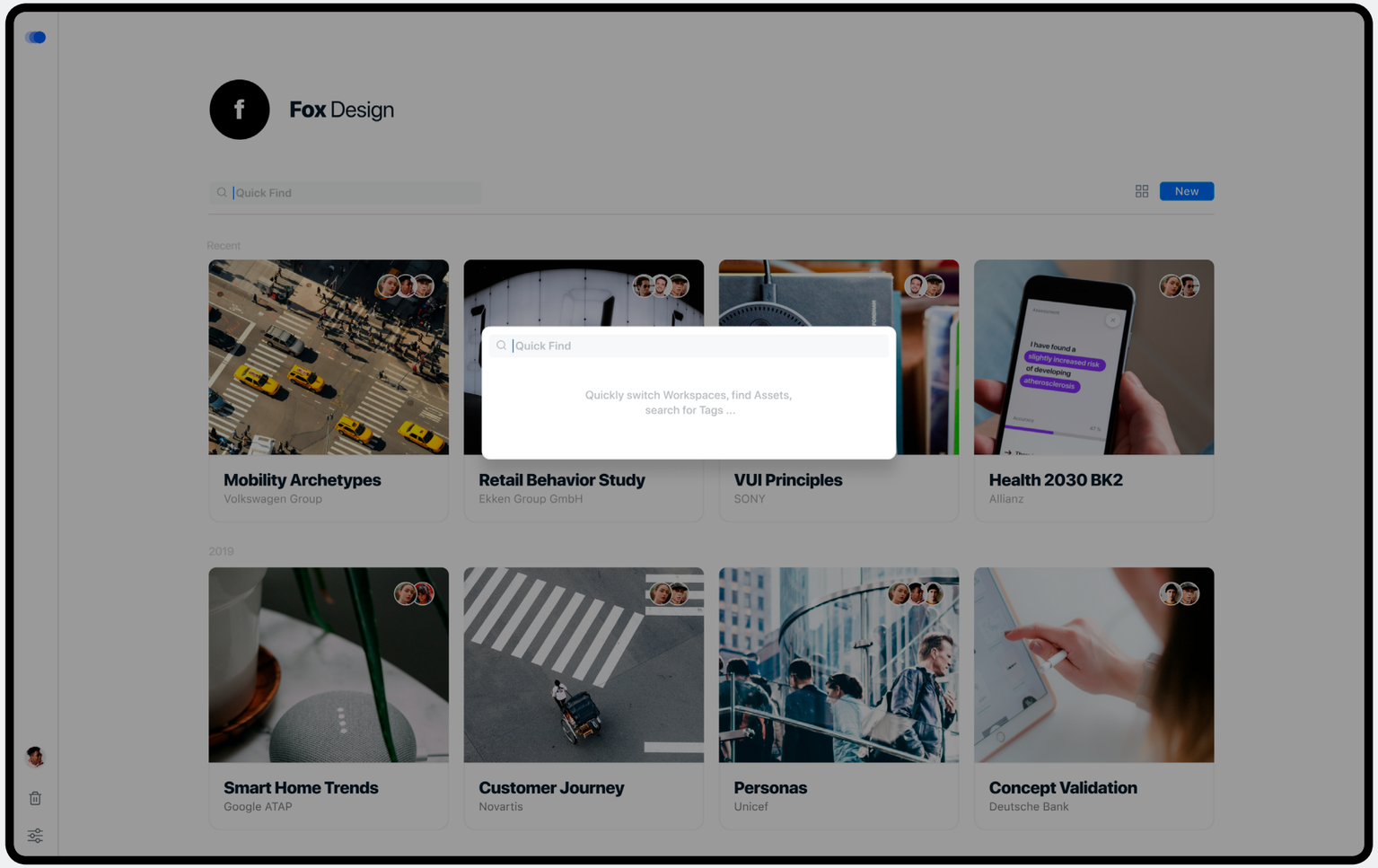


Fig. 45 **Global Search Overlay**

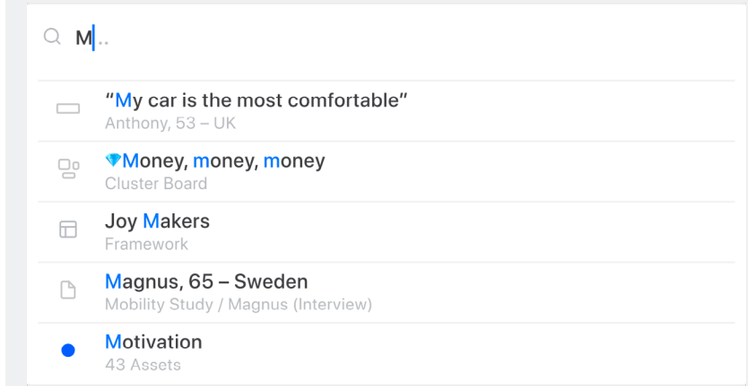


Fig. 46 **Global search query**. With the global search function, the user can quickly access any type of content from anywhere.

Startpage and Project Overview

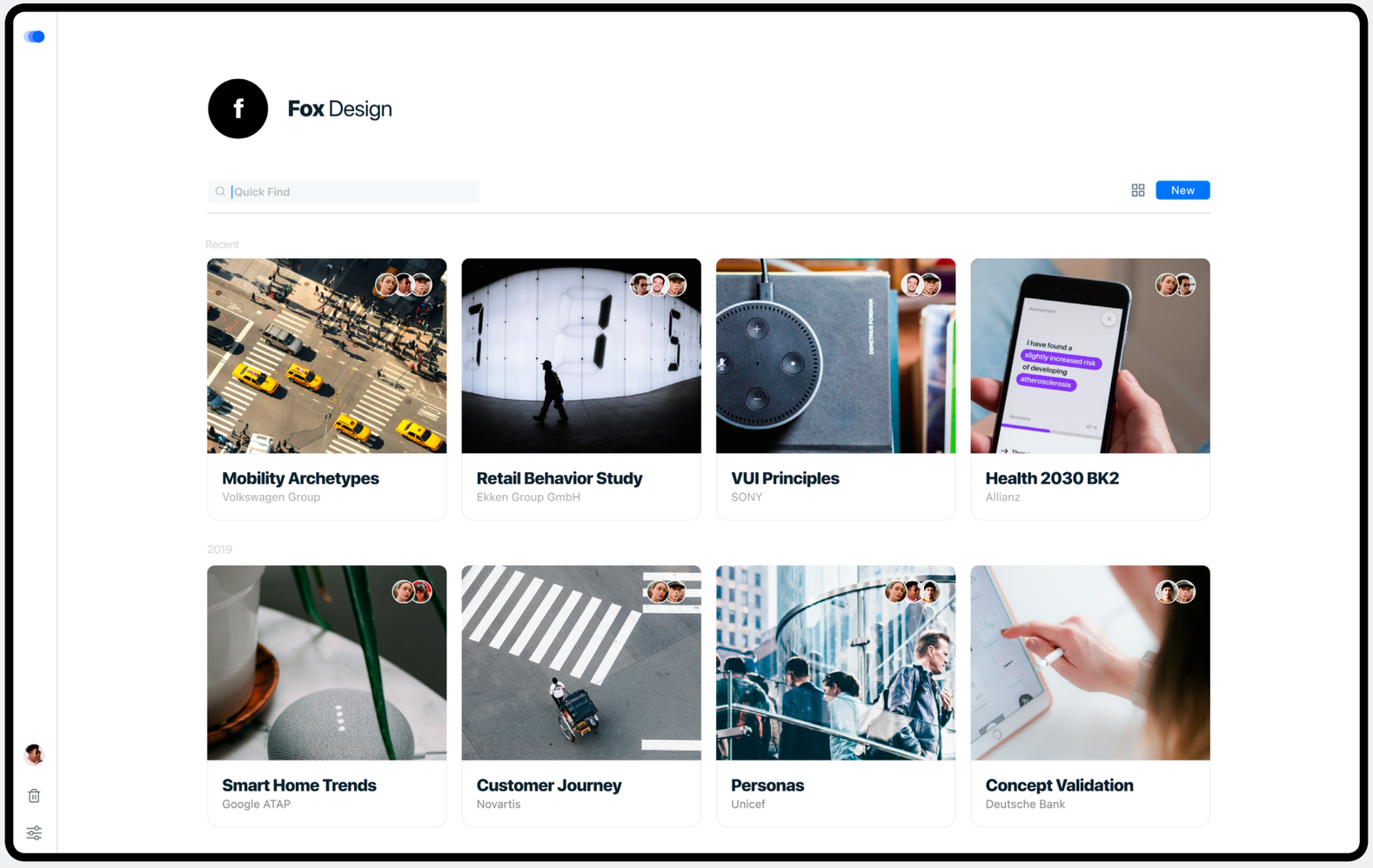


Fig. 47 **Startpage**

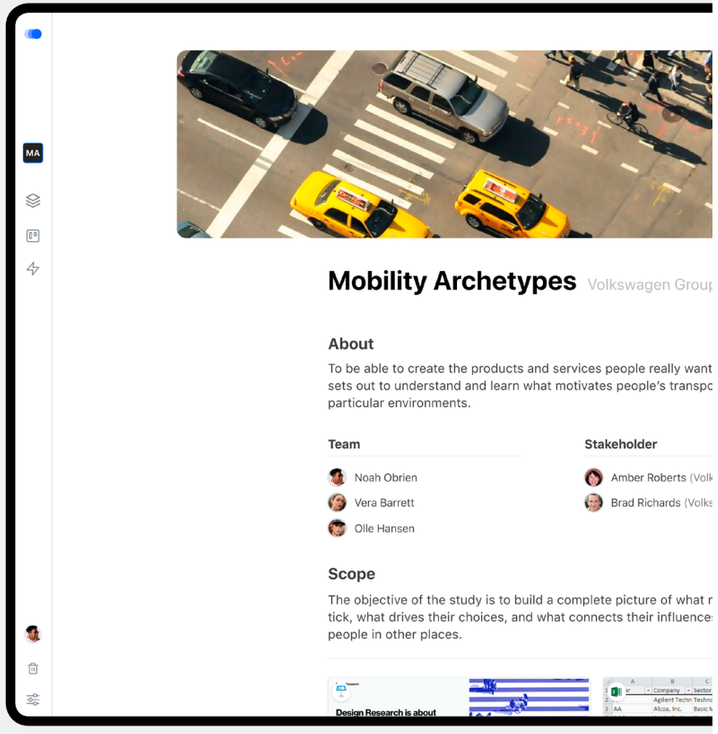


Fig. 48 **Project Overview**

Workspace — Data

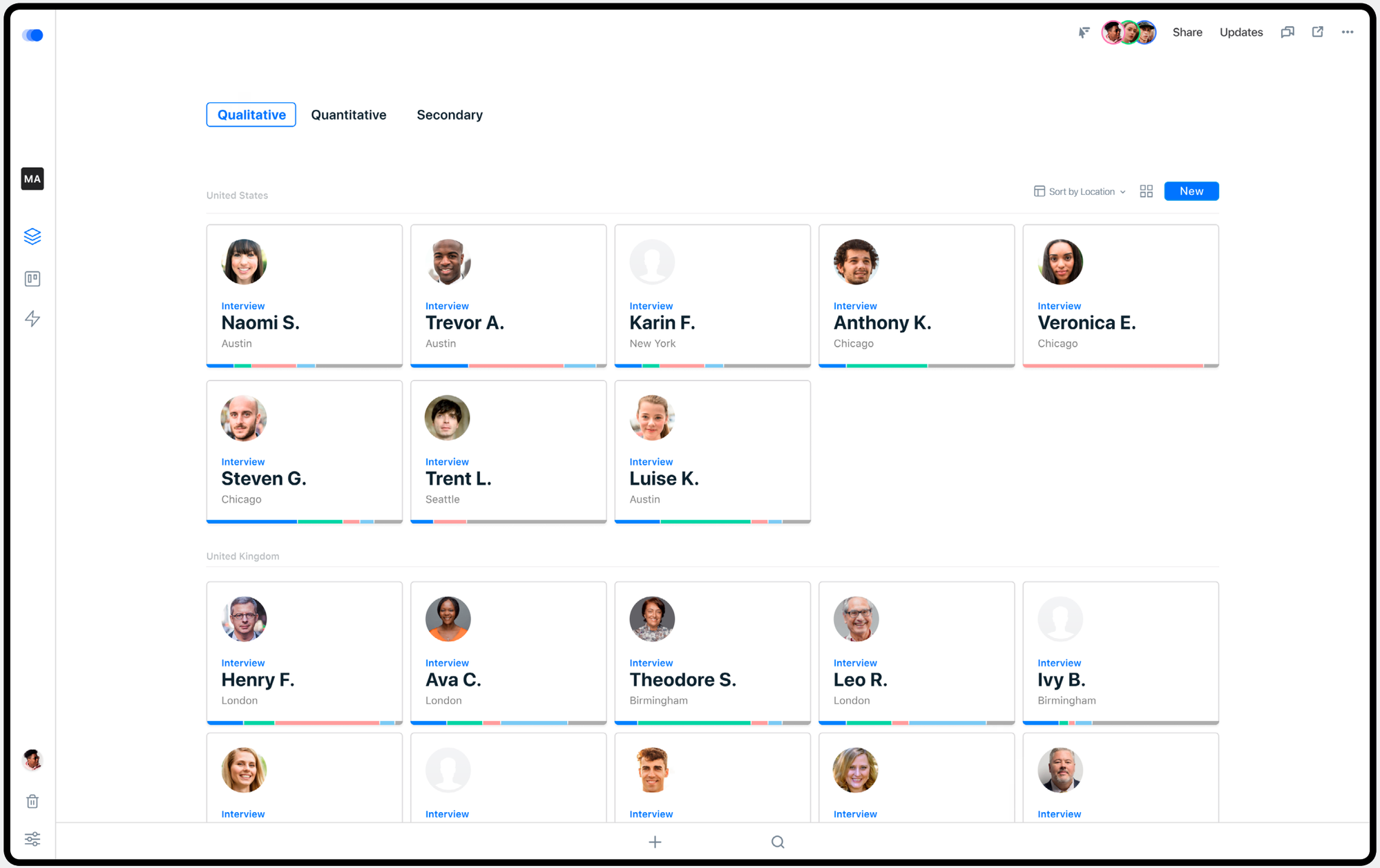


Fig. 49 **Workspace Data**

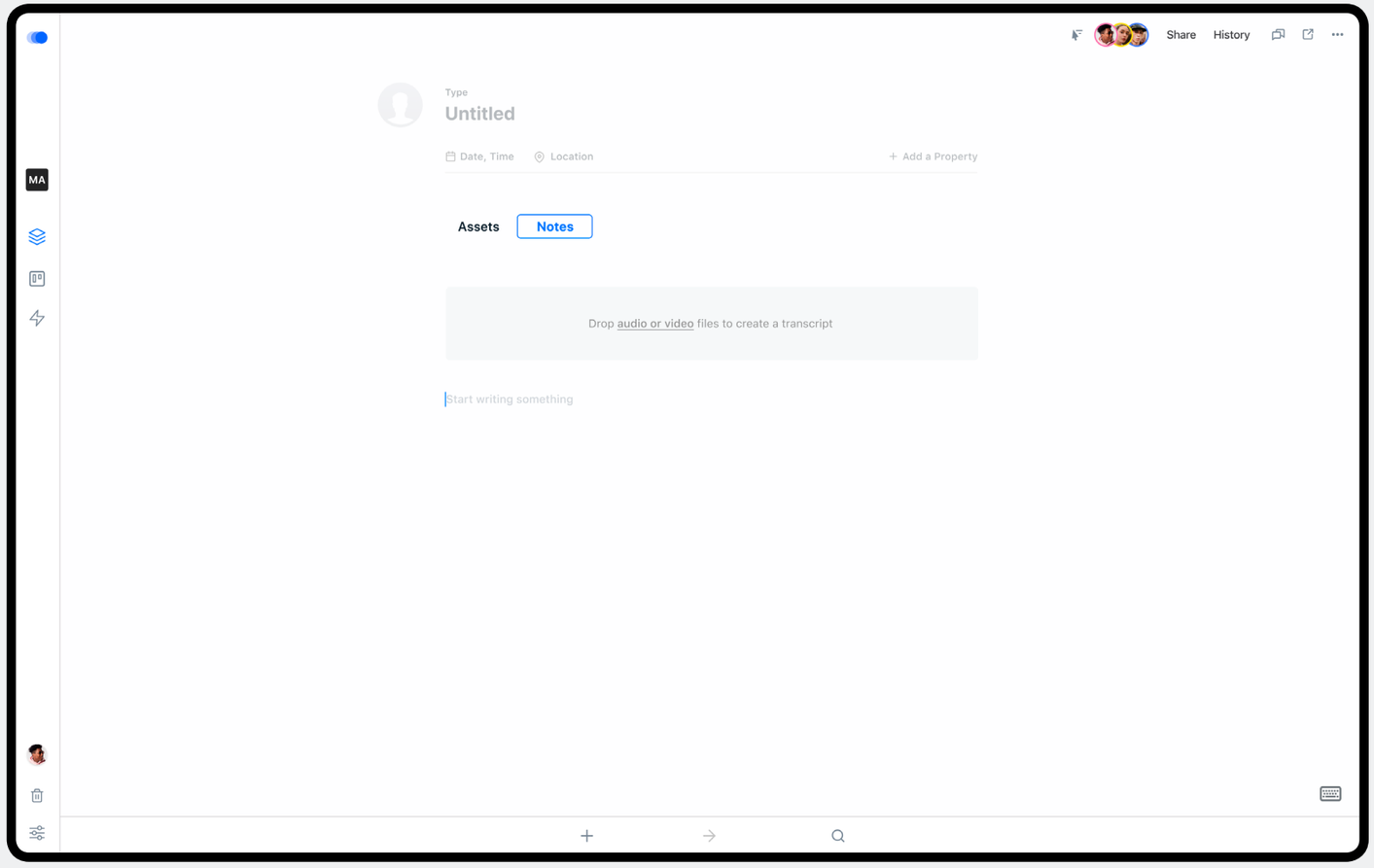


Fig. 50 **Empty Interview**

Interview

An interview can contain different types of media like notes, transcripts, video or audio, but also contextual meta-data. Within the interview, the user can create assets from scratch or use existing data as a basis.

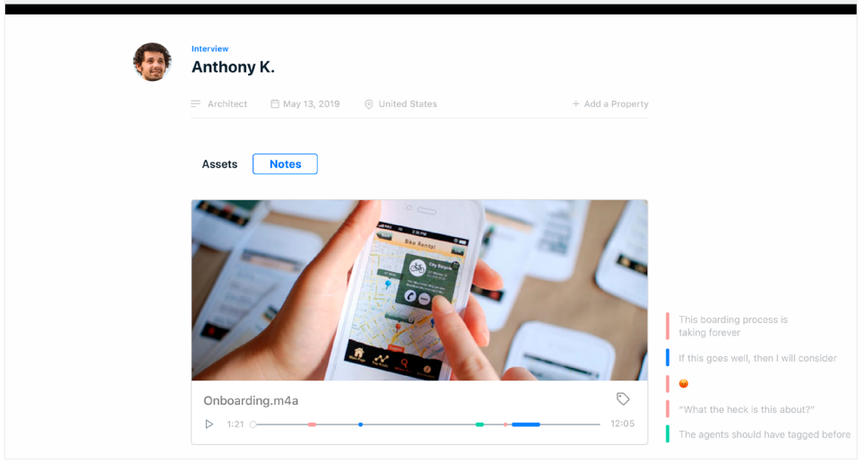


Fig. 51 **Audio and video**. If available, the interview can be enriched with video or audio files

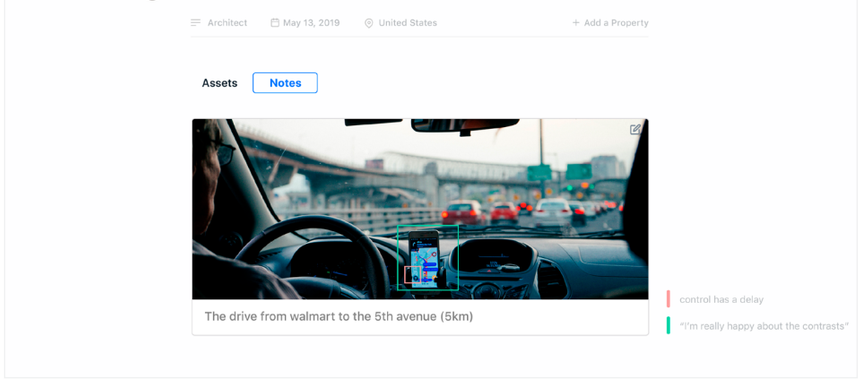


Fig. 52 **Imagery** can be attached to the interview oder pasted directly into the notes section.

Asset Creation

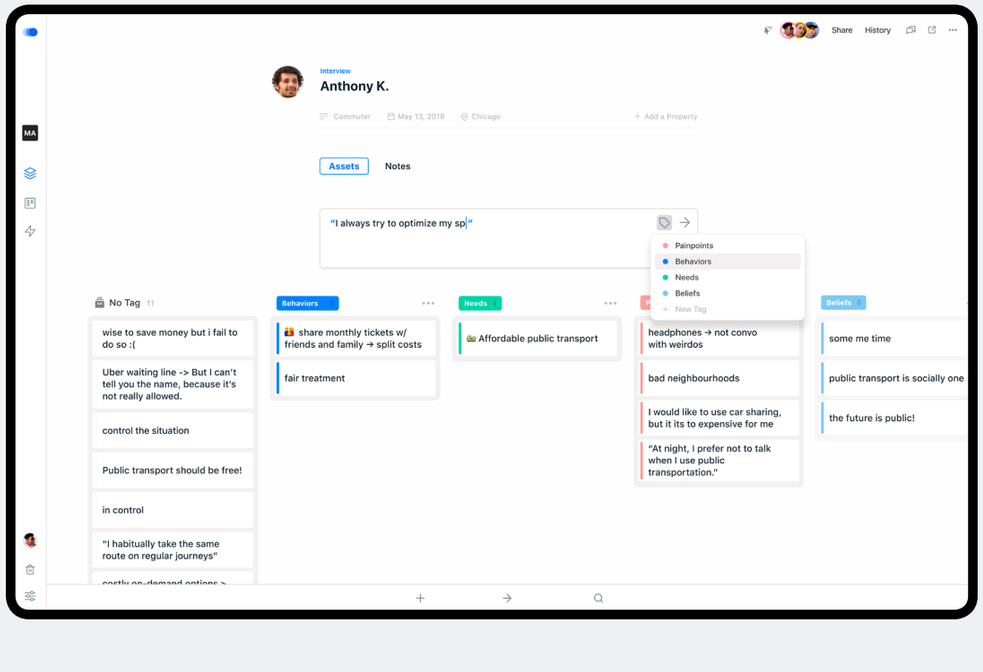


Fig. 53 **Asset creation I** — The fastest way to create an asset within an interview is to use the respective text input field.

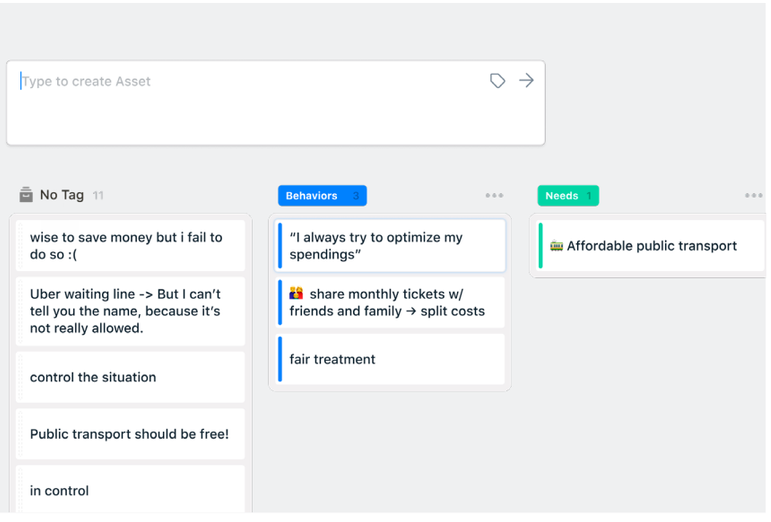


Fig. 54 **Asset creation II**

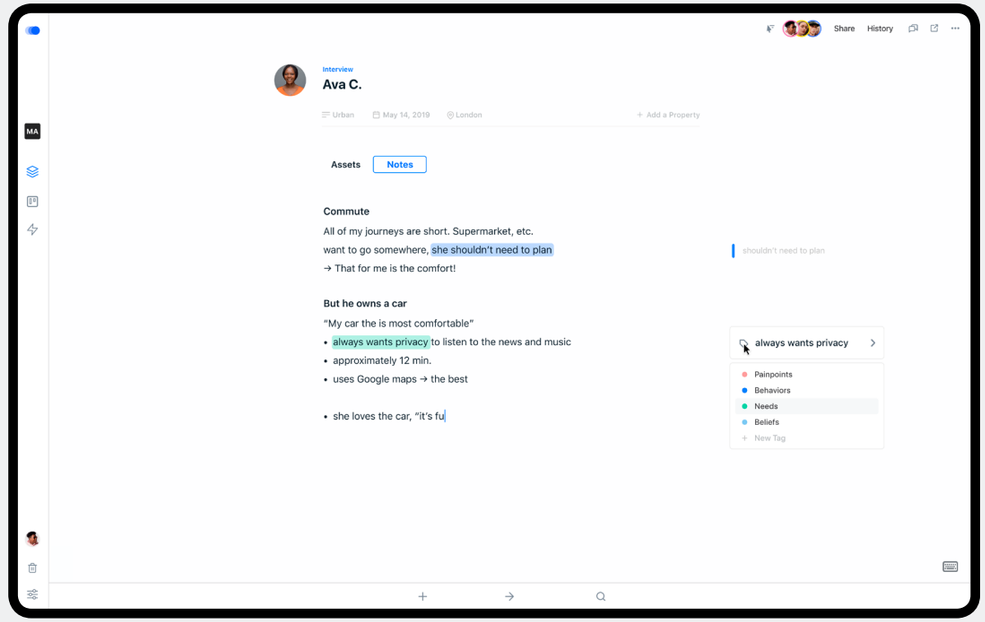


Fig. 55 **Asset creation III** — By tagging text, the user can create an asset that is then linked to the original text.

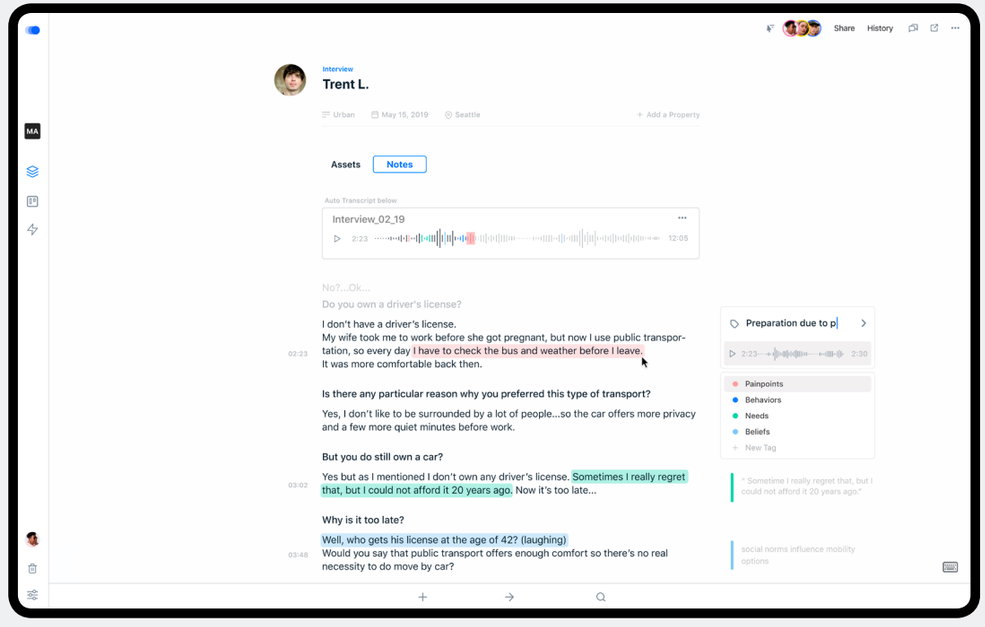


Fig. 56 **Asset creation IV** — If available, audio recordings are automatically attached to the asset.

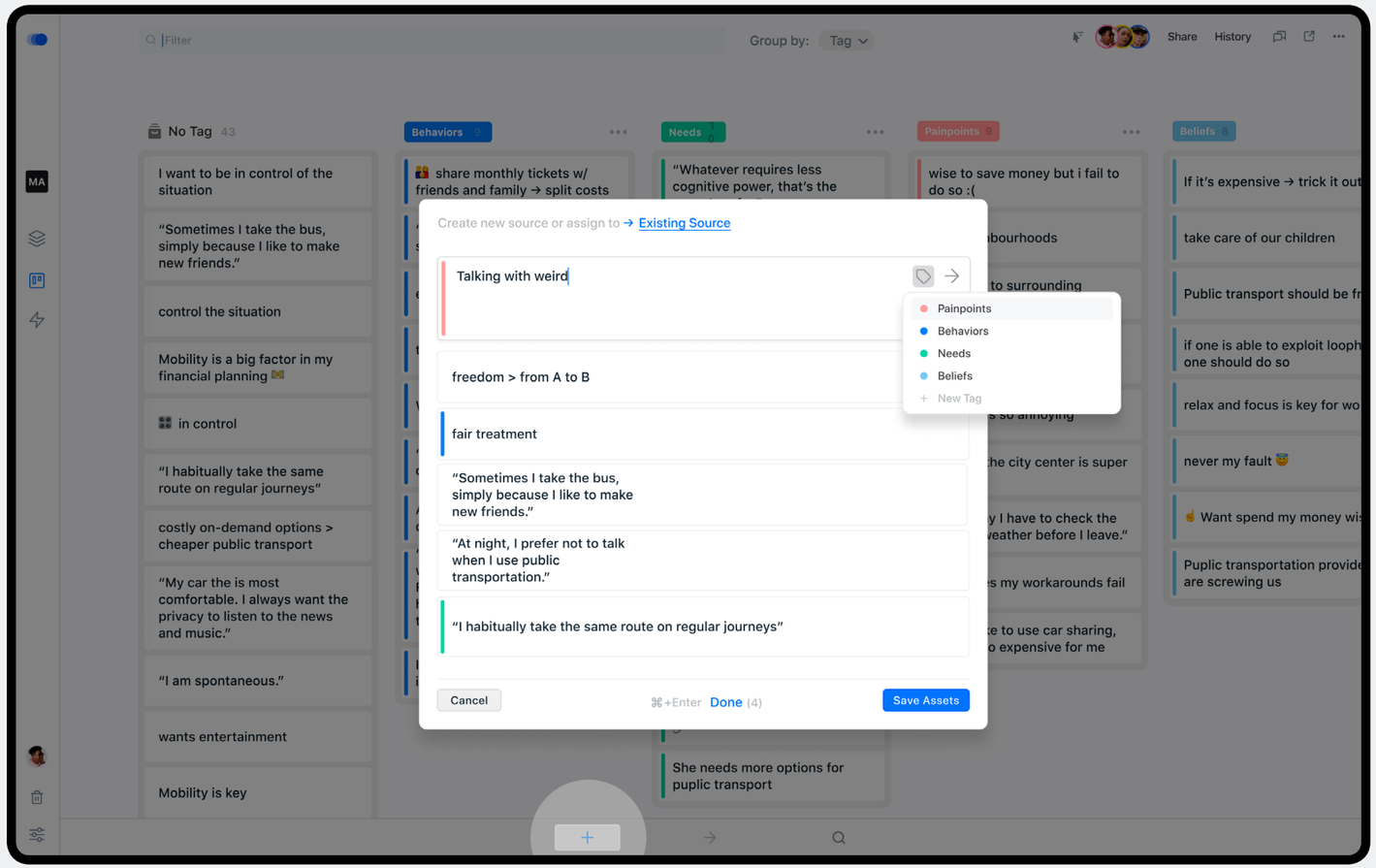


Fig. 57 The user can **create multiple assets**, accessing the respective functionality in the toolbar.

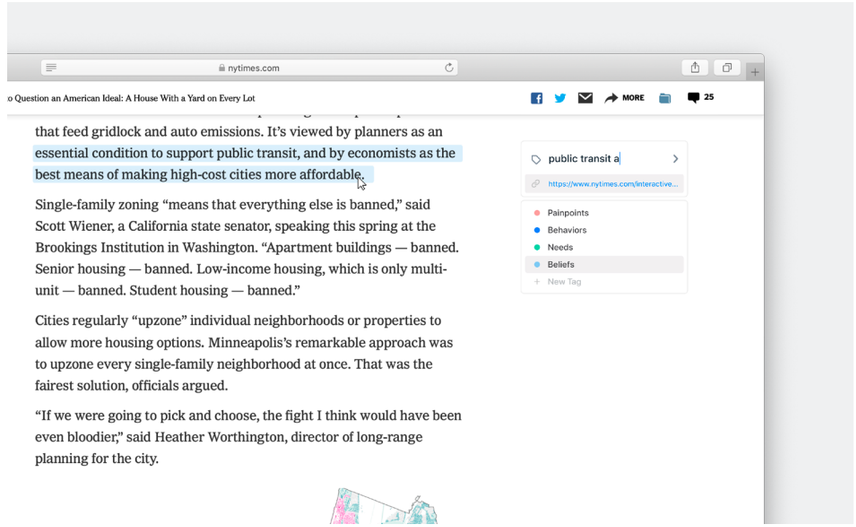


Fig. 58 With the **browser widget**, the user can create assets from web content

Assets

Fig. 59 **Types of assets I**
text-based assets can be either statements or quotes

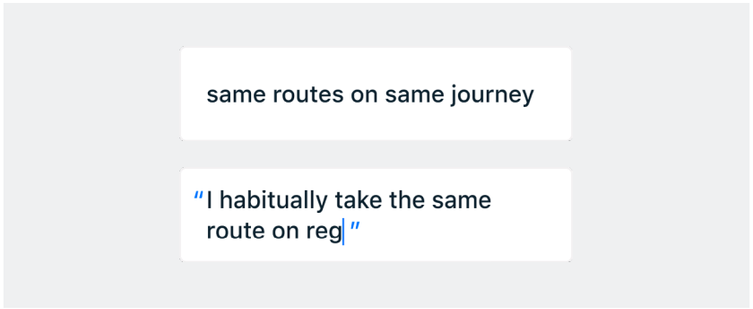


Fig. 60 **Types of assets II**
Assets can be enriched with contextual data, audio or video files

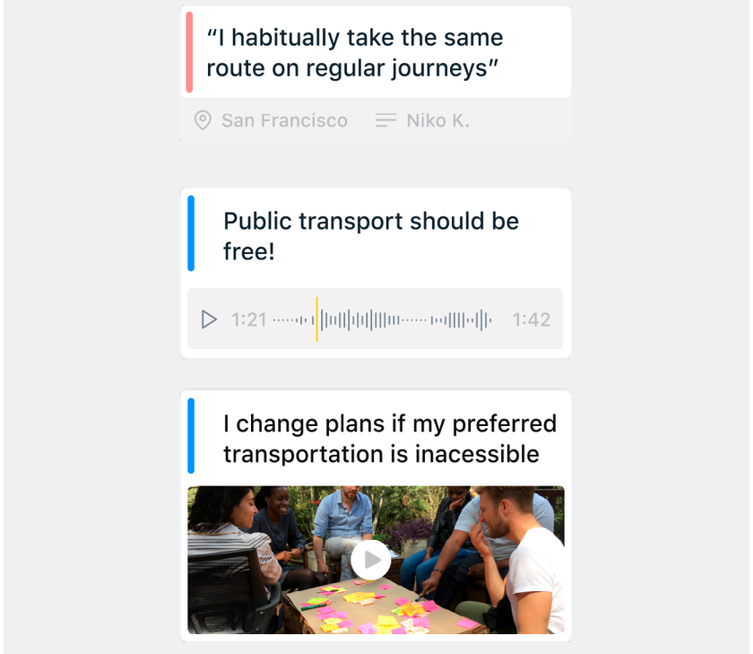


Fig. 61 **Types of assets III**
If assets share the same meaning, they can be grouped.

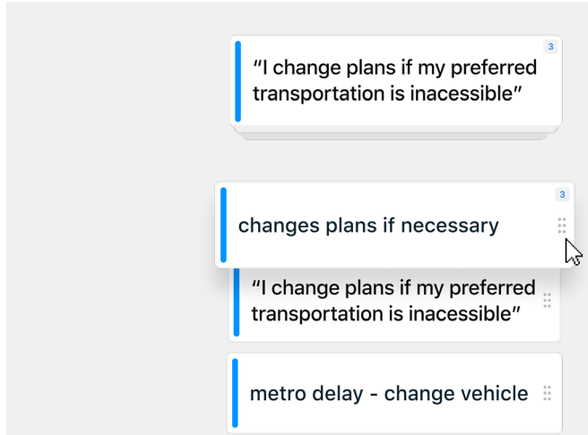
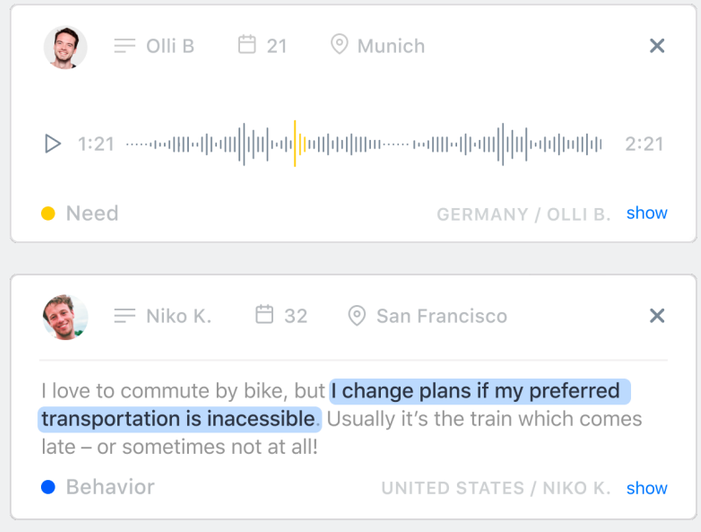


Fig. 62 **Types of assets IV**
Assets can contain different types of data, like qualitative, quantitative or secondary.

Fig. 63 **Types of assets V**
Each asset has a *backbone* that can be toggled.



Workspace — Analysis

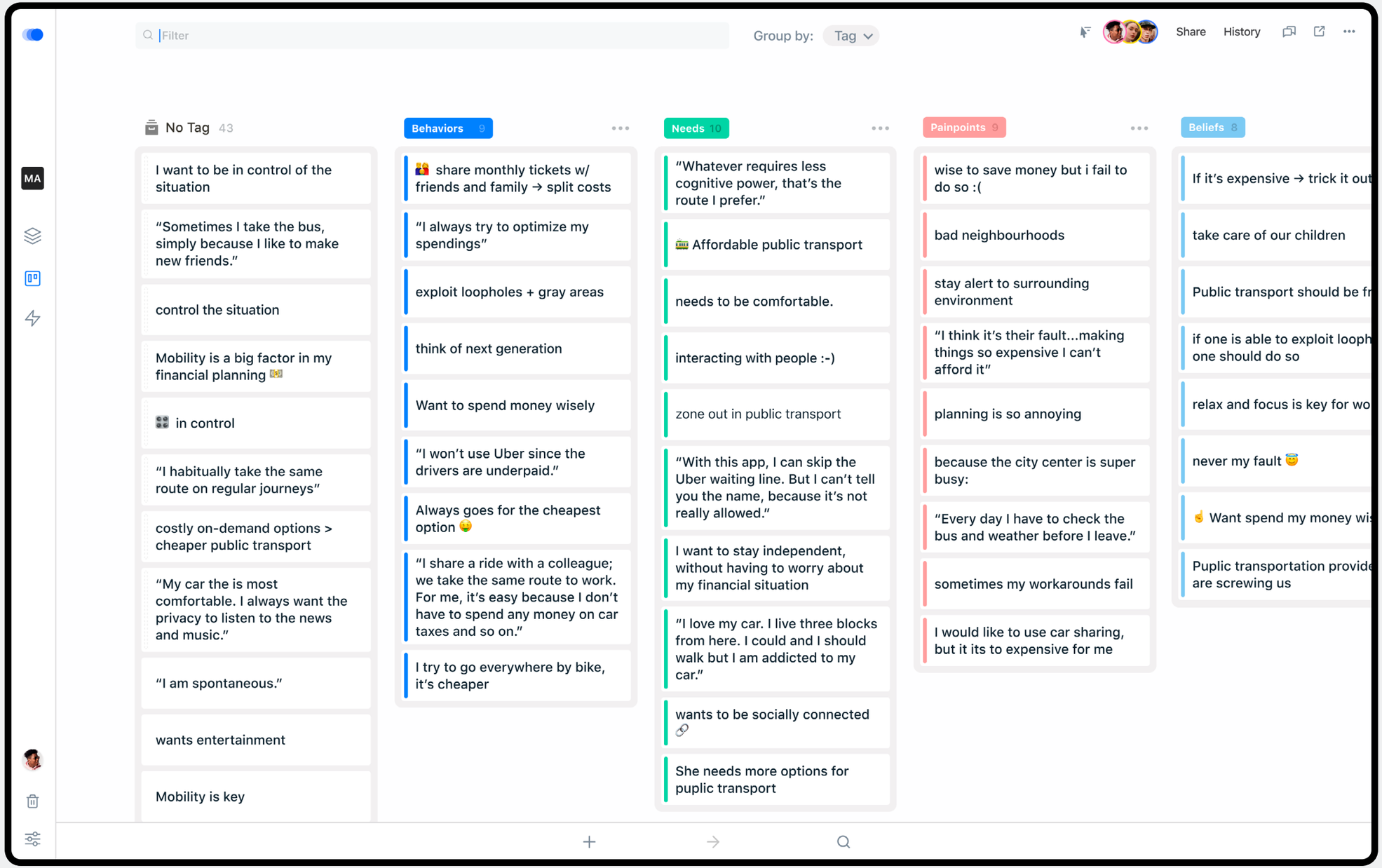


Fig. 64 **Workspace Data**

Filter

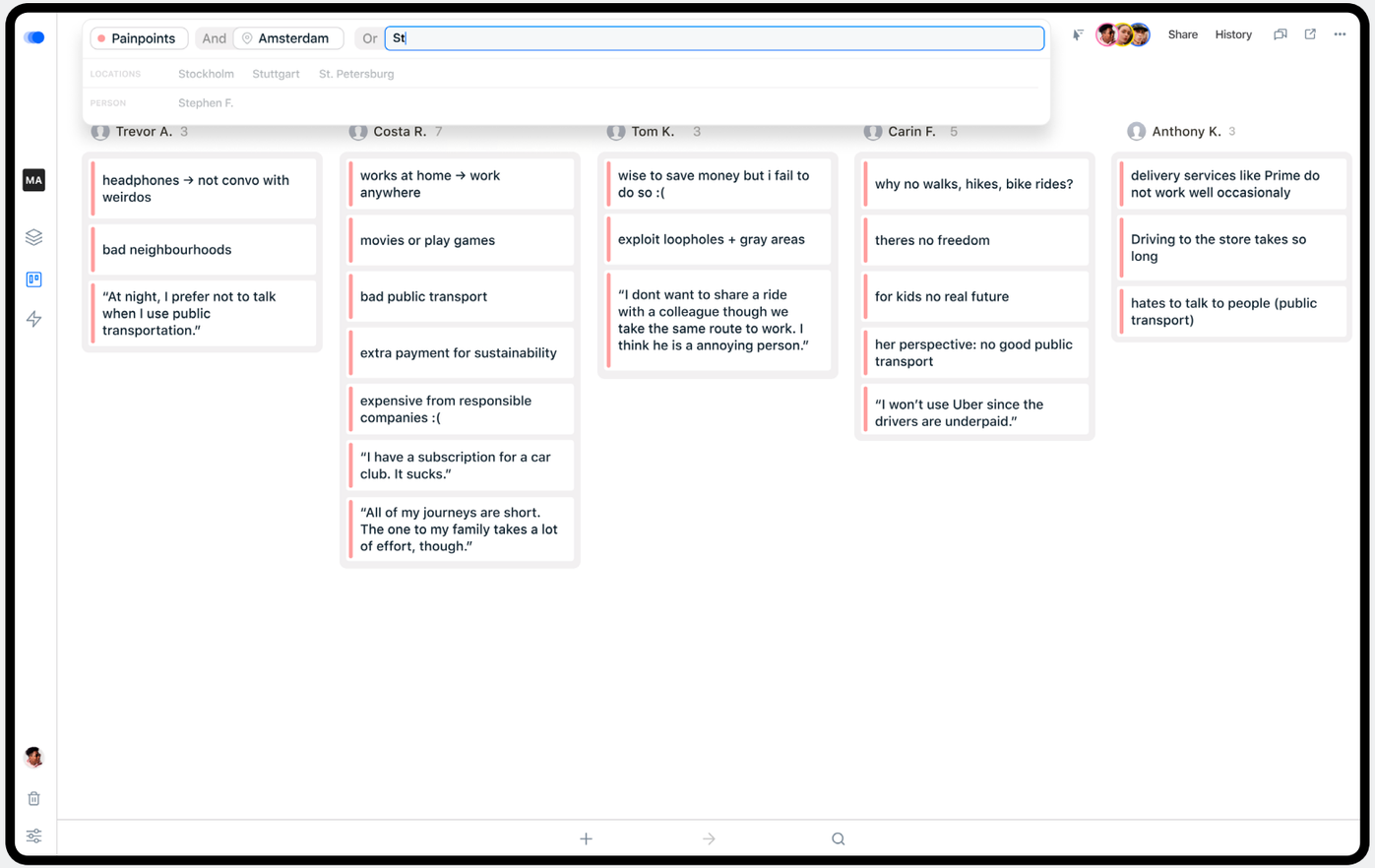


Fig. 65 **Analysis through filters.**

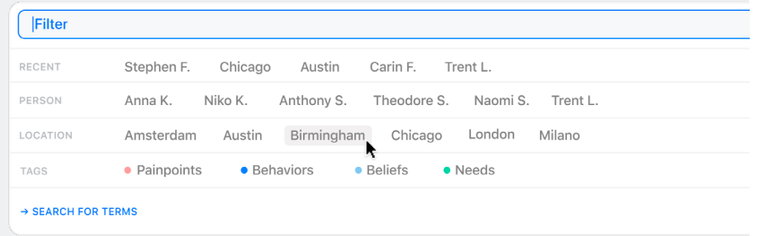


Fig. 66 **Filtering.** Assets can be filtered using metadata

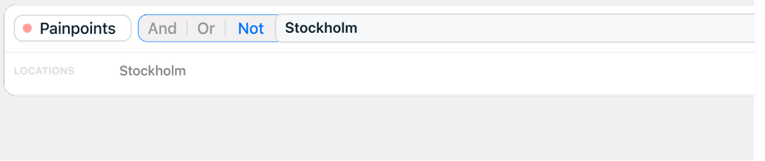


Fig. 67 **Filtering with simple logic.**

Filter and search

The filter and search function allows the asset pool to be rearranged using combinations of tags and metadata, e.g. by applying Boolean logic. This can be helpful to identify interesting correlations or just to get a better overview.

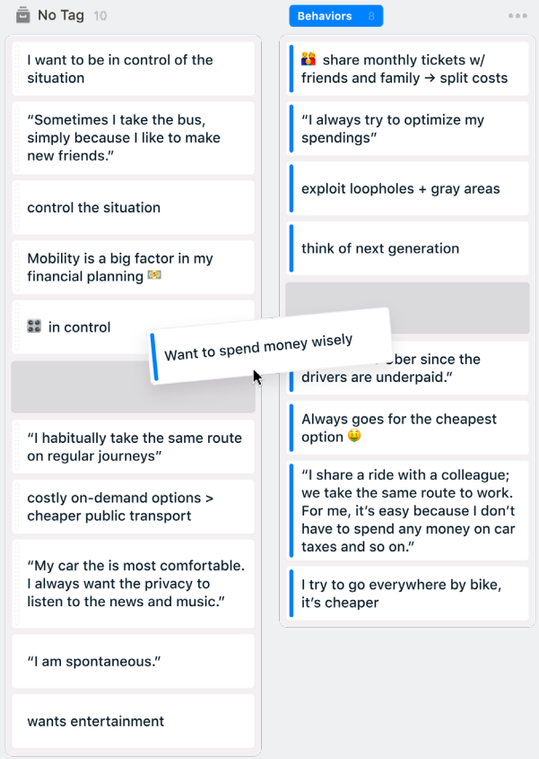


Fig. 68 **Column interaction.** Tag specification of assets can be quickly changed by dragging them into another column

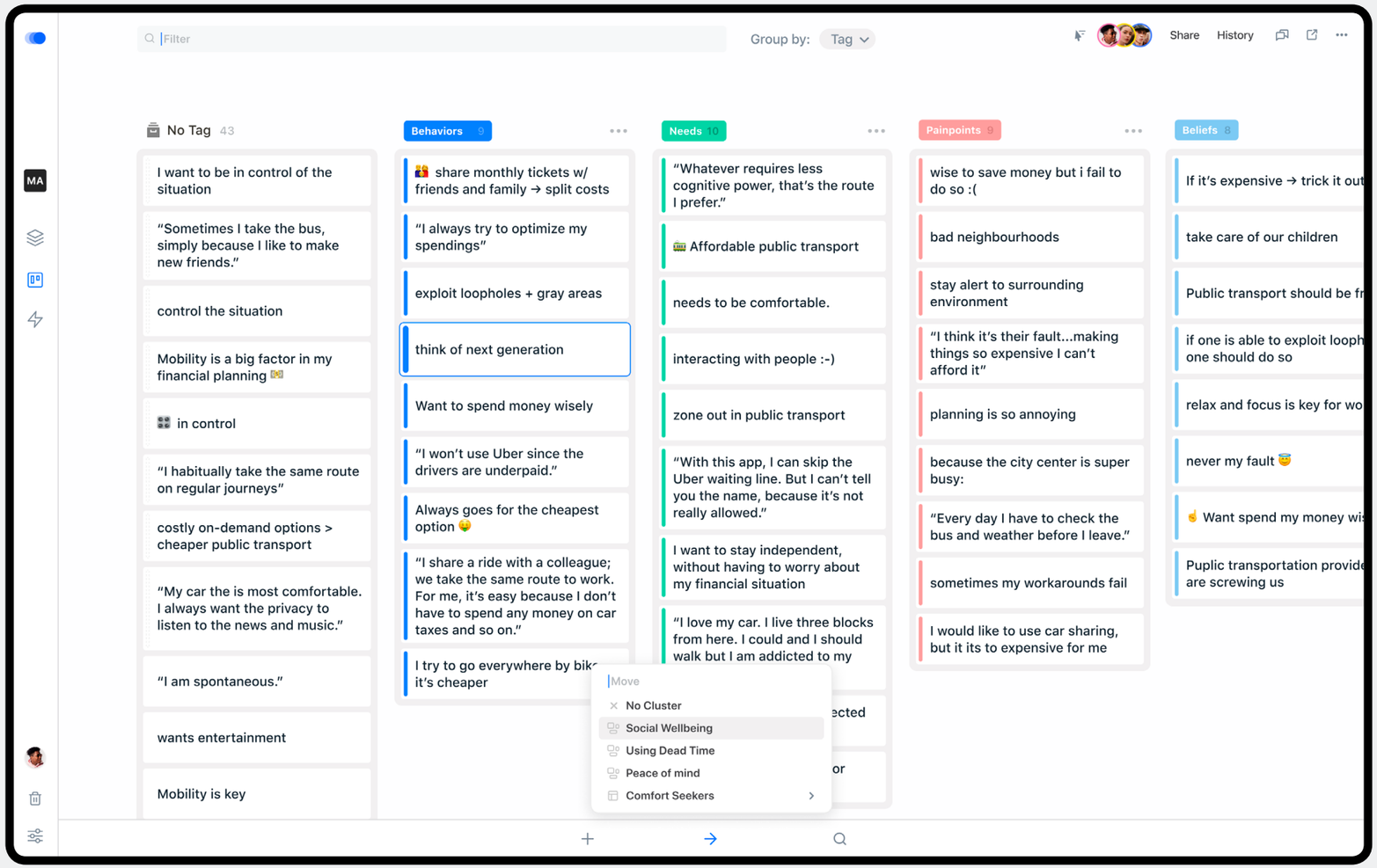


Fig. 69 **Assigning assets to a cluster**

Workspace — Insight

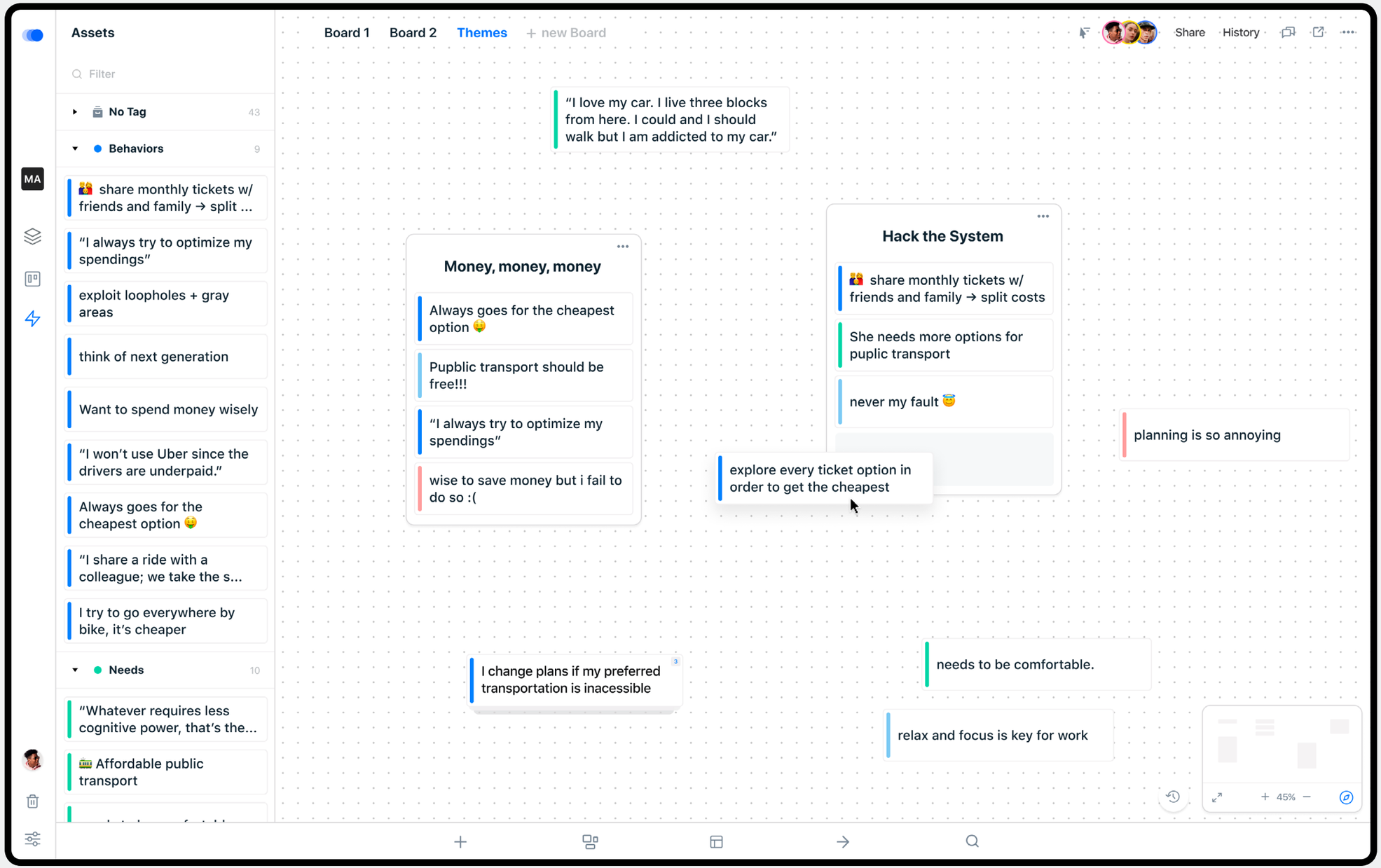


Fig. 70 **Workspace Insight**

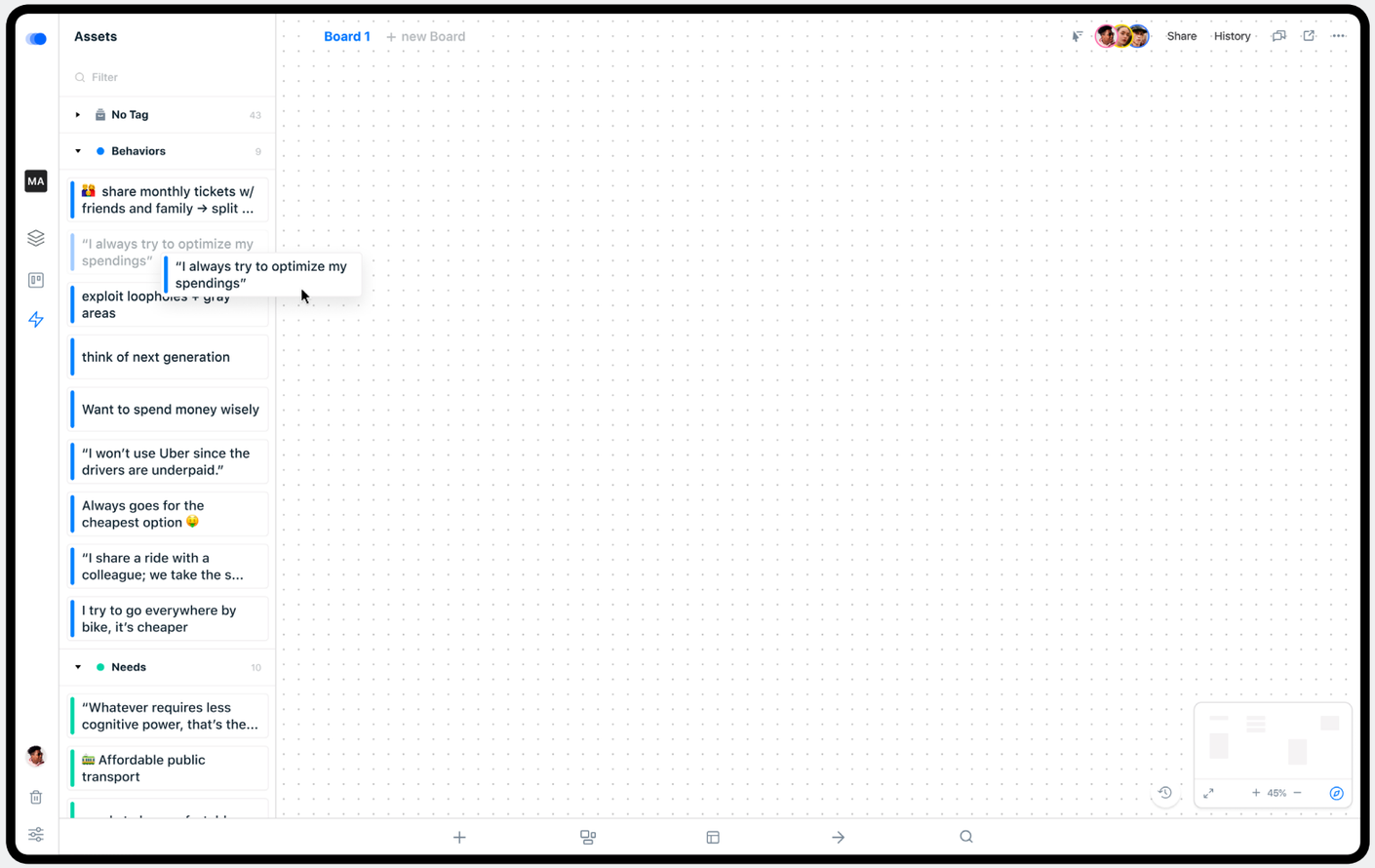


Fig. 71 **Asset list**

Asset List

The Asset list serves as a key component within the synthesis mode. It is the source for every asset, that gets dragged onto the playground for further manipulation. Because the number of assets can easily increase in magnitude the list provides a compact version of the filtering possibilities which were seen in the analysis mode.

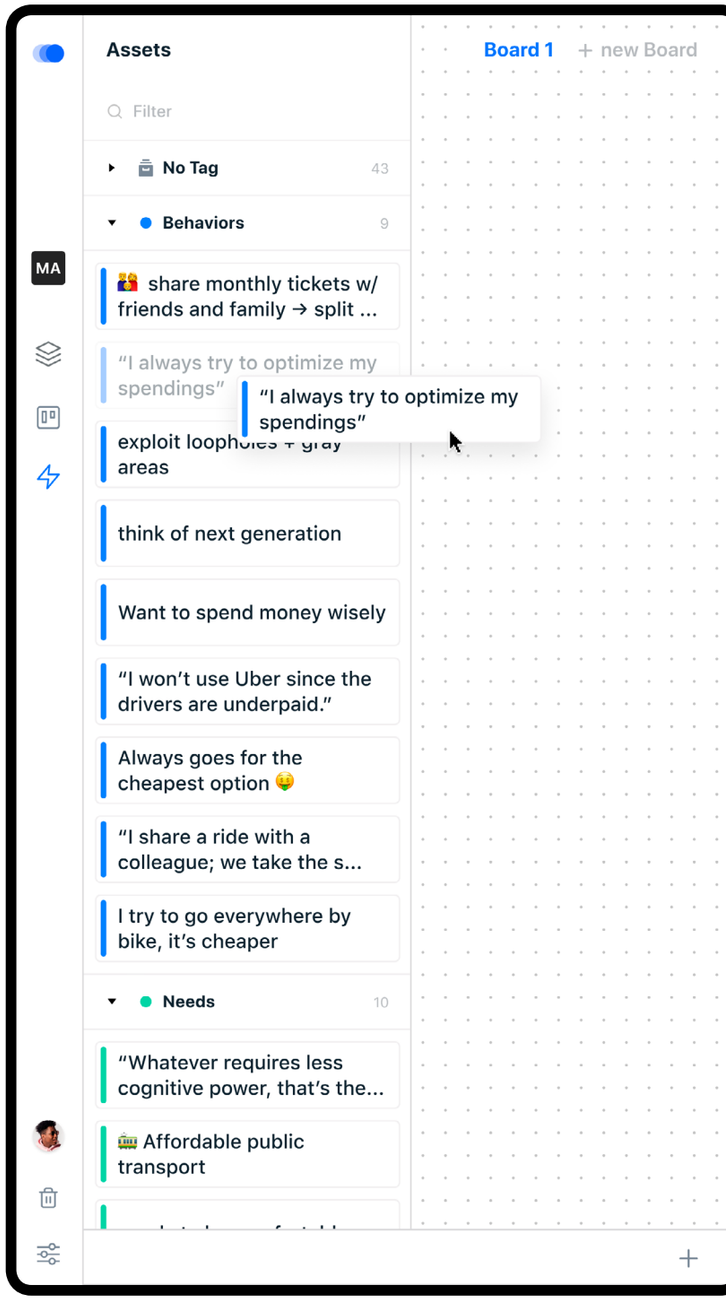


Fig. 72 **Asset list interaction.** This list provides the analyzed data library.

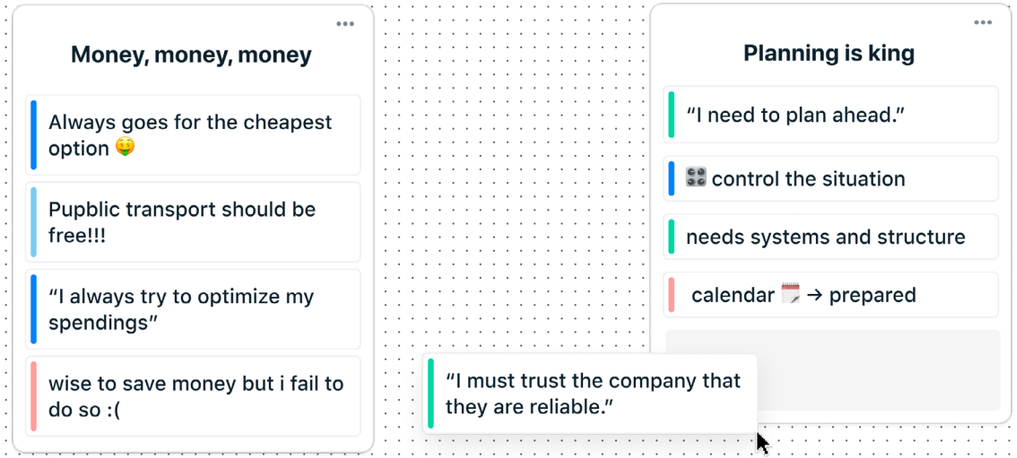


Fig. 73 **Cluster Interaction**

Fig. 74 **Clusters** are a way to group several assets on the canvas. They can be created using the corresponding function in the toolbar.

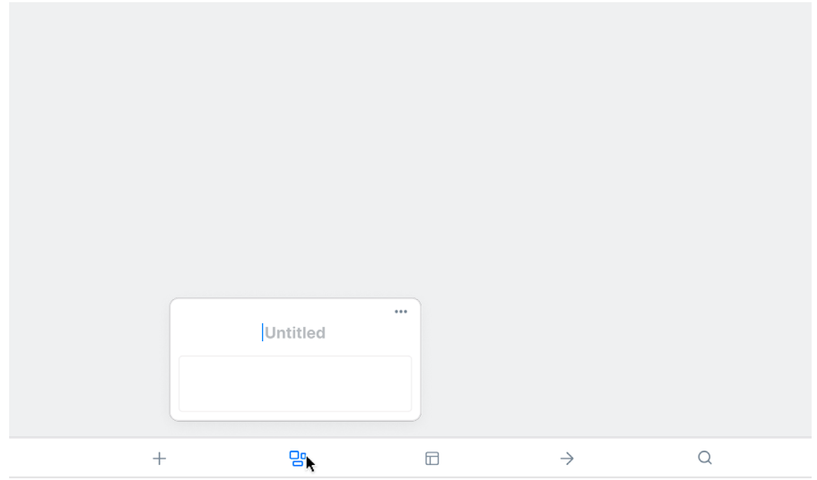


Fig. 75 **Push to cluster**. Assets can be moved into a cluster using drag and drop or by pushing them directly into a cluster with the push functionality.

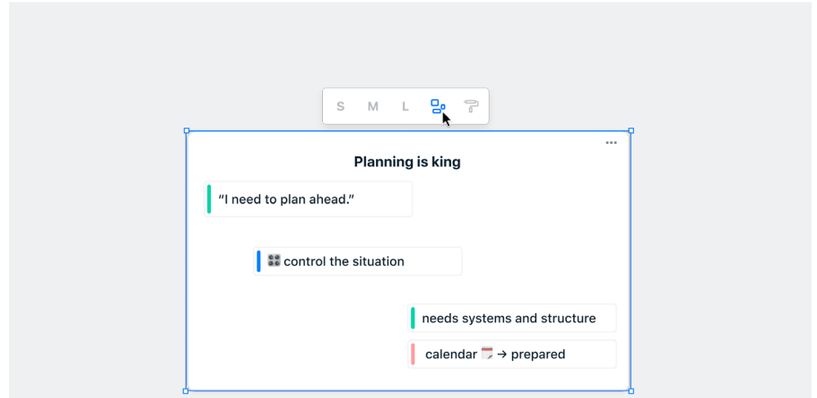
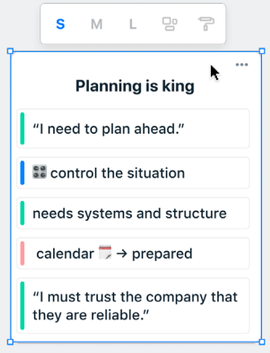


Fig. 76 **Cluster Settings**. Size and highlight color of a cluster can be adjusted individually.



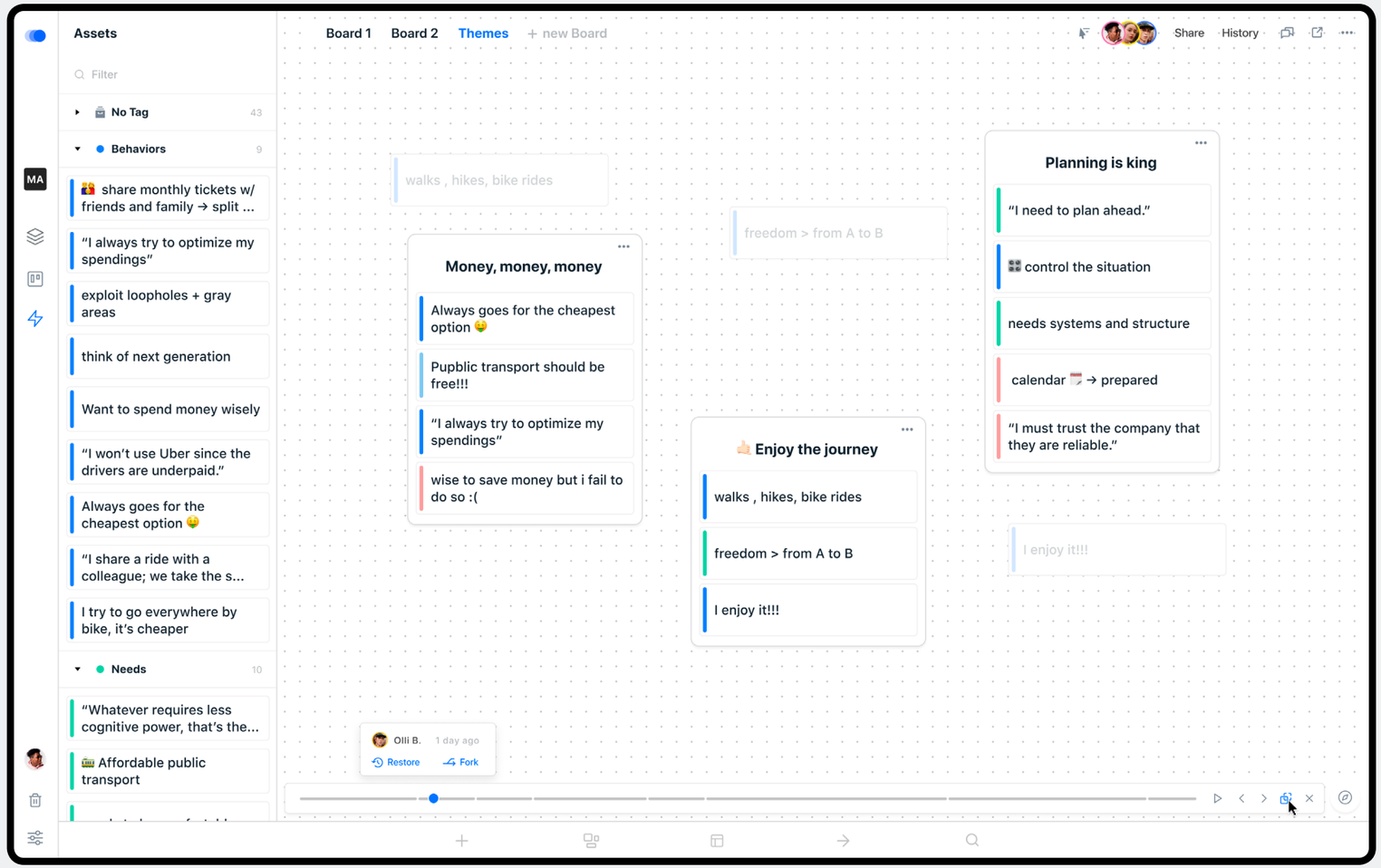


Fig. 77 **Process History**

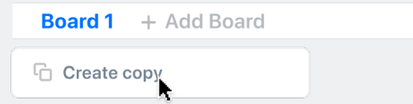


Fig. 78 **Boards and iterations**

Iterations

Every possible constellation of assets can be saved in a board or its respective iteration, meaning a version of it. The user can toggle back and forth between these.

A board can be seen as a state of arrangement rather than static tab or window. The transitions between the respective boards happen fluidly in order to compare and communicate his interpretations.

Each views' history can be accessed via a timeline function, so old versions can be restored easily. It is kept so that users can quickly find different working states, without having to remember their exact title.

Frameworks

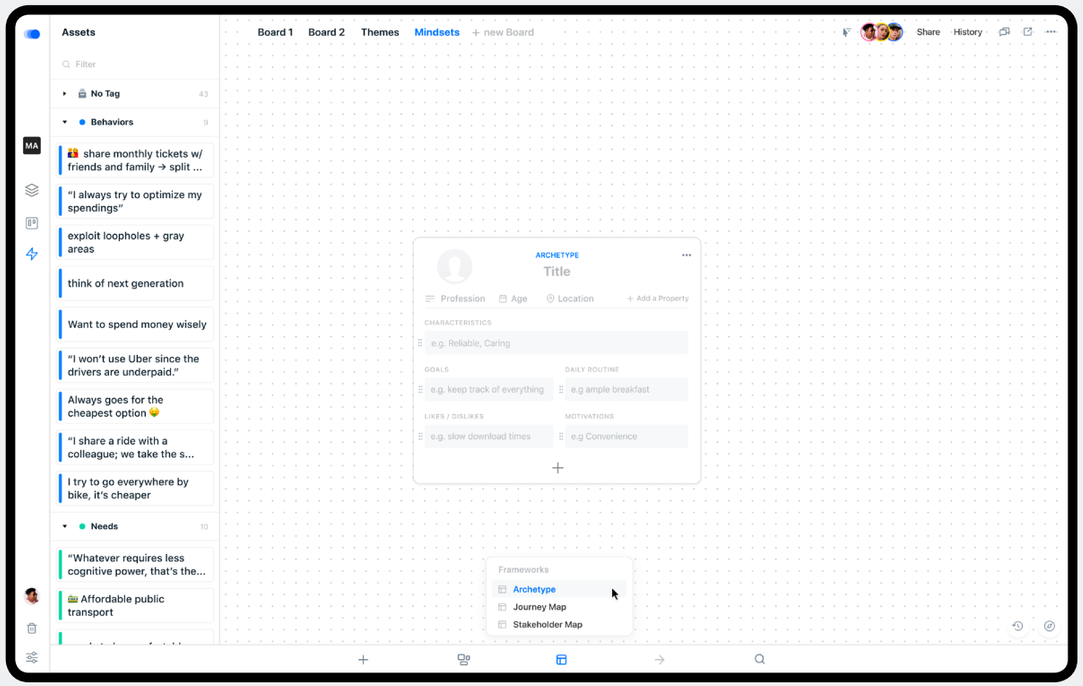


Fig. 79 **Creating frameworks**

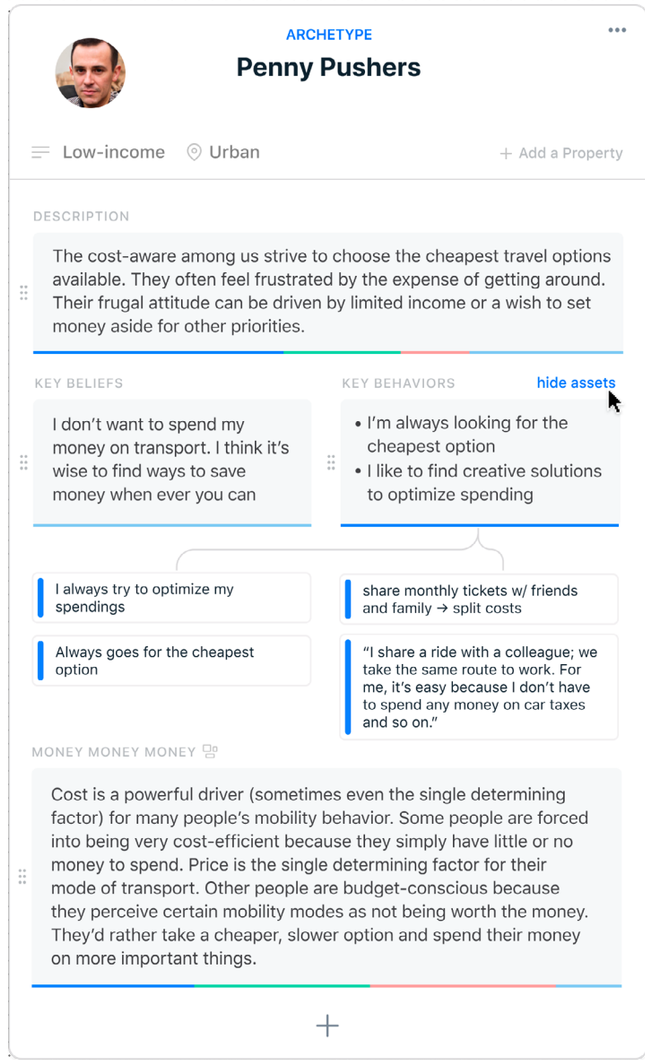


Fig. 80 **Archetype Framework**

Backbone

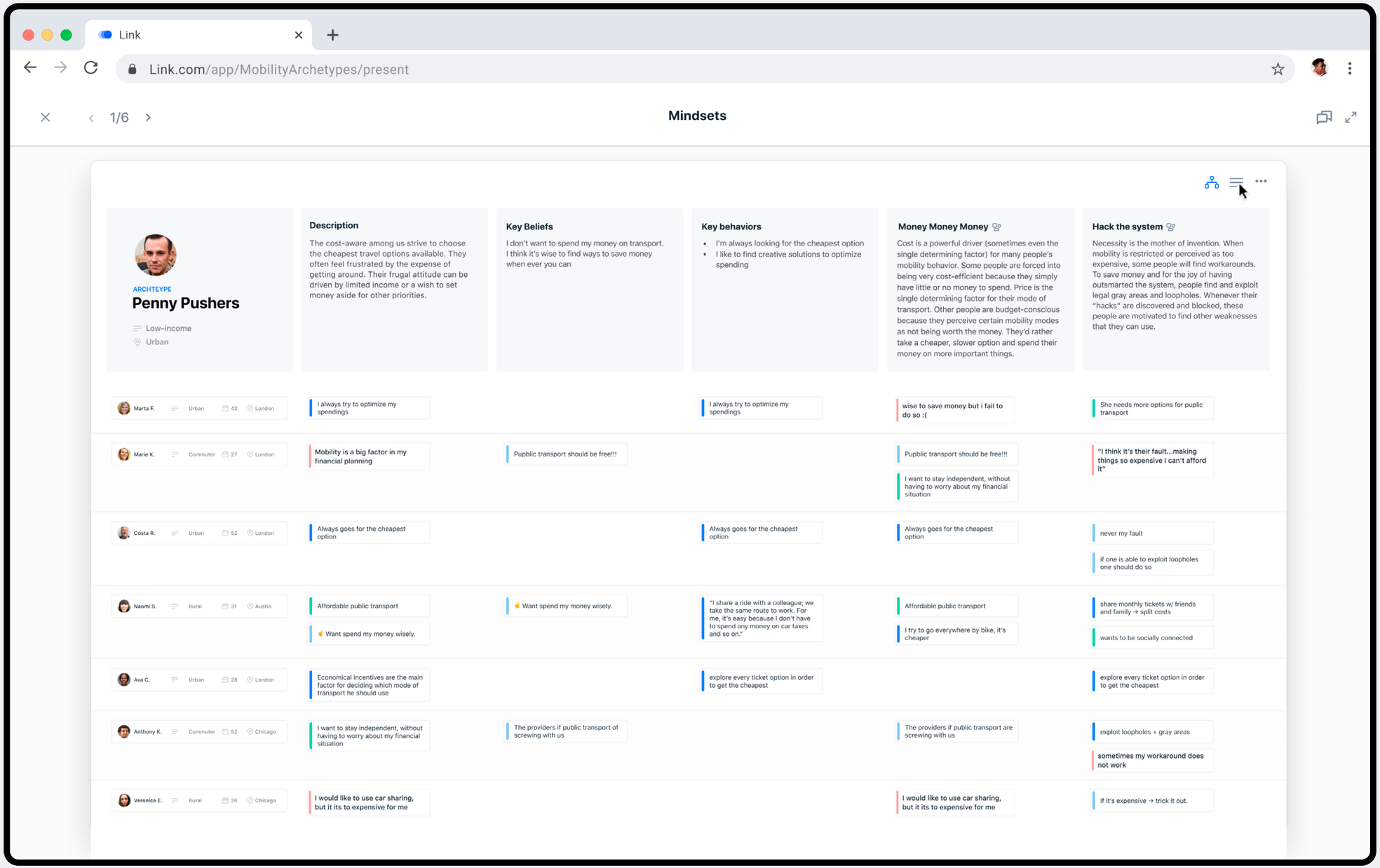


Fig. 81 **Backbone of a framework**

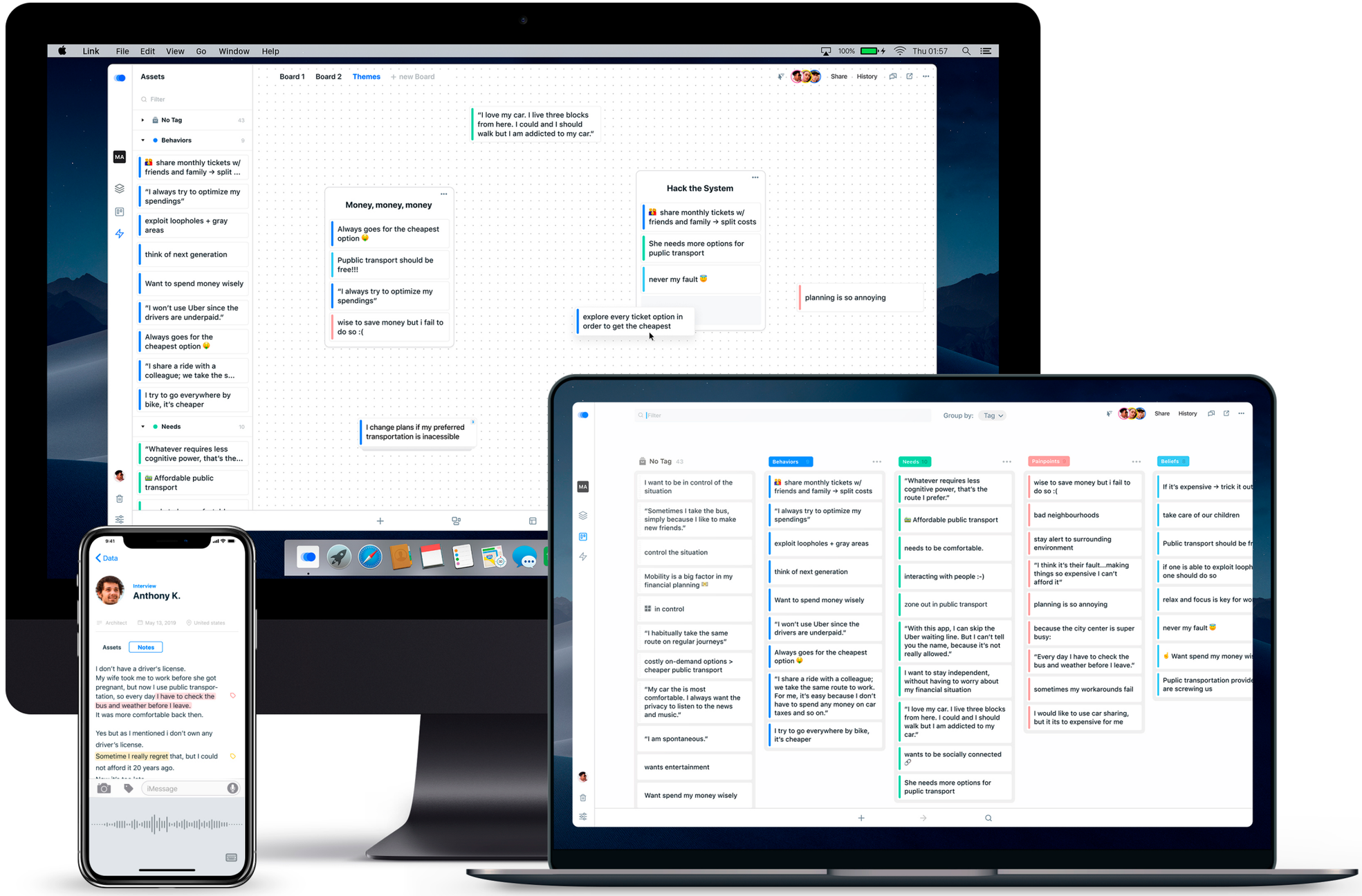


Fig. 82 **Link Key Visual II**

Appendices

Statement of Authorship

We hereby declare that we are the sole authors of this bachelor's thesis and that we have not used any sources other than those listed in the Reference List and identified as references. We further declare that we have not submitted this thesis at any other institution in order to obtain a degree.

Schwäbisch Gmünd, 28.06.2019

Florian Deitermann Max Mertens Janis Walser-Cofalka

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List of Figures

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Colophon

Link – augmenting the process of sensemaking

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