PROTOTYPING AS A DRIVER OF DESIGN THINKING

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INTRODUCTION

WELCOME TO PROTOTYPING.

Architects do it, car builders do it, software developers do it, evolution does it: prototyping. Even Alfred Hitchcock, the famous movie director used prototyping:

“At parties he read different versions of his story and worked on the comments of the audience in his later versions. The final result he tested in short film excerpts at the audience. A famous work, which was created with this method, is the horror film ‘Psycho’.”

(Kropatschek, M., 2002 – translated from German)

Prototyping is not a specific phenomenon that is brand-new. But is it is worth while looking at in the context of a rapidly changing world of rising complexity and digitalisation and the strategies that try to face this ongoing transformation.

The stage of prototyping is one of the very important steps in the Design Thinking process. It is the moment where an idea becomes tangible, and it is the first time getting in touch with the user – a crucial and also a magic moment.

As prototyping is a somehow familiar subject to most people in organisations, it could be a vehicle to help establish a human centered way of working and to create a good starting point for the implementation of Design Thinking.
WHITEPAPER STRUCTURE

THEORETICAL BACKGROUND MEETS BUSINESS RELEVANCE.

This paper analyses the aspects of prototyping in general and specifically in the context of Design Thinking. Aim is to show the fundamental basics to gain an overall understanding of what prototyping is about, what kind of methodologies lie behind it.

Furthermore recommendations will be given how prototyping might be useful in the organisation that is going through a digital transformation process. It will show the relevant framework for the implementation.

A short conclusion will summarise this paper, while giving an outlook of the value of prototyping as a driver for Design Thinking within the organisation.
“As the issues confronting us become more complex — intricate, multinational supply chains; rapid changes in technology platforms; the sudden appearance and disappearance of discrete consumer groups...” (Brown, 2009) ... a new approach of human centered problem solving is needed.

Tim Brown, co-founder of IDEO, an innovation agency, claims that Design Thinking is such an approach.

Design Thinking is a process developed by IDEO to promote creative ideas. Similar to the user-centered design, the design thinking method focuses on generating innovations that are user-oriented and meet their needs. To ensure this, Design Thinking relies on design methodologies, which puts the user in the core of all activities.

Furthermore, the philosophy of Design Thinking is to constantly iterate and learn, to get the users feedback, reflect and find multiple solutions on how to solve a problem. Brown explains:

“Design Thinking differs ‘markedly’ from the linear, milestone-based processes that define traditional business practices.” (Brown, 2009)

Over the last years one can find various approaches to the systematics and stages within the Design Thinking process. Famous models are the the British Design Council’s Double Diamond, IDEO’s human centred design ideology or d.school’s Design Thinking process.

* Source: https://designthinking.ideo.com/?tag=synthesis
All models mentioned show a concept of interdepending stages as well as a wide range of methods used in Design Thinking. These could be generally characterised by user orientation, research, visualisation, ideation, prototyping, simulation, testing, iteration etc. (Wikipedia). The various methods amongst others depend on the project and application area as well as on the preferred tool box of experts using them. Aim of Design Thinking is to solve a problem and find solutions – either in an incremental or in a disruptive manner.

As this essay will focus only on the specific part of prototyping, the following paragraphs will take a closer look at the definition, variety and meaning of prototyping.

Conclusion:
Design Thinking is human centered way of problem-solving, – and prototyping is an inherent part within the Design Thinking process.
PROTOTYPING

WHAT IT IS.

All the Design Thinking approaches mentioned have a similar process whereas prototyping is an inherent and crucial part. One of the most famous Design Thinking schools, d.school at Stanford University, describes prototyping as follows:

“The prototype mode is the iterative generation of artefacts intended to answer questions that get you closer to your final solution. In the early stages of a project that question may be broad ... In later stages both your prototype and question may get a little more refined.”

The d.school specification already shows one of the main characteristics of prototyping: it is not about the creation of just one artefact, but about an ongoing process that can repeat and improve itself towards a final solution.

This characteristic feature is also being outlined by a German internet platform for digital innovations: Gründerzene.de, which is one of the leading news sources for digital business in Germany:

“The production of a prototype, i.e. the method of prototyping, is used to visualise ideas, to explore aspects of a solution or to test a preliminary result. At the same time, prototypes initially have a rough resolution or accuracy and become increasingly finer in the development process.” (translated from German)

As we see the iterative character both in Design Thinking and prototyping, it is not remarkable that these methods often go hand in hand with agile workflows: aim is to improve the prototypes iteratively and quickly.

Conclusion:

Prototyping is used to evaluate, iterate and improve.
THE PROTOTYPE

A FEW DEFINITIONS.

It might be helpful to shortly spot on the definition of ‘prototype’. Later in the essay ‘prototyping’ as well as ‘prototype’ should be considered to be both part of the overall discussion as one cannot be seen without the other.

Prototype in a linguistic context has its origin in Greek and Latin. ‘Prototypon’ (Greek) or ‘prototypos’ (Latin) means archetype, primal image, sample, model. (Wikipedia)

Collective Design, a diverse group of professionals with expertise in research, academia and industry defines ‘prototype’ as follows:

“Prototype is a question, it’s a way to gain confidence in your idea. At its core, a prototype is a way of trying something out with your design’s audience before investing in its full development.”

Google provides the shortest statement:

“A prototype is an experimental model of an idea.”

Gründerszene.de offers a valuable differentiation between prototyping and a prototype:

“The prototyping in itself describes the process. A prototype, on the other hand, is the result of this process and describes a crude version of the desired result.” (translated from German)
Conclusion:
A prototype is an intangible idea brought to life to create an experience that can be put in front of the user.

Examples of prototypes
WHY PROTOTYPE?

AIMS OF PROTOTYPING.

Aims of prototyping are multidimensional. Merging various sources from d.school, IDEO and other experts, two angles can be noted:

In a business context it is about effectiveness and efficiency, so mostly it is about time and money as well as minimising risks:

• To use as few resources as possible means less time and money invested up front.
• To be able to fail quickly and cheaply.
• To test possibilities. Staying low-res allows to pursue many different ideas.
• To make it quicker to see if further improvements are necessary.
• To break large problems down into smaller, testable chunks.

From the human centered perspective it is about creating connection and communication:

• To reflect on ideas while building the prototype (build to think).
• To create a pre-contact and thus also to get a consideration from a completely different point of view.
• To have another, directed conversation with a user.
• To determine at an early stage to whether the product or the service is actually what the future user really needs.
• To start a conversation. Interactions with users are often richer when centered around a conversation piece.

* Source: http://www.slideshare.net/DTHSG/design-thinking-method-cards
Conclusion:

Prototyping is a cost and time-saving option to bring ideas to life, present them to the user and learn from this – it is a journey towards the final solution.
PROTOTYPING AND PROTOTYPES

FIELD OF RESEARCH, STAGES, TYPES AND MATERIALS.

When researching various prototyping methodologies and prototype forms as well as materials, it occurs that there are different levels you can look at. The following model gives a simplified overview on different views:

![Diagram of prototype stages and types](image)

Perspectives on prototypes (author’s model)

d.school in a nutshell explains, what a prototype could look like:

“A prototype can be anything that a user can interact with – be it a wall of post-it notes, a gadget you put together, a role-playing activity, or even a storyboard. Ideally you bias toward something a user can experience.”

But even if this statement sounds as if you could nearly put every kind of prototype in front of a user, a more differentiated view on prototypes in the sense of concepts is given by Gründerszene.de:

“In general, prototypes can differ from actual final production by the materials used, the process of formation and the accuracy of the implementation. Possible special forms of prototyping are throw-away prototyping and rapid prototyping.”

(Translated from German)
In the software industry, where prototyping is a common way of developing solutions for users, you can differentiate between various types of methodologies. You'll find horizontal and vertical prototyping as well as explorative, experimental and evolutionary prototyping (AlWahhab, 2014). This approach describes more the field of exploration a prototype is focusing.

In the context of Design Thinking interesting types of prototyping are mentioned: rapid prototypes and throw-away prototypes. Their purpose is not to create a finally refined solution but to bring ideas to life quickly, in order to reflect on the users needs as soon as possible.

Further ways of prototyping (type rapid prototyping) are paper prototyping and sketching, digital prototyping as well as native prototyping which are used and vividly described and by Google:

Sketching and paper prototyping

https://youtu.be/JMjozqJS44M
Digital prototyping

https://youtu.be/KWGBGTGryFk

Native prototyping

https://youtu.be/lusOgox4xMl
Another interesting perspective is the differentiation between low fidelity and high fidelity: the closer you get to details and reality, the more refined prototypes become.

Characteristics spectrum: low-fi > hi-fi prototyping by Collective IQ Design

We learn: the choice of a suitable model and an application is dependent on many different factors. The budget, the objective of the project and the actors involved form the framework for the alignment of the prototyping. In practice, the model and purpose of the application can be selected in such a way that mixed forms of the above-mentioned distinctions arise. The fidelity of prototypes should represent the fidelity of thinking. (Collective IQ Design, 2016)

**Conclusion:**
Different kinds of prototypes are used for different purposes at different stages.
PROS AND CONS OF PROTOTYPING

A COLLECTION OF ADVANTAGES AND DISADVANTAGES.

After giving a general description on prototyping as a process and prototypes in their typology, a deeper critique on prototyping is required. Pros and cons deliver a comprehensive summary based the previous fundamentals, sources and statements.

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<td>• PT brings the users into the process early</td>
<td>• Development process can slow down considerably</td>
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<td>• PT generates practical experience = limited risk</td>
<td>• Additional costs because PT only represents a model, not the final product</td>
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<td>• Small, clear steps possible on the way to the finished product</td>
<td>• Management may think product is finished if PT is ‘too good’</td>
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<td>• Useful to test every detail of the final product</td>
<td>• Management might think PT could be converted into the final product</td>
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<td>• Errors are detected at early stage</td>
<td>• Users may be unfamiliar with the technique or idea behind PT</td>
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<td>• Greater motivation through visible progress</td>
<td>• PT can become too broad or too complex (developer falls in love with own prototype)</td>
</tr>
<tr>
<td>• First advertising effects in the target group</td>
<td>• PT can lead to remaining in a permanent optimization loop and not taking decisions. Need for MVP/minimal viable product.</td>
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<td>• PT provides a solution to a user problem or need</td>
<td>• Relying too much on PT and testing, might disregard power of visionary ideas</td>
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<td>• A more human centered approach gains more importance within the organisation</td>
<td>• Some ideas cannot be answered or evaluated by the user in sense of its success potential</td>
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<td>• PT promotes awareness that there is not only just one single solution to a problem</td>
<td>• PT helps, but hinders not from being brave and taking risks</td>
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<td>• PT is linked to testing = creates a direct connection to user</td>
<td>• Well-implemented PT creates scope for an innovative set-up within the organization</td>
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Conclusion:
Prototyping needs a professional structure and guidance. It can be a highly valuable methodology but also risky if you are not familiar with purpose and process.
USE CASE: JOYSELL

APPLYING PROTOTYPING TO THE WORKSPACE

Joysell* – a company going through digital transformation.

Joysell is a multichannel retailer selling appealing fashion and lifestyle brands. The company is going through digital transformation: from mail order and catalogue business to a digital fashion and lifestyle platform. Structures, processes, people and skills are still streamlined to ‘old’ business patterns and linear processes.

As new technologies, competitors and new digital brands have entered the market in recent years, Joysell now has to catch up and even overtake its market players in order to stay relevant in the future. Therefore not only incremental optimisations are needed but innovative and disruptive solutions that will bring the business and organisation to the next level.

To help the company become more human centered, more innovative and fast paced in a digitalised world, the methodology of Design Thinking and within, the prototyping format, could help to establish a new and more future driven way of business development.

In order not to overstrain the company and its employees with totally new or foreign methodologies and/or the Design Thinking process as a whole, the aspect of prototyping could help to start forming a new culture of innovation and establish new iterative workflows. Prototyping new ideas and the integration of comprehensive user testing can help transform the business and the organisation both at the same time.

*The company Joysell is fictional.
Prototyping at Joysell

The added value of prototyping.

Opportunities and value of prototyping are created for the business and organisation levels at the same time. The 4square-prototyping matrix shows four perspectives:

The 4square prototyping matrix (author’s model)
Opportunities related to the business perspective (UX – user centered):

• Prototyping is something common and not too abstract or academic, as almost everyone has somehow heard or seen something around prototyping – it sounds familiar.
• Testing prototypes connects the organisation with its customers – a starting point to think and act human centered and not leave it an empty shell stickered in the main entrance hall saying: ‘The customer comes first’.
• You start to work iteratively, as prototyping is not a once in a lifetime issue but an ongoing process of doing, testing, learning, doing testing, learning, etc.
• You can start on a small scale without endangering the current workflows. You can apply the idea of prototyping on a certain project and learn from it without taking too many risks.
• Prototyping is not expensive in the sense of endangering the turnover situation, and budgets can be afforded.
• You can think of new digital products or new service design, prototyping is applicable to nearly every part of the company. But it is especially useful for the more innovative and disruptive ideas and solutions.

Opportunities related to the organisational perspective (EX – employee centered):

• Prototyping can include and invite employees to participate in the process – transformation starts with the corporate culture and its people. It is a good way to create a first employer experience (EX) in the sense of participation.
• You can start creating interdisciplinary teams without changing the whole organisational structure immediately – it gives the organisation the opportunity to get used to a new situation
• Prototyping creates a new culture of communication: bringing an idea to life in group work (and especially interdisciplinary group work) enforces empathy, dialogue, communication and the willingness to find consensus – the process of Prototyping can bring cultural conflicts and opportunities to the surface. You can start improving on it.
• You can see results very quickly – this is what motivates people, what gives them comfort and certainty – something you need if you go through transformation: positive moment to remember.
• You can create ‘proof of concepts’ that have a high impact on internal communication and corporate culture – Prototypes are not only relevant for the testers, but also a tool for internal stakeholder presentations.
IMPLEMENTATION FRAMEWORK

IMPLEMENTING PROTOTYPING INTO THE ORGANISATION.

There are certainly challenges to be faced when it comes to implementing prototyping into business and the organisation.

The following framework help to make it a success:

⭐ **Guidance:** prototyping has its rules, methodologies, structure – it might sound playful, but still follows certain rules. Guidance starts with communication and education about the aim of prototyping, its methodologies and its impact on business and culture. Sharing the idea behind it and guiding the process is part of the transformation.

⭐ **Responsibility:** when implementing prototyping, there should be a person guiding the transformation process and taking the responsibility for the projects. You might need a coach you can rely on when the topic of prototyping is quite new as conflicts may arise.

⭐ **Resources:** resources in terms of prototyping space, materials, technical tools, skilled people and time have to be provided – prototyping does not mean getting the low hanging fruits for low cost at no invest. If you want to give prototyping as well as transformation a realistic chance, you have to invest into the idea, the process and you have to enable the organisation to make it a success story.

⭐ **Budgets:** prototyping must not be expensive, but you still need to provide the necessary tools, user testings etc.. The more refined the prototypes are and the closer to reality they get, the more you might have to invest in technology, design and content to make it a proof of concept. The steps of prototyping depend on iteration steps and testers’ feedback. Be aware that it might take a few steps to come to reliable results.

⭐ **Expectations:** a prototype is not a finished product – often a design or dummy looks so perfect, that you might think it is ready for production. Most of the time there is a huge gap between a prototype and the real product. The low investments in prototypes do not protect decision makers from making significant invests to bring products or services to market. It is important to manage expectations at all times.

⭐ **Starting point:** prototyping is just one possible starting point for transformation. Ideally you are able to bring in Design Thinking as a whole or relevant aspects of Design Thinking together with prototyping (research and ideation methodologies) to embed prototyping into a more comprehensive and human centered approach.
Conclusion:
Prototyping is a useful methodology for a company driving change through digital transformation. It is valuable for business, organisation and culture in parallel.
Conclusion:
Prototyping and its implementation can be seen as a starting point for a human centered approach and Design Thinking. It needs education, guidance, expectation management and an empathetic communication.
RÉSUMÉ

This paper has pictured the basics on prototyping and looked at the possibilities for organisations to start implementing prototyping. Of course prototyping must be seen as an iterative and ongoing process, and ideally prototyping would be embedded into a broader approach like Design Thinking. As an overall conclusion, the methodology of prototyping has two key impacts on business, people and organisations:

1. Prototyping puts the human being in the centre of activities. Of course a prototype without research and ideation in advance or testing it in a user context afterwards is a condition sine qua non. But prototyping could be a starting point – even if you find it in the middle to later stage of the Design Thinking process.

2. Prototyping helps to create a culture of empathic communication, reflection and iteration, which again can bring the core idea of Design Thinking into a company without being too abstract or academic.

As prototyping is the most tangible part of Design Thinking, as it is a well known and familiar methodology to people, and as it is something that brings an idea to life, it can draw attention and gain encouragement. It is an opportunity in creating a valuable employer experience and start a culture of participation and innovation.

It is worthwhile testing prototyping ... and learn from it. Thank you.
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