

# The prototype-evaluation choreography

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## Abstract

Prototyping and the acquisition of knowledge through evaluation are essential elements of the design process. However, both prototyping and evaluation are mostly studied separately. Moreover, prototyping and evaluation both suffer from conceptual confusion caused by the coexistence of many different perspectives brought forward by different disciplines. Multidisciplinarity is needed for innovative breakthroughs, but appears to be challenging. The goal of this paper is to offer a roadmap of possibilities to overcome these challenges and to build bridges between different perspectives in such a way that prototyping and evaluation can be structured, positioned, planned and executed coherently instead of separately. In this roadmap, the possible directions for the WHY, WHEN, WHAT, HOW and WHOM of both prototyping and evaluation are presented. The roadmap functions as a canvas, in which horizontal and vertical alignment of the different elements is crucial. Both a prototyping and an evaluation strategy must be carefully planned and aligned with each other. The presented roadmap assists in that process in such a way that multiple perspectives can strengthen each other. Only when choices about the WHY, WHEN, WHAT, HOW and WHOM of both prototyping and evaluation are made explicit, they can be discussed, communicated and learned from. In the end, prototyping and evaluation are like two dance partners that dance best if they harmoniously dance together. The choreographer designs and plans the dancing steps of the two dancing partners in such a way that a harmonious, elegant and inspiring dance is the result. The presented prototype-evaluation choreography in this paper helps the designer to be the choreographer of the prototyping and evaluation part of the design process.

*Keywords: Prototyping, Evaluation, Conceptual confusion, Alignment*

*“It takes two to tango”. Al Hoffman & Dick Manning (1952)*

Prototyping is a key element of the design process. It is even stated that prototyping is critical for successful innovation (Camburn, et al., 2017; Brown, 2019). Prototyping and the evaluation of prototypes go hand in hand, at least if you follow the reflective practitioner perspective (Schön, 1983). What is the value of a prototype if it is not evaluated in some kind of way? How can one acquire knowledge from a prototype without evaluation? Although it is not more than obvious that prototyping and evaluation go hand in hand, this appears to be difficult sometimes. That has two main reasons. First, there exists conceptual confusion around the topics of both prototyping and evaluation, and, second, both prototyping and evaluation are executed by scientists and practitioners from different disciplines. These two reasons are related: the multidisciplinary contributes to the conceptual confusion. Some scientists and practitioners have a design background and others don't. Designers typically focus on the creation of what does not exist yet, whereas non-designers are focused on what already exists (Johansson-Sköldberg, Woodilla, & Çetinkaya, 2013; Martin, 2007). This difference in perspective creates complications.

A factor that increases the complexity of bridging different perspectives on prototyping and evaluation in an effective way, is the evolution that has occurred the past decades regarding the concept of prototyping. Nowadays, prototyping is not only used in the design process of material artefacts, like products or buildings, but also in the development process of large and complex systems or to explore and develop brand new concepts (Camburn, et al., 2017). Furthermore the landscape of prototyping is changing due to new technical possibilities like generative AI, 3D-printing or Virtual, Augmented or Mixed Reality. Due to the increased popularity and acceptance of design thinking and design science research, the scope in which prototyping is practiced has enlarged and changed. Of course this has an effect on the evaluation of prototypes as well.

Another complicating factor is that the translation from prototype to knowledge, for which the evaluation process is critical, often remains unclear. Camburn et al state: *“A clearer understanding of quantified information gained from a prototype is needed”* (Camburn, et al., 2017, p. 25). Pries-Heje et al (2008) state with respect to evaluation: *“its importance is widely recognized, yet it is often poorly performed and there is little guidance ... concerning how to choose and design an appropriate evaluation strategy”* (Pries-Heje, Baskerville, & Venable, 2008, p. 11). Winter claims that there is a *“lack of commonly accepted, specific evaluation guidelines for the different artefact types”* (Winter, 2008, p. 471). Because of this lack of guidelines and standards it is harder to trust the outcomes of the design process (Prochner & Godin, 2022).

Perhaps due to these difficulties, the academic literature is concentrated either around prototyping or around evaluation, but hardly around a combination of the two. Prototyping and evaluation are like a dance with two dance partners. However, if you don't understand each other's dancing styles and accompanying dancing steps, you will step on each other's toes. To design a beautiful dance, you must understand the differences in dancing styles, witness the evolution of the dance and see the possibilities of the different dancing steps. The purpose of this paper is to create this understanding. By presenting a roadmap of possibilities, this paper hopes to contribute to create bridges, not only between prototyping and evaluation, but also between different perspectives on the two concepts. In this paper the many faces of prototyping are discussed first, and are then followed by the many faces of evaluation. For both prototyping and evaluation there is elaborated on the WHY, WHEN, WHAT, HOW and WHOM. The resulting perspectives are combined in a roadmap of possibilities.

## The many faces of prototyping

“The best prototype is one that, in the simplest and most efficient way, makes the possibilities and limitations of a design idea visible and measurable” (Lim, Stolterman, & Tenenbergh, 2008, p. 3). This definition, showing the economic principle of prototyping, seems straightforward. However, the concept of prototyping is suffering from conceptual confusion: “definitions differ widely and a common understanding does not exist among or within the disciplines” (Exner, Lindow, Stark, Ångeslevä, & Bähr, 2015, p. 2). This conceptual confusion already starts with the question what a prototype entails. Some see sketches and drawings as prototypes, whereas others distinguish prototypes from sketches and drawings (Pei, Campbell, & Evans, 2011; Hannah, Joshi, & Summers, 2012). The same holds for models: they can be seen as different from prototypes or they can be seen as a type of prototype. Since prototypes can be perceived as a concept, an approach, a method and a technology (Exner, Lindow, Stark, Ångeslevä, & Bähr, 2015; Yu, Pasinelli, & Brem, 2018), they can have different shapes and forms: a drawing, a model, a sketch model, a prototype model, a 3D prototype, et cetera. Within this paper we take a broad perspective on prototyping, and include every technique, shape and form, as long as the prototype “makes the possibilities and limitations of a design idea visible and measurable” (Lim, Stolterman, & Tenenbergh, 2008, p. 3). Figure 1 shows an overview of this broad perspective on prototyping with different examples, based on different forms, techniques and materials, within this broad range.

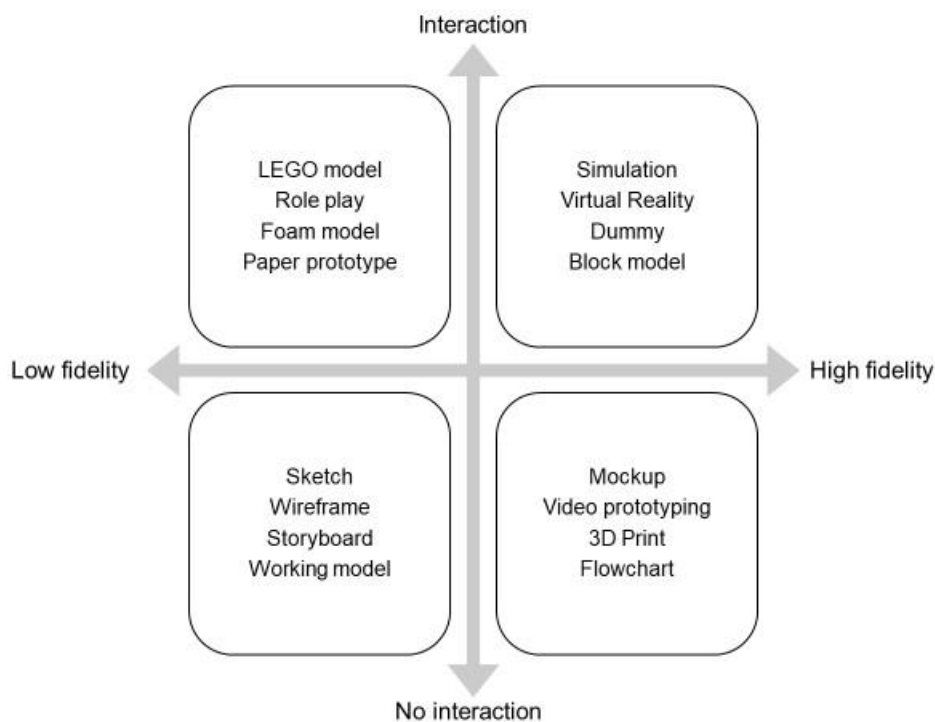


Figure 1: Prototype examples in a positioning map, where fidelity refers to the level of truthfulness to reality and interaction to the ease at which users can interact with the prototype (adjusted from Van Zeeland, 2023)

Taxonomies of prototypes have been suggested with respect to the WHY, WHEN, WHAT, HOW and WHOM of prototyping. With respect to the WHY, there are two groups of prototypes: 1) prototypes that nourish the design process and 2) prototypes that serve as a medium to communicate and test the artefact, see figure 2. Buchenau and Suri (2000) summarize these two groups as ‘design process’ versus ‘design decision’. Regarding this design process there are three possible routes: an explorative route, an experimental route and an evolutionary route (Floyd, 1984; Exner, Lindow, Stark, Ångeslevä, & Bähr, 2015). When prototypes nourish the design process, they don’t have to reflect the possible final design, but can also entail a feature of the design that one wants to explore.

Prototyping is then done with the objective of refinement, exploration or active learning (Camburn, et al., 2017). When prototypes serve as a medium to communicate and test the artefact, the prototype mostly is “a pre-production representation of some aspect of a concept or final design” (Camburn, et al., 2017, p. 1). When the prototype is a medium to communicate the objective is to share information; when the prototype is a medium to test the objective is to acquire information.

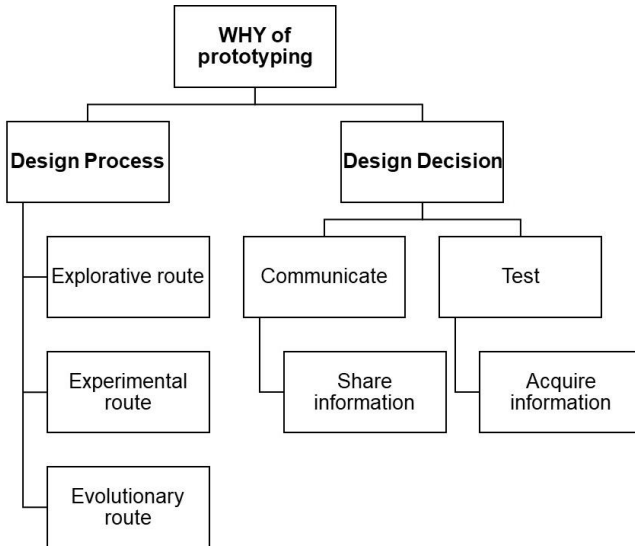


Figure 2: Different purposes of prototyping

Regarding the WHEN, the perspective on prototyping changes when in the design process one is prototyping. Exner et al (2015) define three phases: 1) clarification of the task, 2) conception of the idea, and 3) design of the concept, and this process is not really debated. In early stages of the design process, prototypes are predominantly explorative by nature, whereas further in the design process prototypes are more often used to evaluate the concept, principles or requirements (Exner, Lindow, Stark, Ångeslevä, & Bähr, 2015). The WHEN and WHY are thus closely related.

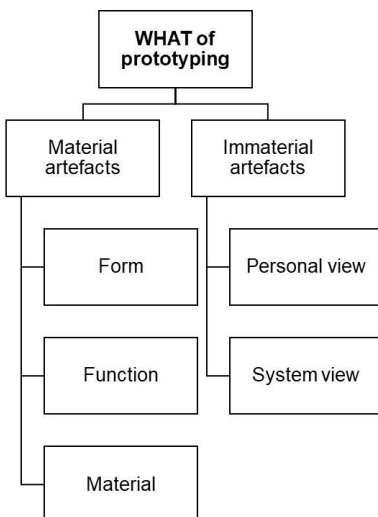


Figure 3: The WHAT of prototyping and its different pillars

With respect to the WHAT, it is first important to define the scope of what the prototype covers: the level of inclusiveness (Lim, Stolterman, & Tenenberg, 2008) and to make the type of prototype explicit. For the development and evaluation of the prototype it is important to make the difference between a material and immaterial artefact explicit. There are different taxonomies of prototypes of

material artefacts and the dominant pillars are form, function and material (Camburn, et al., 2017; Exner, Lindow, Stark, Ängeslevä, & Bähr, 2015). When talking about prototypes of immaterial artefacts other considerations may be relevant. In this context the difference between artefacts with a personal view, where the artefact changes the nature of the task the person is facing, or artefacts with a system view, where the artefact enhances the performance of a system, is relevant (Rabardel & Waern, 2003; Norman, 1991). The different pillars that can constitute the WHAT of prototyping are visible in figure 3.

With respect to the HOW, one can see the most common ground based on which prototypes are categorized: the level of fidelity. However, the concept of fidelity suffers from conceptual confusion as well: does it refer to the level of functionality, the level of visual polish, or the level of interactivity (McCurdy, Connors, Pyrzak, Kanefsky, & Vera, 2006)? Since the level of functionality, visual polish and interactivity have an enormous effect on the evaluation of the prototype, it is important to make choices about this explicit. A positioning map with axes based on which the prototype is positioned (see figure 1 for an example) can be of help here. The HOW relates back to the WHY: low-fidelity prototypes are useful in the design process, when one tries to see possibilities and problems, and high-fidelity prototypes come into place when management has to make an investment decision (McCurdy, Connors, Pyrzak, Kanefsky, & Vera, 2006).

With respect to the WHOM, this relates to 'for whom' one is prototyping; it relates to the audience for whom the prototype is created (Buchenau & Suri, 2000). Different groups can be identified here based on three levels: 1) the design level (the design team or designer), 2) the decision making level (the investor or the manager) and 3) the user level (the individual client or user population).

Most of the choices regarding the WHY, WHEN, WHAT, HOW and WHOM are implicitly made. Because of that, confusion is lurking. It is important for the design process to make the choices about the WHY, WHEN, WHAT, HOW and WHOM explicit. Only when choices are made explicit, they can be discussed, communicated and learned from.

## The many faces of evaluation

*"Evaluation is what puts the 'science' in 'design science'"* (Venable, Pries-Heje, & Baskerville, 2012, p. 425). Evaluation is a crucial element of every design process (Pries-Heje, Baskerville, & Venable, 2008; Hevner, March, Park, & Ram, 2004). Despite its relevance and importance, specifically for knowledge creation, evaluation is often poorly performed and there is relatively little guidance in how to evaluate (Pries-Heje, Baskerville, & Venable, 2008). Furthermore, different perspectives on evaluation suffer from conceptual confusion. For example, Lim, Stolterman and Tenenberg (2008) distinguish evaluation from design exploration, whereas others see design exploration as a possible manifestation of evaluation. One factor that complicates the process of evaluation is that, with a few exceptions, the evaluation cannot take place in the actual situation, because it is the purpose of the design to create a new situation. Because of this complication, the standards and requirements that are used for evaluation in the social and natural sciences, are not applicable here. A different type of knowledge, prescriptive instead of descriptive, requires a different evaluation strategy (Sonnenberg & vom Brocke, 2012).

Also with respect to evaluation the WHY, WHEN, WHAT, HOW and WHOM can be disentangled. Venable et al (2012) distinguish five WHY's with respect to the evaluation process: 1) evaluate an instantiation of a designed artifact to establish its utility and efficacy (or lack thereof) for achieving its stated purpose (in other words: how well the artifact performs), 2) evaluate the formalized knowledge about a designed artifact's utility for achieving its purpose (for example design principles or

technological rules), 3) evaluate a designed artifact or formalized knowledge about it in comparison to other designed artifacts' ability to achieve a similar purpose (does the new artifact provide greater relative utility than existing artifacts?), 4) evaluate a designed artifact or formalized knowledge about it for side effects or undesirable consequences of its use, and 5) evaluate a designed artifact formatively to identify weaknesses and areas of improvement for an artifact under development. The five WHY's operate at the design process level, and thus are relating to the first WHY of prototyping: nourishing the design process. With respect to the second WHY of prototyping, serving as a medium to communicate and test the artefact (making a design decision), the WHY of evaluation is important for the decision between implementing, retesting, adapting or redesigning the artefact (Zeeland, 2023). Figure 4 presents an overview of the different purposes of evaluation.

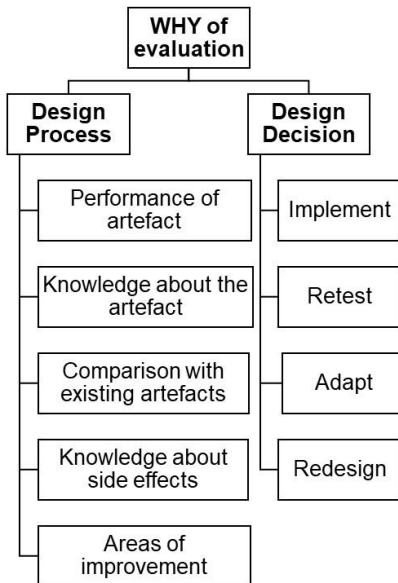


Figure 4: Different purposes of evaluation

With respect to the WHEN, the dominant taxonomy in evaluation is ex ante versus ex post evaluation; in other words, before or after the implementation of the artefact. Another relevant aspect regarding the WHEN is the process of evaluation. Some see evaluation as a separate step in the process towards implementation, and might use a 'stage-gate-model' in which designers first build and then evaluate. For example, within the interpretation of design thinking by Stanford Design School the Test-phase, or evaluation-phase, is the last step in the process. Others see evaluation as a cyclic process of continuous reflection, for example the BIE-cycles: Building – Intervention – Evaluation (Sein, Henfridsson, Purao, Rossi, & Lindgren, 2011). To return to the choreography metaphor: does first one dancer move and then the other or do you dance together?

When discussing the WHAT of evaluation, one gets to the core question of what design actually is: 'creating artefacts' or 'creating meaning'? As Johansson-Sköldberg, Woodilla and Çetinkaya elegantly compare the economical perspective of Herbert Simon with the philosophical perspective of Klaus Krippendorff: "For Simon the artefact is at the core, and he would probably say that meaning is an attribute, while for Krippendorff meaning is the core of the design process and the artefact becomes a medium for communicating these meanings" (Johansson-Sköldberg, Woodilla, & Çetinkaya, 2013, p. 126). Almost every paper on evaluation does *not* discuss this type of WHAT. In most papers the WHAT is covered by the evaluation criteria. However, what it is that has to be evaluated is a relevant question to be answered before one can set evaluation criteria. To answer that question, the difference between object and attribute is relevant. Most objects, both physical as non-physical, are consisting of different attributes. According to Rossiter (2002), objects should be judged based on these attributes. For example, if a new hotel concept is designed, people will describe this new concept using different attributes. Some will perhaps focus on traits as 'calming

and relaxing', others might focus on possibilities for interaction or on the 'look and feel'. These are all different attributes, and all different levels on which the evaluation takes place. Each attribute is covered by one or more evaluation criteria. The papers that discuss evaluation criteria, mostly relate these criteria to the complete object. For example, Checkland and Scholes (1990) identify the five E's: efficiency, effectiveness, efficacy, ethicality and elegance. However, elegance, for example, will possibly relate to one or some attributes of the object, but probably not to all. These kind of lists of evaluation criteria implicitly assume that every object has the same set of attributes that can be evaluated with the same set of criteria. However, evaluation criteria actually should form an explicit choice of the design team (Sonnenberg & vom Brocke, 2012). Each attribute of the artefact can be evaluated with one or more evaluation criteria that are set specifically for that attribute or all the attributes can be evaluated based on the same set of criteria. These possibilities are described in figure 5.

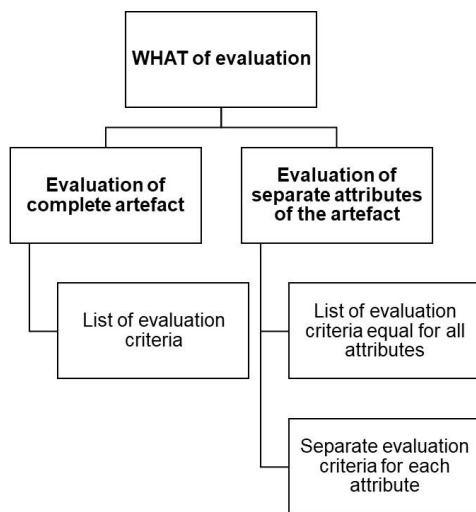


Figure 5: Evaluation strategies and evaluation criteria

The WHEN and WHAT are closely related. With ex ante evaluation mostly other evaluation criteria are used than with ex post evaluation (Pries-Heje, Baskerville, & Venable, 2008). But the WHAT is also strongly related to the WHY of prototyping. If prototyping is used to nourish the design process, other evaluation criteria are used than when prototyping is used to make a decision about the design outcome (Pries-Heje, Baskerville, & Venable, 2008). For example an explorative objective of prototyping will lead to an evaluation of requirements, an experimental objective will lead to an evaluation of particular solutions and an evolutionary approach will evaluate both requirements and solutions (Floyd, 1984; Schneider, 1996). The WHAT also relates to the WHOM of prototyping. When prototypes are made for users, the WHAT of evaluation gets more complex because there is a double character to be evaluated: *“they contain components from artefacts themselves, and components from users’ utilization schemes”* (Rabardel & Waern, 2003, p. 643). The evaluation of the prototype then entails two dimensions: how it is designed and how it is or can be used.

The HOW of evaluation entails a lot, see figure 6. Most literature concerning evaluation deals with the HOW, specifically the possible methodologies. For example Hevner et al (2004) distinguish observational, analytical, experimental, testing and descriptive design evaluation methods. Besides the methodology, the evaluation approach is relevant as well. In their Strategic Design Science Research Evaluation Framework, Venable, Pries-Heje and Baskerville (2012) distinguish between naturalistic evaluation and artificial evaluation. Also the depth of the evaluation is an element to think about. Peffers et al observe two levels: 1) the level of demonstration, which is like a 'light-weight' evaluation, and 2) the level of evaluation, which is a more formal level of evaluation (please note the created conceptual confusion around the term 'evaluation' here) (Venable, Pries-Heje, & Baskerville, 2012; Peffers, et al., 2006). Another relevant element of the HOW is the question how you deal with the information acquired by the evaluation. Bannister and Remenyi (2000) distinguish between a



positivist/reductionist approach and a hermeneutic approach. For the positivist/reductionist approach you allow the methodology to make the decision; you let the data speak for itself. For the hermeneutic approach there is room for interpretation, intuition and 'gut feeling'; the professional acts upon his understanding of the data. With respect to the HOW, of course also the procedure is relevant. Pries-Heje et al (2008) propose a four-step procedure: 1) analyze the context of the evaluation and define the evaluation requirements, 2) match the needed contextual factors of the evaluation (step one) to evaluation criteria, 3) select an appropriate evaluation method, and 4) design the evaluation in detail. However, if you look at the process of evaluation in a bigger context, as in how the evaluation should lead to knowledge, a lot of different procedures are proposed in academia (Winter, 2008).

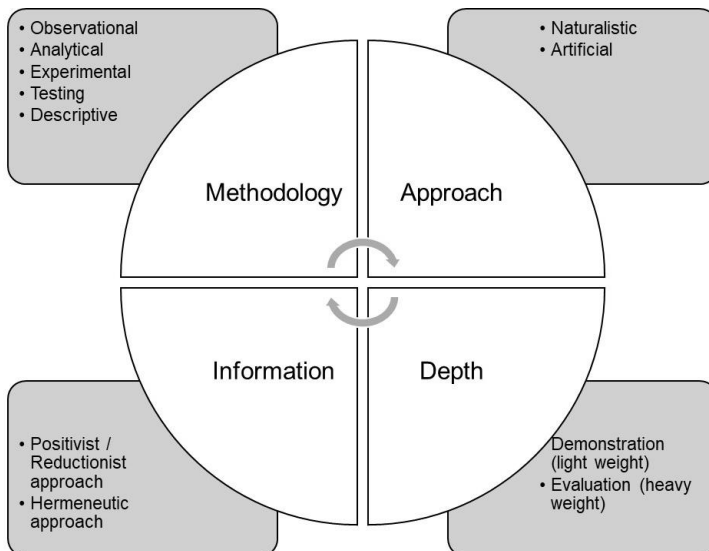


Figure 6: The HOW of evaluation

When evaluating, the WHOM means 'by whom' or 'as perceived by', which is also called the 'rater identification' (Rossiter, 2002). The evaluation *per definition* is dependent on the rater, and should therefore always be made explicit. There are four types of raters: 1) the designers themselves, 2) the decision makers, 3) the users, and 4) experts or peers. The type of evaluation is depending on who is rating. For prototypes that are built to nourish the design process, the designer or researcher is mostly the dominant actor in the evaluation process; for prototypes that serve as a medium to communicate and test the artefact, the user or decision maker are mostly the dominant actors.

## Prototype-evaluation roadmap

In this section the different perspectives regarding the WHY, WHEN, WHAT, HOW and WHOM of both prototyping and evaluation are combined in a roadmap of possibilities. A roadmap is different than a framework: a framework defines how one *should* do things, a roadmap shows how one *could* do things. Within this roadmap every prototype is considered to be unique: "*each prototyping effort requires a certain unique strategy to resolve a design problem or opportunity*" (Camburn, et al., 2017, p. 2). Camburn et al (2017) claim that a prototyping strategy should be carefully planned, which is also the case for the evaluation strategy. The roadmap in figure 7 is designed to assist in the planning of these strategies and to make all the choices along the way explicit and coherent.

The roadmap functions as a canvas, in which each empty cell is unique. Each empty cell reflects the choice made in that specific step along the way. However, the ten different cells are not independent, but strongly relate to each other. Therefore the prototype and evaluation strategy should be aligned on two levels. First of all there should be a *horizontal fit* of the different cells in each row: the WHY,



WHEN, WHAT, HOW and WHOM should together make a logical and coherent strategy. For this horizontal fit, prototyping and evaluation are judged separately. Second, there should be a *vertical fit*, bridging the world of prototyping with the world of evaluation. Using the choreography metaphor, the horizontal fit deals with the question how well each dancing partner can dance, and the vertical fit with the question how well they dance together. Design teams should change the completion of each cell as long as that change improves the vertical and/or horizontal fit of the different elements of the roadmap.

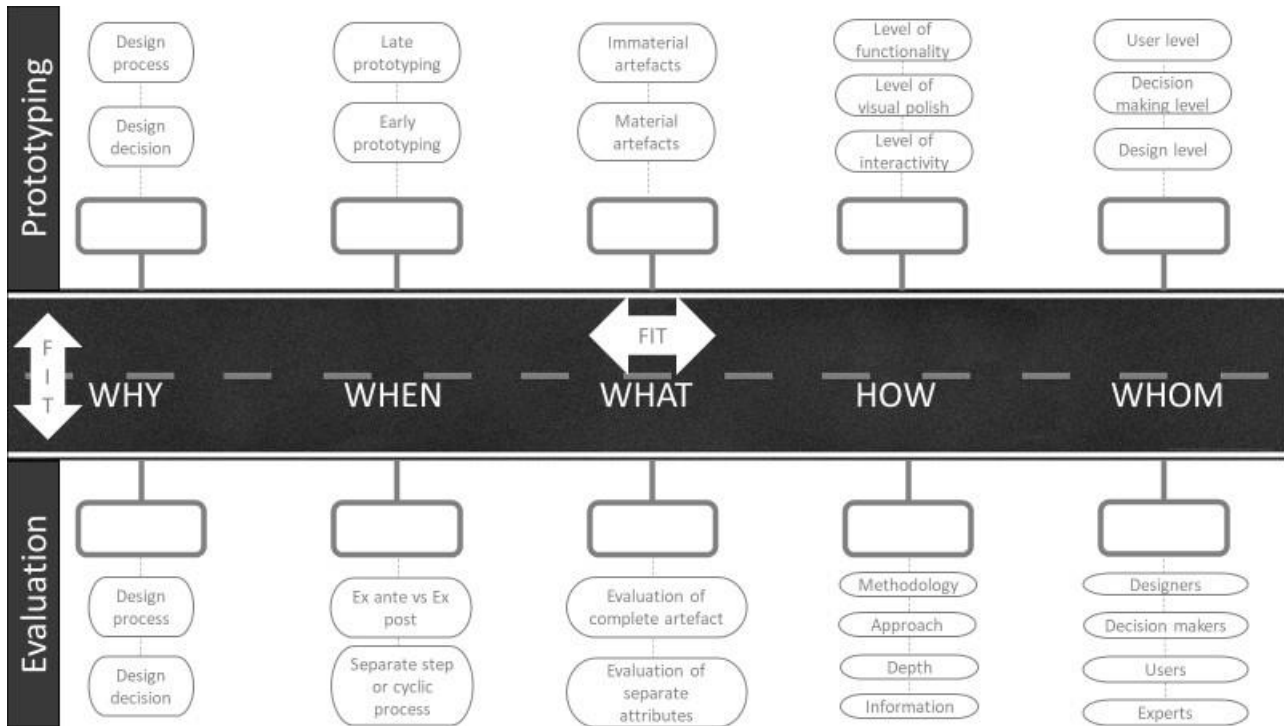


Figure 7: The prototype-evaluation roadmap

## Discussion and conclusion

*“Just as a picture can be worth a thousand words (if you know what it depicts), a prototype can substitute for volumes of paper documents – if, and only if, you know what it is supposed to tell you”* (Schneider, 1996). The bridge from prototyping to knowledge is paved by evaluation. Prototyping and evaluation go hand in hand. One can only derive insights and knowledge from a prototype if one evaluates the prototype. Both prototyping and evaluation can be done from different perspectives. Most papers are concentrating on these perspectives either with respect to prototyping or with respect to evaluation. This paper tries to bridge those two worlds.

To bridge the two worlds of prototyping and evaluation one has to be conscious about what constitutes those two worlds. The presented roadmap might help in creating this consciousness. If the evaluation and the acquired knowledge remains in the head of the designer, which is often the case, than the knowledge is lost if the designer is not attached to the project anymore. Documentation of the evaluation and the acquired knowledge is therefore important. Not every artefact leads to knowledge in a broader context; that is only the case if the artefact is generic to some extent (Winter, 2008). A structured way of planning and assessing prototypes and their evaluations, will also help the communication process around the design and the acquired knowledge during the design process. There is often a lack of formality in the process of synthesis,

that causes vagueness around the design process and its results (Kolko, 2010; Rutkowska, Sleswijk Visser, & Lamas, 2019). Making the steps taken towards synthesis more explicit, will help others to understand.

The presented roadmap functions as a canvas in which each empty cell reflects one or more elements to think about and to plan. It is remarkable that one of the most important elements of the roadmap for the creation of knowledge, the WHAT of evaluation, is in practice mostly not made explicit or even considered. Probably that is because this is one of the most difficult steps to take (Rossiter, 2002). Within the canvas every empty cell must be made explicit. So when using the canvas, one will not oversee one of the most important elements in the evaluation of prototypes.

The roadmap serves to help the design team to align the different dance moves with each other. It helps to assess whether there is both a horizontal and a vertical fit between the different cells in the canvas. To judge whether or not this fit is there, both logic and intuition are important. To discover blind spots it helps to ask others for peer consultation. Peer consultation should be a standard step in the design of the prototyping and evaluation strategy. Another aspect where peer consultation is important, is to sharpen the eye on the ethical perspective. Every design has impact, and designers can be considered as change agents. Creating change comes with a responsibility. With respect to the prototyping-evaluation dance, this responsibility underlines the importance of evaluating possible side effects or undesirable consequences of the use of the artefact (Venable, Pries-Heje, & Baskerville, 2012). As Tim Brown, brings forward: *“Design thinking is not ‘the invisible hand’. It is intentional. ... If we design social media applications to be enticing and addictive, then we are doing so because we wish for that outcome. If we don’t wish what we get, then we are being very poor designers. Design thinkers have a responsibility to understand the outcomes they are designing for and to be conscious about the choices they are making”* (Brown, 2019, p. 4). Including independent peers helps to increase the consciousness throughout the decision process.

Choices in the roadmap affect the dynamics of the process. For example, a higher level of fidelity has an impact on the reactions given by the actors reflecting on the design (Hannah, Joshi, & Summers, 2012). Buchenau and Suri state that *“the tools we use to design, such as prototypes, influence the way we think”* (Buchenau & Suri, 2000, p. 425). About this dynamic relationship between prototyping, evaluating and creating knowledge we don’t know that much, and should be the topic for future research.

What also remains for future research is the impact of context variables on the choices in the roadmap. For example social, organizational and cultural dimensions might impact the choices to be made (Rabardel & Waern, 2003; Sonnenberg & vom Brocke, 2012). Another context variable that has an impact is the set-up of the design team and whether or not one can speak of participatory design. But also technological aspects and developments within the design discipline will affect the choices to be made. The world of prototyping is changing due to new technological possibilities (for example 3D-printing, AI generated prototypes or VR simulations) and new situations in which prototyping is used. This evolution of prototyping is not affecting the roadmap itself, but will affect the choices to be made. Also on the evaluation side evolution takes place. For example, the availability of new evaluation methods, such as fMRI or EEG, might change the choices to be made in the roadmap (Hay, Duffy, Gilbert, & Greal, 2022).

Some uses of evaluation are under addressed in this paper because they lie beyond its scope. One example is the evaluation of design oriented projects by others, for example teachers who evaluate the design process of their students. For these type of evaluations, the CCP-model by Symons (1991) is suggested. With the CCP-model you base your evaluation on three elements: Context, Content and Process. Since this type of external evaluation lies beyond the scope of this paper, these type of evaluation criteria are not discussed here, although it is worthwhile to elaborate on this

perspective for future research, because it is relevant when judging each other's work, which might occur in the context of publication and collaboration.

Prototyping only supports interconnections and collaboration among researchers and practitioners if professionals from different disciplines truly understand each other and are not burdened by conceptual confusion. If you learn about each other's dancing styles and dancing steps, than one is able to design new dancing combinations together. This paper hopes to contribute to a more *inclusive evaluation* in which multiple perspectives strengthen each other.

If you see a dance as a total concept, you can tell whether you think the dance is beautiful or not; if you are aware of the different dancing steps that make the total dance, you can say something about the quality of the dance. So to be able to evaluate the many faces of prototyping, you need to understand these different steps. If you can appoint them separately, you can also point them out to others. The here presented roadmap is meant as a prompting board to ease this process of pointing out. The more articulated the dancing steps are (i.e. the more the prototyping and evaluation choices are made explicit) and the more beautiful the interplay of the two dance partners is (i.e. the more coherent prototyping and evaluation is planned and executed), the better the dance.

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