Leveraging Speculative Design to Re-Imagine Product Roadmaps

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Businesses often have strategic visions for the future of a product space; however, identifying and building toward preferable futures is a daunting task, especially when designing for complex systems, e.g., Digital advertising platforms that include multiple complex interfaces and internal organizational structures. Moreover, because businesses need to iterate on products quickly, often in a reactive manner, many businesses, and consequently researchers, struggle to go beyond short-term needs to tackle long-term solutions; that is, they mostly react to immediate needs and changes rather than taking a proactive strategic approach towards building a favorable future. Speculative design as a methodology to support proactive strategic thinking helps set a pathway to explore a variety of future states with participants, in our case business owners. It does so by designing immersive and impactful experiments for participants that draws insight from well-researched forecast of the probable future, as viewed from today but also more open-form future possibilities, that rely on speculative and fantastical prompts (e.g., science fiction, modern art, fantastical scenarios etc) to generate reflection and dialogue. In this paper, we will present different variations of speculative design implementations at Facebook that allowed us to explore different potential futures of digital advertising. In addition to discussing this research approach, which was novel to this space, we have included retrospective thoughts and best practices that emerged among our product design teams as they reflected on their participation in this work. We hope that our lessons learned can benefit the research community, by broadening the strategic impact of research to design products and services that better anticipate future user needs and identify potential risks early in the process.

INTRODUCTION

Digital advertising is a fast-evolving industry with billions of businesses with wide-ranging needs and abilities and a variety of competing products to serve those needs. In the competitive marketplace of enterprise software, it is no longer sufficient to simply fix design issues or to make incremental improvements to products, but instead, efforts must increasingly be made to anticipate the future needs of users in response to potential changes to industry and the market-- Examples might include technological advancements, the introduction of automation, or evolving regulatory requirements. Addressing these topics effectively, surfaces two major challenges for research practitioners: 1) common user experience practices that are centered around rapid feedback and iteration on presumptive high-fidelity designs, and 2) organizational structures that are built to emphasize the efficiency of the end result by dividing the experience and the work across teams and functions.

In designing product roadmaps, one objective is to orchestrate and align all the functions in a way that minimizes overlaps and keeps the engine running smoothly. Accordingly, each function has a dedicated role and degree of influence at different phases. Research usually comes hand in hand with design to help bring the ideas closer to user needs and to achieve this, researchers work within well-defined boundaries of initial product goals and assumptions. This positioning can not only minimize the strategic value that research

can add in the initial framing of the requirements, but it also limits the influence of customer voices to be incorporated in designing holistic experiences that will truly fit their needs beyond the boundaries of the known space and time.

There have been well established methodologies and research best practices to facilitate the comparatively small research function within this cross-functional product framework, including usability studies and iterative testing - both of which are commonly held contributions for researchers in engineering-lead organizations. While these methodologies and practices remain important for pressing day-to-day product needs, it is equally important that novel approaches are introduced, at least some of the time, to disrupt these rhythms and practices. Such methodological innovations can cross disciplinary and organizational boundaries and challenge our assumptions about what users will want and need in the future. Speculative Design, the focus of this paper, is one such disruptive approach. It is one that can enable teams to step beyond the limitations of familiar yet still critical user experience practices, internal organizational hierarchies, and product development processes, to forge new pathways for learning. While speculative design methods, as a whole, remain at the vanguard of research in the more open-ended spaces of service design, transformational design and futurism, its application within the multidimensional enterprise software organization, where we were operating, was completely novel at this time.

This paper provides an overview into the role of three main pillars that are critical to designing future products: product development processes, research methodologies supporting product roadmaps, and customer experience and expectations.

Product Development Process

The complexity and modular nature of enterprise software imposes distributed organizational structures where various design teams focus on targeted and siloed components of the system. Within each module, product roadmaps are what keeps different disciplines aligned and focused on the next priority so that together they can build and iterate quickly. This approach, although born of an economy of efficiency, (e.g., the work is so complex that it must be distributed) often discourages or even disincentivizes the focus on the broader ecosystem or the holistic end-to-end experiences.

To support the product development process and timely response to research needs raised through product roadmaps, researchers risk being pressured into inadvertently presenting a limited perspective of their participants – that focuses on their current use and understanding of products. Not only does this make it easy to decontextualize tasks from the overall focus on ecosystem-level experiences, it can also serve as a short-term fix to immediate needs that ultimately masks our ability to identify and articulate the longer-term needs and desires of users.

Research Methodologies

Two dominant models of user experience research are: 1) incremental iterative research on adopted products; and 2) generative research on new product innovation. The first is common practice for user researchers and largely focuses on identifying and solving immediate user needs or improving known design flaws by emphasizing incremental iterations of products. The second leverages inductive learnings to uncover users' needs beyond the most immediate ones. This is done in the service of imagining the next

generation of products to fit a potential need. Though both are essential for making great experiences, they can leave important gaps in moving products and users from their tactical near-term needs to bright and shiny future possibilities.

Customer Experiences

Enterprise software, such as advertising platforms, include many autonomous modules that must interact with each other to provide a smooth interconnected experience satisfying both businesses and consumers' needs. However, while customers may expect seamless end-to-end experiences, the complex nature of the products often necessitates breaking the work into specific component parts, leading to fragmented and inconsistent user experiences that struggle to capture real world workflows.

Users of such complex systems can also vary widely in their technical knowledge or task focus; For instance, among small businesses, advertisers spend much of their effort focused on addressing the basic needs of keeping their business afloat and digital marketing may be but one of their priorities, leaving limited time for strategic future-looking thinking or expansion. By contrast, for larger businesses there may be entire teams focused on specific analytic tasks, forecasting or growth. The focus on day-to-day usage of the product also makes it hard for users to think beyond the current state and engage with futuristic possibilities or needs that are not in their current horizon.

Looking beyond Tomorrow

The collective result of these various factors makes it difficult for product teams and users alike to imagine, prioritize, and plan long-term needs in product design and can make it difficult to recognize issues that hinder the journey towards creating more favorable futures for customers.

In this research study, we tried to address some of these challenges; we partnered with a multidisciplinary group of experts across a family of products within the Facebook Advertising Platform organization to examine different ways of representing a holistic understanding of our products that would address end-to-end needs of our customers. Using speculative design as our research methodology helped transition our internal teams as well as our customers to the future state situated on their existing experiences while disconnecting them from the present and limitations of the known space. We also examined different ways to build a common ground with our customers and engage them by creating the future narrative with us through this work.

This approach was new both to our team and to this product space so there was some turbulence and learning along the way, and that learning about best practices is part of the story we will share here too. Ultimately this work proved impactful in that what began as a pilot program to translate an abstract idea into a concrete implementation ultimately evolved into an internal design program that sponsored multiple spin-off projects that leaned on both the methods and learnings of this early work. We hope that by sharing these learnings we can help guide research practitioners to more efficiently identify opportunities to apply this method and to effectively generate outcomes that will help to better visualize and plan for future products.

RELATED WORK

In recent years and with the growing research discipline within the product space, there has been a growing emphasis on user-centered practices. User-centered design is focused on improving user experience "for users" in a world "as is." Different approaches, such as contextual design, human factor, usability testing, have all been used for implementation of human-centered design. Although user-centered research methods have increased the emphasis on user's immediate needs, they still tend to fall into some limiting pattern of analysis when it comes to longer term planning and anticipating future.

User-centered Design and "Designing for Users"

Human centered approach has been mostly led by researchers to observe user needs and behaviors and how they interact with a product. This could potentially result in overlooking other factors and variables in the ecosystem beyond the product and users (i.e., other actors, policies, global crises) that eventually affect user experiences (Sanders and Stappers, 2014). For instance, in IoT design, the owner of things, i.e., objects are the focus of researchers and designers, and other actors, such as neighbors and visitors, are mostly neglected (Yao et al., 2019).

A second shortcoming of user-centered design is focusing on a limited range of user profiles in the universe of possibilities in effort to fully capture their mental model and interaction needs (Abras et al., 2004). Well-known example of this occurred in early face recognition applications that failed to be inclusive of skin color as part of the required facial features in improved face recognition, leading to increased risk of discrimination based on false identification of individuals (Harwell 2019). Airbnb had overlooked their product use in low-income residents in the early stages of their work. Fortunately, the trend towards product inclusion and accessibility has been more upward in recent years.

The third common limitation of user-centered design is a narrow focus on one siloed product and overlooking how interconnected products affect overall user experience (Abras et al., 2004). For instance, in digital advertising platforms, a design team working on improving advertisers' experience to best communicate their marketing goals mostly focuses on how they initiate the campaign and define budget and target elements. Their design could potentially benefit from observing advertisers' interactions with the outcome reports at a later stage of their work to better fit into the end-to-end flow of the product experience.

The final limitation is that product design takes a short-term approach to building solutions, focusing only on users' immediate needs. This approach, although effective in competitive landscape and satisfying present requirements, could produce findings that are not easily scalable beyond a specific time horizon.

Shift to "Designing with Users"

Approaches such as applied ethnography, lead-user innovation, and participatory design shifted the design mindset of "for users" to "with users." These methods involve customers from the early stages of design and consider them as partners in the research process. Discursive design and critical design depart from what benefits customers or markets in the contemporary world and focus on the near future. Discursive approach encourages discourse around a product or service by including customers and the public to the

discussion. Critical design focuses on questioning reasons for a specific product by challenging commercial and conventional values.

While the mindset of design "with users" has shifted the process into the realm of empathy design, different methods have focused on designing for a world "as is" taking the focus away from what it could be. The focus on the present world limits our understanding of a broader context and how user requirements would change between the near and distant future. A well-known quote by Henry Ford reflects the importance of going beyond the existing constraints to better design for long-term user needs; "If I had asked people what they wanted, they would have said faster horses".

Anticipating the Future through Speculative Design

The importance of considering a broader context and researching to shape the longer-term vision of products has motivated scholars and UX practitioners to evolve their process around adapting a more forward-looking mindset and speculative design (Dunne and Raby, 2013). Speculative design overcomes UX product design shortcomings by promoting concept design over product design and is distinct in that it strives to open a discursive space that is underwritten by the unavoidable plurality of the future. As Dunne & Raby put it "the idea is not to show how things will be but to open up a space for discussion". Speculative design approach has a "with user" mindset to design for the "what if" state of the world in the future and is almost entirely focused on the idea, the plurality of the idea, and the associated connotations of that thinking. (Lindley et al., 2014)

The artifacts that are created to support this methodology are considered as provocations or stimuli rather than preferable outcomes in their own right. These future scenarios can be animated through concept videos, designed artifacts, or situated conceptual proposals (Wong and Khovanskaya, 2018). Figure 1 shows different user-centered design methods supporting different product timelines.

Designers and researchers use this methodology to step beyond existing possibilities to create with fewer constraints and apply different stimuli to loosen users' imaginations to capture their foundational insights. They are empowered to depart from existing product design assumptions and consider various social, political, and environmental variables to design future prototypes and understand how to create a favorable future (Wong et al., 2020). While there are no definite facts about the future of a product and its broader context, creative futuristic design prototypes can eventually shed light on gaps between the current design and pave the way towards the desirable future. A more recent example of products developed using this approach that changed telecommunication is Apple's iPhone. Apple envisioned a future beyond connecting people through voice and identified the importance of having a touch screen to smooth the interaction between users and cellphones.

Speculative design has not been used solely in creating breakthrough innovations. One of the main motivations of using this approach is to consider societal issues and raise awareness among people through design (Dunne and Raby, 2013). A recent application of a speculative design approach is in visualizing the future considering socio-technical factors untangled from commercial restrictions (Iadarola, 2018). A designer on this project, Anab Jain, held several exhibitions with her team at Superflux beginning in 2010 to explore how emerging technologies affect our world. In their last show in 2019, they encouraged thinking

of a future in which AI would resolve all world problems (i.e., climate change, diseases) and how we, as a society, need a new cultural sensibility to understand what kind of creature AI is and will be (Abras et al., 2004).

To create successful speculative design projects, we should consider how to best illustrate possible futures. Since this approach considers the holistic context of the product and its reflection on users to create possible future scenarios, it matters how we integrate elements that motivate our participants to engage with future concepts.

Wakkary et al. took an extensive view into different ways for designing artifacts that can be more effective in bringing users along into fictive scenarios while disconnecting them from their existing workflows (Wakkary et al., 2015). They proposed material speculation, the sum of the counterfactual artifact that is designed to exist in the everyday world to be encountered and the multitude of possible worlds it generates by those encounters. Applying the material existence of specifically designed artifacts situated in the everyday can be an effective way to create the speculative future for users.

Stimulating the sense of control and familiarity in participants has been proposed as a technique to encourage them to engage with an unknown and provocative future (Auger, 2013). Dunne and Raby applied the same technique in "Tech-nological Dream Series: No. 1, Robots' project to balance the fear of participants about future robots. They designed robots with familiar appearance features in a domestic scene, shared a little bit about the functionality, and had too much desire for attention and social needs (Dunne and Raby, 2007). The appearance of robots was different from the usual robots that people saw in movies; these robots were like home furniture and designers added human interaction a requirement for robots to function. Participants could easily engage with such robots despite having little information about their functionality. The feeling of power in this instance facilitated participants' interactions (Auger, 2013).

Another technique is including some ordinary, familiar, and small details that are not noticeable compared to the main artifacts. The ordinary items would help participants easily communicate with an ambiguous artifact. The Sensual Interfaces project by Chris Woebken integrated familiar elements of a typical office room, such as a table, a mug, a monitor, and a suited man into a video. The video shows the man sitting at his desk and touching seeds to simulate thoughts around smart dust, and different ways of data mining, i.e., breaking, sharing, throwing away data) (Woebken, 2007).

While including minimum familiar elements would help better perceive a radically different future in some topics, for exploring uncomfortable topics such as death, a familiar design plays a more critical role. For instance, Auger and his colleagues in the 'Afterlife' project designed a coffin that would charge batteries over the post-death process. They aimed to initiate conversations and discussion around perceiving life after death, a cultural shift from religious beliefs to a more factual based understanding of life after death. Dalton and his colleagues used the same technique to initiate discussions around politics and ethical issues of using daily personal data at work. They ran the 'Quantified Toilets' project in CHI 2014 and provided signs in restrooms explaining that the quantified toilet can collect the amount of alcohol and drugs in blood and the data will be sent to employers (Dalton et al., 2014).

Familiarity and tangibility of designed artifacts also help communicate an abstract concept. Rogers and his colleagues explored the role of trust in having a healthy emergent technology, voice-controlled internet. They used a combination of filmmaking and product

design and found that including physical objects plays a critical role in communicating an abstract concept with their audiences (Rogers et al., 2019).
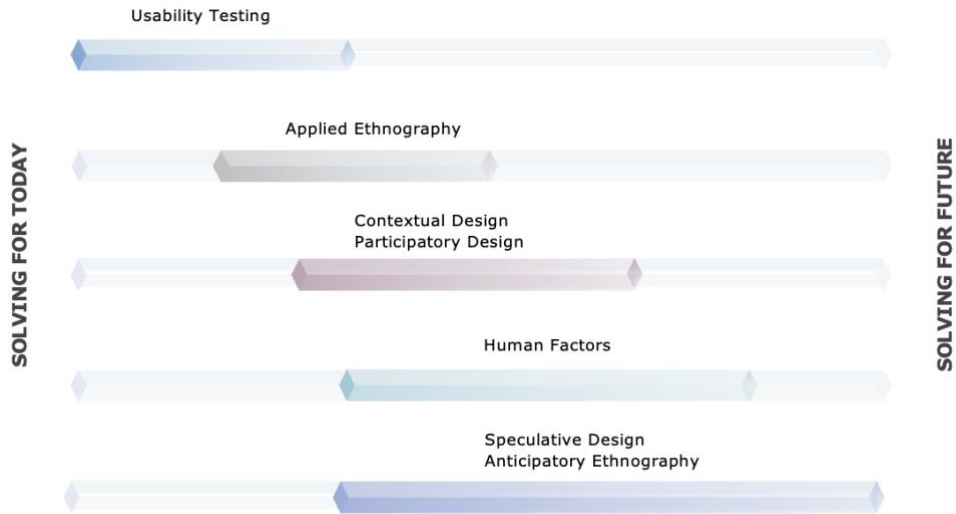

Figure 1. Research methods for solving present and future problems

Operationalizing Speculative Design in a Novel Context

Projects described above have engaged participants with unknown futures through different techniques and design practices, but they have largely done so within the boundaries of contained product spaces. What is missing from these examples is the exploration of concepts that lie within complex systems that include both autonomous and interdependent components, like the structure of advertising platforms. They also do not take into account exploring the future in a setting where customers have conventional practices integrated in their routine use of the product and existing product structures are satisfying their day-to-day needs, which can come on the way of future thinking. In our work we addressed both considerations: the complexity and modular nature of the product and participants' familiarity and comfort with existing workflows.

Traditional product road mapping follows a familiar blueprint that is largely focused on the sizing, efficiency and prioritization of user experience fixes, iterative improvements, and sometimes, the planned introduction of new features. In this process, research most often plays the role of synthesizing and surfacing relevant "inbound" voice-of-the-user learnings. Particular emphasis is placed on any findings that could impact the budgeting and planning of the team goals and commitments as they are being mapped out over timelines that extend over the quarter, the half, or the year. This alignment is useful and particularly critical for complex interconnected products like enterprise software where the product teams are often distributed across multiple features and functions. However, when it comes to untapped future opportunity spaces or distant potential headwinds, the playbook is much less clearly established and from a research perspective, the role is more ambiguous. Indeed, it is not uncommon for research to be excluded during these early stages of speculation, planning

and development and only to be pulled in once the product is more fully in motion and some key decisions have already been made.

In recent years and with more tech companies moving to make headway in uncharted territories, the development process has begun to shift and the benefit of bringing in users and research at an earlier stage of the development process is increasingly being recognized. In the case of this paper, the Facebook example that exemplified this changing product mindset was a collection of projects to better understand the future of advertising from the perspective of an advertiser.

While traditional approaches may have been more willing to rely on opportunity analysis and market research, we were excited to explore a different approach, one which brought researchers into the development process early on, where they could help shape the definition of the product before any design and engineering was locked in. In taking on this role, the design of the future product state for advertisers (in these examples) to respond to, then became our primary challenge and one that required us to look beyond our typical methodological toolkit.

In addition to the challenge of designing for a multi-layered product experience, the selection of users was critical to our learning and so too was the need to decide how to introduce key external elements, e.g., changing regulations that would adequately disrupt their current thinking to imagine future states more fully. The need to generate strong signals across relatively small sample sizes also required us to carefully set a shared context so that research participants could move forward independently, but from a foundation of common ground.

Not only this project was creating a novel experience for our users, but also it was disruptive to our internal product teams because of the ways they lived outside of our typical practices. Prior experiences had shown us how siloed organizational structures could not just distort time horizons but how they could also limit our collective ability to imagine user experiences holistically, a process that was only amplified when considering more distant future product states. Accordingly, although researchers may have been driving these projects, they were not operating alone and the success of the work relied not just on the implementation of a new process but also on the deep domain expertise from a variety of disciplines that were active in the current advertiser space, as well as their shared willingness to try something new and potentially uncomfortable.

Our research in designing a methodology to address these problems and help discover the unknown unknowns ultimately led us to select the speculative design approach. In doing so, we operationalized a version of that approach that fit the complexity of the digital advertising space and significantly, in a way that redefined product roadmaps through the early privileging of the customer points of view, above and beyond the more modular needs of our internal organizations.

METHODOLOGY

This project was initiated to understand the needs of Facebook advertising clients and capture those evolving interactions in future in response to external factors such as new regulations and technological advancements like the move towards automation, or internal measures, i.e., changes in business models or policies. To overcome the limitations of product org structures, we formed a multi-disciplinary team of interaction and content

designers, product experts, and researchers from interconnected product teams that would present a holistic view of the platform, just as our customers see it.

From the vast diversity of ways in which people think about and frame the future (Szpunar et al. 2016) we chose to "simulate" an extreme scenario as provocations, and we shared a construction of a detailed mental representation of that future with our participants.

To implement the research, we applied the abstract speculative concept and operationalized it in a way that the simulated version of future advertising space was situated on participants' existing workflows as well as their evolving needs. These immersive stimuli helped us with building a common space between product teams and customers to share the journey to the future.

In what was defined as a pilot for trying out of the box frameworks in exploring the future product direction, we implemented speculative design in two different ways: In our first approach we took a sudden jump to the future state with our participants and disclosed the information and drastic changes all at once. We called this "jump to the future" because in this scenario, participants were placed in a new reality right away which was completely disjoint from the existing, familiar space. We asked them to explore, understand, and adapt to this new system rather than taking responsibility in building it. Our aim here was to give a quick tour of the future to our participants and collect "first impressions" through a less costly implementation of research and eliminating the exploratory aspect of it.

With our second approach, we applied a gradual and longitudinal disclosure of an extreme future scenario. The research was designed similar to a diary study and unfolded over a 10-day period. We shared daily stimuli with 12 participants representing 3 different market segments and user profiles to provide balanced insights into the end-to-end requirements. We started with news articles and information pieces to prepare them, in the abstract for the more concrete stimuli by the end of the week that mimicked current product experiences but simulated dramatic changes to their familiar business practices. In our deliverable we included provocations and prompts for them to think through when exploring the changes and offered several ways that they could share back their thoughts, including comments, sketches, and conversations, both in group and individually. Our goal with the gradual disclosure, although long and costly, was to build a stronger common ground and understanding with our participants, creating empathy and higher engagement in the follow up conversations that we had planned.

Jump to the Future

With our first implementation of speculative design, jump to the future, we aimed to capture participants' reactions right as they entered a dramatically different future. In this method we designed cross-sectional research where participants attended one in-person interview session and we presented them with the future scenario imposed by technological necessities, e.g., automation, with minimal preparation or context setting, immediate reveal of the future state. Since this was a one interview study setting, recruiting had less complexities, i.e., we needed to ensure we have a representative sample of the audience across different advertising personas. We applied different control and staging techniques (Salovaara et al., 2017) to concretize the future scenarios and narrate them through designed artifacts that were presented to 12 participants, representing 3 market segments and customer profiles, during individual 60-minute interview sessions.

The right design for these artifacts was the most critical point of research; we wanted to give them enough disconnection from their existing scenarios to detach and think beyond their familiar space. There is also a blurry line between the stimuli designed to show a long-term future and design mockups used for feature introduction within the product concept that is familiar to participants. This is where speculative design can differentiate itself through creative thinking to design stimuli that are fully disconnected from the current reality of the existing user experiences. In our project, research, product and content design took a stab at framing the prototypes through ideation and design thinking sessions, what might be considered a longer preparation aspect of this research. Not only did we ask participants to provide specific feedback on the stimuli, but we also invited them to redesign the concept which didn't seem right to them. This research setup was beneficial in implementing speculative design with shorter turn around, iteration, and scalability.

Gradual Disclosure

The main prerequisites for the success of this implementation were recruiting to ensure we are targeting the right audience (marketers from different backgrounds, countries, and business sizes) who could commit to being part of the research for a defined duration. We applied best practices in designing longitudinal studies, to ensure an efficient compensation system and keeping participants motivated and engaged throughout the research project. Our pre-interviews during the recruiting process were an effective way to minimize the attrition rate throughout the 10 days of study. We also created a phased compensation plan so participants would remain encouraged to continue with their engagement, except unforeseen situations. After finalizing the recruitment, the official research was kicked off by conducting an initial in-person interview where we did deep-dives to get to know our participants, including their business objectives, their existing use cases, day-to-day practices and application of the system, and high-level perception around hypothetical future scenarios we had planned to simulate a future state mainly imposed by external factors, e.g, regulatory mandates. With this initial interview we collected an unbiased baseline to refer to as a point of comparison towards the end of the study and after we revealed the revolutionary changes in the system.

The second part of the research was designed as a week-long experiment where participants received daily stimuli to help them immerse themselves in the idea of future possibilities and open their perspective into thinking broadly and differently about how they would best use the "new" platform. This phase was our version of diary implementation with a small difference that we did not design explicit tasks throughout the day. Participants were provided with provocations and explicit scenarios to get them better engaged with the upcoming future scenario and they could freely share their thoughts or just get to explore around. Each participant was provided with their own private version of stimuli shared through a central platform, in this case MURAL digital whiteboards, with the intention of creating the most accessible space where they felt safe and heard. Researchers took daily check-ins on the individual boards to answer any question and capture potential reactions. We took the first few days as an educational opportunity to set the context and unfolded the complete future scenario on day 4 through the concept of time machine. On day 5 participants received the full set of stimuli emulating the current platform which was altered

based on extreme future scenarios. They had additional 2 days to explore the holistic system at once before we entered the next phase of the research.

In the third part of the research, we ran another round of individual interviews to capture the delta on participant's reactions compared to their response on the very first day.

Finally, we included one last stage in this research with a day of focus group sessions. For the first time during this project, we brought in the participants in one place, creating a space for more comparative and competitive discussions between businesses from different sectors.

Applying the Insights to Initiate a New Process

With two types of implementations within two quarters, we now had strong case studies to showcase the application of speculative design within the complex digital advertising space. Our team consisted of 20 skilled researchers, product designers, and content designers who came together to get these projects implemented over the course of six months. This massive amount of work sparked an idea to conduct additional research on the process, to interview the team and establish best practices.

As researchers we don't always get to have a strong stake as strategic partners in an engineering-driven industry and this process enabled us to get there by creating more actionable and data-driven insights. We kicked off an internal program across the company to establish the speculative design methodology as a framework to build a window to the future. To do this, we interviewed members of the core teams involved in this process, including the core players, product and content designers, and researchers, and stakeholders/sponsors of the work, e.g., product owners and program managers. This phase was designed as semi-structured guided interviews in one-on-one settings.

FINDINGS

This was the very first time that speculative design was fully integrated within the context of digital advertising, and we were able to demonstrate the significant impact that using this method can have in generating more tangible and foundational learnings on the topic as well as leading the path for future anticipation work. We brought our participants with us through a time machine and explored designing a new platform together, elevating their perspective and creating strong empathy in them.

The interview data was analyzed using thematic analysis, focusing on interview questions as a sensitizing device and looking for emergent themes. We went through interview notes and transcripts after each phase and identified patterns of design practices, formulating future scenarios, design artifacts, and common issues that needed to be addressed. The findings and product direction resulted from this research are more practical, actionable, and already confirmed by a representative sample of users.

From our observation, combining longitudinal methods with speculative design ideas enabled higher levels of interaction and stronger empathy in participants. Also, it uniquely positioned us to observe a gradual shift in our participants' perception towards the future scenario we were presenting to them without making them defensive or creating those moments of frustration that comes with every change in product direction.

The most interesting observation from the gradual implementation of the method was the increased empathy among participants and their nuanced and embodied understanding

of the complexity of this future space. While they demanded to have a working solution despite drastic changes on the first interview, they presented a more empathetic perspective on these interviews at the end. In contrast to the start of the project their role had shifted from more passive "customers" to proactive problem-solving "partners".

The main challenge our participants faced in the jump to the future method was uneven understanding of the concept and knowledge about the future landscape. Since we didn't invest in creating common ground, we observed an uneven level of insight among our participants, combined with strong push backs towards the introduced changes. This implementation can be applied where the time allocation for the early-stage research is limited.

Ethnographic Reflexivity

It is worth noting that these two projects formed the core of a proof-of-concept pilot that, if deemed a success, would inform the formation of an internal speculative design initiative more broadly in our organization. With that in mind, we were keen to turn the ethnographer's lens on ourselves, not only to assess the viability and replicability of this approach, but in the service of quenching our own inherent researcher-participant curiosity. To undertake this retrospective analysis, we interviewed a range of our colleagues from across disciplines, to dig into their experience of applying this new approach to user research.

In addition to invaluable product specific learnings, we achieved a new level in the implementation of speculative design methodology and were able to generate best practices and learnings to be applied across Facebook products in a way that is suitable for complex product development and enterprise processes. We believe our learnings from this implementation can be scaled by this community and as a foundation for any futuristic research within fast moving, complex industries.

We have framed the findings of the retrospective interviews with the core players on the end-to-end process of this project around four main themes:

1. research setting rationales,
2. team dynamics and collaboration between different stakeholders,
3. conceptualization of the future scenarios, and
4. common challenges in adoption of speculative design as a research methodology.

Research Setting Rationales

Researchers used two techniques for sharing information with participants: gradual vs. sudden. In both cases we were aiming to go beyond the surface either in an extended time that clients needed to grasp the future scenarios or in a sudden shift of attention. The gradual information sharing over the experiment helped participants feel the reality of nuances of their workflow in the future and prepared them to engage and interact with that future. The application of longitudinal research was framed to obtain insights in four stages: initial perception, reaction to stimuli, insights after the experience, and group discussions.

> "It is essential that participants have a central space to experience and spend time
> in it. This is coming from the design background where you would have a studio

with prototypes set up in it, and people would come in and experience them." A product designer's perspective

Jump to the future, the sudden information sharing, aimed to capture participants' reactions right as they entered a dramatically different future. This method is useful when participants do not require a longer time to process information and have some level of understanding about the future scenario. Researchers shared a three-part futuristic user experience flow with participants to take them to a space that was designed drastically differently compared to their current workflows. This helped researchers gain deep insights into participants' long-term thinking about the product space.

While the two methodologies had clear differences, in both cases, researchers helped participants visualize the future through semi-structured interviews and encouraged them to think beyond their daily practices and business routines.

> "It's designing the scenarios and designing what we want to show to people, or what kind of reality we want them to frame their thinking around … that's the most critical part because the questions that we ask might not be that different from what we would ask in a typical scenario, but here it is about how we are generating those thinking around the questions." A researcher's perspective

Team Dynamics and Collaboration

Given that these initial projects were both part of a pilot program it was important for us to evaluate what had worked well and what we might improve or change going forward. The experience had been edifying for us researchers, but it's probably fair to say that we are more accustomed to accepting the messiness of new practices and new situations than most, so we were eager to turn our ethnographic lens on ourselves and our teams too-- not just to tease out more domain learnings but to better understand how this new approach had been experienced by our interdisciplinary teammates. New practices need a plan for building alignment and this work certainly helped us identify some important guiding principles including:

Build common ground and over-communicate; we recommend starting by building a common ground among all members of the team for this type of projects that are less commonly practiced. Over communication is recommended to ensure all members are on the same page all the time.

Involve experts in both domain and process; including both expertise from the early stages of defining the problem space can help pivoting easier and minimizes the blockers for the team. In our case we had researchers with extended knowledge of advertising space and researchers that are experts in speculative design methodology.

Set the expectations and get alignment; by having a fully staffed team across different roles, and identifying goals, responsibilities, and deliverables early in the process, we will help the team reach a shared understanding of the project, but regular meetings are also important to help the team pivot, adapt, and re-align to a process that remains somewhat ambiguous and open to interpretation by design.

Choose the right team size; while each project may have different team size, three roles, including product designers, researchers, and content designers, are essential for projects in

this scale to be successful. There are advantages to keeping the team relatively small and agile, because, although bigger teams can increase scope, they also require more coordination efforts to ensure the consistency of expectations and more inertia when it comes to making changes.

Divide responsibilities between disciplines; while all the roles should be present from the early stages of the project, the main responsibilities vary through the project timeline - Figure 2 shows which role is recommended to be the main POC in each stage. In team settings where there are multiple representatives from each function, assigning one person as a dedicated Point of Contact (POC) would facilitate coordination among individuals with the same role.

Researchers play an important role in defining research settings, goals, and constraints that should be applied in designing artifacts. They are also a project manager in the absence of a dedicated resource for it. Product and content designers work together to iterate different design stimuli based on open questions and scenarios and finalize prototypes with internal product owners.
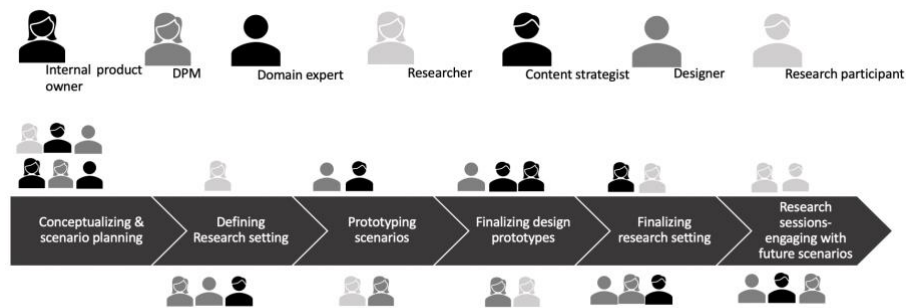

Figure 2. Division of Responsibilities- Roles above the arrow have main responsibilities for the work in each stage. Roles below the arrow will be involved in the work and provide feedback to improve the work.

Conceptualization and Planning the Future Scenarios

Speculative design projects require consideration of a broader context and different variables that could affect future scenarios. As a result, conceptualizing scenarios and operationalizing them through designed artifacts play a critical role in its success. In our implementation of this method, we considered all possible variables initially and narrowed down the emphasis by only including variables that directly impacted the project goals. Finalizing the focus scenario (extreme usecase in our example) early in the process helped with ensuring that there is enough time for iteration and generating new ideas to represent possible futures that last longer.

> "We considered many variables: What are the global policies? What does the workplace of the future look like? What kind of changes in human lifespan or access to healthcare, or changes in literacy, or access to technology will we have? What are the potential variables that we can pull into the scenario?" A content designer's perspective

We focused on the main products that have general usage and are highly interconnected to avoid unnecessary complications for advertisers while interacting with future prototypes. The fidelity level of design stimuli can also vary depending on the team's bandwidth. Ensuring the right level of prototype fidelity is also a factor in retaining participant's engagement throughout the research study.

> "We have to shift our mindset outside of the deliverables that we usually provide in testing, which are clickable prototypes." A product designer's perspective

We should also consider how future-oriented the participants are. In some cases, participants might not be concerned about implementing futuristic approaches in their products. As a result, guiding them to visualize possible future scenarios would require different techniques.

Common Challenges in Adopting Speculative Design Methodology in Research

During our scenario planning phase, we investigated a broad range of societal factors to better define the problem space. We had to find the right balance between too open-ended and too specific scenarios in order to generate informed insights and deal with ambiguity that can be hidden in different phases of the project. Examples of the areas that might seem ambiguous are identifying the problem space, scenario planning, and designing right artifacts to narrate scenarios accurately.

> "Because the method is like philosophy, and to make something real, it had to ground itself in a body of knowledge that informed it, and it had to ground in some of the concrete steps that we would imagine would define it." A researchers' perspective

We used different strategies to accomplish project goals despite the ambiguity of using this new approach. We quickly came to realize that this approach has a philosophical notion which requires us to be open about the uncertainty of applying this approach in practice. Designers in this project initially compared it to sprint design, later they detached their thoughts from what they knew and took their design ideas into the extreme future scenarios. As soon as we got to identify and agree on the level of fidelity, we had the design rolling smoothly. Researchers compared this approach to the participatory and ethnomethodology approaches initially and later they focused on the futuristic component of the method and how it should ground itself with the body of knowledge.

> "I kind of see speculative design as an ethnomethodological approach where you're breaking norms to study reactions. Traditional ethnomethodological studies would look at things like, say, walking backward in the street to understand what people's baseline understanding of certain norms are, like you're showing radically different norms. For speculative design we are showing a radically different future." A researcher's perspective

Impact & Outcomes

Ultimately, the internal impact of these pilots was validated for us across a number of variables. Firstly, it prompted a range of spin-off explorations on the future of digital advertising at a time when the understanding of that topic in a proactive manner was of vital importance to our organization, increasing the breadth of our collective knowledge in the process. Secondly, this work led to an enthusiastic response from our researcher peers, revealing their shared desire to try new approaches that might help themselves and their teams to get beyond the day-to-day and to begin thinking proactively about more nebulous future states as a matter of best practice. For the authors of this paper, it has also meant an internal consulting role, in which we have advised numerous other researchers on how best to design experiments to explore future states. Finally, this proactive and creative approach to exploring the future of products and experiences has been part of a bigger internal groundswell within the company to create more roles within the research organization including roles like pathfinding, new product experimentation, and responsible innovation research, increasingly empowering researchers to amplify their voice in critical conversations about strategic directions, holistic experiences, risk assessment and aspirational designs.

CONCLUSION

Speculative design methodology is different from conventional methodologies used in product design and research as it focuses on a more distant future and aims to design concepts rather than products (Dunne and Raby, 2013). Researchers may hesitate to use this approach due to unfamiliarity and ambiguity of future scenarios and planning them in the most representative way, which can be further expanded in the context of complex platforms or modular products. We applied this method in different implementations and presented the best practices of using it in the context of digital advertising where the scope of the projects was broad, and users did not get to envision the long-term needs through their daily application.

First, methodologically, we presented different techniques of immersing participants with future scenarios. Predicting what kind of reactions from our participants could be most useful, based on historical research on the topic, helped researchers choose the right level of stimuli in presenting the future. Through these studies we showed how different methods of unfolding future scenarios for participants can yield different outcomes.

Second, we presented the nuances of collaboration among stakeholders in the context of a future product planning through speculative design. Most speculative studies focus on a contained product space within an organization which can be limiting the scope unnecessarily and neglect the interdependencies between organizations. We broadened the scope of speculative design application to scale and within our dynamic Facebook platform, minimizing the potential blind spots.

Third, we showed how we created future scenarios when there are many moving variables that would affect our clients and other stakeholders' long-term requirements. We recommend focusing on the most effective variables in pursuing the project's goals. Once speculative design teams run the research sessions and form insights, they can decide on the importance of including additional variables in planning subsequent speculative projects.

Fourth, we shared some expected challenges and how teams can overcome those. We recommend teams to embrace ambiguity of the process and incorporate their foundational

knowledge in creating a version of the future that resonates most with participants or can be balanced with their existing knowledge, to get deeper insights.

Speculative design is a methodology that empowers researchers to best position their user needs in the process of establishing next generation experiences and building products that truly fits their needs. There are many ways that this method can be implemented but it is important to keep in mind that it is not suitable for every project concept or as a general replacement for commonly used research methods. With the right setting and clear directions in identifying elements of the future that will impact the product, we can bring our customers into the immersive experience of designing the desired future within the products.

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