Learning from FemTech to Inform the Design of Healthcare Technologies

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FemTech is an industry within the digital health market that drives investments on technologies related to women's needs, and period tracking apps are its landmark innovation. These apps allow users to record data about their menstrual cycles and get predictions about their cycle length and fertility status. Digital period tracking is convenient but unreliable. Research shows that these applications are based on averages that produce and reproduce the notion of a "default female body," leaving aside the lived and embodied experiences of users who fall outside of normative categories. Moreover, FemTech functions by extracting and selling reproductive health data, which presents a threat to the struggle for gender equality and bodily autonomy. This chapter positions FemTech as a case study to learn about the effect of design and business decisions in people and communities, especially as innovations in digital health have become vehicles to profit from patients and healthcare systems. The chapter proposes seven implications as opportunities for design teams to engage with FemTech in intentional change-oriented domains, where multiple lived experiences are fundamental for the design of technological applications, and where the quality of knowledge and experiences of people who menstruate are the measure of success. The chapter advocates for rerouting the design of digital health applications towards frameworks of health equity and social justice.
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Digital health, sometimes referred to as "mobile health," "e-health," or "digital medicine," is a widely adopted trend in design for healthcare that uses technology and data-mediated interfaces to improve people's well-being in a variety of medical contexts. Most recently, the Covid-19 pandemic provoked an increased demand for the design and adoption of digital health products and services, which are now considered "a necessity, not a choice."[2] Particularly, the context of women's health has recently gained cultural and business traction under the label "FemTech" (a shorthand for female and technology), which encompasses a suite of technologies that deal with all phases of a woman's life, such as menstruation, pregnancy prevention, pregnancy and nursing, aging, and additional areas considered to be central to this population such as beauty, cosmetic surgery, and technologies for longevity.[3] While women's health is much broader than merely the reproductive organs, a large segment of the FemTech industry focuses on this aspect.[4] This chapter predominantly deals with period tracking apps, as the technology that has gained the most business traction, and indeed led to the coinage of the term FemTech in 2016.

The criticism about FemTech is abundant, and this criticism needs to be examined by designers to inform the development of gender-based healthcare technologies. Most criticism is found in the fields of medicine and law, and although design is at the center of this cultural and technological trend, with product designers, experience designers, graphic designers, and service designers shaping these innovations, there is no ample analysis of the role of design as a strategic force in shaping FemTech. This chapter provides an overview of this industry, exploring how its narratives of empowerment are rooted in stereotypes and the harmful definition of a "default female body." It further examines how FemTech is an ecosystem that profits from menstruation, and the implications of this ecosystem in the struggles for gender equality and bodily autonomy. The chapter proceeds to sketch seven

2 Bertalan Meskó, "COVID-19's Impact on Digital Health Adoption: The Growing Gap Between a Technological and a Cultural Transformation," *JMIR human factors*, 9(3), e38926, 2022, 2.

3 Marija Butkovic, "FEMTEC Health Is Finally Bringing Women Holistic, Personalized Healthcare They Deserve," *Forbes Magazine*, March 23, 2022, https://www.forbes.com/sites/marijabutkovic/2022/03/21/femtec-health-is-finally-bringing-women-holistic-personalized-healthcare-they-deserve/?sh=7ae56f461049

4 Bethany A. Corbin, "*Digital Micro-Aggressions and Discrimination: Femtech and the 'Othering' of Women*" *Nova Law Review* 44, no. 3 (Spring 2020), 343.

implications for the creation of gender-based healthcare technologies that are explicitly rooted in feminist perspectives and reproductive justice frameworks.

A Note on Language

In acknowledgment that not all people who menstruate identify as women, this chapter uses the phrase 'people who menstruate' to include anyone who experiences menstruation. The word "women" is used when making references to FemTech discourses that use the gendered category of women, or when paraphrasing.

Defining FemTech as a Duality

This chapter defines FemTech as a duality. On one hand, FemTech has been positioned as a triumph in the digital health industry, because of its capacity to provide tools for self-knowledge for women[5] and people who menstruate. Other acclaimed achievements of FemTech include becoming a system that is accessible, supportive and that offers a sense of community.[6] On the other hand, FemTech has also been described as a network of false and unverified information, data gathering and profiting[7].

Period tracking apps are increasingly gaining popularity as the primary method of contraception for many people.[8] While this exemplifies how digital applications can positively contribute to body literacy goals, as well as the adoption of non-hormonal contraception, period tracking apps do not provide information that is medically reliable and transparent, making the objectives of FemTech fall short in their actual execution and performance.

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5 Madelin Burt-D'Agnillo,"Femtech: A Feminist Technoscience Analysis," *The iJournal: Student Journal of the Faculty of Information* 8, no. 1 (2022), 18.

6 Catriona McMillan, "Monitoring Female Fertility Through 'Femtech': The Need for a Whole-System Approach to Regulation," *Medical Law Review* 30, no. 3 (2022), 418.

7 See Madelin Burt-D'Agnillo, "Femtech: A Feminist Technoscience Analysis," *The iJournal: Student Journal of the Faculty of Information* 8, no. 1 (2022) and Catriona McMillan, "Monitoring Female Fertility Through 'Femtech': The Need for a Whole-System Approach to Regulation," *Medical Law Review* 30, no. 3 (2022), 410–433.

8 Naomi Jacobs and Jenneke Evers, "Ethical Perspectives On Femtech: Moving From Concerns To Capability-sensitive Designs," *Bioethics* (2023), 5.

Positioning FemTech as a duality is an effort to present this industry as a complex assemblage that, instead of being labeled as liberatory or dangerous, is better understood if deconstructed into multiple components that reveal the political agendas and ideologies that it pushes forward, which are the key questions that designers should be asking first, before creating the next digital healthcare application for people who menstruate.

A Critical Analysis of FemTech

FemTech's narratives of empowerment are rooted in a harmful definition of a "default female body." The promise of self-surveillance or self-tracking apps is to increase people's knowledge and control over their bodies.[9] The logic is that digitally gathering data produced by the body and presenting it back to the user in readable formats, can create a learning cycle that leads to better healthcare decisions. In the context of menstruation tracking, the promise of FemTech is for people to understand their bodies so they can be in control of their fertility journey, and therefore become empowered.

While FemTech tools are useful, these promises are hardly achieved by all users. One reason for this is that the technical specifications of the apps are based on averages. This is highly problematic since the bodies of people who menstruate vary greatly. For instance, 28 days is often deemed the average menstrual cycle length in FemTech apps, whereas it is medically recognized that cycles can range between 21 and 35 days.[10] This not only excludes users who experience menstruation differently but can also lead to poor advice and inaccurate results.[11] Period tracking apps have been studied and found to be inaccurate, leading users to experience unwanted pregnancies[12] and failing to predict periods at all. Indeed, the best app has scored only a 21% accuracy rate.[13]

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9 Michele Estrin Gilman, "Periods for profit and the rise of menstrual surveillance," *Colum. J. Gender & L.* 41 (2021), 101.

10 Mitchell D. Creinin, Sharon Keverline, and Leslie A. Meyn, "How Regular Is Regular? An Analysis Of Menstrual Cycle Regularity," *Contraception* 70, no. 4 (2004), 289.

11 Catriona McMillan, "Monitoring Female Fertility Through 'Femtech': The Need for a Whole-System Approach to Regulation," *Medical Law Review* 30, no. 3 (2022), 420.

12 McMillan, 424.

13 Sarah Johnson, Lorrae Marriott, and Michael Zinaman, "Can apps and calendar methods predict ovulation with accuracy?" *Current Medical Research and Opinion* 34, no. 9 (2018), 1587. See also Zod LaRock, "Femtech Companies Are Likely Poised for Speedy

In addition, basing period tracking on averages without room for variation, creates a stereotype of a "normative body." It communicates to the user that a body that menstruates must follow rigid metrics, and that failing to follow those parameters means that there is something wrong or abnormal.[14] Moreover, this categorization is marked by privilege. By catering to healthy, affluent, white, cis women, FemTech further reinforces stigmas around menstruation, and excludes non-binary, trans users,[15] as well as people from socially and economically marginalized populations that are capable of pregnancy, and people with serious chronic medical conditions.[16] In other words, FemTech implies that empowerment is only achieved by those who hold social and economic privilege, apart from enforcing a harmful gender binary that essentializes women.[17]

The choice of visual design elements in these apps also contribute to essentializing the gendered category of women. As Bethany A. Corbin has noted, "period tracking apps routinely include superfluous or insulting design elements that downplay the importance of female health. Floating clouds, color palette that emphasize pink and red, irrelevant flowers and faux-empowering language,"[18] reinforcing feminine notions of gender performativity, and often using elements that assume that a sexual or relationship partner is male, catering only heterosexual relationships.[19]

Growth Despite Failing to Prove That Their Tools Live Up to the Hype", *Business Insider*, July 22, 2019, https://www.businessinsider.in/femtech-companies-are-likely-poised-for-speedy-growth-despite-failing-to-prove-that-their-tools-live-up-to-the-hype/articleshow/70335446.cms

14 Corbin, "Digital Micro-Aggressions and Discrimination: Femtech and the 'Othering' of Women," 356.

15 Amanda Menking, "The rise of Femtech," *Gender and the Economy*, November, 2020, accessed February 15, 2023, https://www.gendereconomy.org/the-rise-of-Femtech.

16 Tamar Krishnamurti, Mehret Birru Talabi, Lisa S. Callegari, Traci M. Kazmerski, and Sonya Borrero, "A framework for Femtech: guiding principles for developing digital reproductive health tools in the United States," *Journal of Medical Internet Research* 24, no. 4 (2022), 1.

17 Gilman, "Periods for profit and the rise of menstrual surveillance," 102.

18 Corbin, "Digital Micro-Aggressions and Discrimination: Femtech and the 'Othering' of Women," 349.

19 Daniel A. Epstein, Nicole B. Lee, Jennifer H. Kang, Elena Agapie, Jessica Schroeder, Laura R. Pina, James Fogarty, Julie A. Kientz, and Sean Munson, "Examining Menstrual Tracking To Inform The Design Of Personal Informatics Tools," *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems* (2017), 13.

Introducing FemTech in the Context of Digital Health

Although a historical overview of technologies for menstruation is out of the scope of this chapter, it is important to recognize that technologies for menstruation tracking have existed for as long as people have menstruated. The success of period tracking apps lies in the industry's ability to capitalize on the convenience of capturing data through personal computing devices, as a vehicle to feed data management practices that enable large profit margins. The social and cultural cost of this is the creation and perpetuation of harmful narratives about normalcy and womanhood.

A Profit Ecosystem Around Menstruation

Period tracking apps are a central component and an enabler of a broader business strategy of data extraction, in which FemTech companies are mining people's personal data for profit, typically without their knowledge of meaningful consent.[20] FemTech is a clear example of how the self-surveillance economy and the menstrual surveillance industry work,[21] where menstruation, people's intimacy and their perceptions and plans for procreation, are exploited for doing business as usual.

The problem with data extraction and third-party sharing is multifaceted. As exposed by Sarah Myers, the commoditization of data enables an asymmetric redistribution of power that is weighted toward the actors who have access and the capability to make sense of information extraction.[22] In other words, data extraction will always favor those who extract and manage data, at the expense of millions of users using the applications that make data collection and sharing possible. At the larger level, data capitalism serves as a vehicle for the accumulation of wealth and uneven distribution of and access to power in society.

Data extraction also has material effects on the lives of people. Having access to people's information about their menstruation cycles, in a socio-political context where bodily autonomy is often curtailed, data extraction

20 Gilman, "Periods for profit and the rise of menstrual surveillance," 100.

21 Gilman, 102.

22 Sarah Myers West, "Data capitalism: Redefining the logics of surveillance and privacy," *Business & Society* 58, no. 1 (2019), 35.

can be used against users. Erickson et. al, identify categories of possible misuse of FemTech data, such as in targeted advertisements, maternity-related discrimination in the workplace, health insurance pricing, in abusive relationships, by attackers, and to spread health misinformation.[23] Incidentally, these predictions have become true in the wake of the US Supreme Court's decision to overturn Roe v. Wade to end federal abortion protections in 2022, when media channels and experts were urging users to delete their period tracking apps, since the data gathered could be used as the basis for prosecution by citing the intent for abortion.[24] This kind of external control over peoples' reproduction is a tool of domination and oppression.[25]

On the other hand, the regulatory frameworks and funding pipelines of FemTech are problematic. There is a lack of a regulatory framework for the FemTech industry that is comprehensive, let alone multi-dimensional or feminist.[26] Moreover, despite portraying women as entrepreneurs, FemTech is funded predominantly by white males, which means that those who are the least familiarized with menstruation are making key decisions about the menstruation experiences of others and earning profit from it. In other words, people who menstruate are only seen as a lucrative market sector.[27]

FemTech on the Horizon of Gender Equality and Bodily Autonomy

At a larger cultural scale, the FemTech ecosystem contributes to feed technology development practices that are depoliticized and individualized.

23 Jacob Erickson, Jewel Y. Yuzon, and Tamara Bonaci. "What You Do Not Expect When You Are Expecting: Privacy Analysis of Femtech," *IEEE Transactions on Technology and Society* 3, no. 2 (2022), 123.

24 Betsy Reed, "Why US women are deleting their period tracking apps," *The Guardian*, June 28, 2022, last accessed on January 20, 2023, https://www.theguardian.com/world/2022/jun/28/why-us-woman-are-deleting-their-period-tracking-apps; Jennifer Savin, "Experts urging women to delete period tracking apps following Roe v Wade being overturned," *Cosmopolitan*, June 28, 2022, https://www.cosmopolitan.com/uk/reports/a40442824/period-apps-abortion-prosecutions.

25 Loretta J. Ross, "Reproductive justice as intersectional feminist activism," *Souls* 19, no. 3 (2017), 292.

26 Catriona McMillan, "Monitoring Female Fertility Through 'Femtech': The Need for a Whole-System Approach to Regulation," *Medical Law Review* 30, no. 3 (2022), 413.

27 Corbin, "Digital Micro-Aggressions and Discrimination: Femtech and the 'Othering' of Women," 352.

For example, common sentences in FemTech's marketing strategies include terminology like "revolutionizing healthcare," "empowering women," and "ending stigma around women's health." These statements are often followed by technology optimism, failing to make any association to social justice or health equity. This selective use of wording associated with feminism creates a narrative that resonates with people who agree with the thought of gender equality, although there is no evidence of a strong theory of change that FemTech operates with. It appears that the industry expects that having people tracking their periods with an app is an effective path towards gender equality and bodily autonomy, contributing to positively transforming the historical discrimination of the female body in science and medicine. However, it is hard to argue that the FemTech ecosystem as a profitable business of female reproductive health data is the path to get there. By designing technologies for the most privileged users, it is safe to infer the industry's lack of interrogation of structural inequalities and power asymmetries in areas related to female bodies' health, menstruation, and technology design.

Narratives supported by numbers, algorithmic predictions and data visualizations, coupled with discourses of empowerment, are means that give users the illusion of control over their bodies, with no association to a socio-political system where menstruation operates, in a similar way that period hygiene brands have historically ignored how individual choices about using a menstrual pad, a tampon, a menstrual cup or any other tool, carry political connotations and repercussions in the collective struggle for gender equality and bodily autonomy. Depoliticization leads to individualizing struggles, as menstruation in FemTech is treated as separate from the socio-economic system, and therefore something that can be controlled by individuals, not as an opportunity to build solidarity and collective empowerment.

Design, Gender, and Healthcare: How to Do Things Differently

The FemTech industry lends itself as a complex case study that demonstrates the wider impact of design decisions in all phases of a creative process: from establishing potential users, to defining app features, and shaping business opportunities. Before moving into a list of implications for design, it is important to clarify what is meant by a gender-based healthcare technology.

The term gender-based does not mean designing for those who identify as women, but rather to bring the complexity of gender, as a category that structures social relations, at the center of the creative process.

Departing from the category of gender is not a neutral task. It involves acknowledging and studying the ways that the patriarchy structures systems of power and privilege, and perpetuates oppression. Along this line, the gender-lens reveals how women and gender-non-conforming folks have been historically excluded, oppressed, and pushed to the margins, and how this oppression is the source of profit for those in power. As it will be described in implication number 3, the gender category is never an isolated identity marker, as gender is always intersecting with other axes of privilege such as race, class, immigration, and ability.

Regarding the design of healthcare, it is useful to draw a broad distinction between a medical and a social model of healthcare. While the medical model uses symptoms and physical signs of the body to categorize someone as ill or having a disorder, the social model of health is focused on the social and environmental determinants of health. The latter is based on the understanding that for a person or a community to be healthy, we need to meet peoples' basic needs first.[28]

Designing self-tracking technologies often renders the human body as a readable biological machine that produces data, which can be remotely collected and analyzed. In doing so, digital applications objectify the body and present it as independent from context and environment. The incorporation of a social model of healthcare can inform design by studying the physical and psychological needs of individuals, and contextualizing those needs in the broader social, political, and economic settings where people live and work.

This chapter has presented an analysis of FemTech as a case study for studying the ways that design and business decisions play out in a larger sociocultural context. The following are seven implications derived from this analysis, crafted from a design perspective, and framed as opportunity spaces for creative teams to advance an agenda for FemTech development that is explicitly rooted in feminist perspectives.

28 Business Bliss Consultants FZE, "Comparison of Social and Medical Models of Health," accessed March 1, 2023, https://nursinganswers.net/essays/definition-and-comparison-of-social-and-medical-model-of-health.php.

1. FemTech design is about healthcare systems, not isolated digital apps

One significant source of problems in the design ecosystem of FemTech is the tendency to reduce, simplify, and categorize complex biological, social, and cultural factors in order to create efficient digital systems.

Period tracking apps use machine learning algorithms to present predictions to users about their menstrual cycle length and fertility status. For algorithms to function, designers and programmers need to simplify the lived experiences of menstruation, context of use, and the wide spectrum of abilities of users and more. This process is called "dimensionality reduction," where few extracted features from a dataset used for training an algorithm are assumed to capture the essence of a larger multi-dimensional reality. In reducing the complexity of the data, both storage requirements and the efficiency of algorithms for inference and decision making are optimized.

Not only are algorithms a reduced version of complex social and cultural situations, but they are also trained using previously established datasets in the healthcare system, which are already biased. When exploring this complexity, and the apparent impossibility to design algorithms that are inclusive and honor the multiple realities of people who menstruate, design teams tend to avoid the discussion altogether and move ahead with assumptions about how the world functions.

However, more than the complexity of designing algorithms, the issue is about how the vision for design has been outlined. Approaching FemTech as the design of digital applications alone misses the point about context, how the apps are used, why, and who they benefit in practice. The alternative is to think of healthcare systems where period tracking apps (if needed) become an enabler but not the center of such systems, and where the healthcare outcome is clearly defined.

Another angle for designers to engage with complexity and expand the design capability is to reframe design challenges in the first place. For instance, it has been noted how FemTech adheres to American data privacy laws, which largely hinge on the concept of "notice and consent." This puts the onus on people to protect their own privacy, however "notice and consent is a myth because consumers do not read, cannot comprehend and have no opportunities to negotiate the terms of privacy policies."[29] If we envision users

29 Gilman, "Periods for profit and the rise of menstrual surveillance," 100.

who can make better healthcare decisions by becoming more data literate, perhaps the design challenge, beyond tracking menstruation, is to make data privacy laws truly accessible, instead of treating the latter as an add-on to the main design.

2. Design teams not only need to be diverse, but ideologically aligned

Design teams embarking on the mission of designing gender-based healthcare technologies need to be diverse in terms of disciplinary knowledge and practices. As Tamar Krishnamurti et al. point out, cross-disciplinary collaboration is required to ensure that any reproductive health tool is comprehensive and accurate.[30] Designers can benefit from working with creative technologists who have the capacity to provide insights into technological possibilities that are feasible and outside of the confines of app development. Other fruitful collaborations can be established with medical professionals to ensure that the design of products and services in FemTech are medically sound.

Diversity is also crucial in terms of gender identities, race, and other forms of privilege. This can partly ensure that different experiences are brought into conversation in design. However, diversity alone does not ensure that technologies are automatically addressing the needs of diverse populations. If a design team is diverse, but there is no disclosure of their political alignment and motivations, technological applications will inevitably fall back into established market trends and data extraction practices described above. Technologies designed for people who menstruate have the potential to become tools for collective empowerment, solidarity, and knowledge of the self, only if these intentions are made explicit in design teams, and if there is a shared understanding of the political and practical implications of such a positioning.

3. The users of FemTech applications need to be defined intentionally and intersectionally

By catering to people who identify as women, who are also young, fit, white, affluent, and able-bodied, FemTech demonstrates how design is complicit with

30 Krishnamurti et al., "A framework for Femtech: guiding principles for developing digital reproductive health tools in the United States," 2.

upholding systems of oppression, since it leaves those historically oppressed at the periphery of technological innovation, both as consumers and producers. The depoliticization of FemTech is both a symptom and a result of a lack of an intersectional approach to define users in the design process.

As outlined by Kimberlé Crenshaw and Patricia Hill Collins, an intersectional approach reconceptualizes multiple oppressions, such as those based on race, class and gender, as interlocking systems. This means that these systems do not operate "on their own" but are experienced together. In other words, the experiences of each person are different because people have different combinations (or intersections) of privilege. For example, a woman who is a citizen of a country by birth, and an immigrant woman, will both experience discrimination based on gender, but they will experience different forms of privilege and discrimination because of their immigration status.[31]

Incorporating an intersectional approach in the design of FemTech applications means that the definition of users, as well as research practices are aware of and intentionally engaged with the ways that different potential users of period tracking apps can actually access their benefits, given the social positions they occupy. The result is not an adaptation of current FemTech apps to different languages or devices, but rather the recognition and exposure of multiple needs and desires that are relevant to specific social contexts, and therefore different solutions or digital interactions could be designed to meet those needs and desires.

4. Design frameworks are stronger if aligned to justice frameworks

The incorporation of an intersectional approach in design transcends the description of users and their privilege. As designer and researcher Jackie Shaw has pointed out, "in applying an intersectional lens, oppression and privilege can be seen as parts of problems that can be addressed, instead of personal attributes of have and have-not."[32] In other words, orienting the design of gender-based technologies towards justice means using the potential

31 For a comprehensive review of the implications of intersectionality in design see Sasha Costanza-Chock, "Design justice: Towards an intersectional feminist framework for design theory and practice," *Proceedings of the Design Research Society* (2018).

32 Jacquie Shaw, "Designing with intentional intersectionality," accessed on January 2023, https://vimeo.com/353133100

of FemTech for balancing power asymmetries and correcting structural inequalities.[33]

This engagement with politics of change necessitates a synergy between design frameworks and justice frameworks. Design teams may engage with theory developed by activists and academics to describe pathways to change in specific social dimensions. For example, "Reproductive Justice Frameworks," as shaped by the Combahee River Collective in 1994, bring together the concepts of reproductive rights and social justice, to advocate for and shape direct action towards sexual freedom and bodily autonomy. A key component of the "Reproductive Justice Frameworks" is to go beyond pro-choice politics. For example, a rights-based framework would focus on ensuring the right to access sexual and reproductive healthcare. While this is necessary, such framing assumes that all women and people who menstruate have an equal ability to make informed choices, ignoring structural factors such as economic status, race, immigration state, incarceration state and many others, that can prevent people from actually accessing quality healthcare.[34]

By coupling design frameworks and "Reproductive Justice Frameworks," products and services can be designed with the intention of strengthening the ways that robust and reliable healthcare can be accessible by all people. This objective includes the elimination of discriminatory barriers in healthcare. Under this framing, designers must evaluate the potential discriminatory effects of different design decisions in the creative process, as well as unintended consequences of digital health innovations.

5. Those who are most affected by the technology must play an active role in shaping it

Krishnamurti et al. described that, "It is an ethical imperative that individuals who are the desired users of these tools have the power to be active participants in their health care decisions and that their right to make their own reproductive decisions is honored, regardless of the context".[35]

33 Madelin Burt-D'Agnillo, "Femtech: A Feminist Technoscience Analysis." *The iJournal: Student Journal of the Faculty of Information* 8, no. 1 (2022), 20.

34 For a detailed account of the Reproductive Justice Framework see Loretta J. Ross, "Reproductive justice as intersectional feminist activism," *Souls* 19, no. 3 (2017): 286–314.

35 Krishnamurti et al., "A framework for Femtech: guiding principles for developing digital reproductive health tools in the United States," 2.

The incorporation of participatory or collaborative approaches to designing healthcare technologies needs to be at the center of the creative process for FemTech.

While centering the voices of people who menstruate is ethically sound, participatory approaches need to be tactfully approached to avoid the extraction of information from people, without giving back to them appropriate decision-making power and credit for their contributions. Participatory efforts need to be understood beyond the implementation of a method, but rather embraced as complete shifts in culture, where sharing power and building capabilities are guiding principles for design.[36]

6. Visual narratives can be radically challenged

As pointed out, the current graphic design of period tracking apps contributes to reinforcing normative femininity and essentializing notions of womanhood. The narrative of empowerment here is justified by visibility of "women's issues," which are in turn appropriated by media and advertisement.[37] It is tempting to challenge visual narratives in FemTech by moving away from superfluous design elements, with aesthetics that are bold and irreverent. This is already trendy in contemporary graphic design and branding for period care products.[38] However, the aesthetic shifts are made in opposition to current visual canons, not in response to a radical analysis.

The word "radical" implies an understanding of root causes. Rather than prescribing a new aesthetic paradigm, the role of design teams is to devise the vehicles for shaping graphic design that responds to contextual needs and people's ability to perceive information and relate to visual material. A radical shift in aesthetics is also being aware of history, and incorporating messaging that promotes collective empowerment and solidarity.

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36 Kelly Ann McKercher, "Beyond sticky notes," *Doing co-design for Real: Mindsets, Methods, and Movements, 1st Edn. Sydney, NSW: Beyond Sticky Notes* (2020), 5.

37 McMillan, "Monitoring Female Fertility Through 'Femtech': The Need for a Whole-System Approach to Regulation," 431.

38 Rachel del Valle, "Modern Period Brands Used to Blend In. Now, Like Everything Else, They're All About Standing Out," *Eye on Design*, May 19, 2022, https://eyeondesign.aiga.org/modern-period-brands-used-to-blend-in-now-like-everything-else-theyre-all-about-standing-out.

7. Design needs a different agreement with business

The question about business is the question about metrics of success. Ellen Lupton provided a realistic perspective about design implementation noting that, "the forces that drive product development range from the short-term economic interests of manufacturers to the expressive or theoretical intent of designers to a community's entrenched habits and customs. Sometimes things look the way they do because that's the cheapest and fastest way to make them, sometimes because that's how the designer or client chose to express a personal vision or creative impulse, sometimes because that's how things have always been."[39] Moreover, current business practices in digital health contexts measure success by increased adoption of digital products and revenue streams.[40]

This aspiration for growth conflicts with the complexity of design processes that follow some of the implications outlined. Funders tend to believe that participatory processes are hard to measure, take more time, are difficult to tie to a budget, among other barriers.[41] On the other hand, by ascribing to fast-paced business practices, design teams risk prioritizing profit over patient-centeredness, especially in instances where the needs of patients and the desires of investors are not aligned, or if certain patients are not considered to constitute a profitable consumer base.[42]A commitment to end oppression through design necessitates a consideration of design and business outside of growth models, placing the quality of knowledge and experiences of users as the metric for success. Instead of focusing on goals based on technology deployment and market adoption, design interventions can be framed as open-ended, continuously improved processes, based on the understanding of the consequences of design decisions in contexts that are treated as emergent and fluid, instead of fixed and predictable. Consequently, designing

39 Ellen Lupton, "Designing for people," in Carpentier, Thomas, and Tiffany Lambert. *Beautiful Users: Designing for People*, Chronicle Books (2014), 21.

40 Krishnamurti et al., "A framework for Femtech: guiding principles for developing digital reproductive health tools in the United States," 2.

41 See the report, "National Academies of Sciences, Engineering, and Medicine 2022. Improving Representation in Clinical Trials and Research: Building Research Equity for Women and Underrepresented Groups, (Washington, DC: The National Academies Press), https://doi.org/10.17226/26479.

42 Krishnamurti et al., "A framework for Femtech: guiding principles for developing digital reproductive health tools in the United States," 8.

FemTech applications requires the adoption of reflection processes where teams revisit their intentions and check on their alignment to values and justice frameworks, especially when the commercialization of technology will require strategic decisions on these areas.

Lessons for Designing Digital Health Applications

Period tracking apps are the landmark innovation in FemTech. Despite their business success, these apps function under incorrect assumptions of the needs and desires of people who menstruate. Moreover, the rhetoric and visual narratives in FemTech are instruments to exercise power and control over people, complicating the ways that communities of women and people who menstruate can advance work towards bodily autonomy and gender equality.

FemTech is more than a technological trend, and design teams must understand this industry in its social and political complexity in order to develop "situated" design practices that are inclusive of the lived and embodied experiences of users, and intentionally avoid the replication of health inequity through technology. The seven implications outlined in this chapter serve as opportunities for designers and design teams to direct technology development towards a health-equity conscious space.

The FemTech industry is one of many niches in the digital health market that harvest patient data for economic interests. Concern about the privacy of medical records is abundant in the field of medical computing, having patients becoming increasingly vulnerable to targeted advertisement and multiple forms of discrimination. The need to rethink healthcare applications and models that are sustainable in non-exploitative ways is urgent. It is also urgent to reconsider design as a strategic force in shaping innovations that are aligned to justice frameworks in order to create a social model of healthcare that can benefit all people.