Designing for Secondary Users of Intimate Technologies

Alejandra *Gómez Ortega*[1]
alejandra@dsv.su.se

Nadia *Campo Woytuk*[2]
nadiacw@kth.se

Joo Young *Park*[2]
jooyoung@kth.se

Anupriya *Tuli*[2]
anupriya@kth.se

Deepika *Yadav*[2]
deepikay@kth.se

Marianela *Ciolfi Felice*[2]
ciolfi@kth.se

Madeline *Balaam*[2]
balaam@kth.se

Airi *Lampinen*[1]
airi@dsv.su.se

[1]Stockholm University, [2]KTH Royal Institute of Technology, Stockholm, Sweden

ABSTRACT

Digital contraceptives are intimate technologies that support their users, and their partners, in preventing pregnancy. These technologies rely on basal body temperature data to predict ovulation and calculate a fertile window, where there is a risk of pregnancy if partners have unprotected sex. Although their use is shared and relational, these technologies are mainly designed for a primary user — the person who can become pregnant. We turn our attention to secondary users of digital contraception (i.e., sexual partners), specifically, Natural Cycles. We investigate how secondary users are designed for and how primary users imagine them to be. We contribute empirical insights on how secondary users are and are not involved in digital contraception and conclude with three design proposals describing how digital contraception tools could be designed to involve secondary users. We discuss how designing for secondary users of intimate technologies requires balancing their potential as co-users and adversaries.

Authors Keywords

Intimate Technology; Digital Contraception; Fertility Data; Personal Data; Secondary Users;

CSS Concepts

• Human-centered computing~Empirical studies in interaction design.

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SECONDARY USERS OF DIGITAL TECHNOLOGIES

Digital technologies are increasingly designed to interact with intimate parts of the body [1, 2, 3] and intimate bodily processes [4, 5], and they mediate intimate relationships [6, 7]. These intimate technologies, in turn, collect, generate, store, and share intimate data [8, 9]. For instance, a smart vibrator collects sensor data from the pelvic floor during use, with the promise of *"better orgasms, better intimacy, and better sexual health"* [10], a connected voice assistant placed in a bedroom collects intimate data about what happens within [11]. Most intimate technologies are designed for individual users, yet their use is often shared and relational. A smart vibrator can be used individually or with partners who might apply force or control the vibration settings [12]— thus influencing the data. The intimate data collected, generated, stored, and shared by these technologies are also relational — they are often produced by or involve more than one person [11, 13, 14, 15, 16, 17]. A connected voice assistant, although configured for a primary user, can be used by and collects data from more than one person in the room [11].

We focus on digital technologies for contraception. These technologies predominantly rely on basal body temperature data diligently measured and inputted by a primary user (e.g., Natural Cycles [18], Daysy [19]) or sensed automatically by sensors embedded in wearable devices (e.g., Oura Ring [20] and Apple Watch [21] integrated with Natural Cycles) and vaginal

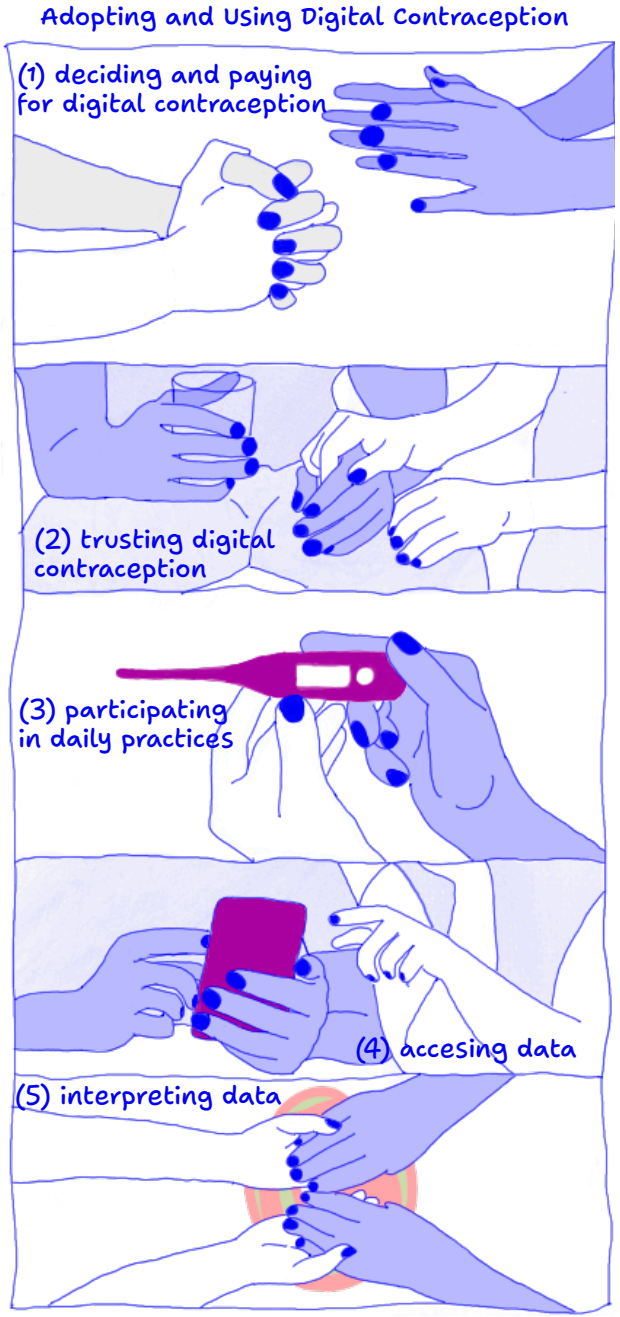
thermometers (e.g., Trackle [22]) to determine whether the primary user is fertile (i.e., approaching ovulation). Due to hormonal fluctuations during the menstrual cycle, basal body temperature rises after ovulation [23, 24, 25]. Thus, digital contraception technologies use proprietary algorithms to identify these temperature increases, predict ovulation, and estimate a *"fertile window"* [25] where there is a risk of pregnancy.

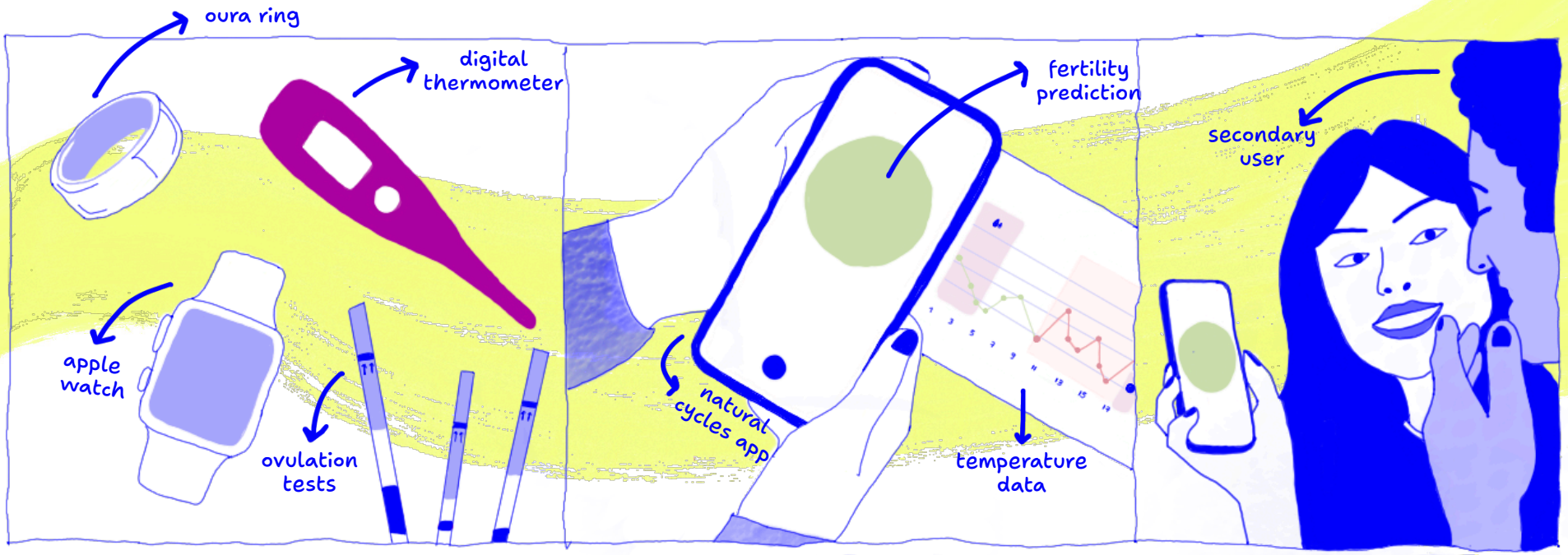
Although contraception is a relational practice involving at least two people engaging in sexual activity, it has historically focused on the bodies of women and people who can become pregnant [26], leading to an unequal distribution of labor and responsibilities between partners. Prior research notes that responsibility for contraception (e.g., birth control pill, intrauterine devices) mostly lies with the partner who can become pregnant, who frequently wishes their efforts were shared or at least acknowledged. Meanwhile, their partners often perceive their involvement as intrusive or a sign of distrust [27, 28]. The *"digital"* aspect of digital contraception technologies means they have more readily the potential to become a shared endeavor; they are not a pill that a person should swallow or a device that a person should insert in their uterus. Yet, these technologies echo the historical focus of contraception and the individual nature of personal informatics [13, 29]. They are predominantly designed for one user — the person who can become pregnant — perpetuating existing unequal distributions of contraceptive labor while simultaneously datafying the bodies of women and people who can become pregnant and potentially exposing them to intimate surveillance and harm [30].

In recent years, Human-Computer Interaction (HCI) and Interaction Design scholars have turned their attention towards intimate technologies (e.g., [6, 5, 7, 31]) and have raised critical questions about how these technologies influence people's relationships with their bodies and partners. Costa Figueiredo et al., [32] explored the use of Artificial Intelligence to assist users in interpreting their fertility data and recommendations. Homewood et al., [31, 33] designed Ovum to pose contraception as a shared practice between two partners. Focusing on Natural Cycles, Ciolfi Felice et al.'s. [3] analysis of users' reviews revealed that its interactivity supported primary users in learning about their menstrual cycle and afforded opportunities for collaboration between intimate partners. They found how the shared use either facilitated sharing the burden of contraceptive practices or highlighted single-sided responsibilities. Park et al., [34] surfaced and discussed some of the awkwardness and tensions that digital contraceptives can create in relationships. Lampinen et al., [35] conducted a large-scale qualitative study on the adoption and use of Natural Cycles, the development of trust between primary users and their partners, and the involvement of partners (i.e., secondary users) in daily digital contraception practices.

We turn our attention to secondary users of digital contraception, how they are imagined to be, and how they could be accounted for through design. We focus on Natural Cycles, the first software application to be certified by the European Union and cleared by the Food and Drug Administration in the United States to market itself as a medical device for contraception [36, 37]. We investigate: **Who is being addressed as a Natural Cycles (secondary) user? How are they imagined to be?** To do so, we build upon a qualitative dataset containing interviews with 133 primary users of Natural Cycles [38], where we explore primary users' accounts of secondary users' engagement with the app and involvement in the process of adopting and using digital contraception.

We contribute empirical insights, through playful imaginaries, on how secondary users are and are not involved in the decision to start using a digital contraceptive, as well as their involvement and lack of involvement in day-to-day practices. We start delimiting the design space for secondary users of intimate technologies through three design proposals describing how digital contraception tools could be designed to involve secondary users as potential co-users and adversaries.





NATURAL CYCLES AS A DIGITAL CONTRACEPTIVE

Natural Cycles is a subscription-based service with annual and monthly payment options. It comprises a mobile app used in combination with a two-digit digital thermometer, the Oura Ring, or the Apple Watch. It uses an algorithm to process menstruation dates, and basal body temperature data and predict the day on which a person might ovulate and, consequently, when they are fertile. It can be used as a digital contraceptive and pregnancy planner. We focus on Natural Cycles as a digital contraceptive, advertised as a hormone-free alternative [38].

The daily use of Natural Cycles requires consistent data generation by its primary users. They are recommended to measure and input their temperature data at least five days a week [39] and, if they are using the basal thermometer, to maintain a regular sleep routine that allows them to measure around the same time every day after the same amount of sleep [40]. Additionally, primary users are able to augment their data with ovulation tests and exclude their temperature data from the app when sleeping differently, feeling hungover, or feeling ill to avoid introducing variation to the algorithm [40]. Natural Cycles predicts fertility data in terms of **red days** and **green days**. Red days indicate that the primary user might be fertile. Thus, the app recommends them to use protection (e.g., condoms) or abstain from vaginal intercourse. Green days indicate that the primary user is not fertile. Thus, no other additional protection is recommended. Red and green days are updated based on the data that is inputted. Note that Natural Cycles states that the *"more temperatures you [users] enter, the better the Green Day ratio is likely to be"* [41]. Users are advised to check their fertility status each day and not rely on previous predictions [42]

The Natural Cycles Partner View

Natural Cycles allows primary users to share their fertility data with their sexual partners (i.e., secondary users) through the Partner View. Secondary users can access primary users' fertility status from this instance of the app on their phones. By default, secondary users have access to the following information: (1) red and green days, (2) ovulation status, (3) predictions, (4) added temperatures and the reason for excluded temperatures, and (5) period and spotting entries [43]. Primary users can choose to share additional data.

Secondary users can choose to receive notifications for the first green day, the first red day, if their partner's period or PMS is approaching, and when it is time for their partners to take an ovulation test or do a self-breast exam. Primary users can disable the partner view at any time. In this case, secondary users will be logged out of their partner view accounts.

Natural Cycles also invites secondary users to learn more about *"your partner, Natural Cycles, or women's health in general"* [44] through curated resources on the app, their Cyclematters blog [45], or their Cyclerpedia [46]. They include various resources, including *"What is the menstrual cycle?"* and *"What are the fertile days in the menstrual cycle?"*

METHOD

We analyzed a large-scale qualitative dataset [38] containing the transcripts of semi-structured interviews with 133 primary users of Natural Cycles who had been using it for at least 6 months as a digital contraceptive. The interviews were conducted between 2021 and 2023. During this time, Natural Cycles launched the Partner View mode and deployed its integration with the Oura Ring. The Apple Watch integration was not available when the dataset was produced.

We deliberately choose to focus on the diverse experiences of primary users – those most invested in digital contraception and who have the most to gain or lose from secondary users' involvement. All participants (i.e., primary users) in the dataset reported that they were born female and identified as women. The majority were cohabiting with a partner (59), and considered themselves heterosexual (103), with a significant portion identifying as bisexual (22). The interviews covered the primary user's daily routines and experiences using, trusting, and sharing digital contraception [38]; mentions of secondary users often unfolded naturally in participants' accounts. Moreover, the interviews specifically probed participants' experiences of sharing with secondary users, questions included: *Was anybody else involved in the decision to adopt Natural Cycles? and How (if at all) are your partner(s) involved in using Natural Cycles?* This is both a limitation and a strength of our work, as we don't directly involve secondary users' perspectives but focus on the diverse experiences of primary users, spanning various ages, countries of origin, socioeconomic status, relationship configurations, and a multiplicity of experiences with Natural Cycles [38]. Since there are no templates for what secondary users' involvement should be, and given the intimate, sensitive, and non-reciprocal nature of digital contraception and fertility data, we start from primary users' experiences sharing digital contraception with secondary users and their wishes and concerns around secondary users' involvement. We note involving secondary users directly as an opportunity for future research.

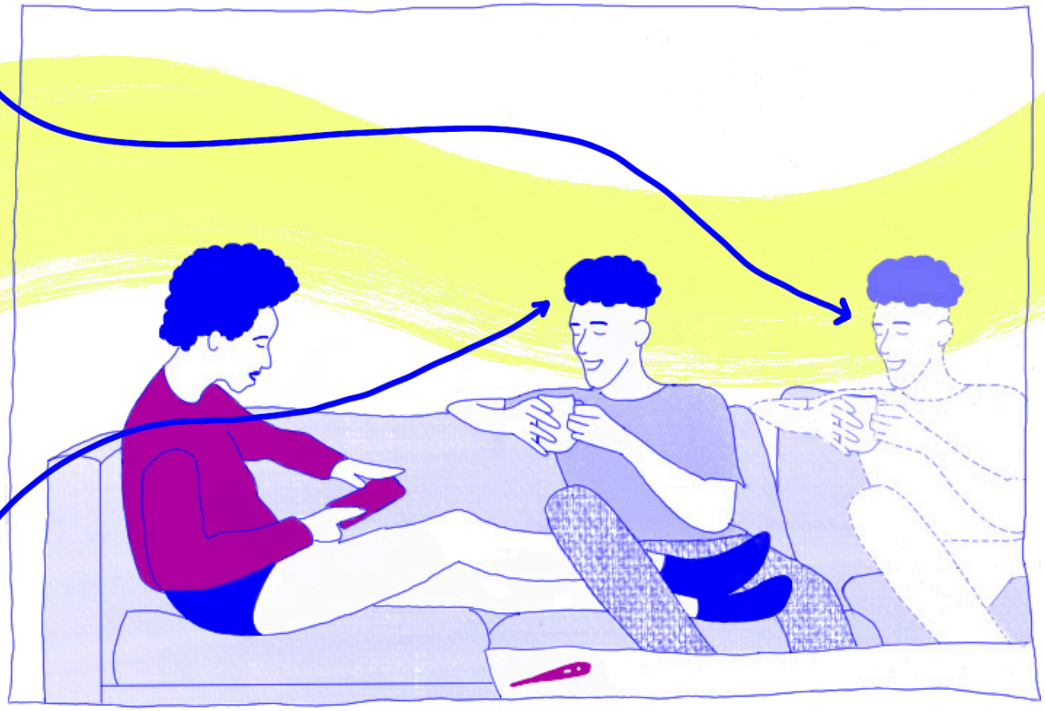
We inductively coded the entire dataset [48], focusing on secondary users as described and imagined by primary users throughout the interviews. Specifically, we address two research questions: **Who is being addressed as a Natural Cycles (secondary) user? How are they imagined to be?** We leveraged Atlas.TI and physical materials (e.g., post-its) to support the process. We clustered the codes into imaginaries, playful representations of different types of secondary users that could exist and do not exist [49, 50, 51]. The imaginaries capture patterns in the data around the attitudes, characteristics, and experiences of different types of secondary users and embed our interpretations of the data. In creating the imaginaries, we combine textual descriptions, quotes from the interviews and illustrations to articulate the qualities and expressions of the relationships and situations where primary and secondary users could be and are imagined to be.

In the following, we present multiple **imaginaries of secondary users of digital contraception throughout the various stages of adopting and using digital contraception**: (1) deciding and paying for digital contraception, (2) trusting digital contraception, (3) participating in daily practices, (4) accessing data, and (5) interpreting data. We introduce each stage with a ***"who"*** question that we answer by illustrating the imaginaries of secondary users, emphasizing divergence in primary user's preferences and experiences. These are not exhaustive categories but playful ways to illustrate different behaviors and expectations captured in the data. **Many of them overlap and blur together: secondary users can play multiple roles and dynamically switch between them.** The imaginaries are composed of illustrations and quotes from the dataset, describing secondary users that may exist as well as the expectations and concerns around secondary users' potential involvement.

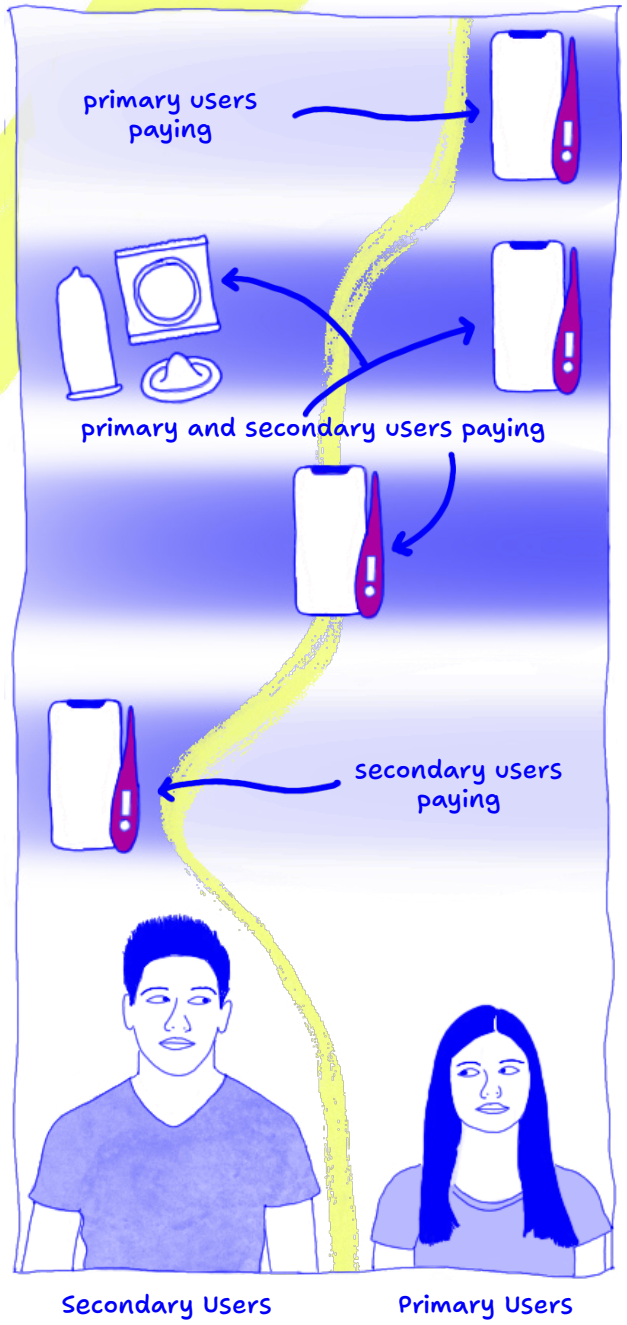
WHO DECIDES AND PAYS FOR DIGITAL CONTRACEPTION?

Digital contraception is imagined to be either a personal decision and a service for individual use, or a relational practice involving more than one person, where secondary users (are expected to) play a role.

THE SILENT-PARTNER: Uninterested and uninvolved secondary users. They are not involved in the decision to use digital contraceptives, sometimes at the initiative of their partners. They are informed and thus aware but not involved or necessarily on board with the decision, *"I mean, I'm married, I have a husband. I did tell him about it, but he doesn't participate in my choices in that way. I guess it's about me, it's my choice."* (P065). Similarly, they are not expected to contribute to paying for digital contraception.



THE ALWAYS-THERE: Involved and co-responsible secondary users. Primary users see digital contraception as a *"shared responsibility"* (P100) and are involved in the decision to use digital contraceptives in various ways, from participating in a conversation *"to make sure it was a decision that suited our relationship"* (P021) to conducting extensive research to support a joint decision. They are expected to contribute to paying for digital contraception, *"it is securing both of us, so we are splitting the cost"* (P062), or contraception as a whole, including other products and services such as condoms.



WHO TRUSTS DIGITAL CONTRACEPTION?

As indirect users of digital contraception, secondary users are imagined to engage with and develop trust in the system and its predictions.

THE DO-YOUR-OWN-RESEARCH

Secondary users who trust digital contraception through research. They support their partners in their decision to start using digital contraception, but don't fully trust it until they have developed an understanding of digital contraception through their own research.

"He looked online and he read studies around the women's cycle, how you can track it, and some of the kind of methods that have been used. And, in fact, it was quite interesting because after the study, he was like: Oh my God, you can never go in the pill again." (P011)

THE YOU-LEAD

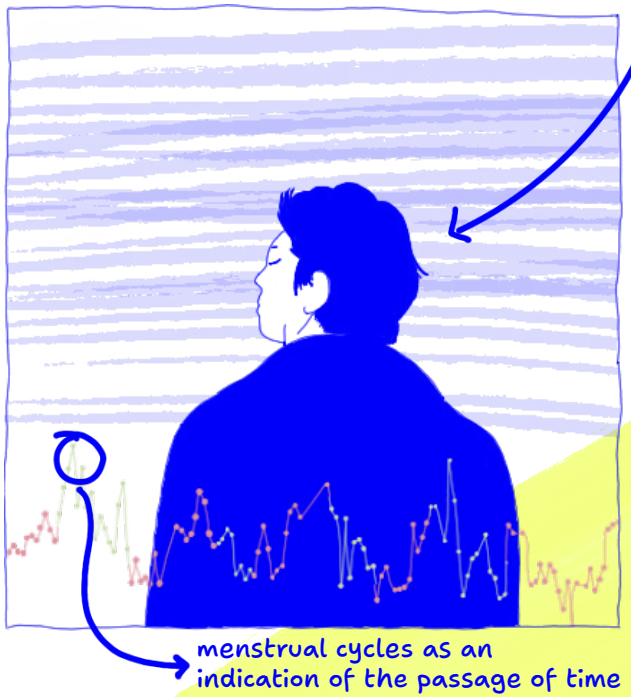
Secondary users who trust their partners, and that is enough to trust digital contraception. They agree with their partner's motivation for trying a digital contraceptive and trust that the primary users know what they are doing and will do it diligently.

"I've had the same partner the whole time I've been using Natural Cycles, and they were really understanding and willing to trust me to input the data and trusted that I had done the research on, you know, this is a legitimate thing." (P129)

THE IT-TAKES-TIME

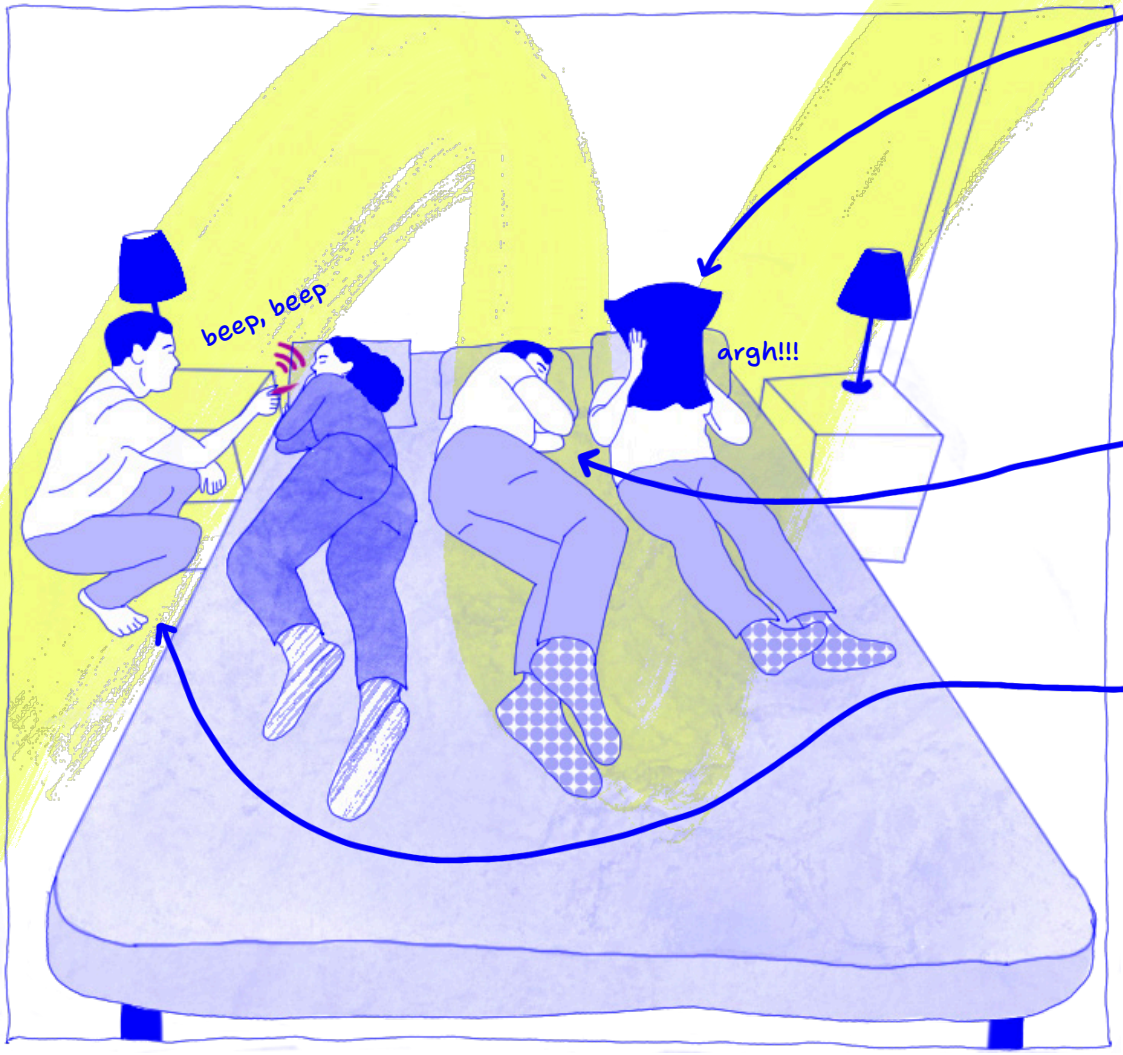
Secondary users who come to trust digital contraception over time. They develop trust through gaining experience of the use of digital contraception, over time becoming convinced of the accuracy of predictions and its effectiveness as a tool for contraception.

"My partner had more doubts about it, and it took some time. We had several months where he was not into it [having unprotected sex], but after a while, he started getting into it, and then some months went by. Now he is a fan of NC [laughs]." (P056)



WHO PARTICIPATES IN DAILY DIGITAL CONTRACEPTION PRACTICES?

Start and end dates of menstruation, daily temperature logs and self-reported occurrences of events that might cause temperature deviations are the core data fed into algorithms for digital contraception. Although the relevant data comes from the primary user's body, the secondary user's involvement in data generation can vary.



THE PLEASEEE DON'T: Secondary users who are not involved but disturbed and annoyed. They share a room or a bed with primary users and are woken up by an alarm, bed light, or the noise emitted by the thermometer. These devices aid primary users in maintaining a routine and recording their temperature. Secondary users can influence and impede data availability as primary users might want to avoid taking their temperature to avoid disturbing others.

"And honestly, if it could have a flash of light or not a beep at all, that would be ideal because it wakes my boyfriend up and like he hates it. And I feel like sometimes that puts me off measuring." (P060)

THE SLEEPY: Secondary users who are not involved nor disturbed. They are not expected to support or assist with digital contraception practices. For instance, when discussing whether her partner tried to remind her about taking her temperature, P003 replied with a resounding: *"No, it's my business."* These secondary users don't contribute to data generation nor influence data availability.

THE CO-TRACKER: Secondary users who are involved and facilitate data generation. They remind primary users to measure their temperature, come up with strategies to facilitate measuring the temperature, or assist them in measuring their temperature. These secondary users contribute to data generation and facilitate data availability. In some cases, their contribution stems from the primary users' intention to distribute participation and labor in contraception:

"I've asked my partner to help me with the temperature. He has the thermometer on top of his alarm. When the alarm goes off, he gives me the thermometer, and I put it under my tongue. (...) Because I ended up always doing it myself, and I said, you have to participate." (P100)

WHO HAS ACCESS TO DIGITAL CONTRACEPTION DATA?

Fertility information, while derived primarily from one user and one body, influences more than one person and more than one body. It is communicated and shared in different ways and moments between primary and secondary users.

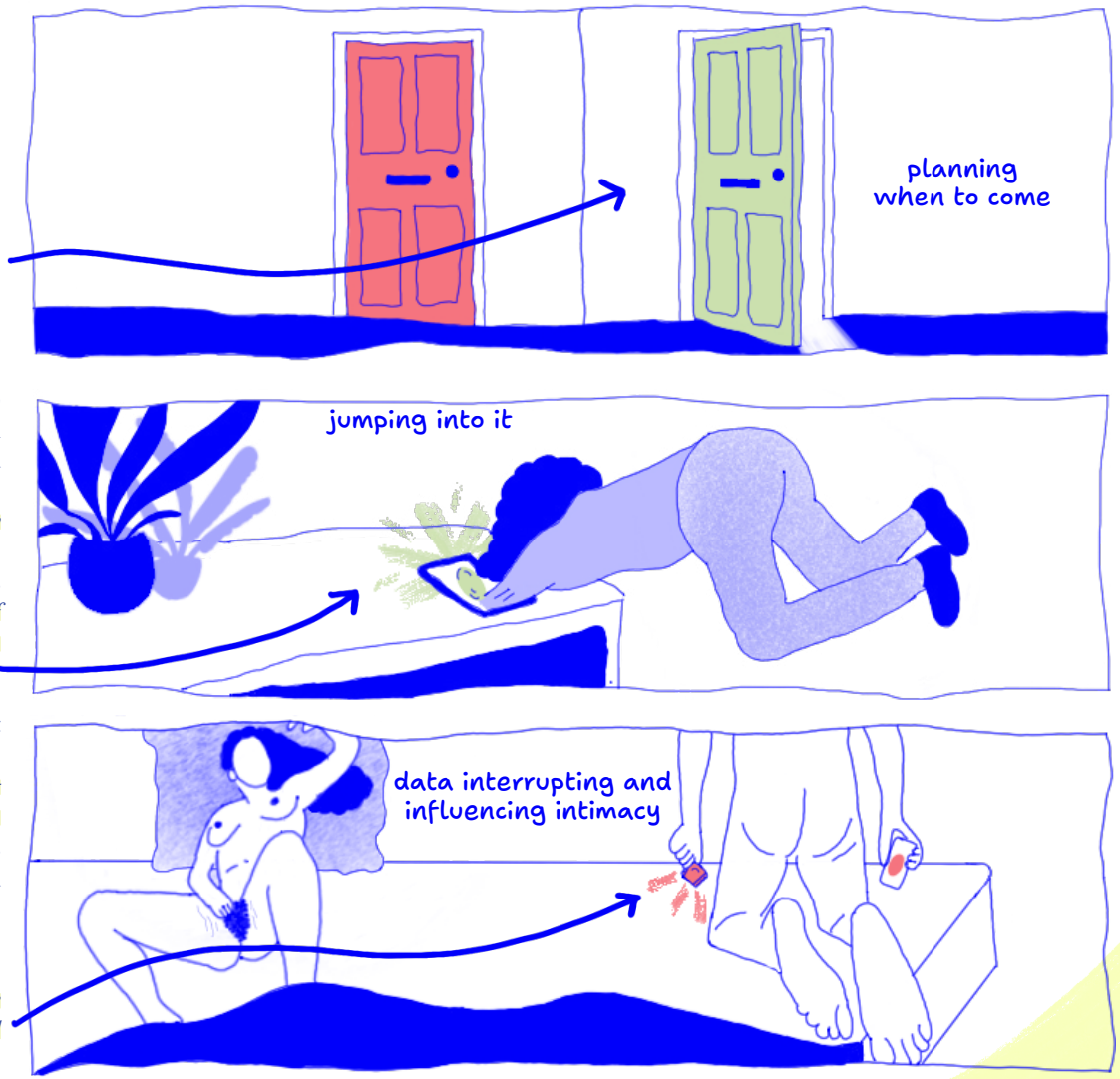
THE MASTER-PLANNER: Secondary users who access past and future data (i.e., predictions) to plan sexual encounters and anticipate their contraception needs on a given day or time. For instance, this may be planning for the most exciting and desirable sex (i.e., unprotected sex on a green day).

"He lives two hours away. So it's more like I have to let him know what's going on when he comes around. So he's like, oh, what's happening this week? Because I'm down this week or whatever. It sounds awful, but yeah, so he always knows when I'm on my period because he knows that just before my period I'm normally on a green day" (P005)

THE FOREPLAYER: Secondary users who access data on the day to preface sex and engage with data to nurture anticipation, arousal and desire for sexual activity. For them, accessing data enables a shared understanding of where their partners are in their cycle and a shared responsibility for green or red days, *"he also becomes responsible to know whether or not we need to use protection"* (P050). Additionally, it prefaces the type of sex partners are going to have on a given day and creates excitement. *"So, my husband is older than me and I guess just it's sort of a game. Like I show him the green screen and 'yay date night' or something. So, I think there is more intimacy, actually."* (P097)

THE WAIT-A-MINUTE: Secondary users who access data on the spot when they and their partners want to confirm if it is a green or a red day right before, and sometimes during, sexual activity. *"We're going to have sex, he's like, oh, it's a green day or a red day? And I'm like, oh shit, I don't know. Grab my phone, have a look" (P060)*. Data informs whether or not they *"can have sex"* (P040), whether or not they should use alternative contraception, or whether they should withdraw. It somewhat determines or influences their sexual activity.

"He often tends to ask if we're kind of, getting, you know, intimate, he does ask if it is a red day or a green day. So you know, whether we should use a condom or not" (P067).

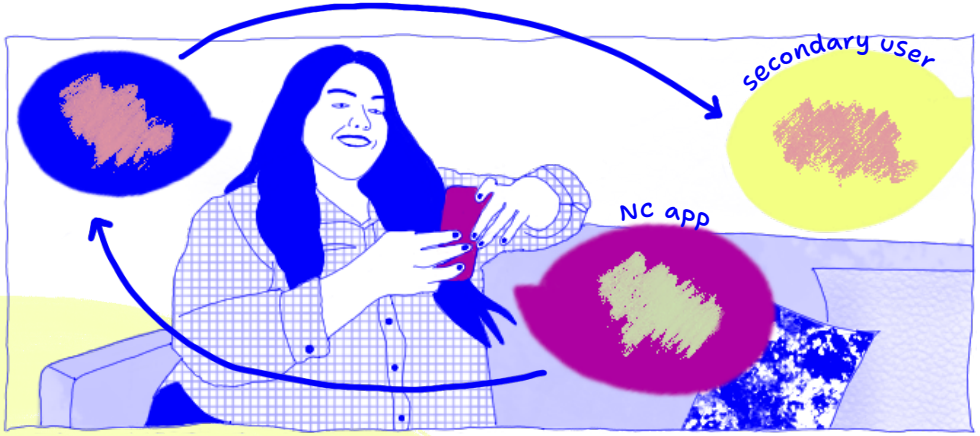


WHO INTERPRETS DIGITAL CONTRACEPTION DATA?

The meaning of fertility information is nuanced and often co-constructed by primary and secondary users. Primary users might opt to exercise power over interpretation.

THE WHATEVER-YOU-SAY: Secondary users rely on data as interpreted by their partners, who communicate it verbally. Primary users, who consider their information a *"private thing"* (P048) and want to control what (not) to disclose, share where they are on their cycle or whether it is a green or red day. Sometimes, they share their own interpretations, such as the last green day being communicated as a red day.

"If it says, the next few days will be red and then, if I'm going to have sex to use protection, I don't ignore that. I take it very seriously. This, between condoms and this app, that is my birth control and condoms are not 100%, you know, perfect birth control in and of itself. Yeah, and so, I trust it pretty good but I do not ignore it. (...) So if I'm nearing red days, if I'm on green days and I'm nearing red days, then I'll be like, no, sorry. I'm not going to risk it just in case there is some variation in my cycle that month." (P127)



a green day is interpreted as a buffer day and it is communicated as a red day to secondary users

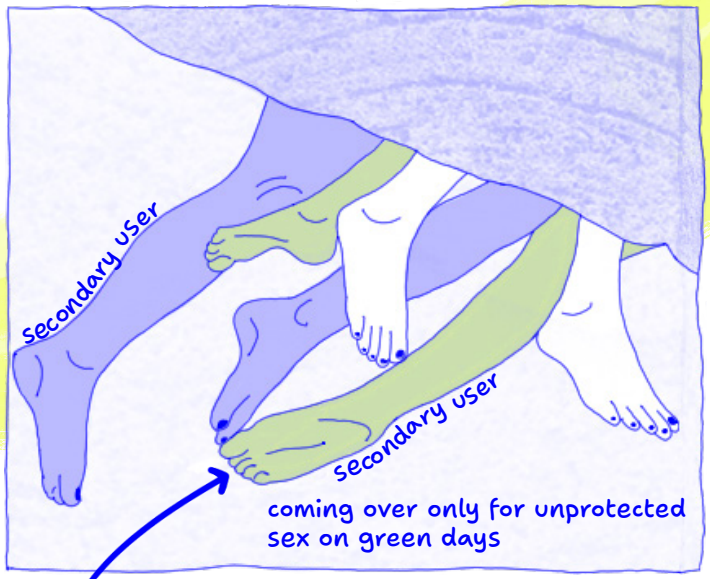
THE OCASSIONALLY-IN-THE-KNOW: Secondary users interpret data with primary users, but only sometimes. For instance, primary users could find something in the data interesting and wish to discuss it with their partners. Participants described sending screenshots to their partners or looking at the app together through the primary user's phone, *"I always showed him with me holding my phone"* (P015). In doing so, they controlled what to disclose and what not to disclose.

THE GHOST: Secondary users (might) interpret the data on their own. Primary users allow and enable them to access their data directly through the Partner View of by having an instance of the app installed in their phones. Still, sometimes they might not access the data, *"he has the Partner View on his phone, he just doesn't use it"* (P068). This helps them not have explicit conversations and still have sufficient information that allows them to care for their partners and act in accordance with their contraception needs.

"He didn't have to constantly ask or constantly feel the need to have to engage with it. He didn't have to ask me and get like third-hand information. He could go in and do the research himself or, like, if he just wanted a little look at how it was going, what days we were on. Makes it easier for spontaneity." (P063)

WHO DO SECONDARY USERS OF DIGITAL CONTRACEPTION BECOME?

The usage and users of digital contraception are dynamic. Users might start using it in contraception mode and change to conception mode after a couple of months or years. Secondary users might change over time as relationships conclude or expand, for instance, by welcoming multiple partners. Secondary users could also become helpful or harmful through the shared use of digital contraception and access to fertility data over time, after a while or multiple years.



THE CO-USER: Secondary users whose participation in digital contraception is helpful and constructive. They support their partners in their daily contraceptive practices. Over time, they are imagined to participate in deeper conversations about the menstrual cycle, contraception, and sex, that allow them to better care for and support their partners, gain knowledge about their partner's menstrual cycle, and gain new sexual habits, including frequently having unprotected sex and more openly discussing sex: "*it did open the door for a more relaxed attitude or like way of using contraception basically in our life, which made it a little bit less stressful about how and when and what, when having intercourse, basically.*" (P059).

"I think it's also just nice if you have a partner who knows, 'she's on day four of her cycle. She would love a bunch of snacks right now' and they just stock up the pantry for you and get you snacks. Or someone who knows, 'she's in a time where she wants more alone time. Maybe if we're hanging out, don't take her on a hike, just do something calm and casual.' Just being mindful of where you're at." (P118)

THE ADVERSARY: Secondary users whose participation in digital contraception is harmful and abusive. They are imagined to potentially abuse or misuse digital contraception tools and fertility data to harm primary users or go against their wishes. For example, this could mean only attending to primary users when they can have the type of sex they prefer. For adversary secondary users, having regular access to primary users' intimate data could facilitate manipulation, for instance, by pressuring primary users to enable the Partner View because it is available and openly advertised by Natural Cycles. Especially given that the *"minimum information"* that primary users can share through the Partner View is a lot of sensitive and intimate information.

"If you were maybe, trying for a pregnancy, they don't want it, maybe they don't want a pregnancy, and this person, like, threatens them with that sort of thing. It's like, I can't articulate a situation, but you could probably even sort of... If you've been in a bad relationship, or anyone who has been in a relationship that's abusive emotionally or physically even, it [Partner View] could definitely have opened up both those opportunities for someone." (P06)

DISCUSSION: DESIGNING FOR SECONDARY USERS OF INTIMATE TECHNOLOGIES

In this pictorial, we introduced imaginaries of secondary users of digital contraception technologies across various moments: from deciding to use digital contraception to the day-to-day practices around it. The imaginaries underline different and contrasting perceptions of what digital contraception should be: (1) an individual practice that stems from a personal decision and is intimate and private (e.g., **the whatever-you-say, the sleepy**), and (2) a relational practice that stems from a shared decision and is distributed (e.g., **the helper, the foreplayer**). In turn, these illustrate how involvement from secondary users is not always desired, the various ways in which secondary users could be involved, and how secondary users' involvement could be potentially helpful but also potentially harmful, especially as abusive partners can easily repurpose tools such as the Natural Cycle's Partner View [44].

Should we then, design for secondary users of intimate technologies? When desired, secondary users' involvement in digital contraception could distribute contraceptive labor (e.g., **the always-there**), facilitate caring and understanding among partners (e.g., **the co-tracker**), and enable diverse and pleasurable sexual encounters (e.g., **the foreplayer**). When not desired, it could hamper data generation (e.g., **the pleaseee-don't**), lead to coercive unprotected sex (e.g., **the master-planner**), and facilitate harm (e.g., **the silent-partner**). How should we design for individual use and mitigating harm, while, at the same time, designing for active involvement and distribution of labor? How should we support transitions between these contrasting modalities as both relationships and secondary users change?

To the extent it is possible, the reconciliation of these tensions requires an interdisciplinary effort, we propose a possible path forward centered on primary users, while acknowledging secondary users simultaneously as potential **co-users** and **adversaries**.

In what follows, we discuss three interaction design proposals that begin to delimit and populate the design space for secondary users of intimate technologies as both **co-users** and **adversaries**. Through these proposals, we want to attend to the multiple imaginaries of secondary users' involvement in contraception. These oscillate between the primary user's own exertion of their reproductive rights and a collaborative, shared endeavor. They offer space for the dynamic transitions of where the secondary users sit within this oscillation over time [34]. Our interaction design proposals aim to anticipate and mitigate potential harms by embodying principles of consent [52, 8, 53] and information boundaries [54, 11, 55] on a conceptual and infrastructural level.

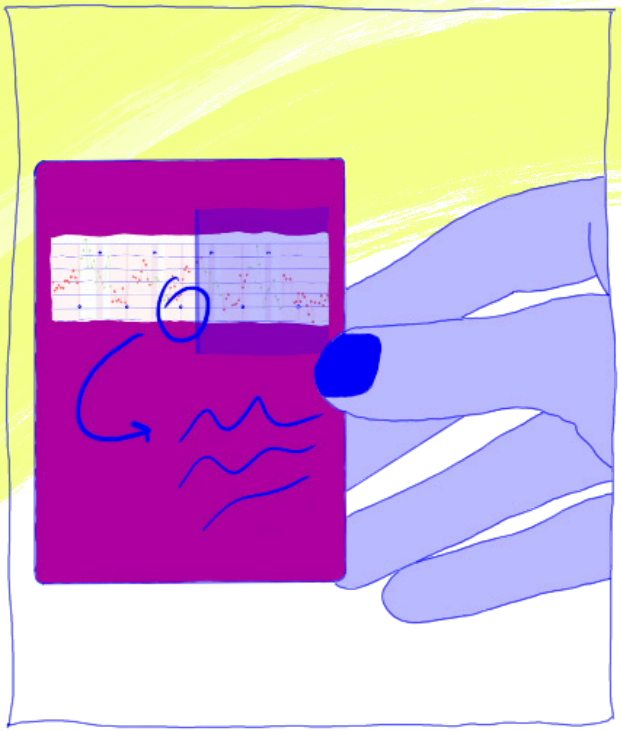
Design Proposal 1: Consensual Data Rituals

The **wait-a-minute** imaginary exemplifies how accessing intimate data can become awkward, reduce spontaneity in sexual relationships, and interrupt intimacy. At the same time, it underlines how digital contraceptive technologies require the continuous disclosure of the primary user's predicted fertility status, i.e., whether it is a green or red day, especially prefacing sexual encounters. Secondary users as **co-users** should be able to access their partner's predicted fertility status and often wish to avoid explicit conversations to encourage spontaneity and care (e.g., **the foreplayer**). Secondary users as **adversaries** should only access their partners' fertility information with their explicit consent, ideally in a co-located setting that allows primary users to retain control. Through *consensual data rituals*, fertility data is only accessed in a co-located setting with the explicit consent of primary and secondary users – data is not accessible unless all partners are physically present in the same space and participating in the ritual. Moreover, data is not accessed through a digital app but communicated through the ritual in the space where it occurs. The ritual is embodied by a lamp that displays the primary user's fertility data as a green or red light only when being simultaneously touched with both hands by primary and secondary users. Flemings et al. [56] propose a similar ambient and abstract light-based representation of basal body temperature data for primary users.

Design Proposal 2: Narrative Data Prompts

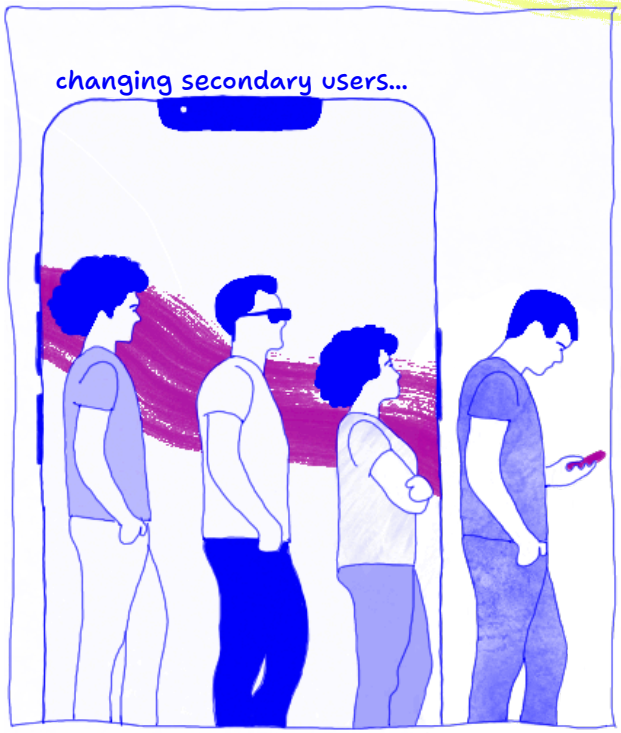
The **co-user** imaginary describes how secondary users could better care for their partners throughout the menstrual cycle by engaging in deeper conversations about *their* menstrual cycle and learning about it. However, primary users often facilitated knowledge acquisition or initiated conversations (e.g., the **occasionally-in-the-know**), further contributing to an unequal distribution of labor and responsibilities regarding contraception. Secondary users, as **co-users**, should be encouraged to initiate these conversations. Secondary users, as **adversaries**, should only be invited to these conversations by their partners if and when they wish to do so. The *narrative data prompts* are a way for primary users to indirectly invite secondary users to initiate conversations about the menstrual cycle, fertility, contraception, and sex. They include partial

representations of primary user's data as a starting point for crafting a story or posing a question that can only continue with the involvement of and discussion with primary users. Primary users can choose what data to partially disclose through the narrative data prompts and when to enable and disable them. Secondary users are unaware of the availability of this feature until invited to partake.



Design Proposal 3: Dynamic Partner Reset

Digital contraception is a long-term project that spans months and even years. Secondary users might change during this time as relationships begin, end, or welcome new partners. With varying partners come varying data-sharing preferences and the wish not to explicitly share one's extended fertility information or sexual history. The *dynamic partner reset* accounts from changing partners and expanding relationships by allowing primary users to configure a new instance of their data with every partner and configure its temporality (i.e., since when to share data) and granularity (i.e., what (types of) data to share). Primary users can simultaneously configure and share multiple instances of the app with varying configurations – this is particularly relevant for bisexual women and people with multiple partners, or a frequent change of partners. Primary users can also decide not to share their data with secondary users. The dynamic partner reset accounts for secondary users, as **co-users**, who wish to have sufficient information to care for their partners and their contraceptive needs. It accounts for **adversaries** by withholding information from them and *"re-setting"* the information that is accessible upon action from primary users, in a subtle way that leaves primary users plausible deniability.



CONCLUSION

This pictorial contributes with imaginaries of secondary users of digital contraception technologies developed through an iterative analysis of a qualitative dataset containing 133 interviews with primary users of Natural Cycles. The imaginaries not only offer empirical insights, but can also serve as prompts for designing with secondary users of intimate technologies. They span through the various stages of adopting and using digital contraceptive technologies and informed three interaction design proposals describing how digital contraception technologies could be designed to involve secondary users as potential co-cyclers and adversaries. We recognize that the imaginaries were constructed through the narratives of primary users and emphasize the need for future work that explores and incorporates the perspectives and experiences of secondary users directly. The interaction design proposals above illustrate how designing for secondary users of intimate technologies is still, partially, designing for primary users, and requires broadening the design considerations applied when designing for primary users. It encompasses critical considerations around dynamic consent, the disclosure of sensitive and intimate information, and how boundaries should be supported and enabled through design. Especially as the uses and users of intimate technologies change over time. **We call for continuing to imagine who secondary users of intimate technologies might be and how we could design for the tensions they raise as we consider them simultaneously and dynamically both co-users and adversaries.** We contribute by articulating tensions that emerge when designing for secondary users of intimate technologies and how these require balancing conflicting and dynamic needs, such as the availability and protection of intimate information, or the desire for solitary use and partner involvement over time. With this work, we invite further discussions within the design research and HCI communities around how we, as designers and researchers, can more intentionally acknowledge the shared and relational nature of intimate technologies.

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REFERENCES

[1] N. Campo Woytuk, J. Y. Park, J. Maslik, M. Ciolfi Felice and M. Balaam, "Tactful Feminist Sensing: Designing for Touching Vaginal Fluids," in In Proceedings of the 2023 ACM Designing Interactive Systems Conference (DIS '23). Association for Computing Machinery, New York, NY, USA, 2642–2656. https://doi.org/10.1145/3563657.3595966, 2023.

[2] A. Ståhl, M. Balaam, M. Ciolfi Felice and I. Kaklopoulou, "An Annotated Soma Design Process of the Pelvic Chair.," in In Proceedings of the 2022 ACM Designing Interactive Systems Conference (DIS '22). Association for Computing Machinery, New York, NY, USA, 1921–1933. https://doi.org/10.1145/3532106.3533469, 2022.

[3] M. Ciolfi Felice, M. Søndergaard and M. Balaam, "Analyzing User Reviews of the First Digital Contraceptive: Mixed Methods Study," Journal of Medical Internet Research. https://pubmed.ncbi.nlm.nih.gov/37962925/, vol. 25, no. e47131, 2023.

[4] K. Helms, "Do You Have to Pee? A Design Space for Intimate and Somatic Data.," in In Proceedings of the 2019 on Designing Interactive Systems Conference (DIS '19). Association for Computing Machinery, New York, NY, USA, 1209–1222. https://doi.org/10.1145/3322276.3322290 , 2019.

[5] M. L. Søndergaard, O. K. Afsar, M. Ciolfi Felice, N. Campo Woytuk and M. Balaam, "Designing with Intimate Materials and Movements: Making "Menarche Bits"," in In Proceedings of the 2020 ACM Designing Interactive Systems Conference (DIS '20). Association for Computing Machinery, New York, NY, USA, 587–600. https://doi.org/10.1145/3357236.3395592, 2020.

[6] S. Homewood, H. Bewley and a. L. Boer, "Ovum: Designing for Fertility Tracking as a Shared and Domestic Experience.," in In Proceedings of the 2019 on Designing Interactive Systems Conference (DIS '19). Association for Computing Machinery, New York, NY, USA, 553–565. https://doi.org/10.1145/3322276.3323692, 2019.

[7] R. Leitão, "Anticipating Smart Home Security and Privacy Threats with Survivors of Intimate Partner Abuse.," in In Proceedings of the 2019 on Designing Interactive Systems Conference (DIS '19). Association for Computing Machinery, New York, NY, USA, 527–539. https://doi.org/10.1145/3322276.3322366, 2019.

[8] A. Gómez Ortega, J. Bourgeois and G. Kortuem, "Participation in Data Donation: Co-Creative, Collaborative, and Contributory Engagements with Athletes and their Intimate Data.," in In Proceedings of the 2024 ACM Designing Interactive Systems Conference (DIS '24). Association for Computing Machinery, New York, NY, USA, 2388–2402. https://doi.org/10.1145/3643834.3661503 , 2024.

[9] A. Desjardins and H. R. Biggs, "Data Epics: Embarking on Literary Journeys of Home Internet of Things Data.," in In Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems (CHI '21). Association for Computing Machinery, New York, NY, USA, Article 615, 1–17. https://doi.org/10.1145/3411764.3445241 , 2021.

[10] Lioness, "You Deserve Better: Better Os. Better intimacy. Better sexual health. Improve your orgasms with the Lioness, the award-winning vibrator that puts the power of pleasure in the palm of your hand.," [Online]. Available: https://lioness.io/. [Accessed January 2025].

[11] A. Gómez Ortega, J. Bourgeois and G. Kortuem, "What is Sensitive About (Sensitive) Data? Characterizing Sensitivity and Intimacy with Google Assistant Users.," in In Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems (CHI '23). Association for Computing Machinery, New York, NY, USA, Article 586, 1–16. https://doi.org/10.1145/3544548.3581164, 2023.

[12] Lioness, "Research Lab Technology Delivered Right to your Bedroom," [Online]. Available: https://lioness.io/pages/how-it-works. [Accessed January 2025].

[13] D. A. Epstein, S. B. D. Ji, G. D'Haenens, Z. Li and T. Zhou, "Exploring Design Principles for Sharing of Personal Informatics Data on Ephemeral Social Media," in ACM Hum.-Comput. Interact. 4, CSCW2, Article 95 (October 2020), 24 pages. https://doi.org/10.1145/3415166, 2020.

[14] M. Costa Figueiredo and Y. Chen, “Health Data in Fertility Care: An Ecological Perspective.,” in In Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems (CHI ‘21). Association for Computing Machinery, New York, NY, USA, Article 204, 1–17. https://doi.org/10.1145/3411764.3445189 , 2021.

[15] D. A. Epstein, N. B. Lee, J. H. Kang, E. Agapie, J. Schroeder, L. R. Pina, J. Fogarty, J. A. Kientz and S. Munson, “Examining Menstrual Tracking to Inform the Design of Personal Informatics Tools.,” in In Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems (CHI ‘17). Association for Computing Machinery, New York, NY, USA, 6876–6888. https://doi.org/10.1145/3025453.3025635, 2017.

[16] A. Kurze, A. Bischof, S. Totzauer, M. Storz, M. Eibl, M. Brereton and A. Berger, “Guess the Data: Data Work to Understand How People Make Sense of and Use Simple Sensor Data from Homes.,” in In Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems (CHI ‘20). Association for Computing Machinery, New York, NY, USA, 1–12. https://doi.org/10.1145/3313831.3376273, 2020.

[17] A. Gómez Ortega, H. Morales Ornelas and U. Genç, “Surrendering to Powerlesness: Governing Personal Data Flows in Generative AI,” in In CHI Conference on Human Factors in Computing Systems (CHI ’25), April 26–May 01, 2025. ACM, New York, NY, USA, 18 pages. https://doi.org/10.1145/3706598.3713504, Yokohama, Japan., 2025.

[18] Natural Cycles, “Natural Cycles: Natural Birth Control. No Hormones or Side Effects,” [Online]. Available: https://www.naturalcycles.com/. [Accessed January 2025].

[19] Daysy, “Daysy: Your Personal Fertility Tracker,” [Online]. Available: https://daysy.me/. [Accessed January 2025].

[20] Natural Cycles, “Natural Cycles Birth Control Powered by Oura,” [Online]. Available: https://www.naturalcycles.com/oura. [Accessed January 2025].

[21] Natural Cycles, “Natural Cycles Birth Control Powered by Apple Watch,” [Online]. Available: https://www.naturalcycles.com/apple-watch. [Accessed January 2025].

[22] Trackle, “Trackle - Contraceptive or Getting Pregnant: You Decide!,” [Online]. Available: https://trackle.de/en/. [Accessed January 2025].

[23] H. Su, Y. Yi, T. Wei, T. Chang and C. Cheng, “Detection of ovulation, a review of currently available methods.,” Bioengineering & Translational Medicine, vol. 6, no. 2, 2017.

[24] Y. Uchida and M. Izumizaki, “The use of wearable devices for predicting biphasic basal body temperature to estimate the date of ovulation in women,” Journal of Thermal Biology, vol. 108, no. 103290, 2022.

[25] E. Berglund Scherwitzl, A. Lindén Hirschberg and R. Scherwitzl, “Identification and prediction of the fertile window using NaturalCycles,” The European Journal of Contraception & Reproductive Health Care. https://pubmed.ncbi.nlm.nih.gov/25592280/, vol. 20, no. 5, 2015.

[26] S. Lévesque, A. Toupin and M. & Pugliese, “Contraception: A gendered burden? A mixed methods exploration of experiences around contraception responsibility.,” The Canadian Journal of Human Sexuality. https://doi.org/10.3138/cjhs-2024-0006, vol. 32, no. 2, 2024.

[27] M. Ma, C. H. Kim, K. Hall and J. G. Kim, “It Takes Two to Avoid Pregnancy: Addressing Conflicting Perceptions of Birth Control Pill Responsibility in Romantic Relationships.,” Proc. ACM Hum.-Comput. Interact. 7, CSCW2, Article 282 (October 2023), 27 pages. https://doi.org/10.1145/3610073, 2023.

[28] A. Tuli, S. Singh, R. Narula, N. Kumar and P. Singh, “Rethinking Menstrual Trackers Towards Period-Positive Ecologies.,” in In Proceedings of the 2022 CHI Conference on Human Factors in Computing Systems (CHI ‘22). Association for Computing Machinery, New York, NY, USA, Article 283, 1–20. https://doi.org/10.1145/3491102.3517662, 2022.

[29] D. A. Epstein, C. Caldeira, M. Costa Figueiredo, X. Lu, L. M. Silva, L. Williams, J. Ho Lee, Q. Li, S. Ahuja, Q. Chen, P. Dowlatyari, C. Hilby, S. Sultana, E. V. Eikey and Y. Chen, “Mapping and Taking Stock of the Personal Informatics Literature.,” in Proc. ACM Interact. Mob. Wearable Ubiquitous Technol. 4, 4, Article 126 (December 2020), 38 pages. https://doi.org/10.1145/3432231, 2020.

[30] K. Levy, “Intimate Surveillance,” Idaho Law Review, vol. 51, no. 679, 2014.

[31] S. Homewood, H. Bewley and L. Boer, “Ovum: Designing for Fertility Tracking as a Shared and Domestic Experience.,” in In Proceedings of the 2019 on Designing Interactive Systems Conference (DIS ‘19). Association for Computing Machinery, New York, NY, USA, 553–565. https://doi.org/10.1145/3322276.3323692 , 2019.

[32] M. Costa Figueiredo, E. Ankrah, J. E. Powell, D. A. Epstein and Y. Chen, “Powered by AI: Examining How AI Descriptions Influence Perceptions of Fertility Tracking Applications.,” in Proc. ACM Interact. Mob. Wearable Ubiquitous Technol. 7, 4, Article 154 (December 2023), 24 pages. https://doi.org/10.1145/3631414 , 2023.

[33] S. Homewood, L. Boer and V. Anna, “Designers in White Coats: Deploying Ovum, a Fertility Tracking Device.,” in In Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems (CHI ‘20). Association for Computing Machinery, New York, NY, USA, 1–13. https://doi.org/10.1145/3313831.3376528, 2020.

[34] J. Y. Park, N. Campo Woytuk, D. Yadav, X. Huang, R. Blanco Cardozo, M. Ciolfi Felice, A. Lampinen and M. Balaam, “Ambivalences in Digital Contraception: Designing for Mixed Feelings and Oscillating Relations.,” in In Proceedings of the 2023 ACM Designing Interactive Systems Conference (DIS ‘23). Association for Computing Machinery, New York, NY, USA, 416–430. https://doi.org/10.1145/3563657.3596062, 2023.

[35] A. Lampinen, M. Balaam, D. Yadav, N. Campo Woytuk, M. Ciolfi Felice, J. Y. Park and R. Blanco Cardozo, “Shared Use of Intimate Technology: A Large Scale Qualitative Study on the use of Natural Cycles as a Digital Contraceptive,” in Proc. ACM Hum.-Comput. Interact. 9, 2, Article CSCW166 (April 2025), 32 pages. https://doi.org/10.1145/3711064, 2025.

[36] U.S. Food and Drug Administration, “FDA News Release: FDA allows marketing of first direct-to-consumer app for contraceptive use to prevent pregnancy,” 10 August 2018. [Online]. Available: https://www.fda.gov/news-events/press-announcements/fda-allows-marketing-first-direct-consumer-app-contraceptive-use-prevent-pregnancy. [Accessed January 2025].

[37] Natural Cycles, “What are the certifications behind NC Birth Control?,” [Online]. Available: https://help.naturalcycles.com/hc/en-us/articles/11900935743133-What-are-the-certifications-behind-NC-Birth-Control. [Accessed January 2025].

[38] M. Balaam, A. Lampinen, N. Campo Woytuk, M. Ciolfi Felice and D. Yadav, Trust in Intimate Health Technologies (Version 1) [Dataset] Available via: https://doi.org/10.5878/6y3e-b797, Quality of Government (QoG) Data. KTH Royal Institute of Technology., 2025.

[39] Natural Cycles, “How Effective is Natural Cycles Birth Control?,” [Online]. Available: https://www.naturalcycles.com/how-effective-is-natural-cycles. [Accessed January 2025].

[40] Natural Cycles, “What happens if I sometimes forget to measure?,” [Online]. Available: https://help.naturalcycles.com/hc/en-us/articles/360003317413-What-happens-if-I-sometimes-forget-to-measure. [Accessed January 2025].

[41] Natural Cycles, “When and how should I exclude my temperature from a basal thermometer?,” [Online]. Available: https://help.naturalcycles.com/hc/en-us/articles/360003316673-When-and-how-should-I-exclude-my-temperature-from-a-basal-thermometer. [Accessed January 2025].

[42] Natural Cycles, “How NC° Birth Control works,” [Online]. Available: https://help.naturalcycles.com/hc/en-us/articles/11904213650205-How-NC-Birth-Control-works. [Accessed January 2025].

[43] Natural Cycles, “Can I trust my green days?,” [Online]. Available: https://help.naturalcycles.com/hc/en-us/articles/360019626298-Can-I-trust-my-Green-Days. [Accessed January 2025].

[44] Natural Cycles, “How to use the Natural Cycles Partner View,” [Online]. Available: https://help.naturalcycles.com/hc/en-us/articles/5693163931293-How-to-use-the-Natural-Cycles-Partner-View. [Accessed January 2025].

[45] N. Cycles, “How to use the Natural Cycles Partner View,” [Online]. Available: https://help.naturalcycles.com/hc/en-us/articles/5693163931293-How-to-use-the-Natural-Cycles-Partner-View. [Accessed January 2025].

[46] Natural Cycles, “Cycle Matters: Your carefully curated health library,” [Online]. Available: https://www.naturalcycles.com/cyclematters. [Accessed January 2025].

[47] Natural Cycles, “NC Cyclerpedia: What is the research behind NC° Birth Control?,” [Online]. Available: https://help.naturalcycles.com/hc/en-us/articles/11900649580445-What-is-the-research-behind-NC-Birth-Control. [Accessed January 2025].

[48] V. Braun and V. Clarke, Successful Qualitative Research: A Practical Guide for Beginners, SAGE Publications Ltd, 2013.

[49] A. Desjardins, G. Benabdallah and M. A. Kaneko, “Un/Making Data Imaginaries: The Data Epics.,” in ACM Trans. Comput.-Hum. Interact. 31, 6, Article 83 (December 2024), 38 pages. https://doi.org/10.1145/3685269, 2024.

[50] W. W. Gaver, J. Bowers, A. Boucher, H. Gellerson, S. Pennington, A. Schmidt, A. Steed, N. Villars and B. Walker, “The drift table: designing for ludic engagement.,” in The drift table: designing for ludic engagement. In CHI ‘04 Extended Abstracts on Human Factors in Computing Systems (CHI EA ‘04). Association for Computing Machinery, New York, NY, USA, 885–900. https://doi.org/10.1145/985921.985947, 2004.

[51] G. Benabdallah, M. A. Kaneko and A. Desjardins, “A Notebook of Data Imaginaries.,” in In Proceedings of the 2023 ACM Designing Interactive Systems Conference (DIS ‘23). Association for Computing Machinery, New York, NY, USA, 431–445. https://doi.org/10.1145/3563657.3596025, 2023.

[52] D. Zytko, N. Furlo, B. Carlin and M. Archer, “Computer-Mediated Consent to Sex: The Context of Tinder.,” in Proc. ACM Hum.-Comput. Interact. 5, CSCW1, Article 189 (April 2021), 26 pages. https://doi.org/10.1145/3449288, 2021.

[53] L. Qiwei, F. Lameiro, S. Patel, C. Isaula-Reyes, E. Adar, E. Gilbert and S. Schoenebeck, “Feminist Interaction Techniques: Social Consent Signals to Deter NCIM Screenshots.,” in In Proceedings of the 37th Annual ACM Symposium on User Interface Software and Technology (UIST ‘24). Association for Computing Machinery, New York, NY, USA, Article 28, 1–14. https://doi.org/10.1145/3654777.3676380, 2024.

[54] E. Tseng, M. Sabet, R. Bellini, H. K. Sodhi, T. Ristenpart and N. Dell, “Care Infrastructures for Digital Security in Intimate Partner Violence.,” in In Proceedings of the 2022 CHI Conference on Human Factors in Computing Systems (CHI ‘22). Association for Computing Machinery, New York, NY, USA, Article 123, 1–20. https://doi.org/10.1145/3491102.3502038, 2022.

[55] M. Warner, A. Kitkowska, J. Gibbs, J. F. Maestre and A. Blandford, “Evaluating ‘Prefer not to say’ Around Sensitive Disclosures.,” in In Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems (CHI ‘20). Association for Computing Machinery, New York, NY, USA, 1–13. https://doi.org/10.1145/3313831.3376150, 2020.

[56] M. Flemings, S. Kazmi, R. Pak and O. Shaer, “Crimson Wave: Shedding Light on Menstrual Health,” in In Proceedings of the Twelfth International Conference on Tangible, Embedded, and Embodied Interaction (TEI ‘18). https://doi.org/10.1145/3173225.3173292, 2018.

[57] D. Freed, J. Palmer, D. Minchala, K. Levy, T. Ristenpart and N. Dell, ““A Stalker’s Paradise”: How Intimate Partner Abusers Exploit Technology.,” in In Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems (CHI ‘18). Association for Computing Machinery, New York, NY, USA, Paper 667, 1–13. https://doi.org/10.1145/3173574.3174241, 2018.