

**Designing an Automated Ticketing Service for Improved Efficiency and Usability**

(Technical Paper)

**Banning Period Plastics: The Power of Informed Choice**

(STS Paper)

A Thesis Prospectus Submitted to the  
Faculty of the School of Engineering and Applied Science  
University of Virginia • Charlottesville, Virginia  
In Partial Fulfillment of the Requirements of the Degree  
Bachelor of Science, School of Engineering

**Vi Nguyen**

Fall, 2021

On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

*Vi Nguyen*

*Technical advisor:* Daniel Graham, Department of Computer Science

*Technical writing advisor:* Rosanne Vrugtman, Department of Computer Science

*STS advisor:* Peter Norton, Department of Engineering and Society

## **General research problem: User-centered design**

*How does working directly with users improve the designs of products and services?*

In both engineering and business, user satisfaction is a core goal. Intuitively, involving users during product development would result in greater satisfaction. Research in design processes supports this idea. Buurman (2010) concluded that “iterative, user-centred design . . . instead of the common, technology and market driven one, leads to more useful and usable products.” Thus, understanding how to optimally include users in design is crucial to producing the highest quality products. This strategy can also make waves outside of engineering. Product designs influence people’s everyday lives and decisions. Collectively, products can drive entire economies and societies.

## **Designing an automated ticketing service for improved efficiency and usability**

*How can user involvement in software development processes improve the efficiency and functionality of an online service?*

This research is under the Computer Science department with advisor Daniel Graham. During a past internship, I redesigned an automated ticketing service for improved efficiency, maintainability, and usability. Throughout the process, I worked with the customer service team that received the tickets. Their input set requirements for the service’s functionality. The continuous feedback also helped to identify bugs and iteratively improve the system. I implemented changes to upgrade the system’s servers, simplify the software’s logic, improve the clarity of support tickets generated. These updates provided several benefits, including cheaper server costs, increased speed, and reduced power consumption. The new system also better supports representatives in responding to tickets quickly. Comparing original and redesigned

systems highlights the effect of user-centered design. Specifically, the project focuses on the collaboration of two teams, one technical and one user group, in system design. These results illustrate the benefits of user-centered design when used in a software engineering team at a major company.

### **Banning period plastics: the power of informed choice**

*How have advocates for sustainable menstrual products advanced their agendas in the UK?*

In the UK, advocates have driven several major companies to reduce single-use plastics in their menstrual products. In August 2019, Sainsbury's was first to "remove own-brand plastic tampon applicators" (Sainsbury's, 2019). Since then, three more — Aldi, Superdrug, and Lil-Lets — have followed suit (Daish, n.d.; Daish, 2021b). Other companies have also responded by launching eco-friendly product lines. How have activists achieved such great change in such a short time?

The End Period Plastics movement occupies a unique space in the intersection of sustainability and feminist empowerment. Campaigning on feminine hygiene comes with a major problem — periods are taboo. The transition to widespread, open dialogue takes root in a sister movement for menstrual equality.

The culture of shame and embarrassment surrounding periods disadvantages women who cannot afford menstrual products. Advocacies, including Bloody Good Period and The Cup Effect, combatted this issue by offering free menstrual products and campaigning for legislation to support menstrual equality. In their publicity, they advocate normalizing menstruation as a healthy and natural part of life (Bloody Good Period, 2021; The Cup Effect, 2019). By opening the dialogue on periods, this movement paved the way for the End Period Plastics campaign.

The sparse discussion on menstruation had a major environmental consequence. Most women are unaware that menstrual products contain plastics at all. Schools often provide girls with samples of conventional sanitary products. As a result, women tend to purchase the same products (Peberdy et al., 2019). The absence of plastic-free options at “4 of the 9 main UK retailers” further solidifies this choice (City to Sea, n.d.). Simply starting conversations about periods empowers women to take charge of their menstrual health. These conversations broaden perspectives about options outside of the traditional tampon or pad. Many women may find that a menstrual cup or period underwear better fits their lifestyle and values. The open dialogue helps women make more informed decisions on their menstrual health.

Research illustrates the benefits of informed choice in selecting sanitary products. Mahajan (2019) concludes that if women can choose a product with unbiased and comprehensive information, this “will automatically ensure that cost to women’s health and the environment is minimised.” Many eco-friendly products also benefit users. Tu et al. (2021) note that many women choose sustainable products for their “inherent strengths . . . such as money-saving, convenience, the ability to be combined with other menstrual products, and the ease of observing menstrual blood.” These findings suggest that when women prioritize their own health and well-being, their decisions will inherently be more sustainable. Thus, the missing factor to achieving plastic-free periods is information.

The End Period Plastics movement fills this information void primarily through social media. The movement’s figurehead, Ella Daish, started the #EndPeriodPlastic which raises awareness about the plastic waste that menstrual products produce (Daish, n.d.). Daish shares statistics on the products’ impact and calls women to rethink their periods. The hashtag has been used by thousands, ranging from individuals to lawmakers to corporations (fig. 1).

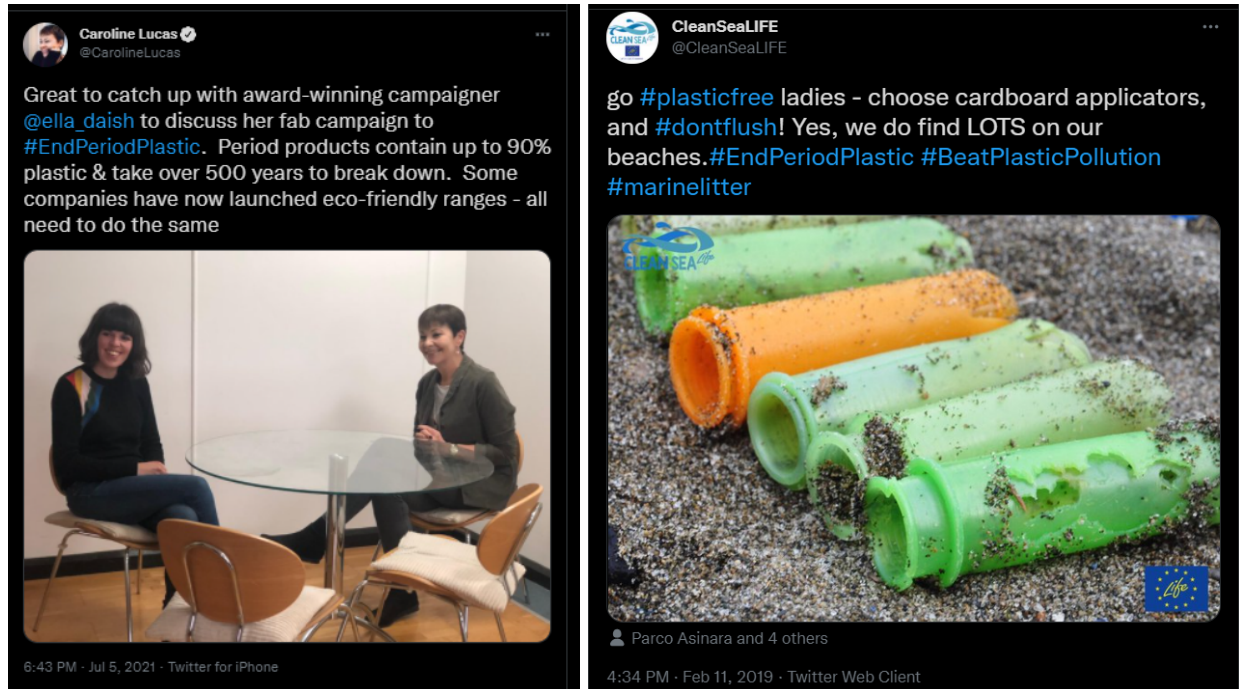


Figure 1. Tweets from British politician Caroline Lucas and organization CleanSeaLife using #EndPeriodPlastic (Lucas, 2021; CleanSeaLIFE, 2019).

The campaign has also garnered support from advocacies. City to Sea is an organization dedicated to reducing plastic pollution. Their Plastic-Free Periods campaign champions the slogan “Better for Your Body, Better for You” (City to Sea, n.d.). They provide media kits to spread awareness online and locally (fig. 2). The campaign also works to ease the transition to sustainable periods, providing information on eco-friendly options and guides for purchasing these products (City to Sea, 2021). Through coupling a call to action with resources to make these changes, activists gain support from women who may otherwise be reluctant.



Figure 2. Images from City to Sea’s Twitter media kit (City to Sea, 2020a; City to Sea 2020b).

These campaigns rapidly spread information by combining social media with word of mouth. Daish (n.d.) encourages starting conversations that will “not only raise awareness and spread the issue to a wider audience but the people closest to us are more likely to listen to what we have to say, especially with a subject like this!” Typical talk about sustainability focuses on a global scale, urging people consider the planet’s greater good. The numbers that #EndPeriodPlastic activists cite have a similar effect. However, they also take advantage of menstruation’s deeply personal nature, achieving greater impact.

Simply promoting sustainability can have the opposite effect. Han and Cheng (2020) concluded that “excessively diffusing pro-environment information on traditional media may make people stressful and reduce pro-environmental behavior.” Instead, interpersonal communication results in the highest adoption of pro-environmental behaviors, and social media strengthens this effect. By blending “characteristics of both interpersonal and mass communication,” social media publicly displays pro-environmental behavior while also encouraging people to scrutinize their own daily lives (Han & Cheng, 2020). This effect is visible in Ella Daish’s success.

Daish’s movement also receives support from several sustainable period companies, including Natracare, WUKA, and DAME. The End Period Plastics movement directly contributes to sales of their organic tampons and pads, menstrual cups, and period panties. In turn, many companies donate their revenue to support activists. Natracare’s 1% for the Planet initiative has given “£330,000 to twenty-five organisations achieving real, positive change” (Natracare, 2021). The companies’ marketing campaigns also increase the movement’s visibility. While most women view periods as a painful inconvenience, advertisements show an idealized

version of menstruation as sustainable, clean, and healthy. This imagery both destigmatizes periods and promotes eco-friendly period products as a new standard. The visuals strongly emphasize body positivity, encouraging women to choose sustainable products out of self-love and appreciation of nature, not guilt (fig, 3).

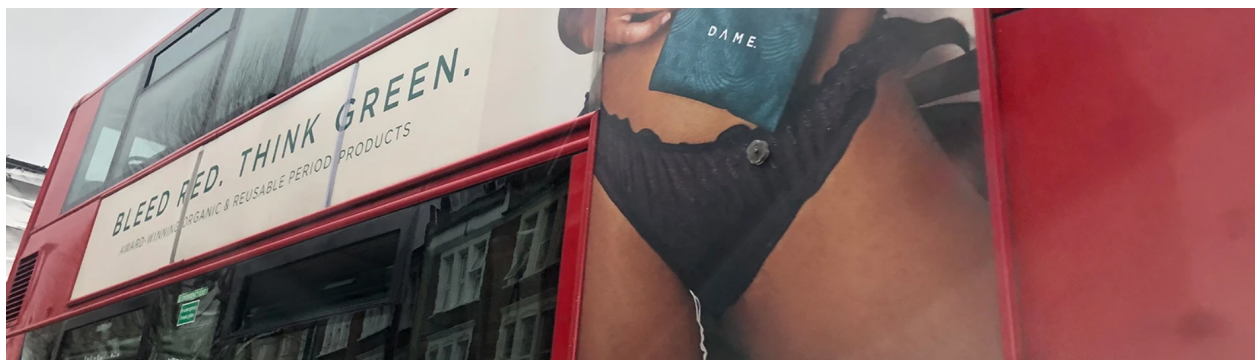


Figure 3. Advertisement by DAME on a UK bus (DAME, n.d.).

This strong support from social media, organized groups, and sustainable period brands allowed activists to more aggressively target specific big-brand companies. Ella Daish encouraged followers to directly pressure companies by tweeting, writing letters, and signing petitions. Her petition to “Make all Menstrual Products Plastic Free” has gained over 245,000 signatures. Daish also met with company representatives to open a dialogue between businesses and the women that use their products (Daish, 2021a). Several companies announced plastic bans shortly after these meetings. Lil-Lets explains, “We listened when our customers had concerns about the environmental impact of our plastic applicator products, and, following 12 months of product design and testing, we are thrilled to be in a position to make a difference today” (Smith qtd. in Daish, 2021b). Moving major corporations to take action illustrates the movement’s influence.

Activists’ greatest win came from the Department for Education. In September 2020, the government agency “committed to providing free period products in English secondary schools and colleges” (DAME, 2019). These free products, however, included only conventional

varieties. In response, advocacy groups and sustainable period brands wrote an open letter demanding that “Period products should be given out free-of-charge in schools and they should be plastic-free ... The government has the power to ensure that, for the first time, they can help an entire generation of young people have better periods. We owe this to them, and the planet” (Natracare et. al, 2019). The letter was accompanied by 37,188 signatures and successfully pushed the Department for Education to action. They announced that the contracted menstrual product supplier must offer “environmentally-friendly sanitary pads as a minimum, and are encouraged to provide further environmentally-friendly options (such as menstrual cups or eco-friendly tampons)” (Tribe, 2019). This step was a significant win for the movement. Menstrual education starts in schools, so incorporating sustainability in this education eliminates the lack of information at its source.

The End Period Plastics movement is still ongoing, continuing to target brands like Tampax and Tesco (Daish, 2021a). By leveraging interpersonal connections, social media, and education, activists have made great progress thus far. The movement differs from typical sustainability campaigns due to menstruation’s personal nature, garnering widespread support from women who use the menstrual products that they fight for. Their continued efforts may soon successfully eliminate all plastic from menstrual products in the UK.



## References

- Bloody Good Period. (2021). Bloody Good Period. <https://www.bloodygoodperiod.com/>
- Buurman, R. D. (2010). User-centred design of smart products. *Ergonomics*, 40(10), 1159–1169. <https://doi.org/10.1080/001401397187676>
- City to Sea. (2020a, May 7). *Plastic Free Periods - Twitter 5* [Graphic]. [https://uc22d233e1c9977c102d43fbcf3b.previews.dropboxusercontent.com/p/thumb/ABWOZSaBbdJN2pD4vsk0MYd451JfKLkCmYiU3AfVAQ-ndwqlHy824jTxJc0GF3e5A1vSh7nDosnstp4UAi9zm8GFOp\\_NdA7s-VQWV7oD7pL6dQigVzREMBIZwhG0xvFIZaFVIJB62SHGnVs4ArB9hC4PBfizZ2K03xWVlhp4SZbfZocD2hEAh-vWjvsGkOMcpeUPwkd-J6p5clk4CV3\\_zkyzWBFTCi2Rzqd9T3MPzTSSqW12gdF3dkIUnJvP4baPKI15WDlpfG\\_k73XwIrYe1Zwj44i0jumh2eD1iAJCjrZfpZ-xFUzyDM\\_7zE5rzuAol90y7gkYE\\_-p9DCu0-SzUYAsQGjVLyI8LaBMx718XROywQ/p.png?fv\\_content=true&size\\_mode=5](https://uc22d233e1c9977c102d43fbcf3b.previews.dropboxusercontent.com/p/thumb/ABWOZSaBbdJN2pD4vsk0MYd451JfKLkCmYiU3AfVAQ-ndwqlHy824jTxJc0GF3e5A1vSh7nDosnstp4UAi9zm8GFOp_NdA7s-VQWV7oD7pL6dQigVzREMBIZwhG0xvFIZaFVIJB62SHGnVs4ArB9hC4PBfizZ2K03xWVlhp4SZbfZocD2hEAh-vWjvsGkOMcpeUPwkd-J6p5clk4CV3_zkyzWBFTCi2Rzqd9T3MPzTSSqW12gdF3dkIUnJvP4baPKI15WDlpfG_k73XwIrYe1Zwj44i0jumh2eD1iAJCjrZfpZ-xFUzyDM_7zE5rzuAol90y7gkYE_-p9DCu0-SzUYAsQGjVLyI8LaBMx718XROywQ/p.png?fv_content=true&size_mode=5)
- City to Sea. (2020b, May 7). *Plastic Free Periods - Twitter 6* [Graphic]. [https://ucd683923996b6de1b0c0a02a85a.previews.dropboxusercontent.com/p/thumb/ABVUkdLqpWsFAY3DcIrnpyvdFcjrxxXqvJ1FNsE6C24TBq5AdxsHwP3mlh5\\_Hm5BgCbDodrYCny6U0npzQ-dLk0W2FYr2xEb3xkkZladpURc1wlQWnM9dTRuwIwTYvSZR\\_7f\\_79\\_yEFmqchJckkcgjVfWvhjU18XLY0ApyhChGPL6NqdE9UijG3mlzj4JHohnKbN1xPfkLOaJD6q\\_pORYyOMdkPt2w6m7BNyVoGYeImI\\_Ur3bwsfbZDWsjq8OCS\\_SjbMQAxrUa52LPIX5VAqH2prdACoxymM5MzP8POCKLGIH\\_qghQKVAccMZrq6sil6-EBQsLIBGxBpUYx-teyEwExi70j1ETFAUPDVu7cP4dSy0A/p.png?fv\\_content=true&size\\_mode=5](https://ucd683923996b6de1b0c0a02a85a.previews.dropboxusercontent.com/p/thumb/ABVUkdLqpWsFAY3DcIrnpyvdFcjrxxXqvJ1FNsE6C24TBq5AdxsHwP3mlh5_Hm5BgCbDodrYCny6U0npzQ-dLk0W2FYr2xEb3xkkZladpURc1wlQWnM9dTRuwIwTYvSZR_7f_79_yEFmqchJckkcgjVfWvhjU18XLY0ApyhChGPL6NqdE9UijG3mlzj4JHohnKbN1xPfkLOaJD6q_pORYyOMdkPt2w6m7BNyVoGYeImI_Ur3bwsfbZDWsjq8OCS_SjbMQAxrUa52LPIX5VAqH2prdACoxymM5MzP8POCKLGIH_qghQKVAccMZrq6sil6-EBQsLIBGxBpUYx-teyEwExi70j1ETFAUPDVu7cP4dSy0A/p.png?fv_content=true&size_mode=5)
- City to Sea. (2021, October 5). Plastic-Free Periods. <https://www.citytosea.org.uk/campaign/plastic-free-periods/>
- CleanSeaLIFE [@CleanSeaLIFE]. (2019, February 11). *go #plasticfree ladies - choose cardboard applicators, and #dontflush! Yes, we do find LOTS on our beaches.#EndPeriodPlastic #BeatPlasticPollution #marinelitter* [Tweet]. Twitter. <https://twitter.com/CleanSeaLIFE/status/1095073520974024708>
- Daish, E. (n.d.). #EndPeriodPlastic Campaign. ELLA DAISH. <https://elladaish.com/endperiodplastic-campaign.html>
- Daish, E. (2021a). Make all Menstrual Products Plastic Free. Change.Org. <https://www.change.org/p/make-all-menstrual-products-plastic-free>
- Daish, E. (2021b, September 29). BREAKING NEWS: Lil-Lets Ditch Plastic Applicators & Launch Reusable! *Change.Org*. <https://www.change.org/p/make-all-menstrual-products-plastic-free/u/29662928>
- DAME. (n.d.). DAME. Award-winning sustainable period products. <https://wearedame.co/>

- DAME. (2019, July 15). *Charities, campaigners, and sustainable period brands join forces to demand that free period products in secondary schools should also be plastic-free* [Press release].  
<https://drive.google.com/file/d/1I1kna2FNZd0vUUKuDa8NIaKJWCZWMIaf/view>
- Han, R., & Cheng, Y. (2020). The Influence of Norm Perception on Pro-Environmental Behavior: A Comparison between the Moderating Roles of Traditional Media and Social Media. *International Journal of Environmental Research and Public Health*, 17(19), 7164. <https://doi.org/10.3390/ijerph17197164>
- Lucas, C. [@CarolineLucas]. (2021, July 5). *Great to catch up with award-winning campaigner @ella\_daish to discuss her fab campaign to #EndPeriodPlastic. Period products* [Tweet]. Twitter. <https://twitter.com/CarolineLucas/status/1412180351305371658>
- Mahajan, T. (2019). Imperfect Information in Menstrual Health and the Role of Informed Choice. *Indian Journal of Gender Studies*, 26(1–2), 59–78.  
<https://doi.org/10.1177/0971521518811169>
- Natracare. (2021, August 9). Giving Back. Retrieved October 31, 2021, from  
<https://www.natracare.com/our-story/giving-back/>
- Natracare, WUKA, DAME, City to Sea, Bloody Good Period, Daish, E., & The Cup Effect. (2019, July 15). Plastic-Free schools need plastic-free periods. DAME.  
<https://wearedame.co/pages/open-letter>
- Peberdy, E., Jones, A., & Green, D. (2019). A Study into Public Awareness of the Environmental Impact of Menstrual Products and Product Choice. *Sustainability*, 11(2), 473.  
<https://doi.org/10.3390/su11020473>
- Sainsbury's. (2019, September 17). Removing plastic tampon applicators from stores is our latest step to reduce plastic.  
<https://www.about.sainsburys.co.uk/sustainability/plan-for-better/our-stories/2019/17-09-2019-removing-plastic-tampon-applicators-from-stores>
- The Cup Effect. (2019, August 21). Why Does The Cup Effect Exist.  
<https://www.thecupeffect.org/why-we-exist/>
- Tribe, J. (2019). Plastic-free Schools need Plastic-free Periods. 38 Degrees.  
<https://you.38degrees.org.uk/petitions/plastic-free-schools-need-plastic-free-periods>
- Tu, J. C., Lo, T. Y., & Lai, Y. T. (2021). Women's Cognition and Attitude with Eco-Friendly Menstrual Products by Consumer Lifestyle. *International Journal of Environmental Research and Public Health*, 18(11), 5534. <https://doi.org/10.3390/ijerph18115534>