Thesis Portfolio

Developing a Criteria-Based Evaluation Tool for User Experience Design that Balances Standardization and Creativity
(Technical Report)

The Mental and Physical Effects of High Smartphone Usage and the Design Measures that can be Taken to Mitigate Negative, Unintended Consequences
(STS Research Paper)

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Socio-Technical Synthesis

A design system is a library of visual style elements and components that creators and developers use to ensure a consistent look throughout their designs of platforms, pages, and systems. By definition, design systems are inherently both technical and social, and can drastically improve the look, feel, and functionality of an app. Design systems are increasing in popularity, created to ensure a consistent aesthetic of graphics and interactions in websites and apps, and to guide product development. Due to their often-rigid requirements on structure and uniformity, traditional design systems can discourage creativity and customization. To forge a balance, this work develops a criteria-based evaluation tool, or 'scorecard' for assessing design components that incorporates principles of consistent, standardized practice, yet prioritizes creative freedom. The evaluation scorecard allows inconsistencies to be managed in a collaborative and consensus-based manner. Users select parameters and metrics to evaluate the various elements of a design component. The tool calculates a singular score based on the number of parameters passed and failed. Any scores below team-desired thresholds signal a need for further modification or redesign. Usability feedback using talk-aloud and surveys in a focus group format assess ease of use and efficiency of the tool and identify gaps in functionality. Candy Crush Saga, a mobile game from King Digital Entertainment was used as a case study for this tool. In use, the tool contributes to the reduction of inconsistencies and offers an overall more enjoyable user experience.

An incredibly important aspect of engineering, however, is the ability to reflect on how a creation or design effects both individuals and society as a whole. When engineers are solely and primarily focused on garnering interest and keeping users hooked on their app or creation, measures need to be in place to ensure these engineers and their creations are being checked. More important than the ability to offer positive smartphone experiences is the assurance that the effects of smartphone usage are being evaluated, understood, and mitigated when necessary. Smartphone usage is at all-time high in 2021. Consumers are spending more time behind their screens than ever before. With this high usage comes smartphone dependence, as well as a plethora of other physical and mental consequences. Understanding these consequences and dependence issues is the first step in addressing them. The negative consequences of high smartphone usage don't boil down to any one particular issue. There are a number of factors contributing to the negative physical and mental effects smartphone users experience. However, understanding which factors play the largest roles allows engineers to address these problems. A prime example of this is blue light from phone and computer screens. Scientists and engineers discovered that blue light could cause eye strain and worked to create blue light glasses, screen protectors, and screen color tints.

Not only has smartphone usage increased in the past 10 years, but this usage is projected to continue to increase in the future. The number of smartphone users worldwide is projected to hit 4.3 billion in 2023, a stark increase from 3.4 billion in 2019. With such strong usage around the world, it's more important than ever to understand the physical and mental effects this usage can have. At the end of the day, smartphone giants like Apple and Samsung will always have profit as their top priority. Looking through the lens of responsible innovation offers a new perspective. Responsible innovation is a key idea to consider when evaluating the consequences of high smartphone usage. This theory reinforces the importance of engineers evaluating both the intended and unintended consequences of their ideas, creations, and designs. Additionally, the concepts of negligence and recklessness are valuable when investigating companies' actions. To better understand the implications of high smartphone usage, a survey was distributed to 92 participants. The survey is a 13-question snapshot into how much participants use their smartphones, how they spend time on their smartphones, and the negative side

effects they may or may not experience. Overall findings indicated a strong dependence on smartphone devices and high reports of negative consequences.