9. Constraints

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Definition and Background

Constraints are factors in a situation—related to the technologies, users, and contexts that are being designed for—that help to limit and direct the choices designers make in anticipation of their product's use case. A wide range of factors can function as constraints: Some are technical, some are related to the users, and some are related to the contexts being designed for. The technical or technological constraints are a facet of a technology that "confines [a designer's] ability to achieve [a] desired outcome" (Mettler & Wulf, 2019, p. 249) or a user's ability to interact with that design to achieve the desired outcome. The intended users of a product, and their understandings, abilities, and the situations they will be in, can shape how the designers balance their wants and intentions with the wants/needs of the users and the ways users might interact with the product. The rules, standards, and expectations of the document or design can shape what the designers are able to do and what the users are looking for with that product (see Herijgers & Maat, 2017). All of these constraints should be taken into account as designers make choices about their product and revise it through the design process.

Constraints help designers determine what the technologies and situations they're working in allow, what they require, what they discourage, and what they refuse (Davis & Chouinard, 2017, p. 2), and these constraints help designers make choices that direct users towards an intended use or outcome—or away from unintended ones. Perhaps because of synonyms like "limitations" and "confines," constraints are sometimes seen as a negative aspect of a technology or situation, but thinking about constraints helps designers determine how the product fits within the contexts it is created for, how it fits with the ways users might interact with the product, and how those interactions fit with the designers' intended outcomes (Gabriel-Petit, 2016).

Design Application

One illustration of technological constraints is the limitations set by Twitter for tweets: They are limited to 280 characters; (up to) four images, one video, or a poll; and they can link to pages outside of twitter. With these constraints in mind, writers know exactly what their text can contain. The technological constraints of tweets can also help the writers imagine how their audience will interact with the text, because they know a tweet can really only be ignored, read, liked, retweeted,

or replied to with similar constraints as above. Knowing how users can interact with a text because of these constraints can enable writers to engineer interactions (like encouraging retweets or responses) or limit others (like locking replies). If these constraints fit the use case, then writers can imagine how to design an effective text; if they don't, then writers can begin to select a new medium and work on identifying its constraints.

The use of situational constraints in design can be seen in the concept of "unpleasant design," in which designers implement "processes and tools . . . aimed specifically at making people uncomfortable or interfering with their use of public space" (Savicic & Savic, 2014, p. 3). Unpleasant designs demonstrate how designers can be given constraints that shape their designs, which in turn result in providing constraints that shape how users interact with the design. A standard park bench, for example, allows multiple people to sit down on it or one single person to lay down on it. If designers have been given a situational constraint like encouraging sitting while discouraging sleeping, then they must devise ways to implement constraints that push users towards that intended outcome, like inserting an armrest in the middle of the bench. The situational constraint shapes the design, and the design shapes the interactions: Potential visitors can still sit on the bench, but the arm rest prevents them from laying down on it.

While *affordances* can help designers think about what is offered or encouraged, constraints can help designers determine how to narrow their possibilities and balance what they *want* to do with what they *can*, or *should*, do in a given situation. Thinking about constraints can aid in the processes of **ideation**, by narrowing the choices that are available, and in **iteration**, by highlighting new constraints that need to influence the next design. Thinking about constraints helps designers see how their goals can, or must, be reconciled with the perceived technological and situational limitations they're designing for, and they are one aspect of **critical making** and design thinking.

◼ Pedagogical Integration

To better understand how constraints shape their design choices, students can work both analytically, to identify the constraints that shaped existing documents/designs, or productively, to identify constraints as they create new documents/designs.

To identify the constraints that led to a design, students can be given an existing product and tasked with identifying both how the technologies, users, and contexts shaped it and how the design shapes the ways users interact with it. For example, students can take a tweet from an organization and identify how the constraints have resulted in choices around the verbal and visual elements that were included, or even the medium itself, and they can determine how these technological constraints shape the ways users are able to—or encouraged to—interact with the tweet. Or they can be shown an example of unpleasant design—

like a park bench—and determine the technological constraints that are encouraging and discouraging certain behaviors and what situational constraints may have led to those design choices (like public policies and community standards). After analyzing the constraints that led to a document/design, students can also be asked to make a new iteration of the product that more effectively responds to the constraints of the situation or implements new constraints that result in different user interactions.

To identify and use constraints productively, students can be given a scenario and work to identify the constraints that would lead to an effective design for the situation and users. For example, they might be asked to take on the role of an organization announcing a new product or event, and they can be given constraints like a specific audience and a specific interaction or outcome for that audience. Students can then identify the situational constraints of that audience and outcome, and determine a medium that would be most effective; with the medium in mind, they identify the technological constraints that would affect their text and the technological constraints they can use to encourage their desired outcome. They can also be given new constraints to determine how their design would need to change in order to respond effectively. By negotiating changing aspects of the situation or intended users, students can better understand how the constraints work towards narrowing, directing, and changing their decisions.

■ References and Recommended Readings

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