

User Experience (UX) Capacity-Building: A Conceptual Model and Research Agenda

Craig M. MacDonald

Pratt Institute, School of Information

New York, NY, USA

cmacдона@pratt.edu

ABSTRACT

Many User Experience (UX) practitioners face organizational barriers that limit their ability to influence product decisions. Unfortunately, there is little concrete knowledge about how to systematically overcome these barriers to optimize UX work and foster a stronger organizational UX culture. This paper introduces the concept of User Experience Capacity-Building (UXCB) to describe the process of building, strengthening, and sustaining effective UX practices throughout an organization. Through an integrated literature review of relevant HCI and capacity-building research, this paper defines UXCB and proposes a conceptual model that outlines the conditions, strategies, and outcomes that define a UXCB initiative. Five areas of future research are presented that aim to deepen our understanding of UXCB as both a practice and an area of scholarship.

Author Keywords

design; UX strategy; organizational capacity; HCI practice.

CSS Concepts

• Human-centered computing~Interaction Design

INTRODUCTION

The User Experience (UX) industry has experienced a hiring boom in the last decade. This trend is largely driven the growth of in-house UX teams, as organizations across nearly every discipline are investing in creating their own internal UX departments. In theory, this allows organizations to more consistently provide engaging experiences with their products, leading to higher levels of user satisfaction [1]. But to realize this potential, it is critical to consider what it means to be a UX-centered organization. Is the organization able to regularly monitor and collect feedback from users? Are there processes in place that enable them to effectively make sense of this feedback and convert it into actionable improvements to their products? And, finally, to what extent are they able to coordinate the activities of the various teams involved in

product design and development so that those improvements are actually implemented?

Making these adjustments is not a trivial matter and may require a fundamental shift in the way organizations operate, which means creating an in-house UX team is only one part of a larger process. To maximize the impact of the UX team, organizations need to go through the hard work of building a user-centered culture that prioritizes user research and places value on design and the assessment and iterative improvement of its products. Unfortunately, many organizations are unable to create or sustain this culture due to a misunderstanding (or lack of awareness) of key UX principles, an inability (or unwillingness) to provide sufficient resources to support UX work, or some combination [40,57,62,69].

Overcoming these organizational challenges is a common and persistent pain point for UX professionals. One recent industry survey reported most UX professionals were generally satisfied with the work they do, but some “were unhappy because they didn’t get to do enough UX or they weren’t able to be as effective as they would like to be” [20:28]. The reasons for dissatisfaction related to: wanting their job to more heavily emphasize UX responsibilities, wanting their organization to support UX more, and being frustrated at the amount of persuasion and compromise required. As one survey respondent put it, “I love the work. But I’ve never worked for a company that was as committed to UX as I am” [20:105]. Another recent survey of over 3000 UX professionals working in an enterprise context reported that their top challenges were tied to managing their organizational culture: improving UX consistency (59%), clarifying requirements (46%), collaborating between teams (44%), securing UX budget or resources (40%), and getting buy-in or understanding from executives (37%) [65]. Other common organizational UX barriers include inefficiencies with internal processes [19], colleague’s lack of understanding or resistance [2], a constant need to “sell” UX to customers [9], resource limitations or technological constraints [44], and general difficulty navigating the organization’s culture [44,67].

In other words, many organizations still struggle to integrate UX into their existing development and decision-making processes [25]. Instead, some organizations create an environment where UX is pushed aside in favor of other priorities, leaving the UX team powerless and frustrated.

Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. Copyrights for components of this work owned by others than the author(s) must be honored. Abstracting with credit is permitted. To copy otherwise, or republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee. Request permissions from Permissions@acm.org.

DIS '19, June 23-28, 2019, San Diego, CA, USA.

© 2019 Copyright is held by the owner/author(s). Publication rights licensed to ACM. ACM 978-1-4503-6270-7/19/06...\$15.00.

<https://doi.org/10.1145/3322276.3322346>

Other organizations recognize that a change in culture is needed but underestimate how much effort is required, leaving the responsibility to a small team or even a single person. Even organizations with a well-developed UX culture have difficulty sustaining it due to high staff turnover, changes in leadership, or other external forces.

As a potential solution, this paper proposes User Experience Capacity-Building (UXCB) as an organizing concept tying together all existing and future HCI research related to the identification, development, and evaluation of strategies to grow a healthy, self-sustaining, and robust UX culture. Organizational capacity is broadly viewed as an organization's ability to achieve its goals [71] and is typically conceptualized in terms of its resources (both tangible and intangible), capabilities, and/or competencies [12]. Many different types of organizational capacity have been examined, but the field of Evaluation Capacity-Building (ECB) provides a useful framework for clarifying the concept of UXCB. Drawn primarily from studies of non-profits and governmental organizations, scholars define ECB as "the intentional work to continuously create and sustain overall organizational processes that make quality evaluation and its uses routine" [30:14]. ECB researchers draw a line between the activities that define an organization's evaluation capacity and the activities they use to strengthen or improve that capacity. This distinction is valuable because it implies that (1) evaluation capacity is not a static construct and (2) there are techniques specifically designed to *build* evaluation capacity. As a result, ECB is itself a practice and field of study with its own themes, concepts, knowledge, and competencies [4].

Drawing heavily from ECB for inspiration, a definition of UXCB is proposed as *the intentional work to continuously create and sustain overall organizational processes that make quality UX work routine*. To borrow from a seminal ECB text, this definition suggests UX capacity is "an organization's visible, enacted [UX] practices and processes" while UXCB "is the process by which an organization develops its understanding and ability to undertake these practices and processes" [6:128]. This framing creates a distinction between an organization's UX capability itself (i.e., its UX capacity) and the methods through which it can grow that capability (i.e., UXCB).

To clarify this distinction, it will be useful to consider what exactly constitutes an organization's UX capacity. From an ECB perspective, Evaluation Capacity (EC) is defined as "the competencies and structures required to conduct high quality evaluation studies (capacity to do), as well as the organization's ability to integrate evaluation findings into its decision-making process (capacity to use)" [7:47]. The breakdown of evaluation capacity into two components – the capacity to "do" and the capacity to "use" evaluation – provides a strong parallel for UX, as an effective organization must be able to first select and apply UX design and research methods before they can incorporate insights

gained from those methods into their products. Therefore, a preliminary definition of UX capacity is proposed as *the competencies and structures required to employ UX processes, methods, and tools (capacity to do), as well as the organization's ability to integrate UX knowledge into its decision-making process and create quality products (capacity to use)*. Of course, the ultimate goal of UX is to make quality products, i.e., products that are user-friendly, appealing, useful, and satisfying. Therefore, UXCB is positioned as a methodology aimed at helping UX professionals create and sustain an organizational culture in which UX methods are used effectively. In other words, UXCB is any activity intentionally designed to strengthen or sustain an organization's capacity to *do* UX (i.e., its use of UX processes, methods, and tools) and/or its capacity to *use* UX (i.e., its ability to create quality products).

The remainder of the paper will further explore the concept of UXCB. In the next section, related work will be examined to demonstrate the novelty of UXCB. The methodology is explained next, followed by the conceptual model for UXCB and two short case studies to demonstrate the model's applicability. The paper concludes by outlining five areas of research that can deepen our understanding of UXCB as both a professional practice and an area of scholarship.

RELATED WORK

There have been many previous efforts to study organizational UX practices. One recent effort is Gray et al.'s [25] "Flow of Competence" for UX professionals, which focuses on how individual designers' perceptions and use of UX competencies influences how they work within and/or build their organization's UX culture. Another example is the SC5 Design Strategy Framework [41]. Described as "a roadmap for UX transformation" (p. 818), the framework includes six dimensions: design process, human resources, designer tools, data and analytics, management tools, and change management. A similar framework was provided by Furniss, Curzon, and Blandford [22]. Using data from interviews with 22 UX and Human Factors and Ergonomics (HFE) professionals, the authors identified six integrated areas of organizational competence that determines whether a UX project is successful. A final example is the Strategic Usability (STRATUS) assessment developed by Kieffer and Vanderdonckt [34] as a way of determining how well organizations employ usability evaluation to achieve their business goals. Each of these frameworks offers a useful way to understand the systemic and interconnected nature of organizational UX practices, but they don't provide guidance on selecting strategies to strengthen or sustain those practices.

Maturity models are the closest parallel to the concept of UXCB. Many maturity models related to UX and usability have been proposed over the past two decades, such as Earthy's Organizational Human Centeredness Scale [18], Schaffer and Lahiri's Usability Maturity Model [60], Chapman and Plewes' UX Maturity Model [15], and

Nielsen's Corporate UX Maturity Model [49,50]. These models provide valuable insights into the state of UX maturity, but there are significant questions about their rigor and applicability [38,66]. Sauro, Johnson, and Meenan [59] attempted to address these limitations by developing a new UX Maturity Assessment questionnaire, and their findings showed that higher ratings of organizational maturity were correlated with higher levels of perceived value of UX throughout the organization and more frequent use of UX assessment methods. These results are promising, but they highlight a third issue with maturity models: documentation on how mature practices can be implemented is unclear or overly generalized [34]. For example, maturity models offer little advice on how to *increase* the perceived value of UX or the frequency of UX methods in an organization. Likewise, a maturity model does not offer specific recommendations about the "right" methods to use or the "best" UX team structures and formats [59]. These issues stem from the fact that maturity model research typically focuses on describing an organization's current stage of maturity, not helping the organization move up to the next stage. There is no question that a comprehensive, validated UX maturity model can be inspirational and informative, but there would still be significant gaps in terms of providing actionable guidance on getting organizational buy-in, developing and evaluating various approaches, and addressing organization-specific barriers to widespread UX adoption. Thus, UXCB research can complement, not replace, UX maturity model research.

METHODOLOGY

Focusing on organizational factors is not a new area of research in HCI; many researchers have previously examined the importance of organizational context and culture (e.g., [24]) and described activities aimed at addressing one or more UX barriers in a specific organization (e.g., [54]). However, the diffuse nature of this work makes it difficult to understand the full scope of knowledge gained in this area. To synthesize literature in this area and identify themes for future research, an integrative literature review was conducted. An integrative literature review is a specific type of research that "reviews, critiques, and synthesizes representative literature on a topic in an integrated way such that new frameworks and perspectives on the topic are generated" [64:356]. It is especially valuable when exploring new concepts because it brings together divergent streams of research into a conceptual framework that can help explain previously disparate results and identify areas for future research [64,68].

Following the process outlined by vom Brocke et al. [8], the first step was to locate scholarly literature on the practical use of HCI in industrial (i.e., non-academic) settings. Since the goal was to be representative rather than exhaustive, the search strategy was purposive rather than systematic. Searches were first conducted in September 2017 using

Google Scholar with broad keywords (e.g., "organizational UX"), which helped to identify key articles and books (including some practitioner-focused texts). This initial search was supplemented with backward- and forward-searching and targeted searching of the ACM Digital Library, ScienceDirect, and Taylor & Francis, resulting in an initial sample of 88 articles and books. This sample was not meant to be exhaustive; the goal was to identify a representative sample of literature that included different perspectives and approaches.

A concept matrix was then used to assist with analysis and synthesis and development of the conceptual model. As explained by [68], a concept matrix begins with a set of initial concepts (which may be topics, theories, dimensions, etc.) and then a set of articles is analyzed with respect to their relationship to those concepts. In this case, the dimensions from the Integrated ECB framework [36,37] served as the initial set of concepts. A purposive sample of 51 articles from the initial sample was identified for further analysis. The author and two research assistants collaboratively reviewed each article and determined which concepts, if any, were applicable to the article. Seven articles were deemed not relevant and were excluded. Some of the initial concepts changed slightly and new concepts emerged during the analysis, yielding a new classification scheme for the remaining 44 articles.¹ The resulting concept-centric organizing framework is presented in the following section.

RESULTS: A UXCB CONCEPTUAL MODEL

Like the Integrated ECB framework it was based on, the UXCB conceptual model is a basic three-part logic model, which posits that the (1) current **conditions** of an organization drive the selection of (2) **strategies** chosen to build UX capacity which lead to (3) **outcomes** at the (a) *individual* (i.e., attitudes, knowledge, and/or skills of individual staff members), (b) *organizational* (i.e., changes to processes or broader cultural changes), and (c) *product* levels. These outcomes create different conditions for future capacity-building initiatives, thus setting up UXCB as a continuous cycle of organizational growth and development. This model is depicted visually in Figure 1. Next, each component of the model will be explained in more detail using examples identified in the literature review.

Conditions (Why)

The *conditions* of UXCB includes three sub-components: buy-in and support, organizational needs, and goals for the capacity-building effort.

Buy-in and support

Depending on the scope of the initiative, making the decision to engage in UXCB may mean establishing UX as an organizational priority [21,52]. Therefore, it is desirable to get buy-in and support from key stakeholders, particularly those in senior leadership positions [56]. Having "consistent

¹ The final concept matrix can be viewed at bit.ly/uxcbmatrix-dis19

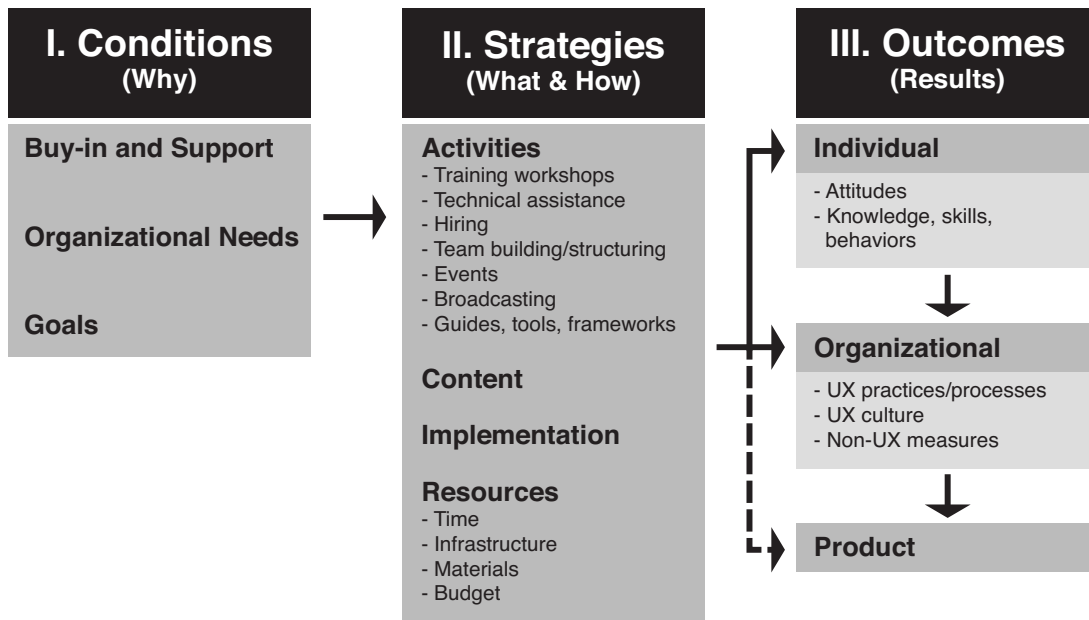


Figure 1. A conceptual model for User Experience Capacity-Building (UXCB), consisting of a basic three-part logic model: conditions (why), strategies (what and how), and outcomes (results).

and visible management support at the highest levels” [57:343] lends credibility to the UXCB initiative and increases the perceived importance of UX as a whole [42]. Getting this type of high-level support not only increases the likelihood of management devoting resources toward UXCB, but it also increases the chances of getting support from other stakeholders [31,69]. Of course, gaining executive buy-in is not a simple process, as it typically means translating the benefits of UXCB (and UX) into the “the business language of economics” [33:306]. Creating an environment conducive to UXCB can also include identifying an advocate in a position of authority who can impart a sense of a urgency and encourage participation and adoption of new practices [19,46]. Therefore, a recommended practice is to designate a high-level champion for UXCB activities [56,57]. This capacity-building leader should be committed to embedding UX into existing organizational processes through new or revised policies or procedures, ensuring there is sufficient technical infrastructure to support UX, providing adequate funding for UX in the annual budget, and providing adequate support and/or time for UXCB work to be carried out [41,52]. Also, though not explicitly mentioned in the HCI literature, it is also important to have buy-in from potential UXCB participants. Top-down directives are likely sufficient motivation for many employees, but some participants may need additional persuasion. To create a more positive atmosphere for UXCB, participants need to have a clear understanding of the perceived benefits of engaging in UXCB (and the potential drawbacks).

Organizational needs

A formal or informal organizational needs assessment should be used to develop UXCB strategies that are tailored to the

organization’s specific context and targeted to a specific area of need [30,52]. Ideally, the assessment would consider all aspects of the organization’s current UX capacity, including the role of UX within the organization [69], its culture, its work practices, its resources, and the depth of its of UX expertise. UXCB practitioners can also assess the quality of the organization’s products to determine if they consistently reflect knowledge about users’ needs and behaviors and adhere to established UX guidelines. For example, Bak et al. [5] described a two-step research process before beginning their UXCB effort: interviews with managers, developers, and user consultants to identify obstacles (step 1) followed by an evaluation of the company’s main product (step 2). Likewise, Liikkanen [41] went through a 5-week “knowledge construction” process to inform the development of their strategic usability recommendations. The discovery research phase included interviews with multiple stakeholders about the company’s competencies, development process, and culture, which was supplemented with a usability evaluation of the company’s systems. These multi-faceted approaches are incredibly valuable in shaping UXCB strategies for the organizational context in which they are applied, but they may not be feasible for smaller organizations or when there are time or resource constraints. In these instances, it is still important to consider where and how UXCB can be most valuable for the organization.

Goals

It is beneficial to define realistic goals for any UXCB effort, ideally developed in partnership with organizational leaders. An important finding from the ECB literature is that capacity-building efforts should go beyond the knowledge, skills, and motivations of employees and focus on the organization as a whole, including its leadership, the level of

support and resources available, and the creation of a climate that fosters learning [63]. Therefore, it is recommended that UXCB efforts be tied to an organization-wide goal, such as: “a permeation of UX throughout the whole development process” [54:1080], fostering a deeper sense of empathy toward users [28], or converting a technology-led company to an experience-led company [51].

Of course, setting an organization-wide goal is only possible when UXCB has the support of organizational leadership. In less mature organizations or in cases where there is limited executive support, practitioners should still strive to create goals for specific UXCB efforts. For example, Ede and Dworman [19] started with the goal of simply “launch[ing] a single, unified effort for onboarding” (p. 844). In another project, the goal was to provide a set of UX tools aimed at encouraging developers to trust the work of usability experts and UI designers [42]. For Øvad and Larsen [54], the goals were to encourage more transparency in UX work, facilitate a shared UX language, and minimize “UX bottlenecks.” Other examples include driving UX consistency across the organization [70], increasing collaboration between UX and non-UX teams [26], and creating consensus around what good UX means for the company’s products [31].

Strategies (What and How)

The *strategies* component of UXCB includes four sub-components: the capacity-building activities that will be used, the content that will be covered, how they will be implemented, and what resources are required.

Activities

The literature review revealed seven unique types of activities for building UX capacity. Although each activity is discussed separately, many successful capacity-building projects include a combination of activities [17,52].

Training Workshops. UX professionals are “often responsible for spreading knowledge and awareness about UX in the organization” [32:16]. A typical approach is for a UX practitioner to reach out to another team that they feel would benefit from UX knowledge (such as marketing or software development) and schedule training workshops. These workshops can last anywhere from a few hours to a few days, and typically cover basic UX knowledge and provide time for hands-on application. This workshop format has been used successfully in many contexts [11,19,54,61].

Technical Assistance. Technical assistance is a specific type of coaching or mentoring that provides targeted support in the form of “one-on-one consultation, small group facilitation, or through a web-based clearinghouse” [48:12]. Technical assistance is a common capacity-building activity because the coaching can come internally from experienced colleagues or externally from outside consultants. Technical assistance can also be informal or formal. Informal approaches include assigning a point person who represents the UX perspective on cross-functional teams and provides advice or guidance as needed [13] or tasking a member of the

UX team with “going by the [developers’] desks and checking” on the status of UX projects [32:17]. Formal approaches include having a UX team member attend daily stand-up meetings with the software development team [13,39], monitoring email, discussion lists, and the company intranet and joining the discussion when UX help is needed [33], or holding regular office hours to provide UX assistance as needed [3].

Hiring. Hiring people is perhaps the most direct way to build capacity, but it is also usually the costliest and is therefore not feasible for many organizations. But, if resources are available, there are two types of new hires that can build UX capacity. The first is hiring new UX practitioners. If this is the first UX hire (i.e. no prior/current UX employees), the organization should identify candidates with a broad base of UX knowledge and skills, covering some combination of human centered design, interaction design, visual design, prototyping, and user research [41]. If the goal is growing an already existing UX team, employers should target people who “bring new knowledge and ways of doing” [22:750] to the organization. The second type is bringing on a high-level UX leader – a vice-president or C-level executive – to oversee design efforts across the organization and sustain the UX culture [25,41,56].

Team Building/Structuring. For organizations that are unable to hire additional staff, an alternative option is modifying how teams are structured and how they function within the organization. One approach is to create cross-functional work groups that are composed of both UX and non-UX professionals. These working groups can focus on solving a specific UX problem [19], serve as advisors on individual UX research and design projects [51,57], or take broad responsibility for guiding all UX projects across an organization [26]. A complementary approach is revising the roles of individual team members to either add explicit UX responsibilities [13,41] or clarify the full scope of UX work each team member is responsible for [51]. Larger organizations may benefit from centralizing their UX teams to better coordinate UX efforts and ensure consistency across projects [35,56]. If it is not feasible to create a centralized unit, organizations should seek other ways to establish baseline UX expectations across every project [27,39].

Events. Another successful UXCB activity is holding UX-themed events that involve large numbers of employees at once. For example, Au et al. [3] described an event called Field Fridays where any employee at Google could attend UX field studies involving users of different products and directly observe or interact with them. Merholz and Skinner [47] described an event held by the design firm Adaptive Path called Open Design Sessions, in which one design team shares a particularly tricky problem they are working on and ask other teams for feedback and ideas to help them tackle it. In a final example, Gray, Toombs, and Gross [25] interviewed a UX designer whose organization hosted an ‘off

the grid' day a few times a year where design teams "design and build and QA a feature of their own choosing" (p. 3292).

Broadcasting. Broadly sharing UX knowledge and results is another common method for increasing organization-wide knowledge and awareness of UX practices [41]. Using "creative and innovative ways" [57:343] to communicate UX insights, case studies, design mock-ups, and UX successes (or failures) is a form of knowledge sharing that helps to increase the visibility of the UX team and, in turn, leads to improved organizational attitudes towards UX [22,27,70]. Some common ways of sharing UX knowledge include UX-themed company blogs and wikis [24–26], company-wide 'lunch-and-learns' [47], and presentations at new employee orientation [3]. Knowledge sharing can also be informal; for example, UX team members can share books and other resources with their non-UX colleagues [25] or they can move their desks closer to their frequent collaborators [27,47].

Guides, Tools, or Frameworks. Creating or adopting UX guides, tools, or frameworks is another effective way to build capacity. UXCB efforts in this category include the creation of tangible resources whose sole purpose is to quicken UX processes or aid UX decision-making, such as a living style guide [41], visual storyboards [47], or a user research knowledge base [3]. Defining UX metrics can also build UX capacity, as they can provide a reliable measure of both "technical successes and organization/team successes" [23:1065]. A guide or tool can also be used to help manage UX workflows. For example, Rohn [56] suggests creating UX-Release Roadmaps that outline key UX features and plots them out for future product releases. Other examples include the Scheduling Tool for Recommending Usability Methods (STRUM), which helps software developers choose usability methods [14], the Usability Goal Achievement Metric (UGAM), which helps product managers make UX judgements [31], and the User Experience Management Requirements (UXMR) Framework, which helps product managers track various UX requirements [45].

It can also be beneficial to create more abstract resources, such as UX design principles or a UX philosophy [41]. Creating a formal team charter that communicates a team's shared vision can serve as "a signal to the rest of the organization of what to expect from the team" [47:23]. A UX vision or UX goals can also be useful tools for planning UX projects, as they help establish clear expectations and prevent misunderstandings between different teams [15,32,35]. Critically, an ideal UX vision should both reflect stakeholder perspectives and include stakeholders in the brainstorming and articulation process [23,26,69]. An organization-wide conversation leading to a UX vision also helps keep the user's perspective in the front of everyone's mind, which further builds UX capacity [58].

Content

Along with selecting appropriate capacity-building activities, it's also critical to consider the content included in

the activity and whether it is appropriately tailored to the context. For instance, if there is a general lack of understanding of UX, UXCB efforts should focus on defining UX [26] and explaining how the design process works [19]. If there's a lack of emphasis on identifying user needs, UXCB efforts can cover the main principles of user research or it can teach people how to apply specific UX research methods like contextual inquiry or AB testing [54]. If the organization needs to collect more user feedback, UXCB can cover how to use the think-aloud protocol in usability testing [61], how to quickly analyze usability data, identify usability problems, and classify their severity [11], and, if necessary, how to use usability lab equipment [57]. And, of course, UXCB efforts can cover both design and research methods if the organization needs to strengthen its practices in both areas [70].

Implementation

Each individual UXCB activity comes with a number of non-trivial implementation decisions; in fact, the willingness to adjust or revise a strategy to overcome implementation barriers is a major success factor for capacity-building projects [37]. UXCB practitioners should ensure that their efforts are aligned with the existing culture and workflows of the organization, paying particular attention to the pacing and complexity of the UXCB activity [42]. If the UXCB strategy relies on education and training, it must be determined how the content will be delivered and how participants will engage with it [53,70]. Many of the UXCB efforts mentioned in this paper were implemented in face-to-face settings but this is not always possible, particularly for large, globally distributed organizations. Remote meetings should be considered as an alternative option that may be perceived as less time-intensive. Synchronous vs. asynchronous activities are also a consideration, especially if written documentation or other types of online content (i.e., video) can be effective. A related set of considerations is the format and structure of UXCB activities. When will UXCB activities take place? How frequently will they be scheduled? How long will each one last? Since time is almost always a limited resource, UXCB practitioners should strive to be as efficient as possible and ensure the activities are purposeful and well-planned. For example, Grenville [26] required a five-hour orientation plus three subsequent three-hour meetings, but each meeting was explicitly tied to the goal of gaining consensus on the corporate UX process. By contrast, Ede and Dworman's [19] initial plan to hold unstructured weekly meetings failed because participants were unwilling to devote time to it; they found success only after reducing the number of meetings and clarifying their objectives.

Resources

Finally, it is necessary to outline the resources needed to implement any UXCB initiative. As noted by Hokkanen, Xu, and Väänänen, "the options to acquire [UX skills] are to recruit, outsource, or educate a team member [and] all these require resources – money or at least time" [29:11]. Underestimating the resource requirement can lead to

resentment or lack of engagement on behalf of participants, while overestimating can create unrealistic expectations by the organization's leadership. The four major considerations are time, infrastructure, materials, and budget.

Time. Perhaps the most important resource consideration of any UXCB initiative is whether enough time is devoted to it. Typically, UXCB efforts are viewed as outside of the normal job responsibilities of the UX team, which adds a significant burden. If not managed properly, these added responsibilities can add stress and create a negative work-life balance [35]. UX professionals therefore need to set clear expectations prior to implementing any UXCB initiative and take careful steps to ensure they have enough time to devote to the project. If possible, employees should be given release time to complete UXCB responsibilities to ensure the project is given adequate attention.

Infrastructure. Some UXCB efforts also require significant infrastructure investments to be successful and to demonstrate the organization is committed to improving its UX practices [27]. Is there a dedicated space for design and/or research activities? For example, one of Airbnb's initiatives to strengthen its UX culture involved creating a studio space with plentiful wall space to display design work and promote a sense of community [47]. In addition to space, there are also hardware and software considerations, such as audio/video capture and live-streaming of user research sessions [28]. Making these types of infrastructure investments not only also increases the visibility of UX work throughout an organization, but also signals that the organization is committed to building a stronger UX culture.

Materials. It may also be necessary to develop specific resources to supplement or streamline UXCB activities. For example, Øvad and Larsen [54] supported their usability workshops with sample work products and example cases, "cheat sheets" with guidelines for planning user research studies, and templates for reporting study results.

Budget. Finally, it's critical to consider whether the organization can devote financial resources towards UXCB. No articles included in this review explicitly discussed whether there was a budget for UXCB activities, but given the resource demands listed above it seems likely that most, if not all, UXCB initiatives require some financial resources. UXCB practitioners should not shy away from this fact; rather, they should begin with a clear accounting of exactly how much the activity will cost to implement and, ideally, an indication of the return on investment.

Outcomes (Results)

The *outcomes* component of UXCB includes three sub-components: the individual, organizational, and product-level impacts of the initiative.

Individual

Individual-level UXCB outcomes come in two categories: attitudes and knowledge/skills/behaviors.

Attitudes. Individuals who participate in UXCB activities typically adopt more positive attitudes towards UX as a result of their experience [11,42]. For example, Hoegh et al. found that software developers who observed user tests were "much more empathetic to the prospective users of the system" [28:184]. In another example, software developers who participated in one-day usability training workshops expressed a deeper appreciation for the UX research process, with one participant noting that "it reopened my eyes on how little I was able to put myself in the end-users' shoes and really see things" [54:1086]. These types of positive attitudinal changes are the hallmark of a successful UXCB effort, and should be considered a necessary first step towards organization-wide culture change.

Knowledge, Skills, Behaviors. Since many UXCB activities include an educational component, participants should be expected to gain new knowledge, learn new skills, and/or adopt new behaviors. These are categorized together because they are often intertwined; for example, a common goal of UXCB is to inspire software developers to adopt usability testing as part of their regular workflow (behavior), which may first require teaching them what usability testing is (knowledge) and how to plan and implement a usability test (skill). Some common knowledge-based outcomes of UXCB include how to recognize usability problems [14], how to more easily explain usability problems [28], and how to accurately rate the severity of the usability problems [31]. From a skill-based perspective, Skov and Stage [61] found that computer science students who were taught how to conduct usability tests were comparable to experts in their ability to identify relevant tasks, select appropriate interview questions, and express usability problems. Similarly, Øvad and Larsen [54] asked an in-house UX designer to judge the quality of an A/B test conducted by software developers and found it to be "comparable to similar tests carried out by the UX team" (p. 1086). Behavioral changes are often the hardest to evaluate. In one successful case, Øvad and Larsen [54] tracked the developers who participated in one of six UX training workshops and found that several of them independently implemented a UX research method at least once in the weeks or months following the training.

Organizational

Organizational outcomes include new or revised UX practices and processes, a stronger UX culture, or other changes not specifically related to UX.

UX Practices/Processes. Perhaps the most direct organizational-level outcome is the adoption of new UX practices or the integration of UX processes with other organizational processes [13,42,56]. For instance, some organizations saw a surge in the number of requests for UX research [19]. Other organizations adopted new practices for the UX team, such as ensuring the UX research and design teams work together more closely on each project [35], involving other stakeholders in the UX benchmarking process [26], or changing how A/B test results were

evaluated and distributed [54]. While more difficult, some organizations have also committed to revising their software development process to better integrate UX activities and involve the UX team more directly [13,41,42].

UX Culture. A related outcome is an organizational culture that places more value on UX work and makes it a more meaningful part of the organization's identity. As explained by one executive interviewed by Roto et al. [58], "when the [UX] expedition has been done, all our employees understand what UX means, how important it is, and how they can participate in developing UX" (p. 835). Because cultural changes are difficult to measure, most are reported in general terms. For example, Ede and Dworman [19] reported an increased sense of excitement within the company, while a UX designer interviewed by Gray, Toombs, and Gross [25] said that there was a general sense that people in their company wanted to know more about UX than they did before. Other cultural changes reported (anecdotally) were increased knowledge sharing [26,33] and better communication between departments [13,35].

Non-UX Measures. The aspiration of most organizations is not solely to adopt better UX practices but to be a successful organization [59]. Thus, it is important to consider whether UXCB has a positive impact on other aspects of the organization. There is some evidence, for example, that UXCB can drive more effective planning by ensuring there is more time to coordinate cross-departmental projects [13], more focus on setting effective cross-organizational goals [26], or more attention paid to team roles and skills [41]. Additionally, UXCB can result in better decision-making by adding a "usability advocate...in a position to make a difference" with decisions [42:16] or by creating reliable metrics that help product teams make more data-driven and user-centered decisions [55]. UXCB can also have a positive financial impact on an organization. There is some debate about the economic value of UX in general [16], but in one case UXCB helped increase the contribution of the UX team from \$50 million to almost \$3 billion [51] (though UXCB practitioners should probably expect a more modest ROI).

Product

A third UXCB outcome is whether the organization's products actually improve. Like ECB, the "program theory" of UXCB is that individual and organizational changes lead to product improvements, which means the product-related outcomes may not be realized immediately [26]. In one case, increasingly positive attitudes towards UX did not lead to an immediate "grand redesign" of the product and many UX issues were still unresolved several months later [42]. But depending on what strategies are used, it is possible that UXCB can lead directly to product changes. For example, Bruun and Stage found that 64% (21 of 33) of the usability problems identified by newly trained software developers had been fixed three months later [10]. Other direct product impacts can include whether a product gets chosen for further development [21,35], if development time is reduced

[54], if the market responds positively towards a product concept [21], or increased media visibility due to design improvements [58].

UXCB CASE STUDIES

To demonstrate the applicability of the conceptual model, this section will briefly discuss two high-profile UXCB examples reported in the literature: Yahoo's User First initiative and Google's Pokerface program.

User First (Yahoo)

Conditions (why)

Yahoo's 'User First' program was initiated with direct support from the company's CEO (*buy-in and support*). The program was developed because there was a fragmentation of the company's UX efforts, with dozens of product teams all operating differently (*organizational needs*). As a result, the primary objective was to promote "a user first mentality at all levels in the company" [62:823]. To achieve this goal, corporate leadership established a company-wide goal that all employees would participate in a "user-understanding" activity at least once each quarter (*goals*).

Strategy (what and how)

Given the scope of the problem, the User First program consisted of multiple capacity-building activities: they created a centralized UX Research and Accessibility (UXRA) team (*team structuring*); they articulated a company-wide vision and expectations for UX research (*guides, tools, and frameworks*); they held a series of regular User Nights where the UX team invited 100 users to company headquarters and paired them with members of different product teams for half-hour long conversations and observations (*events*); they recorded and livestreamed every user research session and made their research calendar available to all employees (*broadcasting*); they scheduled company-wide 'brown bags' in which UX researchers discussed interesting or surprising research results and shared success stories (*broadcasting*); and, they made sure the UXRA team was regularly involved with new employee orientation, wrote intranet articles about UX research, and published posters and papers at internal conferences (*broadcasting*).

Because of its focus on promoting a user-first mentality, UX research was the primary focus of all UXCB activities (*content*). Naturally, all of these activities required significant planning and dedicated resources. As one example, Yahoo renovated their usability lab to provide "inviting, comfortable and large observation rooms" [62:826] to encourage more employees to observe in-person sessions, while also investing in audio/video live-streaming hardware and software so employees could also participate remotely (*resources-infrastructure*). Organizing the User Night events and implementing all of the broadcasting activities also required a significant time commitment from various members of the UXRA team (*resources-time*).

Outcomes (results)

While no formal evaluation of any individual activities has been reported, the UXRA team noticed an increased percentage of employees participating in a User First activity, with over 50% participation in one recent quarter (*individual-knowledge, skills, behaviors*). As a whole, the team concluded that the initiative “established a new awareness of the role and value of UX Research within the company” [62:831] (*organizational-UX culture*). Further, the UXRA team is asked to do UX research at more stages of product development and the team has adopted new research practices more closely tailored to Yahoo’s development cycle and product areas (*organizational-UX practices/processes*). Finally, the UXRA team concluded that the program resulted in “feature, performance, and reliability improvements” [62:825] to a number of Yahoo products (*product*).

Pokerface (Google)

Conditions (why)

Pokerface, Google’s internal “user empathy” program [43:2], was first launched in 2012-13 as an effort to spread a more empathetic mindset throughout the company. With support of top executives, it was re-launched four years later with an expanded scope. For this second iteration, several company leaders recorded videos endorsing the program in which they discussed potential benefits and encouraged product teams to participate (*buy-in and support*). While no formal needs assessment was conducted, the company clearly felt that a user-centered mindset and a commitment to user research was not shared across all of Google’s product teams (*organizational needs*). As a result, the program’s primary goal was to increase user empathy across Google’s software engineers, product managers, and designers; a secondary goal was to gather user insights that could be addressed through immediate product improvements (*goals*).

Strategy (what and how)

The Pokerface program is a training workshop combined with technical assistance (*activity*). The workshop focuses on teaching attendees the basics of user research, including how to quantify hypotheses and triangulate qualitative and quantitative findings. A UX researcher then coaches the participating team to refine their research questions, develop a script, and make sense of results (*content*). The training requires a 3-hour time commitment from participants and includes a 1-hour seminar on user research basics, a 1-hour user research session with actual users, and a 1-hour debrief to discuss findings (*implementation*). To run the program, UX researchers meet with each team lead and prepared a customized study script. The team eventually centralized the script writing process and set up a rolling recruitment system to streamline the program and lessen the burden on each individual UX researcher. Still, the creators noted that implementing the program took more time than they initially planned and are looking for additional ways to streamline project activities (*resources-time*). To scale the program

globally, they created an internal website, sign-up system, promotional videos, and a templating system that covered recruitment, training materials, scripts, debriefing questions, and the final study report (*resources-materials*).

Outcomes (results)

In the most recent iteration of Pokerface, the team engaged over 1500 employees across 10 locations over an 8-month period. To evaluate its effectiveness, the researchers conducted a pre-post survey and found statistically significant differences in participants’ post-experience perceptions of the value of user research and the use of research results to improve their products (*individual-attitudes*). The research team also noticed a culture change at Google and a more widespread understanding about “how much more user research we could integrate into our development process to truly address users’ problems” [43:5] (*organizational-UX culture*). The authors did not cite any specific interface improvements, but they observed many product team members take immediate action to fix issues they found during the research sessions (*product*).

DISCUSSION: A RESEARCH AGENDA FOR UXCB

The previous section reviewed and synthesized a sample of HCI research literature into a conceptual model (Figure 1) that defined UXCB as a context-dependent process that includes a consideration of the organizational conditions, the selection of specific strategies, and the intended outcomes at the individual, organizational, and product levels. The Pokerface and User First case studies showed the usefulness of the model in describing specific UXCB initiatives. However, these results are just a starting point; next, several implications from this research are presented that together define a research agenda for UXCB.

First, an important limitation of this work is that the conceptual model was developed through an analysis of UXCB activities reported in the academic HCI literature, which is biased towards formalized and highly-structured approaches to UXCB that have already received significant buy-in from key stakeholders. Further, both case studies consisted of large-scale capacity-building activities at multi-national corporations where they already had the support of top company executives, which clearly represents the high-end of the UXCB spectrum. There should be no implication that only companies with similar sizes and resources are capable of engaging in UXCB, or that all UXCB programs should be similar in breadth and scope. In practice, UXCB efforts can (and should) vary greatly in terms of their formality, structure, duration, and resources required. Therefore, a key area for future research is exploring other types of UXCB strategies, particularly less formal or “lean” methods that can be implemented by smaller teams and organizations with time or resource constraints and with limited (or no) executive support. For example, it may not always be possible to get executive buy-in prior to starting UXCB. In these cases, can UXCB become a bottom-up process initiated by UX staff? If so, what UXCB activities

are effective at getting executive buy-in for a more resource-intensive UXCB initiative? Another implication is that the UXCB activities identified in this literature review should not be interpreted as an exhaustive list but rather as a starting point for UX professionals to consider given their organizational context. UXCB practitioners and researchers should aim to develop a suite of activities to choose from so they can offer strategic guidance to organizations of all types, sizes, and levels of existing UX capacity.

Second, although the model was informed by the well-established Integrated Evaluation Capacity-Building framework and reflects a variety of academic and practitioner perspectives, none of the articles reviewed for this paper addressed every element of the model and nearly all of them were implemented in corporate settings (many of them software development companies). But UXCB strategies that are successful in multi-national technology companies may not be applicable elsewhere. Therefore, a second key area of future research should focus on applying and evaluating UXCB strategies in a variety of different contexts, particularly less mature organizations and organizations with small (or no) dedicated UX teams, such as non-profits, libraries, or cultural heritage institutions. These efforts will help to validate and extend the model by bringing to light new implementation challenges, success factors, and impact measures while also demonstrating other models for successful UXCB initiatives.

Third, only a few UXCB efforts included in this review included a robust evaluation that considered outcomes at multiple levels (i.e., the individual, organizational, and product levels). Additionally, most UXCB outcomes were reported anecdotally or described in general terms. But in order to be convinced that UXCB is worth investing in, there needs to be persuasive evidence that it makes a positive impact. To avoid UXCB being seen as a luxury, another key area of future research is developing robust and reliable impact measures that consider all three levels of UXCB outcomes. What are reliable ways of measuring changes to individual attitudes, knowledge, skills, and behaviors? How can we measure whether the organization has adopted a more UX-friendly culture? Is it possible to link UXCB directly or indirectly to product-specific changes? And, what are the long-term impacts of UXCB at the individual, organizational, and product levels?

Fourth, only a handful of examples mentioned conducting any kind of needs assessment prior to launching the UXCB initiative. Because the success of UXCB is dependent on how well it the effort is tailored to the organizational context, another area of research is to develop a deeper understanding of what exactly constitutes an organization's UX capacity so that practitioners can figure out where exactly their UXCB efforts should be focused. Future research efforts should be aimed at identifying, describing, and measuring what defines an organization's capacity to do UX (i.e., its resources, expertise, and processes) and its capacity to use UX (i.e., the

extent UX is embedded in the company culture and used in decision-making). Developing such a framework can then inform the creation of instruments for assessing UX capacity and developing targeted UXCB strategies, including less formal and lightweight approaches that can be conducted quickly and with limited resources.

Finally, the examples in this paper suggest that UXCB is its own practice that exists outside of the typical responsibilities of UX professionals. In this way, UXCB can be useful in helping UX professionals to distinguish between their normal day-to-day UX work and the activities they undertake to build their organization's UX capacity, which will help focus their attention, optimize resources, and add clarity and direction to their work. To realize this benefit, a final area of research should focus on educating UX practitioners about how to effectively and efficiently conduct UXCB in different organizational contexts and with varying levels of resources. How can we teach aspiring and junior designers to successfully engage in UXCB activities despite lacking the organizational clout of more seasoned professionals? For mid-level and senior UX professionals, what types of UXCB strategies are the best ways to leverage their expertise? For managers of UX teams, how can they use their influence to better support UXCB across their organization? By developing effective methods for teaching UXCB, educators can ensure they are giving UX professionals the skills they need to succeed in any professional environment.

CONCLUSION

There is widespread agreement that UX is an important and valuable practice; not only has it been shown to save money (through its iterative cycle of design and testing), but it is also well-established that consumers and users appreciate good design. But in order to achieve this goal, organizations have to build their internal competencies, integrate processes and workflows, and create a culture in which UX is valued and supported. To address this issue, this paper proposed the concept of UX Capacity-Building (UXCB) as *the intentional work to continuously create and sustain overall organizational processes that make quality UX work routine*. Through an analysis of existing HCI literature, this paper demonstrated that UXCB has the potential to be a robust and flexible approach to help UX practitioners overcome common organizational barriers. While work remains to be done to transform UXCB into a mature practice and area of scholarship, it promises to provide a systematic path forward for helping UX professionals make the structural, cultural, and procedural changes necessary to increase the impact of their work and consistently design quality products.

ACKNOWLEDGMENTS

I'd like to thank July Sosebee, Alexandra Srp, and Hilary Baribeau for their invaluable assistance collecting, reading, and analyzing articles and providing feedback on early drafts of this paper. I'd also like to thank several anonymous reviewers for their feedback and advice.

REFERENCES

- [1] Rui Alves, Pedro Valente, and Nuno Jardim Nunes. 2014. The state of user experience evaluation practice. In *Proceedings of the 8th Nordic Conference on Human-Computer Interaction: Fun, Fast, Foundational (NordiCHI '14)*, 93–102. <https://doi.org/10.1145/2639189.2641208>
- [2] Carmelo Ardito, Paolo Buono, Danilo Caivano, Maria Francesca Costabile, and Rosa Lanzilotti. 2014. Investigating and promoting UX practice in industry: An experimental study. *International Journal of Human Computer Studies* 72, 6: 542–551. <https://doi.org/10.1016/j.ijhcs.2013.10.004>
- [3] Irene Au, Richard Boardman, Robin Jeffries, Patrick Larvie, Antonella Pavese, Jens Riegelsberger, Kerry Rodden, and Molly Stevens. 2008. User experience at google- Focus on the user and all else will follow. In *CHI '08 Extended Abstracts on Human Factors in Computing Systems*, 3681–3686. <https://doi.org/10.1145/1358628.1358912>
- [4] Michael Baizerman, Donald W Compton, and Stacey Hueftle Stockdill. 2002. Summary and analysis of the case studies: Themes across the cases. *New Directions for Evaluation* 2002, 93: 101–108. <https://doi.org/10.1002/ev.44>
- [5] Jakob Otkjær Bak, Kim Nguyen, Peter Risgaard, and Jan Stage. 2009. Bringing usability evaluation into practice: Field studies in two software organizations. In *Proceedings of the Second International Workshop on the Interplay between Usability Evaluation and Software Development (I-USED '09)*.
- [6] Isabelle Bourgeois and J. Bradley Cousins. 2008. Informing evaluation capacity building through profiling organizational capacity for evaluation: An empirical examination of four Canadian Federal Government Organizations. *Canadian Journal of Program Evaluation* 23, 3 SPEC. ISSUE: 127–146.
- [7] Isabelle Bourgeois, Jane Whynot, and Étienne Thériault. 2015. Application of an organizational evaluation capacity self-assessment instrument to different organizations: Similarities and lessons learned. *Evaluation and Program Planning* 50: 47–55. <https://doi.org/10.1016/j.evalprogplan.2015.01.004>
- [8] Jan vom Brocke, Alexander Simons, Björn Niehaves, Kai Riemer, Ralf Plattfaut, Anne Cleven, Jan Von Brocke, and Kai Reimer. 2009. Reconstructing the Giant: On the Importance of Rigour in Documenting the Literature Search Process. In *17th European Conference on Information Systems*, 2206–2217. <https://doi.org/10.1108/09600031211269721>
- [9] Anders Bruun, Marta Kristin Larusdottir, Lene Nielsen, Peter Axel Nielsen, and John Stouby Persson. 2018. The role of UX professionals in agile development. In *Proceedings of the 10th Nordic Conference on Human-Computer Interaction - NordiCHI '18*, 352–363. <https://doi.org/10.1145/3240167.3240213>
- [10] Anders Bruun and Jan Stage. 2014. Barefoot usability evaluations. *Behaviour and Information Technology* 33, 11: 1148–1167. <https://doi.org/10.1080/0144929X.2014.883552>
- [11] Anders Bruun and Jan Stage. 2015. New approaches to usability evaluation in software development: Barefoot and crowdsourcing. *Journal of Systems and Software* 105. <https://doi.org/10.1016/j.jss.2015.03.043>
- [12] Tara Kolar Bryan. 2011. Exploring the Dimensions of Organizational Capacity for Local Social Service Delivery Organizations Using a Multi-Method Approach; Virginia Tech.
- [13] Michael Budwig, Soojin Jeong, and Kuldeep Kelkar. 2009. When user experience met agile: A case study. In *Proceedings of the 27th International Conference Extended Abstracts on Human Factors in Computing Systems*, 3075–3083. <https://doi.org/10.1145/1520340.1520434>
- [14] Luis Cayola and José A. Macías. 2018. Systematic guidance on usability methods in user-centered software development. *Information and Software Technology* 97: 163–175. <https://doi.org/10.1016/J.INFSOF.2018.01.010>
- [15] Lorraine Chapman and Scott Plewes. 2014. A UX maturity model: Effective introduction of UX into organizations. In *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, 12–22. https://doi.org/10.1007/978-3-319-07638-6_2
- [16] Elizabeth F. Churchill. 2017. The ROI of HCI. *interactions* 24, 3: 22–23. <https://doi.org/10.1145/3068100>
- [17] J. Bradley Cousins, Swee C. Goh, Catherine J. Elliott, and Isabelle Bourgeois. 2014. Framing the capacity to do and use evaluation. *New Directions for Evaluation* 2014, 141: 7–23. <https://doi.org/10.1002/ev.20076>
- [18] J. Earthy. 1998. Usability Maturity Model: Human Centredness Scale. *INUSE Project Deliverable D5 5*: 1–34.
- [19] Meghan Ede and Garrett Dworman. 2016. Why Designers Might Want to Redesign Company Processes to Get to Better UX Design. In *Proceedings of the 2016 CHI Conference Extended Abstracts on Human Factors in Computing Systems - CHI EA '16*, 840–848. <https://doi.org/10.1145/2851581.2851609>
- [20] Susan Farrell and Jakob Nielsen. 2014. *User Experience Careers*.
- [21] Jennifer Fraser and Scott Plewes. 2015. Applications

- of a UX Maturity Model to Influencing HF Best Practices in Technology Centric Companies – Lessons from Edison. *Procedia Manufacturing* 3. <https://doi.org/10.1016/j.promfg.2015.07.285>
- [22] Dominic Furniss, Paul Curzon, and Ann Blandford. 2018. Exploring organisational competences in Human Factors and UX project work: managing careers, project tactics and organisational strategy. *Ergonomics* 61, 6: 739–761. <https://doi.org/10.1080/00140139.2017.1405081>
- [23] Elizabeth Goodman, Erik Stolterman, and Ron Wakkary. 2011. Understanding interaction design practices. In *Proceedings of the 2011 annual conference on Human factors in computing systems - CHI '11*, 1061. <https://doi.org/10.1145/1978942.1979100>
- [24] Colin M. Gray. 2016. “It’s More of a Mindset Than a Method”: UX Practitioners’ Conception of Design Methods. In *Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems*, 4044–4055. <https://doi.org/10.1145/2858036.2858410>
- [25] Colin M Gray, Austin L Toombs, and Shad Gross. 2015. Flow of Competence in UX Design Practice. *Proceedings of the ACM CHI'15 Conference on Human Factors in Computing Systems* 1: 3285–3294. <https://doi.org/10.1145/2702123.2702579>
- [26] Delia Grenville. 2012. Framing participatory practices in a large corporation. In *Proceedings of the 12th Participatory Design Conference on Exploratory Papers Workshop Descriptions Industry Cases*, 133–136. <https://doi.org/10.1145/2348144.2348187>
- [27] Rune Th. Høegh. 2008. Case study: integrating usability activities in a software development process. *Behaviour & Information Technology* 27, 4: 301–306. <https://doi.org/10.1080/01449290701766325>
- [28] Rune Th. Høegh, Christian M. Nielsen, Michael Overgaard, Michael B. Pedersen, and Jan Stage. 2006. The impact of usability reports and user test observations on developers’ understanding of usability data: An exploratory study. *International Journal of Human-Computer Interaction* 21, 2: 173–196. https://doi.org/10.1207/s15327590ijhc2102_4
- [29] Laura Hokkanen, Yueqiang Xu, and Kaisa Väänänen. 2016. Focusing on user experience and business models in startups: Investigation of two-dimensional value creation. *AcademicMindtrek 2016 - Proceedings of the 20th International Academic Mindtrek Conference*: 59–67. <https://doi.org/10.1145/2994310.2994371>
- [30] Stacey Hueftle Stockdill, Michael Baizerman, and Donald W. Compton. 2002. Toward a definition of the ECB process: A conversation with the ECB literature. *New Directions for Evaluation* 2002, 93: 7–26. <https://doi.org/10.1002/ev.39>
- [31] Anirudha Joshi, N. L. Sarda, and Sanjay Tripathi. 2010. Measuring effectiveness of HCI integration in software development processes. *Journal of Systems and Software* 83, 11: 2045–2058. <https://doi.org/10.1016/j.jss.2010.03.078>
- [32] Pariya Kashfi, Agneta Nilsson, and Robert Feldt. 2017. Integrating User eXperience practices into software development processes: implications of the UX characteristics. *PeerJ Computer Science* 3. <https://doi.org/10.7717/peerj-cs.130>
- [33] Micky P. Kerr, David S. Knott, Michael A. Moss, Chris W. Clegg, and Robin P. Horton. 2008. Assessing the value of human factors initiatives. *Applied Ergonomics* 39: 305–315. <https://doi.org/10.1016/j.apergo.2007.10.003>
- [34] Suzanne Kieffer and Jean Vanderdonckt. 2016. STRATUS: A questionnaire for strategic usability assessment. In *Proceedings of the 31st Annual ACM Symposium on Applied Computing - SAC '16*, 205–212. <https://doi.org/10.1145/2851613.2851912>
- [35] Janne van Kollenburg, Sander Bogers, Eva Deckers, Joep Frens, and Caroline Hummels. 2017. How Design-inclusive UXR Influenced the Integration of Project Activities. In *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems - CHI '17*, 1408–1418. <https://doi.org/10.1145/3025453.3025541>
- [36] Susan N Labin. 2014. Developing Common Measures in Evaluation Capacity Building. *American Journal of Evaluation* 35, 1: 107–115. <https://doi.org/10.1177/1098214013499965>
- [37] Susan N. Labin, Jennifer L. Duffy, Duncan C. Meyers, Abraham Wandersman, and Catherine A. Lesesne. 2012. A Research Synthesis of the Evaluation Capacity Building Literature. *American Journal of Evaluation* 33, 3: 307–338. <https://doi.org/10.1177/1098214011434608>
- [38] Thaísa C. Lacerda and Christiane Gresse von Wangenheim. 2018. Systematic literature review of usability capability/maturity models. *Computer Standards & Interfaces* 55: 95–105. <https://doi.org/10.1016/j.csi.2017.06.001>
- [39] Marta Larusdottir, Jan Gulliksen, and Åsa Cajander. 2017. A license to kill – Improving UCSD in Agile development. *Journal of Systems and Software* 123: 214–222. <https://doi.org/10.1016/j.jss.2016.01.024>
- [40] Effie Lai Chong Law, Paul Van Schaik, and Virpi Roto. 2014. Attitudes towards user experience (UX) measurement. *International Journal of Human Computer Studies* 72, 6: 526–541. <https://doi.org/10.1016/j.ijhcs.2013.09.006>
- [41] Lassi A. Liikkanen. 2016. UX Strategy as a Kick-starter for Design Transformation in an Engineering

- Company. In *Proceedings of the 2016 CHI Conference Extended Abstracts on Human Factors in Computing Systems - CHI EA '16*, 816–822. <https://doi.org/10.1145/2851581.2851590>
- [42] Agnes Lisowska Masson, Denis Lalanne, and Timon Amstutz. 2017. A Usability Refactoring Process for Large-Scale Open Source Projects. In *Proceedings of the 2017 CHI Conference Extended Abstracts on Human Factors in Computing Systems - CHI EA '17*, 1135–1143. <https://doi.org/10.1145/3027063.3053345>
- [43] Ariel Liu, Victoria Schwanda Sosik, and Khadine Singh. 2018. Building Empathy: Scaling User Research for Organizational Impact. In *Extended Abstracts of the 2018 CHI Conference on Human Factors in Computing Systems - CHI '18*, 1–7. <https://doi.org/10.1145/3170427.3174352>
- [44] Craig M. MacDonald. 2017. “It Takes a Village”: On UX Librarianship and Building UX Capacity in Libraries. *Journal of Library Administration* 57, 2. <https://doi.org/10.1080/01930826.2016.1232942>
- [45] Job Mashapa, Edna Chelule, Darelle Van Greunen, and Alida Veldsman. 2013. Managing user experience - Managing change. In *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, 660–677. https://doi.org/10.1007/978-3-642-40480-1_46
- [46] Job Mashapa, Edna Chelule, Darelle Greunen, Alida Veldsman, Job Mashapa, Edna Chelule, Darelle Greunen, Alida Veldsman, Managing User, Managing Change, Paula Kotz, Gary Marsden, Gitte Lindgaard, and Janet Wesson. 2013. Managing User Experience – Managing Change. In *Human-Computer Interaction -- INTERACT 2013 (Lecture Notes in Computer Science)*, 660–677. https://doi.org/10.1007/978-3-642-40480-1_46
- [47] Peter Merholz and Kristin Skinner. 2016. *Org design for design orgs: Building and managing in-house design teams*. O'Reilly Media, Sebastopol, CA.
- [48] National Resource Center. 2010. *Strengthening Nonprofits: A Capacity Builder's Resource Library - Delivering Training and Technical Assistance*.
- [49] Jakob Nielsen. 2006. Corporate UX Maturity: Stages 1-4. Retrieved June 11, 2018 from <https://www.nngroup.com/articles/ux-maturity-stages-1-4/>
- [50] Jakob Nielsen. 2006. Corporate UX Maturity: Stages 5-8. Retrieved June 11, 2018 from <https://www.nngroup.com/articles/ux-maturity-stages-5-8/>
- [51] James E. Nieters, Subbarao Ivaturi, and Garrett Dworman. 2007. The internal consultancy model for strategic UXD relevance. In *CHI '07 Extended Abstracts on Human Factors in Computing Systems, 1825–1832*. <https://doi.org/10.1145/1240866.1240906>
- [52] Sophie Norton, Andrew Milat, Barry Edwards, and Michael Giffin. 2016. Narrative review of strategies by organizations for building evaluation capacity. *Evaluation and Program Planning* 58: 1–19. <https://doi.org/10.1016/j.evalprogplan.2016.04.004>
- [53] Tina Øvad, Nis Bornoe, Lars Bo Larsen, and Jan Stage. 2015. Teaching Software Developers to Perform UX Tasks. In *Proceedings of the Annual Meeting of the Australian Special Interest Group for Computer Human Interaction on - OzCHI '15*, 397–406. <https://doi.org/10.1145/2838739.2838764>
- [54] Tina Øvad and Lars Bo Larsen. 2016. How to reduce the UX bottleneck – train your software developers. *Behaviour and Information Technology* 35, 12. <https://doi.org/10.1080/0144929X.2016.1225818>
- [55] Kerry Rodden, Hilary Hutchinson, and Xin Fu. 2010. Measuring the user experience on a large scale : User-centered metrics for web applications. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, 2395–2398. <https://doi.org/10.1145/1753326.1753687>
- [56] Janice Anne Rohn. 2007. How to organizationally embed UX in your company. *Interactions* 14, 3: 25–26. <https://doi.org/10.1145/1242421.1242440>
- [57] Stephanie Rosenbaum, Janice Anne Rohn, and Judee Humberg. 2000. A toolkit for strategic usability: Results from workshops, panels, and surveys. In *Proceedings of the SIGCHI conference on Human Factors in computing systems*, 337–344. <https://doi.org/10.1145/332040.332454>
- [58] Virpi Roto, Eija Kaasinen, Maaria Nuutinen, and Marko Seppänen. 2016. UX Expeditions in Business-to-Business Heavy Industry. In *Proceedings of the 2016 CHI Conference Extended Abstracts on Human Factors in Computing Systems - CHI EA '16*, 833–839. <https://doi.org/10.1145/2851581.2851600>
- [59] Jeff Sauro, Kristin Johnson, and Chelsea Meenan. 2017. From Snake-Oil to Science. In *Proceedings of the 2017 CHI Conference Extended Abstracts on Human Factors in Computing Systems - CHI EA '17*, 1084–1091. <https://doi.org/10.1145/3027063.3053350>
- [60] Eric Schaffer and Apala Lahiri. 2014. *Institutionalization of UX: A Step-by-Step Guide to a User Experience Practice*. Addison-Wesley, Upper Saddle River, NJ.
- [61] Mikael Brasholt Skov and Jan Stage. 2009. Training software developers and designers to conduct usability evaluations. *Behaviour and Information Technology*: 1–11. <https://doi.org/10.1080/01449290903398208>
- [62] Maria Stone, Frank Bentley, Brooke White, and Mike

- Shebanek. 2016. Embedding User Understanding in the Corporate Culture. In *Proceedings of the 2016 CHI Conference Extended Abstracts on Human Factors in Computing Systems - CHI EA '16*, 823–832. <https://doi.org/10.1145/2851581.2851592>
- [63] Tina Taylor-Ritzler, Yolanda Suarez-Balcazar, Edurne Garcia-Iriarte, David B. Henry, and Fabricio E. Balcazar. 2013. Understanding and Measuring Evaluation Capacity. *American Journal of Evaluation* 34, 2: 190–206. <https://doi.org/10.1177/1098214012471421>
- [64] Richard J. Torraco. 2005. Writing Integrative Literature Reviews: Guidelines and Examples. *Human Resource Development Review* 4, 3: 356–367. <https://doi.org/10.1177/1534484305278283>
- [65] Marcin Treder, Jerry Cao, and Vince Ho. 2017. *Enterprise UX Industry Report: 2017 to 2018*.
- [66] Algan Uskarcı and Onur Demirörs. 2017. Do staged maturity models result in organization-wide continuous process improvement? Insight from employees. *Computer Standards and Interfaces* 52: 25–40. <https://doi.org/10.1016/j.csi.2017.01.008>
- [67] Adeola Yetunde Wale-Kolade. 2015. Integrating usability work into a large inter-organisational agile development project: Tactics developed by usability designers. *Journal of Systems and Software* 100: 54–66. <https://doi.org/10.1016/j.jss.2014.10.036>
- [68] Jane Webster and Richard T Watson. 2002. Analyzing the Past to Prepare for the Future: Writing a Literature Review. *MIS Quarterly* 26, 2: xiii–xxiii. <https://doi.org/10.1.1.104.6570>
- [69] Jeff Winter, Kari Rönkkö, and Mikko Rissanen. 2014. Identifying organizational barriers - A case study of usability work when developing software in the automation industry. *Journal of Systems and Software* 88, 1: 54–73. <https://doi.org/10.1016/j.jss.2013.09.019>
- [70] Charles Yiu. 2013. UX design with international teams: Challenges and best practices. In *CHI '13 Extended Abstracts on Human Factors in Computing Systems on*, 2333–2336. <https://doi.org/10.1145/2468356.2468759>
- [71] Reginald Tomas Yu-Lee. 2002. *Essentials of capacity management*. Wiley.