2020

**Executive summary**

VA User Experience (UX) Workshop

The Institute of Healthcare Improvement introduced the concept of the Triple Aim as a compass to guide and improve health system performance1. The Triple Aim calls for organizations to improve three dimensions of care delivery: (1) applying evidence-based medicine to improve the population health; (2) using patient-centered approaches to designing the patient experience; and (3) reducing the per capita cost of healthcare. Stakeholders, acknowledging the growing epidemic of healthcare worker burnout, recommend adding a fourth dimension: improving the work life of health care workers2. This so-called “Quadruple Aim” requires stakeholders to identify and manage the root causes of burnout, including the poor usability of health information technologies (HIT)3.

Improving the usability and user experience of HIT is crucial to achieving the Quadruple Aim. In a 2018 Gallup poll of healthcare employees, 44% reported experiencing feelings of burnout and in a study published in 2015 in the Mayo Clinic Proceedings, 42% of physicians across 29 specialties endorsed burnout4-6. Although there are multiple individual and systems-based causes of burnout, clinicians commonly cite HIT a major contributor7. Non-intuitive interfaces, multiple mouse clicks, intrusive alerts, and fragmented workflows compound user frustration and add two hours to every hour of patient care time8. This decreases operational efficiency, increases healthcare costs, and creates opportunity for medical errors9. Although the Office of the National Coordinator expects HIT vendors to apply user-centered design techniques throughout the HIT development process, providers routinely give electronic health records an “F” usability grade3. A study conducted by Ratwani and colleagues found that many vendors are unfamiliar with or fail to use design best-practices10,11. The task of testing and ensuring HIT usability largely falls upon the healthcare organization.

We designed this three-day user experience (UX) and usability workshop for a range of stakeholders that may be new to UX, human factors engineering, and usability testing. Clinicians, administrative managers, patient safety officers, and informatics executives all have a role in defining business goals, configuring HIT, using HIT, or evaluating the impact of HIT upon patient safety and system performance. Therefore, we believe it is crucial for healthcare stakeholders and front-line users (i.e., physicians, nurses, pharmacists, allied care providers), to become familiar with the principles of user-centered design and UX research.

While it can be helpful to have a background in informatics, computer science, or health record management, it is not essential to conduct UX activities – or participate in this course. Banfield and colleagues sagely noted, “the key components to HIT are not pixels and code, but rather people, time, and processes”12. Good design is less about being a software engineer or “technology guru” and more about understanding enterprise goals, clinical workflow, and the needs of patients and clinicians.

Armed with an understanding of UX, executives can sponsor usability efforts that will have the greatest effect upon business performance and strategic goals. Quality officers need to understand the influence of usability upon behavior to effectively balance the tension between safety and regulatory requirements with user satisfaction and efficiency. Clinical staff that understand evidence-based design can assist with new concept ideation, prototype testing, and implementation efforts. They have the requisite experience to align clinical evidence and evidenced based design with clinical outcomes. Most importantly, technology specialists play a critical role throughout the design lifecycle, from gathering user-requirements, to prototyping designs, and ultimately evaluating product effectiveness prior to implementation. In summary, all workshop participants should walk away from this session with a greater appreciation for the business relevance of UX, their role in the design lifecycle, and how to incorporate UX practices and strategies at every stage of a project.

Each day of the workshop focuses upon a different stage of the product lifecycle. On the first day, we introduce basic definitions, principles, and practices of UX. Participants should be able to define key terms, describe the user-centered design lifecycle, and understand what it means to apply user-centered design throughout HIT development. In the morning, participants will bring in their own projects to workshop activities. By presenting and working on their own projects, participants can quickly identify how they may apply lessons learned in their own practice and can share ideas and experiences with each other. In the afternoon, we pivot to focus upon techniques to empathize with the user and faithfully capture needs.

The second day of the workshop emphasizes the creative process by demonstrating ideation techniques to quickly generate a wide range of potential solutions and explore low-cost prototyping methods. In the morning, we will introduce the cognitive science behind design decisions and explore best practice guidelines published in healthcare. In the afternoon, we will participate in hands-on exercises to gain experience with wireframing and paper prototyping. Participants will learn how to use lean UX prototyping to test designs early and increase collaboration among multi-disciplinary teams.

The third day of the workshop is a deep dive into testing and measurement methods. In the morning, audience members will get hands-on training with a range of usability testing methods including heuristic inspection and user simulation. Because watching users is the most effective ways to uncover usability problems, we will teach methods for designing scenarios, writing tasks, and conducting quick and cheap tests (i.e., “discount usability testing”). In the afternoon, we pivot to look at the specifics, logistics, and challenges of measurement. Participants should be able to select metrics and measurements strategies that simultaneously align business goals with user performance and satisfaction.

By the end of this workshop, participants should be able to return to their workplace armed with a toolkit of usability methods, insights into design opportunities for their own projects, and the foundational knowledge required to promote a UX strategy in their organization.

**References**

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**Our Team**

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| **Blake Lesselroth, MD, MBI, UXC**  Associate Professor, Department of Medical Informatics  University of Oklahoma, School of Community Medicine | **Name, credentials**  Title  Institution |
| Blake completed a residency in internal medicine at Oregon Health Sciences University (OHSU) and a fellowship in Medical Informatics and Medical Education at the VA Portland Healthcare System. He has advanced training in human-computer interactions and specializes in usability evaluation and design thinking methods. | Insert biosketch here. |
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**Sample Agenda**

We have organized this three-day workshop so that each day covers specific phases of the user-centered design lifecycle. The first day focuses upon problem definition and understanding the end-user. The second day focuses upon evidence-based design and prototyping. The third day focuses upon prototype evaluation, including usability testing techniques and evaluation methods.

We further organize each day into a morning didactic followed by a series of “flipped classroom” activities. In the flipped classroom model, we furnish attendees with references materials in advance so they review these materials before each session (although we anticipate this isn’t always possible). During the session, we limit didactic material to very brief tutorials. Then, we ask the attendees to break into small groups and work through mentored exercises, often concluding with a large-group debrief. This approach keeps engagement high, provides hands-on exposure to techniques, enables learners reference real-world projects, and develop higher-order skills such as collaboration, design, and problem solving.

**program FORMAT**

|  |  |
| --- | --- |
| 8:30 – 9:20am | Introductions and housekeeping*Participants introduce themselves and describe their background and expectations for the workshop. The facilitators will review the agenda and goals.*  Learning topics include:   * Review UX workshop format and agenda * Assess audience readiness * Ground rules for participation and use of a “parking lot”   ***Output of this section:*** *Understanding of the UX workshop format and participation etiquette. Materials and deliverables include (1) agenda; (2) revised goals; (3) parking lot; (4) participation ground rules.* |
| 9:30 – 10:20am | **Introduction to User Experience (UX)**  *This is a* ***didactic session*** *that introduces the concepts of user experience, usability, user-centered design, and human factors. The audience should understand the impact of user experience and usability research upon the Quadruple Aim and healthcare quality.*  Learning topics include:   * Definitions of UX, usability, human factors, and human-centered design * The relationship between evidence-based design and quality and safety * Roles for interdisciplinary team members   ***Output of this section:*** *A shared high-level understanding of UX goals and activities. A shared lexicon for describing UX practices and evaluation.* |
| 10:30 – 11:50am | **UX Basic Training: Understanding Goals**  *A* ***flipped classroom*** *session that includes a brief didactic providing an overview of the UX process and two exercises intended to identify and document aims and goals including (1) an analysis of sponsor needs using* ***pain-gain maps****; and (2) a review of participant projects using a* ***design brief*** *format.*  Learning topics include:   * Incorporating UX activities into business activities and product development * Best-practices workflow for UX work * Problem definitions, goals, and mission statements in product development   ***Output of this section:*** *A shared understanding of how UX integrates into business activities. A shared understanding of participant projects. Materials and deliverables include: (1) pain-gain maps; (2) design briefs; and (3) pitch practice for participant projects.* |
| Break |  |
| 1:00 – 2:00pm | **Defining Usability and Requirements**  *A* ***flipped classroom*** *session that includes a brief didactic on the definitions of usability and types of product requirements. The overarching goal of this session is to teach participants how to select a measure that corresponds to the problem or objective.*  Learning topics include:   * Multiple ways of defining and measuring usability * The role of workflows to understand processes and identify measures * Using a customer grid to organize a UX initiative   ***Output of this section:*** *Participants should be able to describe usability and identify dimensions that best align with the project goals. Materials and deliverables include: (1)* ***workflow diagrams****; and (2) the beginning of a* ***customer grid****.* |

**Activities and Learning Objectives**

|  |  |  |  |
| --- | --- | --- | --- |
| **Day**  **time** | **Activity and outputs** | **Learning objectives** | **Materials** |
| **Day 1** |  |  |  |
| 8:30 – 9:20am | **Introductions and housekeeping**  *All participants introduce themselves and discuss their background, skills, requirements, and expectations. The facilitators will review the agenda and explain the purpose behind the ground rules and parking lot. This is the time to negotiate learning objectives, activities, or project focus.*  *Outputs include (1) workshop agenda; (2) any additional goals; (3) list of ground rules; and (4) a parking lot.* |  |  |
| 9:30 – 10:20am | **Introduction to User Experience (UX)**  *This is a* ***didactic session*** *that introduces the concepts of user experience, usability, user-centered design, and human factors. The audience should understand the impact of user experience and usability research upon the Quadruple Aim and healthcare quality.* | * Define user experience, usability, human factors, and user-centered design * Describe how design impacts quality and safety in healthcare delivery * Explain how to apply user-centered design to the technology lifecycle * List ways end-users can be engaged in the development process | * **Video**: Introduction to User Experience I * **Video**: Introduction to User Experience 2 * **Reading**: (an introductory UX paper) * **Reading**: (Bodenheimer paper) |
| 10:30 – 11:50am | **UX Basic Training: Understanding Goals**  *A* ***flipped classroom*** *session that includes a brief didactic providing an overview of the UX process and two exercises intended to identify and document aims and goals including (1) an analysis of sponsor needs using* ***pain-gain maps****; and (2) a review of participant projects using a* ***design brief*** *format.*  *Outputs include (1) a pain-gain map; and (2) a design brief with any associated artifacts.* | * List the major UX design phases and activities * Describe a best-practices workflow for UX design and UX management * Explain the return-on-investment for UX work and evaluation * Identify stakeholders, problem statements, and project objectives using local examples | * **Video**: Applying UX to Operations and Development * **Video**: Understanding Stakeholders * **Video**: Problem Definition and the Design Brief * **Reading**: (pain-gain map) * **Reading**: (something on the UX workflow) |
| **Break** |  |  |  |
| 1:00 – 2:50pm | **Defining Usability and Requirements**  *A* ***flipped classroom*** *session that includes a brief didactic on the definitions of usability and types of product requirements. We follow the didactic with two exercises including: (1) drafting* ***workflow diagrams****; and (2) completing the first several columns in a* ***customer grid****.*  *Outputs include (1) a workflow diagram; and (2) a customer grid with the first several columns completed.* | * List five ways to define and evaluate usability * Explain the difference between formative and summative testing * Organize metrics according to stakeholders, goals, and requirements * Use a workflow to identify measurement opportunities * Use a customer grid to trace stakeholders, features, goals, and metrics | * **Video**: (HFE workflow lecture) * **Video**: Creating a Customer Grid 1 * **Reading:** (something about workflow mapping) * **Reading**: (Lesselroth paper) |
| 3:00 – 4:50pm | **User Empathy**  *A* ***flipped classroom*** *activity that includes a brief didactic emphasizing the importance of user research to empathize with user frustrations and goals. We will demonstrate several techniques using two exercises including: (1) a* ***post-up*** *of user characteristics; and (2) creation of* ***empathy maps.*** *We will also provide examples of* ***journey maps****.*  *Outputs include (1) a facts-and-assumptions post up; and (2) sample empathy maps.* | * List at least three techniques for identifying user needs and goals * Describe the facts and assumptions technique for understanding the user * Demonstrate how to create an empathy map * Create a simplified journey map | * **Video**: Empathizing with Patients and Staff * **Video**: User Research 1: Ethnography * **Video**: User Research 2: Empathy Maps * **Video**: User Research 3: As-Is and Journey Maps * **Reading**: * **Reading**: |
| 5:00 – 5:30pm | **Debrief and evaluation**  *An opportunity to review what went well and what to improve with reference to the day’s activities.*  *Output includes a written evaluation.* |  |  |
| **Day 2** |  |  |  |
| 8:30 – 9:00am | **Agenda and housekeeping**  *The facilitators will review the agenda and confirm shared goals and objectives among all participants. This is the time to negotiate learning objectives, activities, or project focus. Participants will have the opportunity to indicate what lessons from the previous session are the most important to them.* |  |  |
| 9:00 – 9:50am | **Theory and Practice of Design**  *A* ***didactic session*** *introducing fundamental principles of perception and how design influences perception. The audience will learn about key design concepts including Bates’ 10 Commandments of Decision Support and Zhang’s Usability Heuristics for health information technology.* | * Explain how heuristics, gestalts, and habits predict human-computer interaction * List major concepts that influence the design of visual displays * Summarize the 10 commandments of decision support * Explain how Zhang’s 14 usability heuristics can guide interface designs | * **Video**: Introduction to User Experience 3 * **Video**: Introduction to User Experience 4 * **Reading**: (Bates paper) * **Reading**: (Zhang paper) |
| 10:00 – 12:00pm | **Developing Heuristics for the VA**  *An* ***interactive session*** *intended to enrich participants’ understanding of usability heuristics. Participants will have the opportunity to evaluate local enterprise interfaces (e.g., CPRS) using published heuristics and use this as a jumping off point to develop context-specific heuristics for the VA. Exercises will include (1) brainstorming with* ***post-ups****; and (2)* ***affinity mapping****.*  *Output includes an affinity map of VA heuristics with definitions and examples for each cluster.* | * Demonstrate the ability to evaluate interface designs using design heuristics * Identify context-sensitive heuristics and best-practices for local products. * Use post-ups and affinity mapping to uncover novel ideas and discover patterns by clustering information into relational groups. | * **Video**: Post Ups and Affinity Mapping * **Reading**: |
| **Break** |  |  |  |
| 1:00 – 2:50pm | **Design Thinking**  *A* ***flipped classroom*** *activity that includes a brief didactic introducing Design-Thinking and two activities including (1) writing* ***needs statements****; and (2) rapidly designing with* ***sketch-ups****.*  *Outputs include (1) a table of needs statements; and (2) sample sketches from a sketch up* | * Describe the Design-Thinking model * Explain how Design-Thinking leads to better products and services * Create a set of needs statements * Use sketch-ups to rapidly develop design strategies * Explain how prioritization matrices can guide design strategy | * **Video:** Introduction to Design Thinking * **Video:** Needs Statements, User Stories, and Epics * **Video:** Ideation through Sketching * **Reading:** * **Reading:** |
| 3:00 – 5:00pm | **Wireframes and Annotation**  *A* ***flipped classroom*** *activity that emphasizes the importance of developing wireframes and prototypes to gather early feedback, explore design alternatives, and lower overall development costs. This session introduces participants to a range of deliverables and explains to select the best deliverable for the intended audience. Exercises include (1) drafting a* ***wireframe;*** *(2)* ***annotating a prototype*** *for a usability report.*  *Outputs include: (1) sample wireframes; and (2) paper screenshots of a prototype with annotations.* | * Define wireframes, prototypes, and design comps * List at least three ways to prototype a design or product * Demonstrate how to select the fidelity based upon the task or need * Apply best practices to wireframe and prototype design * List common deliverables used to communicate UX * Explain how to select the best deliverable for the audience * Explain the difference between workflows, wireflows, and sitemaps * Describe the purpose, organization, and preferred methods for usability reporting | * **Video**: Prototyping 1: Wireframes, Wireflows, and Annotation * **Video**: Prototyping 2: Medium Fidelity Prototypes and Tools. * **Reading**: * **Reading**: |
| 5:00 – 5:30pm | **Debrief and evaluation**  *An opportunity to review what went well and what to improve with reference to the day’s activities.*  *Output includes a written evaluation.* |  |  |
| **Day 3** |  |  |  |
| 8:30 – 9:00am | **Agenda and housekeeping**  *The facilitators will review the agenda and confirm shared goals and objectives among all participants. This is the time to negotiate learning objectives, activities, or project focus. Participants will have the opportunity to indicate what lessons from the previous session are the most important to them.* |  |  |
| 9:00 – 12:00pm | **Usability Testing**  *A* ***flipped classroom*** *mini-workshop with a brief didactic introducing a framework for approaching usability testing and a range of commonly used testing methods. Activities include (1) completing a* ***heuristic inspection*** *of a sample interface; (2) writing* ***sample tasks*** *for a simulation; and (3) conducting a* ***simulation with Think Aloud*** *protocol.*  *Outputs include (1) a completed heurisitic inspection; (2) a list of simulation tasks; (3) a completed simulation data collection form.* | * Describe the Cognitive Socio-technical Framework for usability testing * Use Zhang’s 14 usability heuristics to complete a heuristic inspection * Describe the goals and general techniques for a cognitive walk-through * Apply a checklist to develop and conduct a usability simulation * Write effective tasks for a simulation * Conduct a usability simulation using the Think Aloud protocol | * **Video**: Usability Testing 1: Overview of Testing Methods * **Video**: Usability Testing 2: Heuristic Inspection * **Video**: Usability Testing 3: Cognitive Walkthrough * **Video**: Usability Testing 4: Introduction to User Simulation * **Video**: Usability Testing 5: Introduction to User Simulation * **Video**: Usability Testing 6: Intermediate Simulation Techniques * **Reading**: (Russ paper?) * **Reading**: (something on heuristic inspection) * **Reading**: (Kushniruk) * **Reading**: (Lesselroth chapter) |
| **Break** |  |  |  |
| 1:00 – 4:00pm | **Analytics and Customer Satisfaction**  *A flipped classroom mini-workshop with a brief didactic introducing the concept of measurement and how to practically apply measurement to usability dimensions. Activities include (1) matching metrics to usability dimensions; (2) matching statistical tests to measures; and (3) completing a* ***customer grid****.*  *Output is a completed customer grid.* | * Describe the difference between dependent and independent variables * Describe the difference between performance measures and self-reported measures * Select a qualitative or quantitative testing strategy based upon testing goals * Select measurement strategies to satisfy stakeholders and meet project goals * List validated user questionnaires for measuring user satisfaction * Explain when to use descriptive statistics as opposed to analytic statistics * Select the correct statistical test and number of users for the type of measure * Demonstrate how to calculate an improvement score and return-on-investment | * **Video**: Usability Analytics 1: Overview of Analytics * **Video**: Usability Testing 2: Selecting the Right Analytic * **Video**: Usability Testing 3: Prioritizing Findings * **Video**: Usability Testing 4: Self-Reported Metrics * **Video**: Usability Testing 5: Performance Metrics * **Video**: Usability Testing 6: Calculating Improvement and ROI * **Reading**: (Russ paper?) * **Reading**: (something on heuristic inspection) * **Reading**: (Kushniruk) * **Reading**: (Lesselroth chapter) |
| 4:00 – 5:00pm | **Debrief and evaluation**  *An opportunity to review what went well and what to improve with reference to the day’s activities.*  *Output is a written evaluation.* |  |  |

Please see appendices for materials and facilitators’ guides for each class.

**Process**

The goal of a workshop in UX is to meet the needs of an interdisciplinary team wherever they are in the product development lifecycle. There are discovery workshops, empathy workshops, design studios, prototyping sessions, prioritization workshops, and design critiques. A workshop should build a method for managing each phase of the lifecycle, whether the goal is to define a problem, develop a solution, or reach a decision. This means there must be a clear agenda, well defined roles, evidence-based methods, and deeper, focused coverage of each issue.

The same expectations apply to a UX workshop on skills development. Successful workshops minimize presentations and unstructured discussion. Most work is interactive and most activities are designed and facilitated. Accordingly, it is extremely important to plan well in advance and work closely with stakeholders to meet expectations. A detailed plan should include a list of potential attendees, arrangement of protected time for participants, and a suitable workspace to permit breakout groups and interactive exercises. It is also critical to consider facilitator-to-attendee staffing ratios, workbook/material development, distribution of reference materials, and availability of technical resources.

Clinical personnel have limited bandwidth and creativity is hard to harness into a linear set of stages. Nevertheless, it is extremely important to work closely with stakeholders and work towards a predictable timeline. While exact milestone completion dates may vary by 1 to 2 days, we stick to a tight schedule and follow the process outlined below:

|  |  |
| --- | --- |
| Milestone | Timeline |
| Confirm dates with client/customer/site |  |
| Needs assessment interview |  |
| Provision of draft agenda |  |
| Refinement |  |
| Approval of agenda |  |
| Confirmation of time, location, and resources |  |
| List of attendees |  |
| Secure on-site personnel |  |
| Provision of final agenda with exercises |  |
| Provision of pre-work package |  |
| Finalize travel |  |
| Negotiate logistics (IT permissions, food, equipment) |  |
|  |  |

**Evaluation strategy**

**References and suggested readings**

**1. Banfield, R**., et al. (2015). Design sprint: A practical guidebook for building great digital products, " O'Reilly Media, Inc.".

**2. Barnum, C. M.** (2010). Usability testing essentials: ready, set... test!, Elsevier.

**3. Harrington, L.** and C. Harrington (2014). Usability evaluation handbook for electronic health records, HIMSS.

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**5. Krug, S.** (2009). Rocket surgery made easy: The do-it-yourself guide to finding and fixing usability problems, New Riders.

**6. McKay, E. N.** and D. Musgrave (2018). Intuitive Design: Eight Steps to an Intuitive UI, Black Watch Publishing.

**7. Nielsen, J**. (1994). Usability engineering, Morgan Kaufmann.

**Appendix A: Pain-gain maps**

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**Appendix B: Design brief template**

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**Appendix C: Sample requirements documents**

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**Appendix D: Sample workflow diagram**

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**Appendix E: Customer grid template**

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**Appendix F: Facts and assumptions exercise**

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**Appendix G: Sample empathy map**

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**Appendix H: Sample journey map**

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**Appendix I: Needs statement template**

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**Appendix J: Sketch up exercise**

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**Appendix K: Sample prioritization matrices**

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**Appendix L: Wireframe for annotation exercise**

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**Appendix M: Paper prototyping exercise**

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**Appendix N: Creating a wireflow exercise**

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**Appendix O: Sample usability report exercise**

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**Appendix P: Heuristic inspection worksheet**

Insert text here

**Appendix Q: Writing sample tasks**

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**Appendix R: Conducting a simulation exercise**

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