

# Optimizing Outpatient CT and MRI Scheduling Using Human-Centered Design Thinking

*A Creative Way to Problem Solving*

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# Disclosures

- ▶ Shaun A Wahab - None
- ▶ Rifat Wahab - None
- ▶ Ann Brown - None
- ▶ Seetharam Chadalavada - None
- ▶ Shari S. Lecky - None
- ▶ Erica Washburn - None
- ▶ Tricia Roberts - None
- ▶ Craig Vogel - ACR Innovation Fund Grant
- ▶ Mary Mahoney - ACR Innovation Fund Grant, Researcher, General Electric Company
- ▶ Achala Vagal - ACR Innovation Fund Grant, Research Grant, Cerovenus

# Purpose

- ▶ **Design thinking is a creative problem-solving technique borrowed from the business world. Our objective was:**
  - (1) To understand and map our outpatient CT and MRI central scheduling pathway using human-centered design thinking**
  - (2) To create a feasible functional prototype of a potential solution for central scheduling using the design thinking methodology**

# Collaboration

- ▶ **The University of Cincinnati (UC) Department of Radiology partnered with UC Health, Live Well Collaborative (LWC), and UC College of Design, Architecture, Art, and Planning (DAAP)**
- ▶ **Our team included all relevant stakeholders: design students, design faculty advisor, patient experience officer, members of the patient and family advisory council (PFAC), scheduling manager, radiology managers, schedulers, technologists, and radiologists**

# What is Human Centered Design?

We ask what can we do to change things? That question leads us to design which is the act of changing existing situations into preferred ones.

- Herb Simon



1. Produces balanced qualitative data



3. Lowers stakeholder uncertainty



5. Promotes collaboration



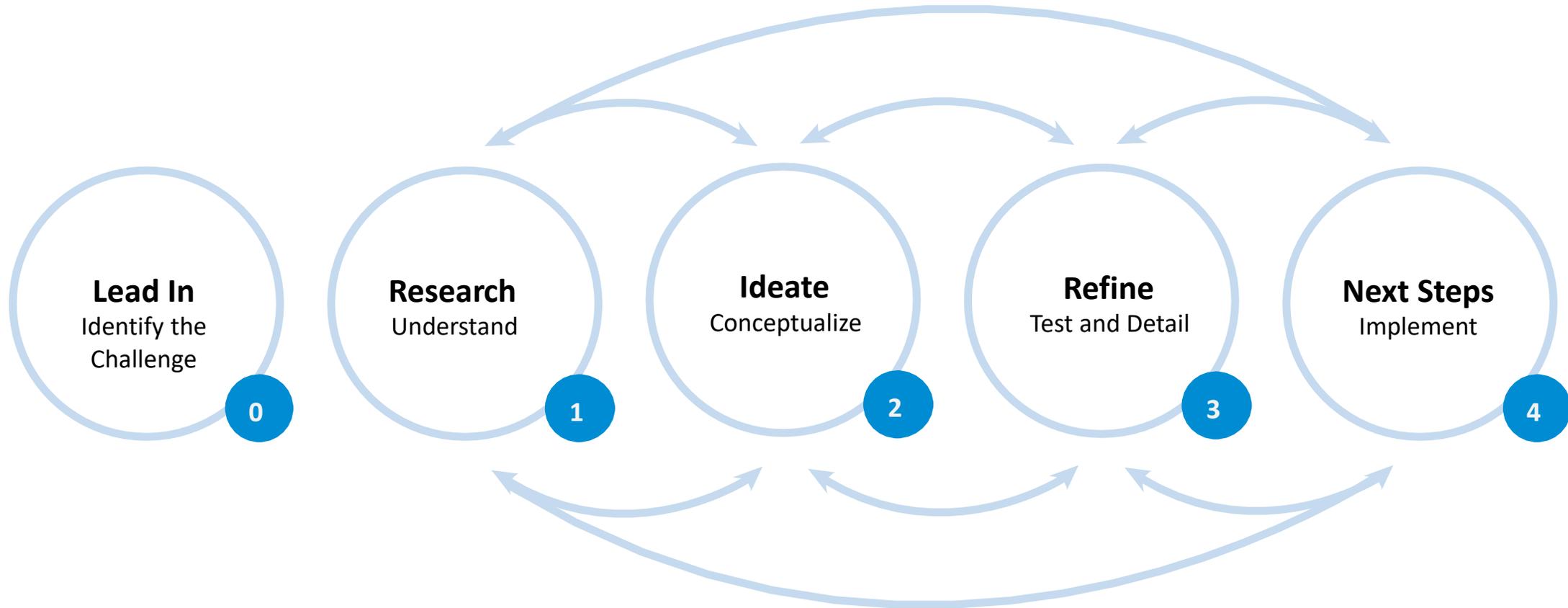
2. Generates visualized concepts



4. Provides coherent relevance

# Methodology: Live Well Design Thinking Process

Design Thinking is an innovative problem-solving process with five distinct phases. These steps are nonlinear, rather are iterative.



# Research Phase

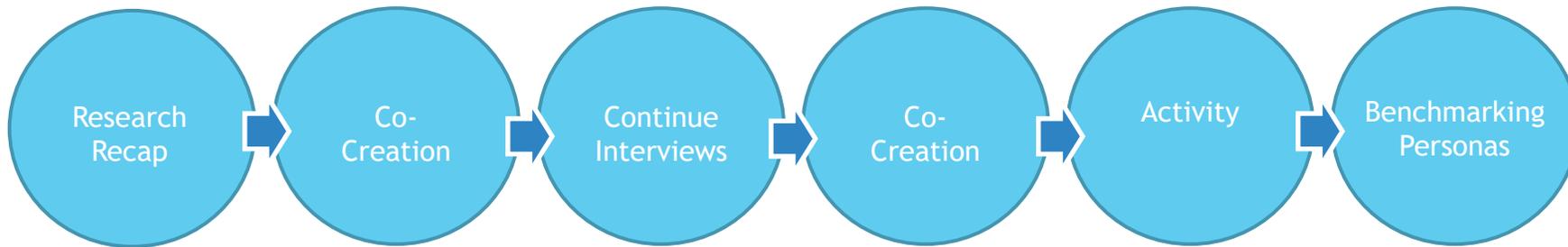
- ▶ Interviews
  - ▶ Face to face interviews were conducted with schedulers, technologists, managers, registrars, radiologists, referring physicians, and members of the patient and family advisory council
- ▶ Scheduling Journey Map
  - ▶ Centralized scheduling journey map was developed with schedulers and patients to gain a better understanding of the scheduling process and pain points
- ▶ Site Observation
  - ▶ Schedulers were observed in their working environment
- ▶ Benchmarking
  - ▶ Benchmarked scheduling solutions from other institutes and companies
- ▶ Existing Data: Scheduling Error Emails
  - ▶ Analyzed emails between the radiology department and centralized scheduling regarding scheduling errors
- ▶ Main Problem Categories Identified
  - ▶ Knowledge Gap in Schedulers
    - ▶ No standardized scheduling educational resource
  - ▶ Inefficient Communication of Updated Information from One Scheduler to Another
    - ▶ Predominantly relying on post-it notes
  - ▶ Ambiguous Information
  - ▶ Unbalanced Reinforcement from Admin to Schedulers
  - ▶ Fragmented New Hire Support
    - ▶ Negligible imaging specific training for new schedulers

Example of a scheduler's office space



# Ideation Phase

- ▶ The ideation phase is characterized by co-creation sessions to review the insights from the research phase and generate alternative solutions for early testing
- ▶ Goals
  - ▶ To translate research insights into potential solutions
  - ▶ To build the initial framework incorporating existing tools
  - ▶ Begin gathering contents for the prototype



- Feasibility Matrix with technologists, radiologists, and schedulers

- In-depth insights on scheduling with radiologists, schedulers, and admins

- Radiology 101 Educational Tool identified as most viable solution

- Content
- Implementation
- Strategy

- Scheduler guide case study
- Understand schedulers needs, experiences, behaviors, and goals



Example of Feasibility Matrix from a co-creation session

# Refinement Phase

- ▶ Using insights gained in the ideation phase, a functional prototype is created for evaluation and testing.
- ▶ Goals
  - ▶ To create an effective implementation plan
  - ▶ To validate and refine the final concepts with all stakeholders

## Information redesign

**CENTRALIZED SCHEDULING - WHAT WE DO AND WHERE WE DO IT - QUICK GUIDE**

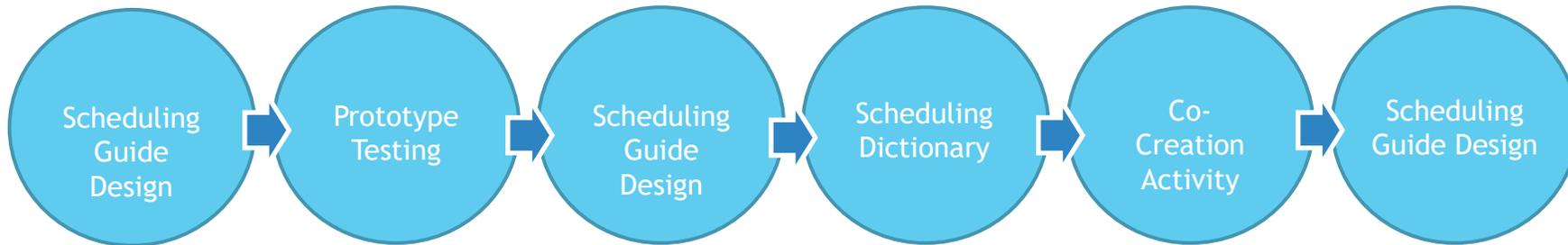
ANY OTHER ROOMS IN THE PROVIDER POOL CAN BE REMOVED BEFORE AUTO-SEARCHING OR MANUALLY SEARCHING

ANESTHESIA/SEDATION IMAGING	UCMC	CALL ANESTHESIA, COORDINATE DATE/TIME W/DOPT PROCEDURE. BOOK APPR. ADD ANESTHESIA RESOURCE (EXCEPT MRI PREP CALL TO UNDERBITNER TO SCHEDULE)
	WCH	CALL ANESTHESIA, COORDINATE DATE/TIME W/DOPT PROCEDURE. BOOK APPR. ADD ANESTHESIA RESOURCE (EXCEPT MRI PREP CALL TO UNDERBITNER TO SCHEDULE)
CT (COMPUTER TOMOGRAPHY)	UCMC	UH CT 1 UH CT 2
	ROGERSWAY	PREC CT 1
	MAB	MAB CT 1
	TDC	TDC CT ROOM 1
	WCH	PREC CT 1 WCH CT 2
	WCH	INDOPHU CT 1
	WCH	INDOPHU CT 2
DEKA (BONE DENSITY) SCAN	UCMC	UH MAMMO DEKA (HOL) UH NM DEKA (JG)
	MIDTOWN	MID DEKA (JG)
	WCH	PREC DEKA 1 (HOL)
ECHO 2D (ECHOCARDIOGRAM)	UCMC	UH ECHO 3 UH ECHO 4
CENTRALIZED SCHEDULING CAN BOOK ECHO 2D AT ALL THESE LOCATIONS		
	ROGERSWAY	PREC ECHO (COMING SOON, DATE TBD)
	MAB	MAB ECHO 1
	WCH	MAB ECHO 2
	HOKWORTH	HOKW ECHO 3
	WCH	WCH ECHO 3
	WCH	PREC ECHO 1
	MIDTOWN	MIDTOWN ECHO
	FLORENCE	FLO DEKA
	TDC	TDC ULTRASOUND 1
ECHO STRESS (ECHOCARDIOGRAM)	UCMC	UH ECHO 4
CENTRALIZED SCHEDULING ONLY SCHEDULES STRESS ECHO AT THE HOSPITAL LOCATIONS (UCMC AND WCH)		
	WCH	WCH ECHO 1
REG/EEG (ELECTROENCEPHALOGRAM)	UCMC	UH EEG
	UCMC	UH REG/EEG GRI
	WCH	EEG ROOM WCH
	WCH	WCH OF REG
REG/ECG (ELECTROCARDIOGRAM)	UCMC	MAB XR 3 (CYSTURETH ONLY)
	UCMC	UH FLUORO G228 (H)
	UCMC	UH FLUORO G228 (L)
	TDC	TDC FLUORO RM 2
	WCH	WCH FL 1
	WCH	WCH FL 2
GAT (GRADED EXERCISE TEST)	UCMC	UH STRESS REG 2
	WCH	WCH STRESS REG 1 WCH STRESS REG 2

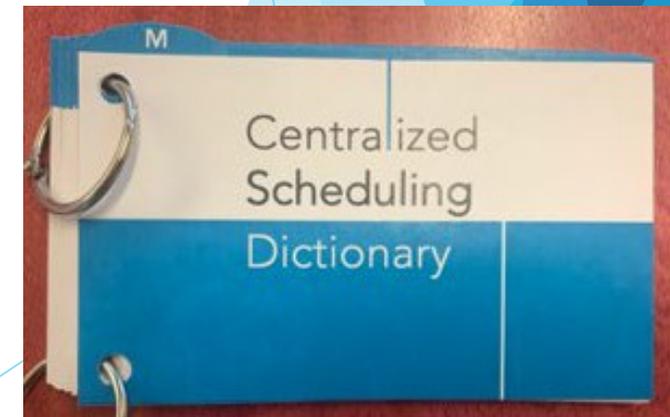
**QUICK GUIDE**

Any other rooms in the provider pool can be removed before auto-searching or manually searching.

<b>MRI (MAGNETIC RESONANCE IMAGING)</b>	UCMC	UH MR1 1 (S) UH MR1 2 (S) UH MR1 3 (S) UH MR1 4 (S) UH MR1 5 (S) UH MR1 6 (S) UH MR1 7 (S) UH MR1 8 (S) UH MR1 9 (S) UH MR1 10 (S) UH MR1 11 (S) UH MR1 12 (S) UH MR1 13 (S) UH MR1 14 (S) UH MR1 15 (S) UH MR1 16 (S) UH MR1 17 (S) UH MR1 18 (S) UH MR1 19 (S) UH MR1 20 (S) UH MR1 21 (S) UH MR1 22 (S) UH MR1 23 (S) UH MR1 24 (S) UH MR1 25 (S) UH MR1 26 (S) UH MR1 27 (S) UH MR1 28 (S) UH MR1 29 (S) UH MR1 30 (S) UH MR1 31 (S) UH MR1 32 (S) UH MR1 33 (S) UH MR1 34 (S) UH MR1 35 (S) UH MR1 36 (S) UH MR1 37 (S) UH MR1 38 (S) UH MR1 39 (S) UH MR1 40 (S) UH MR1 41 (S) UH MR1 42 (S) UH MR1 43 (S) UH MR1 44 (S) UH MR1 45 (S) UH MR1 46 (S) UH MR1 47 (S) UH MR1 48 (S) UH MR1 49 (S) UH MR1 50 (S) UH MR1 51 (S) UH MR1 52 (S) UH MR1 53 (S) UH MR1 54 (S) UH MR1 55 (S) UH MR1 56 (S) UH MR1 57 (S) UH MR1 58 (S) UH MR1 59 (S) UH MR1 60 (S) UH MR1 61 (S) UH MR1 62 (S) UH MR1 63 (S) UH MR1 64 (S) UH MR1 65 (S) UH MR1 66 (S) UH MR1 67 (S) UH MR1 68 (S) UH MR1 69 (S) UH MR1 70 (S) UH MR1 71 (S) UH MR1 72 (S) UH MR1 73 (S) UH MR1 74 (S) UH MR1 75 (S) UH MR1 76 (S) UH MR1 77 (S) UH MR1 78 (S) UH MR1 79 (S) UH MR1 80 (S) UH MR1 81 (S) UH MR1 82 (S) UH MR1 83 (S) UH MR1 84 (S) UH MR1 85 (S) UH MR1 86 (S) UH MR1 87 (S) UH MR1 88 (S) UH MR1 89 (S) UH MR1 90 (S) UH MR1 91 (S) UH MR1 92 (S) UH MR1 93 (S) UH MR1 94 (S) UH MR1 95 (S) UH MR1 96 (S) UH MR1 97 (S) UH MR1 98 (S) UH MR1 99 (S) UH MR1 100 (S)
<b>DEKA (BONE DENSITY) SCAN</b>	UCMC	UH MAMMO DEKA (HOL) UH NM DEKA (JG)
<b>ECHO 2D (ECHOCARDIOGRAM)</b>	UCMC	UH ECHO 3 UH ECHO 4
<b>ECHO STRESS (ECHOCARDIOGRAM)</b>	UCMC	UH ECHO 4
<b>REG/EEG (ELECTROENCEPHALOGRAM)</b>	UCMC	UH EEG
<b>REG/ECG (ELECTROCARDIOGRAM)</b>	UCMC	MAB XR 3 (CYSTURETH ONLY)
<b>GAT (GRADED EXERCISE TEST)</b>	UCMC	UH STRESS REG 2

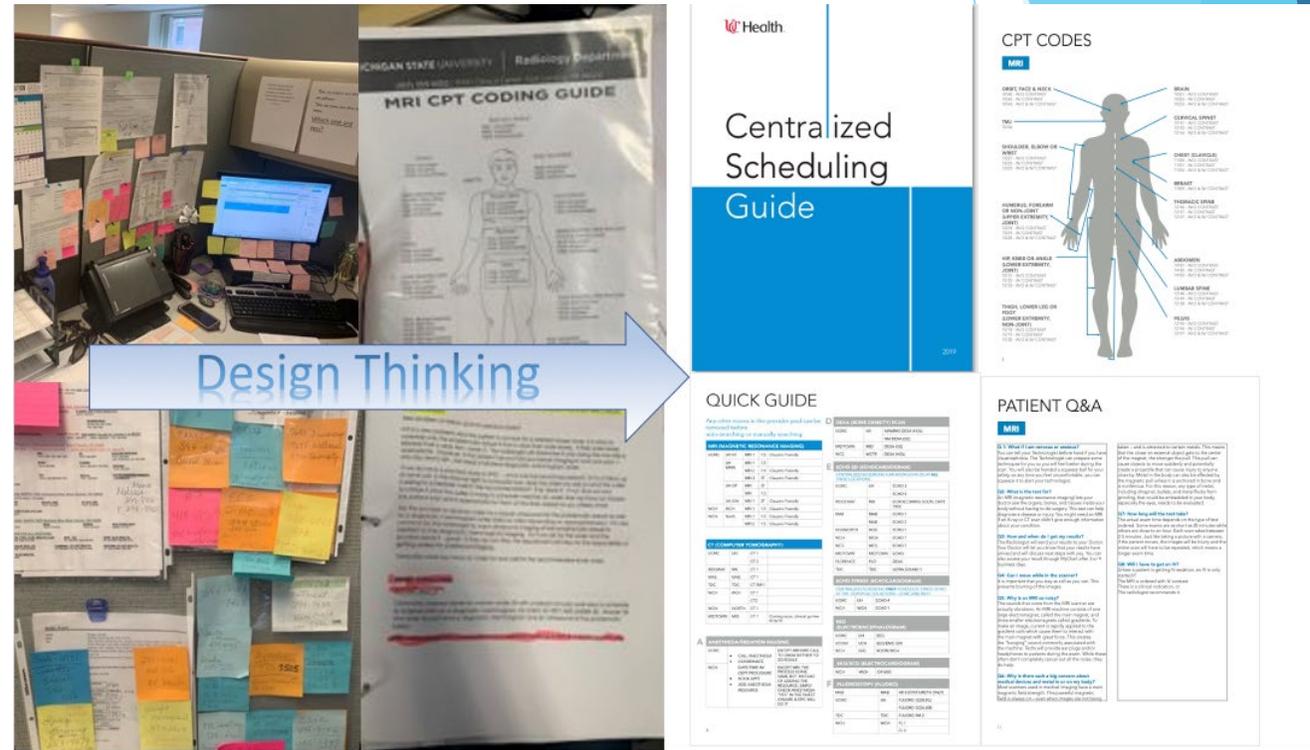


- First prototype
- Tested with 5 schedulers
- Second Prototype
- Physical and electronic versions
- Terminology reference with physical and electronic versions
- Schedulers
- Technologists
- Final Prototype



# Results/Prototype

- ▶ A functional prototype educational tool was created with input from all stakeholders
- ▶ Radiology 101 Centralized Scheduling Guide
  - ▶ Contents
    - ▶ Table of Contents
    - ▶ Contact Info
    - ▶ Quick Reference Guide of CPT codes arranged by body part
    - ▶ Site-based location instructions
    - ▶ Scanner profiles
    - ▶ Patient Q&A
    - ▶ Add-on rules
    - ▶ Scheduling guidelines
    - ▶ Dictionary/Glossary
- ▶ Preliminary feedback from schedulers has been overwhelmingly positive
- ▶ Schedulers are more confident and feel better prepared to guide patients and answer questions



**Previous method of conveying and accumulating scheduling information transformed with design thinking and input from all stakeholders**

**New Radiology 101 Scheduling Guide**

# Conclusions

- ▶ Using human-centered design thinking, we created a comprehensive toolkit for schedulers. This tool will provide better education and empower our schedulers and ultimately translate to better patient care.
- ▶ Collaborators can use the co-design process to find new and creative solutions to common problems in a way that makes ‘thinking outside the box’ the new norm.

