

# D10: Informing Best Practice for NICU Design

HEALTHCARE FACILITIES SYMPOSIUM & EXPO

BOSTON MA

THURSDAY SEPTEMBER 18, 2019

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# Speakers

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Mark Reckin

HGA Medical Planner

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HGA Principal



# UK Healthcare NICU Project Team

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GBBN – Architect of Record

HGA – Associate/Design Architect

Turner Construction – Construction Manager

Affiliated Engineers, Inc – MEP/Technology Engineering

Smith Hager Bajo – Women's/Children Consultant

THP Limited – Structural

BSA Life Structures – Medical Equipment Planning

Preview Group – Code Consultants

Eidahl Environmental Design – Wayfinding

S&ME – Civil Engineering

Jack Evans and Associates – Acoustics

Lighting Research Center – NICU Lighting

# Learning Objectives



Learn how design can address the special needs of NICU babies, their family members and NICU staff.



Understand how to enhance the design process with research.



Discuss the challenges of moving from 48 open-bay to 70 private bed NICU design.



State lessons learned of a large reconstruction project, including results of a post-occupancy evaluation.



## The Project

# UKHealthCare

- Level 1 Trauma Center in Lexington KY
- Phased Replacement Patient Tower – 1.2M square feet
- Licensed over 1000 beds
- Very High CMI Index
- Regional Referral Center



## Existing NICU Unit

- 66 beds – 3 units (multiple floors)
- Open bays divided into pods
- Shared circulation/team work space
- **8,300 SF**



# New Unit

- 70 private beds – 4 neighborhoods
- Private rooms (no toilet)
- Decentralized nursing and huddle station per neighborhood
- 45,000 SF











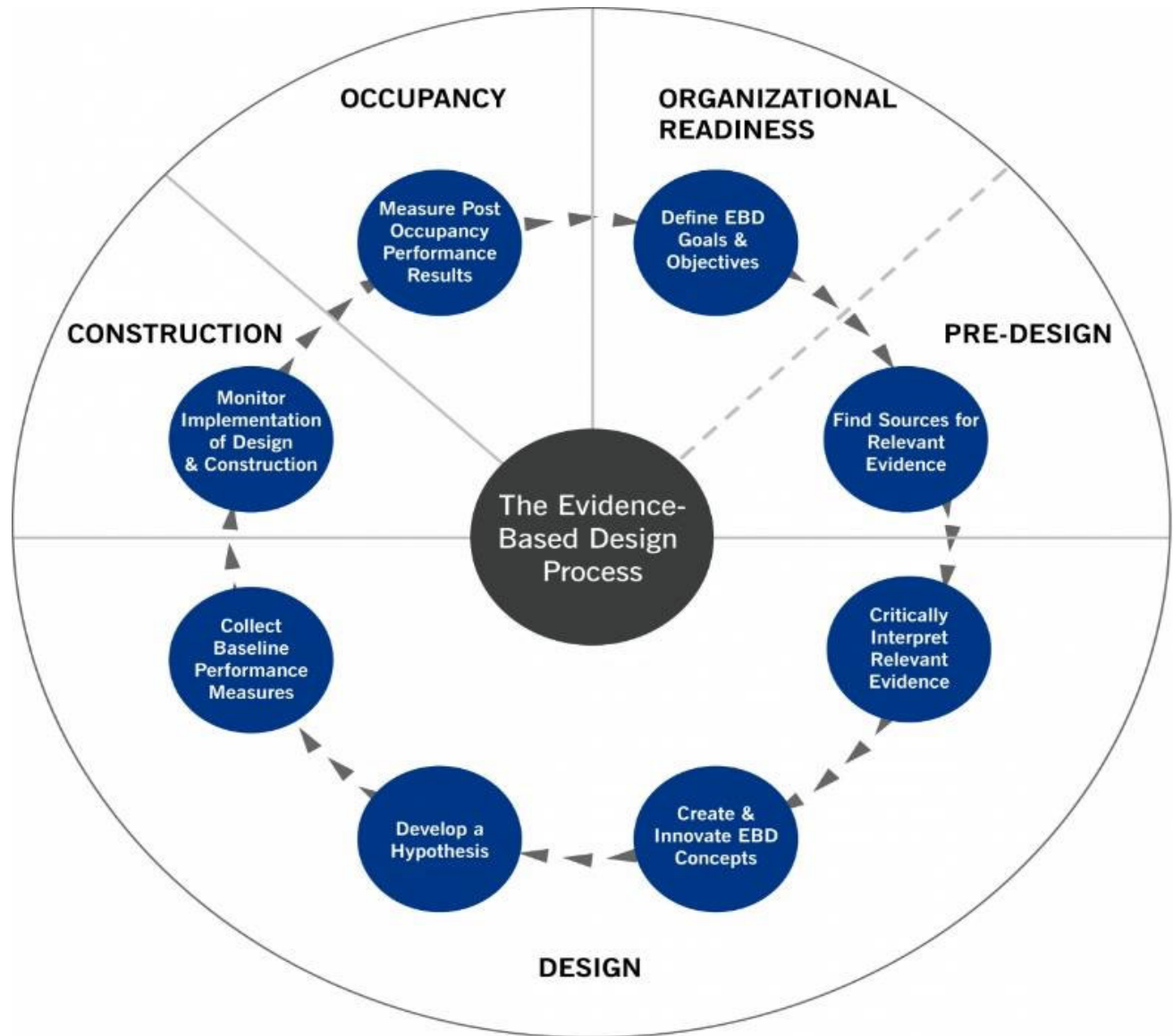








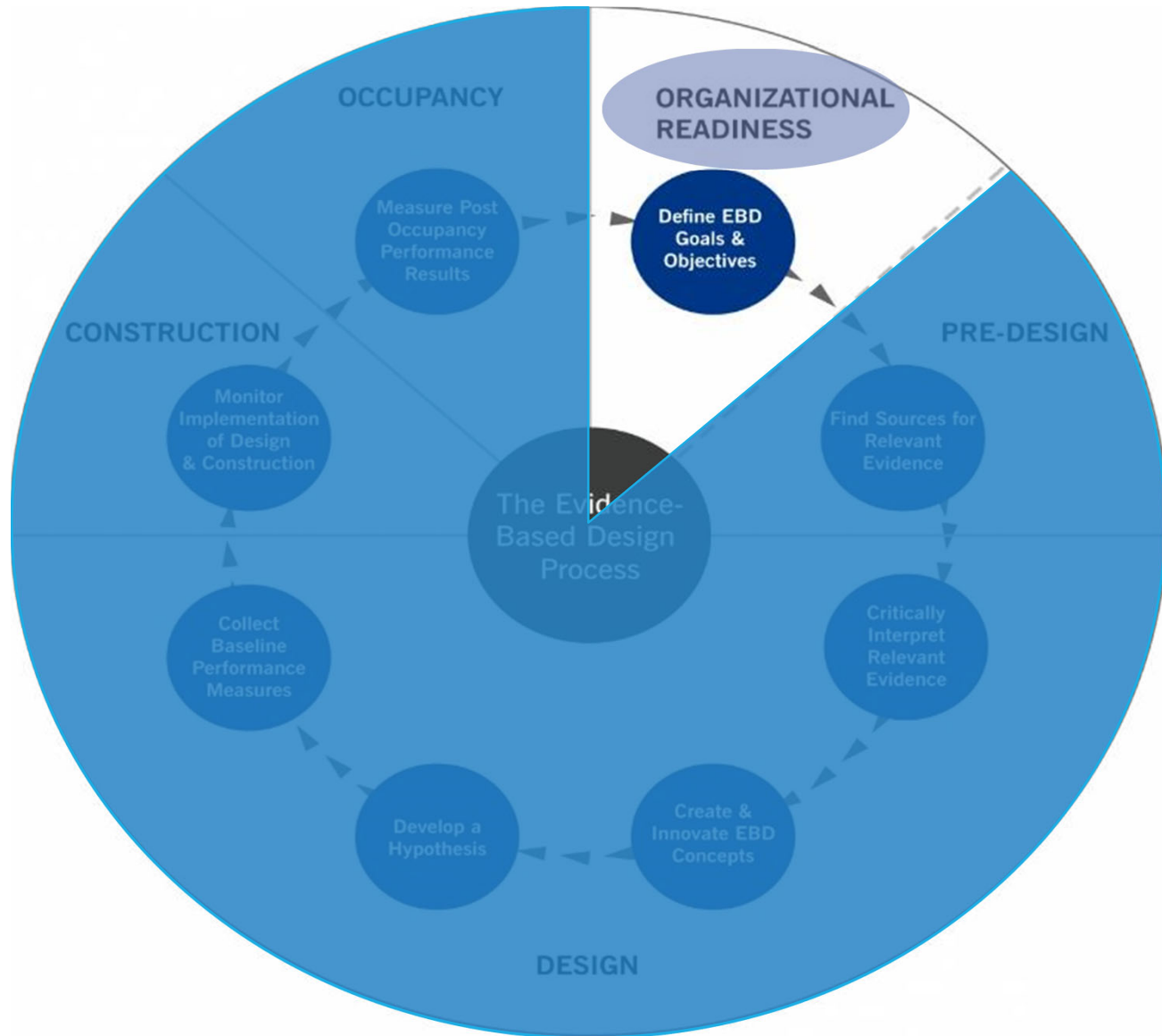
## The EBD Journey



Scientific Figure on ResearchGate. Available from: [https://www.researchgate.net/figure/The-EBD-process-as-part-of-the-facility-design-process\\_fig1\\_262971553](https://www.researchgate.net/figure/The-EBD-process-as-part-of-the-facility-design-process_fig1_262971553) [accessed 20 Jan, 2019]



- Guiding Principles
- Master Plan
- Enabling projects
- Financial Commitment



Scientific Figure on ResearchGate. Available from: [https://www.researchgate.net/figure/The-EBD-process-as-part-of-the-facility-design-process\\_fig1\\_262971553](https://www.researchgate.net/figure/The-EBD-process-as-part-of-the-facility-design-process_fig1_262971553) [accessed 20 Jan, 2019]

# Guiding Principles

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## **Patient Access & Care Priority**

- Promote a family centered model of care
- Ensure patient care quality and improve clinical outcomes

## **Academic Mission**

- Develop a collaborative, supportive staff environment
- Become the Academic Medical Center of choice for patients, faculty, students, and staff

## **Integration of Clinical Services**

- Establish a developmentally supportive care environment
- Provide a clear, safe & discrete connection to Labor & Delivery

## **Efficiency**

- Focus on functions essential to efficient & safe clinical operations
- Eliminate unnecessary duplication of staff, equipment and space

## **Flexibility**

- Design spaces & technology for flexibility/adaptability to future change
- Plan flexible care giving spaces for multiple levels of care

## **Image**

- Create a new, comprehensible 'front door' image for KCH
- Convey 'state of the art' quality of care provided at KCH



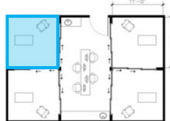

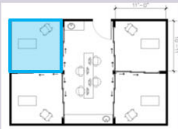
# Master Planning

## Strengths

- Major decisions outlined
- Potential cost options identified
- Fundraising plan material

## Challenges

- Timing of implementation
- Financial commitment

NICU Program Options						
NICU Program Area Options						
	Room Type		Number of rooms	Program Area Required	Area Available Pav HA – typ floor	Difference
A			66	33,942	30,200	(3,742)
B			66	35,839	30,200	(5,639)
C			64 + 2 Isolation	30,656	30,200	(465)
B C			32 + 32	33,620	30,200	(3,420)

February 17, 2012

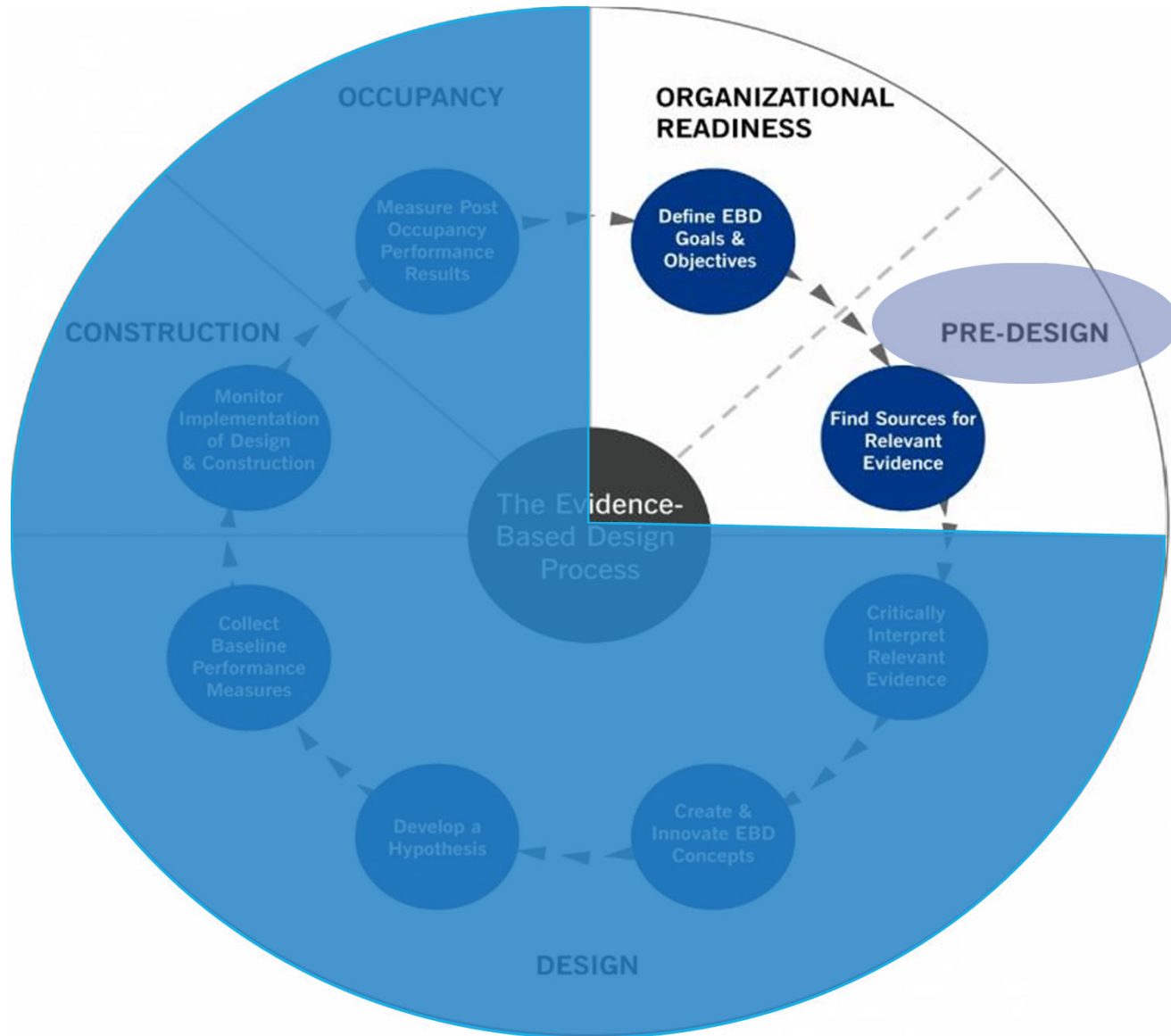
**AECOM**

A woman with blonde hair, wearing a grey sweater, is shown in profile from the chest up. She is holding a blue baby bag with white text that reads "PREMATURE CARE". The background is a blurred hospital room with medical equipment and a pink baby basket hanging from a stand.

## Lessons Learned

- Communication
- Multidisciplinary involvement
- Develop plan within clinical, operational and financial parameters of organization
- Development story spanned the life of project

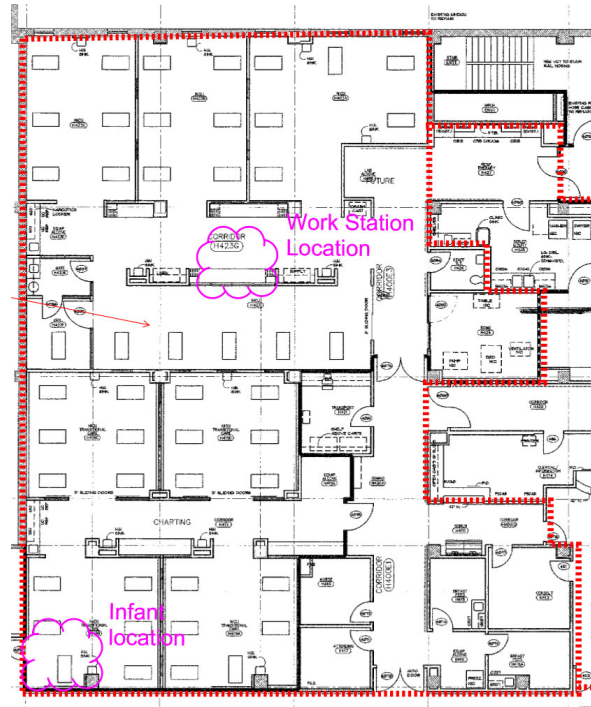
- Changing the Culture
- Benchmarking Tours
- Staff Input
- Family Involvement



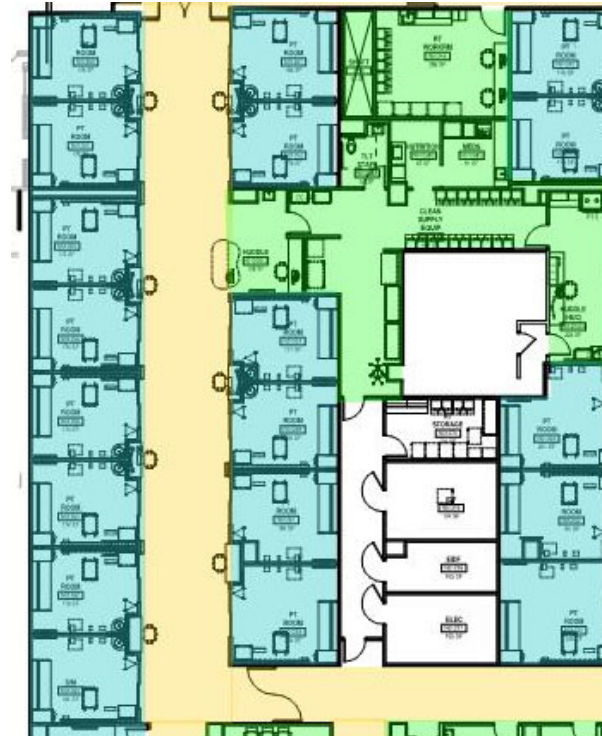
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# Changing the Culture

- From bays to private rooms
- Staff resistance – be prepared
- Patient safety and visibility
- The family experience



Old Unit  
(48 Beds)



Portion of New Unit  
(18 beds)

# Changing the Culture

- Grouping, density and pod configuration
- Staff collaboration & mentorship
- Patient safety and visibility
- Shared space and circulation



Old Unit



New Unit

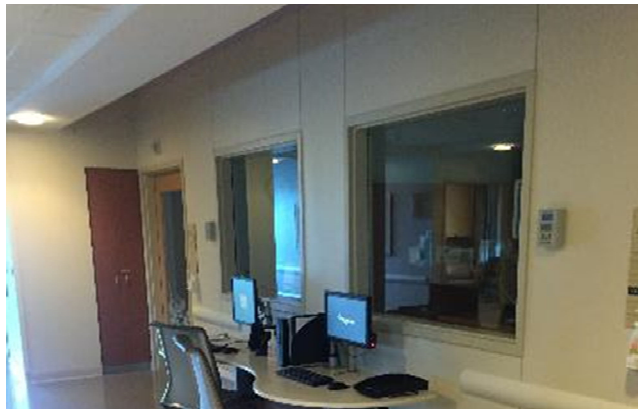
# Benchmarking Tours

## Strengths

- Immediate feedback
- Identify items not previously considered/listed
- Team/Staff ownership & build rapport

## Challenges

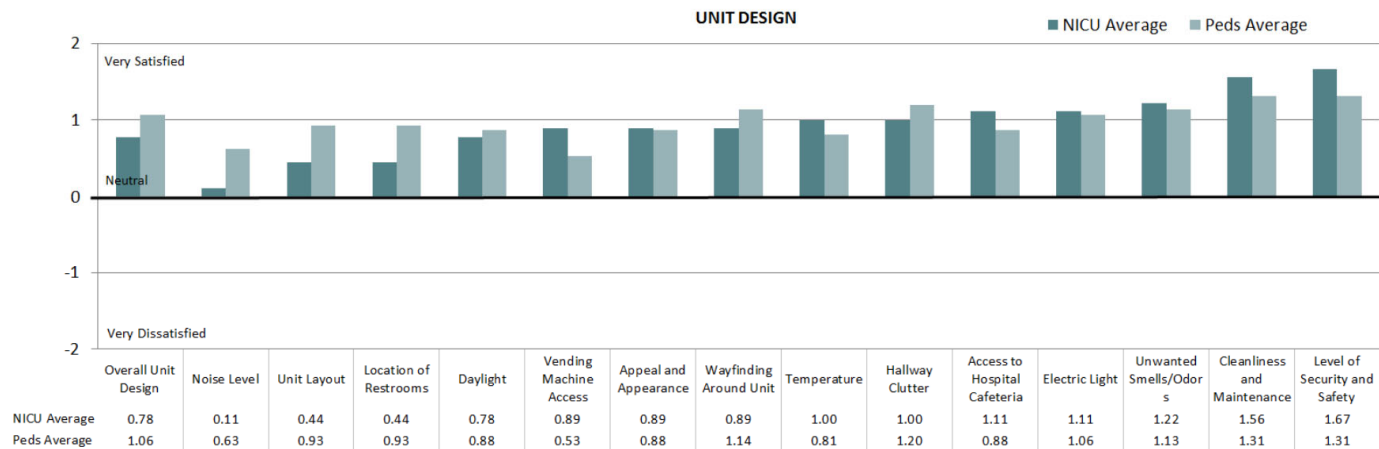
- Finances
- How many?





# Staff Input

QUESTION: *Related to the overall NICU or pediatric floor, what is your satisfaction with the following?*



This graph divides responses according to NICU and Pediatrics averages. The results start with overall satisfaction and then are arranged from lowest to highest mean according to NICU averages.

## Predictor Variable(s) of Satisfaction:

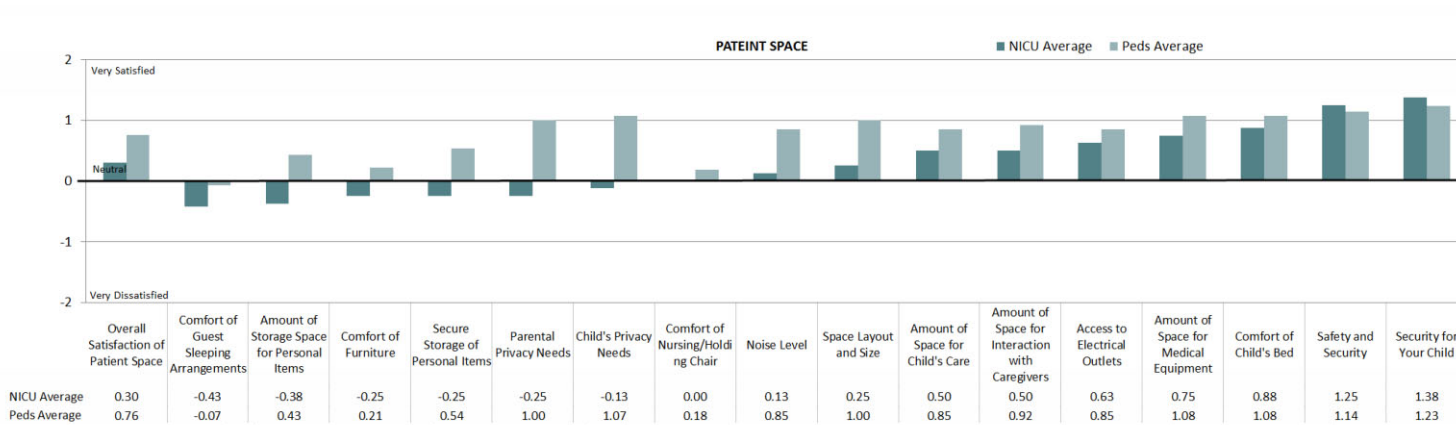
- Unit Layout\*\*
- Breakroom\*
- Noise Level\*

## Predictor Variable(s) of Work Performance:

- Unit layout (e.g., room adjacencies, configuration) \*
- Access to sinks and hand sanitizer dispensers \*

# Family Involvement

QUESTION: *Related to your child's space in the NICU, what is your satisfaction with the following?*



This graph divides responses according to NICU and Pediatrics averages. The results start with overall satisfaction and then are arranged from lowest to highest mean according to NICU averages.

## Predictor Variable(s) of Satisfaction:

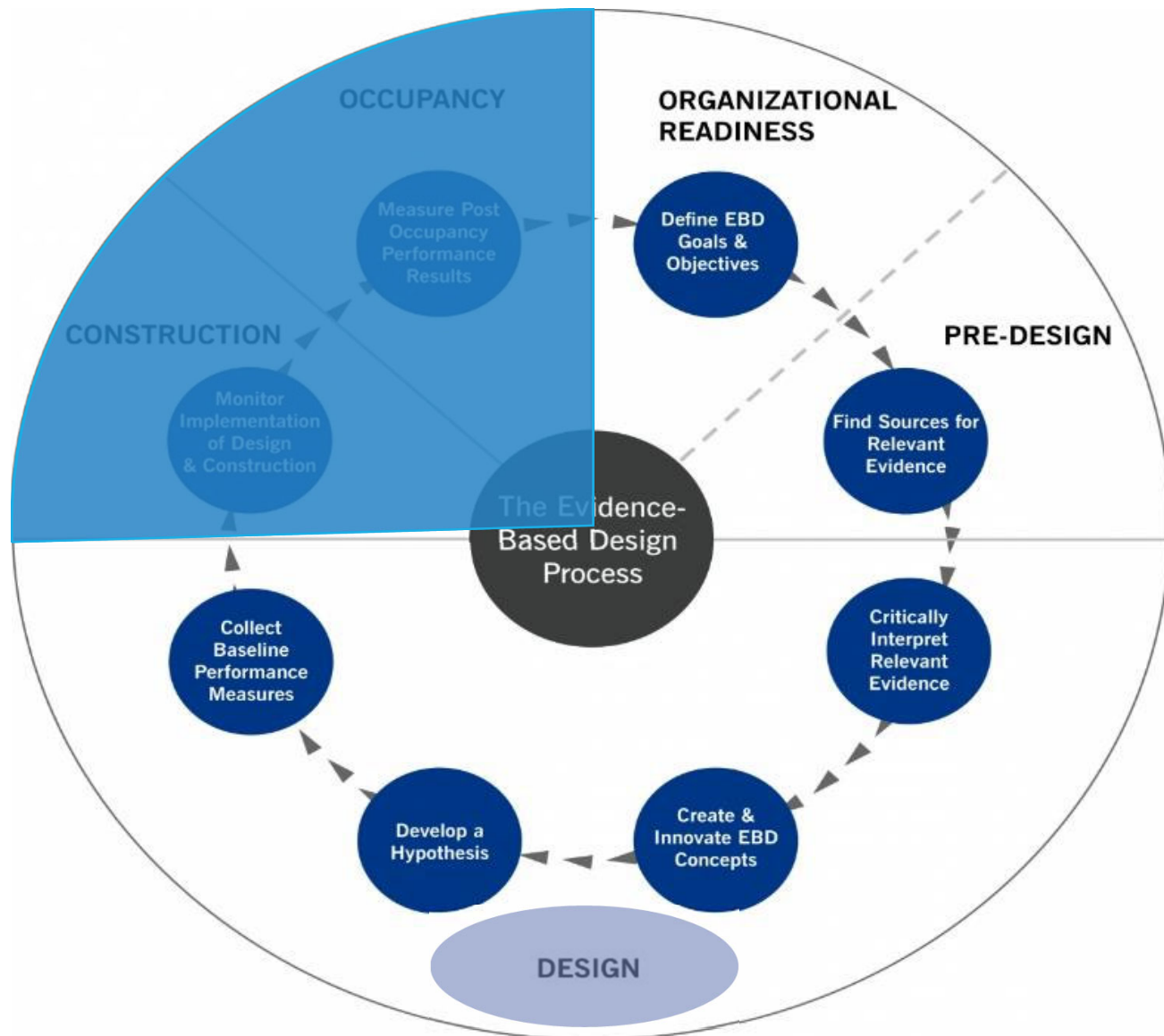
- *Ability to support your child's privacy needs\*\*\**
- *Comfort of chair for nursing or holding my child\*\*\**
- *Ability to securely store personal items\*\**
- *Comfort of guest sleeping arrangements\*\**
- *Overall space layout and size\**
- *Sense of security for your child\**
- *Ability to support parental privacy needs\**

## Lessons Learned

- Site visits KEY
- NICU specific conference
- Use Patient Advisory Group for family involvement
- Staff involvement needs to include “nay-sayers”
- Ideas identified can impact overall care plan in a new way – care by parent space.



- Process Flow/ Improvements
- Extreme Schemes
- Mock Ups
- Design Details
- Unit Identity & Way finding



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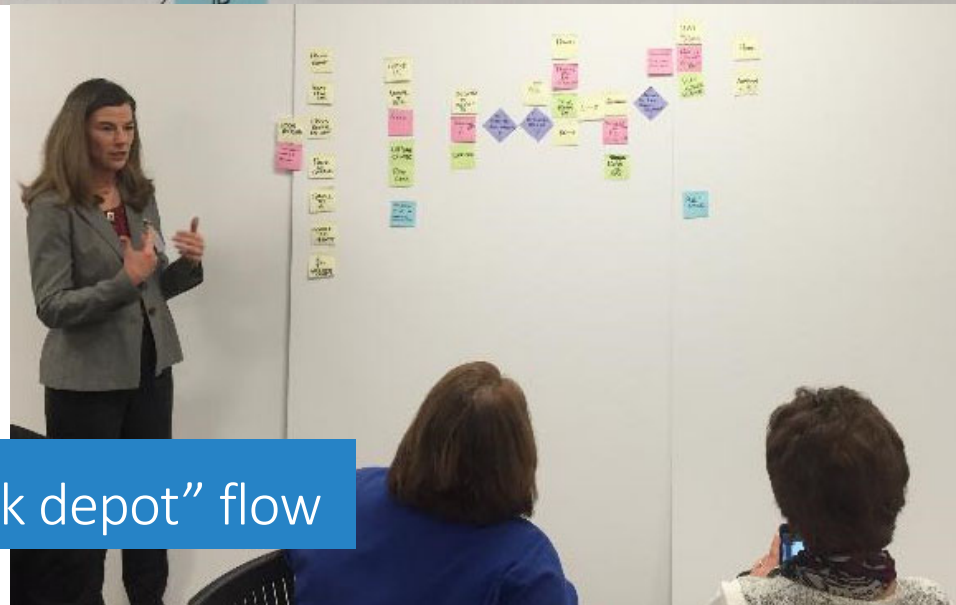
# Process Flow Improvements

## Strengths

- Collaborative consensus
- New/expanded services developed

## Challenges

- Can't fix everything-prioritization and consensus is critical
- Understand equipment maintenance requirements



Understanding the “milk depot” flow



## Extreme Schemes

### Strengths

- Viable options result
- Collaborative process for buy-in

### Weakness

- Wish Lists







# Design Details

## Strengths

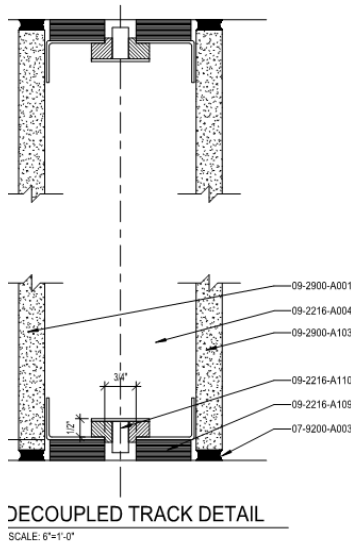
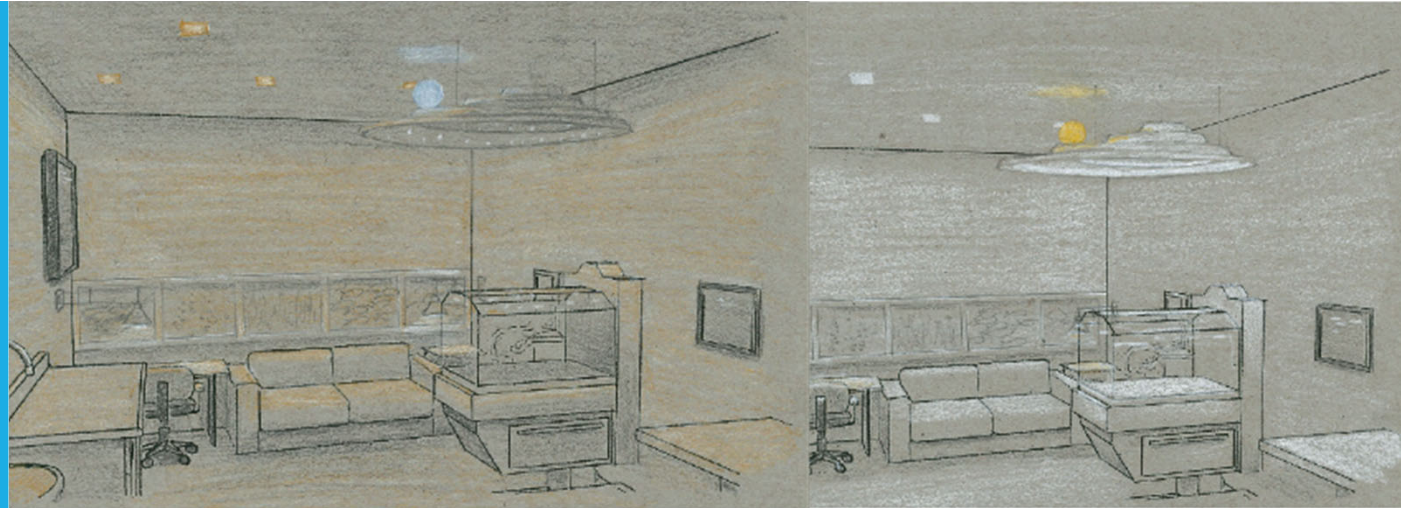
- Consultant team with specialists

- Education for staff

## Challenges

- Existing Conditions

- Access to Natural Light



**DECOUPLED TRACK DETAIL**  
SCALE: 6"=1'-0"

	<b>Demising Assembly STC<sub>c</sub></b>															
	Consultation Room	Exam/Physician Room (no masking)	Exam/Physician Room (with masking)	NICU / NICU Room	Patient Room, (same floor)	Patient Room, (floor-to-floor)	Procedure / Treatment Room	Public Space	MRI Room	Toilet Room	Corridor	Corridor w/ entrance	Break Room / Lounge	Service Area	Mech/Elec Equip Room	
	<b>Source Room =&gt;</b>															
	<b>Receiver Room v</b>															
Consultation Room	50	50	40	50	50	50	50	50	60	50	35	35	50	50	60	
Exam/Physician Room (no masking)	50	50	40	50	50	50	50	50	60	50	35	35	50	50	60	
NICU / NICU Room	50	50	40	50	50	50	50	50	60	50	50	35	55	50	60	
Patient Room	50	50	40	50	45	50	50	50	60	50	50	35	55	60	65	
Procedure / Treatment Room	50	50	40	50	50	50	50	50	50	50	35	35	50	50	60	
Public Space	50	50	40	50	50	50	50	50	50	45	35	35	50	50	60	

Note: Black STC<sub>c</sub> values are from FGI 2010, Table 1.2-3. Blue STC<sub>c</sub> values are JEAoustics recommendations, adapted from Table 1.2-3

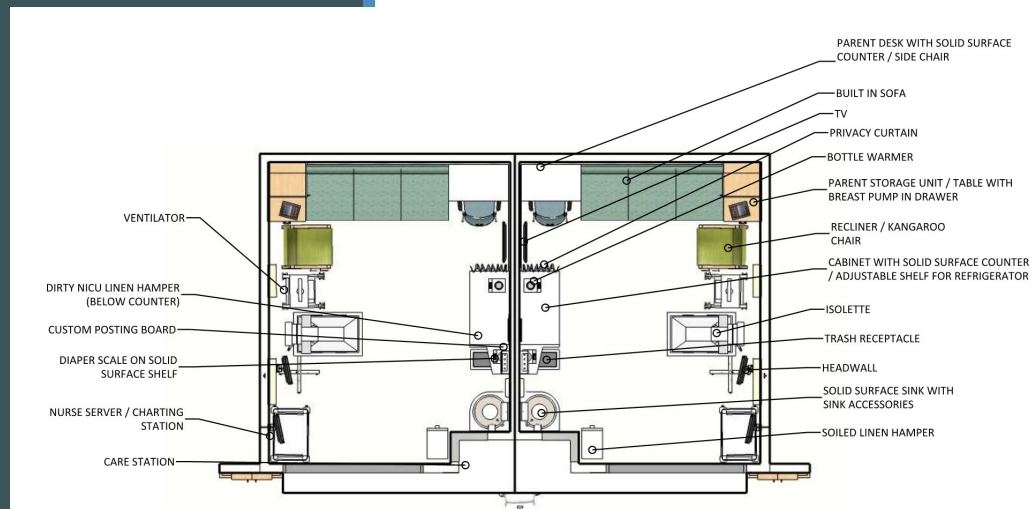
# Mock-Ups

## Strengths

- Various stages and styles
- Final build full build mock up
- Corridor, charting and room for understanding

## Challenges

- Timing of each type of mock-up
- Prioritizing varied feedback
- Logistics – space and access



# Unit Identity and Wayfinding



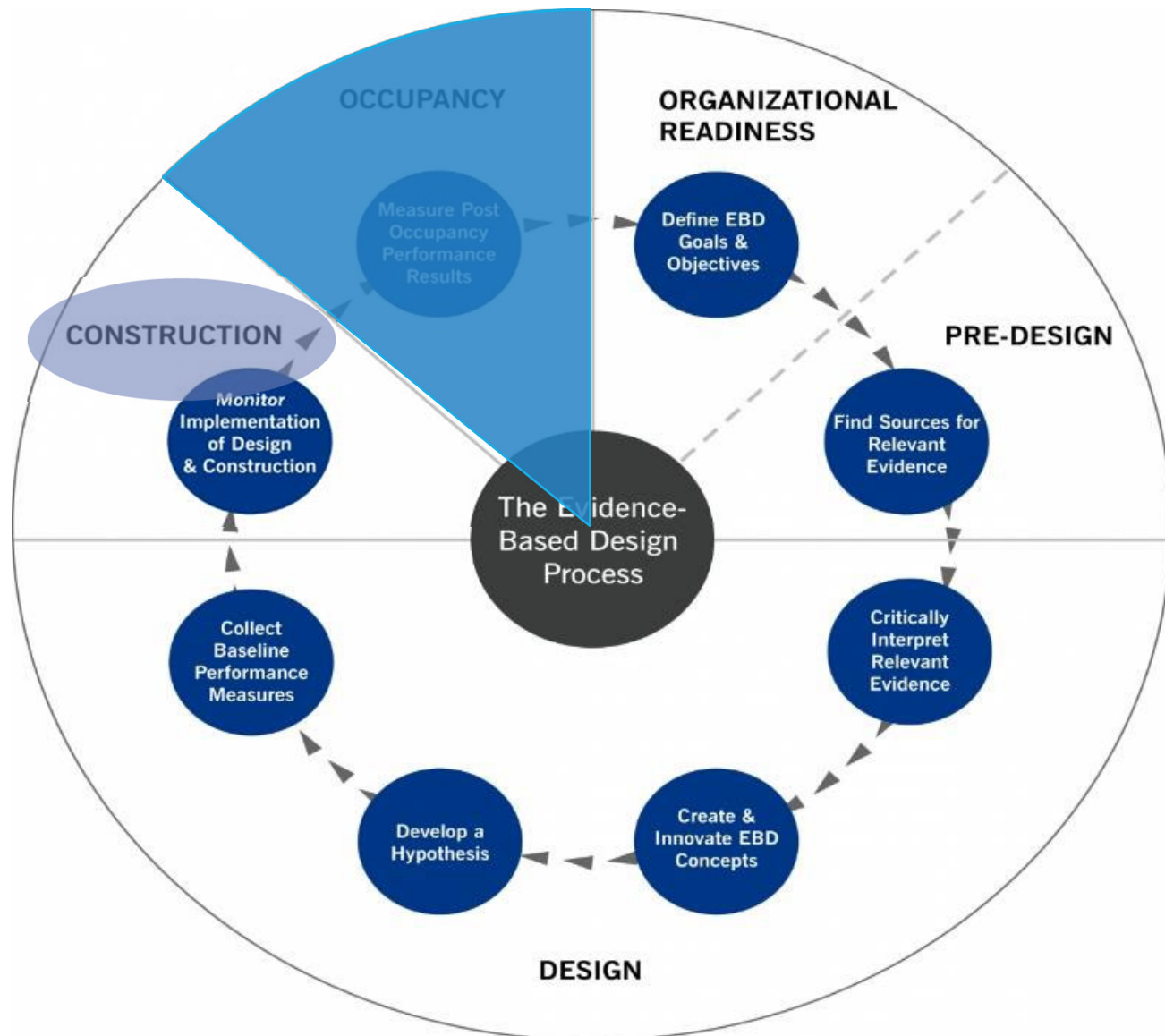


# Lessons Learned

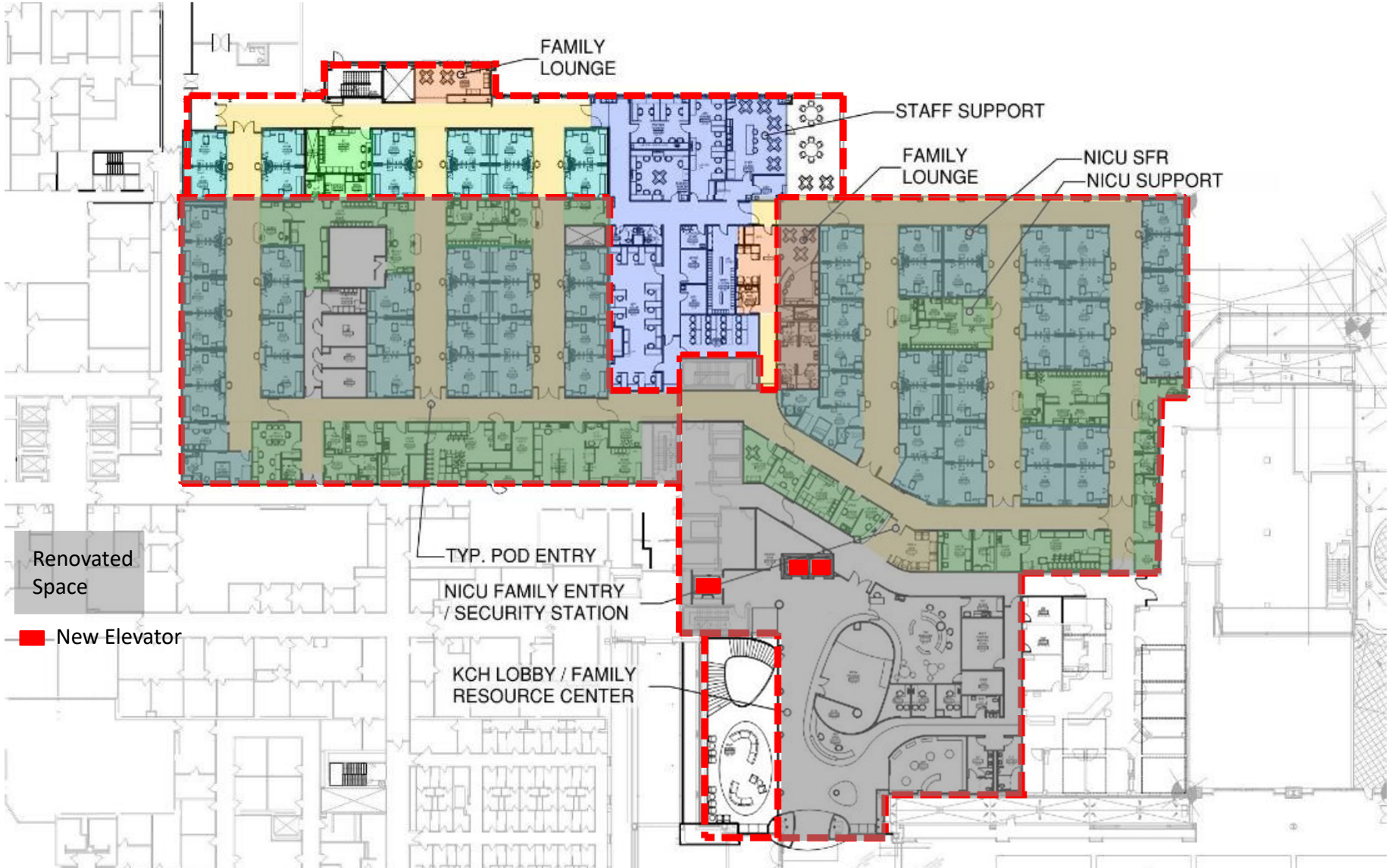
- Sign-offs at critical junctures by KEY stakeholders
- Identity can be both adult user friendly and child-like
- Important that stakeholders be assigned and complete their own set of tasks to report back to the overall design process and complete team
- Know stakeholders and what is important to them (acoustics, vibration, lighting, etc) and have consultants to address as needed



- Renovation
- New Additions
- Location Access/Phasing
- Infrastructure
- Baseline (pre-occupancy testing)



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FAMILY LOUNGE

STAFF SUPPORT

FAMILY LOUNGE

NICU SFR

NICU SUPPORT

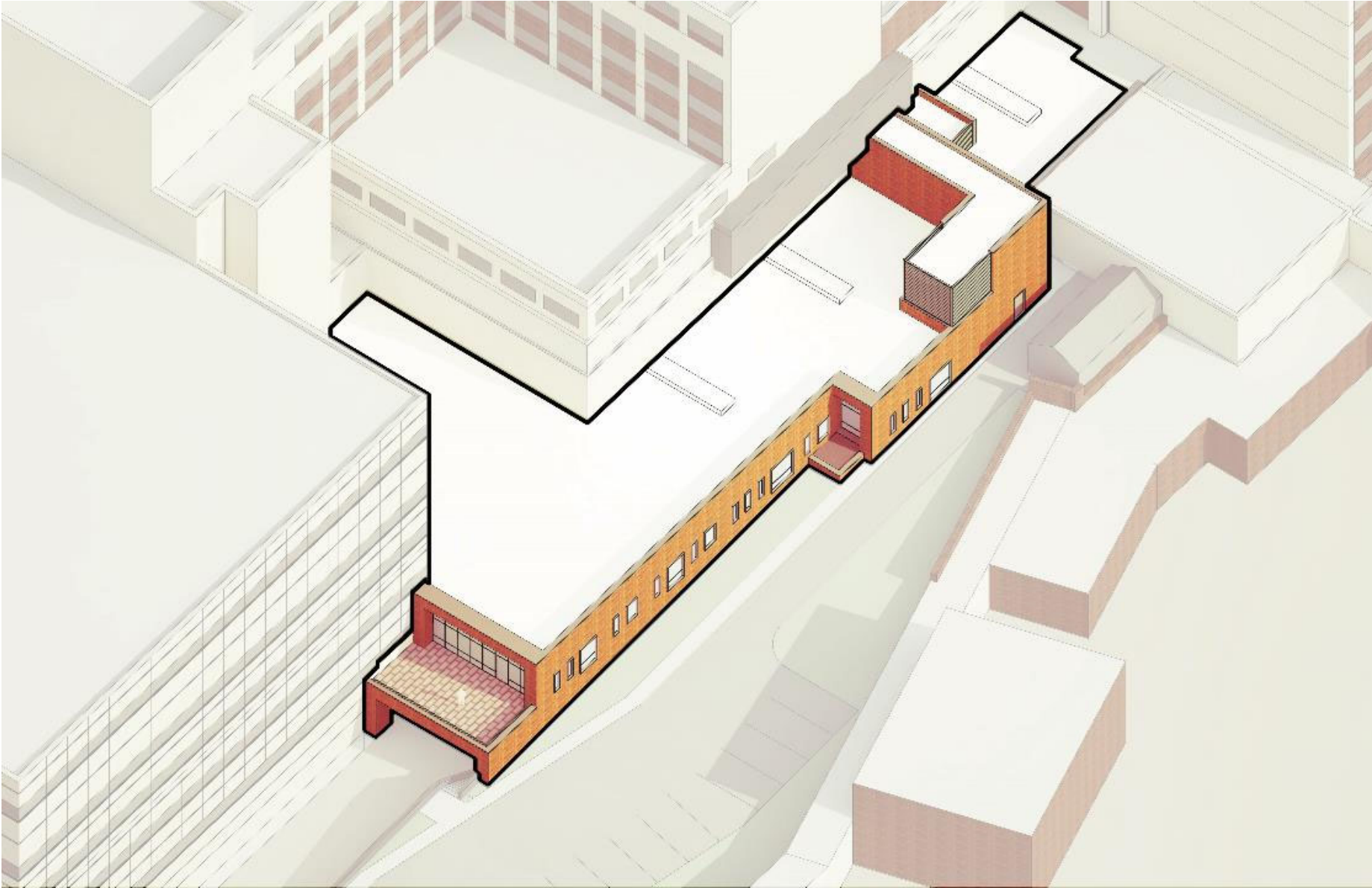
Renovated Space

■ New Elevator

TYP. POD ENTRY

NICU FAMILY ENTRY / SECURITY STATION

KCH LOBBY / FAMILY RESOURCE CENTER







## Baseline Data Collection for Research

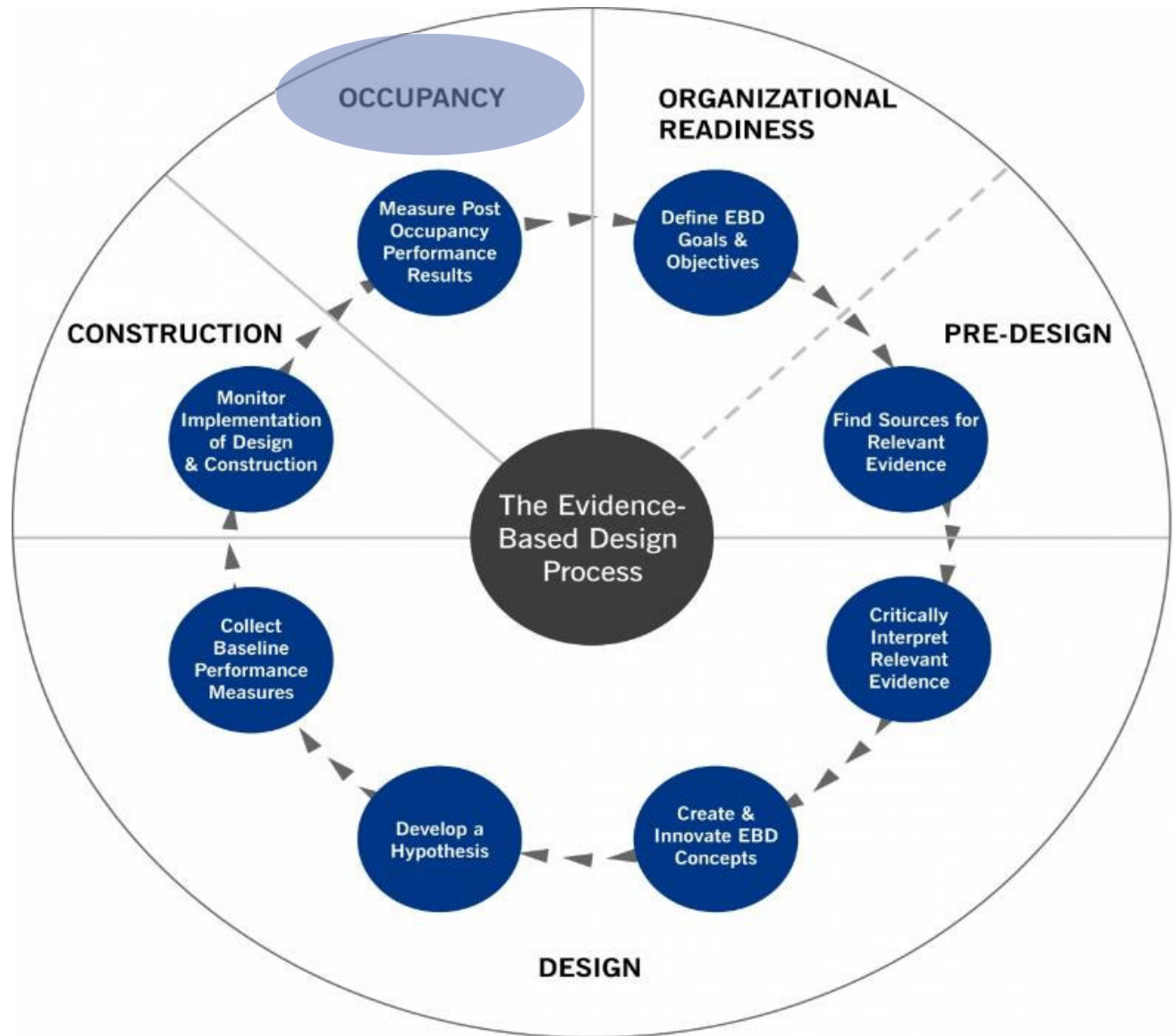
- Lighting
- Acoustics
- Perceptions via Survey

## Lessons Learned

- Existing conditions and new/old tie-ins critical documentation
- User access controlled but must be frequent, available and escorted
- Coordination between all parties – it will be disruptive – regular communication will go a long way
- Master plan infrastructure should be in place prior to a project this size



- Operational Planning
- Move In
- Research



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# Operational Planning

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## Strengths

- Ownership
- Desktops simulations to work through kinks

## Challenges

- Staff Turnover
- Lengthy process – burnout

# Move In

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## Strengths

- Deliberate plan to follow
- Right person to task
- Top down support
- Public Relations involvement/documentation

## Challenges

- Emotional stress
- Clinically fragile babies





## Lessons Learned Occupancy

- IRB for research
- Operational Planning structured & timing
- Move in – Clinical, family and marketing support
- PR positive impact day of/after for all
- Flexibility and adaptability key factors to success day of



## The EBD Cycle – Informing Design

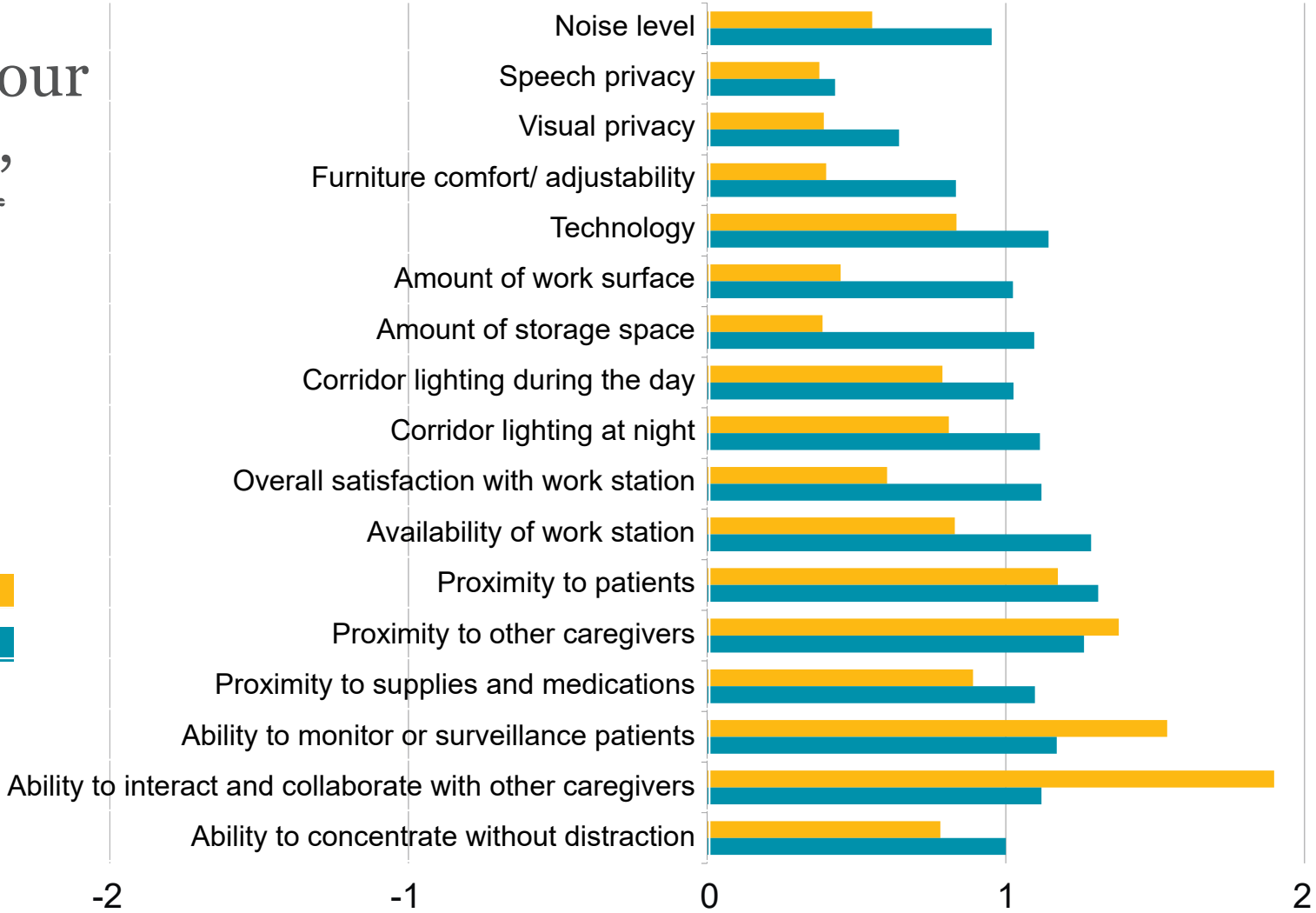
# Research Methods

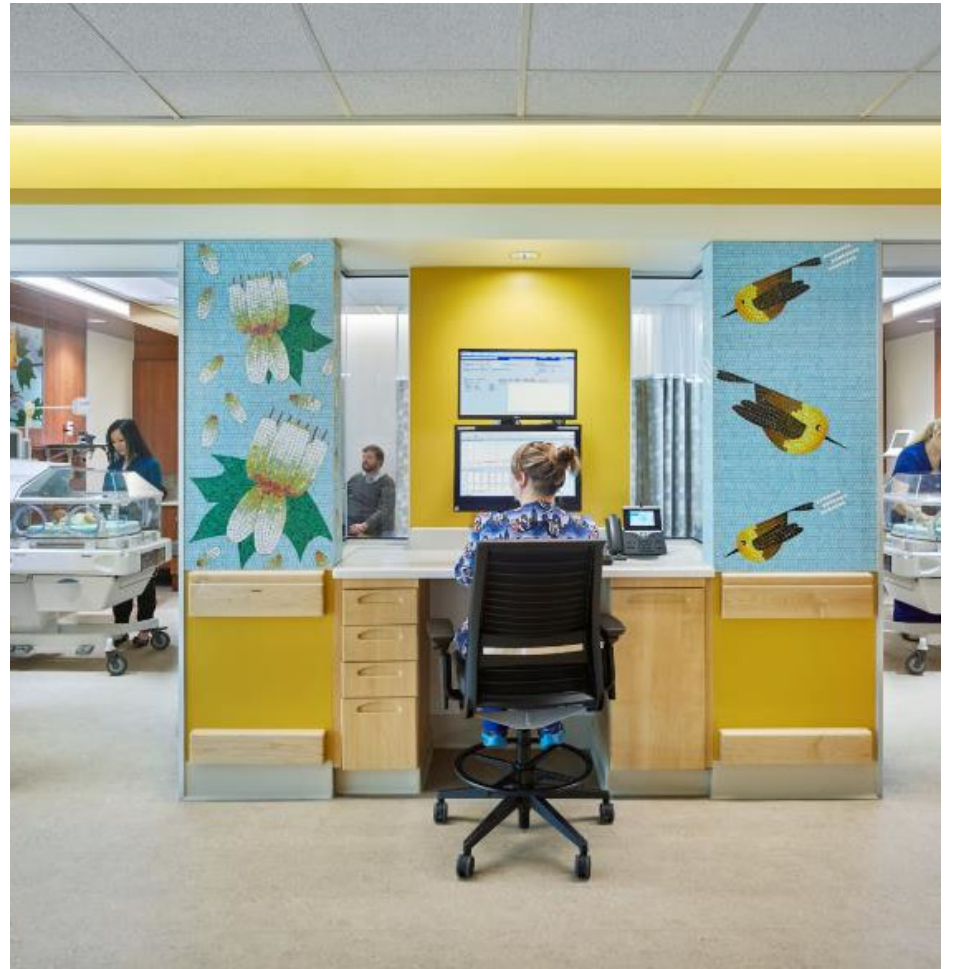
	Phase 1: Existing Design		Phase 2: New Design	
Subjects	Staff n=51	Parents n=2	Staff n=53	Parents n=4
Research Method #1	On-line questionnaire		On-line questionnaire	
Research Method #3	Lighting Measures		Lighting Measures	
Research Method #4	Acoustical Measures		Acoustical Measures	



# Related to your workstation, what is your satisfaction with the following?

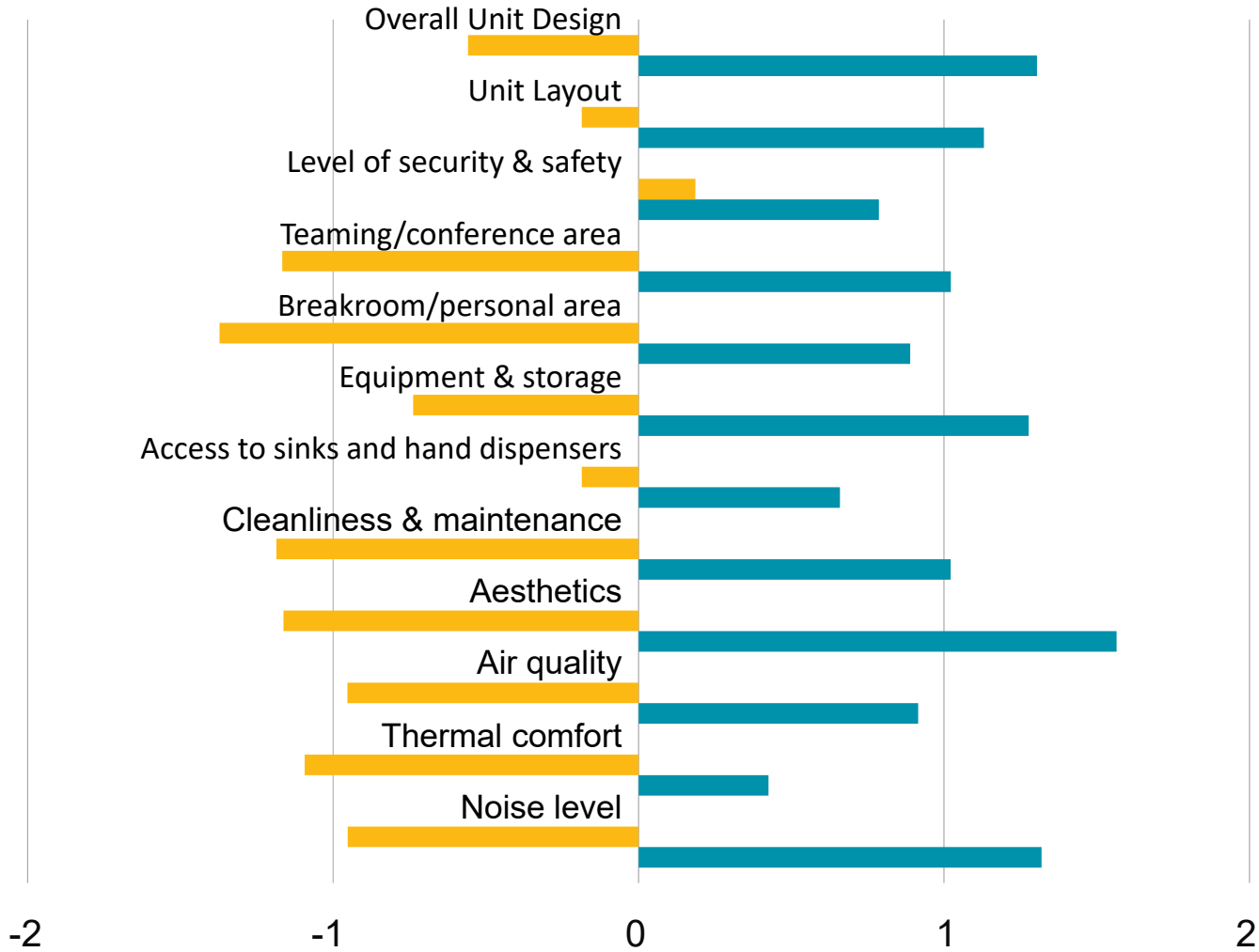
Pre-Occupancy ■  
Post-Occupancy ■





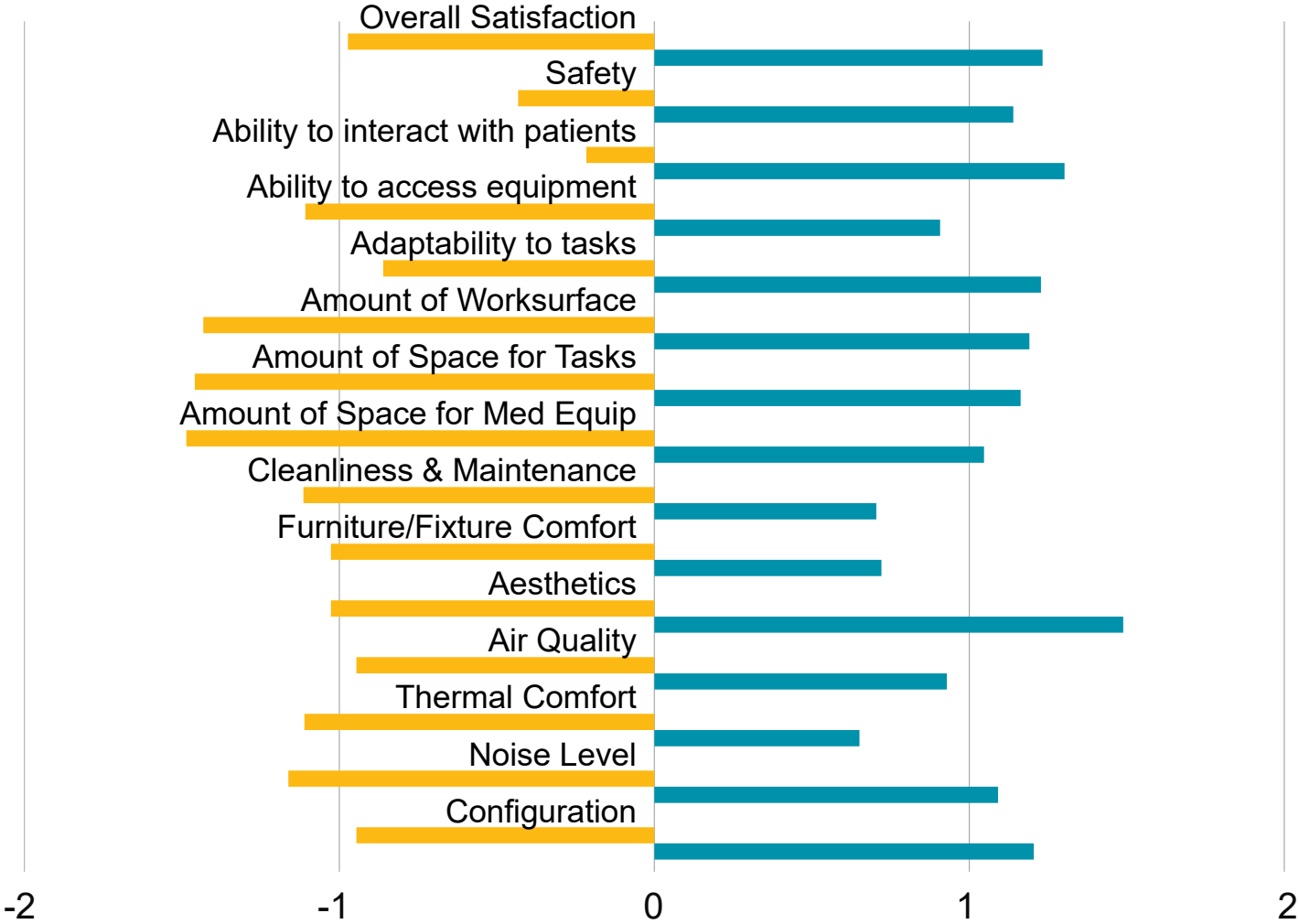
Related to the current unit design of the NICU, what is your satisfaction with the following?

Pre-Occupancy ■  
Post-Occupancy ■



Related to the patient spaces of the NICU, what is your satisfaction with the following?

Pre-Occupancy ■  
Post-Occupancy ■







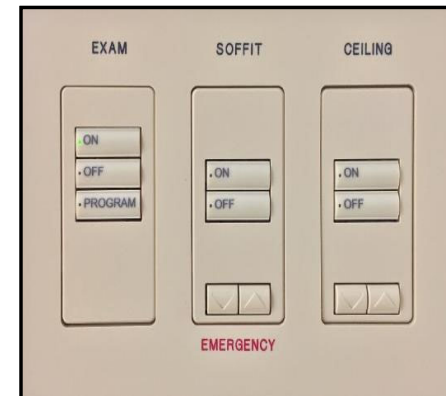
**Dim**  
**Appropriate**  
**Unpleasant** Pleasant  
**Uncomfortable** Comfortable  
**Bright** **Inappropriate**  
**Stimulating**



**Comfortable**  
**Appropriate** Dim  
Uncomfortable  
Unpleasant  
Inappropriate  
**Bright**  
**Pleasant**  
Stimulating

# Patient Room - Controls

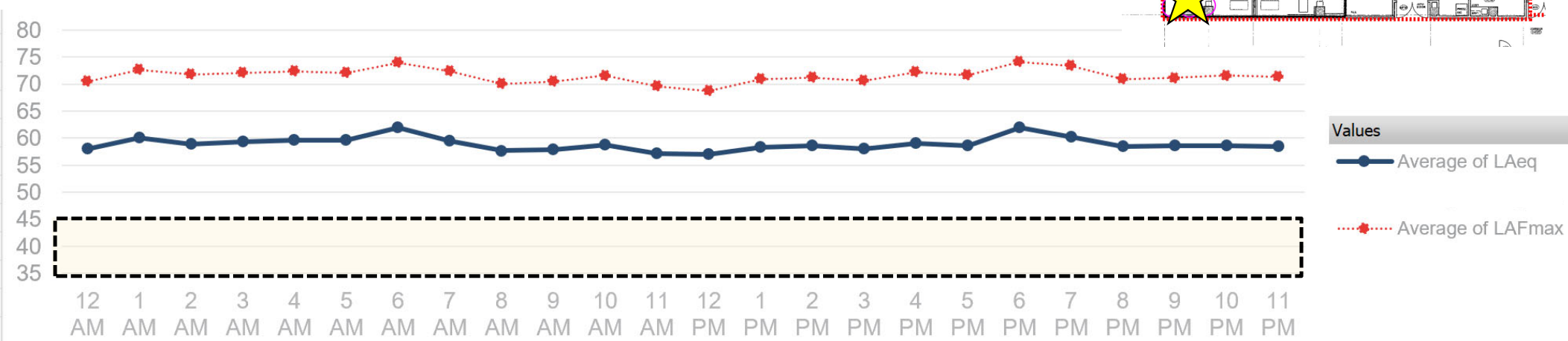
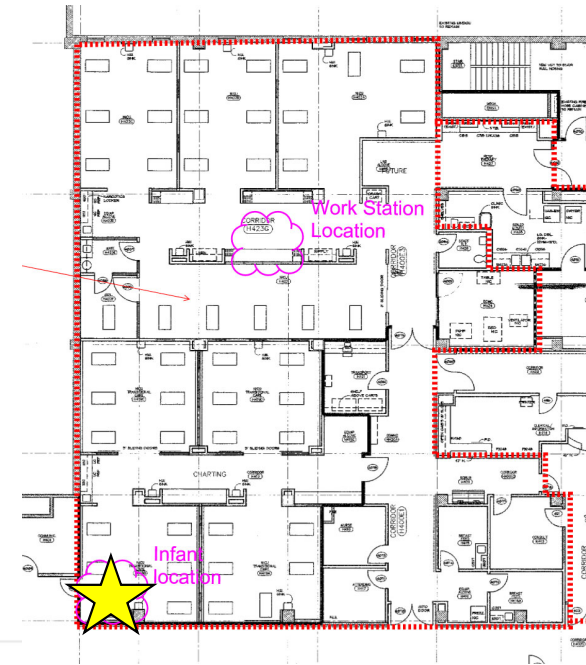
- Dawn/Dusk Mode
- Day Mode
- Exam Mode



# Acoustics Huddle Old NICU Unit

L<sub>Aeq</sub>: 58.93

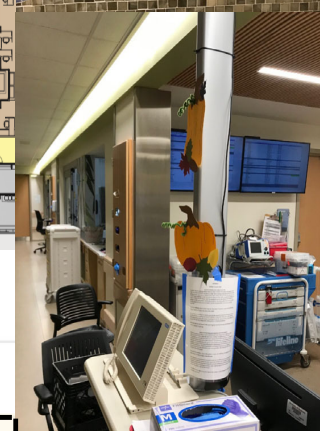
L<sub>A</sub>F<sub>max</sub>: 71.55



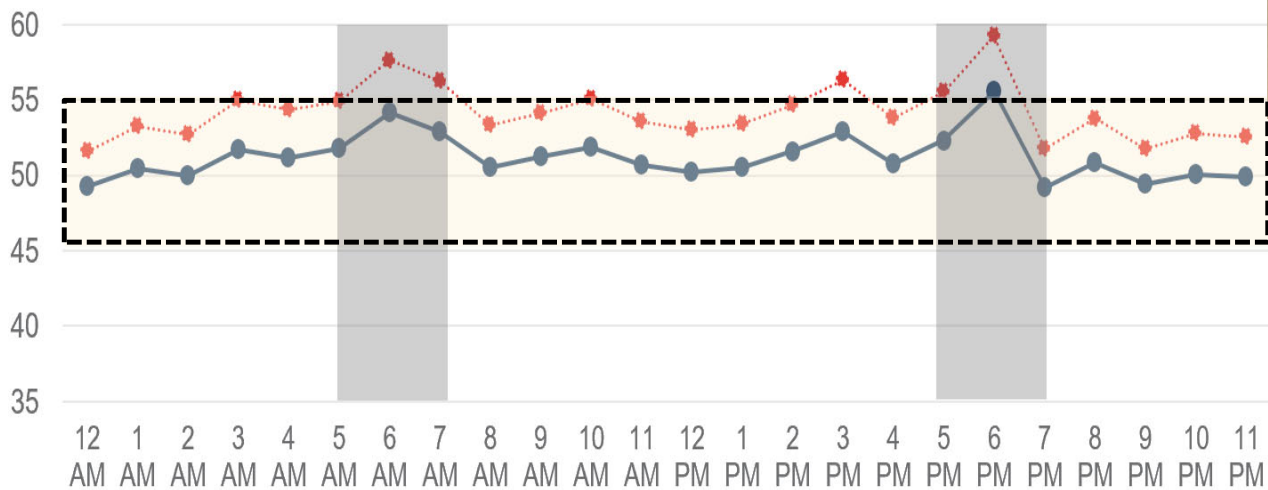


# Acoustics Huddle New NICU Unit

L<sub>Aeq</sub>: 51.22  
L<sub>AFmax</sub>: 54.19



Average of L<sub>Aeq</sub>   Average of L<sub>AFmax</sub>



Values

- Average of L<sub>Aeq</sub>
- ◆··· Average of L<sub>AFmax</sub>



# Questions

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- Tom Gormley – Principal GBBN [tgormley@gbbn.com](mailto:tgormley@gbbn.com)
- Rebecca Kleinbaum Sanders - Principal HGA [rsanders@hga.com](mailto:rsanders@hga.com)
- Mark Reckin – Senior Medical Planner HGA – [mreckin@hga.com](mailto:mreckin@hga.com)