**The Highly Reliable Hospital:
Creating a Facility for a HRO**

Masters Studio Series

08, August, 2017

2:00 pm – 3:00 pm ET

1:00 pm – 2:00 pm CT

12:00 am – 1:00 pm MT

11:00 am – 12:00 pm PT

Presenters:

Christine Basiliere RNC, BSN, MBA
Sharp Chula Vista Medical Center

Matt Richter AIA, ACHA
SmithGroupJJR

Moderator

Rita Ho, LEED AP

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On-line Professional Development

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Masters Studio Series

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Masters Studio Series sessions are tailored to provide healthcare design professionals with sufficient exposure to jump-start interest in wanting to learn more.

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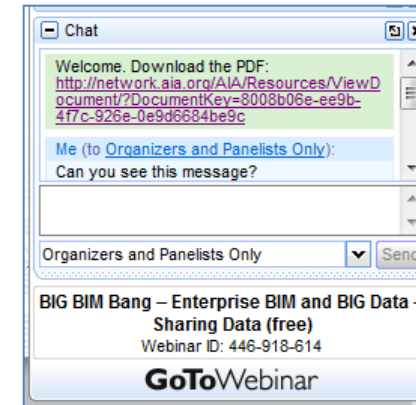
The Highly Reliable Hospital:
Creating a Facility for a HRO

Presenters

Christine Basiliere RNC, BSN, MBA
CNO & Vice President of Patient Care Services
Sharp Chula Vista Medical Center

Matt Richter AIA, ACHA
Vice President, Healthcare Planner
SmithGroupJJR

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Sharp Chula Vista Ocean View Tower

A Presentation on HRO

Session Learning Objectives:

- What makes a Highly Reliable Organization (HRO) and how a culture of reliability in hospital operations is created.

- The story of how HRO was designed into a healthcare facility.

- Putting the patient at the center of safe and secure design.

- Taking HRO into the construction process.

High Reliability Organizations (HROs) "operate under very trying conditions all the time and yet manage to have fewer than their fair share of accidents."

Managing the Unexpected (Weick & Sutcliffe)

Risk=probability x Consequence

By decreasing the probability of an accident,
HROs operate to make systems ultra-safe

Safety Focus + **performed as intended** = No Harm
consistently over time

Hospitals are different: We have to work harder

HOSPITALS	TRADITIONAL HRO
SMALL BUT FREQUENT ACCIDENTS	FEW ACCIDENTS
EPIDEMICS	CATASTROPHES
DESIGNATED VICTIM, PATIENT	DESIGNATED VICTIM, OPERATOR
DOUBLE HUMAN BEING SYSTEMS	HUMAN –ARTIFACT SYSTEMS
EMOTIONAL, NEGOTIATION- BASED DECISION MAKING	RATIONAL DECISION MAKING
EVER CHANGING ORGANIZATIONS	STABLE ORGANIZATIONS
DIVERSE INTERACTIONS	DEFINED INTERACTIONS
EXPERIMENTATION-BASED PRACTICE	PROCEDURE- BASED PRACTICE

Bagnara, Parlangeli, Tartaglia 2010. Are hospitals becoming high reliability organizations. Applied Ergonomics 41 (2010) 713-718
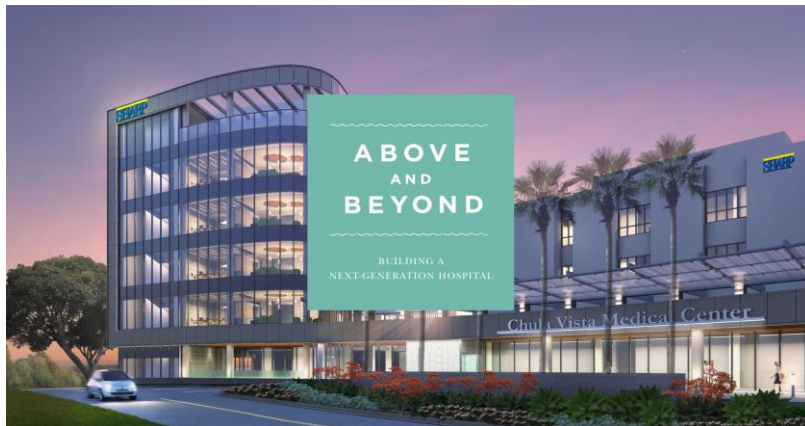
At the heart of our organization are more than 18,000 employees, affiliated physicians and volunteers who are dedicated to making health care better for our patients, their families and one another. It's what we call **The Sharp Experience** and it comes to life in everything we do. It's what we do, it's how we do it and why we do it.
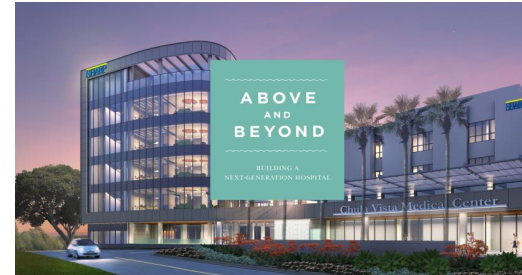
SHC's HRO Commitment

*Sharp is committed to ensuring highly reliable systems, structures, processes, and behaviors to achieve **zero defects** and **zero harm** to employees, physicians, and patients and their families.*
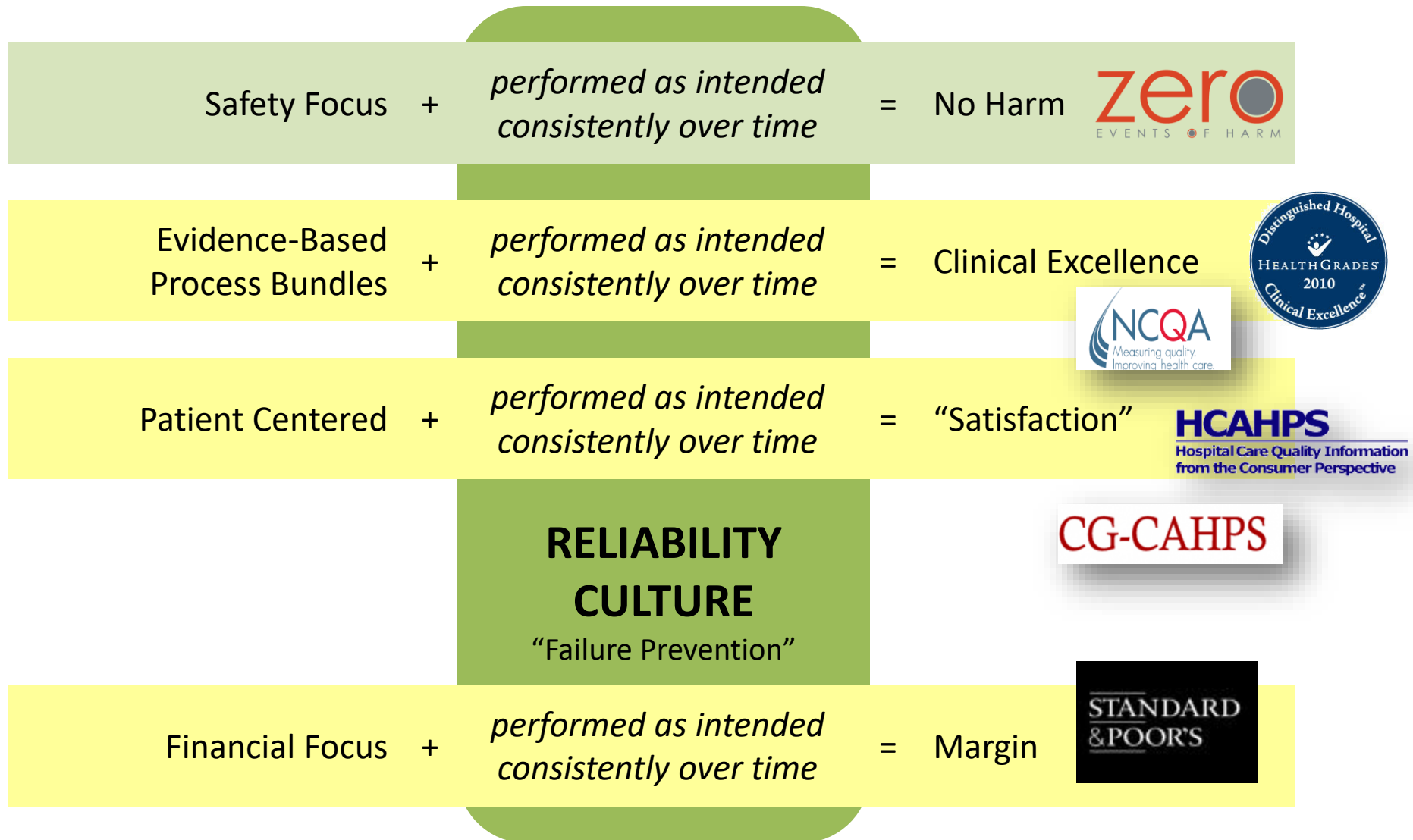
HRO vision and strategy

HRO Vision = Sharp HealthCare's vision:

"To be the BEST place to work, BEST place to practice

medicine and BEST place to receive care."

The HRO initiative is helping us advance The Sharp Experience

Sharps RFP and HRO Requirements

"The goal is 'zero' harm. The code requires many features to "hard wire" infection control. What additional design features can be included in the design to advance Sharp's HRO objective? "
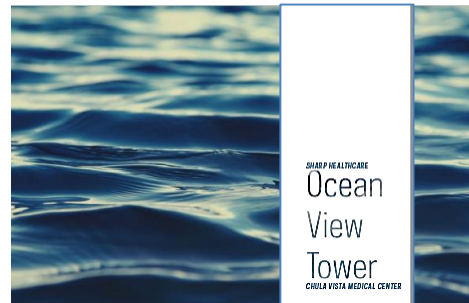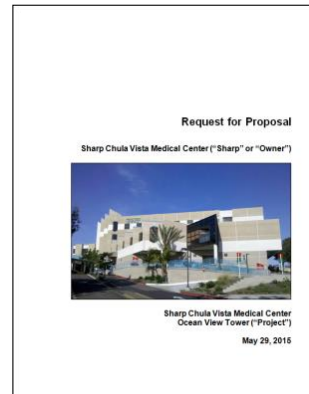
Safety Focus + *performed as intended consistently over time* = No Harm

Evidence-Based Process Bundles + *performed as intended consistently over time* = Clinical Excellence

Patient Centered + *performed as intended consistently over time* = "Satisfaction"

RELIABILITY CULTURE
"Failure Prevention"

Financial Focus + *performed as intended consistently over time* = Margin

2015 Healthcare Performance Improvement

The HRO Design Process

RFP calls for HRO design features

Technical Submittal of the bid identifies 33 features

By the end of Design Development the list of HRO features grew to 55

Request for Proposal

Sharp Chula Vista Medical Center ("Sharp" or "Owner")

Sharp Chula Vista Medical Center
Ocean View Tower ("Project")

May 29, 2015

SHARP HEALTHCARE

Ocean
View
Tower

CHULA VISTA MEDICAL CENTER

Are we creating a Highly Reliable Environment for care? Or just supporting "best practice"?

Designing and Planning for HRO

Let's explore healthcare that are hard-wired for patient, visitor and staff safety.

hard·wired / härd ˈwī(ə)rd / *adjective*

1. pertaining to or being an intrinsic and relatively unmodifiable behavior pattern

Designing and Planning for HRO

Maintaining the highest standards for quality and safety is integral to good design. We were asked to think beyond the 'typical'.

- Performance metrics for the cultural zero-harm hardwiring include:
  - Patient safety
  - Staff safety
  - Quality of clinical operations
  - Engagement of patients
  - Staff & Physician satisfaction
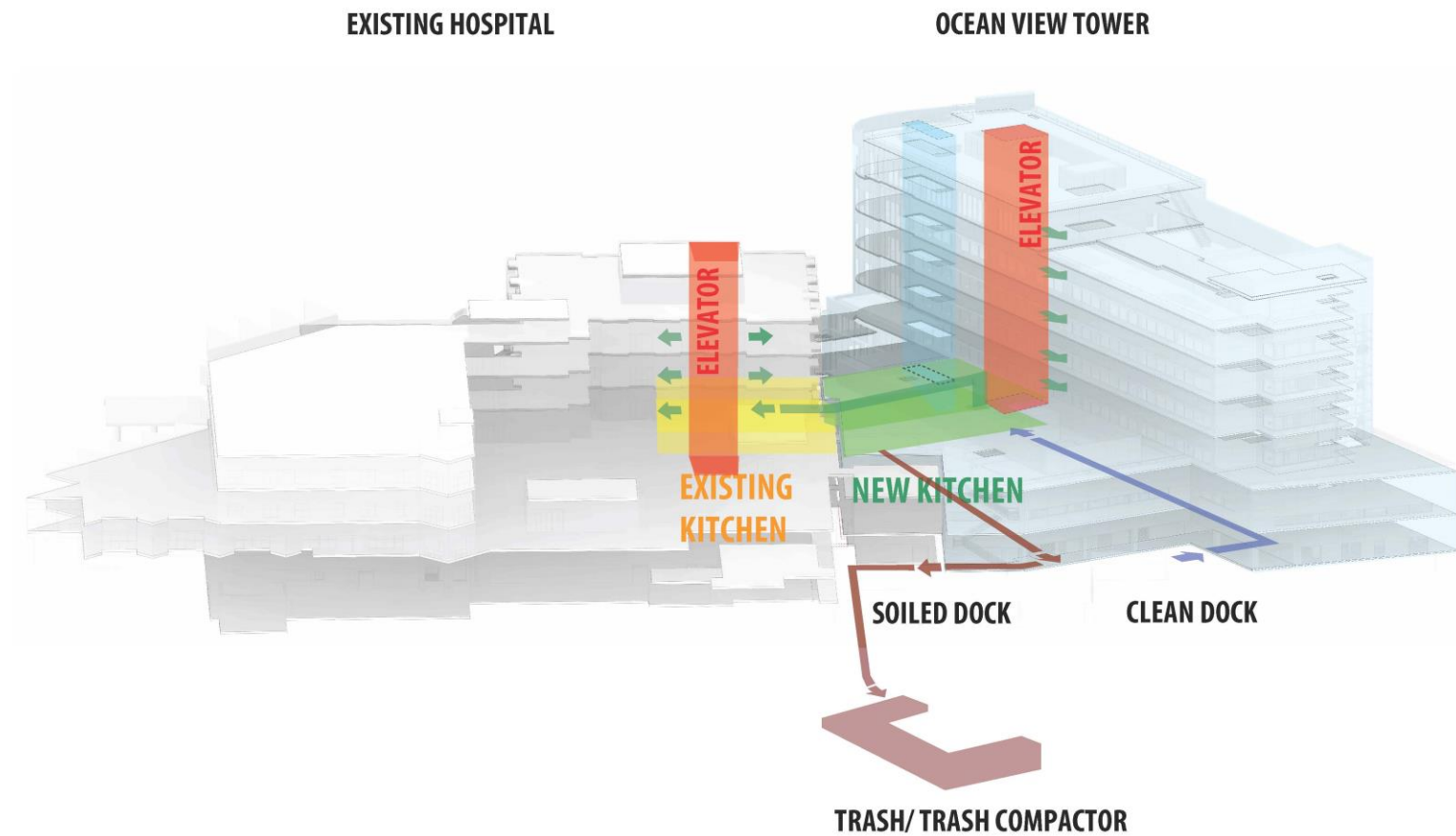 - Financial health

Basic Design Premise

- Architecture can be an **enabler** by providing elements to support behavioral change

- Architectural planning and layouts can also be **restrictive**, promoting cultural changes by not allowing certain flows or cross-overs to occur

- Staff and providers must use the building as intended: not to short-circuit the features designed to support patient safety and error reductions

Key Architectural Planning Concepts

- Separation of clean and soiled – corridors
- Segregated vertical transport – patients, materials, food
- Dedicated spaces that support collaboration and communication
- Clear sightlines
- Private space for focused work
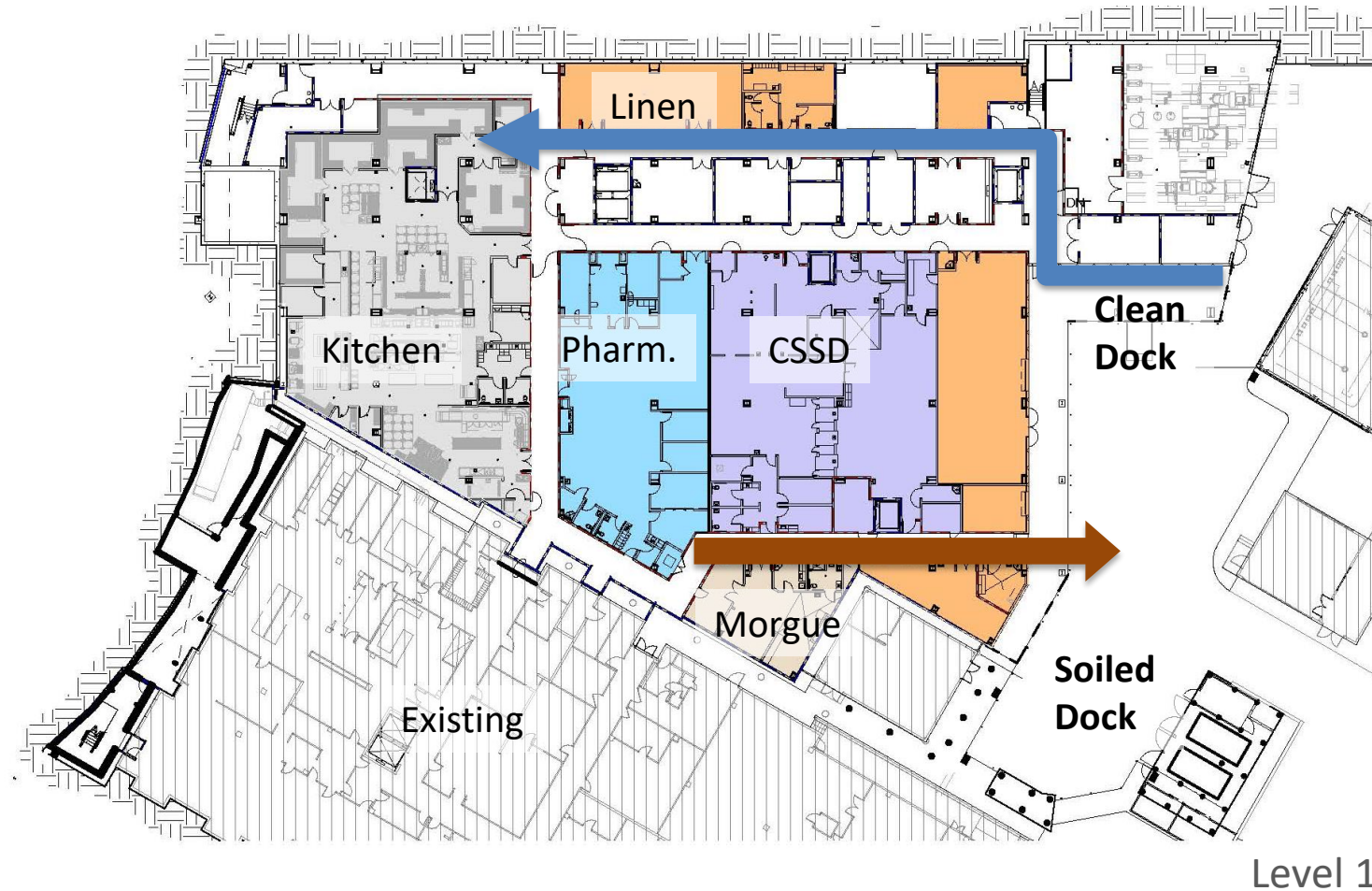- Intuitive wayfinding for patients and visitors

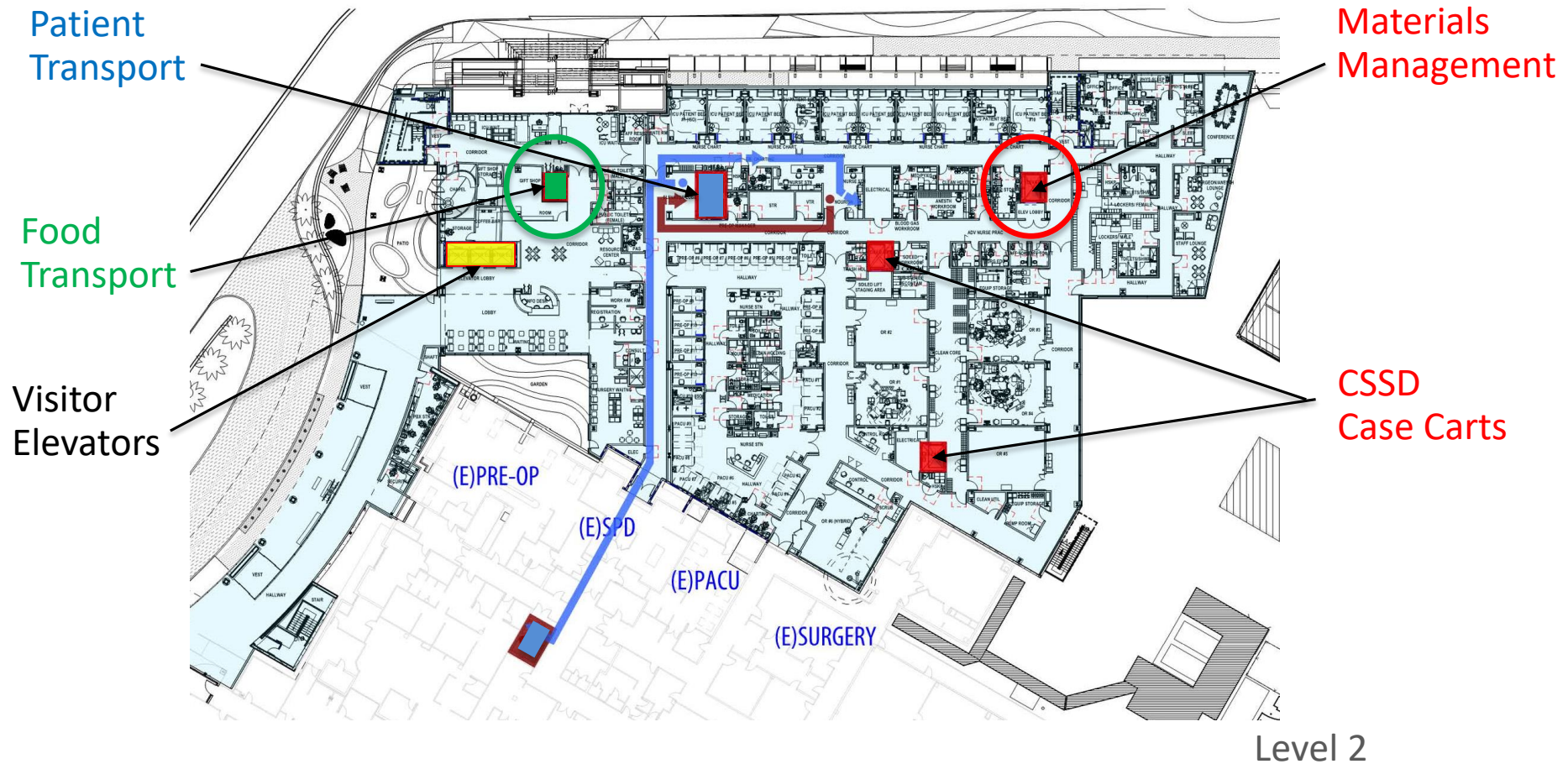# HRO Clean & Soiled Segregation
Starts Outside the Building

EXISTING HOSPITAL

OCEAN VIEW TOWER

ELEVATOR

ELEVATOR

EXISTING KITCHEN

NEW KITCHEN

SOILED DOCK

CLEAN DOCK

TRASH/ TRASH COMPACTOR

HRO Floor Circulation
Materials Transport and Segregation

Linen

Clean Dock

Kitchen

Pharm.

CSSD

Morgue

Soiled Dock

Existing

Level 1

HRO
Materials Transport and Segregation

Patient Transport

Materials Management

Food Transport

CSSD Case Carts

Visitor Elevators

(E)PRE-OP

(E)SPD

(E)PACU

(E)SURGERY

Level 2

HRO
Segregation of Vertical Transport

Patient Transport

Materials Management

Food Transport

Visitor Elevators

MED-SURG PATIENT CARE UNIT

OPEN TO BELOW

ROOF

AHU   AHU   AHU   AHU

ROOF

(E)MED-SURG

Level 4
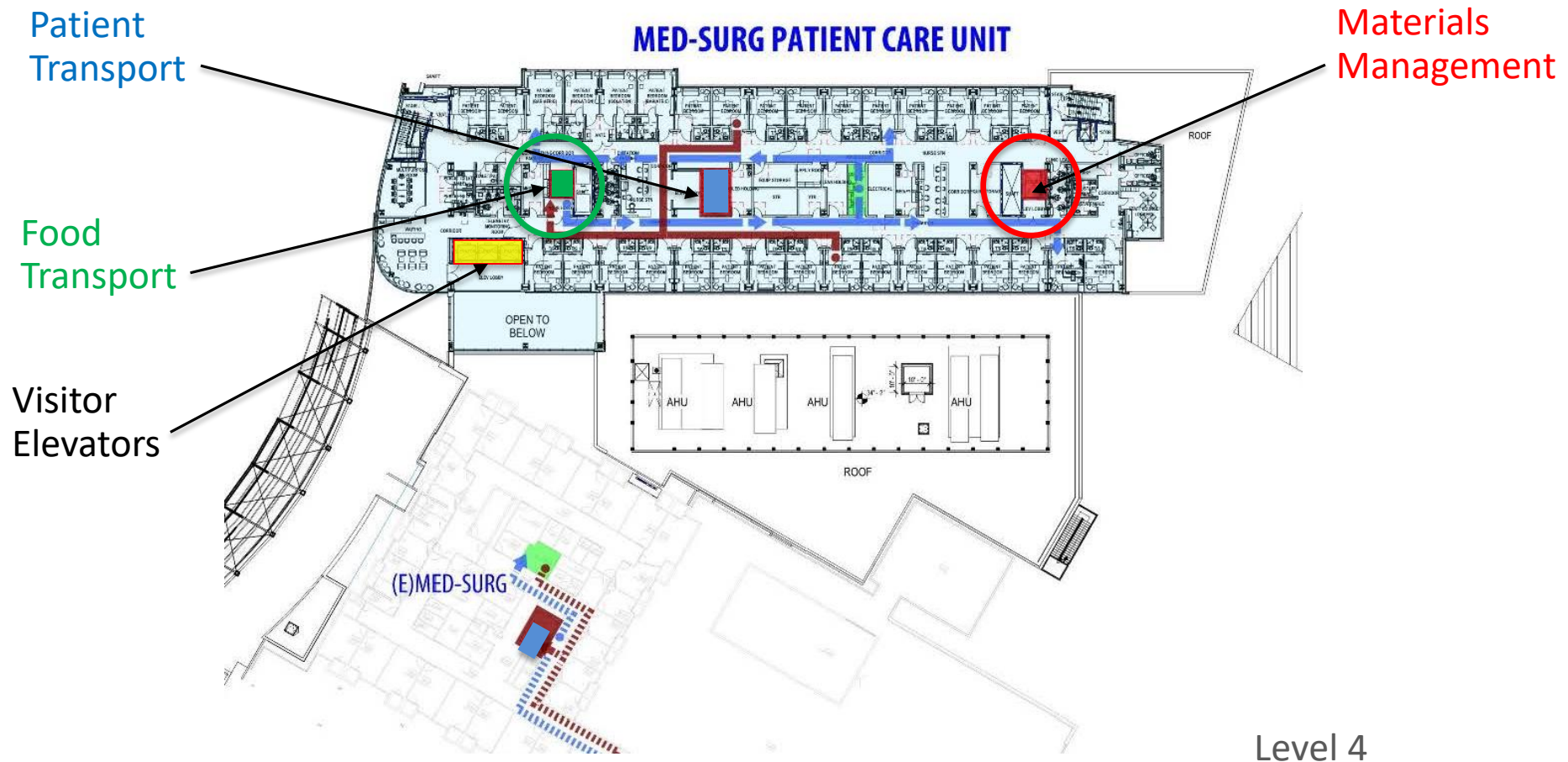
HRO Departmental Layouts: CSPD
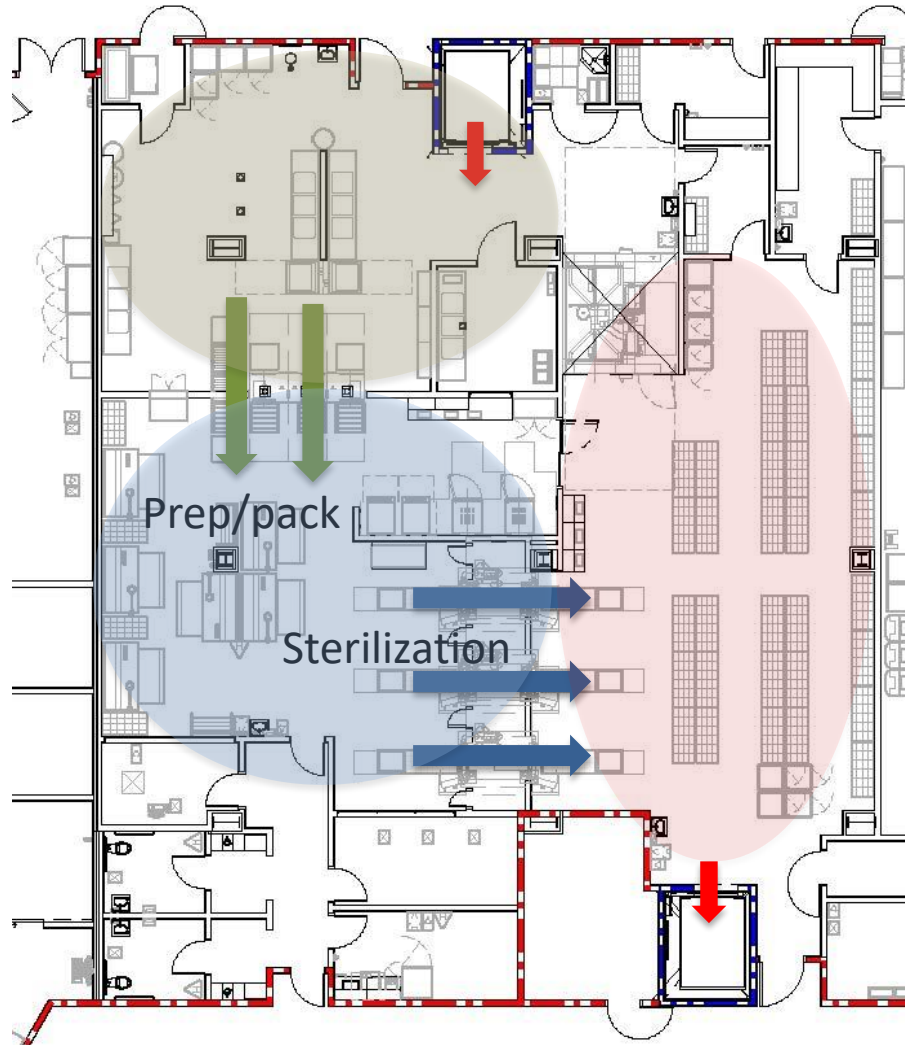
Selection of the two sided sterilizers:

- Greater separation
- Improved safety
- Reduced risk
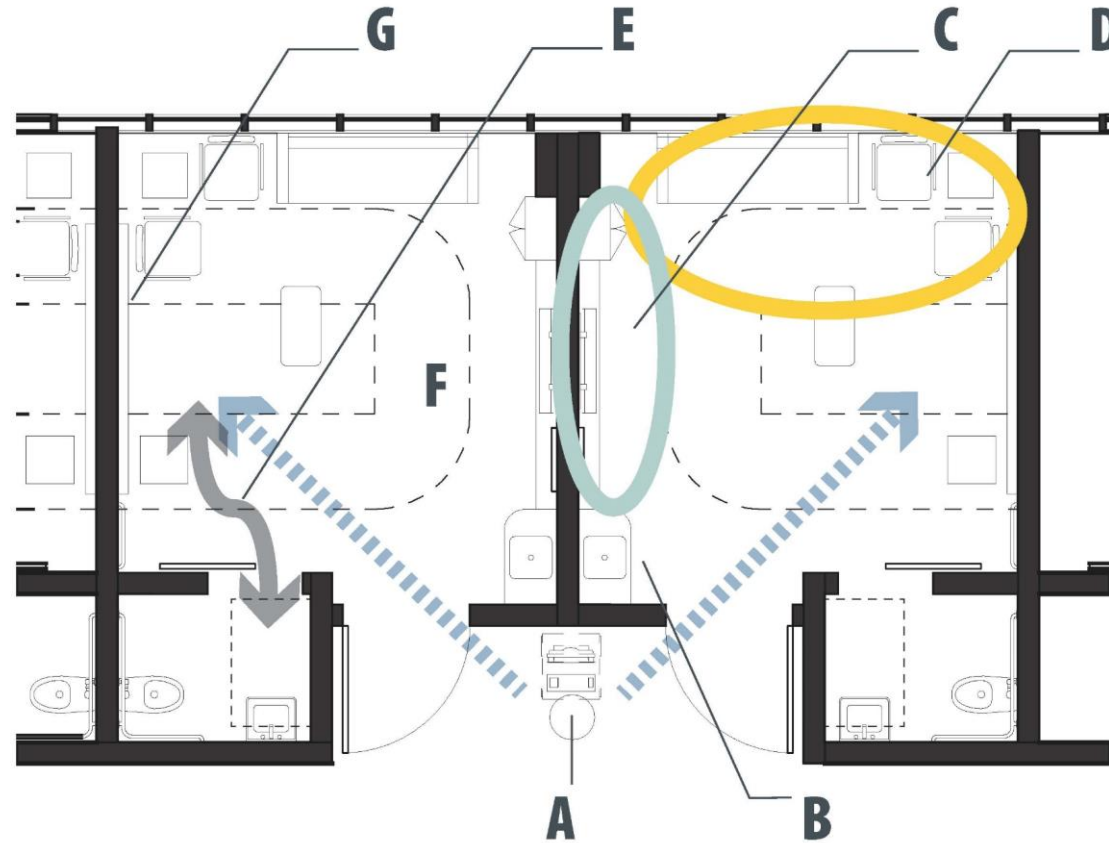
✓ Required slightly higher area
✓ Slightly higher costs

HRO: On the Patient Floors

- Support the Daily Huddle
- Support interdisciplinary collaboration

Multi-purpose room

Collaboration Rooms

Typical Bed floor
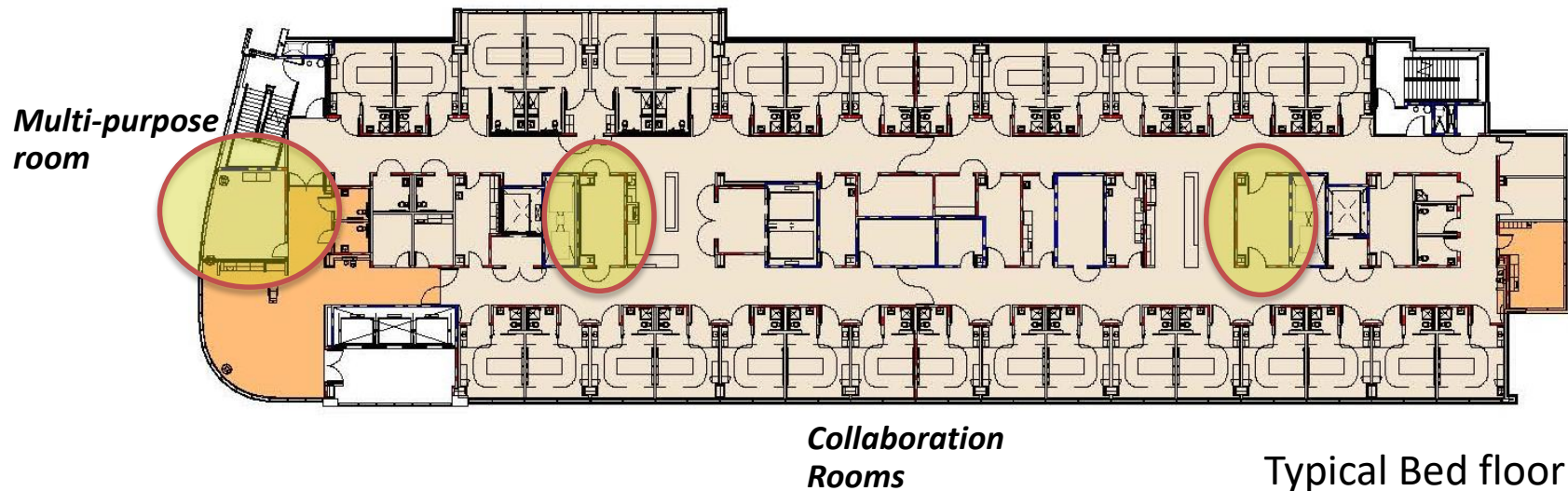
HRO: In the Patient Rooms

- Visibility
- Patient safety
- Staff safety

Typical Med/Surg. room

HRO: Is in the Details

- Multiple user reviews thru full virtual and physical mock-ups

- Over 72 items have been identified & revised thru the mock-up process
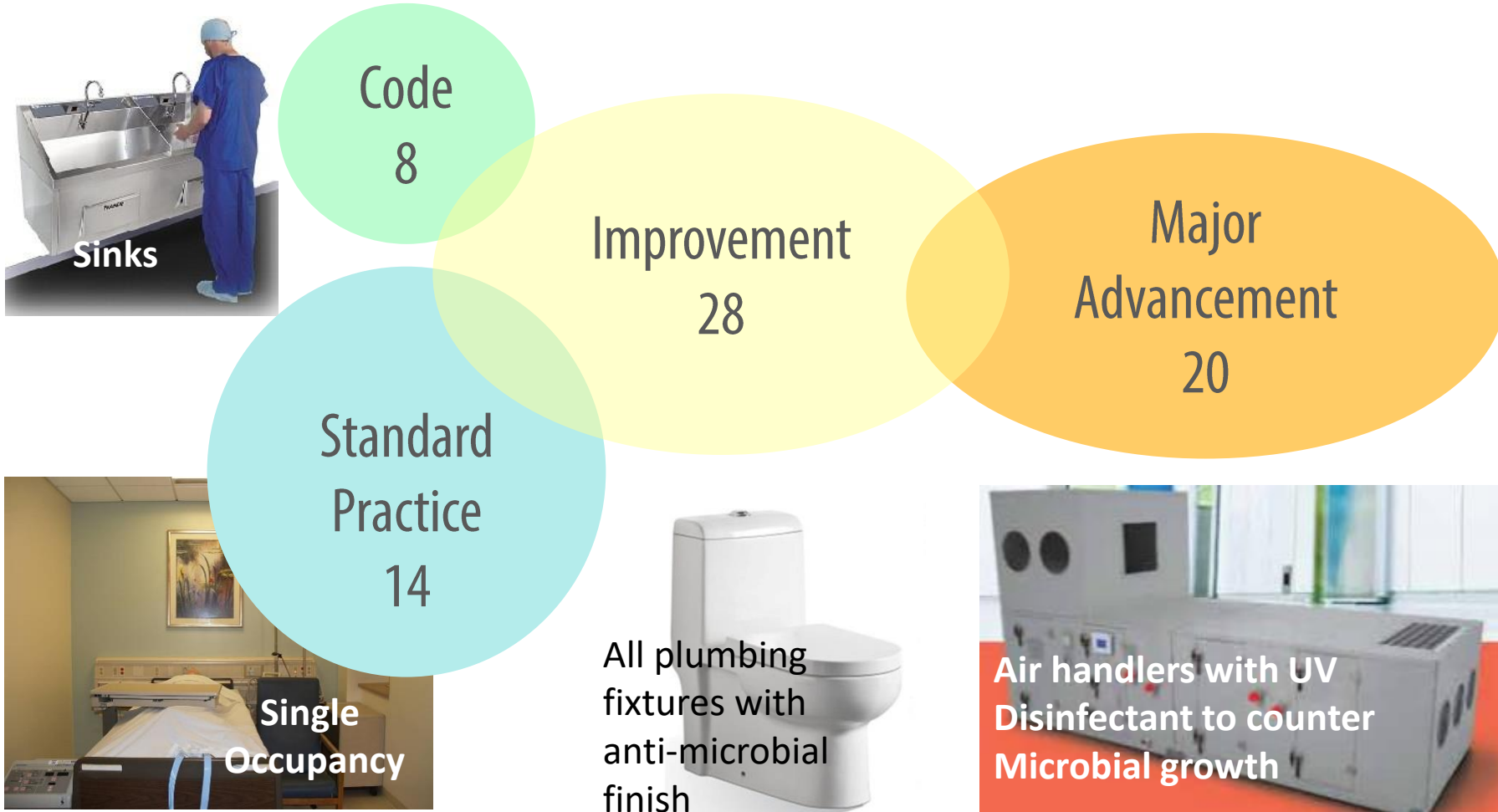
- Overall more than 100 process improvements

Documenting the HRO Design Features

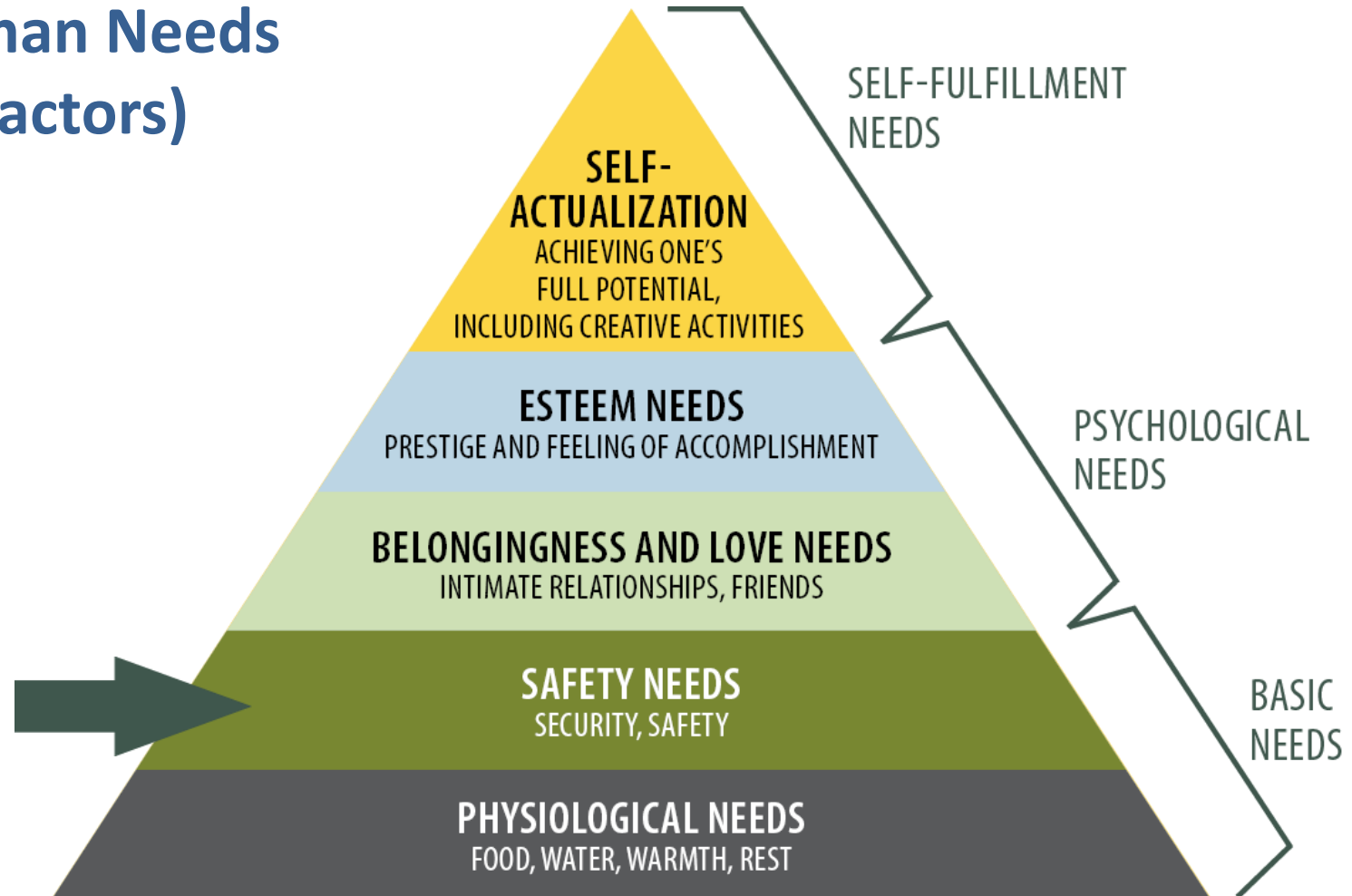| #	Design Feature	Type	Code	Standard Practice	Improvement (What is New)	Major Advancement (What is New)	Comments
1	Medication prep rooms	Arch	X		☑		One required per unit, two provided
2	Doctor Charting (private room)	Arch	X		☑		Private room exceeds code
3	Care giver & visitor hand washing sinks at entrance to every patient care area	MEP	X				
4	Hot water supplied at 120 to kitchen and CSSD degrees & system designed with no "dead legs"	MEP	X		☑		Designed to preclude bacteria growth in water at 120 degrees & no "dead legs"
5	Scrub sinks w controlled temperature & timing	MEP	X				
6	Negative and Positive Pressure rooms	MEP	X		☑		Code requires 1 provided per 35 beds. Exceeds code with 2 provided per 32 beds and 1 for the 10 bed ICU
7	All air handlers, exhaust fans and cooling are on E-power	MEP	X			☑	"All" exceeds code
8	Patient lifts - 2 rooms per floor	Arch	X		☑		Improves employee safety, with 1 lift for every 15 beds, plus 2 sets of mobile lift equipment for each floor of 32 beds
9	Single Occupancy Rooms	Arch		✱			
10	PPE at entrance of all patient care rooms	Arch		✱			
11	EMR w computers in every patient room	Arch		✱			
12	Decentralized charting outside of patient rooms	Arch		✱			
13	Separation of Clean & Dirty paths of travel throughout the hospital	Arch		✱	☑		Well understood concept, rarely well executed
14	Separate vertical conveyance for Materials & Dietary	Arch		✱	☑		
15	Designed departmental expansion with direct adjacency to existing services	Arch		✱			
16	Ergonomic standards at all work stations	Arch		✱	☑		
17	Proximate access to Equipment on floors	Arch		✱			Improves service times
18	Sinks & Urinals with be equipped with features to improve infection control, i.e. sensor-activated faucets, sensor activated flushometers, laminar flow faucets, all plumbing fixtures will coated w anti-microbial finish	MEP		✱	☑		
19	Increased band width for IT	MEP		✱		☑	RTLS is being piloted at Chula Vista prior to the new Tower
20	Improved Building management systems (BMS)	MEP		✱	☑		Fully integrated between existing and new to minimize redundant alarms and improve overall efficiency
21	Environment controls at the bedside for patients	MEP		✱	☑		
22	Environment controls (temperature & humidity) for each operating room	MEP		✱	☑		
23	Design of patient floors configured to reduce walking distances	Arch				☑	
24	Increased HRO for Central Sterile	Arch				☑	Separate and safe, with 3 control zones
25	ICUs located directly adjacent to Surgery	Arch			☑	☑	Best case patient care. Not typical space planning.
26	Space for daily shift "huddles" identified for every department	Arch			☑		Conscious space planning to reinforce HRO behavioral objectives
27	Space for "no interruption" work	Arch			☑		
28	Chemo Prep private room	Arch			☑		Designed for 2 person check
29	Design of the Pharmacy	Arch				☑	
30	Direct path of travel from kitchen to pantry on each bed tower floor to speed delivery, avoid food travelling through mixed traffic	Arch				☑	Well understood concept, rarely well executed. Speed of delivery especially important at this hospital, where 40% of the patients are diabetic & insulin tracking is critical.
31	Kitchen Tray line construct	Arch			☑		
32	Separation of traffic in the kitchen & separate refrig.. (3)	Arch			☑		
33	Planned the project to build all new tower & then connect to existing to existing hospital	Arch			☑		Minimizes disruption and infection control issues during construction
34	New 2014 CDC standards for air exchanges in operating rooms	MEP				☑	100% outside air, single pass
35	UV Disinfectant installed in Air Handling Units	MEP				☑	Counters microbial growth in coils and drain pans
36	Separate and larger vendor and IT rooms	MEP			☑		
37	Nurse Call & Real Time Location Systems	MEP				☑	Improves efficiency & accountability for staff
38	RTLS (real time locating services) patients staff equipment	MEP				☑	Improves patient security
39	Vitals link physo. Equipment	MEP			☑		
40	HIMS level 7	MEP				☑	Medicine delivered through mobile devices
41	Distributed antenna system to support mobile devices	MEP			☑		
42	All beds are telemetry friendly	MEP			☑		
43	WIFI distributed (w/ no dead spots)	MEP			☑		Centralized control room
44	Increased connectivity between radiology images & surgery (Integration in the OR)	MEP			☑		
45	Increased audio & video service in patient rooms, operating rooms, conference rooms	MEP				☑	
46	Single pass air w energy efficiency enhancements for bed tower	MEP				☑	
47	Redundancy and spare capacity planned to improved long term HRO, i.e. electrical systems w/ 20% spare capacity, chillers and chilled water pumps designed for N+1, air handlers w/ 33% spare capacity	MEP				☑	
48	Normal power is provided to the site by SDGE from two sub-stations, with a ATS to - provide redundancy if power is lost at one sub-station	MEP				☑	Added transfer switch
49	Dedicated ATS to feed E-powered cooling to the ORs during a power outage	MEP				☑	
50	Lighting inverters back up the OR lighting to avoid blinking of lights during a power outage	MEP			☑		
51	Combined Fire Control with PBX for alarms mgmt.	MEP				☑	Filter out unnecessary alarms both clinical and operational imitative
52	Alarm Management (fatigue) - Nurse call, etc. coordination with Sharp alarm management committee (includes public address system)	MEP				☑	Putting telemetry on UPS hard-wires backup to improve patient care
53	Implemented Centralized UPS for IT and select building ops.	MEP				☑	Improves reliability
54	Added sensors to Hand gel use (RTLS)	MEP			☑		Hard-wires hand washing by reporting hand gel use by each employee at each location
55	Indicate with paint no storage zones (18" from ceiling & 18" up from the floor)	Arch			☑		Improves employee safety

55 Design Features that Support HRO

Sinks

Code
8

Improvement
28

Major
Advancement
20

Standard
Practice
14

**Single
Occupancy**

All plumbing
fixtures with
anti-microbial
finish

**Air handlers with UV
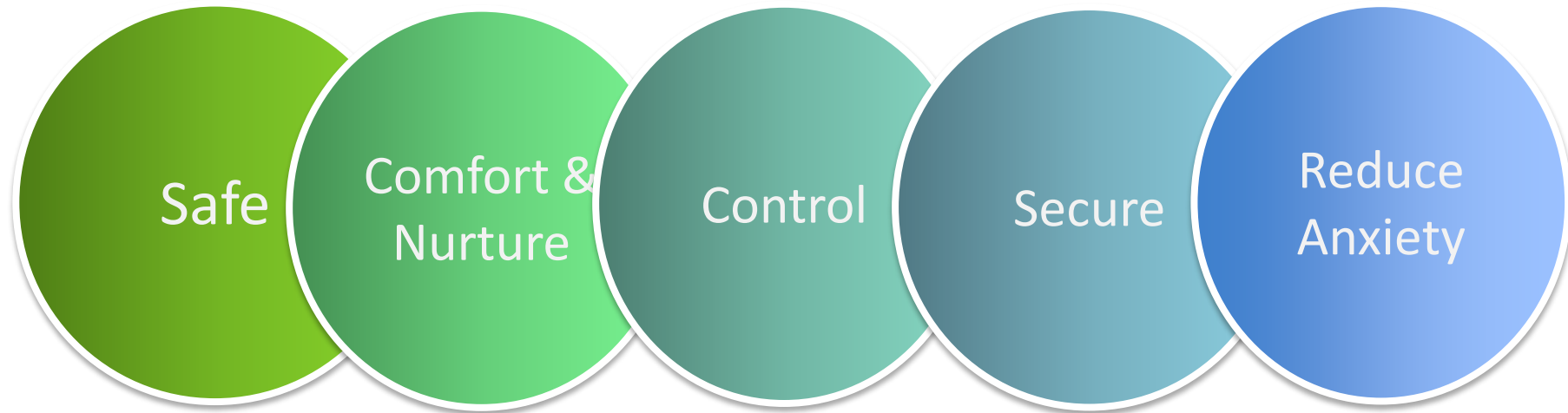Disinfectant to counter
Microbial growth**

HRO Design: Patient Experience

**Basic Human Needs
(Human Factors)**

Excellence in Design + Safe = HRO

The Journey: Safe and Secure
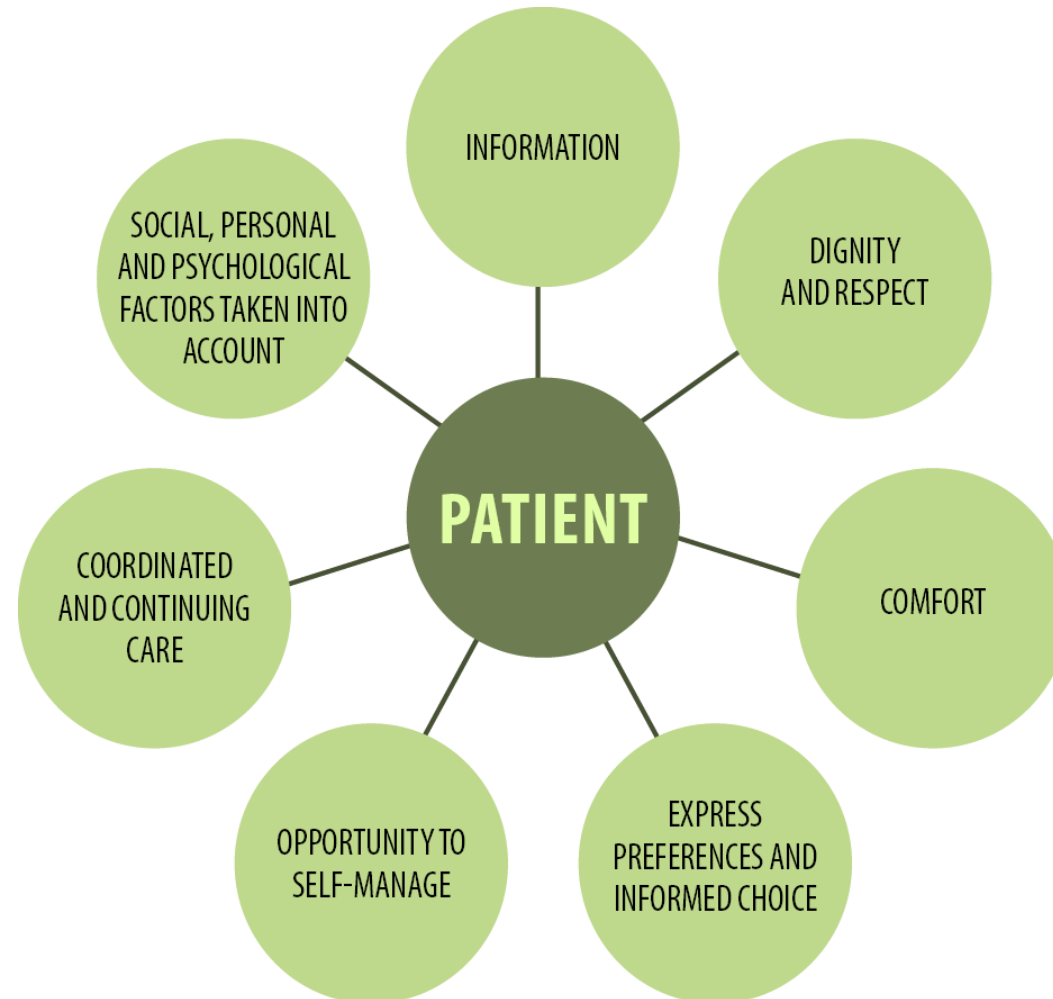Patient Anxiety to Patient Experience

HRO Design: Patient Experience

**Security
and Safety**

**Patient Anxiety….
Patient Experience**

Care process aligned with design process
aligned with patient experience…

Theory into Design: The Experience

Arrival

Theory into Design: The Experience

Pathway

Theory into Design: The Experience

The Front Door

Theory into Design: The Experience

Wayfinding

Theory into Design: The Experience

Waiting
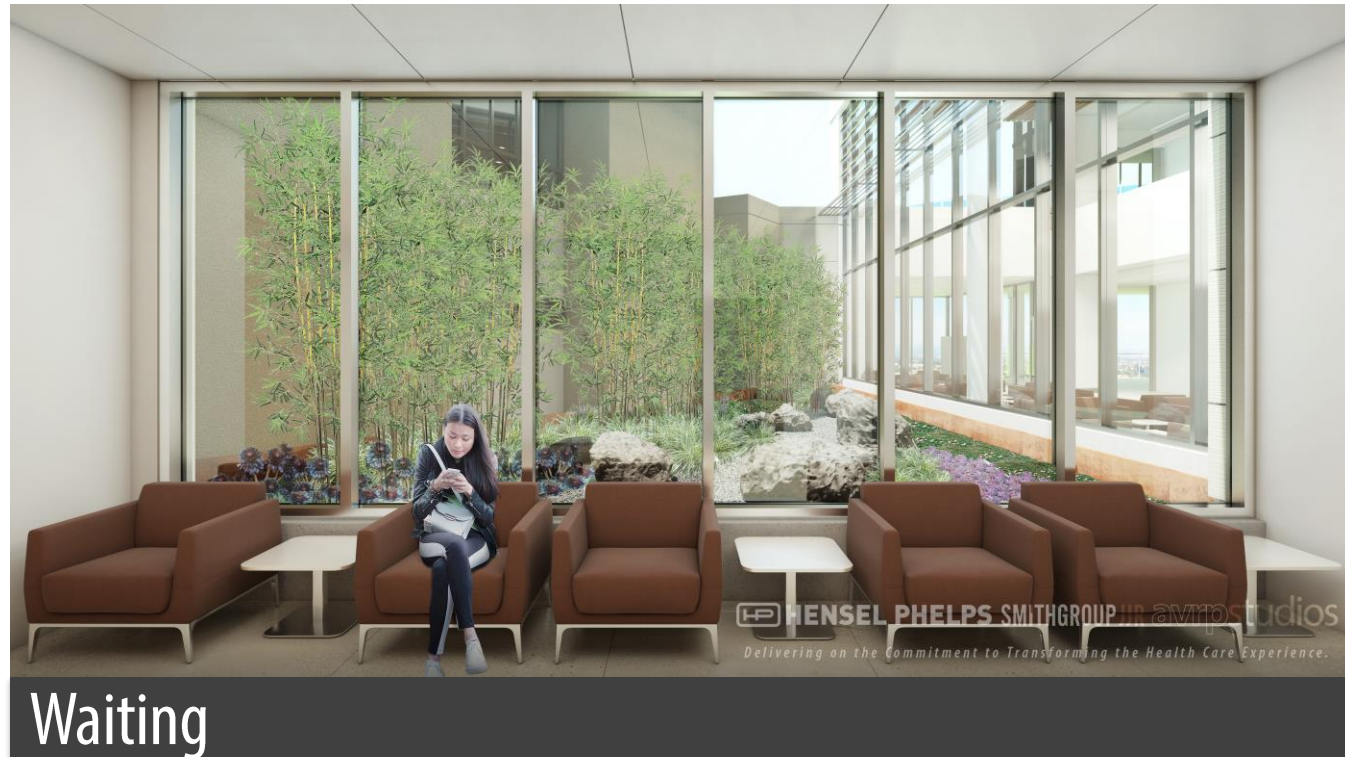
Theory into Design: The Experience

Wayfinding From Parking

Theory into Design: The Experience

Entry From Parking

HRO Design:
Patient Experience

- Meeting basic human needs
- Access to information
- Having clearly marked navigation
- Controlling natural light and views
- Controlling artificial light
- Controlling noise
- Environmental aesthetics

Diagram labels:

PATIENT EXPERIENCE

HUMAN NEEDS
(MASLOW/SAFE)

PATIENT CENTERED CARE
(PLANETREE)

HRO DESIGN
(NO HARM)

Upcoming Break for Questions and Comments

Submit a question to the moderator via the chat box.
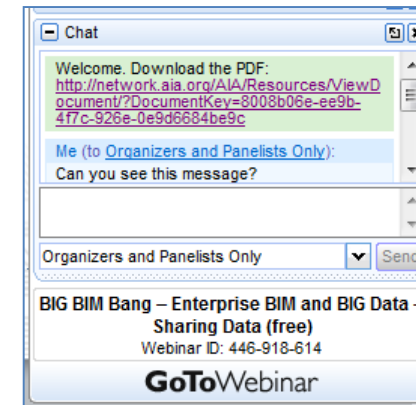
HRO: Construction

- Safety is our top priority!

- How do HRO concepts advance standard practice?

#	Features	Type of Feature	Code	Standard Practice	What is New		Comments
					Minor Advancement	Major Advancement	
1	The job was awarded to the team with the best HRO design and construction features.	Safe Culture				☑	The culture of HRO is the foundation of the design, the construction practices and the very working of the design Build team.
2	The Team culture of Trust improves communication & problem solving	Safe Culture				☑	Team Culture defined by Respect & Trust. Our Teaming Agreement establish our rules of engagement.
3	Bottoms Up Communication - Every construction worker	Safe Culture				☑	Building a culture of communication where apprentices and up are empowered to speak & identify safety concerns
4	Education of all workers for Safety & Infection Control practices	Safe Culture			☑		Education begins by changing how the workers view the work and understand the HRO objectives.
5	The Design Build Team works as a partnership.	Team				☑	Strong coordinated problem solving
6	Inspectors of Record report weekly concerns in OAC meeting; resolution occurs as soon as possible	Team				☑	IOR are Owner's representatives and are members of the team. Issue are reported weekly and tracked for early completion.
7	Safe Observations - Cross monitoring	Team			☑		Walk the job site & know the work force by name, Two person check on each other to verify safety conditions (cross-monitoring)
8	Safe Walks - Inside the Fence	Team			☑		Fresh eyes from 2 staff folks assigned to another area of the project. Daily reports & real time corrective actions.
9	"Zero" NNC (Notice of Non-Compliance)	Team				☑	Issues resolved quickly and on schedule need never to turn into an NNC. "Zero" is the goal.
10	Inviolable Rules - Causes for removal from jobsite	Team			☑		Significant safety violations that have the potential to place self or others in harms way will not be tolerated. They will result in removal from the jobsite and will be reported in the company database.
11	Discipline Database	Team				☑	Hensel Phelps maintains a database of all discpline violations across southern california. This makes the team aware of previous violations on other projects, and helps determine if the individual has the safety philosophy needed to work on our projects.
12	Safety Committee - Monitors safety issues in order to seek ways to improve	Improve			☑		HP & Subs have a Safety Committee that meets weekly to review Safe Observation reports, Near-Miss Reports.
13	Near-Miss Reporting	Improve			☑		The goal is to learn from a near miss event and use the event to improve process controls. All near misses are reviewed with the staff and all subcontractor foremen to spread awareness of the potential issue. In addition, Hensel Phelps is made aware of near misses from other projects so we can ensure we dont have a simliar situation occur.
14	Public Hazard Audits	Improve			☑		3rd party audits

#	Features	Type of Feature	Code	Standard Practice	What is New		Comments
					Minor Advancement	Major Advancement	
15	HP's 6 Step QC Process	Processes				☑	(1) Buyout Meeting, (2)Pre-MOB Meeting, (3) Prep Meeting, (4) Initial inspection, (5) Follow-Up Inspection & (6) Final Inspection
16	Immediate Stop Rule when requested by the Hospital	Processes				☑	Every craft person is directed to stop if so directed by a designated Hospital representative
17	GC issues a "Right to Excavate Permit"	Processes			☑		HP Superintendent issues a permit, after all safety checks are satisfied
18	High Risk Safety Audits	Processes	X		☑		OSHA requires scaffolding audit at 125 ft., HP audits at 50 ft. or greater. Crane construction is also audited prior to use
19	Daily Huddles	Processes			☑		Enhanced by the participation of the Owner when needed
20	STICC communication process is used to manage risks	Processes			☑		Situation, Task, Intent, Concern, Calibrate = STICC. JHA (Job Hazard Assessment) is enhanced by a more detailed review of STA (Safety Task Analysis). Hensel Phelps personel also have digital access to all AHA's and STA's while in the field, which allows for immediate review and corrective action when required.
21	"Zero" tolerance for infection control breaches	Processes				☑	Sharp contract requirement.
22	Mobile & Tablet Safety Application	Tools				☑	All team members have access to a mobile applications that contains all vital safety documentation such as the emergency action plan, staff responsibilities, emergency contacts, site logistics, etc.
23	Digital Gang Boxes	Tools			☑		Computer screen and server on each floor for easy access to drawing and submittals. Connects to files for IOR Issues Log and Punch List items.
24	Use Noise Monitoring & Vibration monitoring equipment to help mitigate excessively disruptive activities	Tools				☑	Tools used to pre-test for impact in clinical area. Used to plan timing for activities and additional mitigation measures that may be needed.
25	Geocomp's iSite Monitoring System for continuous real time monitoring of infection control barriers.	Tools				☑	Traditional negative air monitoring is periodic. This is real time and sent to superintendents cell phone.
26	Drone updates enhances communication	Tools				☑	major milestones of construction are reported with a drone video.
27	4D Scheduling	Tools			☑		3D BIM enhanced with the use of 4D scheduling to review construction sequencing activities for safety issues. One more tool to ensure "no surprises".
28	Waterproof fire caulking at all pipe penetrations	Barriers			☑		To control water migration during construction and in the final condition.
29	Waterproof sealant at the bottom framing tracks at all shafts	Barriers			☑		To control water migration during construction and in the final condition.
30	Waterproof sealant at all perimeter firesafing areas	Barriers			☑		To control water migration during construction and in the final condition.
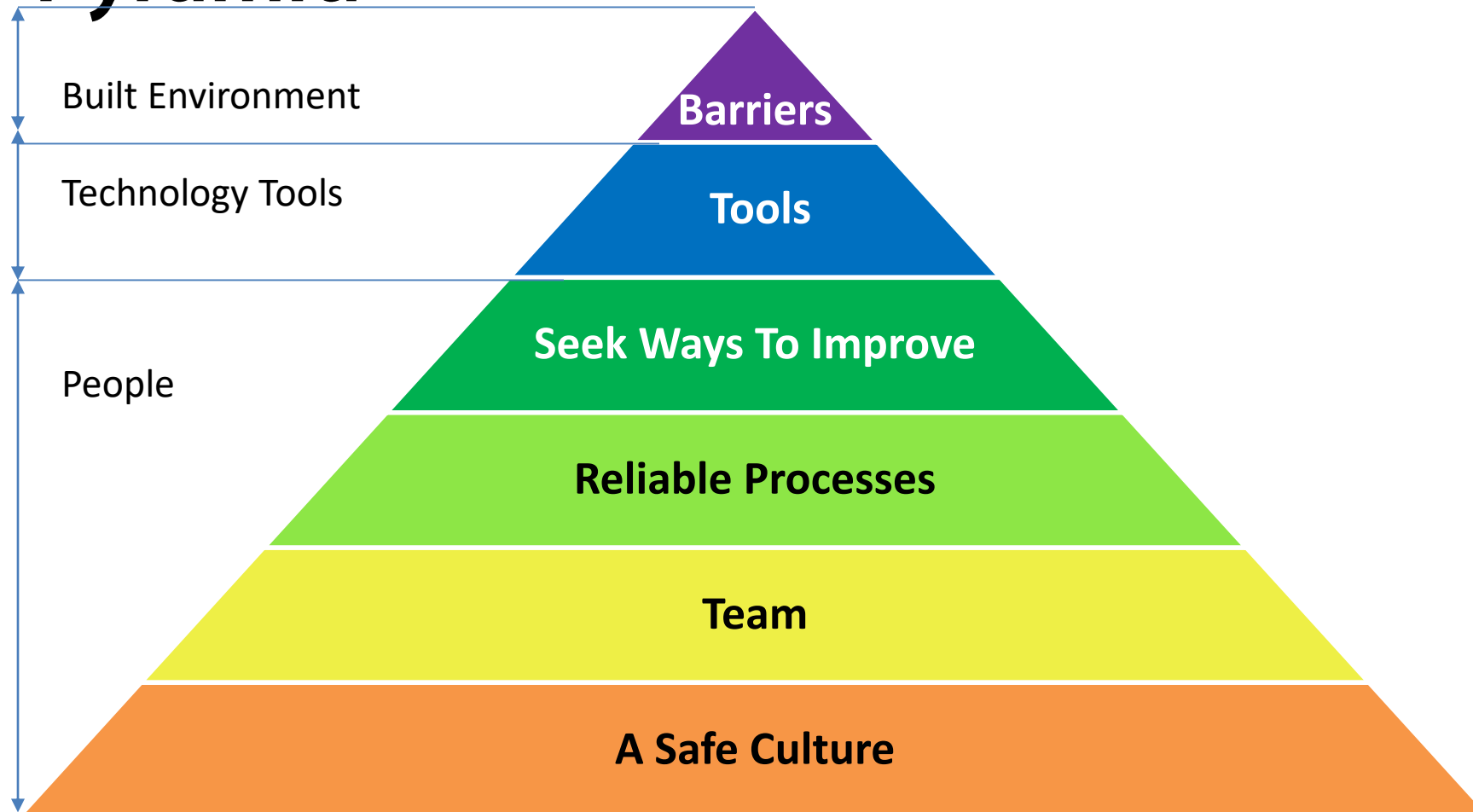
- Assume will not go as planned
- Immediate Stop Rule
- Partnership
- Bottom-up Communication – More eyes on site
- Attitude

Seek Ways To Improve
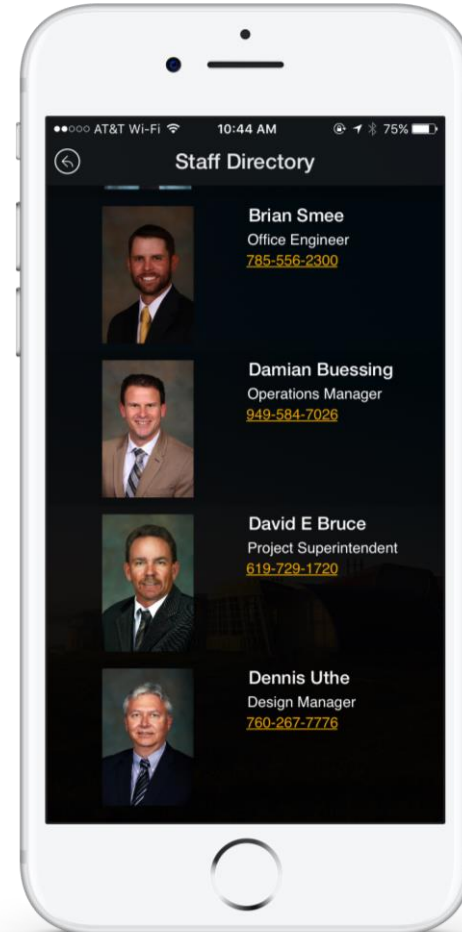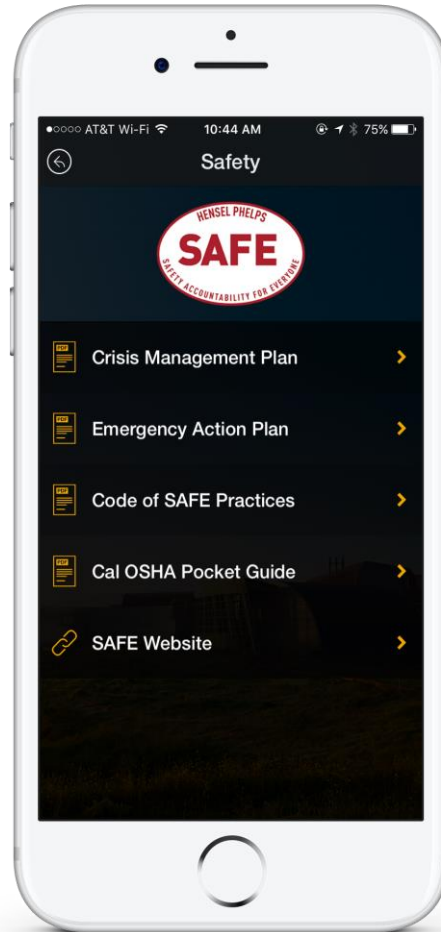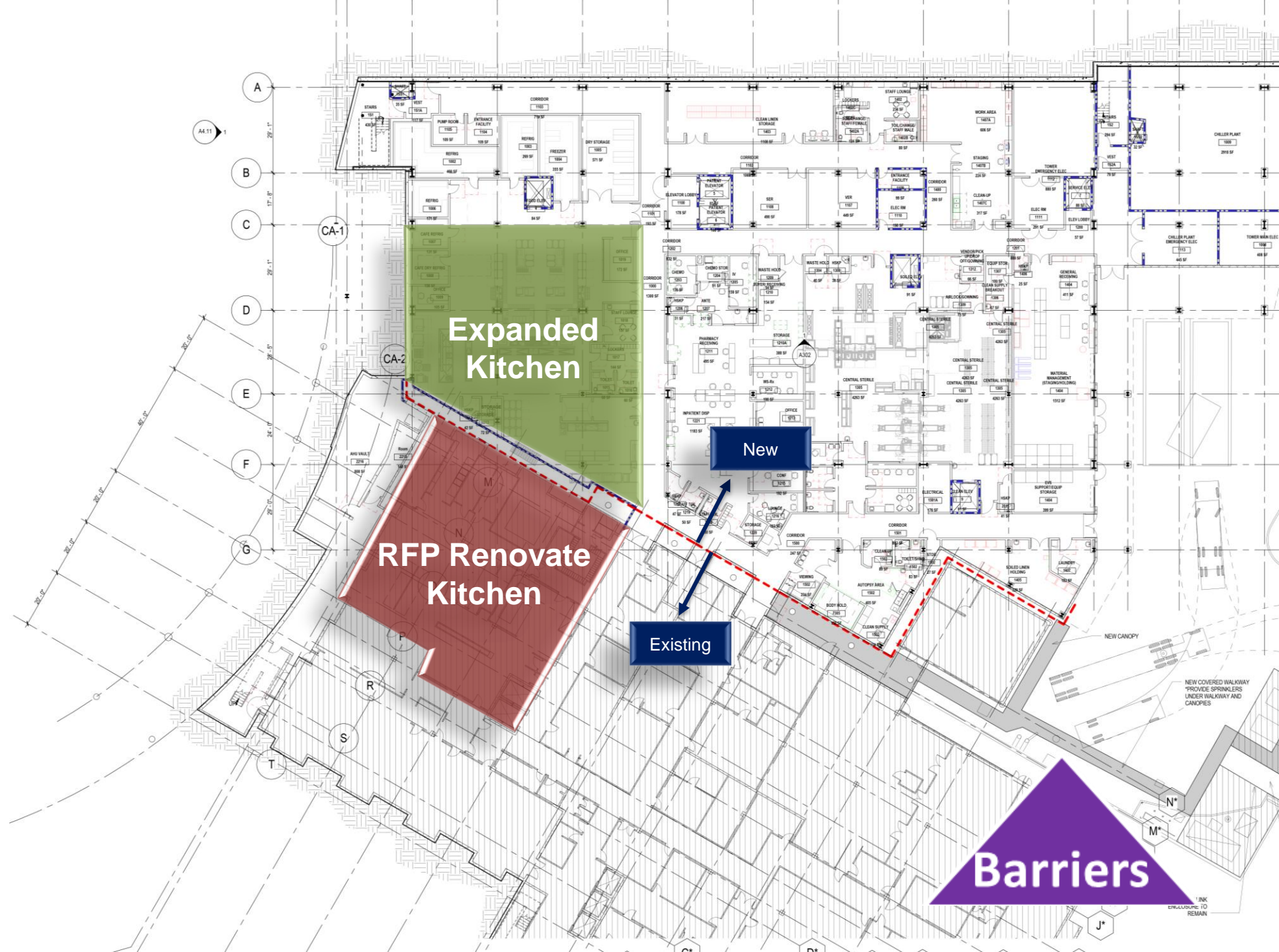
Reliable Processes

Team

A Safe Culture

Field Tablets
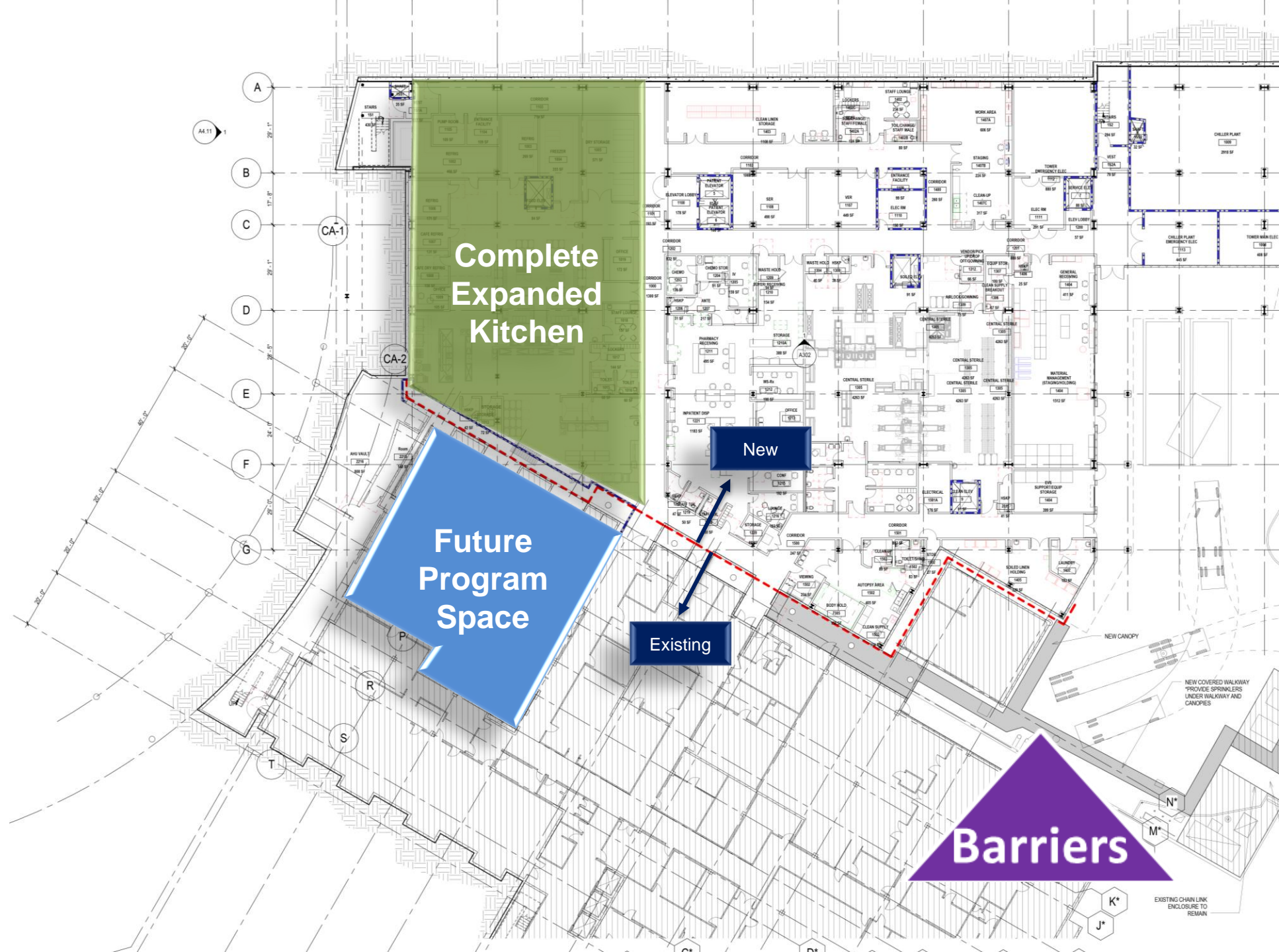
- Access contract documents
- Quality Control
- **Safety**

Tools

Complete Expanded Kitchen

Future Program Space

New

Existing

Barriers

Construction HRO Advancements

People

- Attitude/Empower

Cost

- Minimal impacts

Schedule

- Minimize phasing

- Significantly shorter schedule

"Separate = Safe"

*What might HRO mean to you
in your industry?*

Time for Questions and Comments

???-!!!

**Moderator
Rita Ho, LEED AP**

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Date	Series	Topic
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10/10	HC 101 Series	Lean Concepts Drive Healthcare Architecture Planning and Design
11/07	Masters Studio Series	Generative Design for Healthcare Planning

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