

# Application of CAST in Site Identification Safety in Interventional Radiology (IR)

June 5<sup>th</sup>, 2024

Jasmine Ghorbani, Melissa Marquez, Patrick Samedy

Division of Quality & Safety



Memorial Sloan Kettering  
Cancer Center

# Initial Introduction

## Overview

### Background

Wrong site procedures are known as preventable “never events” that occur in very low volumes, requiring the need to sustain a highly resilient system. Site identification is a key element of prevention of wrong site procedures.

### Goal

Address site identification related issues with a novel approach: a **Systems Analysis** that incorporates **Human Factors** principles

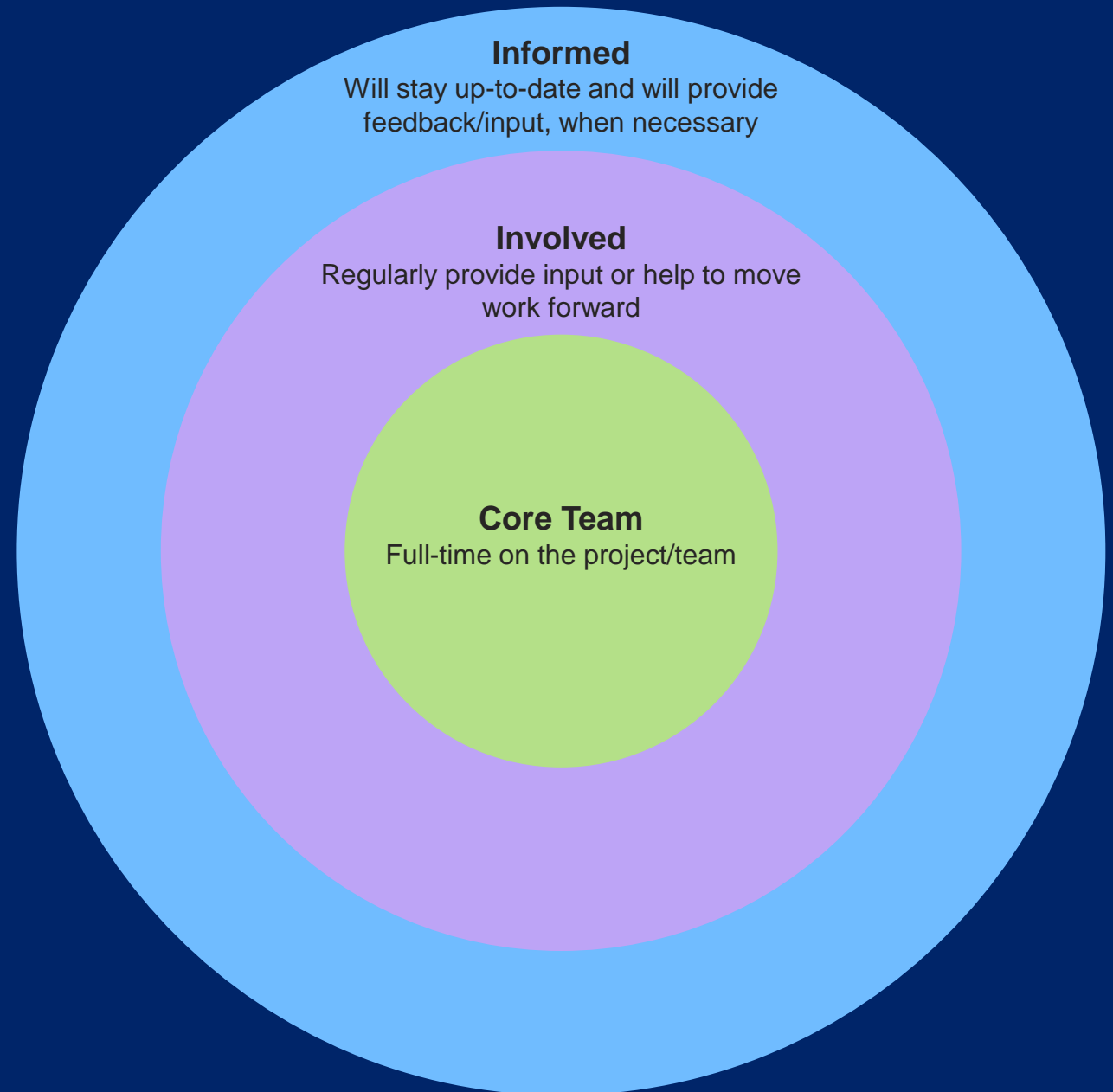
If successful, transfer what is learned in IR into other procedures involving site identification.

Wrong Site Surgery made up **8%** of all sentinel events reviewed by the Joint Commission in 2023 [1]

# Project Management

## Methods

- DMAIC\* Process
- Stakeholder Analysis
- Project Charter
- Change Coalition Diagram
- Project Dashboard
- Monthly Project Updates



\*DMAIC= Define, Measure, Analyze, Improve, Control

# Project Management

## Stakeholder Analysis & Management

### “Core Team”

#### Project Managers/Engineers

- *Facilitate meetings*
- *Perform systems safety analysis and make recommendations*
- *Send project communications*

#### Project Champions

- *Provide project credibility, department perspective, and project guidance*
- *Facilitate support among department members*

#### IR Quality & Safety Representative

- *Participate in interviews & provide feedback*
- *Provide relevant event/trend information*

### “Involved”

#### Subject Matter Experts (IR Clinical Roles)

- *Participate in interviews*
- *Provide feedback and confirmation of workflows*
- *Provide relevant resources*
- *Attend recurring meetings, as needed*

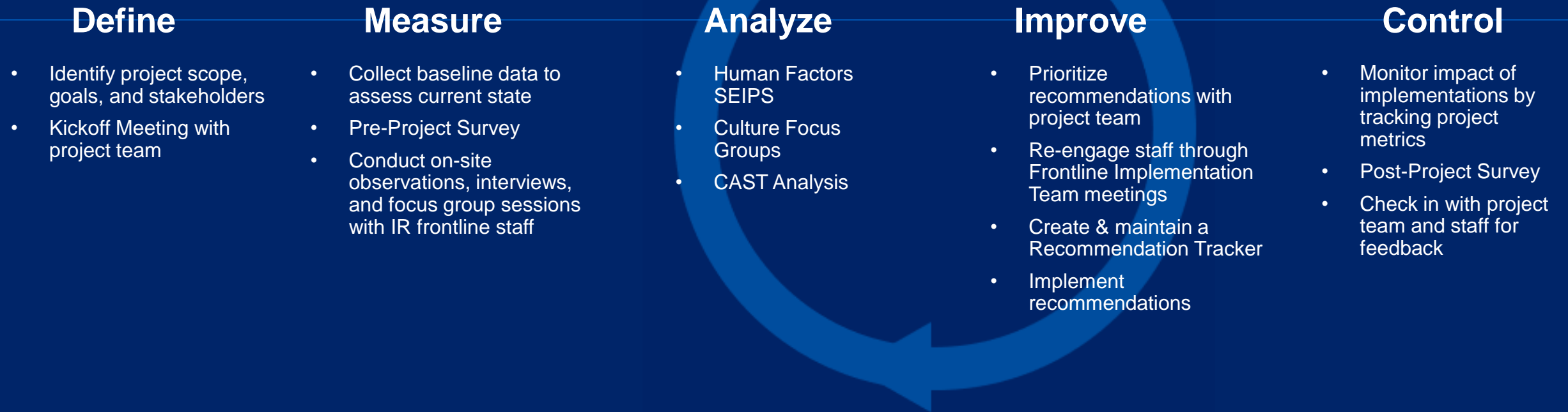
### “Informed”

#### Project Sponsors

- *Identify strategic priorities*
- *Provide departmental support and resources*
- *Escalate key project matters to appropriate department/roles*
- *Authorize the implementation of recommendations*

# Project Management

## DMAIC Project Timeline



# Project Indicators

## Baseline Metrics



### Lagging Indicators:

- No. of events that reached the patient
- No. of days since last event



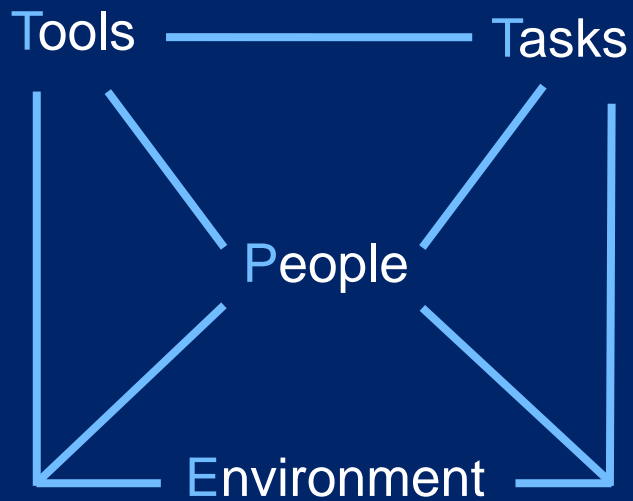
### Leading Indicators:

- No. of near-misses
- No. of orders that had updated laterality
  - Right to Left
  - Left to Right
- Patient Safety Culture survey responses

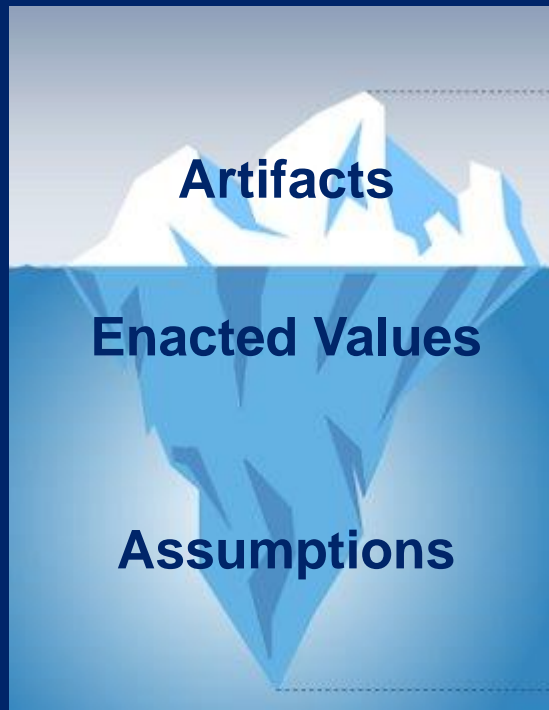
# Analysis Approach

## Methods

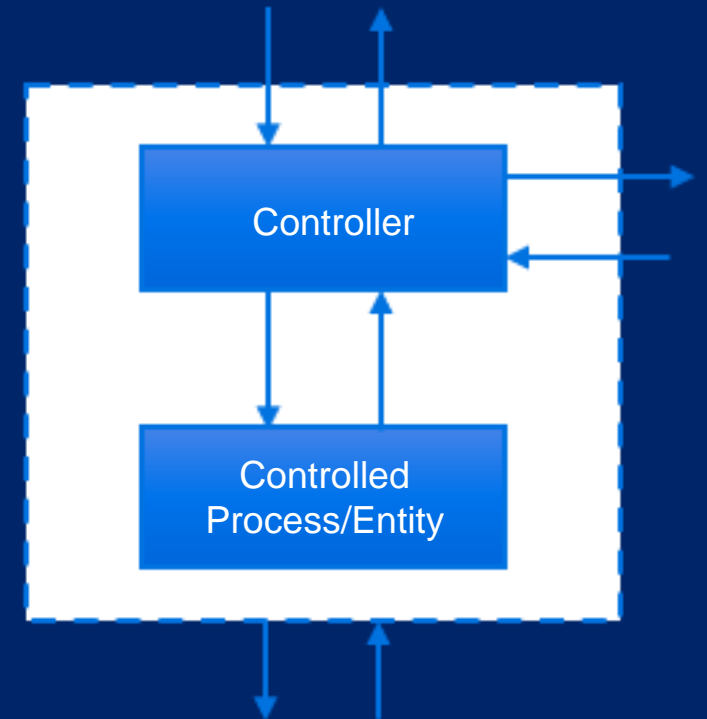
### Human Factors SEIPS Analysis



### Safety Culture Assessment



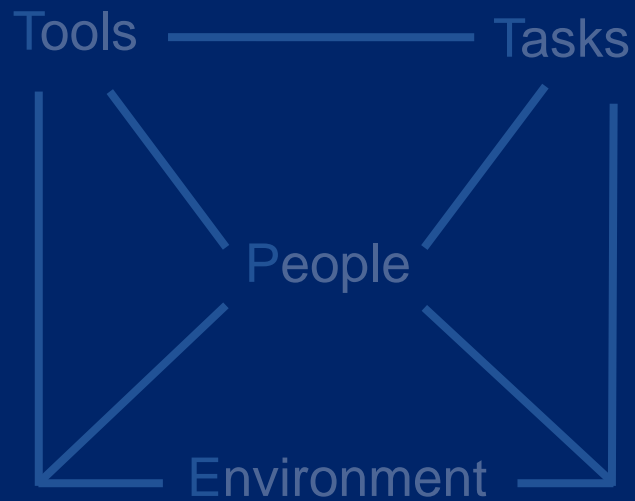
### Systems Safety CAST Analysis



# Analysis Approach

## Methods

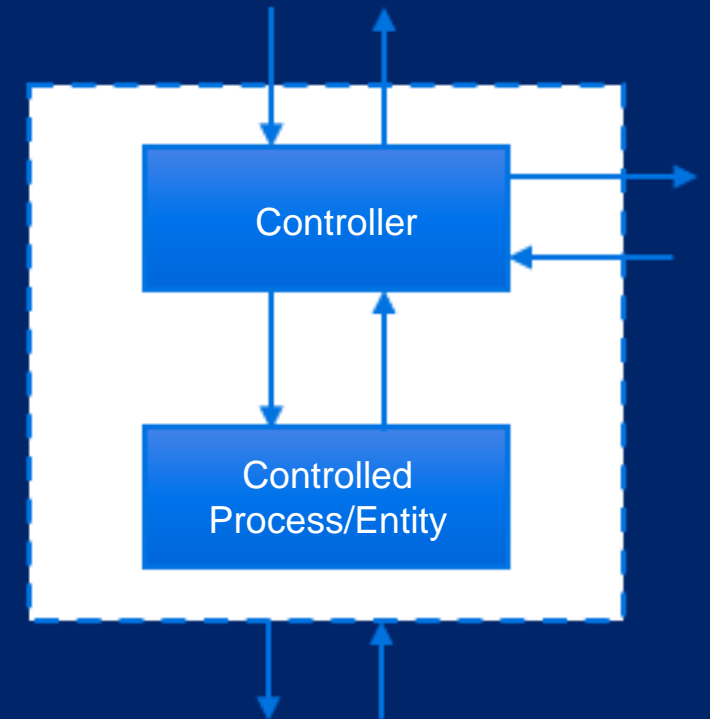
### Human Factors SEIPS Analysis



### Safety Culture Assessment



### Systems Safety CAST Analysis





# CAST Analysis

## Approach

### Data Sources

- Multiple patient safety events and near misses:
  - Voluntary reporting system
  - Internal Quality Review Reports
  - State Reportable RCA Reports
  - Observations & Interviews

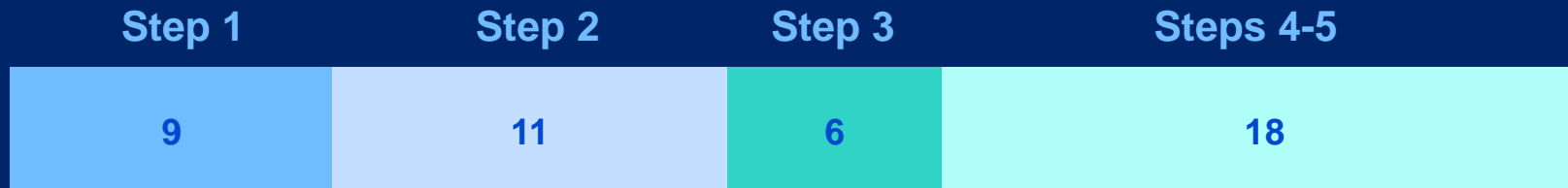
### Analysis Team

- Systems Engineers:
  - Analysis leads
- Subject Matter Experts:
  - System details, validation
- Clinical Quality Manager:
  - Past analysis/event details, validation

### Platforms

- Apps:
  - MS Excel spreadsheet
  - Miro
- Learning material:
  - CAST Handbook
  - CAST Tutorial videos
  - Publications

## Average Hours per CAST Step\*

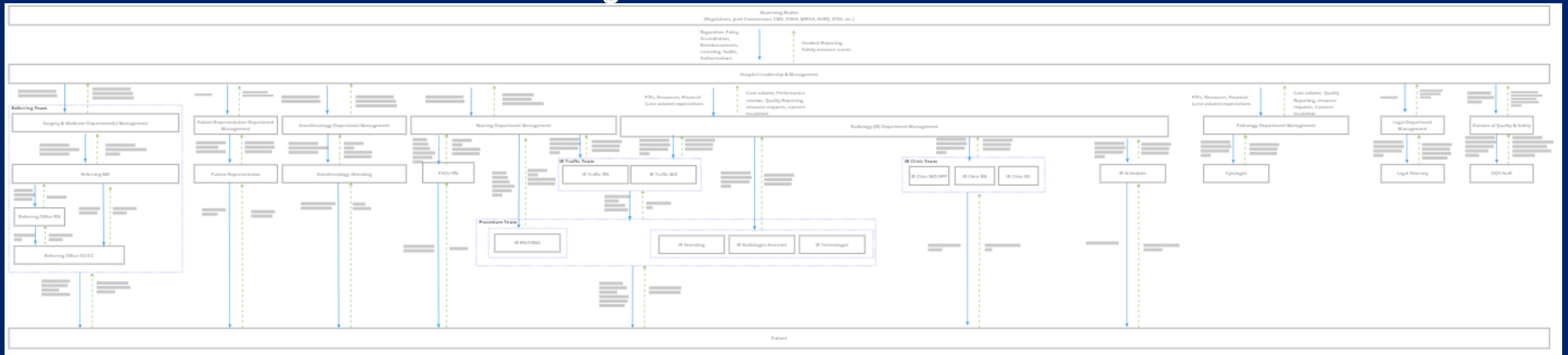


\*Performed among multiple projects and engagements

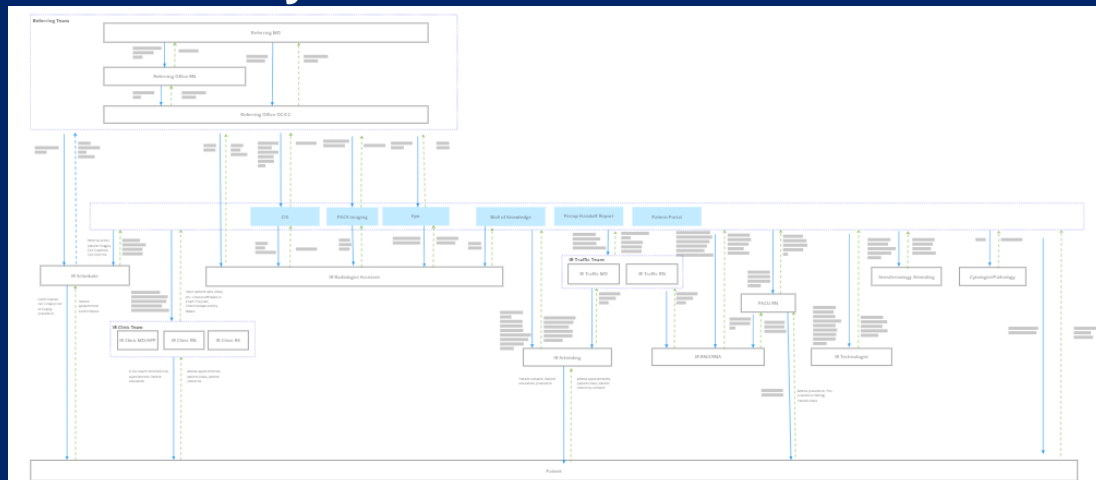
# CAST Analysis

## Multi-Level Control Structures

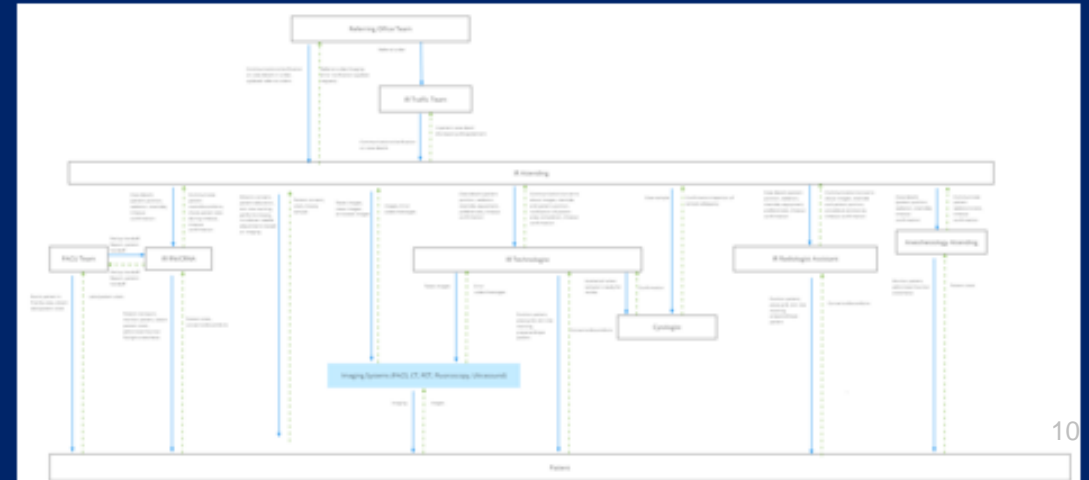
### High-Level Control Structure



### Systems Control Structure



### Procedure Control Structure



# CAST Analysis

## Controllers

No.	Controllers
C-1	Referring MD
C-2	Referring Office
C-3	IR MD
C-4	IR Traffic Team
C-5	IR Radiologist Assistant
C-6	IR Nurse
C-7	IR Technologist
C-8	IR Anesthesiologist
C-9	IR Scheduler
C-10	Patient
C-11	Surgery
C-12	Radiation Oncology
C-13	Pathology
C-14	Patient Representative
C-15	Diagnostic Radiology
C-16	Pre-Surgical Care Nurse
C-17	Post-Anesthesia Care Unit Nurse
C-18	Governing Bodies
C-19	Hospital Leadership & Management
C-20	Department-level Management
C-21	Legal Department
C-22	Division of Quality and Safety
C-23	Pharmacy
C-24	External Vendors
C-25	IR Clinic MD/NP/PA
C-26	IR Clinic RN
C-27	IR Clinic RA
C-28	Imaging systems
C-29	EHR
C-30	Scheduling
C-31	Patient Portal
C-32	Perioperative Handoff Report

# CAST Analysis

## Systems Losses & Hazards

No.	System Losses
L-1	Loss of life or harm due to incorrect site biopsy
L-2	Loss of life or harm due to lack of biopsy
L-3	Loss of life or harm due to untimely biopsy/diagnosis
L-4	Loss of patient satisfaction
L-5	Damage to organization's reputability
L-6	Loss of data integrity
L-7	Loss of resources (Procedure time slot, medication/equipment, staff)
L-8	Legal repercussions

No.	Hazards
H-1	Inaccurate/incomplete biopsy referral order
H-2	Inaccurate/incomplete clinical documentation
H-3	Wrong side/site biopsied
H-4	Insufficient side/site(s) biopsied
H-5	Incorrect equipment utilized
H-6	Incomplete timeout
H-7	Delay in biopsy/diagnosis
H-8	Insufficient appointment/rooms
H-9	Incorrect patient positioning
H-10	Incorrect site marking
H-11	Lack of/poor communication between procedure room staff
H-12	Miscommunication between care team

# CAST Analysis

## Safety Constraints

No.	Safety Constraints
SC-1.1	Referring Office must ensure accurate/complete biopsy referral order entry
SC-1.2	There must be a reconciliation process to confirm referral order accuracy and completeness
SC-1.3	EHR Referral Order must re-entered when update is needed
SC-2	Clinical documentation (Case details, Clinical notes, etc.) must be accurate and complete
SC-3.1	Correct site and side must be biopsied
SC-3.2	Measures must be taken to reduce repeat biopsies
SC-3.3	Consenting process to review procedure site/side with patient
SC-4	All intended sites and sides must be biopsied
SC-5	The appropriate equipment must be utilized
SC-6	Timeouts must be performed completely, with all necessary roles present
SC-7	Timely biopsies/diagnoses
SC-8	Appropriate case prioritization by traffic team
SC-9.1	Patient must be properly positioned prior to start of procedure
SC-9.2	There must be agreement/consensus regarding patient positioning prior to procedure prep
SC-10	Correct and effective site marking must be performed
SC-11	Effective communication between procedure room staff
SC-12	Effective communication between care team
SC-13	There must be sufficient and properly allocated resources

# CAST Analysis

## Event Analysis Template

No.	Year	Actual or Near Miss?	Short Description	Event Description	Losses	Hazards	Controller(s)	Safety-Related Responsibilities	Role in Event/ Contributions (UCAs)	Questions	Process (Mental) Model Flaws	Questions	Contextual Factors	Questions	System Flaws	Questions

# CAST vs. RCA

## Comparison

### RCA

**Linear** approach that looks to identify **the root cause** following an event

**Ambiguous** analysis process including potential use of tools such as Fishbone diagram, 5 Whys, etc.

Often over-simplified, **single root cause statement**

#### Approach

#### Tools/Methods

#### Outcomes

### CAST

**Holistic** approach that looks to identify lack of **system controls** with surrounding processes that could contribute to similar events happening

**Structured 5-step analysis process** using systems theory and control structures with feedback loops

Robust **list of system-wide contributions** to the event

# Project Management

## Implementation & Tracking

### 1. Documentation of Findings

- CAST Spreadsheet
- CAST Control Structure
- Risk Register

### 2. Implementation Phase

- Stakeholder Involvement in Prioritization
- Frontline Implementation Teams
- Delegation of Action Items
- Recurring Project Update Meetings
- Pre-Implementation Survey

### 3. Project Tracking

- Post-Implementation Survey
- Post-Patient Safety Culture Survey
- Project Dashboard
- Metrics Dashboard



# Key Takeaways

1. CAST is a **valuable approach** to review patient safety events **holistically** and **comprehensively**
2. A **multi-event approach** to CAST is feasible and insightful
  - Recommend applying CAST or preparing CAST-specific questions to events as soon as they happen
3. CAST analysis has proven to generate **unique findings** outside of other analysis methods
  - RCA, SEIPS, Culture Analysis, Contextual Inquiry
  - Identified seemingly innocuous risks within the system
4. **Frontline insights** and **involvement** are **essential** to form an understanding of the system to perform CAST
  - Engage stakeholders early
  - Spend time to earn Frontline trust
  - Observations, interviews, focus groups are invaluable data sources
  - Involve in implementation process

**Thank You**

