


Centralized High-Level Disinfection Process

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Company Background


A world-class academic and healthcare system committed to advancing medicine and health



Located in Durham, North Carolina



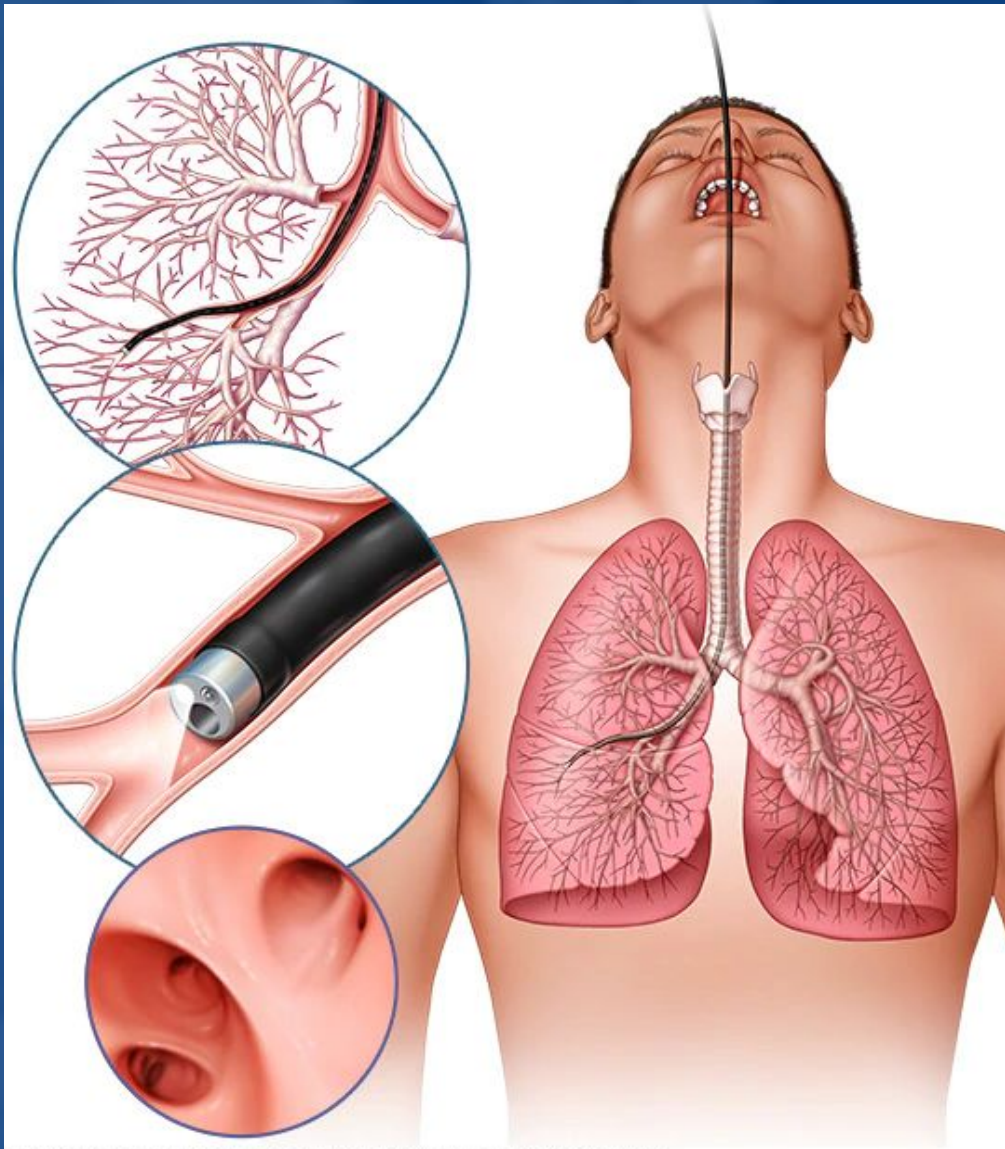
3.5 Million Outpatient Visits Annually



16,600 Health System Employees

What is an Endoscope?

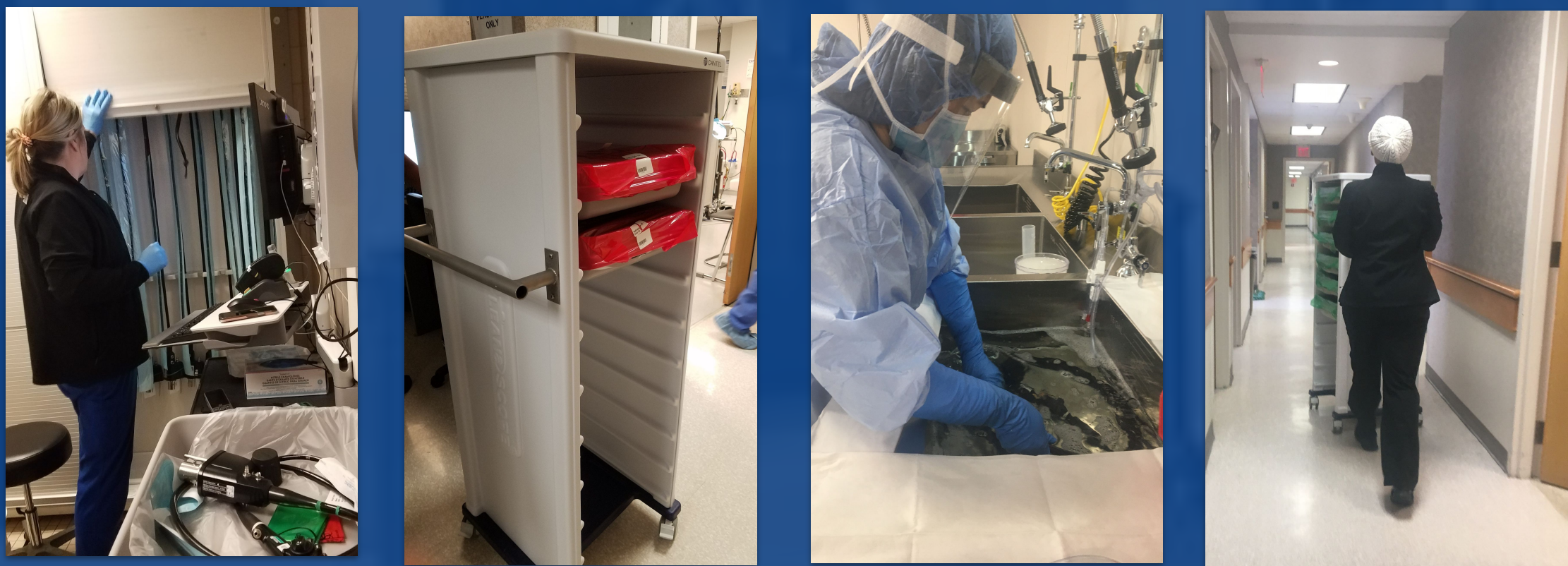
- A medical tool consisting of a small, powerful camera and a bright light
- Average Cost: \$10,000-\$20,000



High Level Disinfection Process

High Level Disinfection Process (HLD) is a **standardized cleaning process**. In order to remain in compliance with the Joint Commission standards, Duke has to move to a centralized HLD process.

Centralized High-Level Disinfection Process Flow



Scopes are used in clinical procedures

→

Scopes are retrieved and transported to HLD lab

→

HLD sanitizes scopes

→

Scopes are returned to clinics by transporters

Opportunity

Duke has never had a centralized HLD process for its outpatient clinics before, and lacks the **quantitative insights** to **optimize** the endoscope transportation between clinics and the centralized HLD lab.

Objectives



Model transportation and HLD staffing to maximize scope throughput



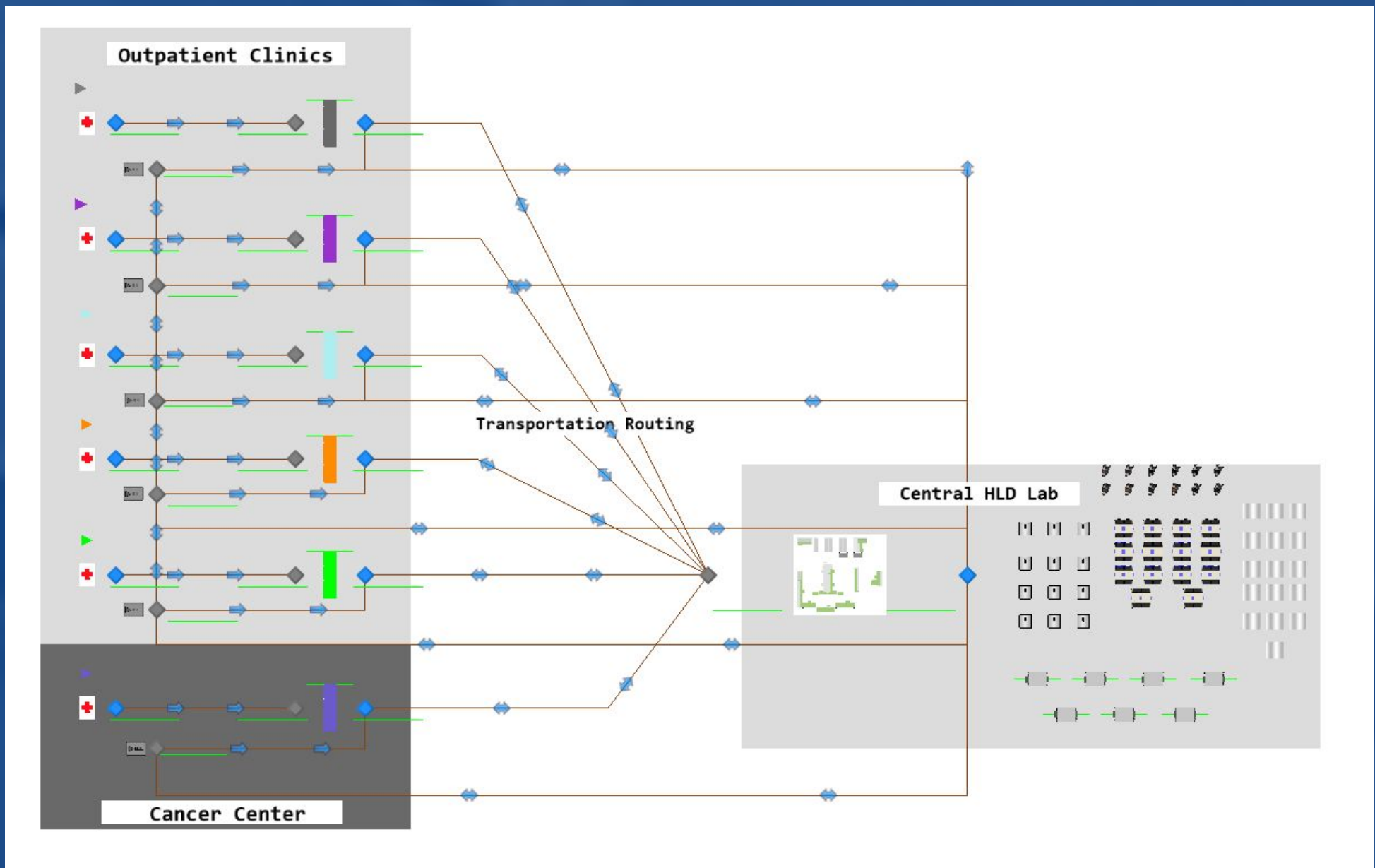
Determine number of endoscopes to meet patient demand



Develop strategy to minimize the financial impact of process

Solution Approach

Simio



Simulation of Completed Centralized HLD Rollout

Scope Inventory Model

$$\min Z = \sum_{i=1}^8 \sum_{j=1}^n \sum_{k=1}^m A_{ijk} - D_{ijk}$$

Where:

i = outpatient clinics (1-8), j = scope type (1, 2, ..., n - depending on clinic), k = scope numbers based on hourly intervals (1, 2, ..., m)
 Z_{ijk} = difference between total scopes owned by clinic and clinic scopes in use at time of day
 A_{ijk} = total number of scopes owned by clinic
 D_{ijk} = total number of scopes in use by clinic at time of day = $P_{ijk} + T_{ijk} + \sum HLD_{ijk}$
 P_{ijk} = total number of scopes in use by clinic in patient procedures by time of day
 T_{ijk} = total number of scopes in transport to and from clinic by time of day
 $\sum HLD_{ijk}$ = total number of scopes from clinic in HLD processing stages by time of day

Mathematical Model to Calculate Inventory Levels

Impact



Up to 8%
Cycle Time Reduction



Zero negative impact on patient procedures
via guaranteed endoscope availability and improved process efficiency



Up to 9%
Clinic-to-Sink Reduction

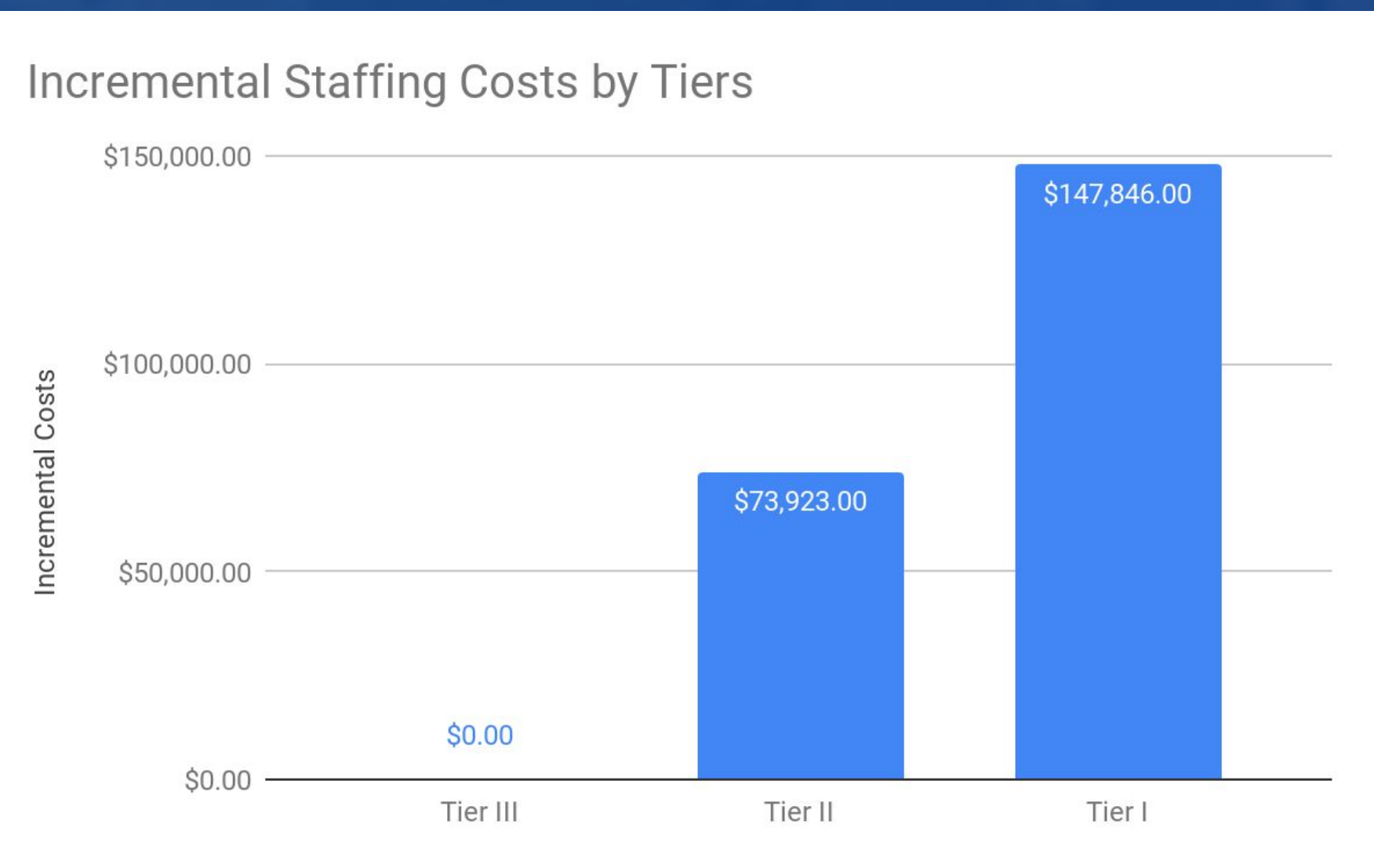
Results

Final Deliverables Include:

- Flexible roadmap containing **performance tiers** and **additional process recommendations**
- Comprehensive simulation package**, with an easy-to-follow guidebook for continual simulation improvement

Performance Tiers

Tier I	Tier II	Tier III
High Scope Inventories	Moderate Scope Inventories	Current Scope Inventories
High Workforce Levels	Moderate Workforce Levels	Current Workforce Levels



Additional Recommendations

- Change SPM scanning points to better capture the "Golden Hour"
- Standard operating procedure for loading scopes onto carts
- Upgrade badges for automatic login

Mistake-Proofing

- Colored labels for inventory rotation
- Poka-yoke system for consistent scanning