Children’s Hospital Of Michigan

“Cardboard City” In the Motor City
Objectives

• Share learning from Integrated facility Design (IFD) and lean processes
• Understand need for Life size mock ups and walk through to maximize operational efficiencies.
• Increase knowledge base of Integrated Facility Design
• Share lessons learned from designing 2 hospitals at same time.
• Understand the importance of Executive Leadership and Support to facilitate the changes needed.
Established 130 years ago
Michigan’s first and oldest hospital entirely for kids
Opened the new outpatient facility – Feb. 1, 2016
Open New Hospital downtown 2017
Children’s Hospital Of Michigan- Troy
Building Blocks for Successful Healthcare

• Provide patients and families with best known options to improve health

• Delivery clinical quality

• Provide patients and families an exceptional service experience

Advanced lean in Healthcare: Albanese, Aarby & Platchek 2014
Children’s Hospital of Michigan Responded

• Challenges viewed as opportunities
• “Go see what good looks like”
  – Study trips
• Lean transformation at infancy level
• Mile wide inch deep approach
Next Steps

• Lean transformation to next level
• Construct a building utilizing Lean principles
• Commitment to do things differently
• Executive leadership buy-in
• Gain synergies from Troy facility to Critical Care Tower
• Focus on Customer “The Patient”
Integrated Facility Design (IFD)

- Design process
- Applies Lean Principles
  - Guiding principles (e.g. line of sight, work cells)
- Concurrent integration of all experts/stakeholders
- Achieve breakthrough performance
- Includes:
  - Workflow analysis
    - 8 flows of healthcare
  - Cycle time and Takt time analysis
  - 5S (workplace organization)
    - optimal layout workspaces.
  - Standardized work planning
    - optimal work sequences/timing
  - Visual management principles
    - define locations/content for visibility
    - essential for practicing Lean management
Traditional Build Process - Division of Specialists

- Administration
- Design Engineering
- Production

Compromised Requirements
Re-engineering
Excessive Documentation

Re-tooling
Poor Yield
Poor Quality
Excessive Design Change

Over the Wall

Poor Feedback
Case for IFD

- Silo approach to building design
  - Architects, Engineers, Administration
- New way
  - Collaboration: multidisciplinary
  - Architects and general contractors background assisting
  - Patients and families
- Based on “The Patient”
  - flow through the facility.
- “No Wait” environment.
- Meets customer demand
- Smaller footprint
- Reduce costs
- Fewer RFI’s post construction
Investment Strategy Assumptions

Typical Organization

Traditional Improvement
With Traditional Investment Strategy

Lean Waste Reduction

NVA

- Speed up value added steps
- Add capacity

Original Lead Time

Minor Improvement

Major Improvement
Improving Functionality & Capability

IFD Costs

Traditional Costs

Cost of Design Changes

IFD Process

Traditional Design Process

Design Effort/Effect

<table>
<thead>
<tr>
<th>Pre-design</th>
<th>Schematic Design</th>
<th>Design Development</th>
<th>Construction Documents</th>
<th>Agency Permit/ Bidding</th>
<th>Construction</th>
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</thead>
<tbody>
<tr>
<td>Conceptualization</td>
<td>Criteria Design</td>
<td>Detailed Design</td>
<td>Implementation Documents</td>
<td>Agency Coord / Final Buyout</td>
<td>Construction</td>
</tr>
</tbody>
</table>
Stages of IFD

- Governance
  - Charter/resource allocation/commitment
- Conceptual
  - Education
  - Design layout using paper dolls
- Schematic
  - Life size mock up/flow
  - 1 week per floor
- Detail
  - Life size mock up/room specifics
  - 1 week per floor
- Matching Capacity to Demand
  - Level loading schedules:
- Daily Management System
  - Standard work/leader standard work
  - Confirmation of standard work
  - Hourly rounding
### Lots of Work to Do

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**Children’s Hospital of Michigan**

DMC. DETROIT MEDICAL CENTER

Leading. Pediatric. Care.
Involvement & Commitment

- Medical
  - Allergy
  - Cardiology
  - Diabetes
  - Emergency Services
  - Endocrine
  - Genetics/Metabolics
  - Hematology/Oncology-including infusions
  - Neonatal Intensive care-Includes PANDA
  - Nephrology
  - Neurology
  - Radiology
  - RIM- PT/OT/Speech
  - Pediatric Intensive care
  - Pediatrics overall
  - PM&R
  - Pulmonary
  - Rheumatology

- Surgical
  - Anesthesia
  - Cardiovascular
  - General Surgery
  - GI
  - Neurosurgery
  - Ophthalmology
  - Orthopedics
  - Otolaryngology
  - Urology
Conceptual Events

- [https://vimeo.com/106000857](https://vimeo.com/106000857)
- Lean training
- Guiding principles
- Current state/future state mapping
- Out of box thinking exercises
Guiding Principles

• Start with the customer
• Too much space is an enemy
• Flow optimization, not department optimization
• Use load leveling to reduce space requirements
• Reduce lead times to decrease space requirements
• Design to accommodate cellular layout
• Build tents, not castles - avoid monuments
• Create line of sight
• Prepare for point of use supplies
• Use the 7 Flows to test the design
• The source of teamwork is a common future: Engage everyone in Integrated Design Events
• Add natural light
• Design for acoustical environment
• Development of STD Work for every Process
• Flexible and Shared use of Space
• Perception & Reality of a “Safe Environment”
• Create on staging and off staging flows
• Bring resources to the patient
### Patient/Family Is Our Customer

#### SURGERY DEPARTMENT CURRENT STATE

<table>
<thead>
<tr>
<th>Patient</th>
<th>Intake</th>
<th>Wait</th>
<th>Pre-Op</th>
<th>Transfer to OR</th>
<th>OR</th>
<th>Transfer to PACU I</th>
<th>PACU I</th>
<th>Transfer to PACU II</th>
<th>PACU II</th>
<th>Discharge</th>
<th>Lead time</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CT: 20 minutes</td>
<td>CT: 30 minutes</td>
<td>CT: 40 minutes</td>
<td>CT: 5 min</td>
<td>CT: 80 minutes</td>
<td>CT: 10 minutes</td>
<td>CT: 64 minutes</td>
<td>CT: 10 minutes</td>
<td>CT: 60 min</td>
<td>CT: 10 min.</td>
<td>324 minutes</td>
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</table>

#### SURGERY DEPARTMENT FUTURE STATE

<table>
<thead>
<tr>
<th>Patient</th>
<th>Intake</th>
<th>Pause</th>
<th>Pre-Op &amp; Induction</th>
<th>OR</th>
<th>Transfer to PACU I</th>
<th>PACU I</th>
<th>Discharge</th>
<th>Lead time</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CT: 5 minutes</td>
<td>CT: 30 minutes</td>
<td>CT: 25 minutes</td>
<td>CT: 50 minutes</td>
<td>CT: 5 minutes</td>
<td>CT: 25 - 90 minutes</td>
<td>CT: 5 minutes</td>
<td>165 minutes</td>
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</table>

**Lead Time:** 324 min. to 165 min.

**# Steps in process:** 10 to 7
Mapping the Flows
### Paper Doll Scorecards

#### NICU PAPER DOLL SCORECARD

<table>
<thead>
<tr>
<th>ROUNDS</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
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<tbody>
<tr>
<td>PT. DISTANCE TRAVEL ED</td>
<td>109</td>
<td>102</td>
<td>92</td>
<td>94</td>
<td>85</td>
<td>105</td>
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<td>PROVIDER TRAVEL</td>
<td>90</td>
<td>44</td>
<td>54</td>
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<td>49</td>
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<td>NURSE TRAVEL</td>
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<td>36</td>
<td>56</td>
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<td>FLOOR TOTAL SQ. FT.</td>
<td>30,000</td>
<td>24,006</td>
<td>23,384</td>
<td>25,340</td>
<td>25,340</td>
<td>23,300</td>
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<tr>
<td>PROGRAM TOTAL SQ. FT</td>
<td>28,350</td>
<td>24,000</td>
<td>23,840</td>
<td>25,340</td>
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<td>23,300</td>
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#### 2ND FLOOR PAPER DOLL SCORECARD (ED/RADIOLOGY/CLINIC)

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<tr>
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<th>2</th>
<th>3</th>
<th>4</th>
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<td>FLOOR TOTAL SQ. FT.</td>
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**IFD GUIDING PRINCIPLES 18/18**

- 18/18
- 12%
- 12%
Buildings Takes Shape

Stacking the building

3rd floor conceptual design
Schematic Event

Schematic Week Agendas

- Review drawings
- Walk through layouts
- Mock up rooms with equipment
- Scenario testing
  - Routine/Emergency
  - Health care flows
- Scorecard validation
- Design changes
- Tours
- Review tour feedback
- Additional design changes
- Finalization of event
- Needs for next event
## All About The Flow

<table>
<thead>
<tr>
<th>LIKES</th>
<th>PLEASE CONSIDER</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSP same floor</td>
<td>Making 1 big sterile supply room</td>
</tr>
<tr>
<td>Pre-op induction rooms</td>
<td>HCG testing &amp; restroom location</td>
</tr>
<tr>
<td>PACU rooms and windows for light</td>
<td>PACU rooms in line of sight</td>
</tr>
<tr>
<td>Like rooms and windows</td>
<td>Soiled utility in PACU</td>
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<tr>
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<td>Flip flop PACU with nourishment &amp; equipment</td>
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</tbody>
</table>

![Diagram of floor plan]
Tours
## Schematic Event Wrap Ups

<table>
<thead>
<tr>
<th>SURGERY VALUE ADDED ANALYSIS</th>
<th>CURRENT</th>
<th>FUTURE</th>
<th>% OF CHANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong># STEPS</strong></td>
<td>17</td>
<td>7</td>
<td>↓62%</td>
</tr>
<tr>
<td><strong>LEAD TIME</strong></td>
<td>324 MIN</td>
<td>165 MIN</td>
<td>↓51%</td>
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<tr>
<td><strong>%VA STEPS</strong></td>
<td>1/17 = 6.1%</td>
<td>1/7 = 14%</td>
<td>↑8%</td>
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<tr>
<td><strong>% VA TIME</strong></td>
<td>.06 6.1%</td>
<td>.12 12%</td>
<td>↑6%</td>
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<tr>
<td><strong># CHECKING STEPS</strong></td>
<td>5</td>
<td>2</td>
<td>↓60%</td>
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<tr>
<td><strong># HANDOFFS</strong></td>
<td>5</td>
<td>2</td>
<td>↓60%</td>
</tr>
<tr>
<td><strong>WORK IN PROGRESS</strong></td>
<td>4</td>
<td>1</td>
<td>↓75%</td>
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<tr>
<td><strong>DISTANCE TRAVELED</strong></td>
<td>1,375 FT</td>
<td>150 FT</td>
<td>↓89.1%</td>
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</table>
Detail Events

- Layout 2 examples of each room
- Placement/number:
  - Outlets
  - Doors/tables/sinks/clocks
  - Desk height/computers/printers
  - Furniture- type/location
- IT/Clinical Transformation walk through
- General Contractor/Electrical/Mechanical engineer walk through
- Equipment planning
# It’s All About The Detail

<table>
<thead>
<tr>
<th>LOBBY/REGISTRATION</th>
<th>PLEASE CONSIDER</th>
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<tbody>
<tr>
<td><strong>LIKES</strong></td>
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<tr>
<td>Play area</td>
<td>Interactive board games</td>
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<tr>
<td>Tours</td>
<td>Involving child life in interior design</td>
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<tr>
<td>Plugs</td>
<td>Pods of chairs for families</td>
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<tr>
<td>Glass/natural light</td>
<td>Keys for locker cabinets- survey says</td>
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<tr>
<td><strong>Lockers</strong></td>
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<td>Family bathroom</td>
</tr>
<tr>
<td>Hidden drinking fountain</td>
<td>Lower desk to be more open</td>
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<td>Water feature if get</td>
<td>Shorten privacy walls</td>
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<td></td>
<td>Process for step parents to see patient</td>
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<td>Tables by chairs for belongings</td>
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<td></td>
<td>Chair groupings</td>
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<tbody>
<tr>
<td><strong>INDUCTION</strong></td>
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<tr>
<td>Natural light in hallway</td>
<td>Sky light</td>
</tr>
<tr>
<td>Like TV</td>
<td>Add music to TV stations</td>
</tr>
<tr>
<td>Like chairs</td>
<td>Keep IV pump with child thru process</td>
</tr>
<tr>
<td>Family friendly design</td>
<td>Child friendly decor</td>
</tr>
<tr>
<td>Team design</td>
<td>Chairs</td>
</tr>
<tr>
<td>Sound proof walls</td>
<td>3 way light system</td>
</tr>
<tr>
<td>Family presence in OR</td>
<td>Nurse call on TV monitor</td>
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<tr>
<td>Soundproof hallway doors</td>
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*Children’s Hospital of Michigan*

Leading. Pediatric. Care.
Detail Mock Ups
Survey Said!!

Troy OR Surgery

Frequency

Y or N or Pos or Neg

Children’s Hospital of Michigan
DMC. DETROIT MEDICAL CENTER
Leading. Pediatric. Care.
Lean & Integrated Facility Design Results

**Results:**

- Reduced OR Lead-Time by **51%**
- Reduced Clinic Lead-Time by **40%**
- **30%** decrease in RFI’s
- **6 months** design 2 building.
- **13%** Reduction ER room requirements
- **14%** Reduction in Ambulatory building requirements from business plan
- **0** Waiting Rooms - small Pause areas
Results:

<1% Decrease LWBS rate to

>95% achievement of meeting ED lead times
  Achieved by standard work processes
  Equipment at point of service

↑5000 Ambulatory visits capacity since opening:
Reduction in clinic appointment time slots
  ↓60% Orthopedic clinic
  ↓33% Neurology

11% Decrease No show rate

↓56% PACU time

Cost avoidance
Matching Capacity to Demand

Max. Resources Required

Min. Patient Requests

Leveling Concept
• volume
• variety

Clarify wastes

OR Service Requirement

Max. Min.
Hockey to Ballet

Typical OR Schedule

After Level Loading

Flex Slot for Add-On
Vision of Level Loaded Schedule

- A level loaded schedule:
  - Smooth’s out daily demand for resources
  - Based on:
    ✓ Specialty
    ✓ Appointment type
    ✓ Provider
    ✓ Room in Room out time
    ✓ Volume
- Eliminates waste
- Improves patient/staff experience
- Appointments arranged to meet Takt and reduce variation
- The thresholds/boundaries upheld to maintain a leveled schedule
- Provides safe, efficient care for add-ons (same day no delay)
- Incorporates no shows, cancellation rates
Benefits

• Better communication/teamwork
• Steady pace
• Efficient workflow
• Reduced space requirements
• Less frustration and pressure
• Identifies quality problems upstream
• Improved satisfaction
  – Patient/Family/Staff/Provider
Level Flow
Makes Standard Work Possible

OR Rooms and PACU

Example of Leveled OR Output

Troy OR level loading example

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Each block represents 10 min Cadence

PACU Beds

Inverted Leadership Triangle

Level Patient Flow
(1 every 28 min)

Nurse Standard Work
(complete work in 20 min)

Daily Management System (DMS) Maintain process capability through immediate andon response

Children’s Hospital of Michigan

Leading. Pediatric. Care.

JWA 2014
Cultural Change: “Not Just a new Building”

- 33% Designing a building
- 33% Creation of a daily management system to ensure building functions as intended by design
- 33% Lean principles of matching capacity to demand integral
Daily Management System

Unit Targets

Standardized Work

Shift Readiness

Schedule & Cadence

Improvement Ideas

Leader Standard Work, Coaching, Visual Systems & Accountability

Principles
Core Elements

- Mindset/culture
- Visual management
- Patient access – Level loaded
- Standard work
- Leader Standard Work
- Point of use materials/equipment
Core Element: Visual Metrics

Daily Management
• Operational metrics
  – Throughput metrics
  – Daily success metrics
  – Manage execution to plan
• “Real time” updates
  – Daily /Hourly

MESS: Shift readiness
• Methods
• Equipment
• Staffing
• Supplies
• Environment
Core Element: Standard Work

Leader Standard Work huddles

Standard Operations Sheet Task Level

Confirmation cards

Job Element Sheet
Lessons Learned

• Go and see what good looks like
• Ensure value engineering does not impact design flow
• Communicate more than you think you should!
• Solidify commitments
  – Help ancillary staff see importance of participating in events
• Hospital representatives from design to be part of construction meetings right from the start
• Relationship building with construction team
  – Value of clinical input
• Same staff in subsequent events
• Trust the process and design
• On boarding of new leadership
Credits

- Doug Dulin
  - Joan Wellman & Associates
- Use of slides, presentation material approved by D. Dulin JWA
- Harley Ellis Devereaux - AE
- The Christman Company - CM
Questions