Lean Six Sigma

Rapid Cycle Improvement

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Agenda

1. History of Lean and Six Sigma
2. DMAIC
3. Rapid Continuous Improvement
   - Quick Wins
   - PDSA
   - Kaizen

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Lean Six Sigma

Lean Manufacturing
(Toyota Production System)

- T.I.M.W.O.O.D
- 5S
- SMED
- TAKT TIME
- KAN BAN
- JUST IN TIME
- ANDON
- KAIZEN
- VALUE STREAM MAP

Six Sigma
DMAIC

- PROJECT CHARTER
- FMEA
- PDSA/PDCA
- SWOT
- ROOT CAUSE ANALYSIS
- FMEA
- SIPOC
- PROCESS MAP
- STATISTICAL CONTROLS

Process Improvement

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Lean Manufacturing

- Lean has been around a long time:
  - Pioneered by Ford in the early 1900's (33 hrs from iron ore to finished Model T, almost zero inventory but also zero flexibility!)
  - Perfected by Toyota post WWII (multiple models/colors/options, rapid setups, Kanban, mistake-proofing, almost zero inventory with maximum flexibility!)
- Known by many names:
  - Toyota Production System
  - Just-In-Time
  - Continuous Flow
- Outwardly focused on being flexible to meet customer demand, inwardly focused on reducing/eliminating the waste and cost in all processes

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Six Sigma

- Motorola was the first advocate in the 80's
- Six Sigma Black Belt methodology began in late 80's/early 90's
- Project implementers names includes "Black Belts", "Top Guns", "Change Agents", "Trailblazers", etc.
- Implementers are expected to deliver annual benefits between $500,000 and $1,000,000 through 3-5 projects per year
- Outwardly focused on Voice of the Customer, inwardly focused on using statistical tools on projects that yield high return on investment

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DMAIC

- Project Charter
- Voice of the Customer and Kano Analysis
- SIPOC Map
- Project Valuation / ROIC Analysis Tools
- RACI and Quad Charts
- Stakeholder Analysis
- Communication Plan
- Effective Meeting Tools
- Inquiry and Advocacy Skills
- Time Lines, Milestones, and Gantt Charting
- Pareto Analysis

- Value Stream Mapping
- Value of Speed (Process Cycle Efficiency / Little's Law)
- Operational Definitions
- Data Collection Plan
- Statistical Sampling
- Measurement System Analysis (MSA)
- Gage R&R
- Kappa Studies
- Control Charts
- Histograms
- Normality Test
- Process Capability Analysis

- Process Constraint ID and Takt Time Analysis
- Cause & Effect Analysis
- FMEA
- Hypothesis Tests/Conf. Intervals
- Simple & Multiple Regression
- ANOVA
- Components of Variation
- Conquering Product and Process Complexity
- Queuing Theory

- Replenishment Pull/Kanban
- Stocking Strategy
- Process Flow Improvement
- Process Balancing
- Analytical Batch Sizing
- Total Productive Maintenance
- Design of Experiments (DOE)
- Solution Selection Matrix
- Piloting and Simulation

- Mistake-Proofing/ Zero Defects
- Standard Operating Procedures (SOP's)
- Process Control Plans
- Visual Process Control Tools
- Statistical Process Controls (SPC)
- Solution Replication
- Project Transition Model
- Team Feedback Session

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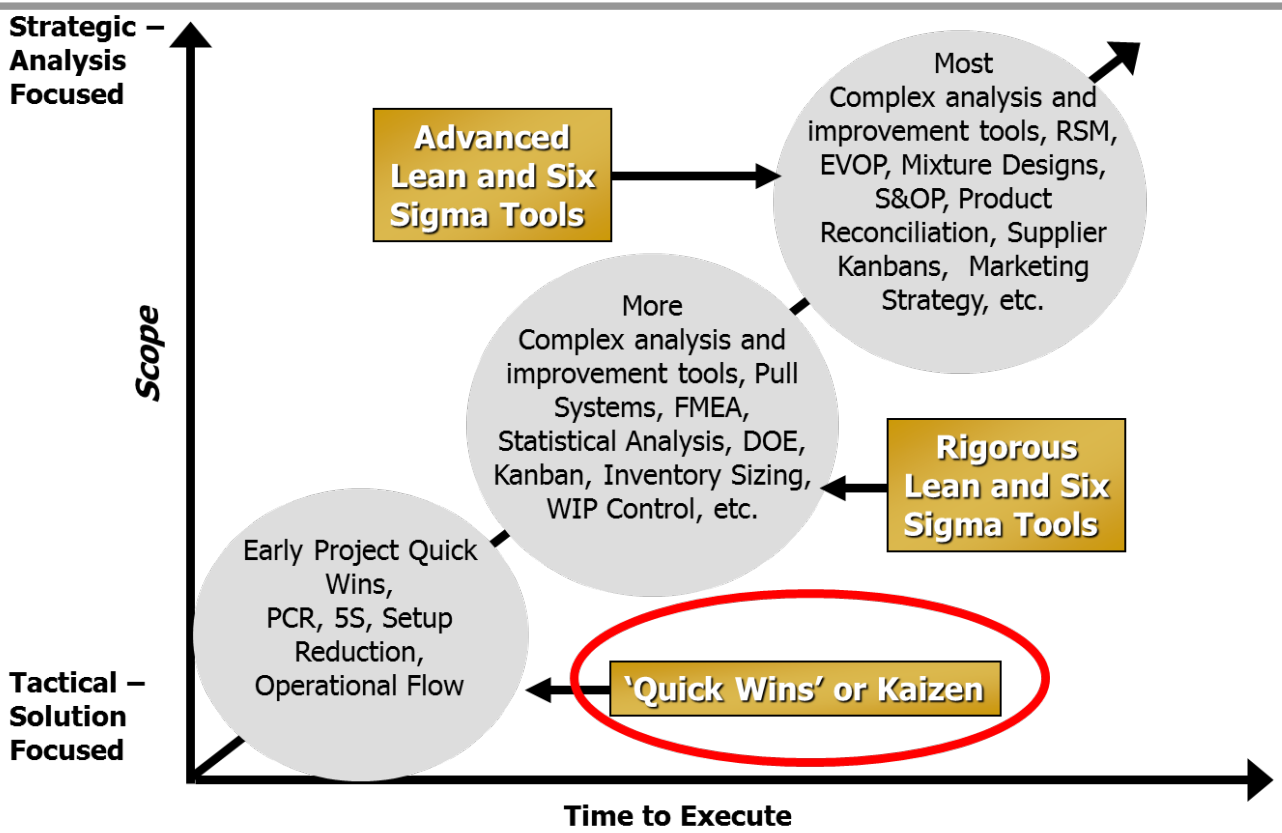
Quick Wins



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Quick Wins

- The Lean Six Sigma training focuses on a disciplined roadmap to Process Improvement.
- The key to effect process improvement is successful completion of the Measurement and Analysis phases.
  - They set the stage for improvement
- However:
  - Opportunities may be identified early in the project that do not warrant extensive analysis.
    - 'Quick Wins' bypass the Analyze phase and go straight to Improve
    - Kaizen improvements still follow the DMAIC format but the Define, Measure, and Analyze portions are accelerated.

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Quick Wins

- The primary difference is in the work required to implement the idea.
  - A **'Quick Win'** is already a developed solution idea, i.e., **it is in the Improve Phase already**.
    - The only determination left is 'how to implement.'
    - There is still a requirement to complete Define and Measure, to clarify scope and to be able to measure a change, but there is **no need to go through Analyze Phase.**
  - A **Kaizen Event is essentially an *accelerated DMAIC*.**
    - Focuses on specific improvement objective;
      - Setup Reduction, 5S, Process Improvement, Line Balancing, etc.
    - Although the Vision of the 'Future State' may be in place, there is **still a requirement to go through the Analyze Phase to determine HOW to make it happen** (as opposed to just 'how to implement' a developed idea, as in the case of the 'Quick Win').

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Quick Wins

What do you think might be the benefits of Quick Improvement?

- Provides momentum for the project
- Drives value ($) early, thus improving ROI
- Provides confidence to the broader organization that Lean Six Sigma is a viable approach to process improvement
- Reduces stress on project team to 'Get Something Done!'

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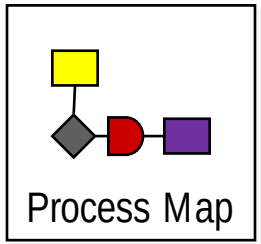
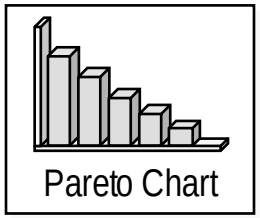
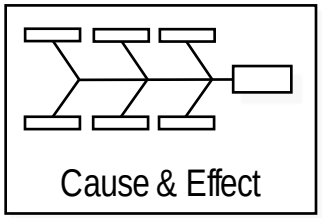
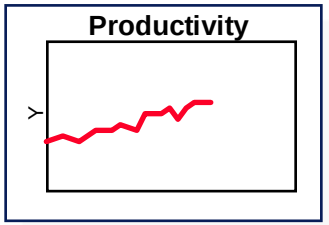
Quick Wins

- Often we are able to find some opportunities for immediate improvement early in the project using our basic tools
  - Process map
  - Pareto chart
  - Fishbone Diagram
  - Metric Implementation (Hawthorne effect)









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Quick Wins

- Just because we learn statistical methods does not mean we <u>always</u> need statistics.
- Sometimes the Answer hits us right between the eyes early in the project!
- This may be referred to as the “Inter-Ocular”* analysis.

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‘Quick Win’ Improvement Criteria

- Minimal or no Capital Expenditure
- Low Risk
  - Narrow scope
  - Buy-in to solutions by all Stakeholders
  - Certainty the change will generate a positive impact
- Improvements May be Implemented Quickly (within 1-2 weeks)
- The project team has the authority to implement the desired changes

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Quick Improvement Control Plans

- Quick Improvements, whether 'Quick Wins' or Kaizen improvements, **must** have implemented Control Plans in place before being considered complete.

- It is desirable to implement improvements as soon as possible but implementation **without control can be worse than no implementation at all.**

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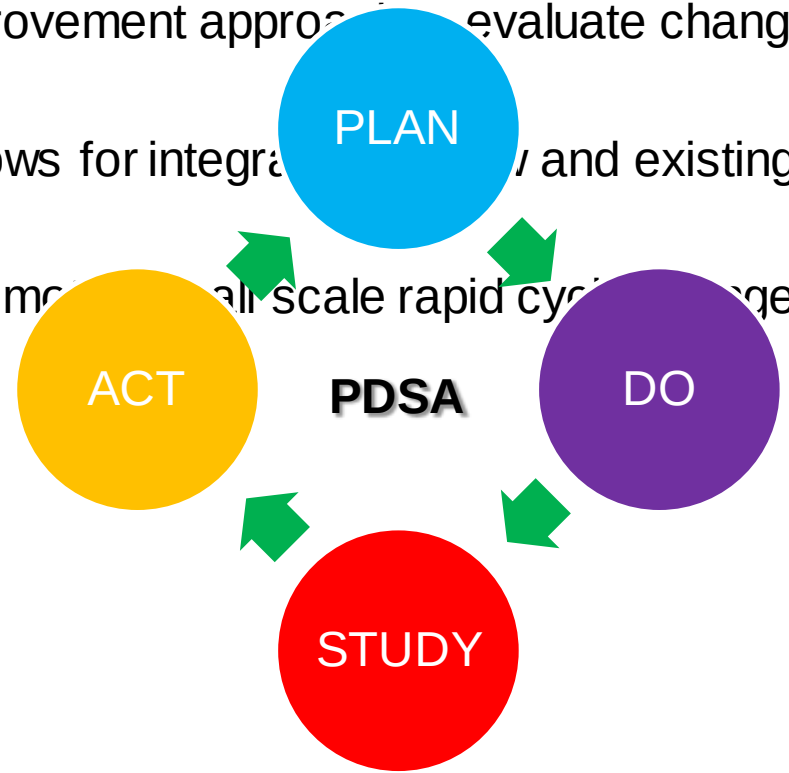
PDSA Cycle

- A process improvement approa[illegible]evaluate change
- This model allows for integra[illegible]v and existing systems.
- This model promo[illegible]all scale rapid cyc[illegible]ge over short periods of time



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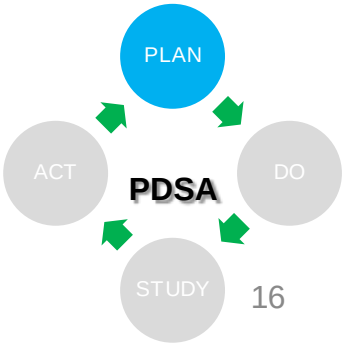
PDSA Cycle

Stage 1: PLAN

- Recruit Team
- Draft Aim Statement
- Describe Current Context and Process (Brainstorm)
  - SWOT
  - Process Map
- Problem Statement
- Identify Causes and Alternatives
  - Root Cause Analysis



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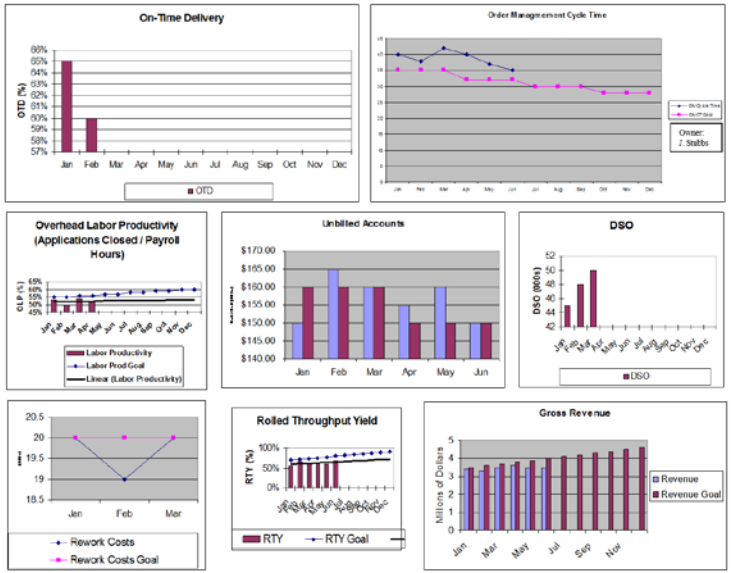
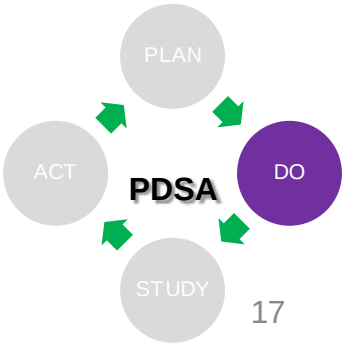
PDSA Cycle

Stage 2: DO

- Start to implement you action plan
- Collect data



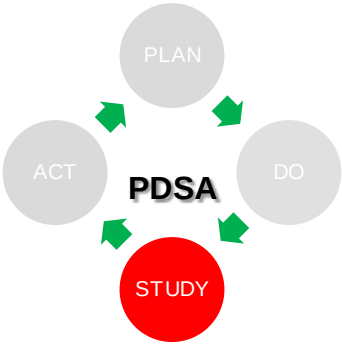


PDSA Cycle

Stage 3: STUDY

Using the aim statement drafted in **Stage 1: Plan**, and data gathered during **Stage 2: Do**, determine:

- Did your plan result in an improvement? By how much/little?
- Was the action worth the investment?
- Do you see trends?
- Were there unintended side effects?



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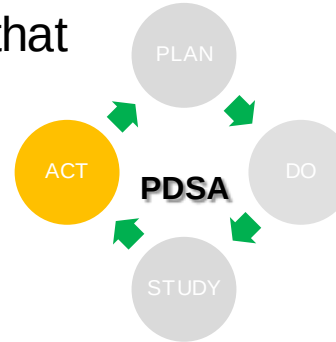
PDSA Cycle

Study

Stage 3: ACT

- **Reflect on Plan and Outcomes**
  - If your team determined the plan resulted in success, **standardize** the improvement and begin to use it regularly.
  - After some time, return to **Stage 1: Plan** and re-examine the process to learn where it can be further improved.
  - If your team believes a different approach would be more successful, return to **Stage 1: Plan**, and **develop** a new and different plan that might result in success.

The PDSA cycle is ongoing, and organizations become more efficient as they intuitively adopt PDSA into their planning.



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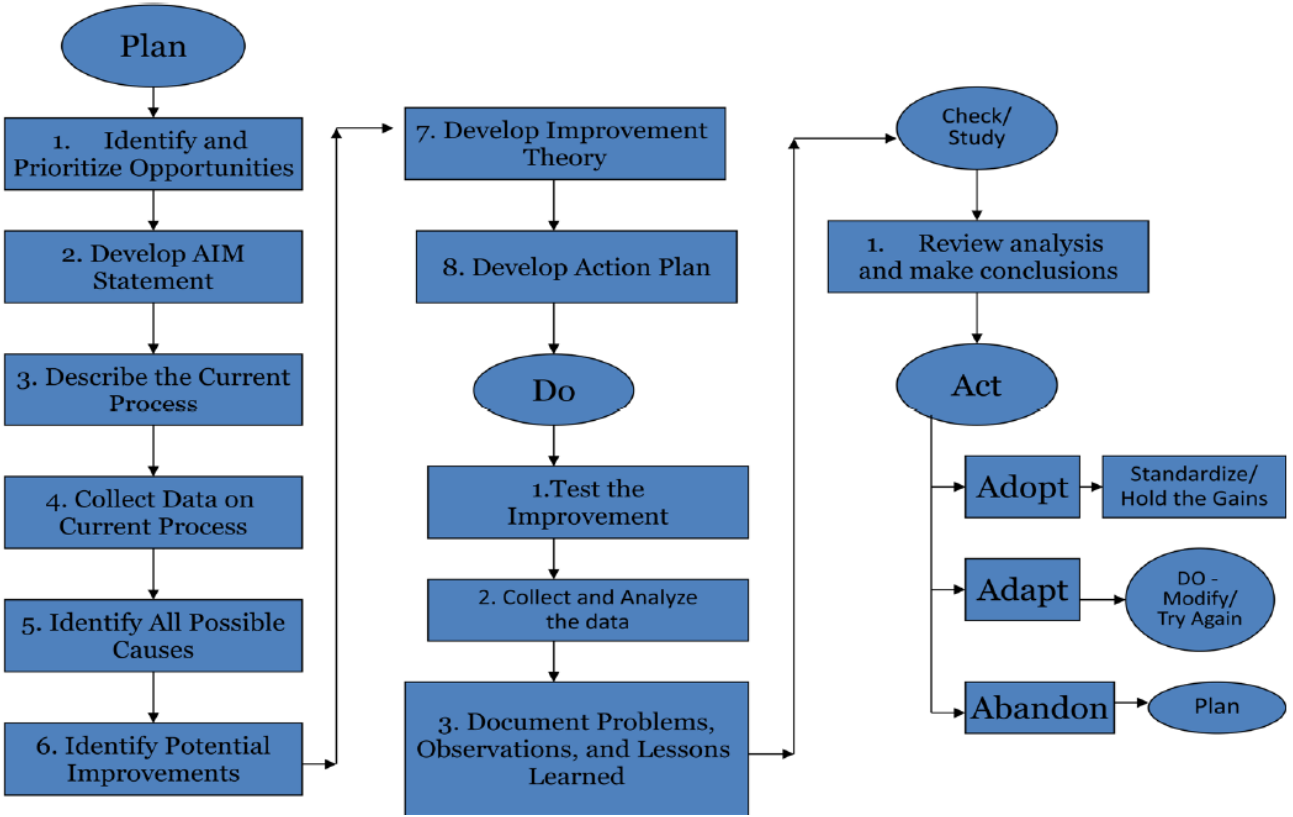
PDSA Overview



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Kaizen

- Kaizen is the organized use of common sense to improve cost, quality, delivery, and responsiveness to customer needs.
- Kaizen assembles cross-functional teams aimed at improving a process or problem identified within a specific area.
- Kaizen is the continuous improvement vehicle utilized by the Toyota Production System.

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Types of Kaizen

- Any narrowly scoped problem may use the “General” process improvement Kaizen methodology to find solutions. Some problems however require a specialized Kaizen methodology.
  - Set Up Reduction(i.e. Discharge Process)
  - Throughput
  - Product Cost Reduction
  - Infection Prevention
  - 5s

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Kaizen

- When obvious waste sources have been identified
- When the scope and boundaries of a problem are clearly defined and understood
- When implementation risk is minimal
- When results are needed immediately – i.e., capacity constraints, setup reduction, acute quality problems, safety/ergonomic issues
- In the early stages of a project to gain momentum and build credibility

As the result of Process Mapping, work area tour, data collection, etc., obvious sources of instability and waste are identified.

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Kaizen Deployment

- Kaizen is a vehicle to implement 'Quick Improvement'
  A. **Pre-Event Prep:** Identify and plan narrow scope events
  B. **Kaizen Event:** Implement do-now quick hit solutions during the Kaizen event
  C. **Follow-up Action Items:** Kaizen activity typically ends 20 days following Kaizen
- The Kaizen approach follows the DMAIC process – it is a "DMAIC Workout!"

Kaizen! Timeline

(Maximum of 30 Days from Start of Event Prep, Through Event, to Final Follow-up)

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Kaizen Preparation

Preparation Phase (1-2 Weeks before start of event)

- Data Collection/Analysis
- Team Selection/Notified
- Scope Identified
- $$ Savings Determined
- Process Map

- Resources Alerted
- Create “Specialized” Training
- Logistics Arranged (Appendix)

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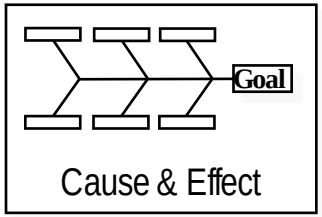
Kaizen Follows the DMAIC Structure

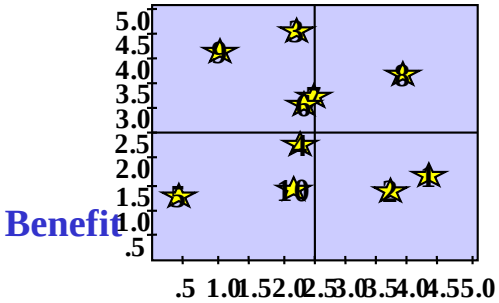
Team Training

GEMBA/ Observations

Issue List



Brainstormed Ideas



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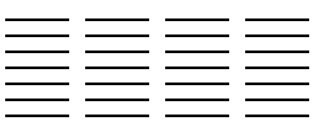

Action Items

Implementation

Final Presentation

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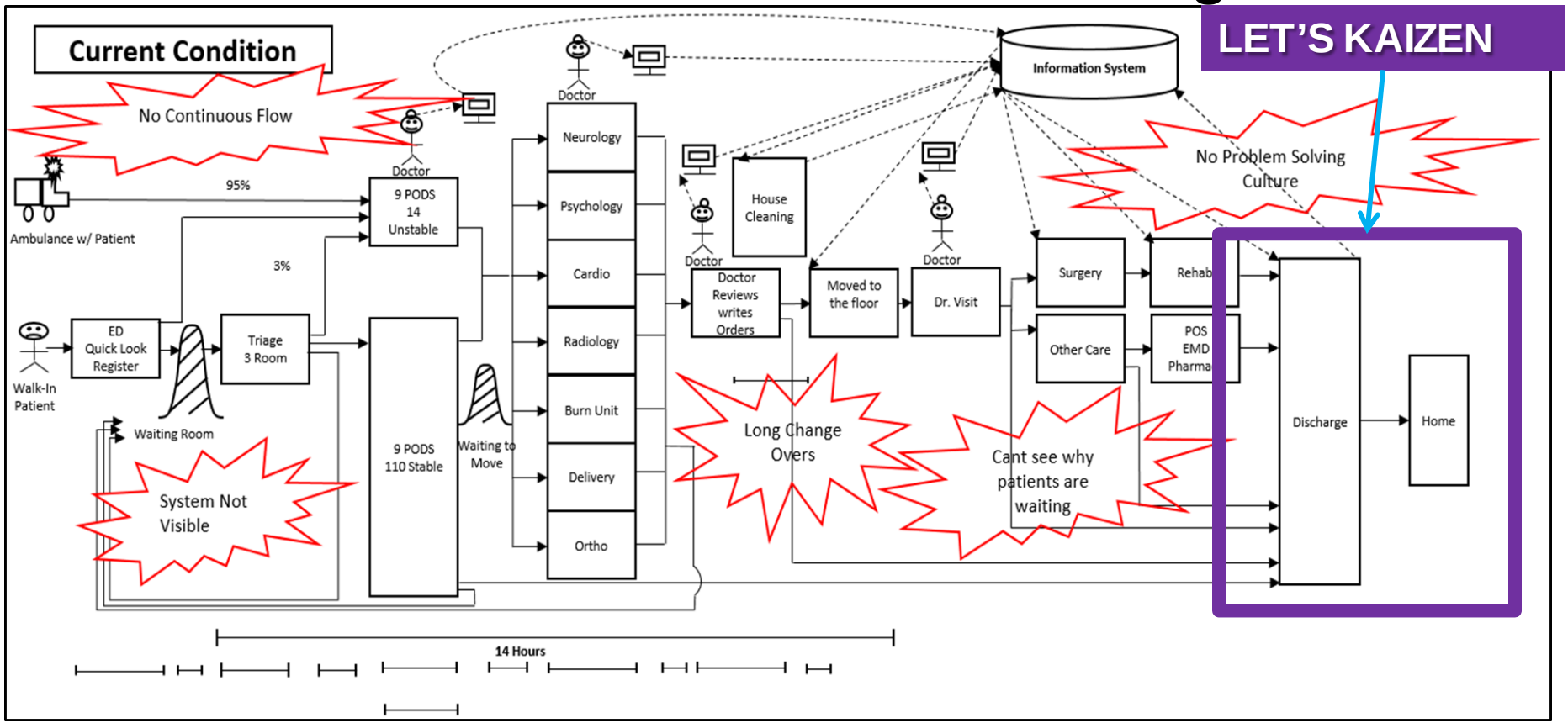
Kaizen-Discharge Process



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Kaizen Discharge Process

A 3-day workshop was held from 4/11/16 to 4/13/16 jointly by Toyota and Operational Excellence to analyze and improve the selected process

- **Workshop Facilitators: Scott Dickson and Ben Naughting (Toyota), David Garcia , Gabriel Fruge (Parkland OPEX)**
- **Team: ED Nursing, UTSW Medical Staff**

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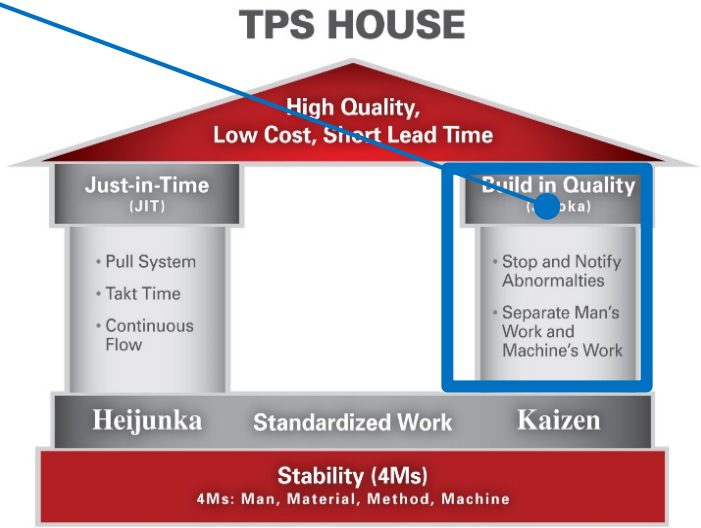
Training/Introduction to TPS

- Use and teach TPS Philosophies
  - Customer 1st,
  - People Most Valuable Resource
  - Kaizen (Continuous Improvement)
  - Shop Floor Focus)
- Grasp current condition –Visualize problems / stagnation
- Standardize discharge process and utilizing TPS Technical Tools:
  - Implement Jidoka (Built-in Quality) thinking
  - Visualize abnormalities' Understand Ahead/Behind condition in 3 seconds
  - Standardized Work



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Kaizen Event

Data collection & observations

Brainstorming

- The team developed a standard process for ED discharges using the Single Minute Exchange Die (SMED) methodology to identify internal and external elements.
- The methodology showed the opportunity to reduce the discharge turnaround time (order to DC) from an average of 52 minutes to 15 minutes (≈70%)

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Solution

Standardized Process

- The group performed several trials and observations before reaching to the optimal sequence.
- Early Providers Notification
  - Allows the nurse to proactively initiate the preparation (PREP) or discharge

		Final Sequence	Owner
PREP *Before Discharge Order*	1	Pre- Discharge Notification to RN and Patient	Provider
	2	*Request Patient to get Dress*	Provider/RN/Tech
	3	*Collect Equipment*	RN/TECH
	4	**Call Social Worker (If necessary)**	RN
PRINT *After Discharge Order*	5	*Acknowledge order*	RN
	6	*Request Translator (If Required)*	RN
	7	*Print AVS*	RN/TECH
EXECUTE *After Discharge Order*	8	*Obtain vitals signs & Chart*	RN/TECH
	9	*Remove PIV & Chart*	RN
	10	*Perform DC Instructions*	RN
	11	*Complete DC Note*	RN
	12	*Remove from EPIC*	RN
	13	*Remove from Room to:* *-Chair* *-Discharge Lounge* *-Waiting Room*	RN/TECH
	14	*Push "Red"button*	RN
	15	*Clean Room*	TECH

Patient can be removed from system if waiting for ARC and/or Social Worker

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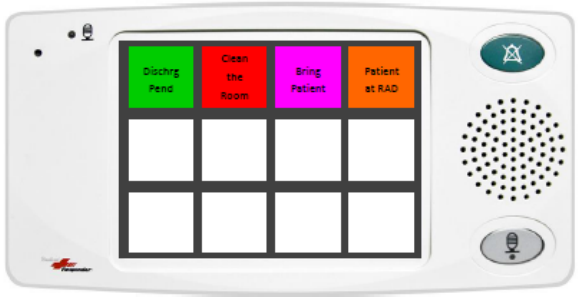
Solution

Light System

- **Andon (Signal System)**
  - Transition from Signal to Action
  - Re-defined Light System
  - Re-configured Responder 5 Configuration

Before



Current

Discharge Pending

Sequence	Process
1	Provider determines when patient will be discharge
2	Provider presses "Discharge Pending button"
3	Nurse acknowledges green light and begins Discharge process

Clean the room

Sequence	Process
1	Patient is discharge
2	Nurse walks patient out of the room
3	Nurse presses "Clean the Room button"

Bring a patient

Sequence	Process
1	RN/Tech cleans room
2	Nurse presses "Bring a patient" button
3	Nurse takes patient from waiting room to POD room

Patient at Radiology

Sequence	Process
1	Radiology Tech gets to the ED Pod area
2	Takes Patient to ED radiology
3	Radiology Tech presses "Patient at Radiology" button

Final Presentation

- Kaizen team met with Parkland's leadership to show and explain the story(all work done) during event.
- Great opportunity to discuss opportunities and areas for support.

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Summary

- The rapid improvement work must be seen as the Work and not a separate project.
- Implementation and holding the gains requires integration into daily work and meetings
- Start work with those interested in change
- Communicate what is happening persistently
- Provide support to providers and staff who take on this new work

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References

- http://www.health.state.mn.us/divs/opi/qi/toolbox/pdsa.html
- Kubiak, T.M. (2009). Book of Knowledge. ASQ Quality Press: 2 edition