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Las Vegas | Venetian – Palazzo – Sands Expo Center

Strategic Process Improvement: Applying Lean & Six-Sigma Tools and Techniques to Achieve Organizational Excellence

Preconference Workshop, March 5, 2018

Larry Dux, Mary Ellen Skeens, Deborah D. Flint,
Dean Athanassiades, John Hansmann, Brian Compas

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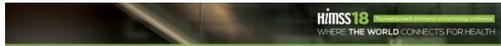
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Strategic Process Improvement: Introduction & Lean Six Sigma

Larry Dux, BSIE, MBA, CPHIMS, FHIMSS, DSHS,
Director, Patient Care Informatics & Process
Improvement, Froedtert & The Medical College of
Wisconsin Community Hospital Division

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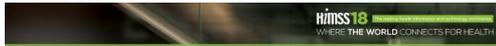


Conflict of Interest

Larry Dux, BSIE, MBA, CPHIMS, LFHIMSS, DSHS

Salary: Froedtert Health Community Memorial Hospital
 Royalty: N/A
 Receipt of Intellectual Property Rights/Patent Holder: N/A
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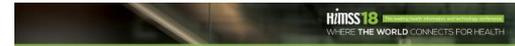


Conflict of Interest

Mary Ellen Skeens, BSIE, MSHS

Salary: Philips
 Royalty: N/A
 Receipt of Intellectual Property Rights/Patent Holder: N/A
 Consulting Fees (e.g., advisory boards): N/A
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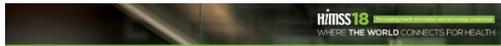


Conflict of Interest

Deborah D. Flint, PE, BIE, MBA, MSHQS, FHIMSS, DSHS

Salary: UAB Hospital Management, LLC
 Royalty: N/A
 Receipt of Intellectual Property Rights/Patent Holder: N/A
 Consulting Fees (e.g., advisory boards): N/A
 Fees for Non-CME Services Received Directly from a Commercial Interest or their Agents (e.g., speakers' bureau): N/A
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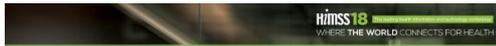


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John Hansmann, MSIE, LFHIMSS, DSHS

Salary: Health Catalyst
 Royalty: N/A
 Receipt of Intellectual Property Rights/Patent Holder: N/A
 Consulting Fees (e.g., advisory boards): N/A
 Fees for Non-CME Services Received Directly from a Commercial Interest or their Agents (e.g., speakers' bureau): N/A
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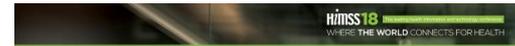


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Dean Athanassiades, BSIE, MBA

Salary: Philips
 Royalty: N/A
 Receipt of Intellectual Property Rights/Patent Holder: N/A
 Consulting Fees (e.g., advisory boards): N/A
 Fees for Non-CME Services Received Directly from a Commercial Interest or their Agents (e.g., speakers' bureau): N/A
 Contracted Research: N/A
 Ownership Interest (stocks, stock options or other ownership interest excluding diversified mutual funds): Philips
 Other: N/A

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Brian Compas, PMP, CRCR, LFHIMSS

Salary: Cerner Corporation
 Royalty: N/A
 Receipt of Intellectual Property Rights/Patent Holder: N/A
 Consulting Fees (e.g., advisory boards): N/A
 Fees for Non-CME Services Received Directly from a Commercial Interest or their Agents (e.g., speakers' bureau): N/A
 Contracted Research: N/A
 Ownership Interest (stocks, stock options or other ownership interest excluding diversified mutual funds): Cerner
 Other: N/A

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Agenda

- Welcome and Introductions
- Overview of Healthcare Industry Changes & Introduction of Lean & Six-Sigma
- Strategic Process Improvement
- Using Value Stream Maps and Flowcharts
- Lunch – Networking and Discussion of Challenges & Applications

Agenda - continued

- Using Cause & Effect Tool
- Using Data Collection and Display Tools
- Generating Solutions and Evaluating
- Defining Standard Work
- Summary Wrap-Up

Learning Objectives

- Describe key healthcare industry changes driving strategic process improvement initiatives
- Identify areas for strategic process improvement
- Define and clarify the scope of the problem to be solved
- Use the appropriate measures to assess organizational performance from a strategic perspective
- Apply and effectively use Lean & Six-Sigma tools and techniques to achieve desired organizational performance

Welcome and Introductions

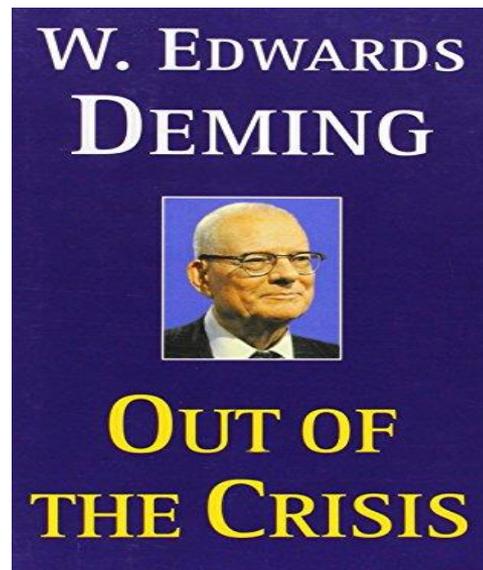
- **Dean Athanassiades**, PMP, CPHIMS, FHIMSS, Senior Director, Transformation Program Office, Philips, Member of Faculty, University of Phoenix
- **Brian Compas**, PMP, CRCR, LFHIMSS, Senior Project Manager, Cerner Corporation
- **Larry Dux**, BSIE, MBA, CPHIMS, FHIMSS, DSHS, Director, Patient Care Informatics & Process Improvement, Froedtert & The Medical College of Wisconsin Community Hospital Division

Welcome and Introductions

- **Deborah D. Flint**, PE, FHIMSS, MBA, MSHQS, DSHS, LSSBB, Sr. Director, Performance Engineering, UAB Medicine: The Kirklin Clinic of UAB Hospital
- **John Hansmann**, MSIE, LFHIMSS, DSHS, Vice President, Professional Services, Health Catalyst
- **Mary Ellen Skeens**, PMP, CPHIMS, FHIMSS, CSSBB, DSHS, Director, Solutions and Services Management Office, Philips

Deming Red Bead Exercise

- New Company being started today
- Need 5 Workers and 1 Quality Assurance Specialist
- Paying Top Wages with Bonus for High Performance
- Need Observers of the Workers
- Need Observers of the Manager



Deming Red Bead Exercise - Debrief

- Observers
 - What observations do you have of the workers? manager?
- Workers
 - What did you feel? What were you thinking about the work environment and the manager?
- What can we learn from this exercise?
- How does this exercise apply to this workshop today?

Healthcare in the Headlines



HEADLINES

Trump Calls Drug Pricing 'Astronomical' and Promises Changes

by Anna Edney and Justin Sink
 January 31, 2017, 5:41 AM EST Updated on January 31, 2017, 10:34 AM EST

- President says prices must come down, promises faster FDA
- Industry has been lobbying lawmakers to counter Trump plans



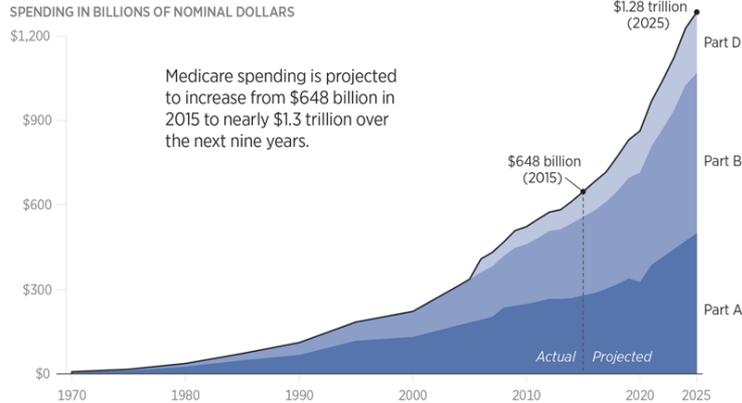
A healthcare model providing care at a high cost and rate of emergency department utilization, no matter the level of quality, is not sustainable

7-country comparison of acute unscheduled care

Healthcare in the Headlines

CHART 3

Medicare Spending: \$1.3 Trillion in 2025



SOURCE: Centers for Medicare and Medicaid Services, "2016 Annual Report of the Boards of Trustees of the Federal Hospital Insurance and Federal Supplementary Medical Insurance Trust Funds," Table III.B4, p. 56, Table III.C4, p.88, Table III.D3, p. 107, and Table V.B1, p. 180, June 22, 2016, <https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/ReportsTrustFunds/Downloads/TR2016.pdf> (accessed July 20, 2016).

SR 185 heritage.org

Healthcare in the Headlines



Definitions – Lean

- “A way to specify value, line up value creating actions in the best sequence, conduct these activities without interruption whenever someone requests them, and perform them more and more effectively.”

from *Lean Thinking*, by James Womack and Daniel Jones (1996)

- Lean thinking begins with driving out waste so that all work adds value and serves the customer's needs. Identifying value-added and non-value-added steps in every process is the beginning of the journey toward lean operations.

<http://www.ihl.org/knowledge/Pages/IHIWhitePapers/GoingLeaninHealthCare>

Definitions Lean Six Sigma

- **Lean Six Sigma** is a business process philosophy that focuses on the customer and increasing value and improving quality, safety and productivity. Both Lean and Six Sigma have their weaknesses and their strengths.
- For example, Six Sigma will eliminate defects but will not address speed or optimize flow. Lean does not include the advanced statistical tools required to identify the sources of variation necessary to craft an intervention that is as simple and as focused as possible.

Definitions Lean Six Sigma

- Recognizing the complementary nature of the two methodologies, many companies have used Lean and Six Sigma concurrently, utilizing different pieces of the tool kit to address specific improvement problems along a value stream. This practice of combining different tool sets and playing to strengths is sometimes called the "blended approach." The Center for Transforming Healthcare uses the Lean Six Sigma blended approach.

Waste – What is it?

- Defects: mistakes, rework, errors
- Overproduction: doing more than is required
- Waiting: waiting on people or supplies
- Not Utilizing Staff Talent: not maximizing ability and potential of all staff

Waste – What is it?

- Travel: moving patients, files, equipment
- Inventory: stockpiling supplies
- Motion: leaving the patient room to search for supplies
- Excess Processing: redundant capture of information, inspection, any unnecessary steps



Five Questions of the Lean Transformation Framework



- What is the purpose of the change—what true north and value are we providing, or simply: what problem are we trying to solve?
- How are we improving the actual work?
- How are we building capability?
- What leadership behaviors and management systems are required to support this new way of working?
- What basic thinking, mindset, or assumptions comprise the existing culture, and are driving this transformation?

Questions of the Lean Transformation Framework

- Fundamentally, the process of successful lean transformation rests on applying PDCA cycles of experimentation (the art and craft of science) at every level, everywhere, all the time. Being situational means that every story is going to be specific and different (each situation has a different aim or purpose). Being grounded in a common set of principles yet situational in application provides rich opportunity for the development of truly profound wisdom. Lean thinking and practice also propose a specific point of view around each question. We believe that there are certain approaches to answering each of the 5 questions that will yield greater success in your lean journey.

Lean Framework

- **Purpose, Process, People**

Womack and Jones recommend that managers and executives embarked on lean transformations think about three fundamental business issues that should guide the transformation of the *entire organization*:

- **Purpose:** What customer problems will the enterprise solve to achieve its own purpose of prospering?
- **Process:** How will the organization assess each major value stream to make sure each step is valuable, capable, available, adequate, flexible, and that all the steps are linked by flow, pull, and leveling?
- **People:** How can the organization ensure that every important process has someone responsible for continually evaluating that value stream in terms of business purpose and lean process? How can everyone touching the value stream be actively engaged in operating it correctly and continually improving it?

Strategic Alignment

- **The Right Projects:** The success of performance improvement programs is rooted in the projects selected. Unfortunately, many organizations fail to develop criteria for project selection, which results in projects that provide no real benefit to the organization. If employees aren't working on the right projects, it doesn't matter how well the projects are run – the results just won't make a difference. Thus, the “right” projects should be linked to organizational strategies, have identifiable and quantifiable hard results, and be realistic in scope.

Symptoms of a Broken Process

- Customers (internal or external) are unhappy
- Some things just take too long
- The process wasn't done right the first time
 - It produced errors, rework, mistakes, missing, incomplete or incorrect information
- Management throws people at the problem but it doesn't improve
- Employees report a high frustration factor while working
- Process spans several departments and there is finger-pointing and blaming

Symptoms of a Broken Process

- Processes aren't measured or controlled
- Inventory, buffers and other assets sit idle
- Data redundancy is common
- Too many reviews and signoffs
- Complexity, exceptions and special cases are common
- Established procedures are circumvented to expedite work
- No one manages the total process
- Management throws money at the problem, but it doesn't improve
- Managers spend a great deal of time “firefighting”

Why Lean Six Sigma Approaches?

- One of the important advantages of using process improvement tools such as DMAIC (define, measure, analyze, improve, control) is that they provide a systematic approach to solving complex problems. Specifically, they guide improvement teams to examine why processes fail to achieve their desired results. It is this systematic search for causes of quality and safety problems and the assessment of the relative contribution of each cause that gives these improvement tools a great deal of their effectiveness. Experience with the application of the tools of Robust Process Improvement[®] in health care is consistent with that of other industries including aerospace, automotive, construction, electronics and more.

Why Lean Six Sigma Approaches?

- The collaborating organizations in the Center's network have a great deal of experience using RPI® methods and tools, such as Lean Six Sigma and change management, in the health care environment. Currently, the lack of convincing data is a key weakness in the effort to improve safety and quality. Because Lean Six Sigma projects are driven by highly reliable measurements, they provide an ideal source of data on the ultimate impact of the solution.

Why Lean Six Sigma Approaches?

Questions?

- Contact information for Larry Dux:
 - Email: larry.dux@froedtert.com
 - LinkedIn: [linkedin.com/in/larry-dux-a396998](https://www.linkedin.com/in/larry-dux-a396998)
- Please remember to complete the online session evaluation

Resources

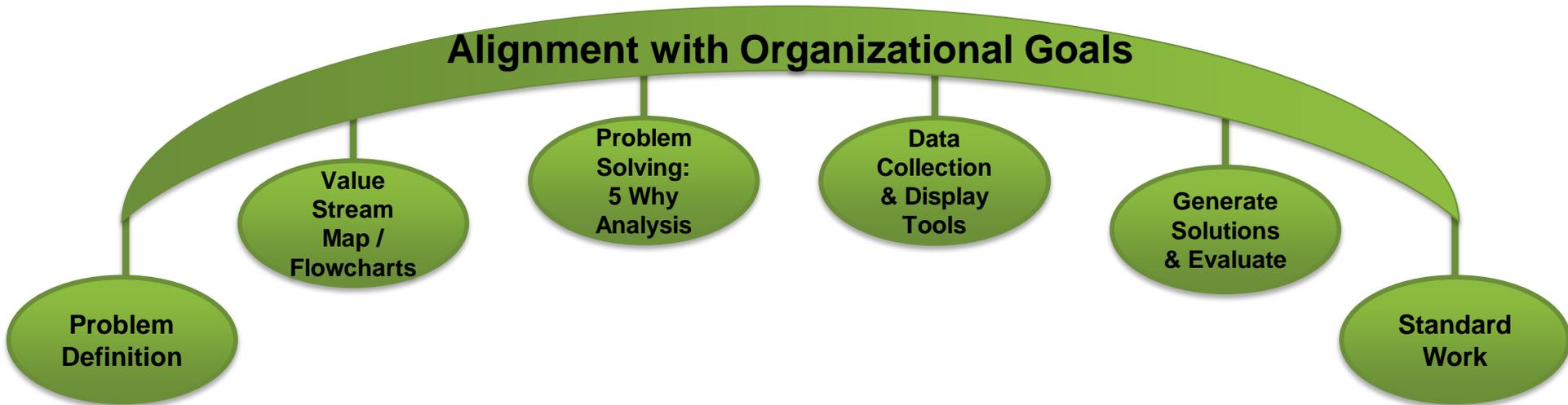
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Strategic Process Improvement: Strategic Alignment & Problem Definition

Dean Athanassiades, PMP, CPHIMS, FHIMSS, Senior Director, Transformation
Program Office, Philips, Member of Faculty, University of Phoenix

John Hansmann, MSIE, LFHIMSS, DSHS, Vice President, Professional
Services, Health Catalyst

Strategic Process Improvement - Tools Overview



Strategic Process Improvement

How do you determine what projects you will work on?

Strategic Process Improvement

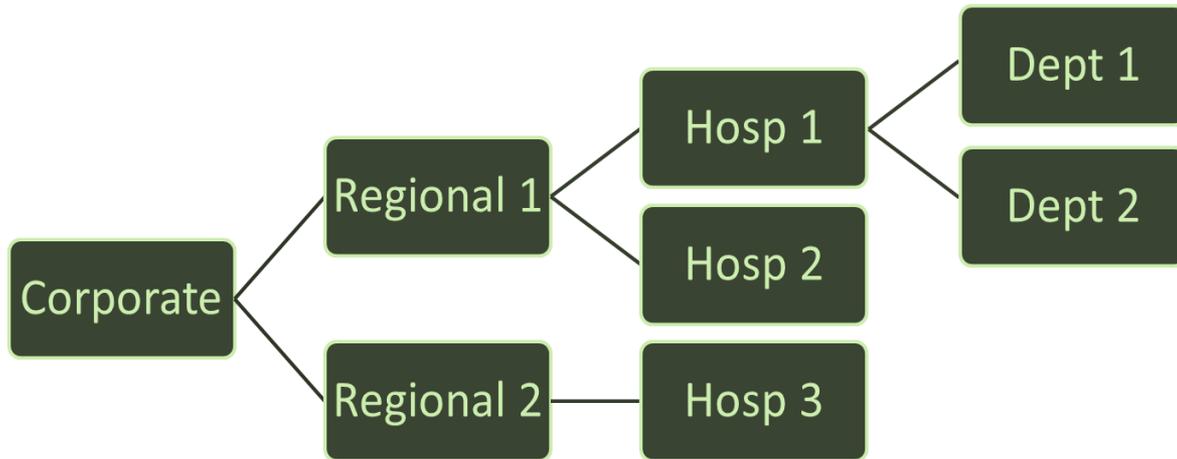
- Organizational Level
 - How many of your organizations have a strategic planning process?
 - How many have a formal process improvement effort?
 - Are they aligned?
- Individual and/or Project Level
 - What is your level of involvement in the organization's strategic goals and objectives?
 - How do you align your projects with the organization's strategic goals and objectives? Project charter?

Project Selection



Goal Alignment

Cascading Goals



HHS Strategic Plan FY 2014 - 2018

<p>Strategic Goal 1: Strengthen Health Care</p> <ul style="list-style-type: none"> Objective A: Make coverage more secure for those who have insurance, and extend affordable coverage to the uninsured Objective B: Improve health care quality and patient safety Objective C: Emphasize primary and preventive care, linked with community prevention services Objective D: Reduce the growth of health care costs while promoting high-value, effective care Objective E: Ensure access to quality, culturally competent care, including long-term services and supports, for vulnerable populations Objective F: Improve health care and population health through meaningful use of health information technology 	<p>Strategic Goal 2: Advance Scientific Knowledge and Innovation</p> <ul style="list-style-type: none"> Objective A: Accelerate the process of scientific discovery to improve health Objective B: Foster and apply innovative solutions to health, public health, and human services challenges Objective C: Advance the regulatory sciences to enhance food safety, improve medical product development, and support tobacco regulation Objective D: Increase our understanding of what works in public health and human services practice Objective E: Improve laboratory, surveillance, and epidemiology capacity 	<p>Strategic Goal 3: Advance the Health, Safety, and Well-Being of the American People</p> <ul style="list-style-type: none"> Objective A: Promote the safety, well-being, resilience, and healthy development of children and youth Objective B: Promote economic and social well-being for individuals, families, and communities Objective C: Improve the accessibility and quality of supportive services for people with disabilities and older adults Objective D: Promote prevention and wellness across the life span Objective E: Reduce the occurrence of infectious diseases Objective F: Protect Americans' health and safety during emergencies, and foster resilience to withstand and respond to emergencies 	<p>Strategic Goal 4: Ensure Efficiency, Transparency, Accountability, and Effectiveness of HHS Programs</p> <ul style="list-style-type: none"> Objective A: Strengthen program integrity and responsible stewardship by reducing improper payments, fighting fraud, and integrating financial, performance, and risk management Objective B: Enhance access to and use of data to improve HHS programs and to support improvements in the health and well-being of the American people Objective C: Invest in the HHS workforce to help meet America's health and human services needs Objective D: Improve HHS environmental, energy, and economic performance to promote sustainability
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Example Strategic Plan & Associated Metrics

Fiscal Year 2018 Goals and Targets

Below is a table of the Fiscal Year 2018 goals and targets for the organization. The table is organized into four columns: Strategic Area, Strategic Objectives, Key Performance Indicators (KPIs), and Target Values.

Strategic Area	Strategic Objectives	Key Performance Indicators (KPIs)	Target Values
Strategic Area 1	Strategic Objective 1.1	KPI 1.1.1	Target 1.1.1
Strategic Area 1	Strategic Objective 1.2	KPI 1.2.1	Target 1.2.1
Strategic Area 2	Strategic Objective 2.1	KPI 2.1.1	Target 2.1.1
Strategic Area 2	Strategic Objective 2.2	KPI 2.2.1	Target 2.2.1
Strategic Area 3	Strategic Objective 3.1	KPI 3.1.1	Target 3.1.1
Strategic Area 3	Strategic Objective 3.2	KPI 3.2.1	Target 3.2.1

Strategic Goals

Strategic Goals

Specific Metrics

Current Goal ----- **Baseline**

This table displays a detailed list of specific metrics and their current values relative to a baseline. The metrics are organized into columns, with the first column representing the 'Current Goal' and the second column representing the 'Baseline'.

Metric	Current Goal	Baseline
Metric 1	Value 1.1	Value 1.2
Metric 2	Value 2.1	Value 2.2
Metric 3	Value 3.1	Value 3.2
Metric 4	Value 4.1	Value 4.2
Metric 5	Value 5.1	Value 5.2

Alignment with Organizational Strategies

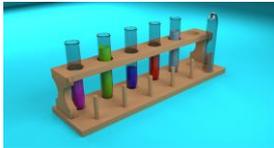
- Aligned
 - Purpose
 - Function
 - Resources

Results in

- More organized and sustainable approach
- Better outcomes



“Science Projects”



“Assorted Results”



Organizational Strategic Goals



“If you don’t know where you’re going, any road will take you there.”

Lewis Carroll, Alice’s Adventure in Wonderland

“A problem well-stated is a problem half-solved.”

Charles Kettering, GM Research

Defining the Problem: Problem Statement

- A **problem statement** is a clear, concise description of the issue. It should include data to help quantify the problem (e.g. cost per case, overtime rate) as well as describe the impact on patients and the system as a whole.

- It's the “what” that needs to be solved.

Problem Statement Criteria

- It states what is wrong (**not** why it is wrong or causes for it.)
- It focuses on the gap between actual and expected – “what is” versus “what should be.”
- It is specific and measurable.
- It identifies who is impacted.
- TAGS
 - Standard – what is expected?
 - Actuals – how you are performing?
 - Gap – between expected and performance.
 - Trend – trend of performance.



Well Written Problem Statements



- Will be a good communication tool
- Will assist with getting buy-in and support – from management and potential team members
- Will explain itself, minimizing the amount of time someone needs to spend explaining what the situation is
- Will provide an understanding to people within and exterior to the improvement team of what is trying to be accomplished
- Will use metrics to identify the gap, and state the obvious for expected (e.g. 11% of ED patients LWOBS, should be 1%)

Examples of Problem Statements

Problem Statement

1. We need to improve patient throughout.

Improved Problem Statement

- a. What needs to be improved?
- b. Actual and expected performance?
- c. What's being measured?

2. 15% of the doctor's office patients are waiting 20 more minutes to get their lab results.

- a. Improve-lab results waiting time
- b. Actual-20 min longer (gap); really don't know expected performance
- c. Impacted-15% of pts, but could it be more specific?

Examples of Problem Statements

- **Example #1:** Patient registration is an essential step in the ED workflow, required to initiate documentation and impacts patient care. The hospital discovered that patients were waiting in line for as long as 15 minutes, and want it to be less than 5 minutes to be checked into the ED to receive treatment.
- **Example #2:** Readmission within 90 days after colorectal surgery occurs nationally in approximately 25% of the patients, resulting in additional cost of about \$9,000 per readmission. The hospital identified that it was experiencing a 28% readmit rate in its elective colorectal surgery patients over the past year.

Scenario throughout Workshop:

***Patient Flow from the ED into the
inpatient environment***

***Purpose for today is to learn how to use the various
tools, NOT to solve the problem!***

Scenario – Anywhere Health System (AHS)

Anywhere Health System (AHS), located in Anywhere, USA is an integrated health system that includes 9 hospitals and over 200 additional locations.

AHS' service area includes urban city, suburbs, and rural areas.

Key metrics for Anywhere Health System:

- 2.1M patients
- 51,000 surgeries
- 6,000 deliveries
- 500,000 outpatient encounters
- 302,000 ED visits.
- 20,000 employees

Scenario – AHS Vision

Anywhere Health System's organizational **vision** is to be the healthcare provider of choice in every community that we serve. Our **mission** is to improve healthcare delivery everyday in everything we do. Our organizational goals include:

1. To become the safest place to receive care
2. To be the healthiest work environment
3. To provide the best in clinical care
4. To provide exceptional service to our patients

Scenario – AHS Focus

Through the annual business planning process, Anywhere Health System has decided to focus on the delivery of care in its **9 emergency departments**.

Customer experience interviews and other collected metrics suggest that opportunities exist to improve wait time in the emergency departments including the patient/family perception of ease of service.

Scenario – AHS ED Metrics Monitored

For all patients

- Patients Leaving Without Being Screened (LWOBS)
- Patient Satisfaction
- Diversion Hours

For discharged patients

- Door to Doctor Time
- Doctor to Discharge Time
- ED Arrival to Departure for Discharged Patients

For admitted patients

- Door to Doctor Time
- Doctor to Decision to Admit Time
- Decision to Departure from ED Time
- ED Arrival to Departure for Admitted Patients
- Daily Boarding Hours

Scenario – AHS ED Data

Door to Doctor time for Discharged Patients past 12 months

Month	Door to Doctor Time (Minutes)
Jan	58
Feb	51
Mar	52
Apr	55
May	54
Jun	47
Jul	41
Aug	55
Sep	52
Oct	50
Nov	53
Dec	57

- The median ED LOS for Discharged Patients is currently 215 minutes.
- The rate of patients leaving before Medical Screening Exam was 11% in the most recent month.
- The organization strives for a Door to Doctor time of 15 minutes and a Patients Leaving Before Medical Screening Exam rate of 1%.
- The organization's leadership is very concerned that Door to Doctor time remains significantly higher then their goal.

Exercise

- What's the problem that needs solving?
- How does it align with the organization's strategic goals?

1. Divide into Teams

2. Write Problem Statement – 20 min

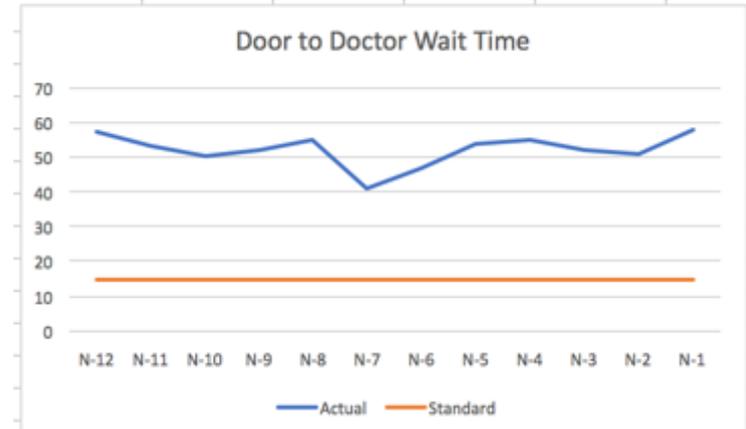
3. Report Out – 15 min

Exercise Debrief - Report Out

- What's the problem that needs solving?
- How does it align with the organization's strategic goals?

Exercise Debrief

- While there may be many concerns, symptoms, issues, etc., there is only one Problem that surfaces in the case. The Problem is “**Average Door to Doctor Wait times each month for the past 12 months far exceed the Standard of 15 minutes**”
- This problem **aligns** with the organizational **goals #3**-provide best clinical care and **#4**-provide exceptional service.



Purpose for today is to learn how to use the various tools, NOT to solve the problem!

Questions?

- Contact information for John Hansmann:
 - Email: john.hansmann@healthcatalyst.com
 - LinkedIn: <https://www.linkedin.com/in/jthansmann>
- Contact information for Dean Athanassiades:
 - Email: dathanassiades@gmail.com
 - Twitter: @dathanassiades
 - LinkedIn: www.linkedin.com/in/dathanassiades
- Please remember to complete the online session evaluation



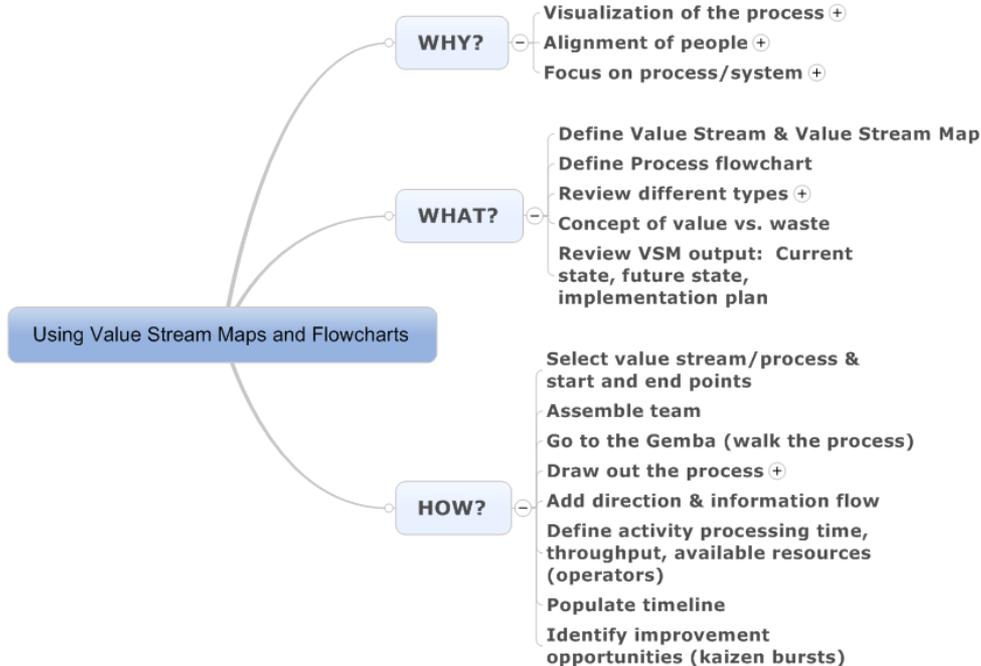
Resources

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- <https://www.healthcatalyst.com/knowledge-center/>

Strategic Process Improvement: VSM & Flowcharting

Mary Ellen Skeens, PMP, CPHIMS, FHIMSS,
CSSBB, DSHS, Director, Solutions and Services
Management Office, Philips

Using Value Stream Maps and Flowcharts



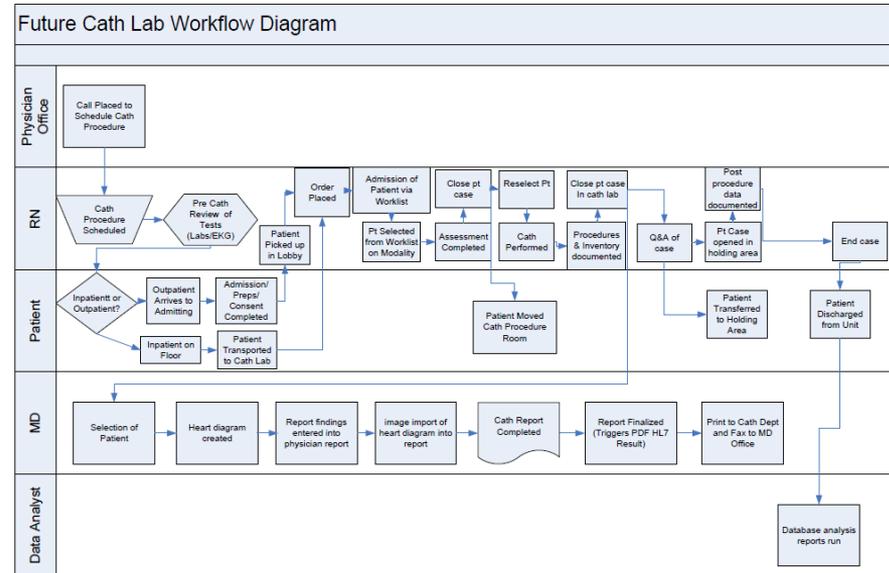
Why utilize this approach?

- **Visualization of the process**
 - downstream impact of work
 - incorporates customer point of view
- **Alignment of people**
 - involves people who actually do the work
 - enables people to see beyond their silo
- **Focus on process/system**
 - optimization of system vs. subsystem
 - helps translate strategy to improvement actions



What is Process Flow Charting?

- Identification and sequencing of steps in a process
- Specifies start and end points of process



What is Value Stream Mapping?

- A tool for identifying, planning and communicating continuous improvement
- A diagram of showing the details of a particular value stream



Value and Waste

- **Value**

- What customers are willing to pay for
- Changes form, fit or function of material and/or information

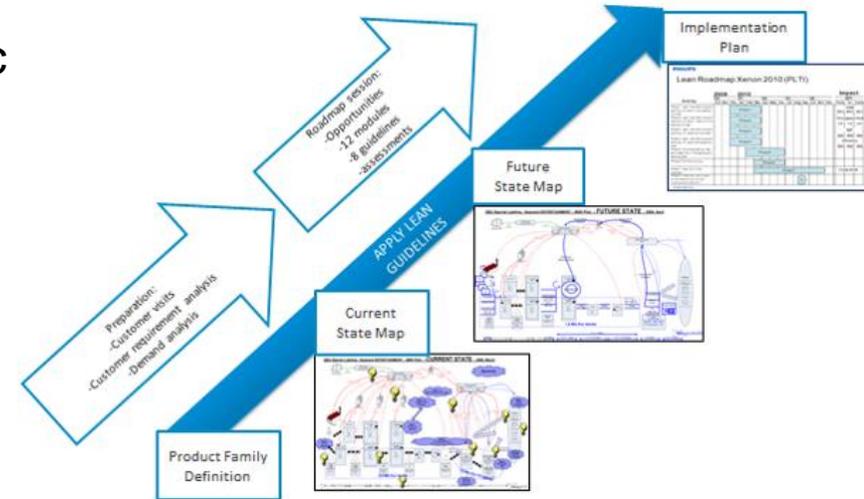
- **Waste**

- Anything that consumes resources but adds no value
- Typically “8 types of waste”



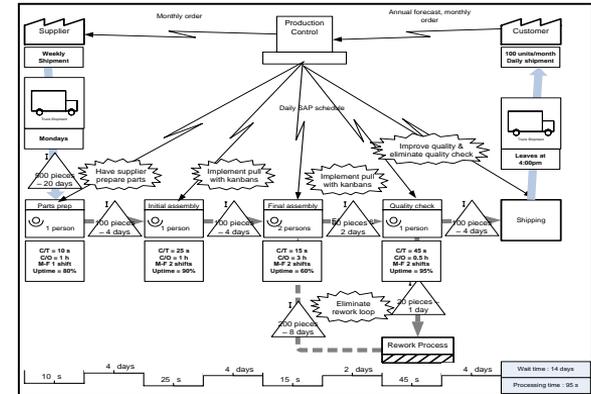
Value Stream Mapping Output

- **Current state VSM**
 - Includes rework, waste, systemic problems
- **Future state VSM**
 - Process streamlined to reduce waste
- **Implementation Plan**
 - Plan to achieve the future state
 - Prioritization of actions



How do you create a VSM?

1. Select value stream/process & start and end points
2. Assemble team
3. Go to the Gemba
4. Draw out the process
 - Record all steps in the process
 - Sequence steps
5. Add direction & information flow
6. Define activity processing time, throughput, available resources
7. Populate timeline
8. Identify improvement opportunities (kaizen bursts)



Exercise

- **Background:** The ED project team would like to better understand the current ED process. They have decided to utilize Value Stream Mapping to visualize the process and understand bottlenecks/opportunities for improvement.
- **Exercise:** Develop a current state value stream map for the ED process using the information provided in the handout.
 1. Identify major steps in the ED process
 2. Sequence timing of the process steps
 3. Add direction and information flow
 4. Add processing time, throughput, available resources
 5. Draw timeline
 6. Identify areas for improvement (kaizen bursts)

Exercise Debrief

- What bottlenecks were identified in the process?
- How did the visualization of the process help in identifying these?
- How did the VSM exercise help the team in aligning on the process?

Questions?

- Contact information for Mary Ellen Skeens:
 - Email: meskeens@bellsouth.net
 - Twitter: [@maryellenskeens](https://twitter.com/maryellenskeens)
 - LinkedIn: <https://www.linkedin.com/in/mary-ellen-skeens-88a5519/>
- Please remember to complete the online session evaluation

Resources

- Larson, Jean Ann (2001) *HIMSS Guidebook Series: Management Engineering*. HIMSS
- Larson, Jean Ann (2014) *Management Engineering: A Guide to Best Practices for Industrial Engineering in Health Care*. CRC Press
Taylor and Francis Group
- Martin, Karen and Osterling, Mike (2013) *Value Stream Mapping*.
McGraw Hill

Strategic Process Improvement: Networking Lunch

Brian Compas, PMP, CRCR, LFHIMSS, Senior
Project Manager, Cerner Corporation

Networking Lunch Instructions and Guidelines

Work at your tables through lunch

Questions:

- If your organization has been using a lean six-sigma approach to process improvement, what have been some of your keys to success?
- What have been some of the challenges?
- If your organization has not been using lean six-sigma approach what do you think are some of the barriers to doing so?

Use a flipchart to record the discussion if helpful

Be prepared to briefly report out your results at the end of lunch

Questions?

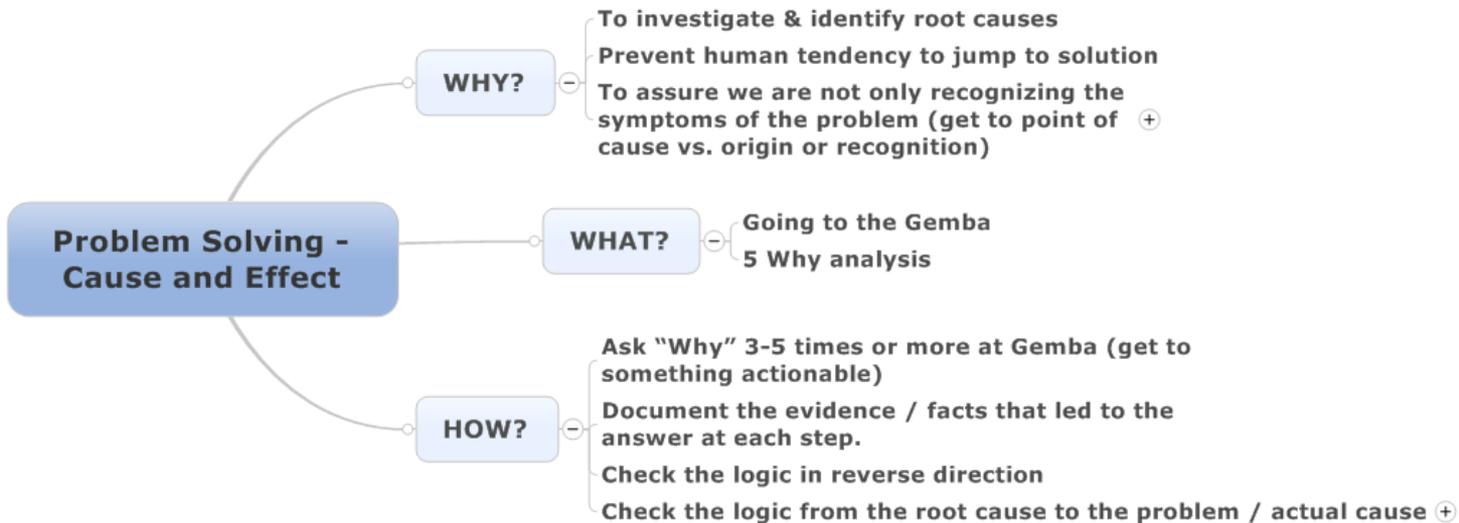
- Contact information for Brian Compas:
 - Email: brian.compas@cerner.com
 - LinkedIn: www.linkedin.com/in/brian-compas-lfhimss-pmp-8958097
- Please remember to complete the online session evaluation

Strategic Process Improvement: Problem Solving Tools – 5 Whys

Mary Ellen Skeens, PMP, CPHIMS, FHIMSS, CSSBB, DSHS, Director, Solutions and Services Management Office, Philips

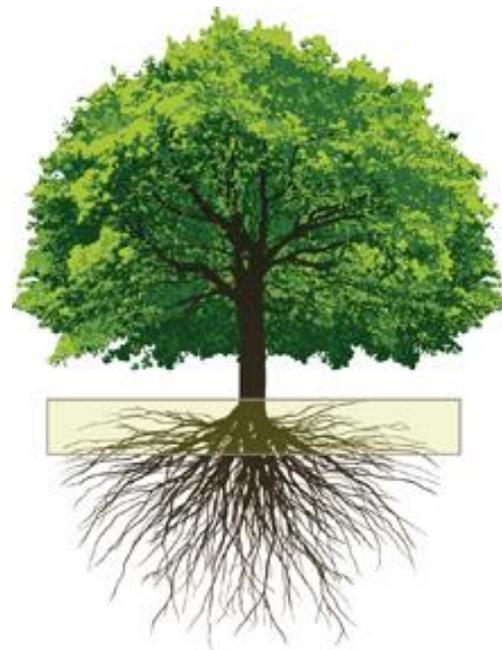
Dean Athanassiades, PMP, CPHIMS, FHIMSS, Senior Director, Transformation Program Office, Philips, Member of Faculty, University of Phoenix

Problem Solving – Cause & Effect



Why apply a structured technique?

- To investigate & identify root causes
- Prevent human tendency to jump to solution
- To assure we are not only recognizing the symptoms of the problem (get to point of cause vs. origin or recognition)

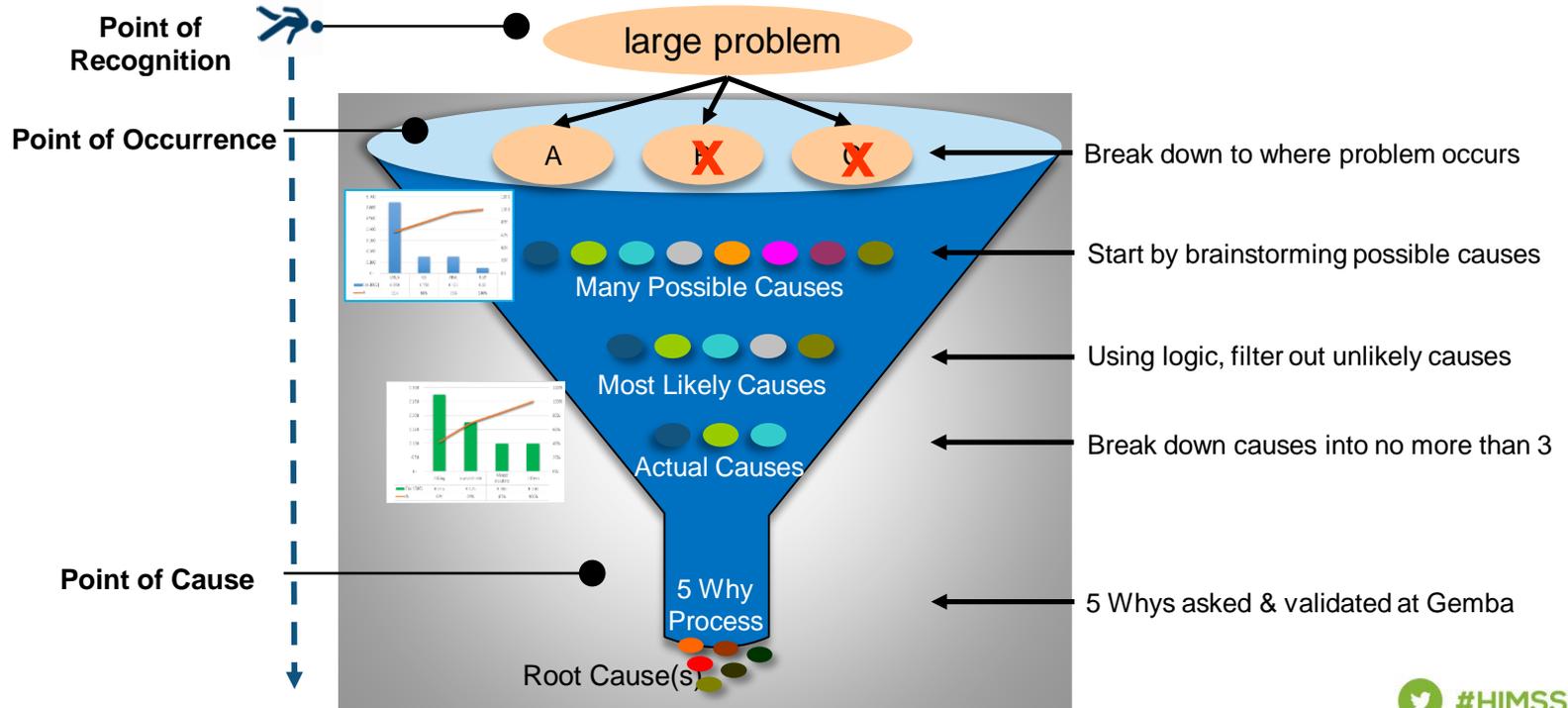


What is the approach?

- Going to where the work is performed (Gemba)
 - Observe/investigate
 - Gather and verify facts
 - Collect and confirm data
- 5 Why Analysis

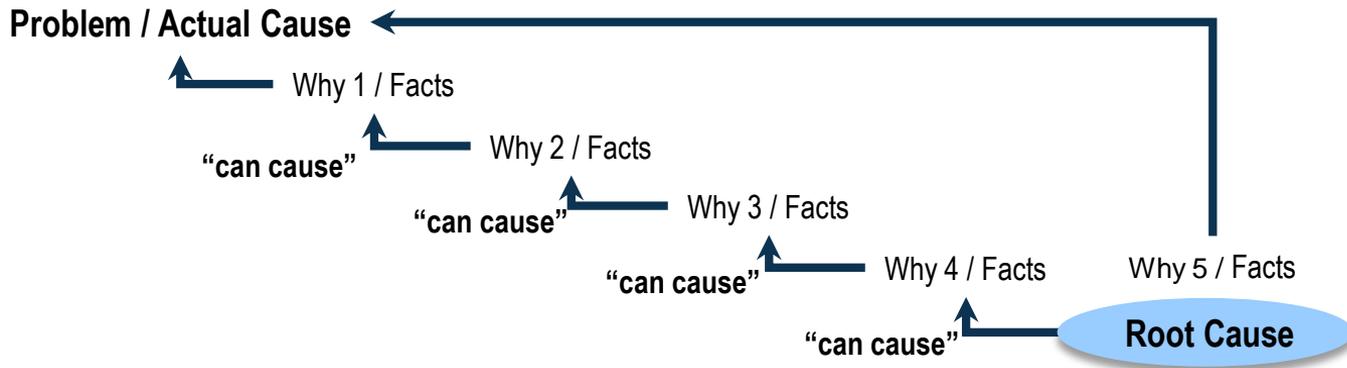


Breaking down the problem



How to use 5 Whys

1. Ask “Why” 3-5 times or more to get to an actionable root cause
2. Document the evidence and facts that led to the answer at each step
3. Check the logic from the root cause to the problem
 - if eliminated, would the problem stop, be prevented, cease to reoccur?
 - if root cause occurs, does the problem occur?



Effective 5 Why Criteria

Effective 5 Why Criteria

Logical, specific causes flow with evidence/facts observed at each Why

Effective Countermeasures can be identified within your team's control

Avoid blaming and qualitative words in the 5 Why analysis

Denominator consistent unit of measure

Stop asking "Why" (actionable Root Causes)

Critically assess your 5 Why analysis to ensure consistent logic

5 Why example: The Jefferson Memorial

How can we stop the crumbling of the Jefferson Memorial marble?



1. Why is the marble crumbling?
2. Why are the frequent washes needed?
3. Why are there so many bird droppings?
4. Why are there so many spiders?
5. Why are there so many midges?

The midges turned out to be attracted by the lights that were turned on at dusk.

Solution: turning on the lights only 1 hour later, made the midges find their sleeping places somewhere else. They broke the food chain, needed less washes with less strong cleaning acids and stopped the decay.

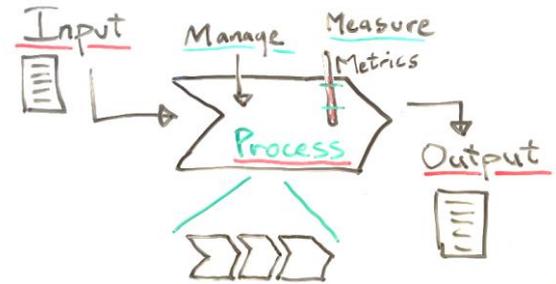
Focus on the Process

For process-oriented problems, 5 Whys must result in identifying one of, or a combination of the following:

- There is **no Process** (lack of Process)
- The Process is followed, but **not** desired **results**
- The Process is **not followed** (not executed)
- The external environment changes thus rendering a previously working Process ineffective.

**99% of problems are Process oriented!*

R	Responsible
A	Accountable
C	Contributing
I	Informed



Exercise

- **Background:**

The ED project team wanted to understand the root cause behind a dramatic month over month increase in the rate of patients leaving the ED before the medical screening exam. They decided to perform 5 Why Analysis to dig into this.

- **Exercise:**

Perform 5 Why Analysis to discover root cause of why patients are leaving before medical screening exam.

1. Assign roles to team members and use script provided to conduct interviews to ask why to get to an actionable root cause.
2. Document the evidence and facts that led to the answer at each step.
3. Check the logic from the root cause to the problem.

Exercise Debrief

- Would the team have identified all the root cause without performing 5 Why analysis?
- How many why's did it take to reach root cause?
- Did the logic check out?
- How does knowing the root cause help with the identification of countermeasures?

Questions?

- Contact information for Dean Athanassiades:
 - Email: dathanassiades@gmail.com
 - Twitter: @dathanassiades
 - LinkedIn: www.linkedin.com/in/dathanassiades
- Contact information for Mary Ellen Skeens:
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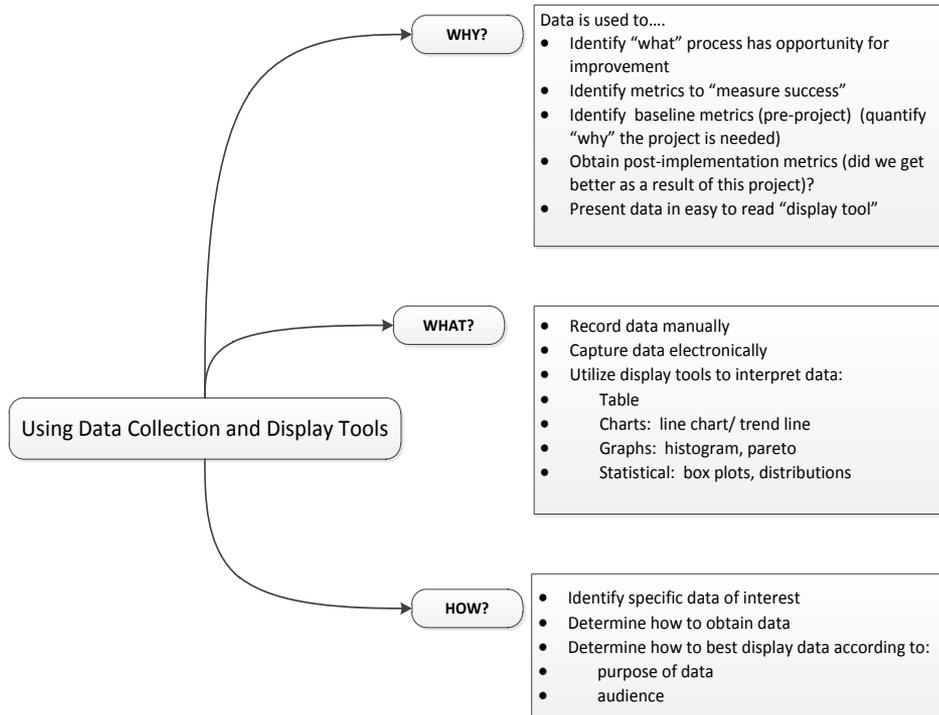
Resources

- Larson, Jean Ann (2001) *HIMSS Guidebook Series: Management Engineering*. HIMSS
- Larson, Jean Ann (2014) *Management Engineering: A Guide to Best Practices for Industrial Engineering in Health Care*. CRC Press
Taylor and Francis Group
- Graban, M. (Sept 2009) *Use 5 Sequential "Whys," not 5 Random Ones*. Retrieved from <https://www.leanblog.org/>

Strategic Process Improvement: Data Collection & Display Tools

**Deborah D. Flint, PE, FHIMSS, MBA, MSHQS,
DSHS, LSSBB Sr. Director, Performance
Engineering, UAB Medicine: The Kirklin Clinic of
UAB Hospital**

Using Data Collection and Display Tools



Why do we need data? To measure!

- To determine: “How are we doing?”
 - To identify opportunities for improvement
 - How “bad” are we doing?
 - What process needs to be improved?
 - To make the case for change
 - To measure results
 - Have we improved?
 - What process is working well?

Kinds of Data

- Categorical (qualitative)
 - Nominal (named categories)
 - Ordinal (categories with an implied order)
- Numerical (quantitative)
 - Discrete (yes/no, present/absent)
 - Continuous (measurement)

Types of Quantitative Data

- Attributes Data
- Variables Data

Attribute Data

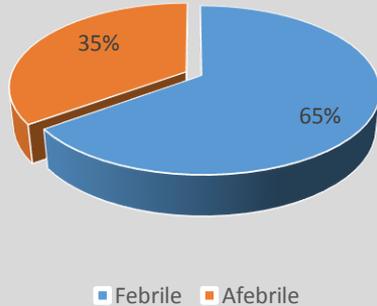
- Binary in nature: yes/no, present/absent
- Count the number of “good” or “bad”, “pass” or “fail”
- Answers whether or not an event occurred, e.g.:
 - Was triage performed?
 - Did resident physician see patient?
 - Was patient febrile or afebrile?
 - Did patient leave without being seen?
- Must be converted to a type of variable data (discrete data) to be useful

Displaying Attribute Data

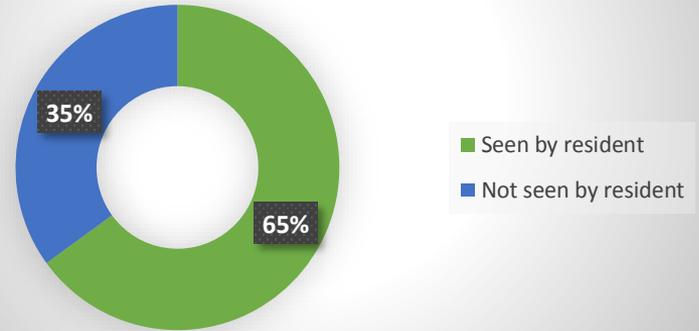
- In FY17, 92% of patients had triage performed
- In Qtr1FY17, 34% of patients were seen by a resident in the ED
- In the 2017 flu season, 65% of ED patients admitted with positive flu testing were febrile
- In March 2017, 142 (8%) patients left the ED without being seen

Graphical Displays

Percentage of Patients Admitted with Flu diagnosis with Fever



Portion of ED Patients Seen by Resident



Variables Data

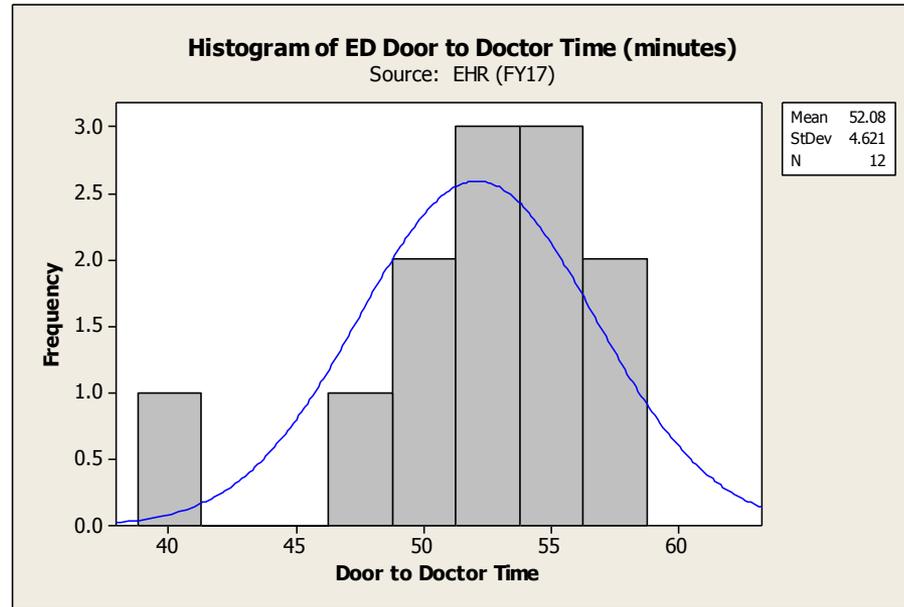
- Quantitative data
 - Discrete (“count” data: yes/no, present/absent)
 - Continuous (“measurement” data: time, length, weight)

Displaying Variables Data

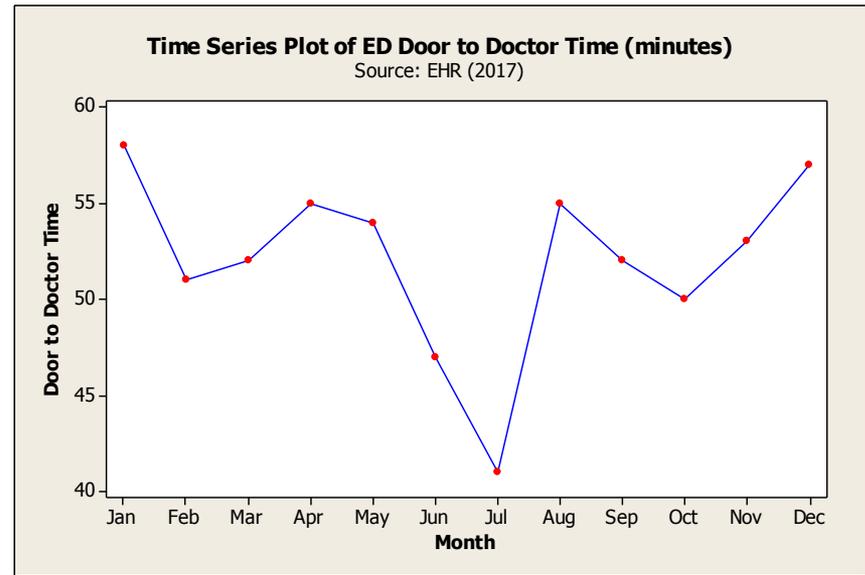
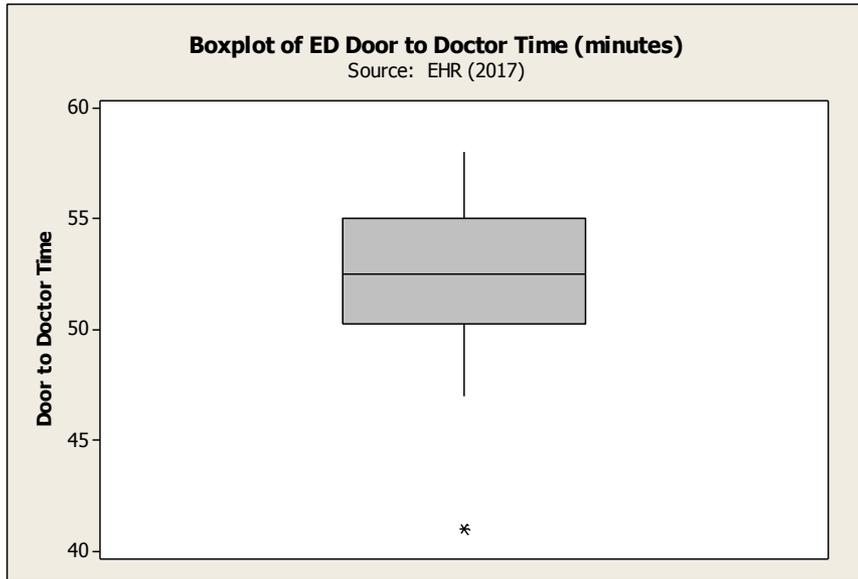
- In FY17, average door to doctor time was 52 minutes with a standard deviation of 4.62
- Median ED LOS for discharged patients is currently 215 minutes
- Time spent with resident physician ranged from 9.2 to 14.7 minutes.

Graphical Displays

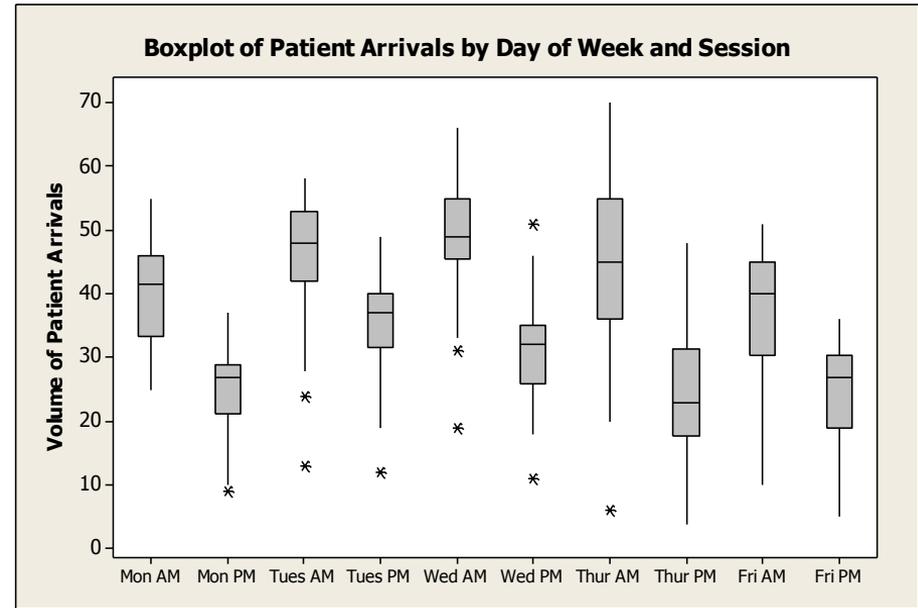
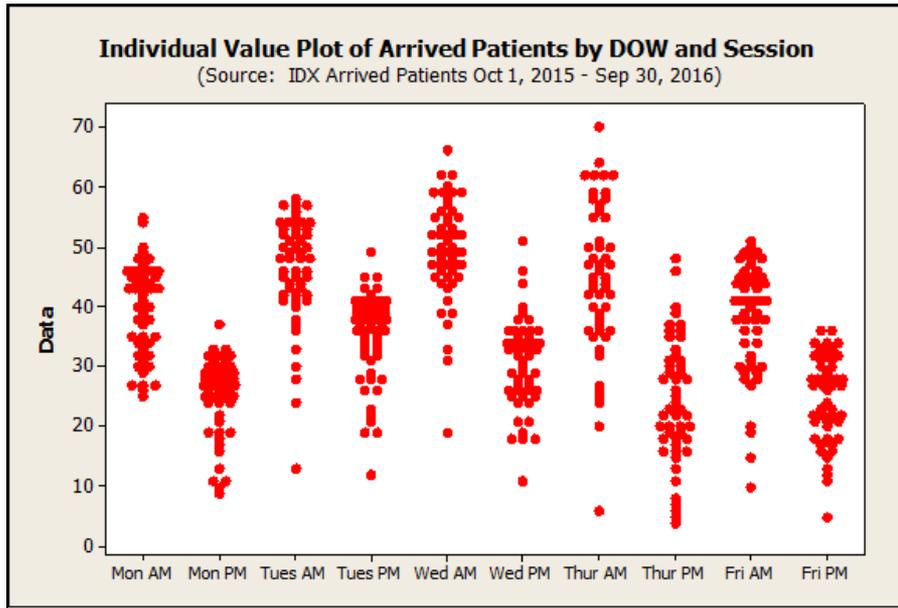
Month	Door to Doctor Time (Minutes)
Jan	58
Feb	51
Mar	52
Apr	55
May	54
Jun	47
Jul	41
Aug	55
Sep	52
Oct	50
Nov	53
Dec	57



Graphical Displays continued



Other Examples: Demonstrate Variation



Pareto Chart

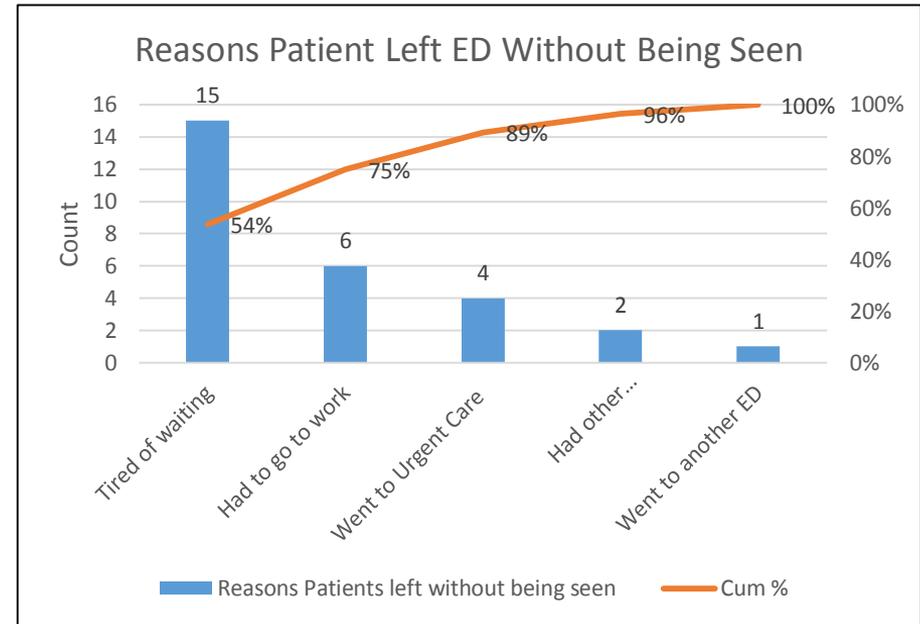
- Pareto Principle (80/20 rule):
 - Named after Italian economist, Vilfredo Pareto
 - Theory stating that 80% of the output from a given situation is determined by 20% of the input
- Used when analyzing data related to the frequency of problems or causes of problems

Sources:

<http://whatis.techtarget.com/definition/Pareto-principle>
<http://asq.org/learn-about-quality/cause-analysis-tools/overview/pareto.html>
https://en.wikipedia.org/wiki/Pareto_chart

Pareto Chart Example

# of observations	Reasons Patients left without being seen
6	Had to go to work
15	Tired of waiting
4	Went to Urgent Care
2	Had other commitment/family obligation
1	Went to another ED



Back to our ED Project

- What data is needed?
- How will we capture it?

Project is focusing on reducing “Door to Doctor” Time

- May need to combine data from multiple sources
- Possible sources of data:
 - Registration system (capture “door” or “arrival” time)
 - Electronic Health Record (capture “doctor time”) and/or
 - Direct observations (stand in hallway and observe when doctor enters room)

Electronically Captured Data-Registration System

Dept Desc	Location Desc	Patient Name	MRN	Arrival Date	Arrival Time
Emergency	ED	Jones, D.	xxxxx-123	2/5/2017	0:24
Emergency	ED	Smith, K.	xxxxx-124	2/5/2017	1:22
Emergency	ED	Andrews, D.D.	xxxxx-125	2/5/2017	1:35
Emergency	ED	Simpson, L. H.	xxxxx-126	2/5/2017	6:45
Emergency	ED	James, S.	xxxxx-127	2/5/2017	8:22
Emergency	ED	Brown, L.M.	xxxxx-128	2/5/2017	9:10
Emergency	ED	Johnson, F.	xxxxx-129	2/6/2017	12:25
Emergency	ED	Thomas, W.	xxxxx-130	2/6/2017	1:15
Emergency	ED	Rollins, K.	xxxxx-131	2/6/2017	1:17
Emergency	ED	Black, A.	xxxxx-132	2/6/2017	2:02
Emergency	ED	Williams, M.P.	xxxxx-133	2/6/2017	17:15
Emergency	ED	Johnson, M.	xxxxx-134	2/6/2017	20:25

Manually Recorded Data- Data Collection Sheet for Direct Observations

Date: Tues, 10/24/17

Dr. [Redacted] Head, Neck, Brain
 Dr. [Redacted] Res MD Breast, Brain, Lung

Appt Time	Provider	Last Name	First Name	Age	Gender	Type	Duration	Room #	ticket chart placed	Time Patient Enters Exam Room	Time Nurse First Enters Room	Time Nurse Leaves Room	Time Resident Enters Room	Time Resident Leaves room	Time MD Enters Room	Time MD Exits Room	Time Patient Exits Room	Notes
6:30 AM	[Redacted]	[Redacted]	[Redacted]	61	F	UTV	10		:	:	:	:	:	:	:	:	:	
7:30 AM	[Redacted]	[Redacted]	[Redacted]	62	M	UTV	10	2	:	:	:	:	:	:	:	:	:	
8:00 AM	[Redacted]	[Redacted]	[Redacted]	55	M	UTV	10	3	:	8:08	8:08	8:15	:	:	8:30	8:37	8:37	
8:30 AM	[Redacted]	[Redacted]	[Redacted]	41	F	UTV	10	5	:	8:42	8:42	8:53	:	:	9:01	9:04	9:04	
8:30 AM	[Redacted]	[Redacted]	[Redacted]	63	M	UTV	10		:	:	:	:	:	:	:	:	:	no show / no more treatment
8:30 AM	[Redacted]	[Redacted]	[Redacted]	63	M	UTV	10	6	:	8:00	8:04	8:12	:	:	8:26	8:29	8:29	
9:00 AM	[Redacted]	[Redacted]	[Redacted]	56	M	Ret	20		:	:	:	:	:	:	:	:	:	
9:00 AM	[Redacted]	[Redacted]	[Redacted]	56	F	Ret	20	6	9:10	9:14	9:14	9:16	9:28	9:54	9:58	10:12	10:46	waiting for stimulation test (10:12)
9:00 AM	[Redacted]	[Redacted]	[Redacted]	61	M	New	30		:	:	:	:	:	:	:	:	:	
9:00 AM	[Redacted]	[Redacted]	[Redacted]	67	M	UTV	10		:	8:08	8:10	8:12	8:15	8:21	8:28	8:54	9:54	

Hybrid of Manual/Automatic Data

- Create form in MS Access
- Use tablet

Time Study Form

Tab 1 Tab 2 Tab 3 Tab 4 Tab 5 Tab 6 Close

Patient Info Room [dropdown] In Out 12/20/2017

Clear Patient Name [text] [text] [text]

Clear Patient Info Clinic [dropdown] Clear Clear STORE

Visit Type [dropdown] MD name [dropdown]

Comments: [text] [icon]

Staff/Faculty providing care In Out **Care Event**

Title [dropdown] [text] [text]

Comment associated with Care Activity [dropdown] Clear Clear Store

Staff/Faculty providing care In Out **Care Event**

Title [dropdown] [text] [text]

Comment associated with Care Activity [dropdown] Clear Clear Store

Staff/Faculty providing care In Out **Care Event**

Title [dropdown] [text] [text]

Comment associated with Care Activity [dropdown] Clear Clear Store

Manually Recorded Data- Tally Sheet

Number of Patients Seen by Resident	
Hour of Day	Number
8:00 - 9:00	
9:01 - 10:00	
10:01 - 11:00	
11:01 - 12:00	
12:01 - 1:00	
1:01 - 2:00	
2:01 - 3:00	
3:01 - 4:00	
4:01 - 5:00	

Data Collection Tools/Methods on display at HIMSS Exhibition

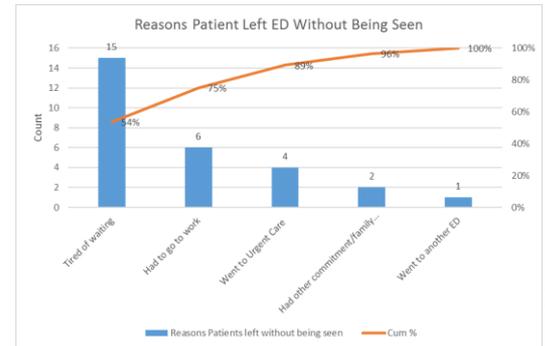


How do we decide what graph is best?

- **What is the purpose of the data review?**
 - What story does our data tell?
 - How can we present the data to clearly display the results?
 - How can we use our data to make the case for change?
- **Who is our audience?**
 - Executives generally prefer high level overview
 - Department managers may need more detail
 - Engineers want every line item detail!

M & M Exercise

- **Background:** In our ED example, the project team wanted to determine root causes of delay in “door to doctor”. The project team “went to the Gemba” and observed patients waiting on the doctor to determine causes of the delay.
- **Exercise:** Using the M & Ms at your table, create a Pareto chart to determine the most frequent causes of delay waiting for the doctor.
 - Identify root causes of delay (for each color M&M)
 - Quantify volume of each type of delay
 - Sort types highest to lowest
 - Calculate cumulative percent
 - Display in Pareto chart format



Exercise Debrief

- What were the root causes of delay for “door to doctor”?
- What was the most common root cause?
- Did you see evidence of the “80-20 rule”?

Questions?

- Contact information for Debbie Flint:
 - Email: dflint@uabmc.edu
 - Twitter: [@ddflint11](https://twitter.com/ddflint11)
 - LinkedIn: <https://www.linkedin.com/in/debbie-flint-pe-mba-6093498/>
- Please remember to complete the online session evaluation

Resources

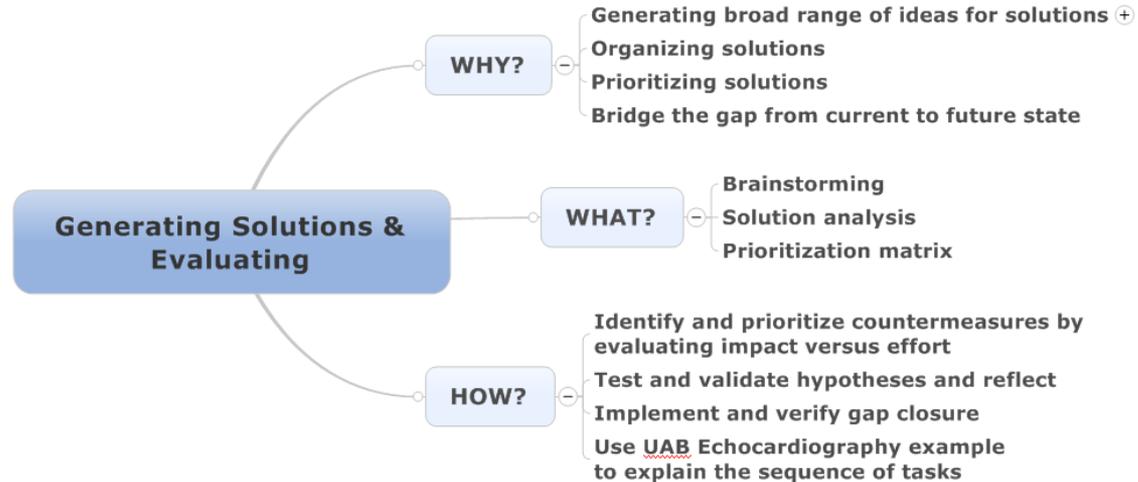
- <http://sixsigmastudyguide.com/types-of-data/>
- <https://www.isixsigma.com/dictionary/attribute-data>
- <https://www.isixsigma.com/dictionary/variable-data>
- <http://whatis.techtarget.com/definition/Pareto-principle>
- <http://asq.org/learn-about-quality/cause-analysis-tools/overview/pareto.html>
- https://en.wikipedia.org/wiki/Pareto_chart

Strategic Process Improvement: Generating Solutions & Evaluating

Mary Ellen Skeens, PMP, CPHIMS, FHIMSS, CSSBB, DSHS, Director,
Solutions and Services Management Office, Philips

Deborah D. Flint, PE, FHIMSS, MBA, MSHQS, DSHS, LSSBB Sr. Director,
Performance Engineering, UAB Medicine: The Kirklin Clinic of UAB Hospital

Generating Solutions & Evaluating



What is the approach?

- Facilitate Brainstorming
- Perform Solution analysis
- Develop Prioritization matrix



Brainstorming

- Important to set ground rules
- Everyone has an equal voice
- Can be used to identify improvement ideas, strengths/weaknesses



Solution Analysis

Development of Countermeasures:

- A proper root cause analysis will point to the action needed
- Make a plan that includes who, what, when
- Pursue multiple countermeasures
- Explore as many countermeasures as possible
- Build consensus rather than promote/defend solutions

Develop Countermeasures

Temporary

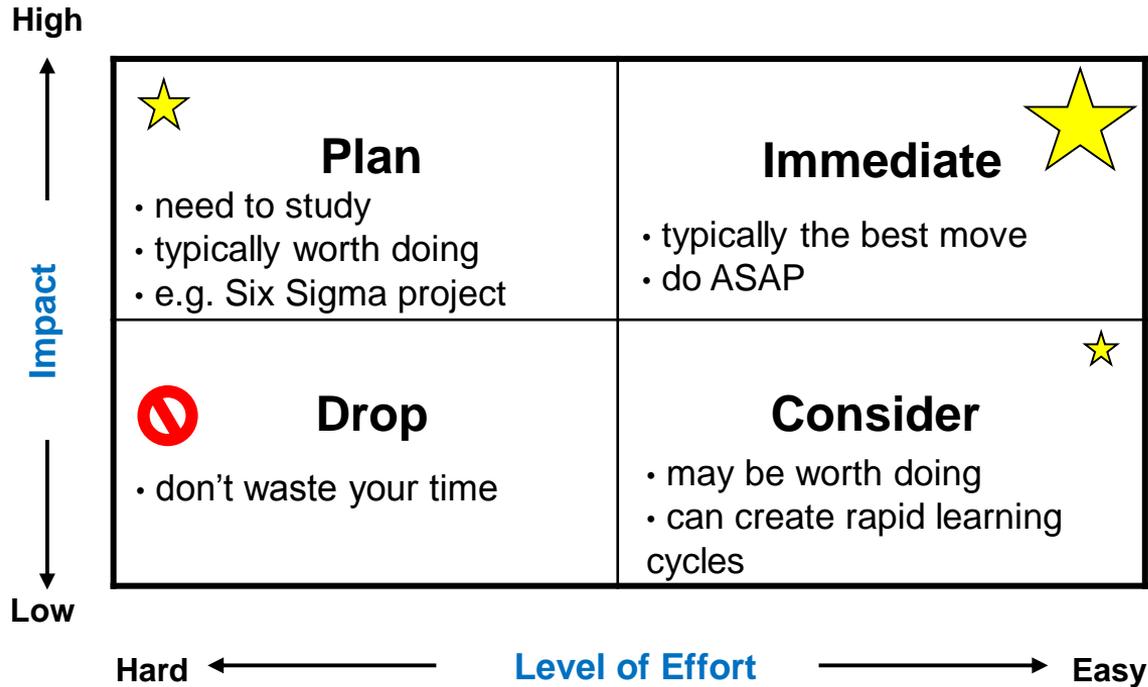
- Short term view
- Actions that address problem symptoms, but do not address root cause

Permanent

- Longer term view
- Actions that address root causes to close the gap

COUNTERMEASURE		
WHAT	WHO	WHEN

Prioritization Matrix



How to create prioritization matrix?

- Identify and prioritize countermeasures by evaluating impact versus effort
- Test and validate hypotheses and reflect
- Implement and verify gap closure



Assessing Impact

Level of Impact - Impact that work on this effort would have on improving UH Echo In-Lab

Span of Control - Degree that work on this effort is within the span of control of Echo department.

Areas of Improvement	Level of Impact (1= low impact, 10= high impact)	Span of Control (1= low control, 10= high control)
Patient Transport		
Managing Workflow		
Staffing Levels		
Performing Exams		
Space & Equipment		
Echo Physician Availability		

Check the Impact of Countermeasures

- Countermeasures should be tested and validated prior to implementation
- Test countermeasures using pilots, focus groups, dry runs, simulations, etc.
- During the test, observe impact of the countermeasure first-hand at Gemba at the time of change
- Evaluate how the lagging or leading indicators have changed
- Prepare to make adjustments

UAB Echocardiography Example Project

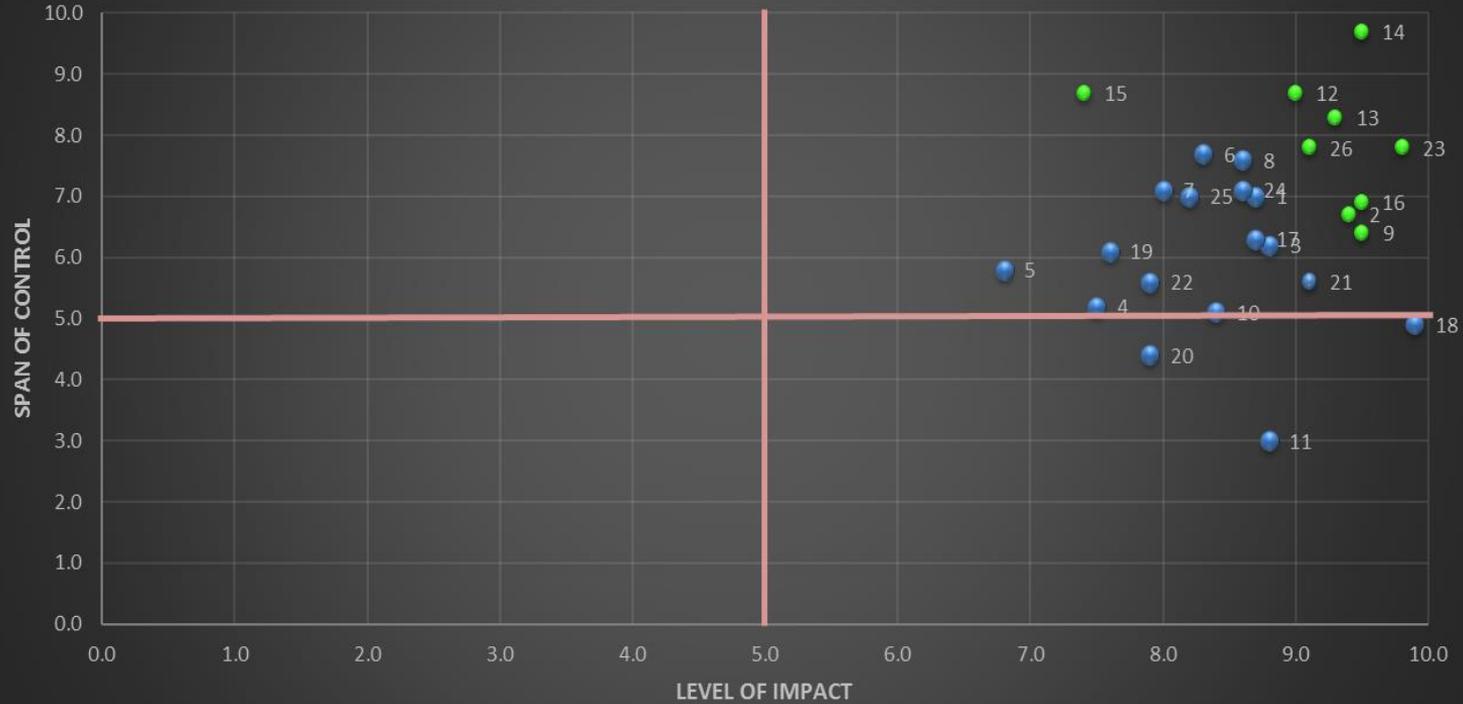
Project Goal: Evaluate lab workflow to identify inefficiencies and propose recommendations to streamline workflow to improve turnaround time for patient care

Scope: Echo order received to test finalized for 5 departments

1. Reviewed prioritization matrix results
2. Identified top focus areas (highlighted in green)
 - “managing workflow”
 - “performing exams”

Series	Areas of Improvement	Location	Level of Impact	Span of Control
1	Communication	UH Echo Portable	8.7	7.0
2	Division of Workload	TKC Echo	9.4	6.7
3	Echo Physician Availability	UH Echo In-Lab	8.8	6.2
4	Echo Physician Availability	UH Cath Lab	7.5	5.2
5	Lab Results	UH TEE	6.8	5.8
6	Managing Workflow	UH Echo In-Lab	8.3	7.7
7	Managing Workflow	UH Echo Portable	8.0	7.1
8	Managing Workflow	UH TEE	8.6	7.6
9	Managing Workflow	TKC Echo	9.5	6.4
10	Managing Workflow	UH Cath Lab	8.4	5.1
11	Patient Transport	UH Echo In-Lab	8.8	3.0
12	Performing Exams	UH Echo In-Lab	9.0	8.7
13	Performing Exams	UH Echo Portable	9.3	8.3
14	Performing Exams	TKC Echo	9.5	9.7
15	Performing Exams	Reporting Process	7.4	8.7
16	Physician Reading Process	Reporting Process	9.5	6.9
17	Reporting System	Reporting Process	8.7	6.3
18	Scheduling	TKC Echo	9.9	4.9
19	Space & Equipment	UH Echo In-Lab	7.6	6.1
20	Space & Equipment	UH Echo Portable	7.9	4.4
21	Space & Equipment	UH TEE	9.1	5.6
22	Staff & Equipment	UH Cath Lab	7.9	5.6
23	Staff Training	TKC Echo	9.8	7.8
24	Staffing Levels	UH Echo In-Lab	8.6	7.1
25	Staffing Levels	UH Echo Portable	8.2	7.0
26	Staffing Levels	UH TEE	9.1	7.8

Echo Prioritization Matrix Results



Exercise

- **Background:** The team ED project team identified several possible countermeasures based on the root cause analysis of the dramatic month over month increase in the rate of patients leaving the ED before the medical screening exam. The team decided to utilize a prioritization matrix to help determine which ones to implement.
- **Exercise:** Brainstorm on countermeasures to address root cause identified. Develop a prioritization matrix.
 - Identify and prioritize countermeasures by evaluating impact versus effort

Exercise Debrief

- How did the evaluation of impact and effort help to narrow in on the countermeasures that should be implemented?
- How can the countermeasures be validated?
- What do we do if the countermeasure is not effective?

Questions?

- Contact information for Debbie Flint:
 - Email: dflint@uabmc.edu
 - Twitter: [@ddflint11](https://twitter.com/ddflint11)
 - LinkedIn: <https://www.linkedin.com/in/debbie-flint-pe-mba-6093498/>
- Contact information for Mary Ellen Skeens:
 - Email: meskeens@bellsouth.net
 - Twitter: [@maryellenskeens](https://twitter.com/maryellenskeens)
 - LinkedIn: <https://www.linkedin.com/in/mary-ellen-skeens-88a5519/>
- Please remember to complete the online session evaluation

Resources

- Larson, Jean Ann (2001) *HIMSS Guidebook Series: Management Engineering*. HIMSS
- Larson, Jean Ann (2014) *Management Engineering: A Guide to Best Practices for Industrial Engineering in Health Care*. CRC Press
Taylor and Francis Group

Strategic Process Improvement: Standard Work & Using Control Charts

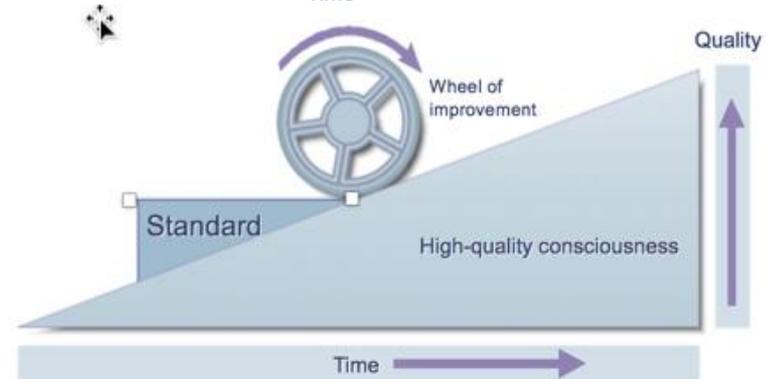
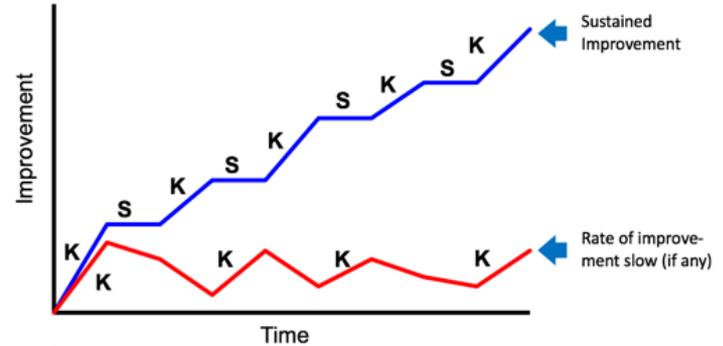
Dean Athanassiades, PMP, CPHIMS, FHIMSS, Senior
Director, Transformation Program Office, Philips,
Member of Faculty, University of Phoenix

Defining Standard Work & Using Control Charts

- Why Standard Work?
- How can I use a Control Chart to monitor, control, and improve the work?

Why Standard Work

- Ensures that everyone is working in the best possible way
- Reduces process variability and thereby increase quality
- Provides a structure for cross training and creates flexibility within teams
- Sustains the gains from previous kaizens and provides a baseline for further improvement
- Where there is no standard there can be no kaizen [good improvement] – Taiichi Ohno, founder of Toyota Production System



Standard Work Exercises

Discussion

- Think about how you got out of bed to work this morning.
 - What part of that was routine?
 - Can you give examples of tasks you did routinely?
 - What are advantages of having a routine?
 - What are disadvantages of having a routine?

Activity

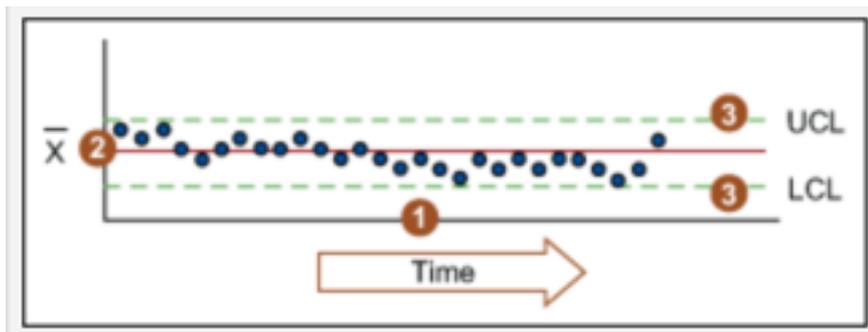
[Standard Pig Exercise](#)

Levels of Standard Work

1. No process, “tribal knowledge”
2. Process exists, not documented
3. Documented process
4. Documented, standardized and controlled
5. Continuously improved

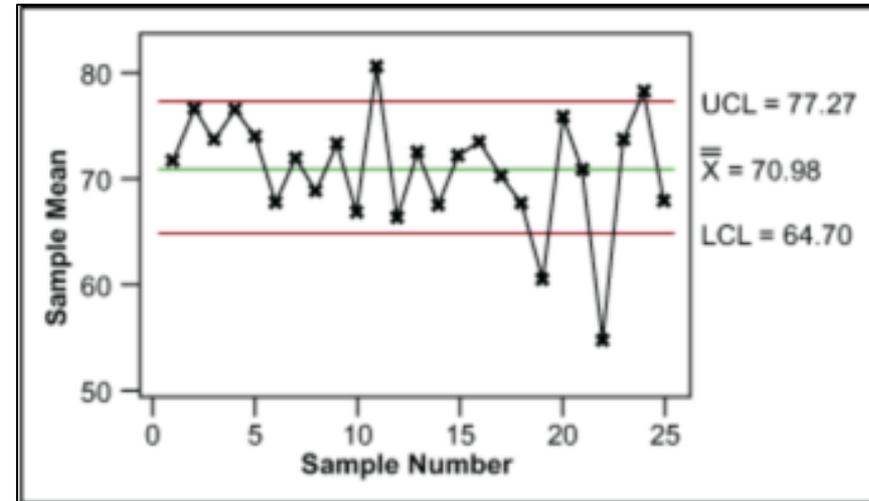
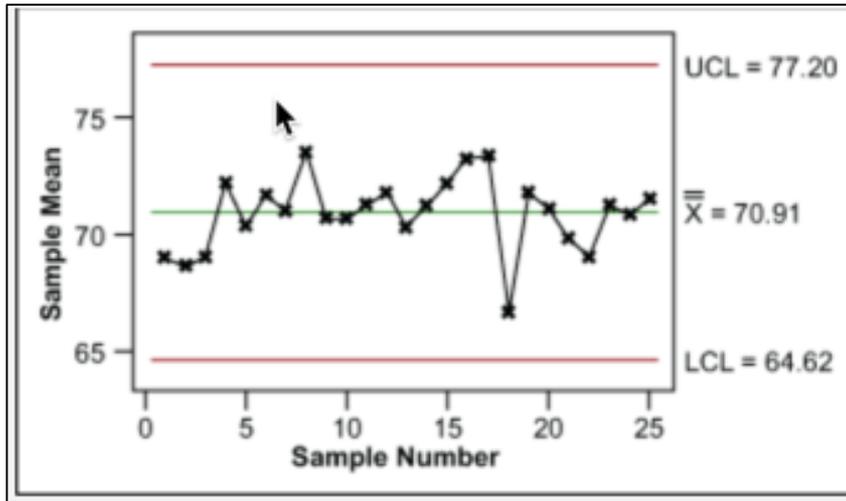
What is a Control Chart

- Tool to monitor process stability and control
- Tool to support continuous improvement



1 – data plotted over time
2 – expected value for an in-control process (idea state)
3 – upper and lower control limits (above or below – process is not in control)

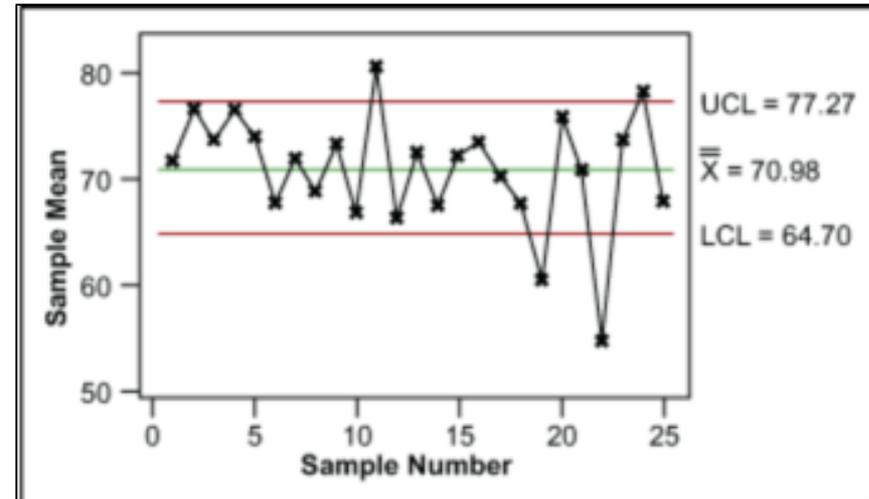
Interpreting a Control Chart



Which process is in control?

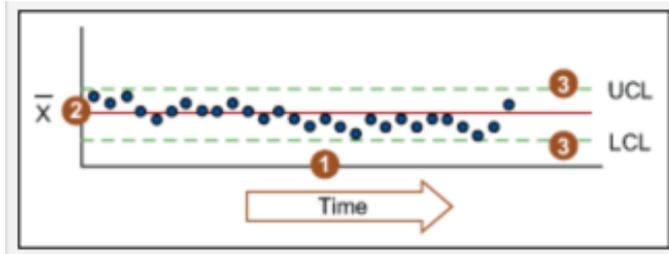
When is a process out-of-control?

Rule	Rule Name	Pattern
1	Beyond Limits	One or more points beyond the control limits
2	Zone A	2 out of 3 consecutive points in Zone A or beyond
3	Zone B	4 out of 5 consecutive points in Zone B or beyond
4	Zone C	7 or more consecutive points on one side of the average (in Zone C or beyond)
5	Trend	7 consecutive points trending up or trending down
6	Mixture	8 consecutive points with no points in Zone C
7	Stratification	15 consecutive points in Zone C
8	Over-control	14 consecutive points alternating up and down



Exercise

- Using the data from the ED example, create a control chart



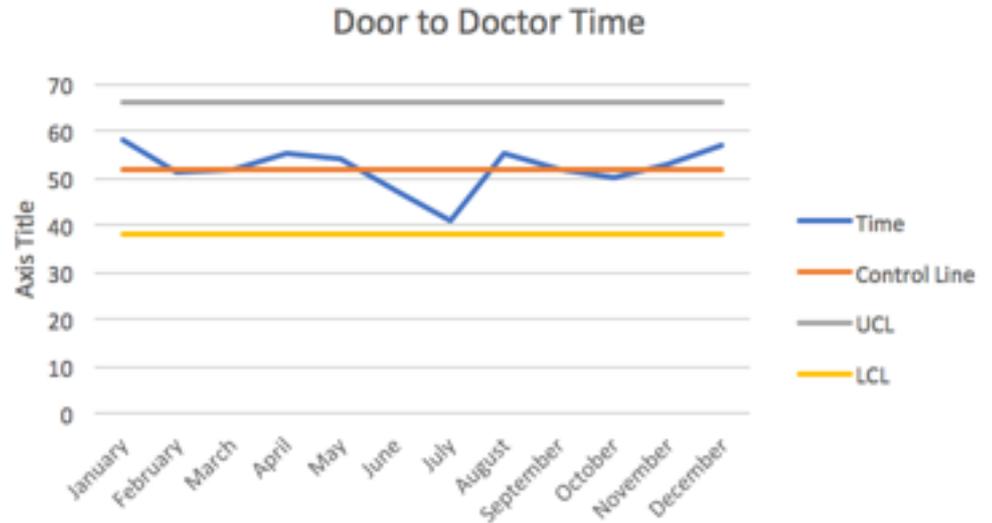
Door to Doctor time for Discharged Patients past 12 months

Month	Door to Doctor Time (Minutes)
Jan	58
Feb	51
Mar	52
Apr	55
May	54
Jun	47
Jul	41
Aug	55
Sep	52
Oct	50
Nov	53
Dec	57

Mean = 52.08
Median = 52.50
Std Dev = 4.62
Mode = 52.00

Exercise Debrief

- Is the process in-control?
Out-of-control? Why?
- Should we be satisfied?
Why or why not?



Questions?

- Contact information for Dean Athanassiades:
 - Email: dathanassiades@gmail.com
 - Twitter: @dathanassiades
 - LinkedIn: www.linkedin.com/in/dathanassiades
- Please remember to complete the online session evaluation

Resources

- Larson, Jean Ann (2001) *HIMSS Guidebook Series: Management Engineering*. HIMSS
- Larson, Jean Ann (2014) *Management Engineering: A Guide to Best Practices for Industrial Engineering in Health Care*. CRC Press Taylor and Francis Group
- iSixSigma.com (n.d.). "A Guide to Control Charts." [Control Charts](https://www.isixsigma.com/tools-templates/control-charts/a-guide-to-control-charts/). from <https://www.isixsigma.com/tools-templates/control-charts/a-guide-to-control-charts/>.

Strategic Process Improvement: Summary

Summary

- How will you take the learnings from today back to your work place?
- How will you apply what you learned today in your work place?
- Are the tools and concepts learned today applicable to help improve performance in your organization?

Learning Objectives

- ✓ Describe key healthcare industry changes driving strategic process improvement initiatives
- ✓ Identify areas for strategic process improvement
- ✓ Define and clarify the scope of the problem to be solved
- ✓ Use the appropriate measures to assess organizational performance from a strategic perspective
- ✓ Apply and effectively use Lean & Six-Sigma tools and techniques to achieve desired organizational performance

Thank You
for participating
today

*** Please remember to complete the online session evaluation ***

Contact Information

Dean Athanassiades

- Email: dathanassiades@gmail.com
- Twitter: @dathanassiades
- LinkedIn: www.linkedin.com/in/dathanassiades

Brian Compas

- Email: Brian.Compas@Cerner.com
- LinkedIn: www.linkedin.com/in/brian-compas-lfhimss-pmp-8958097

Larry Dux

- Email: larry.dux@froedtert.com
- LinkedIn: linkedin.com/in/larry-dux-a396998

Debbie Flint

- Email: dflint@uabmc.edu
- Twitter: @ddflint11
- LinkedIn: <https://www.linkedin.com/in/debbie-flint-pe-mba-6093498/>

John Hansmann

- Email: john.hansmann@healthcatalyst.com
- LinkedIn: <https://www.linkedin.com/in/jthansmann>

Mary Ellen Skeens

- Email: meskeens@bellsouth.net
- Twitter: @maryellenskeens
- LinkedIn: <https://www.linkedin.com/in/mary-ellen-skeens-88a5519/>

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- <http://sixsigmastudyguide.com/types-of-data/>
- <http://whatis.techtarget.com/definition/Pareto-principle>
- <https://www.healthcatalyst.com/knowledge-center/>
- <https://www.isixsigma.com/dictionary/attribute-data>
- <https://www.isixsigma.com/dictionary/variable-data>
- https://en.wikipedia.org/wiki/Pareto_chart

Conflict of Interest Documents

Conflict of Interest

Dean Athanassiades, BSIE, MBA

Salary: Philips

Royalty: N/A

Receipt of Intellectual Property Rights/Patent Holder: N/A

Consulting Fees (e.g., advisory boards): N/A

Fees for Non-CME Services Received Directly from a Commercial Interest or their

Agents (e.g., speakers' bureau): N/A

Contracted Research: N/A

Ownership Interest (stocks, stock options or other ownership interest excluding diversified mutual funds): Philips

Other: N/A

Conflict of Interest

Brian Compas, PMP, CRCC, LFHIMSS

Salary: Cerner Corporation

Royalty: N/A

Receipt of Intellectual Property Rights/Patent Holder: N/A

Consulting Fees (e.g., advisory boards): N/A

Fees for Non-CME Services Received Directly from a Commercial Interest or their

Agents (e.g., speakers' bureau): N/A

Contracted Research: N/A

Ownership Interest (stocks, stock options or other ownership interest excluding diversified mutual funds): Cerner

Other: N/A

Conflict of Interest

Larry Dux, BSIE, MBA, CPHIMS, LFHIMSS, DSHS

Salary: Froedtert Health Community Memorial Hospital

Royalty: N/A

Receipt of Intellectual Property Rights/Patent Holder: N/A

Consulting Fees (e.g., advisory boards): N/A

Fees for Non-CME Services Received Directly from a Commercial Interest or their

Agents (e.g., speakers' bureau): N/A

Contracted Research: N/A

Ownership Interest (stocks, stock options or other ownership interest excluding diversified mutual funds): N/A

Other: N/A

Conflict of Interest

Deborah D. Flint, PE, BIE, MBA, MSHQS, FHIMSS, DSHS

Salary: UAB Hospital Management, LLC

Royalty: N/A

Receipt of Intellectual Property Rights/Patent Holder: N/A

Consulting Fees (e.g., advisory boards): N/A

Fees for Non-CME Services Received Directly from a Commercial Interest or their

Agents (e.g., speakers' bureau): N/A

Contracted Research: N/A

Ownership Interest (stocks, stock options or other ownership interest excluding diversified mutual funds): N/A

Other: N/A

Conflict of Interest

John Hansmann, MSIE, LFHIMSS, DSHS

Salary: Health Catalyst

Royalty: N/A

Receipt of Intellectual Property Rights/Patent Holder: N/A

Consulting Fees (e.g., advisory boards): N/A

Fees for Non-CME Services Received Directly from a Commercial Interest or their

Agents (e.g., speakers' bureau): N/A

Contracted Research: N/A

Ownership Interest (stocks, stock options or other ownership interest excluding diversified mutual funds): Health Catalyst

Other: N/A

Conflict of Interest

Mary Ellen Skeens, BSIE, MSHS

Salary: Philips

Royalty: N/A

Receipt of Intellectual Property Rights/Patent Holder: N/A

Consulting Fees (e.g., advisory boards): N/A

Fees for Non-CME Services Received Directly from a Commercial Interest or their

Agents (e.g., speakers' bureau): N/A

Contracted Research: N/A

Ownership Interest (stocks, stock options or other ownership interest excluding diversified mutual funds): Philips

Other: N/A