Systems Mapping as a Guide to Operational Excellence in Government

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Thursday  │  Jan. 10  │  12 pm ET
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Moderated by the Chairman of the ASQ Government Division, Marc D. Berson, CSSBB, PMP
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- ASQ represents the voice of quality throughout the world with over 80,000 members ([https://asq.org/](https://asq.org/))
- The **Government Division** is one out of 26 divisions in the Society ([http://asq.org/gov](http://asq.org/gov))
- The Government Division is a community of practitioners focused on **quality and performance improvement** for Federal, State, Local, and International **Governments**
- We are composed of government leaders & employees, seasoned experts, consultants, practitioners, university professors, students, and others interested in the public sector
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• LEAN SIX SIGMA SUPPORTS NATURAL DISASTER RECOVERY ACTIVITIES scheduled for Tuesday, March 5, 2019

• Go to the Government Division website to learn more about these and to register (http://asq.org/gov)

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Today’s Webinar

• Use the Q/A Tab (or chat box) to send in any questions you have during the webinar
• We will address as many questions as we can near the end of the presentation
• Contact information for Division Officers and Speakers will be at the end of this presentation
• Most presentations are available for download within a few days of the webinar from the Government Division website (http://asq.org/gov)
• Now, I have the pleasure of introducing our speaker today ... Rich Mallory!
SYSTEMS MAPPING AS A GUIDE TO OPERATIONAL EXCELLENCE IN GOVERNMENT

Presented by:
Richard E. Mallory, MM, PMP
Quality Profession Missed Something Big!

• “System of Profound knowledge” IS the basis of the Science of Excellence, and “An integral part of the system of profound knowledge is appreciation for a system” – W. Edwards Deming.

• “Learning organizations themselves may be a form of leverage on the complex system of human endeavors. Building learning organizations involves developing people who learn to see as system thinkers see, who develop their own personal mastery, and who learn how to surface and restructure mental models collaboratively … systems thinking is the fifth discipline.” - Peter M. Senge, The Fifth Discipline.
Purpose of webinar

• Provide a quick overview of system management framework (which is a tool set) and how it provides a parallel tool set to process mapping (and process science);

• Provide its professional roots and practices;

• Show how system mapping PLUS process mapping creates a unified best practice for every manager, and for entire organizations;

• On that basis, reinvents the job of manager/ supervisors and organizational improvement;

• How this provide the basis of a “learning organization” as described in Peter Senge’s Fifth Discipline

• Show system management as a tool for implementation of ISO 9001 and Baldrige (making systems visible)

• In combination with Auditable Quality Standards, provides the basis of an organization-wide scorecard that makes the use of quality practices visible!
Quality Science/ Continuous Quality Improvement are made up of:
  • Process Science- Supported in part by process mapping and analysis
  • System Science – Supported in part by system mapping and analysis

Together these distinct disciplines provide an agile framework for implementation of organization-wide quality practices.

The allow organizations to develop comprehensive, best known operational practices, called work flows.

The approach and deployment of process mapping and system mapping can both be measured through workflow maturity standards.

When measured and put on a scorecard, they provide the best incentive for the sustainability of quality practices.
Emergency Response: System of Systems

System input: “Emergency Occurs”

- Risk Assessment
- Scenario Analysis
- Influencer: “Weather”
- Inventory of Resources
- Local Responder Network
- Direct Response
- Evacuation/Safety Actions
- Police/Fire Actions
- Output and Outcomes
Definition of a System

• A set of interacting or interdependent components that create a defined outcome and outputs.

• Human systems are a collection of men, machines, methods, and materials that create a valuable output, defined by its aim.

• Systems are either:
  • Native – Created through use over time and held in place by habit or presumption.
  • Designed – Best known operational practice designed by subject matter experts. Updated and validated through review of results against requirements.
Dr. Deming defined a system as “a network of interdependent components that work together to try to accomplish the aim of the system.”
System management expands the Circle of Control

Systems modeling challengers leaders and managers to think about whether they have defined a best practice model, and whether they are influencing everything under their control and under their influence to make best practices happen!
Baldrige Excellence Framework

• Encourages a ‘systematic approach’ in completion of all ‘performance system’ categories – which it calls ‘processes’ (Criteria Categories #1-6)

• Defines ‘Systematic’ as: “Well ordered, repeatable, and exhibiting the use of data and information so that learning is possible.”

• Its Process Scoring Guidelines notes that any ‘systematic approach’ should have:
  ➢ Approach: Specific methods that are repeatable and based on reliable data and information
  ➢ Deployment: Approach is applied consistently, and is used by all appropriate work units
  ➢ Learning: Approach is refined through cycles of evaluation and improvement
  ➢ Integration: Approach is aligned with organizational needs, and harmonized across processes and work units in support of organizational needs (i.e. does not set up internal conflicts).
Deming and Baldrige provide a foundation

• System is defined by an “aim”
• Well ordered, repeatable, and exhibiting the use of data and information so that learning is possible
• Cyclical – It delivers a consistent thing “output” for which “customer requirements” can be developed, and from which we can measure its successful completion, learn and improve
Unifying Theory of Work Management

- Uniformity of Outputs
- Uniformity of People/Steps/Methods
- Projects
- Systems
- Process
Different Types of Workflows

<table>
<thead>
<tr>
<th>High Frequency</th>
<th>Low Frequency</th>
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<tbody>
<tr>
<td>Low Variation</td>
<td>Low Variation</td>
</tr>
<tr>
<td>(of Tasks/ Methods/ Output)</td>
<td>(of Tasks/ Methods/ Output)</td>
</tr>
</tbody>
</table>

**High Frequency, Low Variation**
- PROCESS
  - Licensing Actions
  - Benefit Determinations
  - Routine Program Action

**Low Frequency, Low Variation**
- SYSTEM or PROCESS
  - Capital Needs Analysis
  - Design/ Construct Civil
  - Contract Actions

**High Frequency, High Variation**
- SYSTEM or PROCESS
  - Legal Actions
  - Accident Investigations
  - IT Help Desk

**Low Frequency, High Variation**
- SYSTEMS
  - Strategic Plan
  - New Technology Projects
  - HR Recruitments
Systems work flows must include more than tasks!
California DOT: Civil Project Design through Construction

Evaluation Criteria/ Performance Characteristics:
1) Protective Features
2) Purpose and Need
3) Cost Management
4) Schedule Management
5) Design Standards Compliance
6) Environmental Commitments;
   Minimization and Compliance
7) R/W Minimization and Compliance
8) Construction Contract Standards Compliance
9) Constructable
10) Designed to Operate as Planned
11) Maintainable
12) Optimization

Evaluated by Subject Matter Experts in:
- Construction
- Traffic Operations
- Maintenance
- Design
- Environmental
- Right of Way
- Transportation Planning
- Project Management
- Structures
- Office Engineer
Mapping Your Systems

- Business Purpose
- Principal Activity Group 1
- Principal Activity Group 1
- Principal Activity Group 1
- Best Outcome: Description of its Success
- Measures of Operations/ These predict success!
- Measures of Outcome – Quantity/ Quality
Quality is the study and control of workflows

Purpose is to produce defined outputs, that match requirements, error-free 100% of the time
First structured model of a system

Name of System Map

Statement of Business Purpose

Primary Activity Group 1 – NEXT STEP

Primary Activity Group 2 – NEXT STEP

Primary Activity Group 3 – NEXT STEP

List of Outputs of Program or Unit
Key ‘System’ in a HR Office

Providing a Capable and Motivated Workforce

- Hiring and Recruiting
- On-Boarding, Placement and Orientation
- Training and Development
- Satisfaction/Retention
Key System in an IT Office

Network Support:

Key Activities:

- Network Capability: HCD and Cloud
- Directory Optimization Management
- IT Security: Environment and Physical
- Patching Updates & Support
Principal Activity Groups support requirements

Define Requirement: Metrics and Indicators

Define Requirement: Metrics and Indicators

Define System Outcome and Output Requirements

Principal Activity Group/Milestone

Principal Activity Group/Milestone

Principal Activity Group/Milestone
Adding Attributes of Success

**Indicators of Success:**

1. **Network Capability:**
   - No out of date software/equipment
   - Performing at 50% IT service threshold
   - Replacements as scheduled
   - Reliable service-limited outages

2. **Directory Management:**
   - Access to folders only as defined; Annual Audit of users 100% confirmed by folder owners

3. **IT Security:**
   - Email risk based protocol is updated annually
   - 100% of employees take security training annually
   - No ransom-ware of other system intrusions
   - Pass all security audits/ Dept. of Military

4. **Updates & Support:**
   - Install patches applied monthly
   - Server patches/ One-offs after 30 days
   - PC patches – 100% of headquarters and field every month/ 100% of DR Quarterly
Adding Attributes of Failure

Indicators of Success:
1. Network Capability:
   - No out of date software/equipment
   - Performing at 50% IT service threshold
   - Replacements as scheduled
   - Reliable service-limited outages
2. Directory Management:
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4. Updates & Support:
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Attributes of PSF allow us to develop measures

Outputs: How much did we do?

- Users by type
- User hours by type
- 100% of planned uptime is ‘up’
- Patches (Number and installed within 30 days)
- # Issues resolved
- # of folder update requests

Quality of Output

- 100% system uptime/ No unplanned system downtime.
- % required patches installed within 30 days.
- 100% folder permission updates within 30 days;
- No virus-ware/ ransom-ware intrusions

Operations

- Measured uptime of devices by group
  - File Servers, Print Servers; eMail; Networks, remote systems
- No out of date software or equipment.
- Replacements as scheduled.

Output Indicators/ Predictive Measures

- No out of date services.
- No out of date hardware.
- 100% of employees complete security training annually
- Email risk-based protocol update annually
Best Practice Operational Plan

Network Support:

Key Activities:

Network Capability: HCD and Cloud
- Application and Database Tracker: Solarwinds; Net Botz
- Backups

Directory Optimization Management
- Define folders: Ownership and Change protocol
- File clean-up

IT Security: Environment and Physical
- Monitor Environment
- IT Security Training
- E-mail checked and quarantined
- Evaluation of risks/benefits – ISO and/or IT Steering Comm.
- Exceptions policy/practices where needed

Patching Updates & Support
- Patching Security Holes/Updates
- 2nd Tier Help Desk Solutions
- Trouble shoot problems
- Root cause analysis of issues
Karau Ishikawa gave us the key

- Car won’t Run Reliably
  - Out of gas
    - Forgot to refill
    - Too busy
  - No electric power
    - Battery dead
    - Post corroded
    - No service schedule
  - Engine breakdown
    - Thermostat failed
    - Oil turned to sludge
    - No service schedule
    - Timer belt broke
  - Overheated
    - Thermostat failed
    -Forgot to service
  - Flat
    - Hit nail
      - Didn’t see it
      - Driving through new subdivision
    - Tires were excessively worn
  - It’s old
    - Can’t afford new one!
Using Cause and Effect for Error Cause

**Effect:** The Error or Problem

**Causes:** The reasons for the error or problem
Cause and Effect for Influencing Factors

Positive Factor Cause and Effect (Root Cause Analysis)

**Effect:** The Output/Outcome to be achieved

**Causes:** The Factors that ensure success

- Cause
- Cause
- Cause
- Cause
Recruitment and Hiring System Map

Providing a Capable and Motivated Workforce

- **Hiring and Recruiting**
  - Implement Hiring Options
  - Create Hiring Options
  - Marketing and Outreach
  - Projecting Future Needs; Track Vacancy and Turnover

- **On-Boarding, Placement and Orientation**
  - Orientation to Program, Including Job and Procedures
  - Orientation to Department as a whole
  - Develop and Use Checklist for Hires

- **Training and Development**
  - Implement and Manage Job Training

- **Satisfaction/Retention**
  - Employee Surveys and Follow up Activity
  - Analysis and Reporting on Voluntary Separations/Exit
Safety Program System Map

Oversight and Use of Injury Reporting and Investigation

- Review and revise treatment and reporting instructions
  - Evaluate training session feedback
  - Web page is used.
  - Correct forms are completed

- Supervisor Training on Injury Treatment and Reporting
  - Was it responsive to employee need?
  - Did it prevent escalation of injury?
  - Was treatment most cost-effective?
  - Did it prevent a claim?
  - Person seen in right place at right time?

- Review Injury Treatments and Results
  - Too many reports – minor incidents
  - Too few reports – unreported serious
  - Claims not a proxy for performance issues
  - Appropriate investigations are assigned and completed

- Review Reported Incidents
  - Saftey Factors Identified and Addressed
  - Maintaining healthy and motivated workforce? Avoiding preventable injury? Minimizing lost work days?

- Web page is used.
  - Correct forms are completed
Assessing Available Resources

Implementing and Managing

Running Operations

Create and Communicate options; Communicate with programs

Advance Resources Strategies

Implement Resources

Report, Review, Monitor

Trend Analysis and Vulnerability Assessment

Create BCPs and Other Resource Methods

Communicate Results

Run Administrative Processes

Determine Current Staffing Sustainability; Vulnerability Assessment

Match with Workforce Needs information (SMT)

Create most Viable Options for needed resources with programs

Determine Current Resources Needs and Sustainability
Define SYSTEM inputs: Requirements and format

Milestone/Check Gate

Activity/Action

Define MILESTONE outputs: Metrics and Indicators

Milestone/Check Gate

Activity/Action

Define MILESTONE outputs: Metrics and Indicators

Milestone/Check Gate

Risk

Define SYSTEM OUTPUT: Requirements, metrics and indicators

Activity/Action

Activity/Action

Activity/Action
Identification of Risk and Uncontrollable Factors

- Define SYSTEM inputs: Requirements and format
- Milestone/Check Gate
- Risk: Intervening System Input
- Milestone/Check Gate
- Risk: Intervening System Input
- Milestone/Check Gate
- Define SYSTEM OUTPUT: Requirements, metrics and indicators
Systems are inputs and outputs to processes
Systems provide inputs/outputs to systems

System Inputs to System

System Cycle

System Outputs to Systems – and Overlap

Resources
Information
Analysis
Organizational Actions
Decisions
Strategies

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The Global Voice of Quality™
Frameworks in a Diversified Organization

Executive

- Wastewater Operation
  - Systems
  - Process
- Water Operations
  - Systems
  - Process
- Human Resources
  - Systems
- Contracts and Procurement
  - Systems (Projects)
  - Process

Engineering

Service Billing

Permits

Legal

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Government Division
The Global Voice of Quality
<table>
<thead>
<tr>
<th>Systems Purpose and Structure</th>
<th>Goal Directedness Through Measures and Feedback</th>
<th>Management of Intervening Variables and Risk</th>
<th>Alignment, Evaluation, and Improvement</th>
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<td>5 - There is documented evidence of an ordered system that delivers uniform and predictable quality outputs over multiple operational cycles. The ordered system is supported by a system map and supporting documented covering all tasks, accountabilities, and contributing factors. Major intervening variables and system risks have been identified. The system map links to process maps as necessary to accomplish organizational goals, and requirements statements for process inputs or outputs are built into systems requirements. System deployment is specific to the means used to manage the system and to ensure its continuing operations according to design. Operational deployment is supported by responsibilities and accountability for each contributing resource group, and through the use of indicators and performance measures for all principal activity groups. There is evidence of the use of this system management structure for three or more years.</td>
<td>5 - Performance feedback and objective measures are linked to this system and all its defined activity groups. Positive levels and trends exist for the entire system and for all its principal activities. Several indicators and measures are available for each defined activity group. There is evidence that the performance of this defined system has improved and contributed to improving organizational outcomes over three or more years.</td>
<td>5 - Risks are actively managed by the risk manager and the risk owner, and progress is reported to management on a regular basis. System design and structure has been modified to lessen the impact or occurrence of intervening variable and risks. There is documented evidence of the use of analysis to lessen risk and system impacts. There is documented evidence of systems learning and improvement. There is evidence of systematic risk identification, tracking, analysis, and controls or mitigations in place.</td>
<td>5 - There is evidence of continuous systematic annual improvement, participated in by all defined systems personnel. There are measurable, positive results on outcomes, and in each activity group, with demonstrated positive relationships to all dependent processes.</td>
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Process and System Maturity Scorecard
How you manage each chosen system:

- Establish its AIM or Purpose, with metrics and indicators representing SUCCESS!
- Establish customers: Users of the outputs
- Standard Operating Practice, Defined Best Practice
- Timeline, Check Gates, and Milestones
- Actions and Activities
- Required Practices/ Rules of Operation
- Known Requirements
- Knowledge Management
- Feedback Against Criteria
Thank You!! Any Questions?

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