Work Process Integration and System Planning

Or

The Science of Change

Presentation to
Northwest Construction Consumer Council

By
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Agenda

• How I came to the Science of Change?
• What are the Change Principles?
  – Lessons Learned
• How Do we Apply these Principles?
  – Method and Technique
• What Results can be Achieved?
  – Case Studies
History Lesson

we could make much better software than our Clients could implement.
…..the real problem was not on the technology side, on the business side.

The Two Plants

You Must Pass Through the Information Plan
The Information Plant Problem

Our Information Plant has grown up like weeds….

We must learn to apply Engineering Discipline!

The Science of Change

• It is a Messy World
  – Just because we can draw neat models does not mean we believe life can be this neat!
  – There will always be more name than fit in the Rolidex!
  – There will always be more things than we can do before noon!
  – There will always be things that don’t work right!
  – There is more detail than we can ever deal with!
The Science of Change

• Chaos Theory
  – There is really order to the Messy World.
  – It is made up of complex arrangements of simple patterns.
  – When examined in the proper context the pattern appears.
  – Models help us understand these structures and deal with the messy world.
  – They help us bring a little order to a corner of the Messy World.

The Science of Change

• Systems Theory
  – Systems (Enterprises) are made of sub-systems
    • If the overall system is to operate optimally
    • The sub-systems will not operate optimally
  – Ignoring this principle
    • Causes inconsistent performance
    • Organizational Silos
The Science of Change

• Project Management
  – Scope Control
    • Resolving Out of Scope Issues
    • Keeping On Track
  – Management Commitment
    • Managing Expectation
    • Backing Results

Change As An Applied Science

• MetaPower Methodology
  – Design Model
  – Project Model
  – Design Technology
Change As An Applied Science

The MetaPower Design Model

- Radical Change
  - Strategy
  - Programs
  - Processes
  - Tools
  - Data

- Incremental Change
  - Marketplace Results
  - Business Rules
  - Information and Work Flows
  - Technical Infrastructure
  - Performance and Reference Information

Change As An Applied Science

The MetaPower Project Model

- Reason
  - Establish Business Case for Project
  - Target improvement expectations

- Assessment
  - Analyze current company environment
  - Identify change potential

- New Ideas
  - Benchmark industry for new ideas
  - Brainstorm for new ideas

- Design
  - Develop Business Case
  - Negotiate alignment through Design Model
  - Develop implementation Plan & Cost Benefits
  - Negotiate alignment through Design Model

- Plan
  - Perform project implementation
  - Evaluate project results

- Implement

meta
power
The Power to Change

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Change As An Applied Science

Putting It All together

- Design Technology
  - Data Flow Diagrams
  - Data Dictionary
  - Logic Specifications
Sample DFD

“Initiate Unapproved Work Order”

Sample Data Dictionary

**Equip ID #**: "A unique number for a plant equipment that is registered in the EMS data base and used to identify equipment on a maintenance work order."

**Symptom**: "A set of data that describes the equipment condition, the discovery of that condition and requests maintenance action.

\[
\text{WO #} = \text{WO Prob Desc} + \text{Init UserID} + \text{Init Date} + \text{Init Time} + \text{Init Phone} + \text{Equip ID} + \text{Location} + \text{(MID + Source Doc Type + Source Doc #) + (SI# + SI Para) + (WO Tag? + # WO Tags) + WO Status}
\]

**Wk Window Data**: "A set of data that describes a condition in the plant that will enable certain equipment to be worked on in an outage condition.

\[
\text{WW #} = \text{WW Window Sch Date} + \text{WW Window Dur}
\]

**WW Window Sch Date**: "The date on which a system Work Window begins and during which multiple work orders can be performed."

**WO #**: "The unique identifier (number) for a work order."

**WO Tag**: "A printed tag used to locate the equipment for which a work order has been written."

**WO Tag Data**: "The set of data that is printed on a work order tag.

\[
\text{WO #} = \text{WO Prob Desc} + \text{Equip ID} + \text{Equip Desc} + \text{Initiator} + \text{Init Date} + \text{Bar Code}
\]
“Sample” Logic Specification

UPON RECEIPT OF an Equipment Symptom:
IF the Equipment Symptom does not have an Equip ID,
DETERMINE the correct Equip ID.
IF Equip ID cannot be determined,
PREPARE Equip ID Search Request WITH:
SET System # = Equipment Symptom’s System #.
SEND the Equip ID Search Request TO Search Sys Equip.
UPON RECEIPT OF the Equip ID Search Results:
DETERMINE the correct Equip ID.
SET Equipment Symptom’s Equip ID =
“Determined” Equip ID.
SEND the “Equip ID” Equipment Symptom TO Enter Equip System.

Case Studies

• TVA’s Browns Ferry Nuclear Station
• Montana Power’s Colstrip Station
Case Study

• TVA’s Browns Ferry Nuclear Station
  - Activities
    • Process Design
    • Work Management Software Implementation
    • Document Management Implementation
  - Results
    • Presidential Award for Excellence
    • VP National Performance Review - Hammer Awards (2)
    • Reengineering Industry Association - Giga Excellence Award
    • Low Cost Nuclear Unit
    • 19 day Refueling Outage

Using "Least Square Fit” Analysis, Work Order Preparation for the last 18 months shows an improvement from 39.8 hours to 23.3 hours.

BFN WO processing time reduced from 39.8 man-hours per work order to 23.3 man-hours per work order (41% improvement).
Procedure Process - Savings

BFN procedure processing time reduced from 24.6 man-hours per procedure to 10.5 man-hours per procedure (57% improvement).

Procedure Revision Preparation for the last 18 months shows an improvement from 24.6 hours to 10.5 hours.

Browns Ferry Process Savings

<table>
<thead>
<tr>
<th>Process</th>
<th>BFN Process Savings</th>
<th>Millions Per Year</th>
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<tbody>
<tr>
<td>Labor to plan, schedule and perform a work order</td>
<td>14.5 man-hour per work order savings</td>
<td>$ 4.5</td>
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<tr>
<td>Document management staff</td>
<td>N/A</td>
<td>$ 1.6</td>
</tr>
<tr>
<td>Labor to revise procedure</td>
<td>14.1 man-hours per procedure</td>
<td>$ 2.3</td>
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<tr>
<td>Total</td>
<td></td>
<td>$ 8.4</td>
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Case Study

- Colstrip Station (Montana Power Co.)
  - Activities
    - Business Strategy
    - Reliability Base Production Program
    - Process Designs
    - System Designs
  - Results
    - Net generation is **up 3.5%**
    - Non-fuel O&M costs are **down 38%**
    - This results in $/MWh **down 40%**
    - Opacity excesses are **down 12%**
    - Recordable accidents are **down 57%**.

Colstrip Station - Case Study

Colstrip Non-Fuel Production Costs

<table>
<thead>
<tr>
<th>Year</th>
<th>Budget</th>
<th>Actual</th>
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<tbody>
<tr>
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<td></td>
<td></td>
</tr>
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<tr>
<td>1998</td>
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Summary

• There is a science to changing business.
• It is important to covert this science to practice.
• It can produce significant if not dramatic results.