5 Steps to Leverage IoT in Business Transformation

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Today’s Agenda

• Why deploy IoT? Opportunities and Risks
• Understanding the IIoT Hierarchy
• The 5-step plan for Digital Transformation
• Factors that influence your roadmap
• Calculating Return on Investment (RoI)
About Hamiltonian Systems

- 17 Years History of Enterprise Platform/Applications Support
- Expertise in eAM, Manufacturing, Supply Chain
- Focused Products & Tools
  - Cloud Adoption
  - IoT Applications/Support
  - Supply Chain Enhancement
- Headquartered in Pittsburgh, PA
- Software Development Teams in USA & India
Your Presenters

Ravi Venkatraman
President
Hamiltonian Systems

David Radin
President & CEO
M. Masters Corporation
What is IoT?

- A network of physical entities interacting with the digital world through the internet
- IoT is information about remote physical objects in real-time available anywhere through the internet
- The concept of IoT applied to an industry e.g. In a factory to better govern its assets and manage their performance in real-time
- These physical assets can be trucks, forklifts, lathes, boilers etc.
**OPPORTUNITIES**

- Increased Efficiency
- Faster distributed decision making
- Production and Maintenance Agility
- Increased product quality
- Stepping into the service economy

**RISKS**

- Initial Investment
- Business and IT Buy In
- Security and Privacy
- Know-how and Support
- Implementation Challenges
Immediate Gains from IoT

1. Increased Equipment Uptime (40%)
2. Service Margins (30%)
3. Increased Supply Chain Efficiency (30%)
4. Decreased Energy Consumption (30%)
5. Increased Operational Efficiency (25%)
6. Product Profit Margin (10%)
7. Savings in Business Expenditure (10%)
What is driving the need for IoT?

• Customer relationship and customer service
• Increasing revenue
• Getting ahead of the competition
• Increase operational efficiencies
• Increase profit margins by driving cost reduction

• B2B Scenario
  • How does our product behave in conjunction with our customers’ products or systems to produce the desired effect?

• B2C Scenario
  • Ensure that customers use the products as designed for use
  • Improve future product design by detecting any flaws in the existing design
  • Integrate with CRM, Service Management products for seamless workflows for maintenance
Use Case #1 – Operations Optimization

First Principles Modeling

- Physical model
  - No Fault
  - Minor
  - Major
  - Critical

Data-driven Modeling

- Degradation model

Intended use: Simulate what-if scenarios

- Prescriptive maintenance
- Inventory Management
- Operational Planning
- Fleet Management
Use Case #1 – Operations Optimization

First Principles Modeling

- Physical model

Data-driven Modeling

- Kalman filter
  - Noise measurement data
  - Estimated state (degradation)
  - Selector

- Degradation model
  - Estimated Remaining useful life – 121 hrs

Estimated Remaining useful life – 121 hrs
What is driving the need for IoT?

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Use Case #2 – Customer Focus

Water leak

1. Backlog for maintenance work created
2. Find the required parts
3. Schedule work based on customer input

Create a maintenance work order and ask customer for time to work on the issue

Text/email to customer about a potential issue

Compare models and other data for design issues for future product improvements

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Other Related Terms

**Digital Twin:** an up-to-date representation of your operational assets, enabled by IoT

**Connected Devices:** Products with the capability to send information through the Internet

**Smart Devices:** Products with the capability to reduce cognitive load of human beings in some way

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Understanding the IIoT Hierarchy

Data Sources
- Data Historian
- Machines
- Remote Assets

Information
- ERP Integration
- Real-Time Dashboards
- Alerts & Notifications

Knowledge
- Alerts
- Predictions
- Trends

Wisdom
- Rethink
- Reorganize
- Redesign

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Cleansing Existing Data
Historical data accumulated in operating over the years

Hardware and Gateways
Bringing Real-Time Data to the Cloud

Aggregation Presentation & Alerts
Organizing data into usable information and triggering simple actions

Identify trends and patterns
Draw insights into your business processes and convert the information into knowledge

Adapt and Improve Processes
Use the insights to constantly improve your processes, the goal is to mend before anything ever breaks.
Factors that influence your roadmap

Data Collection

IoT Platform

Leveraging IoT

Change Management

Data Ingestion

Historic Data
- Accessing the large volume of data siloed in your historians.
- Cleansing and reformating it
- Migrating historian data to new data-lake
- Maintaining and improving data hygiene.

Real-Time Data
- Selecting IoT Gateway
- Network type (LAN, Wireless, Mesh Network)
- Latency considerations
- Security and Access
- Cloud Integration

Ways to use IoT
- Moving to predictive maintenance from preventive maintenance
- Knowing the issue before dispatching remote service
- Safety and compliance monitoring of your staff
- Closer monitoring of product quality esp. in regulated sectors
- Using IoT data to inform which spares to hold
- Increasing customer engagement
- Turning your product into a service

Leading Change
- Focus on Vision and Metrics
- Maintain Open Dialogue
- Willingly Adapt Your Perspective
- Value Appreciation for the Impact on Employees
- Clarify Expectations
- Provide Continuous Feedback

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ROI factors

- Uptime
- Waste
- Rejections
- Time to Market
- Man Power Savings
- Machine utilization
- Implementation Cost
- Recurring Cost

<table>
<thead>
<tr>
<th>Labor Savings Calculator</th>
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<tbody>
<tr>
<td>Estimated Time Saved Per Employee in mins every work hour</td>
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<tr>
<td>Number of Employees</td>
</tr>
<tr>
<td>Per hour wage in $</td>
</tr>
<tr>
<td>Projected Labor Savings in $ per hour</td>
</tr>
<tr>
<td>Hours of operation per year</td>
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<tr>
<td>Projected Labor Savings in $ per year</td>
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KEY PERFORMANCE INDEXES

<table>
<thead>
<tr>
<th>Project Metrics</th>
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<tbody>
<tr>
<td>Number of Years to complete the Project</td>
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<tr>
<td>Percentage Increase in costs in the year of commencement</td>
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<tr>
<td>Percentage Increase in costs per year during implementation</td>
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<tr>
<td>Total Initial Investment</td>
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<tr>
<th>Post Completion Metric - TCO</th>
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<tbody>
<tr>
<td>Total Per-Device Annual TCO</td>
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<tr>
<th>Post Completion Metric - ROI</th>
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<tbody>
<tr>
<td>Total Per-Device Annual ROI</td>
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<tr>
<td>Total Annual ROI</td>
</tr>
<tr>
<td>Rate of Return on Investment in percentage per year post completion</td>
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<tr>
<td>Time in years to Break Even</td>
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<td>Time to get 10x return in years</td>
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Maintenence Savings - Preventing Catastrophic Failure

Cost of catastrophic failure for critical machine in replacement/repair | $50,000 |
Cost of downtime per critical machine/hr | $1,000 |
Number of hours downtime per failure | $30 |
Avg. no. of critica failures/year | $2 |
Projected Operational Savings in $ per year | $160,000 |
Data Ingestion

**Historic Data**

- Accessing the large volume of data idling in your historians
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**Real-Time Data**

- Selecting IoT Gateway
- Network type (LAN, Wireless, Mesh Network)
- Latency considerations
- Security and Access
- Cloud Integration
What to look for in an IoT platform?

• Integration to your enterprise software (substantial value here)
• Platform flexibility and scalability
• Ability to automate routines
• A configurable hierarchy for your assets
• Intelligent dashboarding for every level of owner
• Access management
• Security
• UI/UX – Less is more
Ways to use IoT

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Willingly Adjust Your Perspective
Show Appreciation for the Impact on Employees
Clarify Expectations
Provide Continuous Follow-up

Source: Kevin J. Sensenig, Ph.D. RODP, Dale Carnegie Training Global Thought Leadership
Engage with Hamiltonian

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