IIoT & Digital Transformation
Payback? Where we are going, we don’t need payback

Presented by:
William Leet
Sr. Offering Management Specialist, Connected DC
Honeywell Intelligrated
William Leet
Sr. Offering Management Specialist, The Connected Distribution Center

**Responsibilities:** support customers with leveraging IIoT technologies for digital transformation for distribution center, material handling and warehouse industries

**Experience:** six years in the building automation and energy management industry working with smart buildings, and two years in the industrial automation industry helping design industry 4.0-enabled machines

**Education:** mechanical engineering,

**When I’m not working:**
road cycling/racing, backpacking, mountain biking, motorcycling
Objectives

• Review barriers to adoption
• Understand and set financial criteria for evaluating IIoT
• Risk and sensitivities for IIoT adoption
• How to quantify benefits and recognize intangible benefits
• Prove it – how to validate financial performance before scaling
IIOT TECHNOLOGY ADOPTION

DIGITAL TRANSFORMATION EXAMPLE

Physical

Analog to digital

New operation, roles, process

New business and customer focus

DIGITIZATION

We digitize information.

DIGITALIZATION

We digitalize processes and roles.

DIGITAL TRANSFORMATION

We transform the business.

POWERED BY POSSIBILITIES.
Asset Health & Predictive Maintenance

- Geometrical alignment – before commissioning
- Changes in vibrations – 1 to 9 month
- Particles that can be detected by oil analysis – 1 to 6 month
- Audible noise – 1 to 4 weeks
- Heat (by touch) – 1 to 5 days
- Failure
  - Potential failure
  - P-F interval (potential failure to functional failure)
Vibration Analysis Use Case

- Increase in vibration detected
- Inspection requested
- Inspection uncovered a misaligned gearbox
- Issue corrected with no long-term damage
What Are CEOs Saying About Digital Transformation?

Business senior leadership’s adoption of IIoT

<table>
<thead>
<tr>
<th>STRATEGY – Digital is a leadership priority.</th>
<th>% of respondents who “agreed” or “strongly agreed”</th>
</tr>
</thead>
<tbody>
<tr>
<td>53</td>
<td>53</td>
</tr>
</tbody>
</table>

We have a strategy for how digital will enable competition.

<table>
<thead>
<tr>
<th>EXECUTION – Digital strategy is translated to specific initiatives.</th>
<th>% of respondents who “agreed” or “strongly agreed”</th>
</tr>
</thead>
<tbody>
<tr>
<td>29</td>
<td>29</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>RESOURCES – We have sufficiently skilled resources.</th>
<th>% of respondents who “agreed” or “strongly agreed”</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>30</td>
</tr>
</tbody>
</table>

A majority of business leaders say digital transformation is a priority, but few define any strategic vision or actionable goals.

Source: McKinsey analysis 2016
Currently, I don’t have an IIoT initiative. 20%

I have an IIoT initiative, but no strategic plan or well-defined goals. 46.67%

I have a clearly defined three- to five-year IIoT plan. 26.67%

I have successfully executed against my IIoT plan and demonstrated positive measured results 6.67%
Gartner Hype Cycle for the Internet of Things, 2016

- Embedded Software and Systems Security
- Event Stream Processing
- Machine Learning
- Predictive Analytics
- Low-Cost Development Boards
- IoT Platform
- IoT-Enabled ERP
- Wide-Area IoT Networks
- IoT for Customer Service
- IoT Architecture
- Connected Home
- IoT Integration
- Internet of Things
- Enterprise Information Management Programs
- MDM of Product Data
- Cloud MOM Services
- Operational Technology Platform Convergence
- Smart Lighting
- Asset Performance Management
- Managed Machine to Machine Communication Services
- Data Federation/ Virtualization Tools
- Licensing and Entitlement Management
- Digital Twin
- Edge Analytics
- Digital Ethics
- IoT Business Solutions
- Informatics

Plateau will be reached in:
- Less than 2 years
- 2 to 5 years
- 5 to 10 years
- More than 10 years

As of July 2016

Source: Gartner
© 2016 Gartner, Inc. and/or its affiliates. All rights reserved.
So why are 75% of IIoT projects failing?

✓ We understand the technology
✓ We think it is important
✓ We know there are benefits
✓ Everyone is talking about IIoT
Customer Barriers, per MHI 2019 Study

- Lack of understanding of technology landscape and effects on our business: 27%
- Lack of adequate talent to effectively implement and utilize the technology: 26%
- Lack of a clear business case to justify the investment: 19%
- Lack of access to capital to make investments: 14%
- Unwilling to invest due to economic uncertainty: 11%
- Cultural aversion to risk – waiting until technology is fully proven and established: 10%
- Cyber security and privacy of corporate information / exposure to: 10%
- My company’s technology is functioning well and does not need the innovation: 6%

Figure 14: Barriers to Adoption of Predictive/Prescriptive Analytics Innovations

POWERED BY POSSIBILITIES.
What’s the payback?

Threshold for Project Success

Traditional Project

Hidden Benefits

Visible Benefits

New Technology

leaders in IOT adoption were 75 percent more likely to cite the preparation of a strong business case as a key success factor for their IoT programs.

Without such a vision or value metrics, companies will find it difficult to tie their IoT programs to their business strategies, disrupt obsolete processes, and measure progress toward implementation.

-Mckinsey survey of IoT practitioners 2018
Innovation Process

350 IoT services
Emerging vendors

Awareness → Trial → Works/Doesn't Work

Profit!

No success metric
No measurable progress

No differentiation
Market buzz

Evolving offerings

Awareness → Greater Awareness → Evaluation → Let Market Mature → Evaluation → Further Evaluation

Slow down! I wanna get there, but I wanna get there alive!

No clear vision
No achievable milestone
Not time-bound
Innovation Process

1. Choose a Team
2. Awareness
3. Evaluation
4. Start Small
5. Prove Value
6. Reinvest

“Hortise” Approach
IIoT Market Awareness
Customer Barriers, per MHI 2019 Study

- Lack of understanding of technology landscape and effects on our business: 27%
- Lack of adequate talent to effectively implement and utilize the technology: 26%
- Lack of a clear business case to justify the investment: 19%
- Lack of access to capital to make investments: 14%
- Unwilling to invest due to economic uncertainty: 11%
- Cultural aversion to risk – waiting until technology is fully proven and established: 10%
- Cyber security and privacy of corporate information / exposure to: 10%
- My company’s technology is functioning well and does not need the innovation: 6%

Figure 14: Barriers to Adoption of Predictive/Prescriptive Analytics Innovations
Try Premium. For 30 days.

- Spotify on your mobile
- Enhanced sound quality
- No advertisements
- Offline mode for your playlists
- Take your music abroad
- Unlimited music.

YouTube Premium

YouTube and YouTube Music ad-free. Plus access to all YouTube Originals.

TRY IT FREE

3-month free trial • $11.99/month

ENJOY
3 MONTHS FREE pandora PREMIUM

Amazon Music Unlimited
Any song, anywhere

Start your 30-day free trial
Choosing your IIoT Success Team
Customer Barriers, per MHI 2019 Study

Figure 14: Barriers to Adoption of Predictive/Prescriptive Analytics Innovations
Choose A team

Members of an innovation team:

**Visionary:** someone with clear direction on how and where to innovate

**Motivator/Coach:** someone with the capacity to engage others

**Executor:** someone with ability and resources to affect change
Honeywell Webinar Survey Results

How many people are included in my IIoT team initiative?

- 1: 30%
- 2–3: 40%
- 4–6: 10%
- 7–10: 10%
- 10+: 10%
The Connected Distribution Center

IIoT Success Team

- Adoption Coach
- Software Developers
- Data Scientists
- Tech Support
- IT Support
- Visionary
- Coach/Mentor
- Executors
- Salesperson
- Customer Innovation Team

“66% include external vendors on their IoT planning team” — Forbes Insights
Evaluating Outcomes

Awareness

Choose a Team

Evaluation

Awareness
Lessons from Building Energy
Evaluation

Align benefits with key stakeholders
What Business results can we expect?

<table>
<thead>
<tr>
<th>Average savings from a functional predictive maintenance program</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Return on investment</td>
<td>10 times</td>
</tr>
<tr>
<td>Reduction in maintenance costs</td>
<td>25% to 30%</td>
</tr>
<tr>
<td>Elimination of breakdowns</td>
<td>70% to 75%</td>
</tr>
<tr>
<td>Reduction in downtime</td>
<td>35% to 45%</td>
</tr>
<tr>
<td>Increase in production</td>
<td>20% to 25%</td>
</tr>
</tbody>
</table>


A properly functioning predictive maintenance program can provide a savings of **8% to 12%** over a program utilizing preventive maintenance alone.

Depending on a facility’s reliance on reactive maintenance and material condition, it could easily recognize savings opportunities exceeding **30%** to **40%**.
Benefit Modeling

Total Benefits

Cost Avoidance (Risk)
- Lost Productivity
  - Recovery Costs
    - Materials
    - Labor
    - Third Party Services
  - Downtime Labor Costs
- Reduce Inventory
  - Inventory Carrying Cost
    - Inventory Spend
    - Total Inventory
- Intangible Costs
  - Brand Loyalty (On-time Delivery)
  - Reporting and Manual Data Collection
  - Lack of Innovation
  - Worker Stress
- Preventative Maintenance Spend
  - Materials
- Increased Profit
  - Throughput
- Operational Benefits (Reduce Touches)
  - Bad Gap Reduction
  - No-read Reduction
  - Jam Reduction
  - Mistrack Reduction

Continuous Improvement (Productivity)

Standard returns on CRM

<table>
<thead>
<tr>
<th>Benefit</th>
<th>Return on Investment</th>
<th>Reduction in Maintenance Costs</th>
<th>Elimination of Breakdowns</th>
<th>Reduction in Downtime</th>
<th>Increase in Production</th>
</tr>
</thead>
<tbody>
<tr>
<td>Return on investment</td>
<td>10%</td>
<td>25% to 30%</td>
<td>70% to 75%</td>
<td>35% to 45%</td>
<td>20% to 25%</td>
</tr>
</tbody>
</table>

Example: 3M’s IIoT Project

Minnesota Public Radio reports that 3M staff earlier this year removed over 1,000 clocks from its 400-acre campus, leaving up only a handful in places like laboratories and fitness centers.

The shift recognized that few people need wall clocks any longer, not when the correct time is always available with a glance at their phones— which are generally more accurate than modern mechanical clocks anyway.

The mass removal eliminates the need for 3M to staff a crew of nearly two dozen people, two weekends a year, to reset clocks and replace batteries during 12-hour shifts. It also saves roughly $35,000 a year in the cost of batteries, MPR reports.

3M also noted that the change could reduce potential fall injuries caused by workers climbing up and down ladders a few thousand times a year.

And there are other potential benefits: Researchers at Yeshiva University's Sy Syms School of Business in New York conducted a study in 2014 that found employees were happier and more productive if they weren’t beholden to a clock-based schedule. Even the presence of a clock was enough to hurt employee creativity in their study, The Wall Street Journal reported.

You could give 160 employees iPhones, or 1,900 Fitbits

- Time Accuracy: $6,400
- Labor: $38,707
- Batteries: $35,000
- Additional Functionality: $1
- Creativity: $1
- Happiness: $1
- Medical: $34,294
- Lost Labor: $5,000
- Company EMR: ???

Annual Net Benefit: >$120,000

POWERED BY POSSIBILITIES.
Speed to value

VALUE OF INSIGHT

SPEED OF DELIVERY

Custom API
Machine Learning
Motor Vibration
Historic Trending
Data Accuracy
Alarm Management
Visualization
Start Small to Prove Value

- Start Small
- Prove Value
- Evaluation
- Reinvest
- Choose a Team
- Awareness
Pick a “start small” that is BIG enough to succeed
# Scope: Sortation — Critical Path

| Equipment Type          | Description                                                                                                                                                                                                 | Monitoring: vibration, temperature, run status, product counts and I/O cycle counts                                                                 | Monitoring: vibration, temperature, run status, product counts and I/O cycle counts                                                                 | Monitoring: vibration, temperature, run status, product counts and I/O cycle counts                                                                 | Monitoring: vibration, temperature, run status, product counts and I/O cycle counts                                                                 | Monitoring: vibration, temperature, run status, product counts and I/O cycle counts                                                                 | Monitoring: vibration, temperature, run status, product counts and I/O cycle counts                                                                 | Monitoring: vibration, temperature, run status, product counts and I/O cycle counts                                                                 | Monitoring: vibration, temperature, run status, product counts and I/O cycle counts                                                                 |
|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| Merge motors            | Includes any motors for the recirculation lane (attached with the monitored sortation system) and associated power transfer components such as: meter belts, staging belts, vertical transfer belts, spurs and merge main beds. Takeaway belts for the recirculation lane are attached with the monitored sortation system. | Includes any scanners, dimensioners and scales attached to the monitored sortation system.                                                                                                                  | Monitoring: read and error rates                                                                                                                                                                        | Monitoring: power consumption                                                                                                                                                                        |                                                                                                                                                                                                                                                  |
| Induction motors        | Includes any motors from the exit of monitored sortation system merge to the start of the monitored sortation system.                                                                                         |                                                                                                                                                                                                               |                                                                                                                                                                                                               |                                                                                                                                                                                                               |                                                                                                                                                                                                                                                  |
| Recirculation motors    | Includes any conveyor motors along the recirculation loop from the exit of the sortation system along the path to the entrance of the same sortation system. Not all systems will have a recirculation loop.                                                                  |                                                                                                                                                                                                               |                                                                                                                                                                                                               |                                                                                                                                                                                                               |                                                                                                                                                                                                                                                  |
| Scanners/scales         | Includes any scanners, dimensioners and scales attached to the monitored sortation system.                                                                                                             |                                                                                                                                                                                                               |                                                                                                                                                                                                               |                                                                                                                                                                                                               |                                                                                                                                                                                                                                                  |
| Ambient conditions      | Includes sensors on all monitored control panels described above and a single sensor to monitor conditions of the occupied space inside the building.                                                      |                                                                                                                                                                                                               |                                                                                                                                                                                                               |                                                                                                                                                                                                               |                                                                                                                                                                                                                                                  |
| Sorters                 | Includes any sorter motors. If the system has subsequent sorter systems, it will also include any motors interconnecting the sorters.                                                                       | Monitoring: vibration, temperature, run status, product counts, I/O cycles, key performance indicators and power consumption                            |                                                                                                                                                                                                               |                                                                                                                                                                                                               |                                                                                                                                                                                                                                                  |
| Control panels          | Includes control panels but limited to any control panel associated with the sortation system control and the main sortation system merge.                                                               |                                                                                                                                                                                                               |                                                                                                                                                                                                               |                                                                                                                                                                                                               |                                                                                                                                                                                                                                                  |
Start Small and Prove Value

• Start with an achievable project
• Organize and build out your team
• Define return
• Test technology
Prove it!

1. Choose a Team
2. Awareness
3. Evaluation
4. Start Small
5. Prove Value
IloT Deployment Stages

**STAGE 1**
**VISUALIZATION**
- Graphical UI
- Historical data capture

**STAGE 2**
**INSIGHTS**
- Trend analysis
- Mobile alerts
- Predictive maintenance
- Optimization

**STAGE 3**
**AUTOMATION**
- Work orders and reporting
- Inventory optimization
- Labor optimization

$31,746
Benchmark Performance

$11,789
Vibration Analysis Use Case

✓ Increase in vibration detected
✓ Inspection requested
✓ Inspection uncovered a misaligned gearbox
✓ Issue corrected with no long-term damage

$35,000

Change detected
Gearbox realignment
Drive belt replaced

VELOCITY

ACCELERATION
MEASURE FINANCIAL OUTCOMES

**Results 1-year**
- **Investment**: $145,000.00
- **Net Benefit**: $421,625.53
- **IRR**: 20%
- **NPV**: $276,625.53

**Results 3-year**
- **Investment**: $255,000.00
- **Net Benefit**: $1,545,960.28
- **IRR**: 23%
- **NPV**: $1,290,960.28

**Cash Flow**
- **Cost Avoidance**
- **Productivity Improvement**
- **Subscription**
- **Installation**

**Value**
- **Lost Margin, $428,400.00**
- **Jam Reduction, $11,789.50**
- **No-Right Reduction, $47,158.00**
- **Bad Gap Reduction, $28,294.80**
- **Recovery Costs, $113,312.08**
- **Annual Inventory Costs, $2,430.00**
- **Mistrack Reduction, $24,000.00**
- **Lost Productivity, $6,783.00**
- **Bad Gap Reduction, $28,294.80**

**Value**
- **Lost Margin, $428,400.00**
- **Jam Reduction, $11,789.50**
- **No-Right Reduction, $47,158.00**
- **Bad Gap Reduction, $28,294.80**
- **Recovery Costs, $113,312.08**
- **Annual Inventory Costs, $2,430.00**
- **Mistrack Reduction, $24,000.00**
- **Lost Productivity, $6,783.00**
- **Bad Gap Reduction, $28,294.80**
Reinvest or Scale Success

Start Small → Prove Value → Reinvest → Choose a Team → Evaluation → Awareness

POWERED BY POSSIBILITIES.
Reinvest

Once value is proven, the process can be iterated to scale the benefits or expand to additional features.
Repeat Process to Scale Benefits

Location A
- Asset 1
- Asset 2
- Asset 3

Location B
- Asset 1
- Asset 2
- Asset 3

Location C
- Asset 1
- Asset 2

Location D
- Asset 1
- Asset 2
- New Asset

Future Locations
Key Takeaways

- Choose a partner
- Select a diverse team for success
- Model financial feasibility early
- Align outcomes to team members
- Choose a limited scope that will be large enough to prove value
- Validate findings against financial goals and trial exit criteria
- Repeat process at scale or larger scope
For more information:

Speaker email: william.leet@Honeywell.com

Or visit MODEX Booth #7619