

GLOBAL PRODUCT DATA INTEROPERABILITY SUMMIT 2023

Where's the ROI?

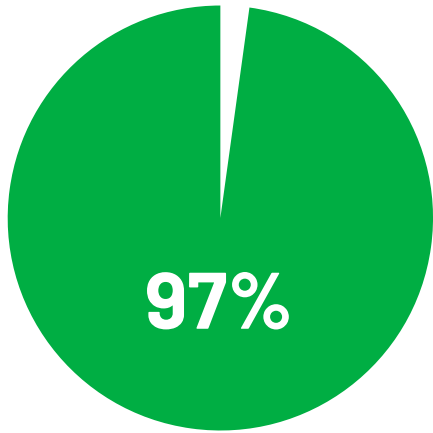
How to Develop Business Cases for Digital
Transformation & Technology Initiatives

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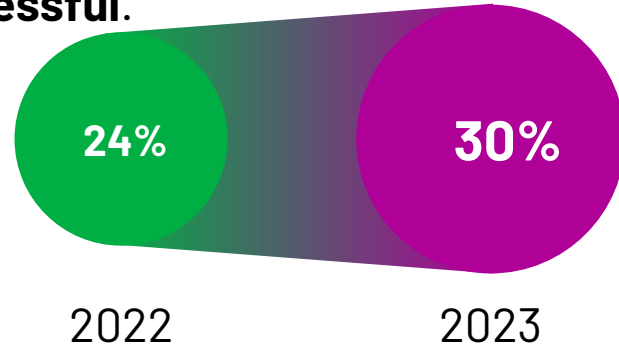
Many leaders don't have what they need

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Using or pursuing adoption of Smart Manufacturing Technologies

30% of leaders feel that their top internal obstacle to meeting business goals is **not having the tools they need to be successful.**



The ideas that get funded are the ones that fund themselves.

-- some CFO (probably)

Articulating and demonstrating ROI is critical for any leader who aspires to have **organizational impact**

Two common metrics for assessing investments

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ROI

Payback Period

Return on Investment (ROI)

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$$\text{ROI} = \frac{\text{Value to the Organization}^*}{\text{Total Cost of Ownership}}$$

Calculated for a given time period
(such as annually)

Money saved by cutting costs
Net new profit

Cost of technology
Cost of integration (amortized)
Operational cost

*Some will argue that the numerator is "Net Value" not "Gross Value", but most executive intuition is aligned with Gross Value

ROI and Payback Period are Related

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ROI

$$\frac{\text{Value to the Organization}}{\text{Total Cost of Ownership}}$$

For manufacturing, ROIs of **>3**
are considered very strong

Payback Period

$$\frac{\text{Total Cost of Ownership}}{\text{Value to the Organization}}$$

Yet many organizations feel **18+**
month paybacks are acceptable

ROI is a better metric than payback period

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- While ROI and Payback Period can both use the same inputs, most often Payback Period uses fewer inputs – ex. Robotic automation accounts only for wage savings, not quality improvement
- ROI enables you to account for the broadest possible impacts of a technology investment on the organization
- Many people find ROI to be more clear: I pay \$1 to save \$3

**Who here has calculated the ROI of
one of your technology investments?**

In manufacturing, calculating ROI is hard

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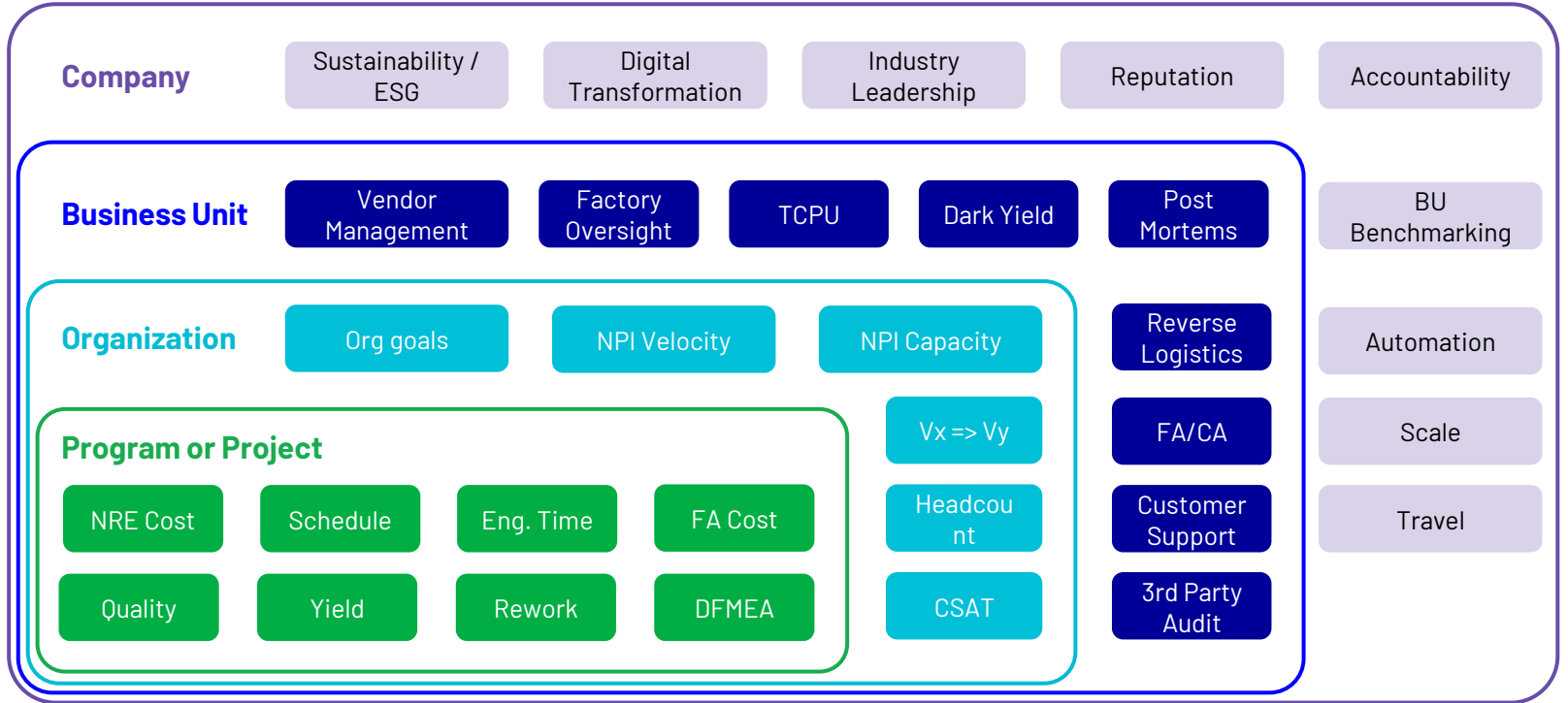
- The person with the problem often has limited access to value data, resulting in value analyses with lower ROIs
- Value information is often siloed throughout the organization:
 - Easy to get process cost or headcount
 - Hard to get return rates and cost of field repair process
- There are hidden costs to change management
- There are a lot more value drivers than many people contemplate

Increase ROI by accounting for greater impact

Never use fewer than three value drivers in your analysis

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Value Drivers



Leverage your leg up!

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Our experience working with both commercial and A&D customers is:

- A&D electronics teams can more easily enumerate the cost of quality and field performance on the business
- A&D teams do more in-house assembly, reducing the muddiness that CM and JDM models create in the analysis

Step-by-Step Playbook

For building business cases that support technology investment and expansion

Playbook for Technology Investment ROI

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1

Build & Present a Business Case

Identify the core value drivers and leverage the business case to justify the investment in a trial of the technology

2

Implement the Proof of Value

Implement the technology where the value drivers are maximized – providing the greatest ability to demonstrate value

3

Update & Re-Present Business Case

Measure realized value and realized costs of ownership to the organization to calculate the ROI and justify expansion

1

Build the Business Case

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Step 1: Identify Relevant Value

Understand your key objectives and future state vision to identify at least *three* value drivers

Step 2: Generate Business Case

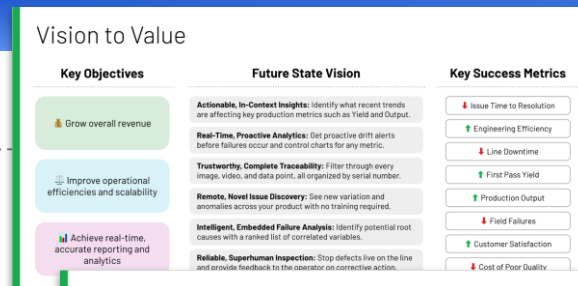
Make simple assumptions to rapidly produce expected dollar savings to ensure ROI is viable

Step 3: Architect the Solution

Identify and price out the investment for both the proof of value and the full roll-out

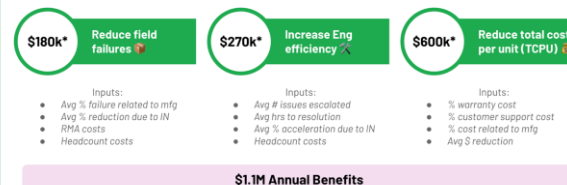
Step 4: Present to Your Leadership

Value, Price, and ROI ready for official review



Future State Benefit Summary

Focusing on three initial value buckets



Future State ROI Summary

Phase 1 Digital Transformation for less than half the cost of an engineer

	Benefit*	Cost**	ROI
Phase 1 Year 1	\$270k Annually	\$63k Year 1	4.3x
Future State Year 1	\$1.1M Annually	\$666k Year 1	1.7x
Future State Subsequent Years		\$298k Subsequent Years	3.7x

Identify 3+ value drivers for
the business

- Expensive in-field repair
- High cost of rework
- Just starting a multi-factory scaleup



1. *Reduce field failures*
2. *Improve First Pass Yield*
3. *Ramp lines faster*

Build a model for each driver: **Improve FPY by [5%]**

NAIVE APPROACH: 1 rework technician headcount

~ \$80K

ANALYTICAL APPROACH: Accounts for impact of smoother operations

Less rework time	⇒ 1 rework technician (skilled) headcount	~ \$80K
Less debug time	⇒ 0.25 debug technician headcount	~ \$15K
Less retest time	⇒ 3% reduction in test operator time across test line	~ \$20K
	⇒ Potential opportunity to reduce test replication	~ \$60K
Fewer issues escalated (\$\$\$)	⇒ 10% engineering team (10) efficiency improvement	~\$150K
Higher effective throughput	⇒ 1% increase in profit	~\$300K

4X
impact

7.8X
impact

Build a model for each driver

Create a detailed spreadsheet to build up the calculations

Which line items will you measure in your POV to determine realized value for the organization?

	Item	Year 1	Description		
Capacity	Number of lines with Instrumental	1	Input		Requires customer input
	Units produced per day	6,000	Input		Educated assumption
	Operational days per year	300	Assumption		Calculated
	Production per line per year	1,800,000	Calculation		
	Total units through Instrumental	1,800,000	Calculation		
Intercepts	Number of monitors running (ref)	20	Assumption		
	% intercepted per monitor (ref)	0.0050%	Calculated		
	% of units intercepted by monitors	0.10%	Assumption		
	# of units intercepted by monitors	1800	Calculated		
	% of units with new discoveries [one-offs]	0.10%	Assumption		
	# of units with new discoveries [one-offs]	1800	Calculated		
	% attribution versus other tests	70%	Assumption		
	Total number of defective units avoided	2520	Calculated		
	Percent that actually fail in the field	50%	Assumption		
	Adjusted actual field failures	1260	Calculated		
Direct Costs	Unit cost	\$200	Input		
	Customer support phone call	\$20	Assumption		
	Product install	\$100	Assumption		
	Reverse logistics	\$25	Assumption		
	Refurbish rate	10%	Input		
	Units that get refurbished	126	Calculated		
	Total Direct cost of single failure	\$345	Calculated		
Total Direct costs	\$391,230	Calculated			
	# engineers involved on a field defect	3	Assumption		
	Hours spent per engineer on investigation	0.25	Assumption		
	Average cost per field defect	0.75	Calculated		

+ ≡ Reduce Field Failures ▾ Improve FPY ▾ Reduce TCPU ▾ Accelerate Factory Ramp ▾ Improve Customer Satisfaction ▾

- Build a one-slide executive summary to take to leadership
- Make your recommendation
- Describe how you will measure the realized value

Executive Summary

💡 Value Hypothesis

By partnering with Instrumental, Company will empower Engineering and Operations teams with modern tools to maximize efficiency, streamline manufacturing processes, and centralize data within one system of record.

The Instrumental platform can extend from traceability to predictive analytics, enabling engineers to identify quality changes, manufacturing trends, and predictive failure avoidance.

🔑 Key Objectives

- Grow overall revenue
- Improve operational efficiencies and scalability
- Achieve real-time, accurate reporting and analytics

Uncover up to:

\$1.1M

Annual Steady-State Gross Benefits:

- Reduce field failures - **\$180k**
- Increase engineering efficiency - **\$270k**
- Reduce TCPU - **\$600k**

2

Implement Proof of Value



- **Upgrade POCs into POVs.** A Proof of Concept demonstrates how a technology functions; a POV demonstrates how much value a technology provides
- **Put the POV where it hurts most.** Select a high-visibility problem area to maximize results
- **POVs do not need to be ROI-positive.** The business case is what matters, not the NRE for the POV
- **Assess Cost of Ownership.** Update assumptions for integration and operational costs
- **Add more value drivers.** Expand your value drivers as necessary to fully capture total organizational value

2

Proof of Value Example

\$10B INDUSTRIAL ELECTRONICS LEADER



- **Put the POV where it hurts most.**
 - Implemented Instrumental's quality improvement solution on a line with low yield
 - Forgot to consider that upcoming build plan had reduced volume, so didn't capture as much value as intended
- **POVs do not need to be ROI positive.**
 - Due to setup costs, ROI on a 90 day POV was >1 , but <3 .
 - Team presented value at scale – longer duration and more lines to show $>3X$ ROI
- **Add more value drivers.**
 - Discovered influence on the bone pile, an ongoing operational cost \Rightarrow an additional value driver to add to the business case

Step 1: Replace Assumptions with Reality

Leverage your measurements from the POV to turn your Business Case into a Realized Value study

Step 2: Confirm Total Cost of Ownership

Ensure technology pricing, integration costs, and operational costs are accounted for, informed by the POV

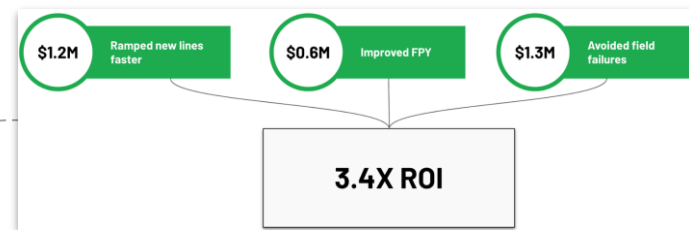
Step 3: Present to Leadership

Present Realized Value from the POV (if relevant), or POV-informed organizational business case for expansion

Step 4: Realize Business Impact

Expand the technology solution

	Item	Year 1	Description	
Time	Number of NPI's with Instrumental	7	Known	Requires input
	Percent of programs with unexpected build	30%	Input	Educated assumption
	Extra weeks req'd for extra build	6	Input	Confirmed
	Probability of Instrumental preventing the build	20%	Assumption	
	Expected additional builds avoided with IN across all programs	0.42	Calculated	



Original value driver: **Eliminate 1000 field failures / year**

ORIGINAL MODEL: Based on service records, we believe we have about 1000 field failures every year

	Item	Year 1
	Adjusted actual field failures eliminated	1000
Direct Costs	Cost for every unit with field issue	\$240
	Cost for replaced units	\$1,050
	Refurbish rate	12%
	Cost per refurbished unit	\$280
	Total Direct cost of single failure	\$1,198
	Total Direct costs	\$1,197,600
Indirect Cos	Total eng cost saved	\$225,000
	Total management cost saved	\$120,000
	Total Indirect Costs	\$345,000
	Total	\$1,542,600

POV RESULT: Technology prevented an escape that impacted 10K units, but management time investment was less

	Item	Year 1
	Adjusted actual field failures eliminated	10000
Direct Costs	Cost for every unit with field issue	\$240
	Cost for replaced units	\$1,050
	Refurbish rate	12%
	Cost per refurbished unit	\$280
	Total Direct cost of single failure	\$1,198
	Total Direct costs	\$11,976,000
Indirect Cos	Total eng cost saved	\$2,250,000
	Total management cost saved	\$160,000
	Total Indirect Costs	\$2,410,000
	Realized Value Total	\$14,386,000

Total Cost of Ownership = Direct Costs + Indirect Costs

Direct Costs to Assess:

- Technology license or CapEx
- Vendor support fees
- Integration fees
- Team costs for setup
- Operator headcount needs

Indirect Costs to Assess:

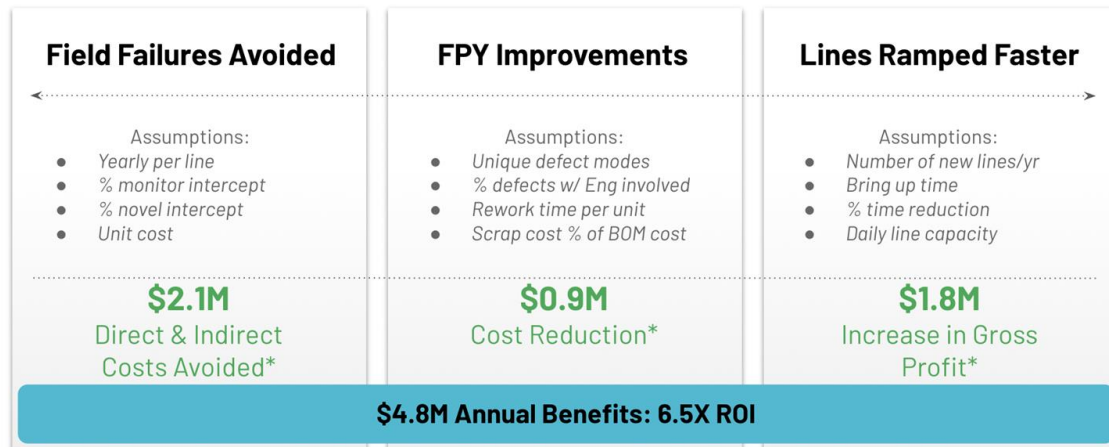
- Line space
- Added cycle time
- Cultural shift & training

Demonstrate your leadership and ability to impact organizational goals

- Build a one-slide ROI summary to take to leaders
- Make your recommendation – to stop, continue, or expand
- Highlight rollout plan and further investment

\$8B INDUSTRIAL ELECTRONICS LEADER

Instrumental Realized Value Results



Key Takeaways for Organizational Visionaries

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- ROI is hard: you won't have all of the numbers off hand – finance may be able to help
- Never have fewer than three value drivers to justify an investment, even if one *seems* sufficient
- Proof of Value, not Proof of Concept
- Look out for unexpected value drivers that arise during POV
- Impacting organizational goals provides you with visibility and can accelerate your career



Speak to an expert about doing your own ROI analysis



Build Better Handbook – a curated collection of knowledge content for Ops and Engineering leaders



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