MT*Connecting*
YOUR Income Statement

David McPhail

President/CEO

Dave Edstrom

CTO

Memex Automation

Advancing Data-Driven Manufacturing

David McPhail

- President and CEO
- 30+ years in manufacturing
- President and Founder of
  - PSI - Process Systems Integration
    - Sold in 2008
- President and Founder of PEC - Process Electric and Controls
  - Sold in 2004

Dave Edstrom

- CTO
- 35 years in computer industry
- Former President and Chairman of the Board of the MTConnect Institute
- Virtual Photons Electrons CEO/CTO
- Sun Microsystems
- Burroughs
- Bureau of Economic Analysis

Manufacturing and Connectivity Buzzword Bingo

- Lean, Six Sigma, Deming Cycle, Hoshian Kanri, insert program of your choice, etc. …. fail to gain real traction due to the inability to link incremental improvement to business profitability

- OPC, MODBUS, BACnet, Profibus, Fieldbus, TCP/IP, SCADA, MQTT, INSTEON, ZigBee, XMPP, OSIAN, Z-Wave, DDS, 6LoWPAN, and AMQP

- No direct cause and effect analysis back to the income statement

$[MC]^2$

Manufacturing Management's Top 10

1. How well is my plant running and making parts?

2. Am I making money?

3. What can I do, more importantly, what *should* I do to make more money (Income From Operations – IFO)?

4. What is holding me back from reaching my best profit potential?

5. Am I optimizing the use of my resources (people, equipment)?

6. What continuous improvement path or Roadmap should I take to improve my performance to maximize profits?

7. Where in the manufacturing operation should I start?

8. What specific activities make the biggest impact to maximize profits?

9. What is the ROI for effort expended?

10. *What if I had the "Holy Grail" and could 'see' the dollar value of my decisions?

What Does A Shop Floor Dashboard Provide?

1. Real-time information on machine OEE Performance
2. Email alerts
3. Machine data is captured for historical reporting
4. Custom reports
5. Advance reporting, such as OEE analysis and data modeling

What Does An Income Statement Provide?

1) Revenue

2) COGS – Costs of Goods Sold

3) Direct Manufacturing Labor Costs

4) Total Expense (General & Administrative, Engineering, Rent, Utilities, Overheads, etc.)

5) Net Income

**CONSOLIDATED MANUFACTURING CORPORATION**
CONSOLIDATED 3 YEAR STATEMENT OF INCOME AND RETAINED EARNINGS
FOR THE YEARS ENDING DECEMBER 31, 2011, 2012, 2013

	31-Dec-11 $		31-Dec-12 $		31-Dec-13 $	
Sales	11,016,000	100.0%	26,503,000	100.0%	33,534,000	100.0%
Cost of Goods Sold	5,460,000	49.6%	6,780,000	25.6%	8,534,625	25.5%
Royalties Paid	304,000	2.8%	2,085,000	7.9%	3,372,000	10.1%
Gross Profit	5,252,000	47.7%	17,638,000	66.6%	21,627,375	64.5%
Operating Expenses						
Engineering / Admin wages	1,090,000	9.9%	2,531,137	9.6%	2,850,787	8.5%
Direct Mfg labor	1,850,000	16.8%	6,100,000	23.0%	7,900,000	23.6%
Sales / Marketing Wages	212,320	1.9%	743,000	2.8%	1,035,000	3.1%
Employee Burdens	97,464	0.9%	358,127	1.4%	458,987	1.4%
Office and General EXP	288,750	2.6%	1,027,000	3.9%	1,132,500	3.4%
Utilities	270,000	2.5%	569,000	2.1%	732,000	2.2%
Rent EXP	377,500	3.4%	597,000	2.3%	629,000	1.9%
Telephone	36,000	0.3%	65,000	0.2%	78,000	0.2%
Insurance	62,000	0.6%	159,000	0.6%	164,000	0.5%
Professional Services	31,000	0.3%	61,500	0.2%	81,000	0.2%
Bad Debt Expense	11,500	0.1%	18,000	0.1%	27,000	0.1%
	4,326,534	39.3%	12,228,764	46.1%	15,109,274	45.1%
Net Income (loss) before other items	925,466	8.4%	5,409,236	20.4%	6,518,101	19.4%
Amotization of tangible assets	122,500	1.1%	310,000	1.2%	285,000	0.8%
Interest and Bank Charges	23,500	0.2%	38,000	0.1%	44,000	0.1%
Interest on L. Term Debt	0	0.0%	0	0.0%	0	0.0%
Repayment of Term Loan(s)	60,000	0.5%	60,000	0.2%	60,000	0.2%
Other Government assistance	0	0.0%	0	0.0%	0	0.0%
Net income before Tax	719,466	6.5%	5,001,236	18.9%	6,129,101	18.3%
Provision for taxes	850,000		3,180,000		3,980,000	
Retained Earnings (Deficit), Beginning of year	0	0.0%	-130,534	-0.5%	4,870,702	14.5%
Retained Earnings end of year	-130,534	-1.2%	4,870,702	18.4%	10,999,802	32.8%

3 Year Income Statement

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Bridging Shop Floor to Financials


Shop Floor
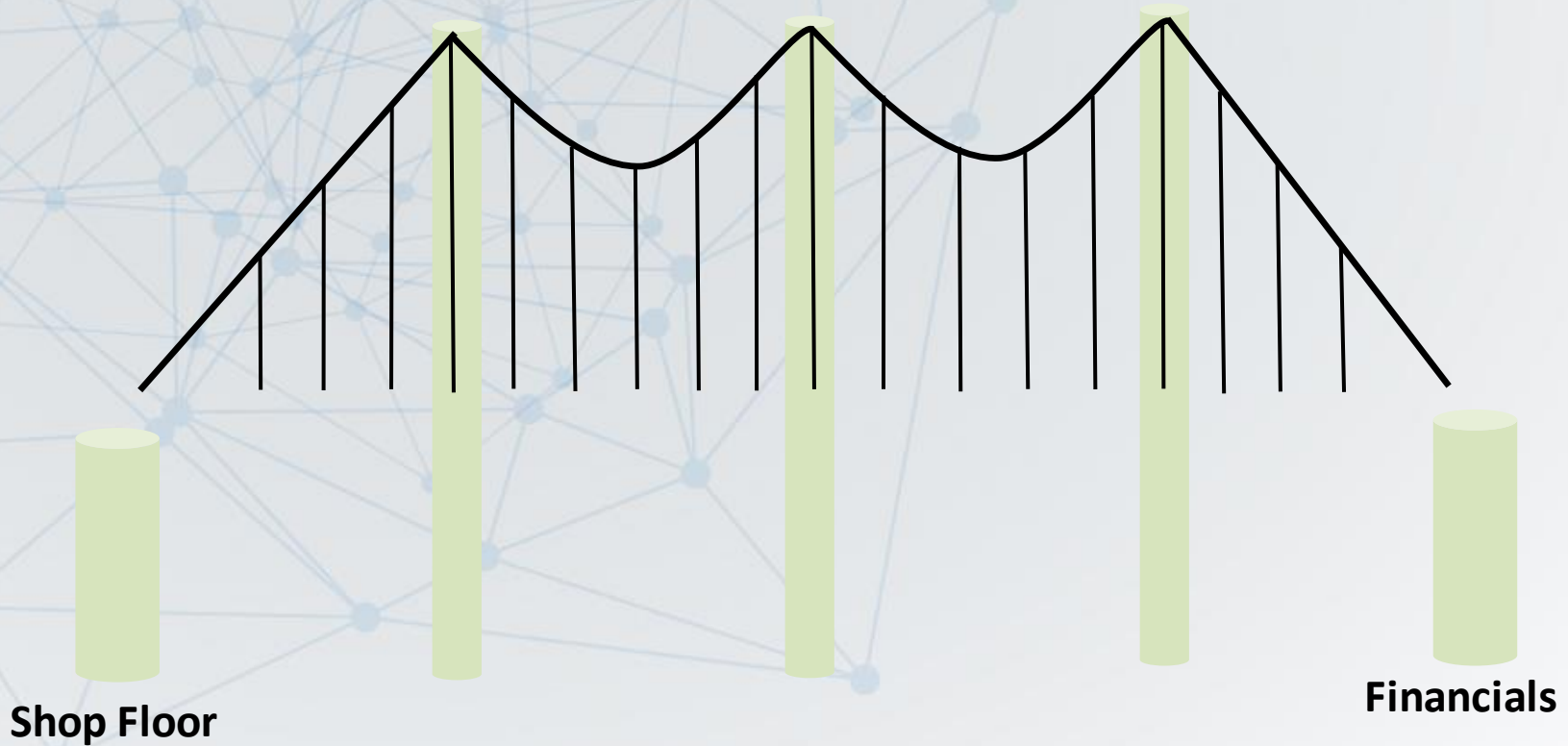
Financials

Challenges Linking MTConnect Data to an Income Statement

1. Data credibility
   - Valid measures (auto-collected) vs. guessing
2. Unit & Machine information for both OEE and Financials
3. MTConnect: capture history in repository
4. Unit cost, LOB Operating expenses by Product
5. The end goal is truly understanding your current profitability vs. performance   (and What Could Be)

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Manufacturing Technology & Operator Input

- Manufacturing equipment - processes generating data
- Operator panel input

Shop Floor

MT/OP
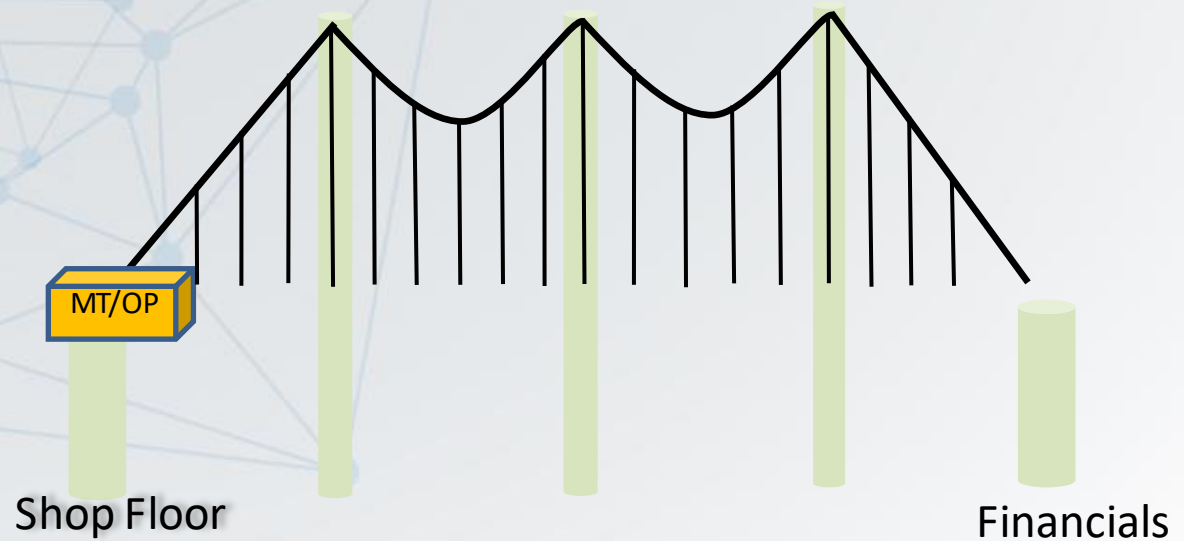
Financials

ERP and Assets

- ERP system to generate financial reporting and job costing (material, labor, operating expense, overhead)

- Income by product, product mix and volume

MT/OP

ERP/Assets

Shop Floor

Financials

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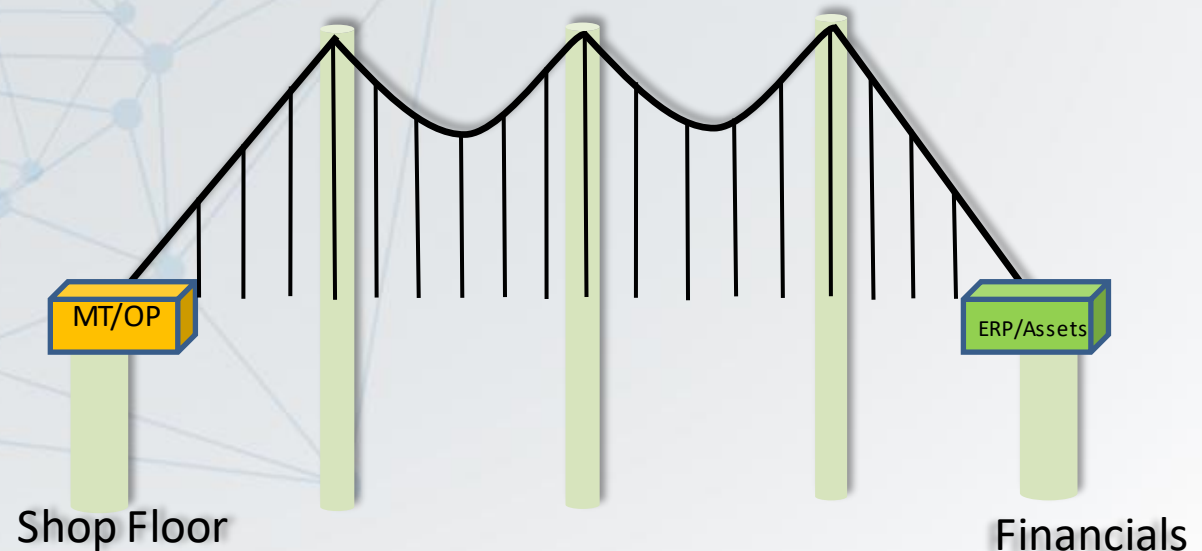
- MTConnect enabling shop/plant machine tools and equipment
- Historical repository
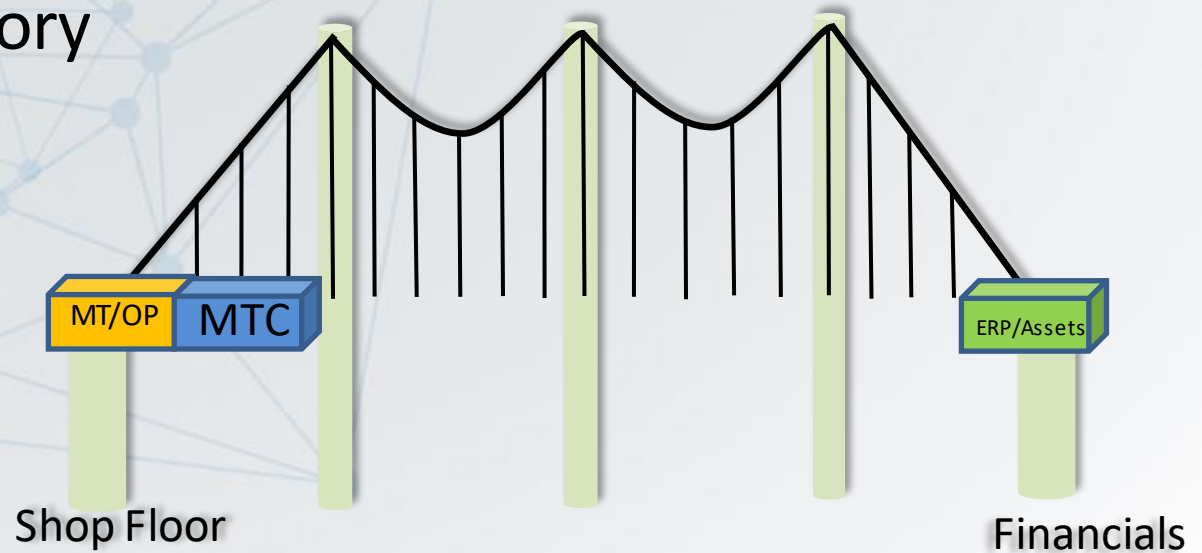
Product and Work Orders

- Product standards and product specific manufacturing data by product and by workstation
- Work orders to be dispatched to the shop floor
- Operator lists to drive operator selection at the MES level
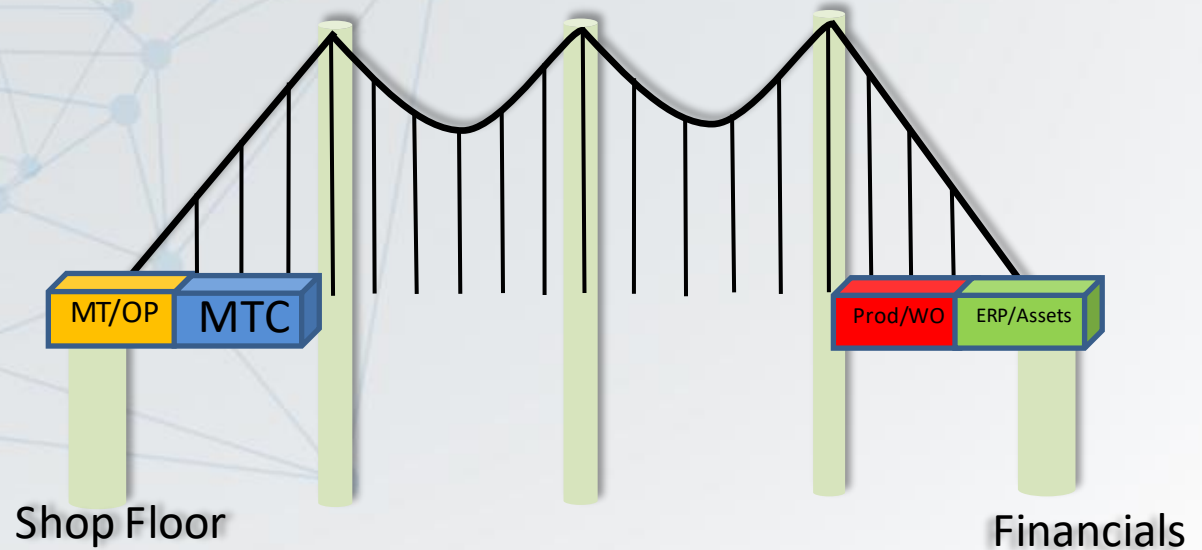
Manufacturing Execution System (MES) & Manufacturing Operations Management System (MOMS)

- MES/MOMS < - > ERP connection (bi-directional)
- Operator input
- Data collected by product (historical info on all products produced)

MT/OP MTC MES/MOMS Prod/WO ERP/Assets

Shop Floor
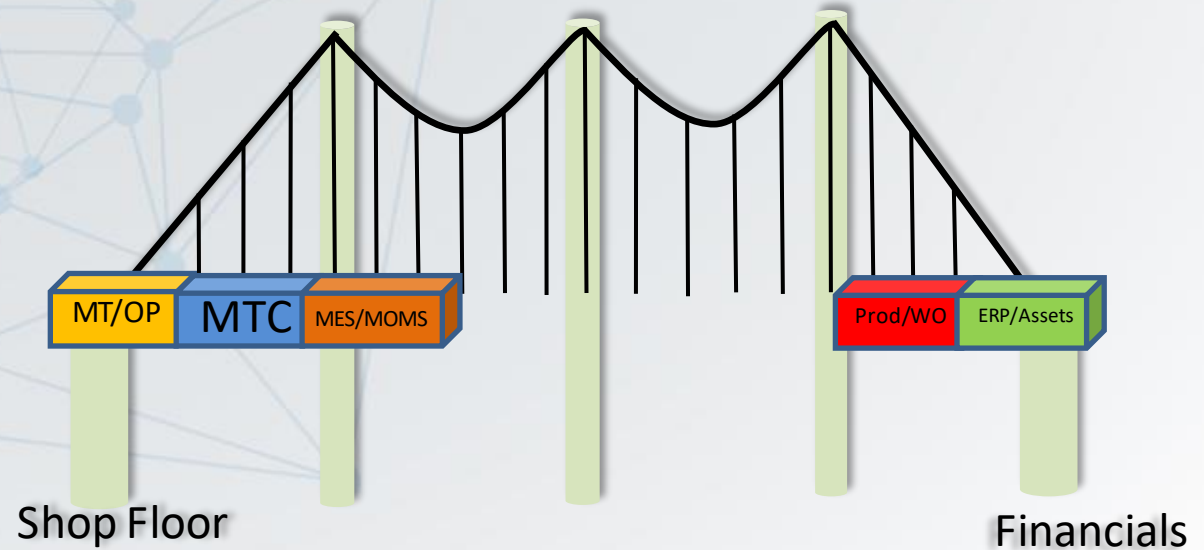
Financials

Shop Application Programming Interfaces

- Integrated core manufacturing processes
- Eliminating silos
- ERP bi-directional connectors
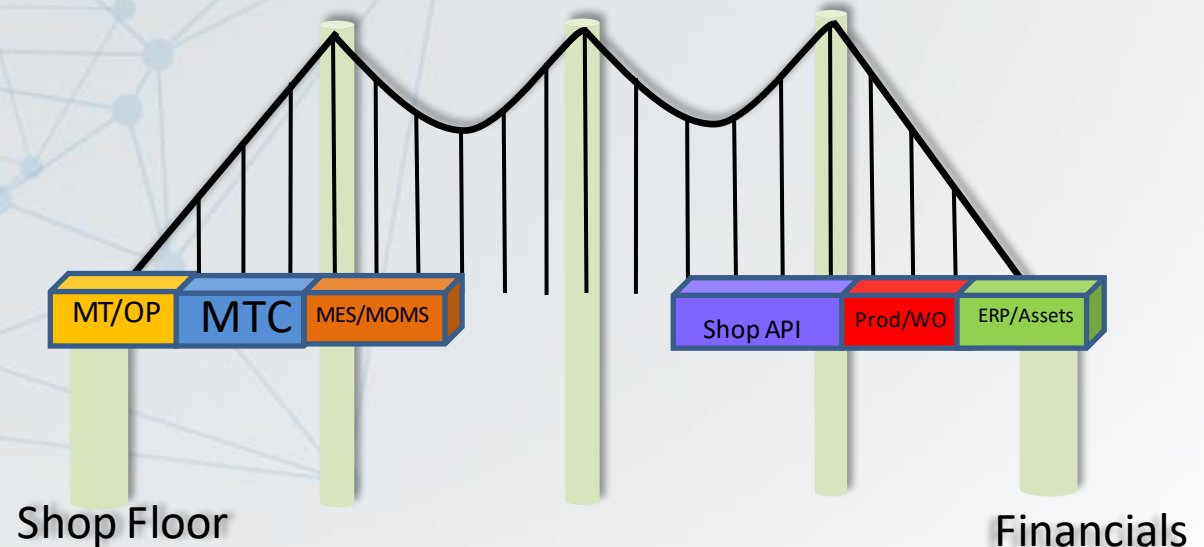
Financial Overall Equipment Effectiveness

- $OEE = Availability \times Performance\ Efficiency \times Quality\ Rate$

- FOEE = ratio of **_Current Profits_** (IFO) at Current OEE relative to **_Theoretical Profits_** at World Class
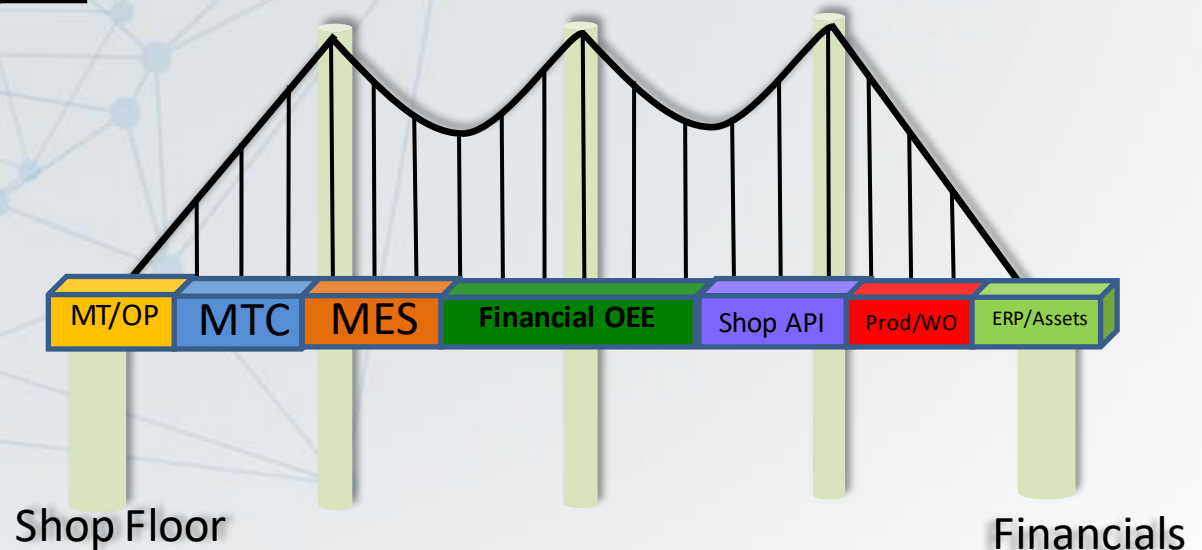
WHY BUILD A FINANCIAL OEE BRIDGE?

- For the first time, you will know the *why* and *where* of profit and loss within your shop/plant
- You will make more profit with the same resources
- You will **now know** the financial cause and effect of future continuous improvement initiatives
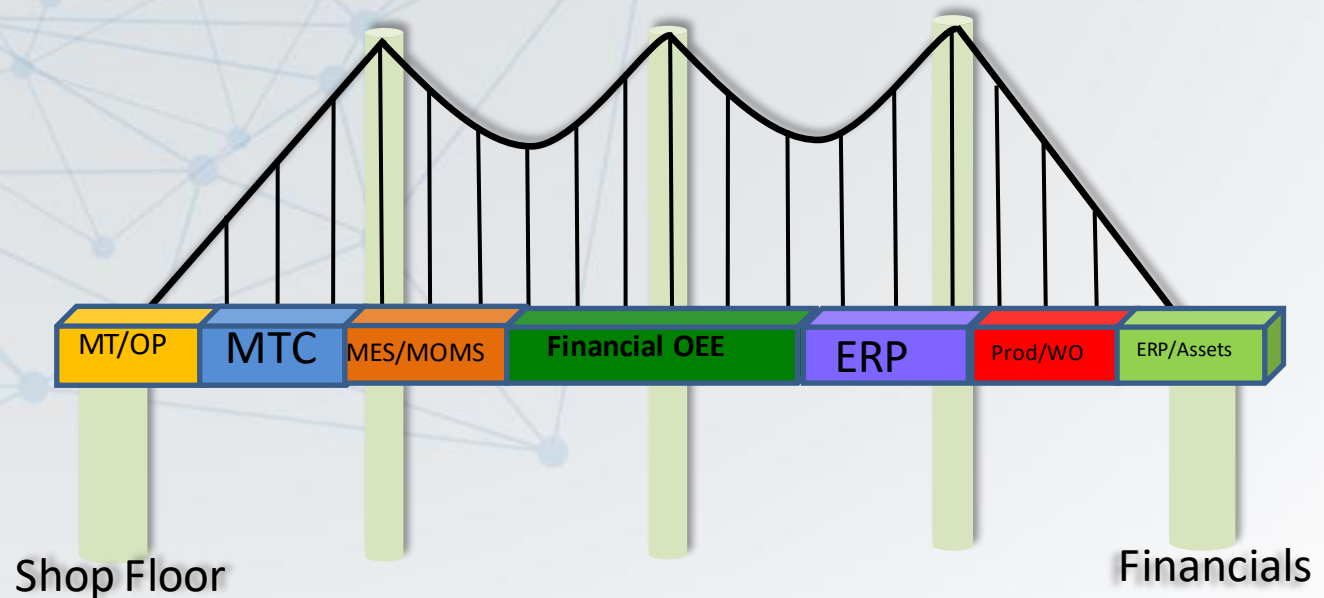
Summary
MTConnect Your Data
To Your Income Statement

- Merge the silos between shop floor and your financials
- Actual Product, Process and Machine Data
- Financial OEE provides a quantitative visual of Profits