Wipfli LLP

Industry 4.0

What is an Industrial Revolution?

A monumental transition in manufacturing that is enabled by the emergence of a new technology.

The fourth industrial revolution: Leveraging advancements in cloud computing and machine to systems integration, 4.0 reprioritizes human involvement towards value-add activities.

The Principal:

Flow

- Waste free manufacturing through perfect transfer of people, materials and information
- Outcomes are predictable, cost-effective, profitable

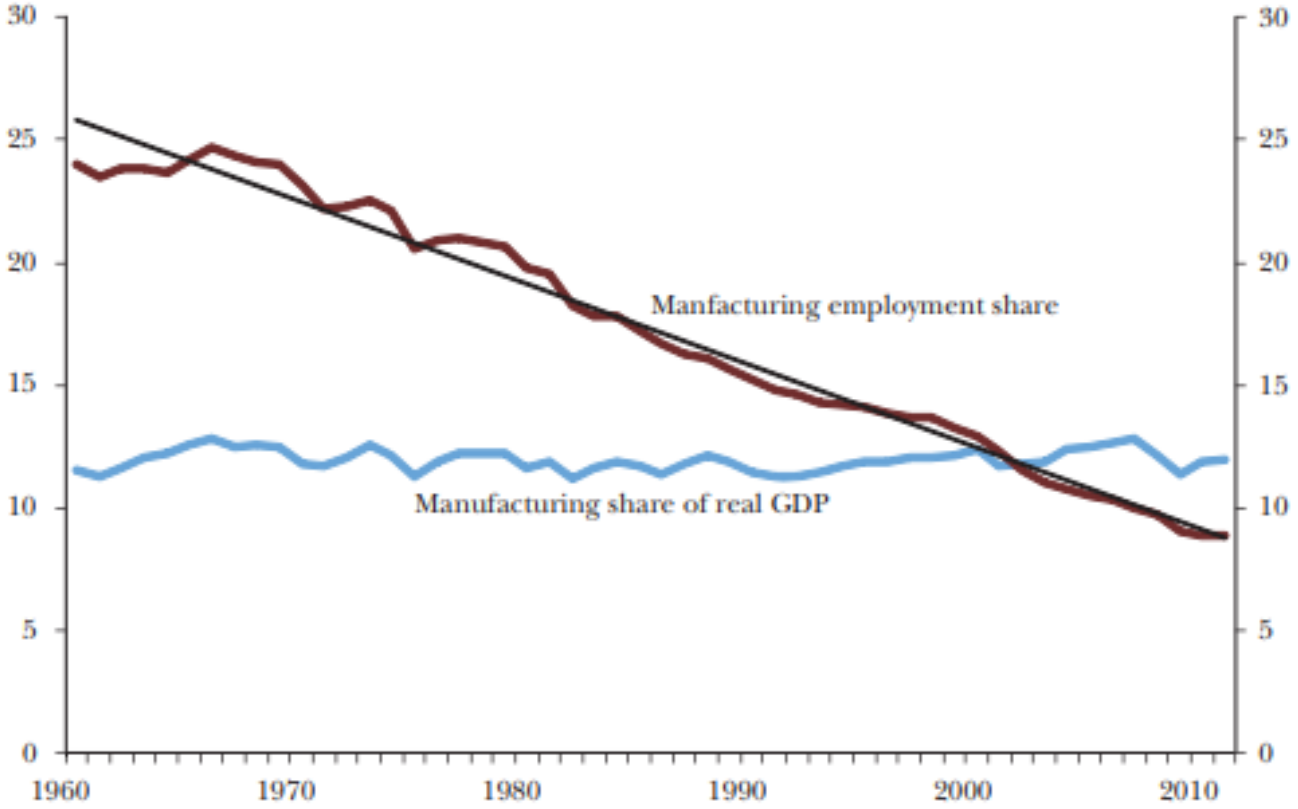
The Problem:

Variation

- What interrupts flow?
  - Procedure variations
  - Equipment variations
  - Material variations
  - Natural variations

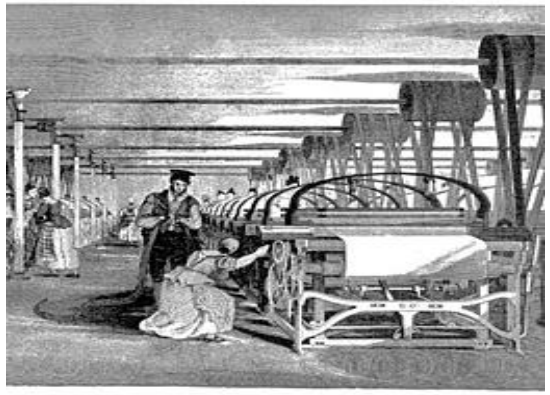
Every revolution achieves the same goal: increase flow, limit variation

U.S. Manufacturing GDP Share vs. Employment Share



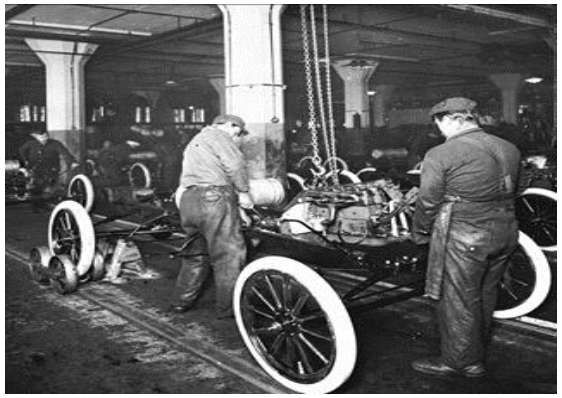
- Manufacturing share of real GDP has been constant for the past 50 years
- Employment share has dropped significantly
- Indicates ever-increasing efficiency

The Four Revolutions



1.0 (1760-1870)

- Steam power
- Mechanization



2.0 (1870-1920)

- Electric power
- Mass-Production

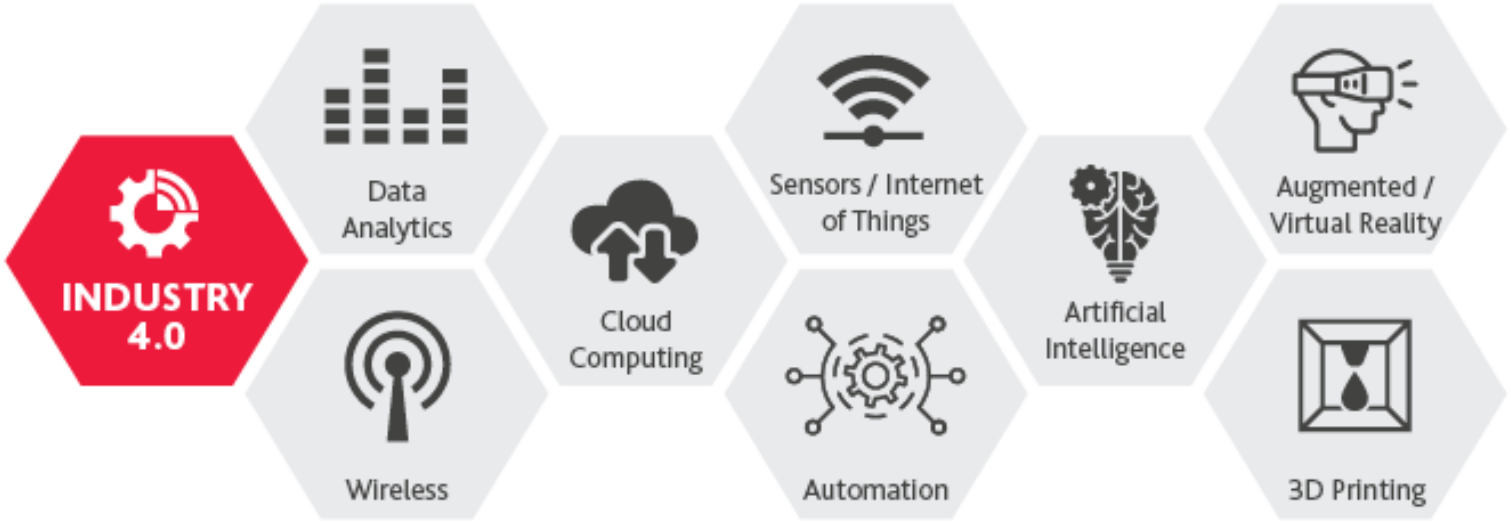
3.0 (1970-2000)

- Computing
- Automation

4.0 (2000-present)

- Cloud computing
- Complex automation

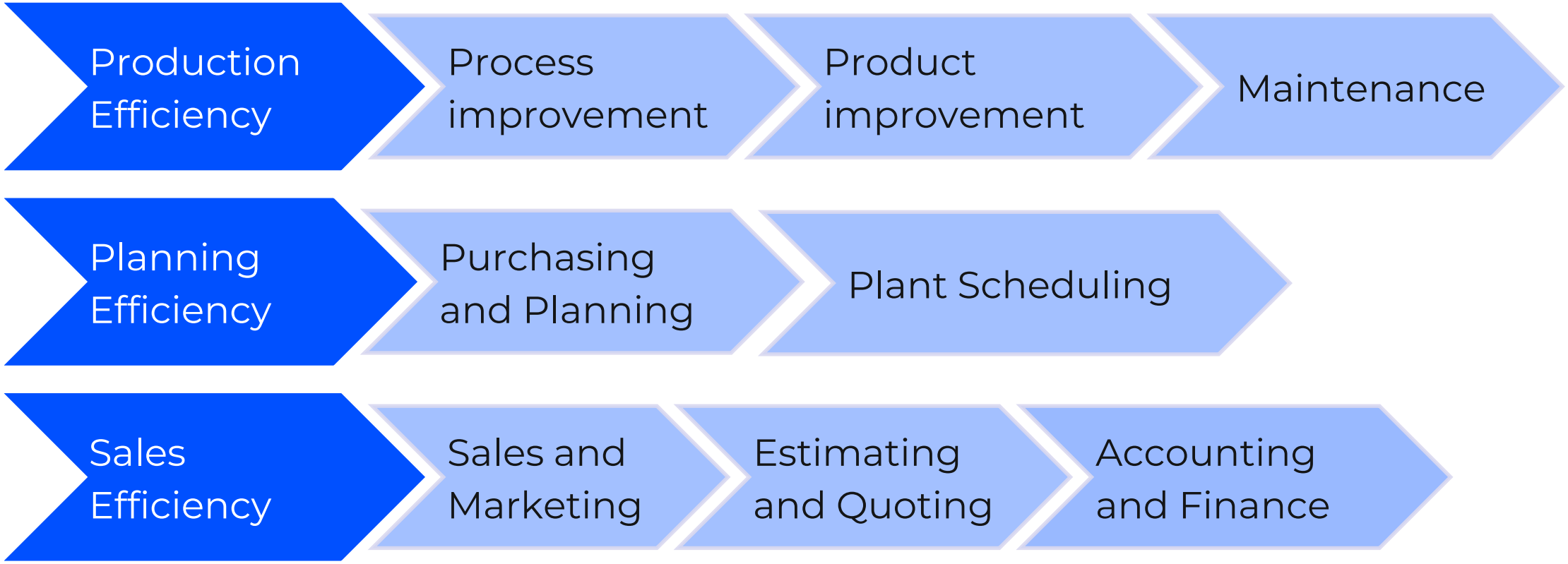
Industry 4.0 Technologies



Industrial Internet of Things (IIoT)

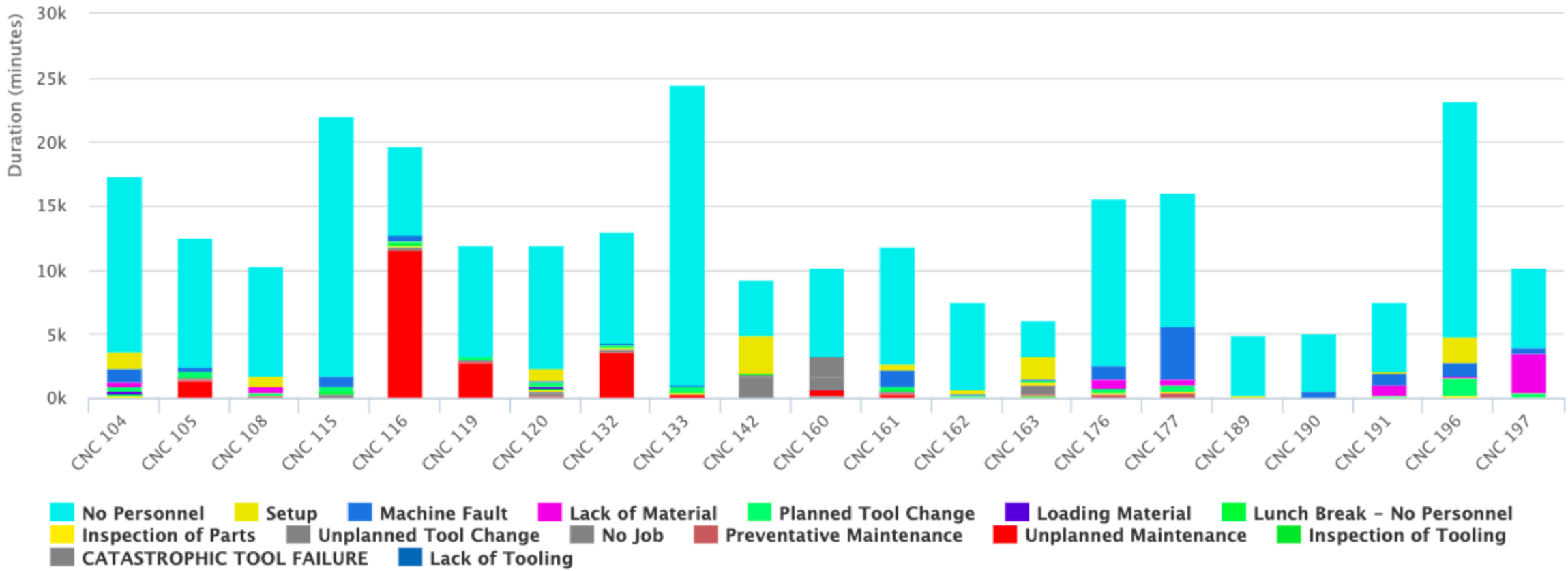
- The internet of things is the concept of connecting any device to the internet and other connected devices. IIoT represents the industrial application of Internet of Things
- In practice, IoT is hardware that uses wireless communication to automatically communicate real-time signals to a cloud database
- Manufacturers use IIoT to learn about the cohesive performance of their operations and predict future variances

Usages of Production Data




machinemetrics
CITIZEN 01
2h · Active
96%
PARTS GOAL
234
PARTS
00390: 9 parts behind
3:30 PM
12:00 AM 11/15
CITIZEN 03
2h · Other
25%
PARTS GOAL
30
PARTS
00499: 90 parts behind
3:30 PM
12:00 AM 11/15
CITIZEN 04
9m · Active
98%
PARTS GOAL
158
PARTS
00427: 3 parts behind
3:30 PM
12:00 AM 11/15
CITIZEN 05
10m · Idle
-
PARTS GOAL
0
PARTS
00405: 144 parts behind
3:30 PM
12:00 AM 11/15
CITIZEN 04
9m · Active
98%
PARTS GOAL
158
PARTS
00427: 3 parts behind
3:30 PM
12:00 AM 11/15
CITIZEN 08
2h · Active
98%
PARTS GOAL
199
PARTS
00678: 3 parts behind
3:30 PM
12:00 AM 11/15
CITIZEN 09
2h · Active
87%
PARTS GOAL
137
PARTS
00552: 19 parts behind
3:30 PM
12:00 AM 11/15
CITIZEN 12
17m · Active
108%
PARTS GOAL
264
PARTS
00310: 21 parts ahead
3:30 PM
12:00 AM 11/15
CITIZEN 13
7h · Setup
-
PARTS GOAL
0
PARTS
00325: 233 parts behind
6:20 PM
12:00 AM 11/15
CITIZEN 12
17m · Active
108%
PARTS GOAL
264
PARTS
00310: 21 parts ahead
3:30 PM
12:00 AM 11/15

Downtime by Machine



SHOP FLOOR OPTICS

Date 1/1/2019 9/28/2019

Customer: All

Assigned Employee: All

Workcenter: All

Part ID: All

To Shop Floor Optics

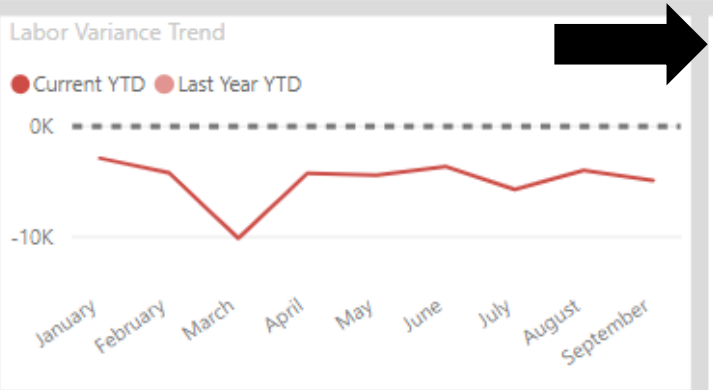
75.63%
Average OEE

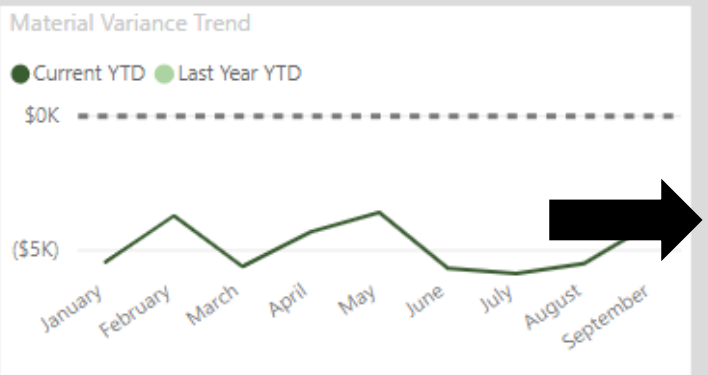
($44,059.27)
Total Labor Variance

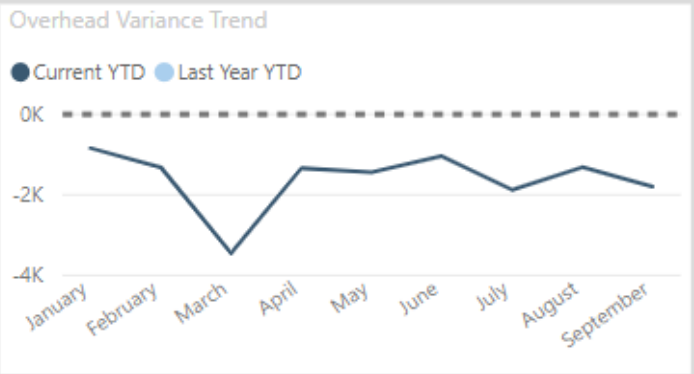
($43,608)
Total Material Variance

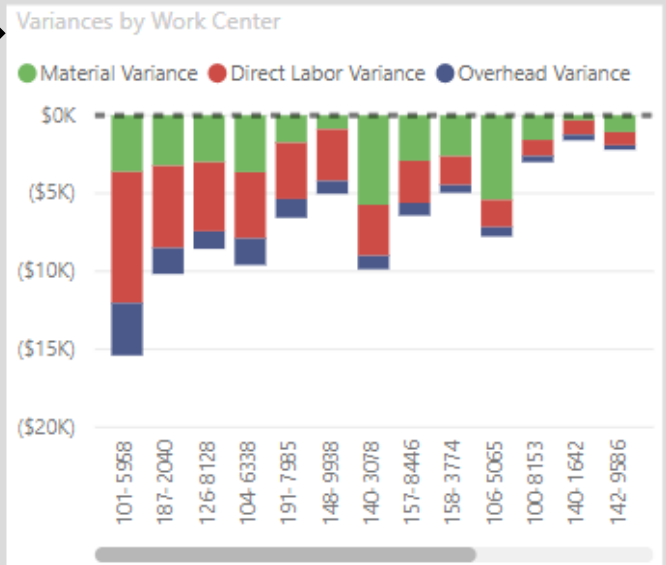
($14,414.74)
Total Overhead Variance

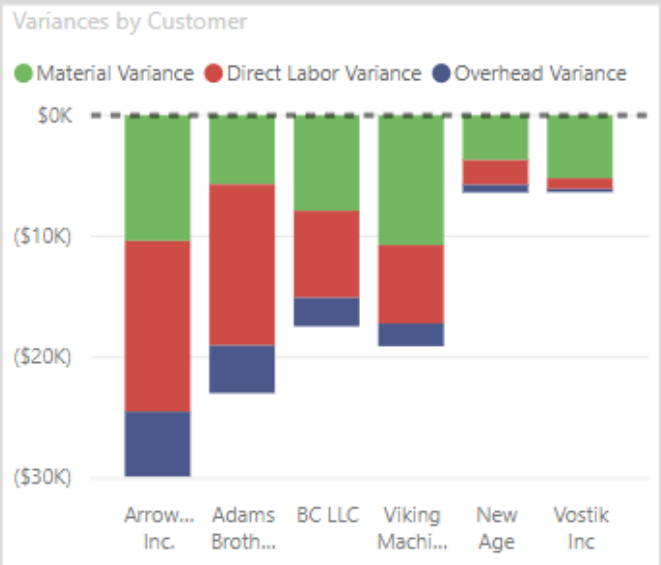
267,668
Total Units Produced

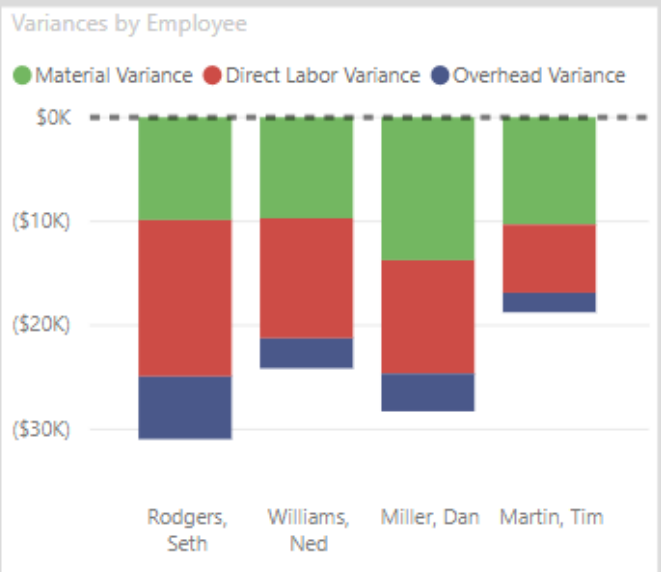


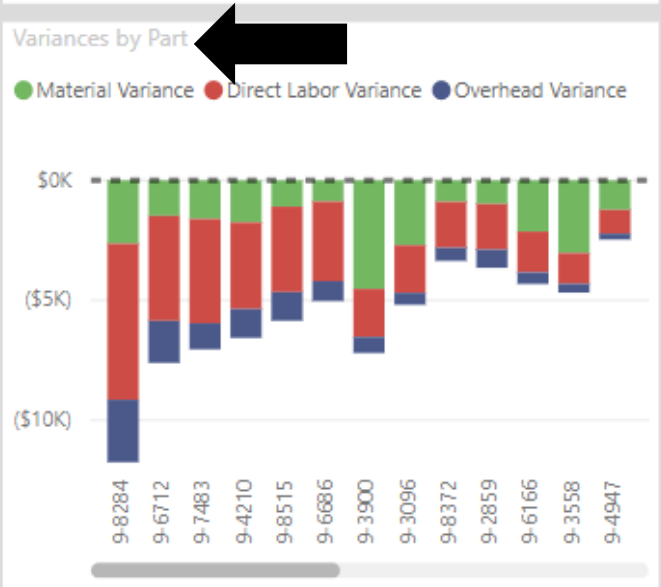




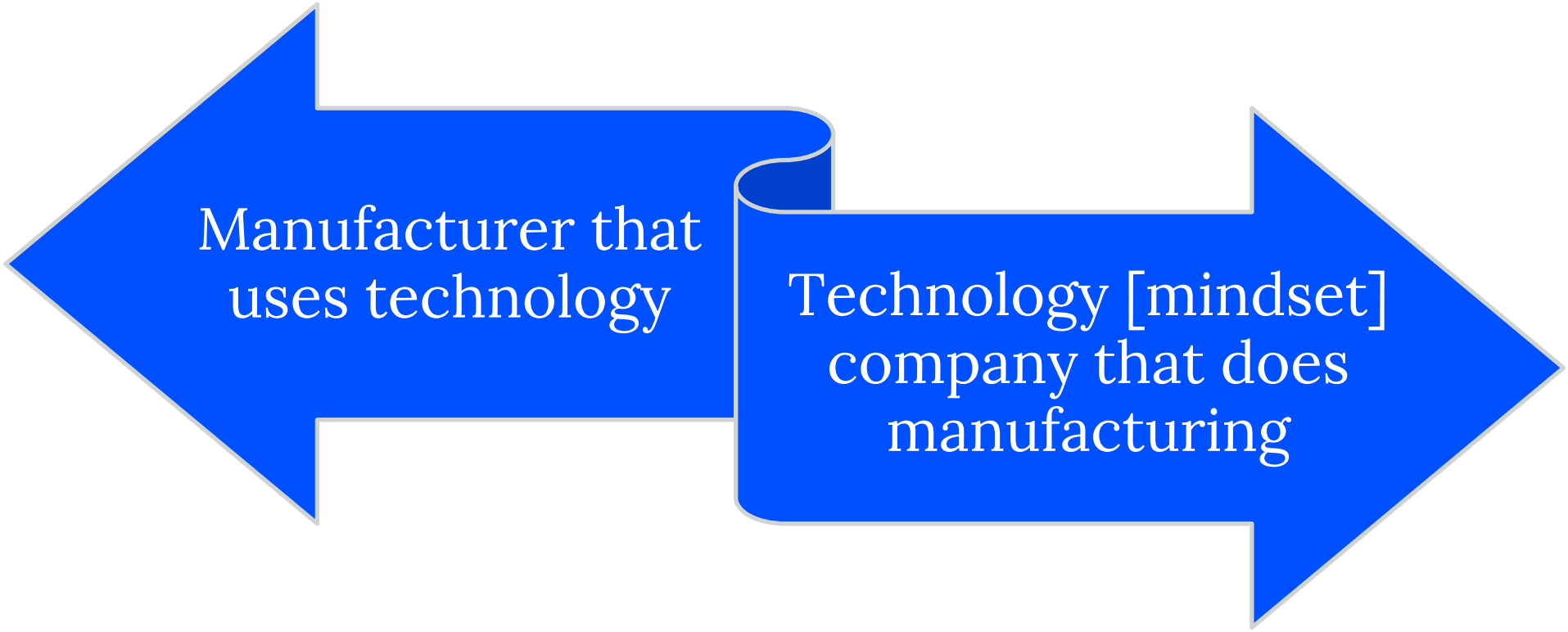




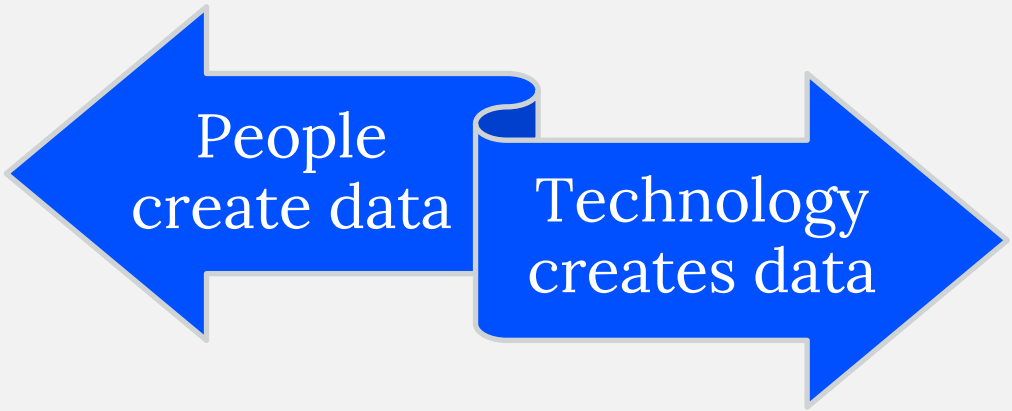




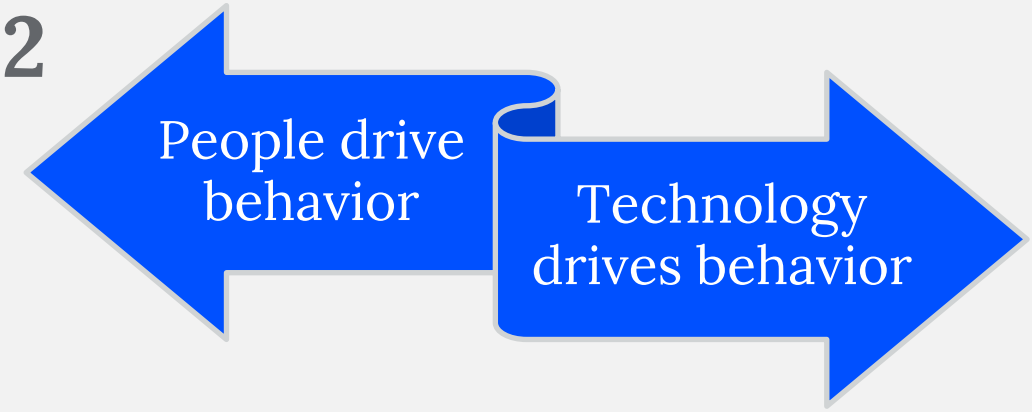
Flipping the Script



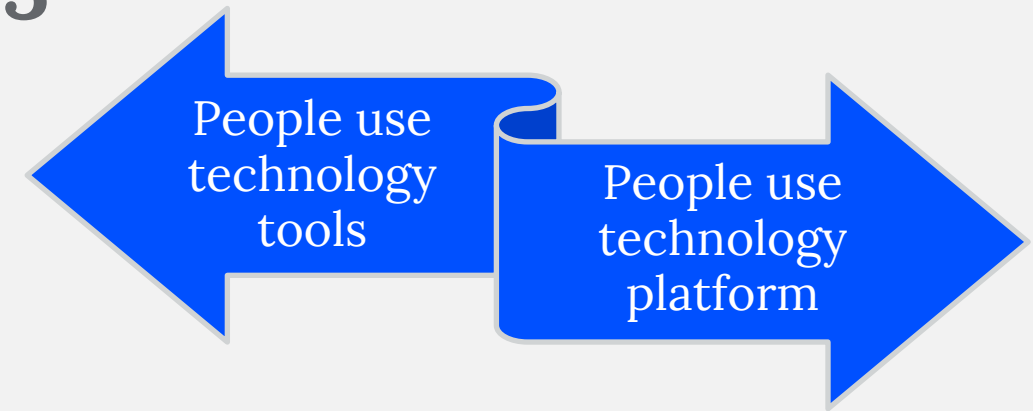
1


People create data
Technology creates data

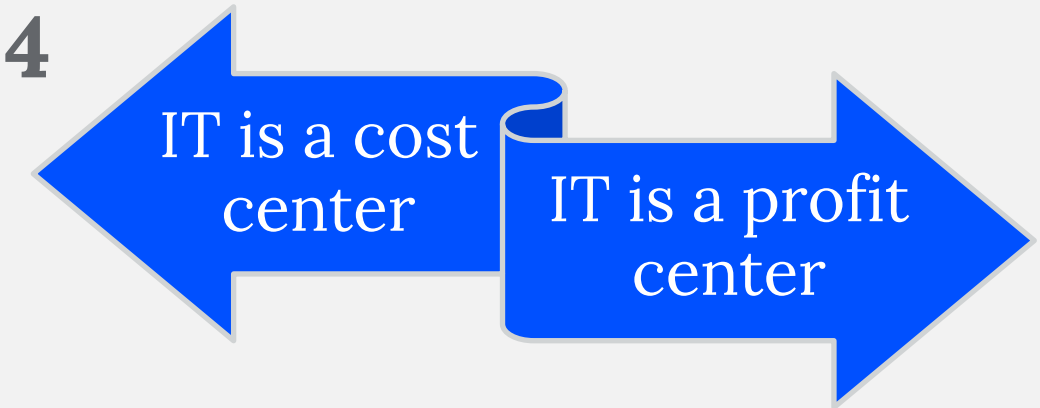
2


People drive behavior
Technology drives behavior

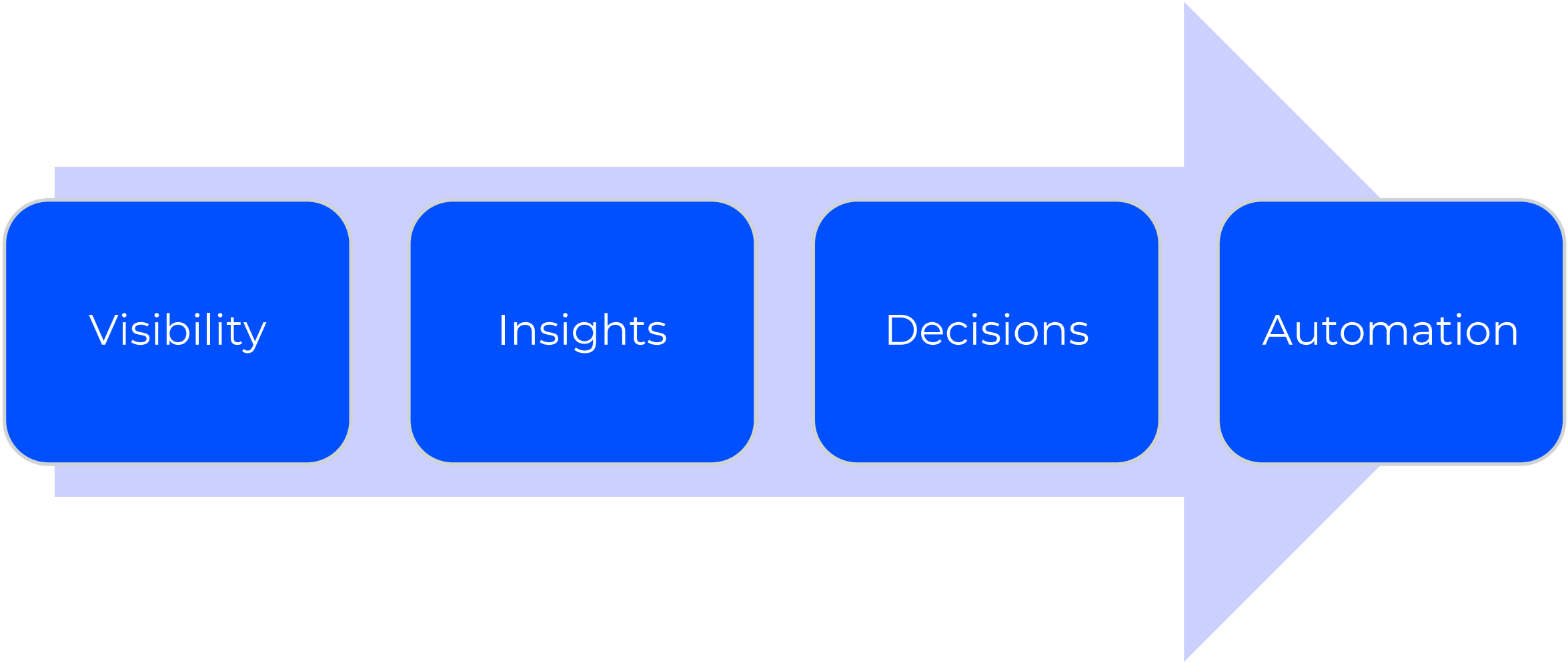
3


People use technology tools
People use technology platform

4

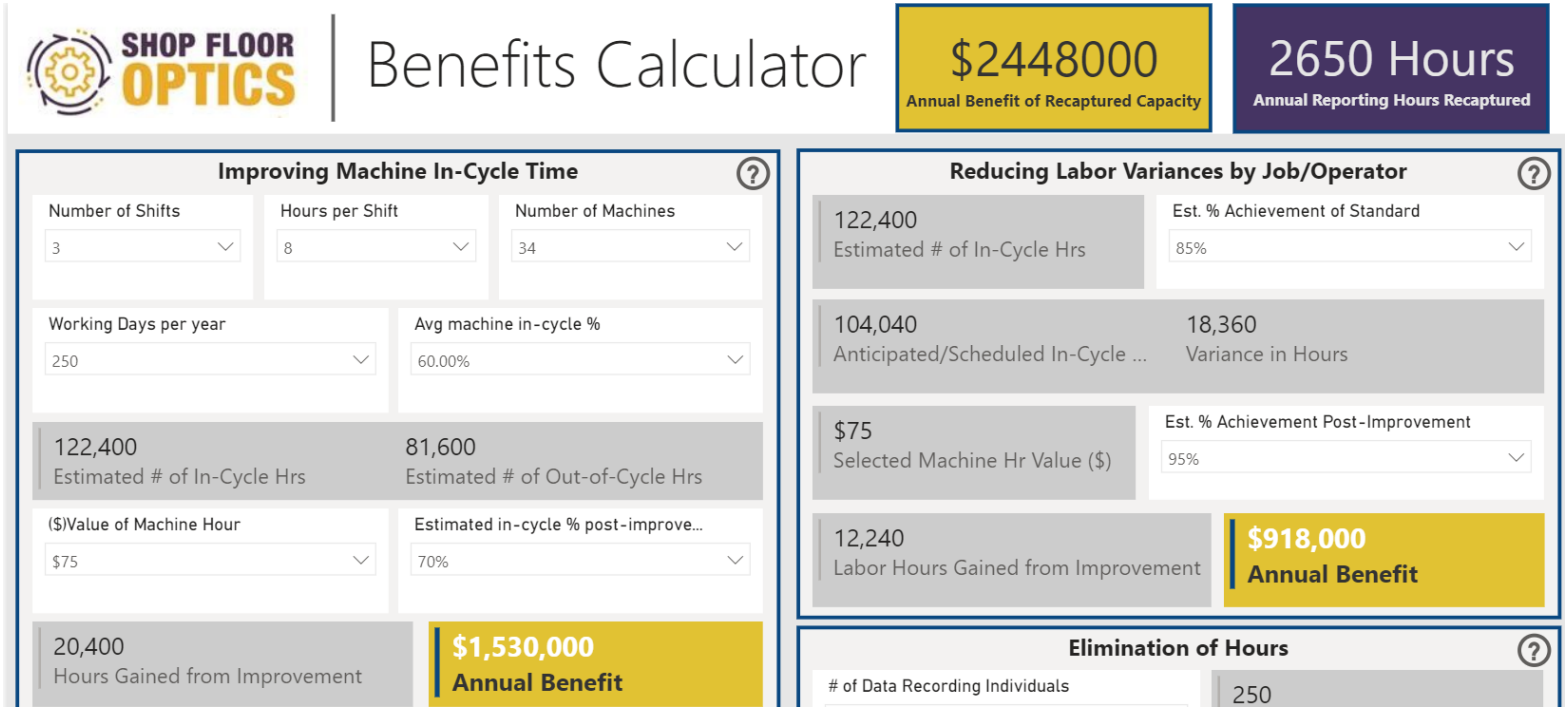

IT is a cost center
IT is a profit center

Key Takeaway



Typical Return on Investment Focus Areas

1) Improving machine in-cycle time
2) Reducing labor variances
3) Reducing material variances
4) Reducing turnover by improving engagement
5) Elimination of data recording and data entry activities
6) Elimination of report gathering activities
7) Improving inventory turnover



Wipfli Case Study

Metals Contract Manufacturer

Value statements

- $100M → $200M company with no additional resources
- Develop managerial habits of statistical analysis
- Create a culture of continuous improvement

Anticipated Return on Investment

- 40 machines, increase average in-cycle time from 45% to 60%
- Improve manufacturing standard attainment from 85% to 95%
- Approximate $5.2M of Annual Benefit

Wipfli Case Study

Plastic Extrusion Manufacturer

Value statements

- What/when/where should we produce product?
- Should we use virgin or recycled material?
- What is our optimal shift staffing pattern?
- Develop managerial habits of statistical analysis

Anticipated Return on Investment

- 35 lines, increase average in-cycle time from 60% to 70%
- Reduce inventory carrying costs by 20%
- Approximate $8-10M of Annual Benefit

5 Common Pitfalls of Scaling Digital Transformation

McKinsey & Company: Capturing the true value of Industry 4.0 (April 13, 2022)

1. Siloed implementation – independent delivery teams decoupled from the business
2. Failure to adapt – deploying one-size-fits-all approach
3. Analysis paralysis – getting stuck early
4. Technology-driven, not Value-driven – decoupled from purpose/value
5. Perfect is the enemy of good – waiting until everything's low cost and low risk

Takeaway: work together around common goals and be flexible with the execution

Questions?