MRC AMT
June 21, 2023

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Making the Leap of Faith to Invest in AMT

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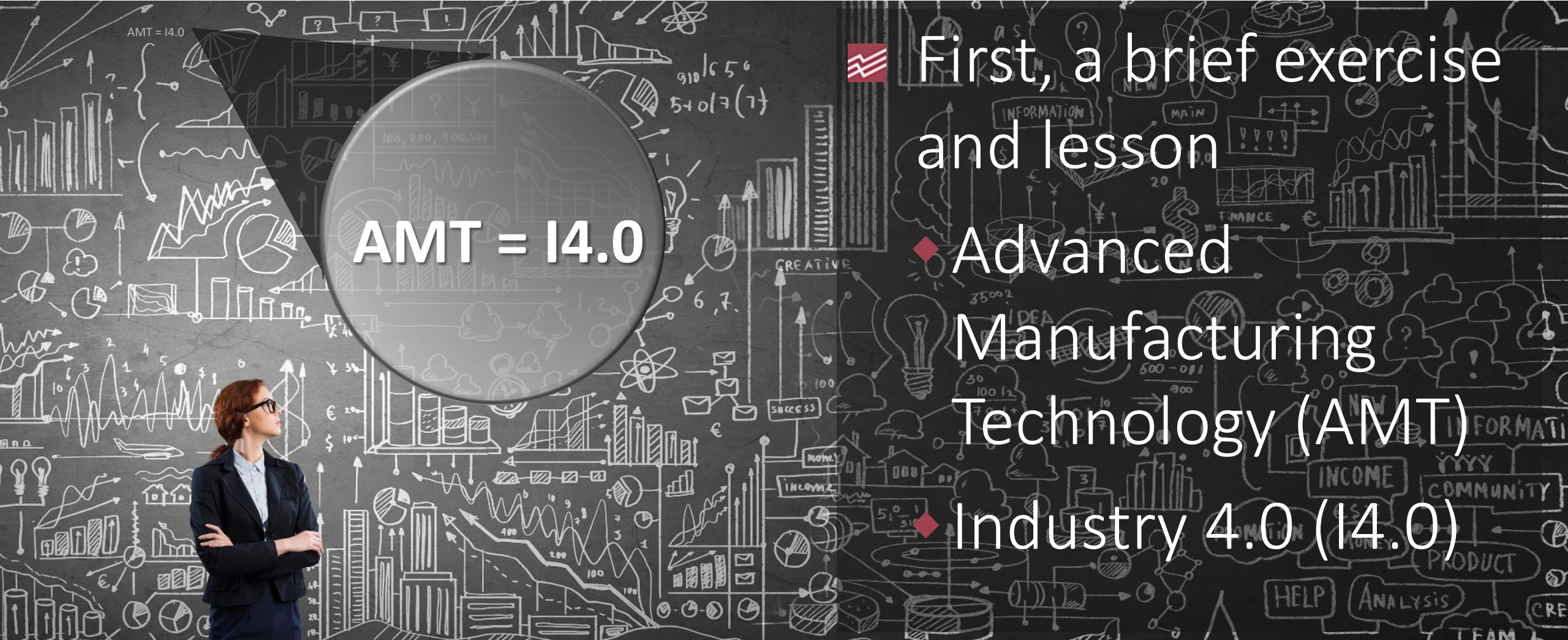linkedin.com/in/shawn-furman-7206302/

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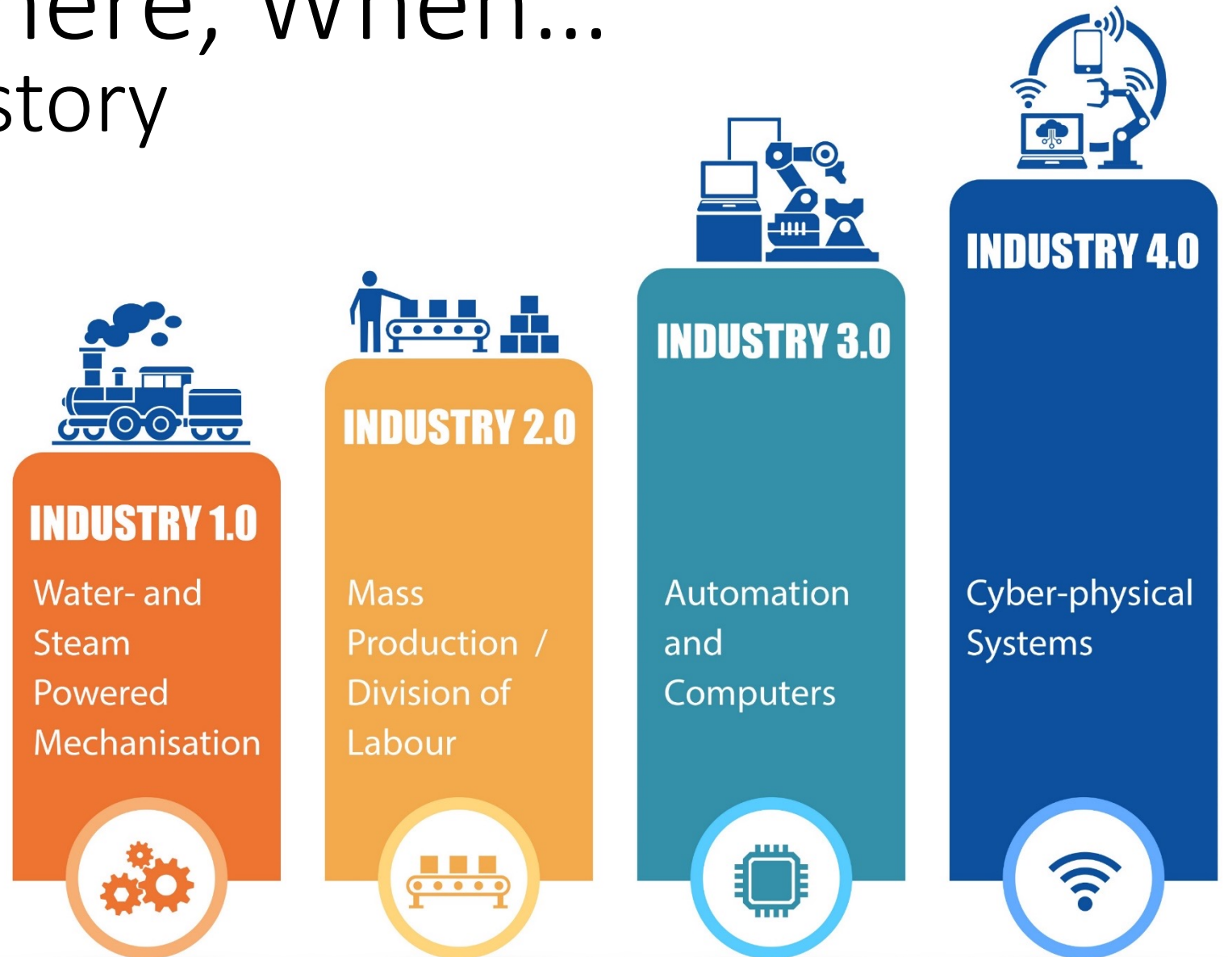# Advanced Manufacturing or Industry 4.0?

AMT = I4.0

- First, a brief exercise and lesson

  - Advanced Manufacturing Technology (AMT)

  - Industry 4.0 (I4.0)

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Who, What, Where, When…
The "Making of History

- 4 industrial revolutions???
  - Klaus Schwab, WEF

INDUSTRY 1.0
Water- and Steam Powered Mechanisation

INDUSTRY 2.0
Mass Production / Division of Labour

INDUSTRY 3.0
Automation and Computers

INDUSTRY 4.0
Cyber-physical Systems

Who, What, Where, When…
The "Making of History

- AMT wheel of 9 categories of technology

Interesting, but…

Big Data & Analytics

Autonomous Robots & Advanced Automation

INDUSTRY 4.0

Augmented Reality

Simulation

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Additive Manufacturing

Horizontal / Vertical System Integration

Cloud Computing

Cyber Security

Industrial Ethernet (Networks)
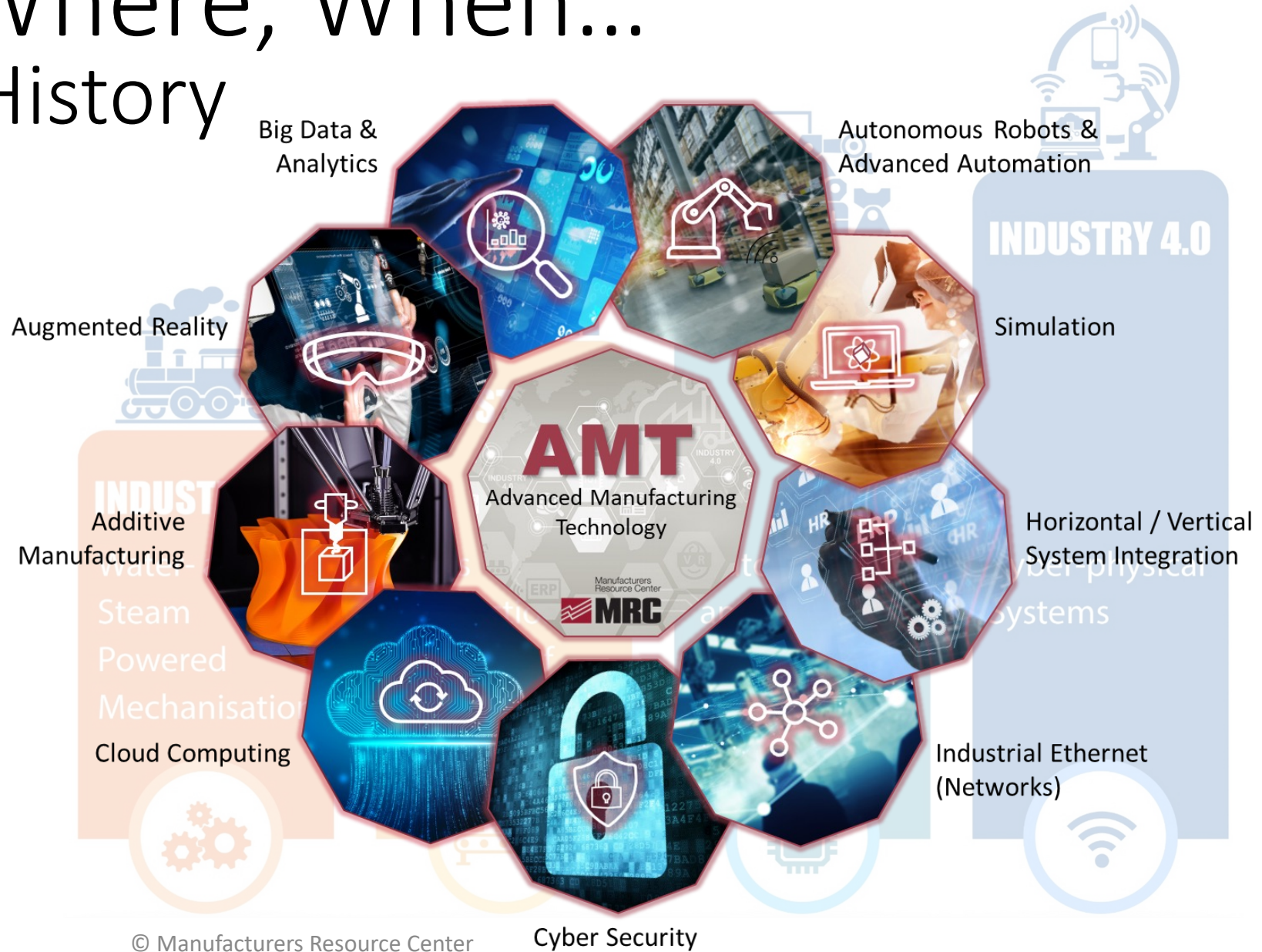
...Why, and How
7 of the 9 categories already exist!
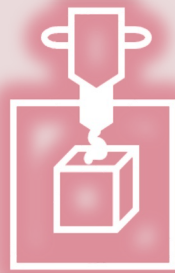
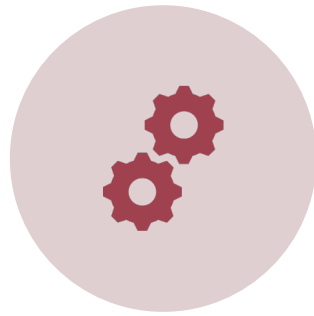| Robotics	Data Collection& Analysis	Industrial Ethernet	Cyber Security	Additive Manu-facturing	Systems Integration	Simulation	Cloud Computing	Augmented Reality
• 1970's	• 1980's	• 1990's	• 1980's	• 1980's	• 1990's	• 2000's	• New	• New

…Why, and How

Improved Integration Between Categories to Further Drive Action

Development of Tools And Standards to Make Solutions More Robust And Simpler to Implement
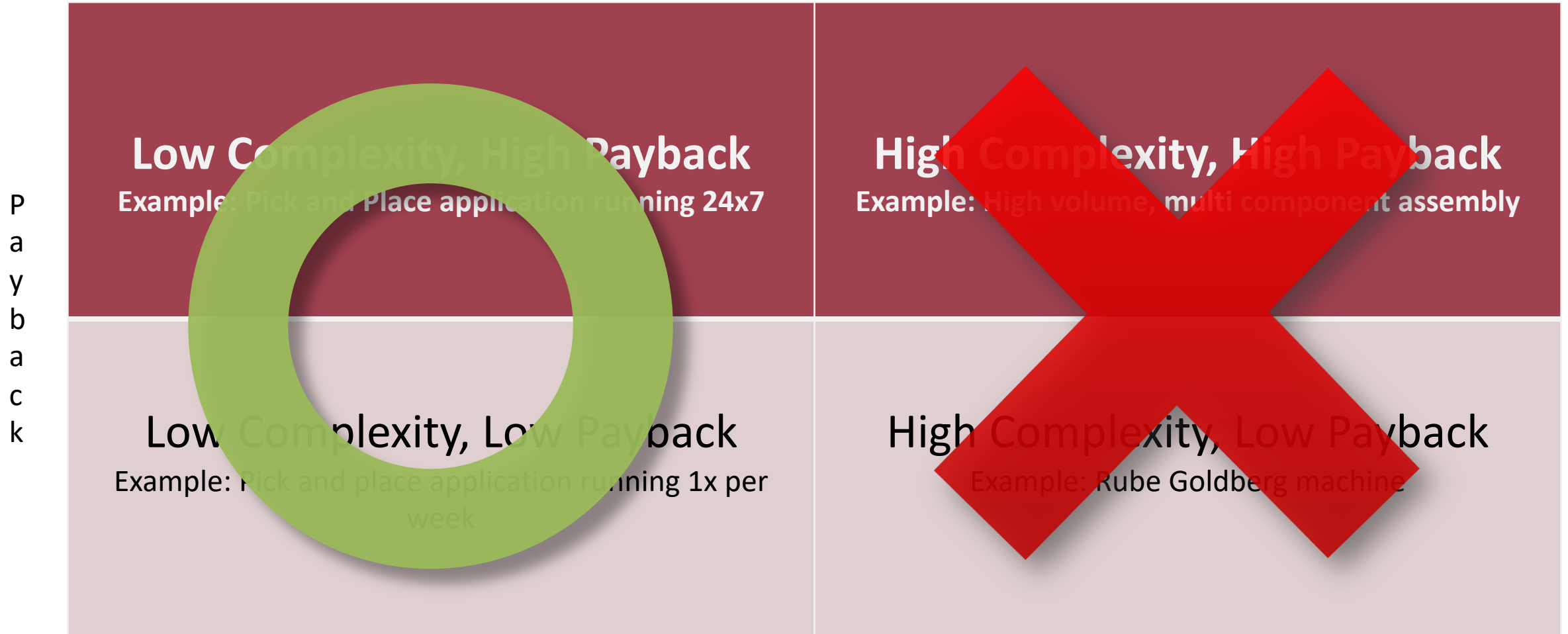
More Collaboration Between Service and Tech Providers

Captures Multiple Technology Solutions Into a Collection That is Continuing to Improve

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Where Do You Start?

Low Complexity, High Payback
Example: Pick and Place application running 24x7

High Complexity, High Payback
Example: High volume, multi component assembly

Low Complexity, Low Payback
Example: Pick and place application running 1x per week

High Complexity, Low Payback
Example: Rube Goldberg machine

Payback

Complexity

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The Challenge to Help Lucy and Ethel

No unwrapped candy leaves the workstation

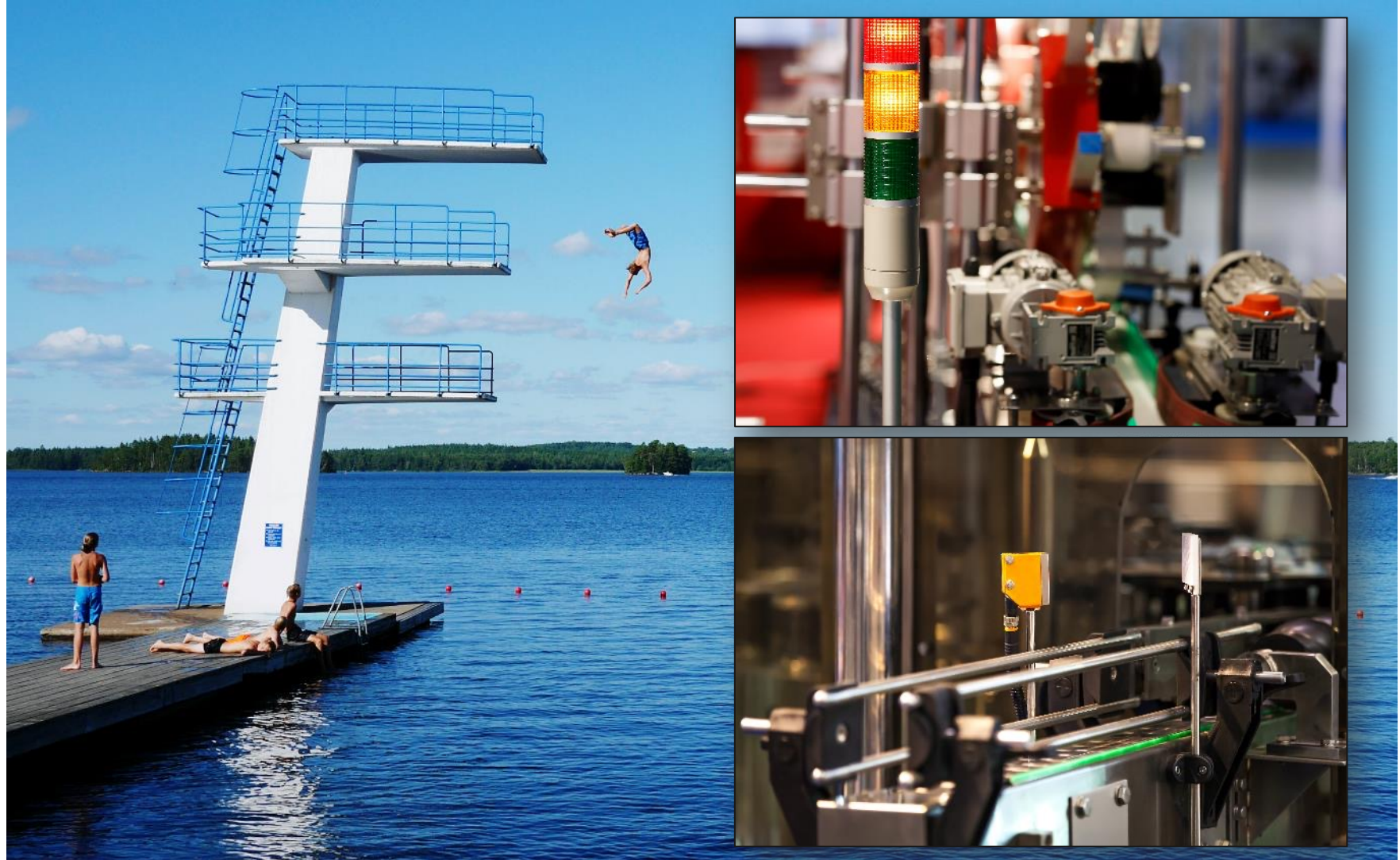**Improve food safety**

Improve safety

No added waste

No headcount reduction

AMT Scenario 1 to Help Lucy and Ethel

Jumping from the dock

- Stop the line when a piece is missed - Andon
- Slow the line down – visual to upstream ops
- Smart photo eye for color detection
- Reject system to capture unwrapped pieces into rework bin

AMT Scenario 2 to Help Lucy and Ethel

Jumping from the platform

- Automatic wrapping machine with missing wrap detection running 10x faster than Lucy and Ethel
- Built to the finest machine and safety standards
- Easily cleanable
- Where do Lucy and Ethel go?
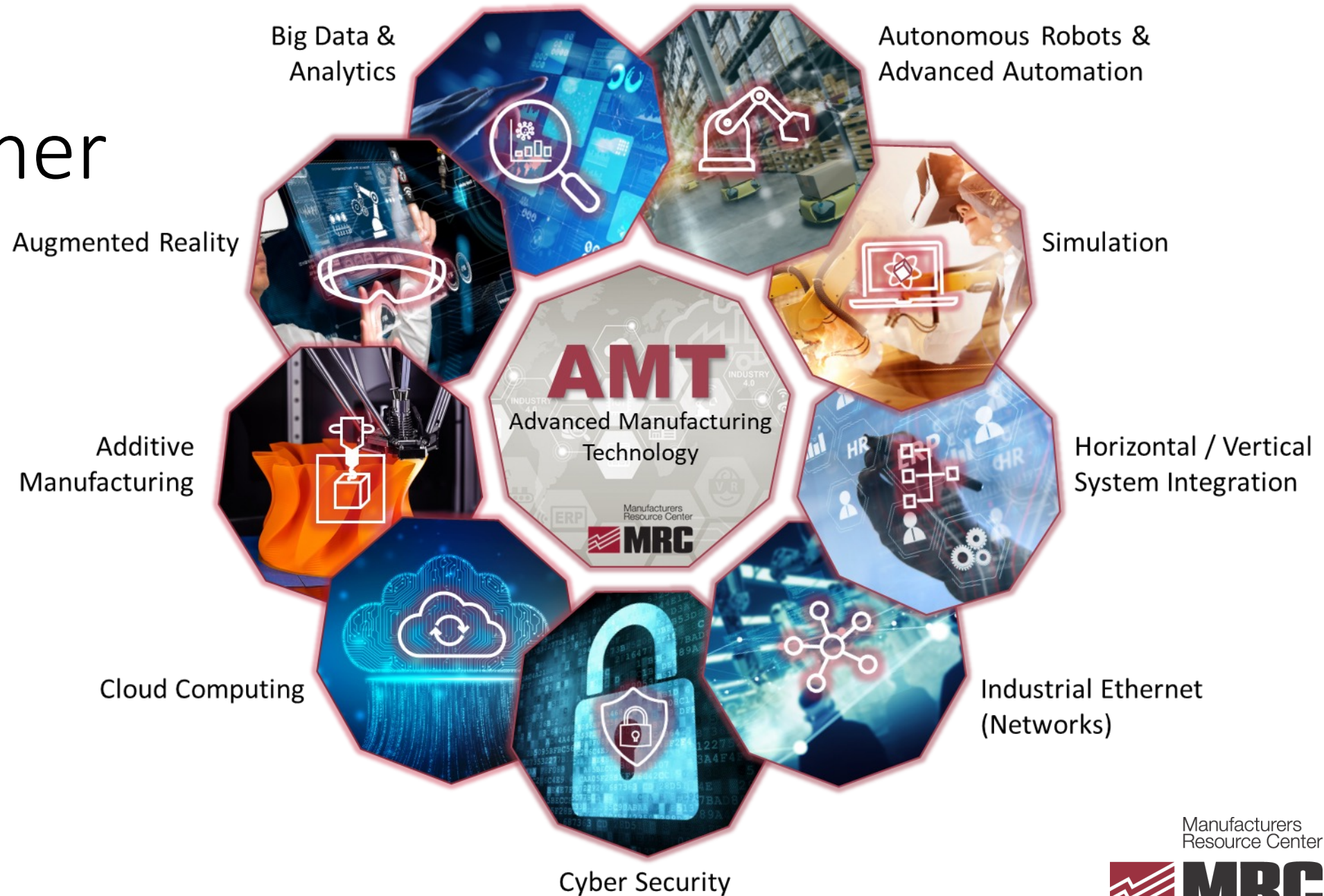
How did AMT Improve the Operation ?

Scenario 1

✓ Lucy and Ethel still wrap all candies

✓ No unwrapped candy leaves their area

✓ They no longer need to eat candy to meet demand

✓ They can stop the line when needed

Scenario 2

✓ Lucy is the operator of a high-speed wrapping machine that she cleans and maintains

✓ Ethel is part of the Quality group where she is responsible for monitoring individual piece weights, sensory analysis, and wrap integrity

✓ Both Lucy and Ethel no longer require weekly therapy from the repetitive motion of wrapping candy

Putting it ALL Together

Big Data & Analytics

Autonomous Robots & Advanced Automation

Simulation

Augmented Reality

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Horizontal / Vertical System Integration

Additive Manufacturing

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Scenario 3: Jumping From the Top!

- High speed wrapping machines are connected to a network passing machine performance data (OEE) through a secure firewall to a cloud-based data warehouse

- Data analytics algorithms are monitored and maintained to predict when the wrapping machines require cleaning and maintenance as well as comparing data between the 2 wrapping machines

# Scenario 3: Jumping From the Top!

- Plastic wear parts for wrappers are 3D printed to reduce lead time, cost, and precious inventory space

- Wrapping machines run when a production order is selected by Lucy in digital workflow system. Materials consumed during the production run are used to adjust raw material and finished goods inventory in the company ERP

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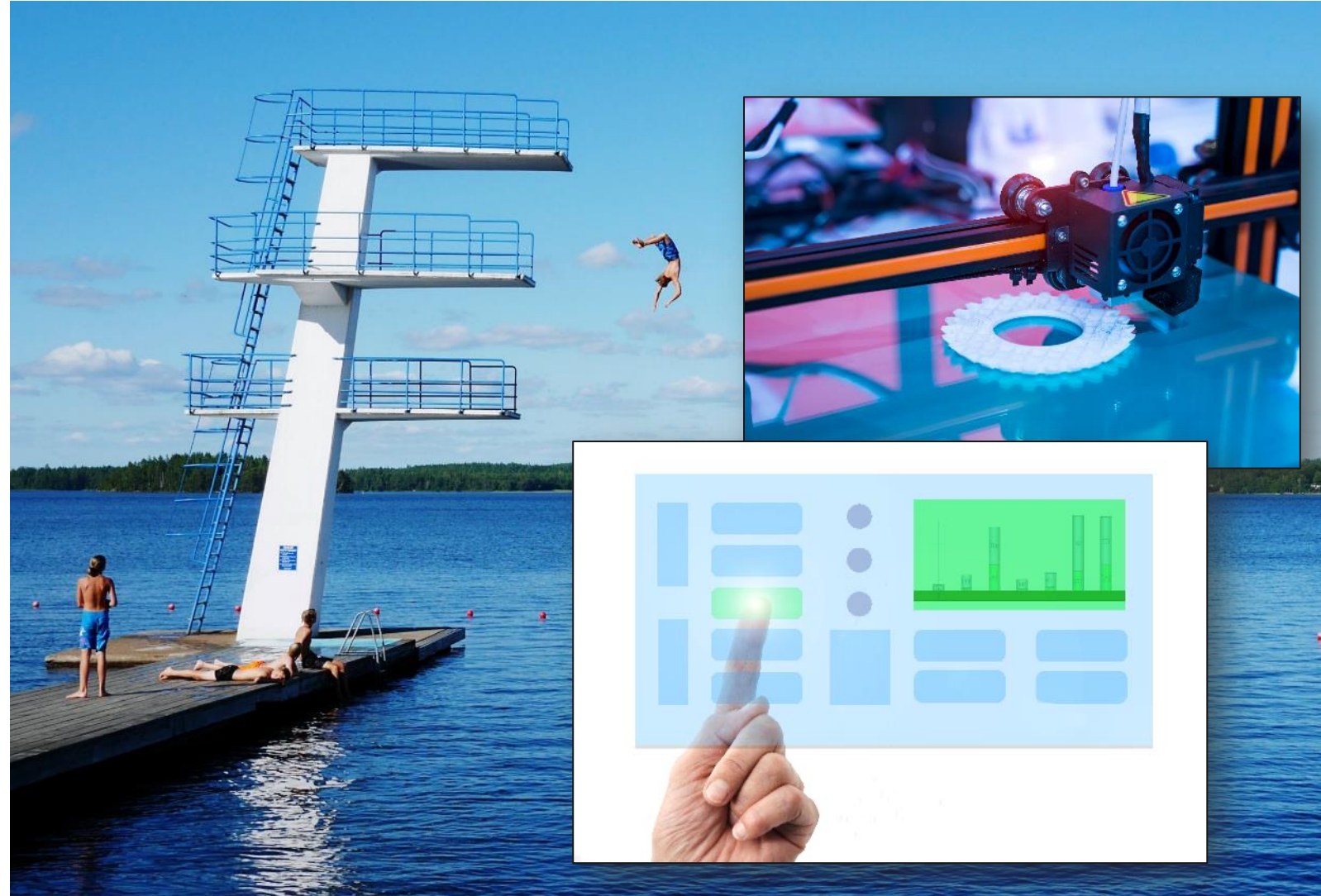
Scenario 3: Jumping From the Top!

- Once candies are wrapped, packed, and palletized autonomous guided vehicles (AGV's) transport pallets to a warehouse where the WMS directs put away.

- Lucy and Ethel are ready to retire; HR uses an extended reality platform as to capture their knowledge and create on-demand training for new hires.
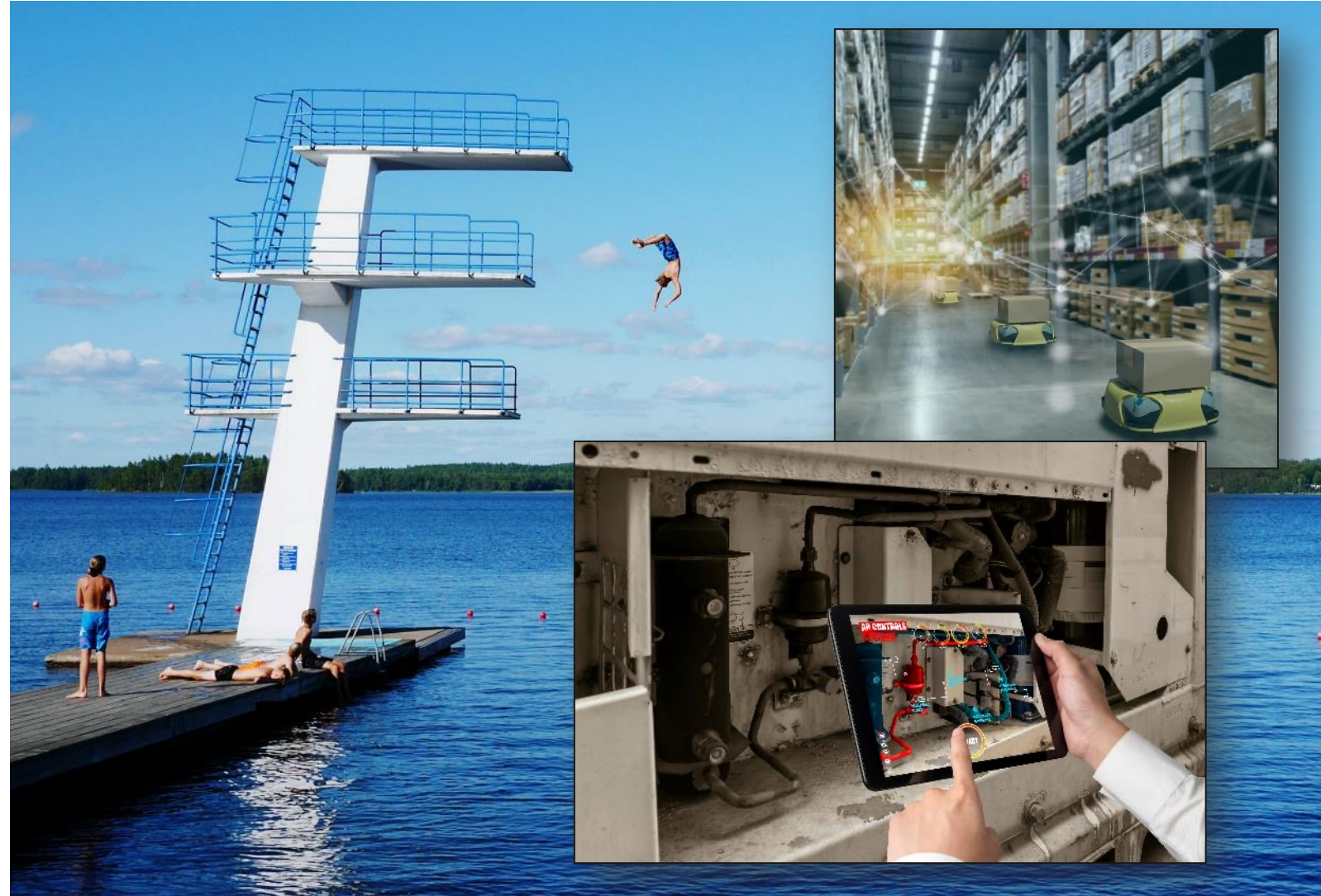
Set Yourself up for Success!
Key Points to Follow when implementing AMT
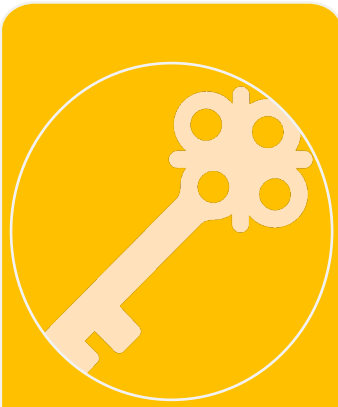
Define the challenge or opportunity

Start simple! Low risk with tangible payback

Start on the floor, bottom-up approach

Involve your employees

Communicate the "Why"

Keep momentum by reinvesting

Document, Document, Document!

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