AFS METALCASTING CONGRESS

April 23 – 25, 2024
Milwaukee, WI

Why INDUSTRY 4.0?

Connecting Inputs to Assessments to KPIs to Business Value

Todd Hutcheson, University of Northern Iowa

introduction.

- Executive-in-Residence at UNI's Center for Business Growth & Innovation
- Business Strategy & Policy Instructor for UNI's Wilson College of Business
- Industry 4.0 Professional Certificate from MIT
- 32 years of leadership in the aerospace and defense industry's business/corporate environment
- 13 years of academic leadership and instruction at an undergraduate and graduate level
- Areas of experience include Industry 4.0, Continuous Improvement, Strategic Management, Project Management and Manufacturing/Supply Chain Operations

Todd Hutcheson

Thought-starter questions …

? What does “**Industry 4.0**”, or “**Foundry 4.0**” mean to you?

? Do you find **assessments** to be worthwhile?

? **Why** or **why** not?

? What constitutes “**value**” to your **business**?

? What constitutes “**value**” to your **customers**?

METALCASTING INDUSTRY Statistics

- **US economic benefit** from metalcasting in 2020[1]
  - **Economic Impact** = $110.5B (Direct = $44.3B)
  - **Jobs** = 492.6K (Direct = 162.8K)
  - **Wages** = $32.2B (Direct = $11.6B)
  - **Tax revenue** = $10.6B
- **US Government** equipment, product and service supply chains rely **HEAVILY** on the foundry & casting industry

- From 2014 and 2023-est [2]
  - 162 (9%) of **existing US foundry facilities closed**
  - **Per facility revenue increased** by $6.5M (30%)

1. https://www.afsinc.org/us-metalcasting-industry-impact-us-jobs-economy
2. https://www.foundry-planet.com/d/metalcasting-congress-2023-surpasses-200-exhibitors-more-than-20-first-timers/

Metalcasting Matters for
United States of America

Metalcasting Industry Vital to the U.S. Economy

A highly modern industry with ancient roots and today's cutting-edge technology, metalcasting is the backbone of the manufacturing economy. It is an industry with a total economic output of $110.52 billion that provides almost 500,000 U.S. jobs, directly and indirectly. The industry is central to a growing economy, modern infrastructure, and national defense. Moreover, metalcasting provides excellent careers for those with the right skills.

Total National Economic Benefit
Direct & Indirect

Economic Impact
$110.52B

Jobs
492,565

Wages
$32.16B

Tax Revenue
$10.59B

Metalcasting Matters

U.S. made metal castings are critical to:

- Aircraft
- Appliances
- Automobiles, Motorcycles and Trucks
- Cookware
- Defense Technology
- Farm Equipment Needed to Harvest Food
- Golf Clubs
- Medical Devices
- Mining and Construction Equipment
- Pipes that Deliver Clean Water
- Power Plants that Supply Electricity
- Pulp and Paper
- Railroads and Mass Transit
- Ships and Submarines
- Stadium Seating
- Ventilators
- Wind Turbines

Economy

- More than 1,759 metalcasting facilities nationwide.
- Providing direct & indirect employment for more than 460,000 workers.
- Nearly 80% of U.S. metalcasters are small businesses employing fewer than 100 employees.

Direct Economic Benefit

Industry Jobs
162,816

Wages
$11.61B

Economic Impact
$44.29B

This 2020 economic research was conducted by John Dunham & Associates.

Number of Facilities (Excluding Art Foundries and Educational Foundries)

	2014	2015	2016	2017	2018	2019	2020	2021	2022 est	2023 fcst
Facilities	1,871	1,866	1,787	1,780	1,772	1,765	1,731	1,725	1,715	1,709
Annual Growth		-0.2%	-4.2%	-0.4%	-0.4%	-0.4%	-1.9%	-0.4%	-0.6%	-0.3%

Revenue Per Facility ($ Thousands)

	2014	2015	2016	2017	2018	2019	2020	2021	2022 est	2023 fcst
($ Thousands)	21,743	20,837	19,942	21,256	23,337	25,093	21,205	24,527	27,006	28,258
Annual Growth		-4.2%	-4.3%	6.6%	9.8%	7.5%	-15.5%	15.7%	10.1%	4.6%

MANUFACTURING'S PERFECT STORM

Attraction
Retention

Reliability
Cost

Cost
Expertise

Our **CURRENT SITUATION** requires a **TOTALLY DIFFERENT APPROACH…**

Reference: AdobeStock_622455498, Available at: https://stock.adobe.com (Accessed: October 2023).

“This research is sponsored by the DLA-Troop Support, Philadelphia, PA and the Defense Logistics Agency Information Operations, J68, Research & Development, Ft. Belvoir, VA.”

Reference: PEXELS Photo cy Kateryna Babaieva, pexels-kateryna-babaieva-2747017.jpg, https://pexels.com

NCDMM

UNI University of Northern Iowa. Business & Community Services

FOUNDRY 4.0

Technologies revolutionizing the metal casting industry!

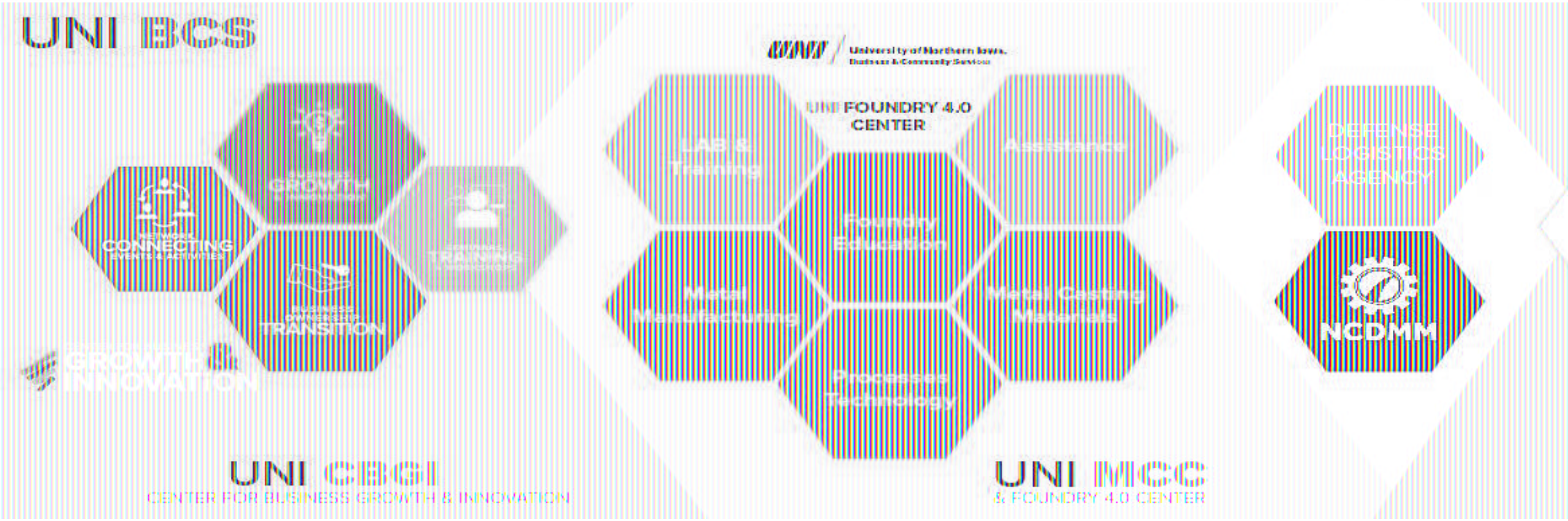
SHAPING THE FUTURE OF AN INDUSTRY

FOUNDRY4.0@NCDMM.ORG

PROJECT MISSION

Create resiliency in the
FOUNDRY & CASTING INDUSTRY
through the implementation
of Industry 4.0 technology

Reference: Pexels Download, Cody King https://www.pexels.com/photo/black-and-silver-dslr-lens-1208074, https://pexels.com



FOUNDRY 4.0

Technologies revolutionizing the metal casting industry!

Foundry 4.0 Partnership Facts…

Outreach Facts

- Hosted **2** Steps-to-Success Workshop Events to **81** individuals in the USA Representing **25** businesses and employee groups, as well as **15** business support organizations.
- Have presented at **3** regional and **3** national industry events.

Assessments Facts

- I4.0 Assessments completed with **10** companies
- Actively conducting assessment engagements with **5** additional companies
- Building a significant industry response database with **60+** responses from **15** companies to date

Future Plans

- **MORE!** Additional workshops and regional/national presentations planned
- **7** businesses have been in contact regarding the potential of starting an assessment
- A goal of **50+** assessments reaching **300+** individuals for response

TAKING FOUNDRIES TO THE NEXT LEVEL

FOUNDRY 4.0

Technologies revolutionizing the metal casting industry!

About the UNI Center for Business Growth & Innovation:
https://advanceiowa.com/sites/default/files/uni_cbgi_advance_iowa.pdf

About the UNI Foundry 4.0 & Metal Casting Centers:
https://advanceiowa.com/sites/default/files/uni_foundry_4.0_metal_casting_centers.pdf

Partners: NCDMM · Center for Business Growth & Innovation, University of Northern Iowa · Foundry 4.0 & Metal Casting Centers, University of Northern Iowa · Youngstown State University Excellence Training Center · YBI Youngstown Business Incubator

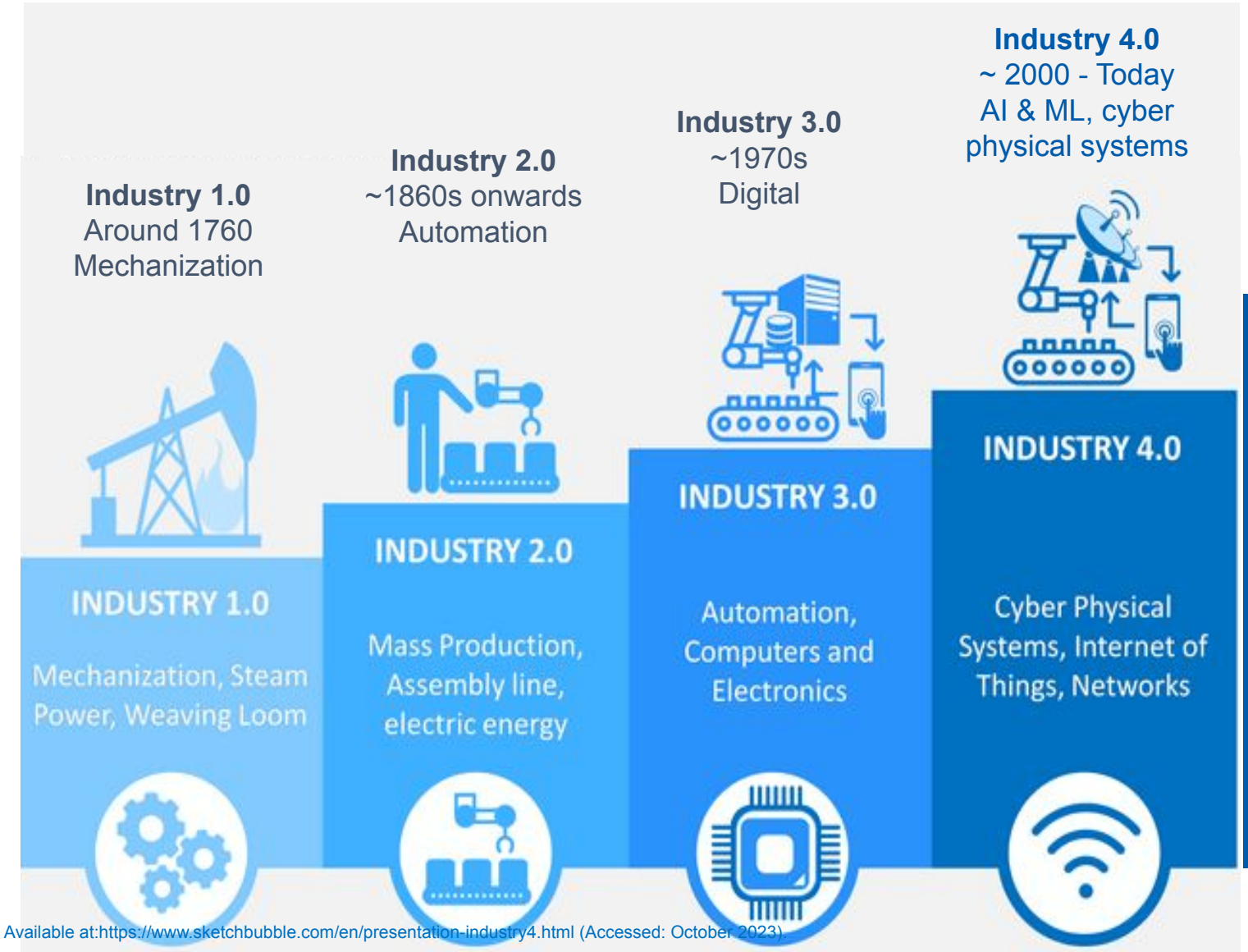
What is INDUSTRY 4.0?
& HOW DID WE GET HERE?

Industry 1.0
Around 1760
Mechanization

Industry 2.0
~1860s onwards
Automation

Industry 3.0
~1970s
Digital

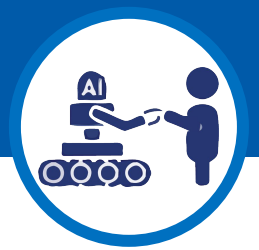
Industry 4.0
~ 2000 - Today
AI & ML, cyber physical systems



Industry 5.0
Concept was presented by Japan at the CeBIT 2017 trade fair in Hannover (Society 5.0)

INDUSTRY 5.0

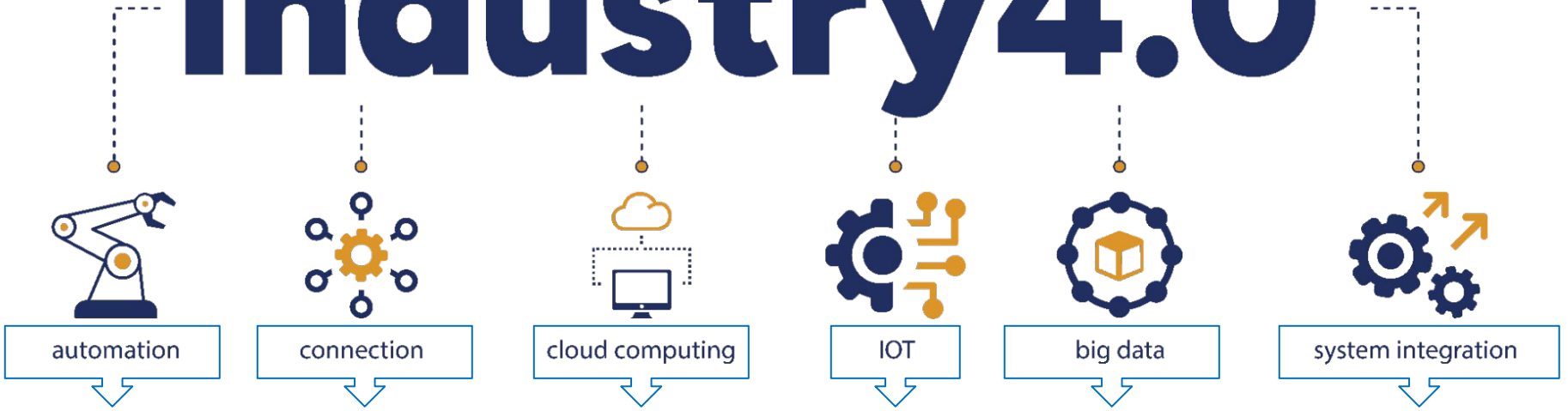
Is future of work, referring to people utilizing robots and intelligent machines to drive productivity and economic growth



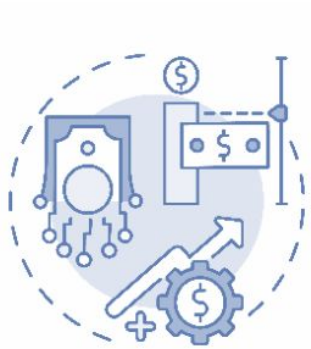
NOTE:
INDUSTRY 4.0 applied to an industry or function can become *"Foundry 4.0", "Manufacturing 4.0", "Logistics 4.0"* … all apply similar principles

Reference: industry-4-slide2.png, Available at:https://www.sketchbubble.com/en/presentation-industry4.html (Accessed: October 2023).

Industry4.0

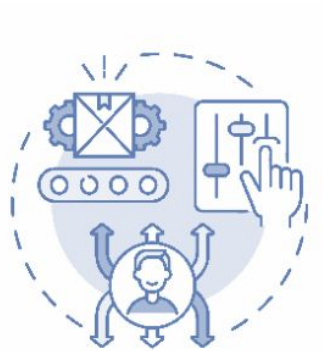


BOOSTING PRODUCTION



INCREASING PROFIT MARGINS

TOTAL BUSINESS AUTOMATION



QUICK ADAPTATION TO CUSTOMER NEEDS

REDUCING HUMAN LABOR

References: AdobeStock_646030045.png & AdobeStock_410448729 https://stock.adobe.com (Accessed: October 2023).

UNDERSTANDING INDUSTRY 4.0 Technologies

Managing Information

- Horizontal & Vertical System Integration
- Big Data & Analytics
- Internet of Things (IoT)
- Cloud Computing
- Cyber Security

Producing & Performing

- Autonomous Robots
- Additive Manufacturing (3D Printing)

Designing & Testing

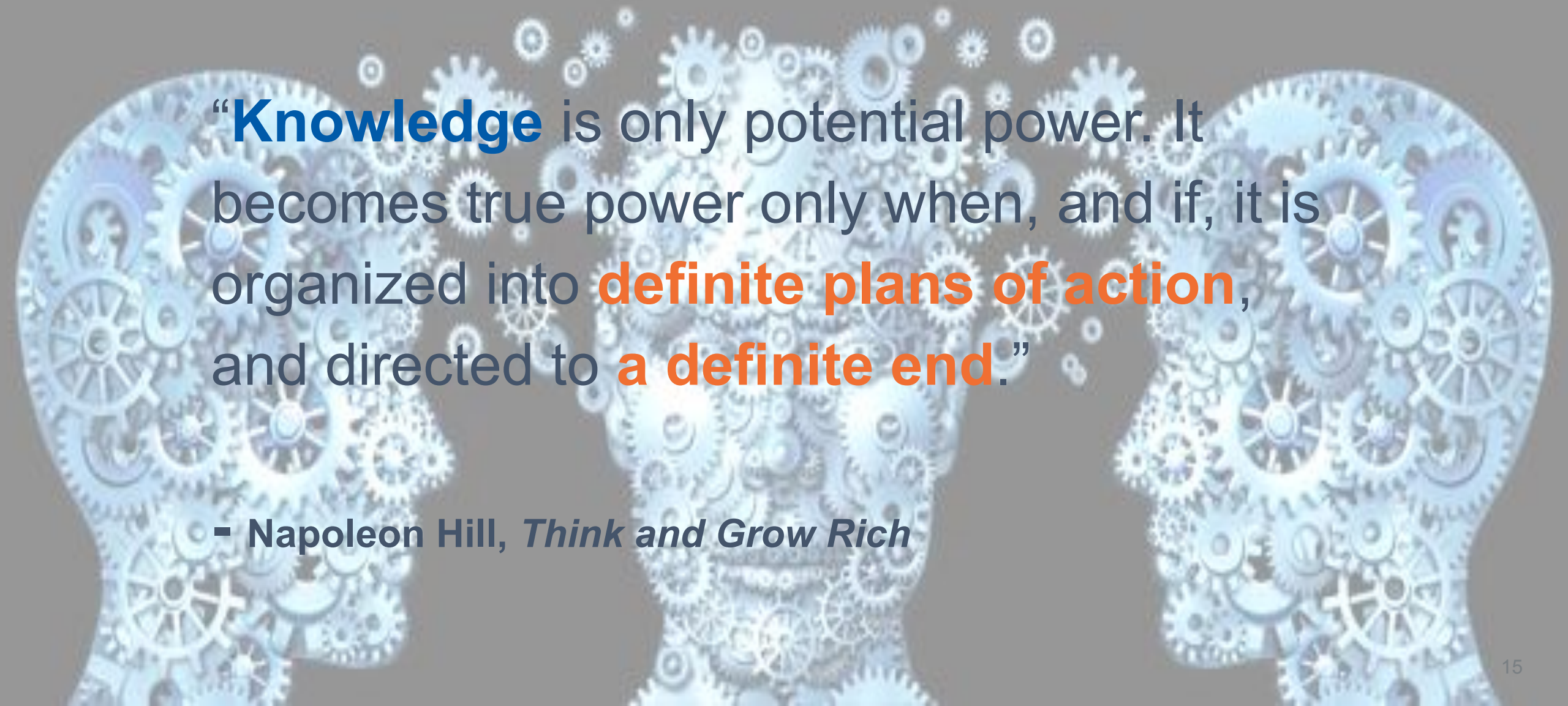
- Augmented Reality
- Simulation & Digital Twin

Business Success Elements

- Business “Wild Cards”
- Organizational Culture
- Industry 5.0

4 BROAD BUCKETS

KNOWLEDGE Quote



"**Knowledge** is only potential power. It becomes true power only when, and if, it is organized into **definite plans of action**, and directed to **a definite end**."

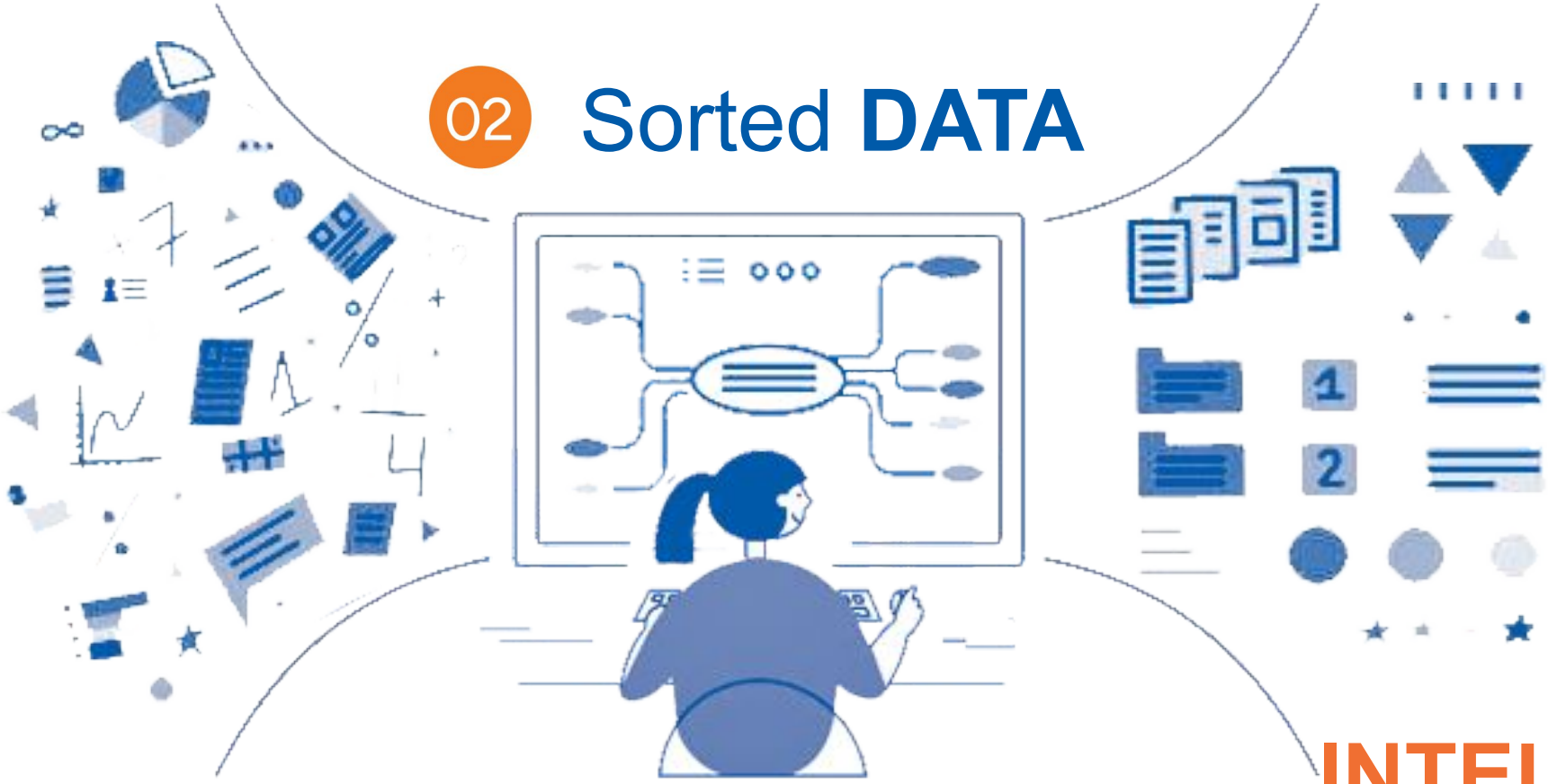
- **Napoleon Hill, *Think and Grow Rich***

DATA & INDUSTRY 4.0

CONVERTING DATA INTO USEFUL INTELLIGENCE

01 Raw **DATA**

02 Sorted **DATA**



03 Arranged & Usable **INTELLIGENCE**

Reference: istockphoto-1325034866-612x612.jpg, Available at: https://www.istockphoto.com/vector/data-analysis-vector-illustration-with-young-woman-sitting-in-front-of-big-computer-gm1325034866-410181015 (Accessed: October 2023).

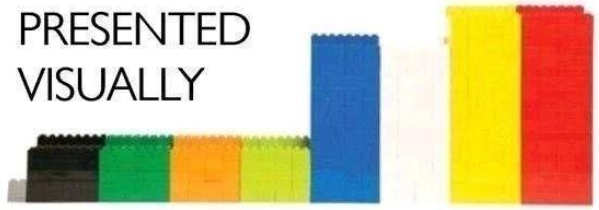
DATA & INDUSTRY 4.0

CONVERTING DATA INTO USEFUL INTELLIGENCE

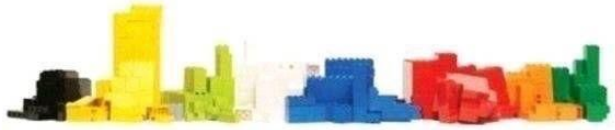
DATA

EXPLAINED WITH A STORY

PRESENTED VISUALLY



ARRANGED

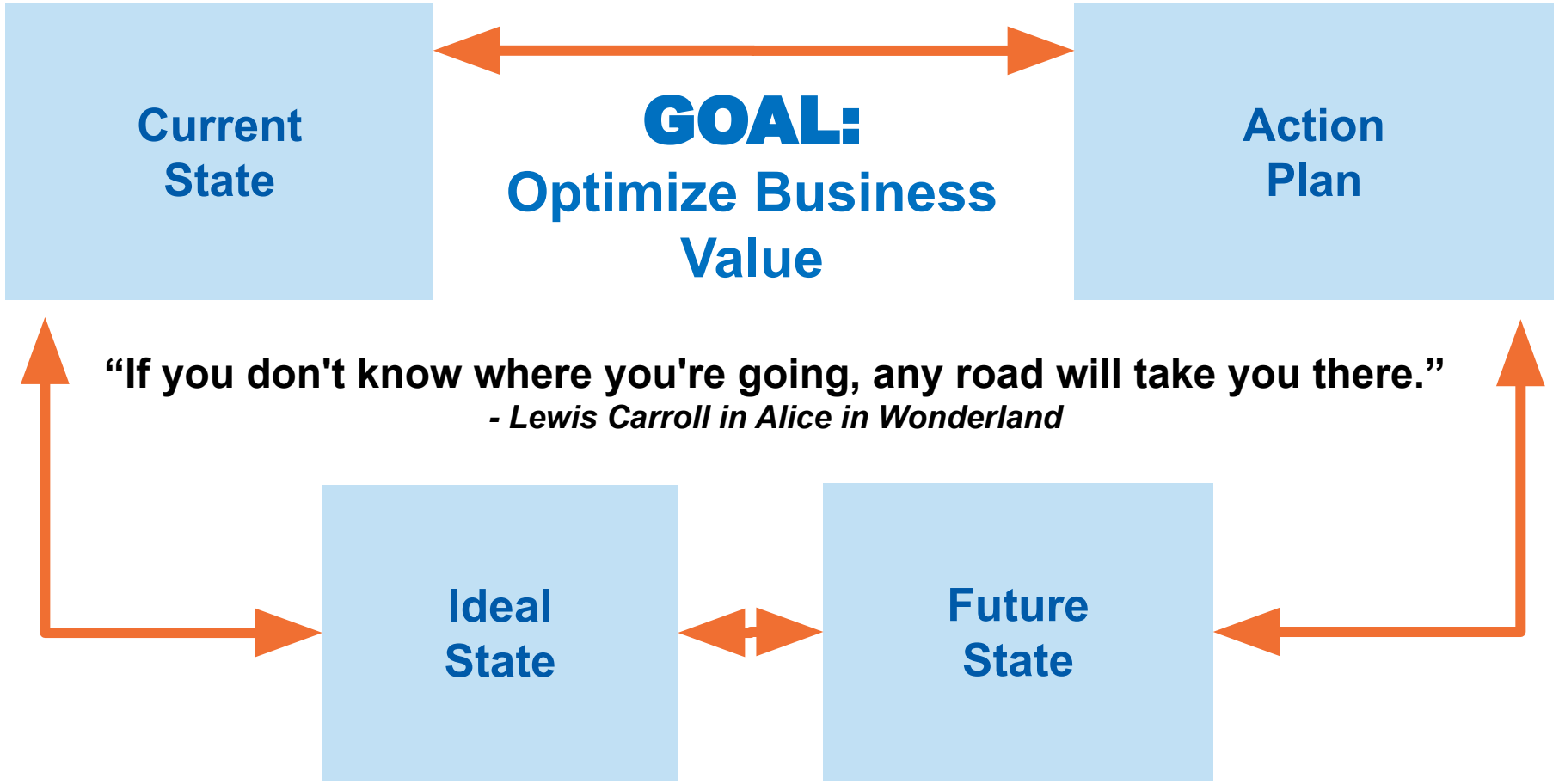


SORTED

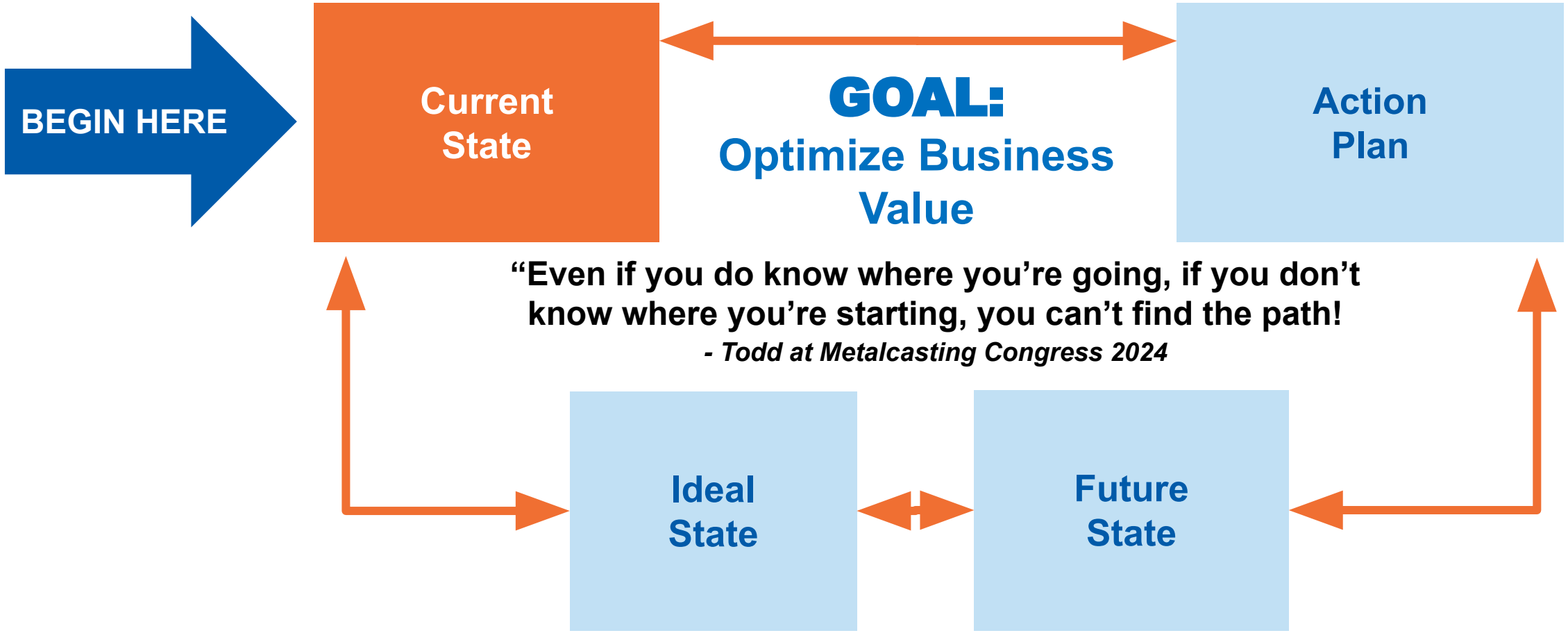
WHY IMPLEMENT INDUSTRY 4.0?

- Real-time Data & Analytics
- Cost Reduction
  - Increased Efficiency & Productivity
  - Supply Chain Optimization
  - Improved Product Quality
    - Reduced Scrap Rates
    - Enhanced Quality Control
    - Predictive Maintenance
- Customization & Flexibility
  - Faster Time to Market
  - Enables Iterative Innovation
  - Competitive Advantage
- Enhanced Safety
- Workforce Alternatives
- Global Connectivity

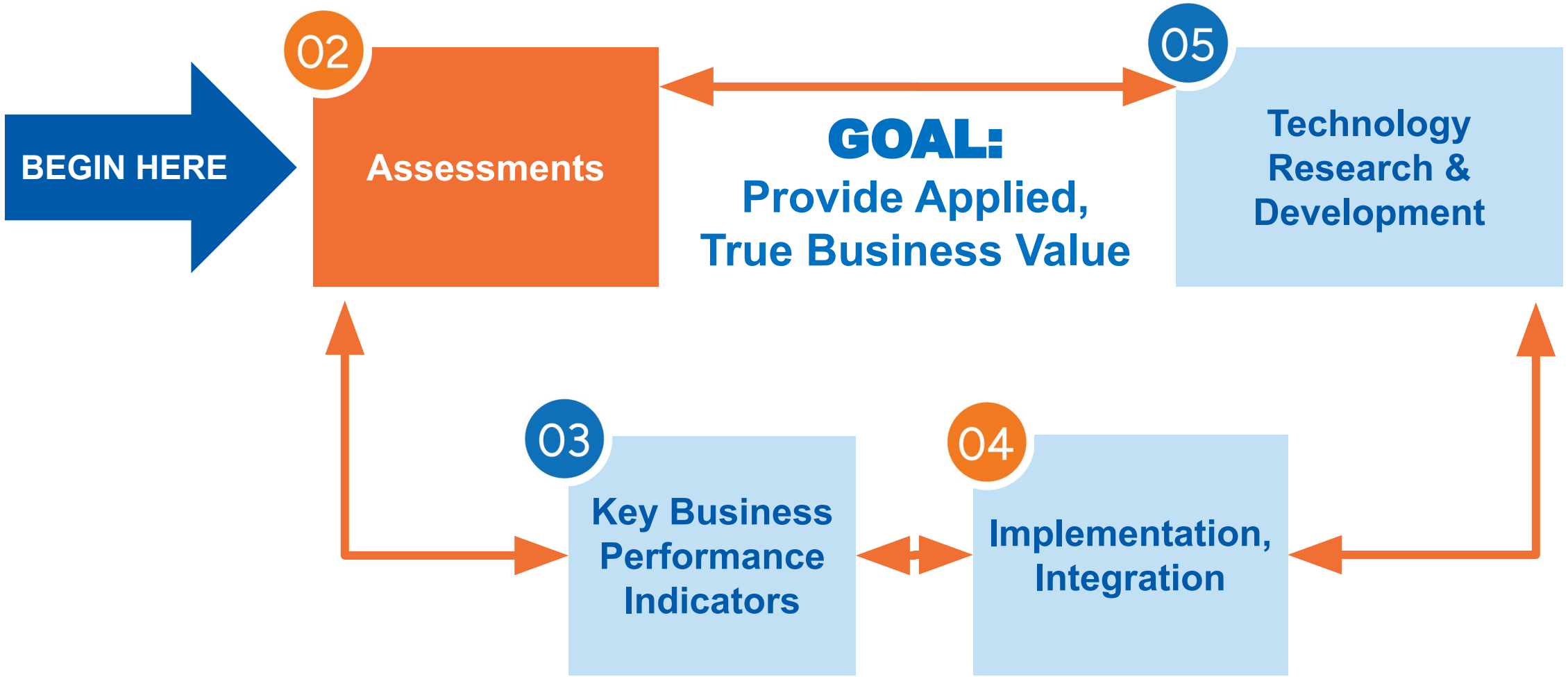
I4.0 IMPROVEMENT METHODOLOGY



I4.0 IMPROVEMENT METHODOLOGY



I4.0 IMPROVEMENT METHODOLOGY



What Are Assessments?

What an assessment **DOES** …

- Provides a set of data points identifying potential opportunities
- Points towards a set of activities that can provide bottom line value
- Allows a company to evaluate and compare the relative value of these activities
- Sets up an opening for discussion from multiple functional areas that can enable connection and collaboration

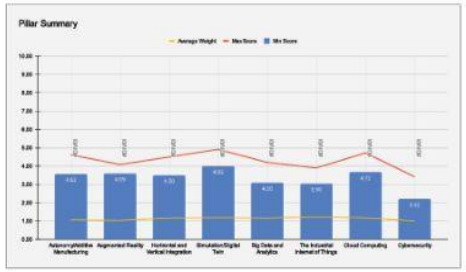
What an assessment does **NOT** do …

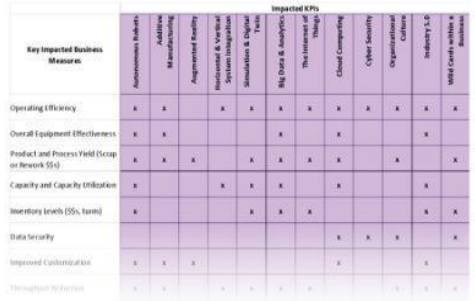
- Identify THE solution of HIGHEST value across ALL companies and situations
- Automatically connect businesses with technology providers and integrators to install solutions
- Give prescriptive direction

The VALUE in Assessment results from the Reflection & Discussion

ELEMENTS OF INDUSTRY 4.0

Improvement Implementation





I4.0 Improvement
Potential Summary Report

- Summary of Findings
- Key Opportunities
- Considerations
- Other Comments

Revolutionizing
Assessment Reporting
Harnessing AI for Efficient & Insightful Assessment Reports

JOIN the Conversation!

Please take a moment to scan the QR code or click on the provided link to access our registration form. Once you've submitted it, we will quickly get in touch to kickstart the assessment process for both you and your team. This will empower you to harness Industry 4.0 technologies, positioning your business with cutting-edge advancements and driving improvement as well.

READY TO BEGIN YOUR JOURNEY?

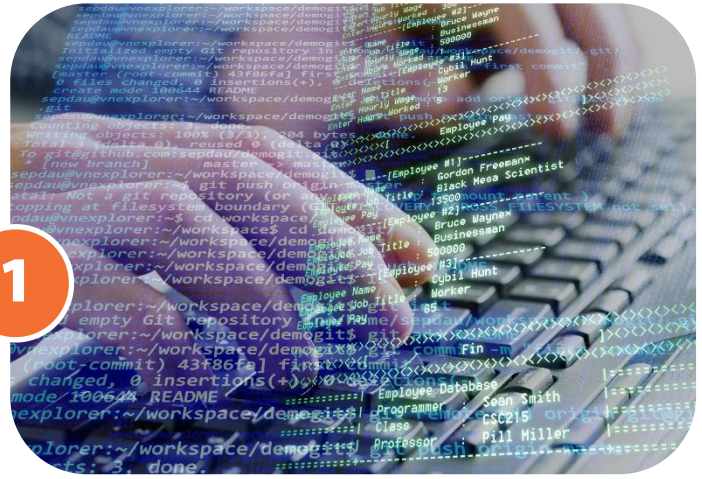
QR-CODE & LINK TO OUR GOOGLE FORM:

Current assessments can fall short in:

1. Ease of engagement/use
2. Collaborative involvement of multiple functions and their subject matter expertise/perspectives
3. Connection of assessment results to business value and feasibility

ELEMENTS OF INDUSTRY 4.0

Improvement Implementation

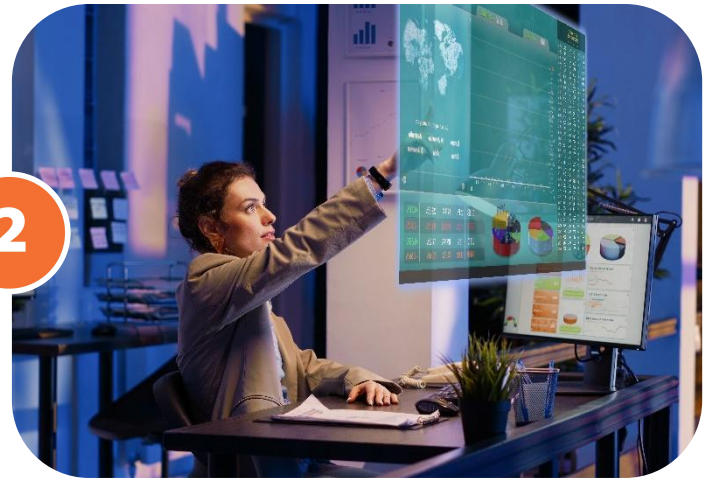


1

DATA COLLECTION

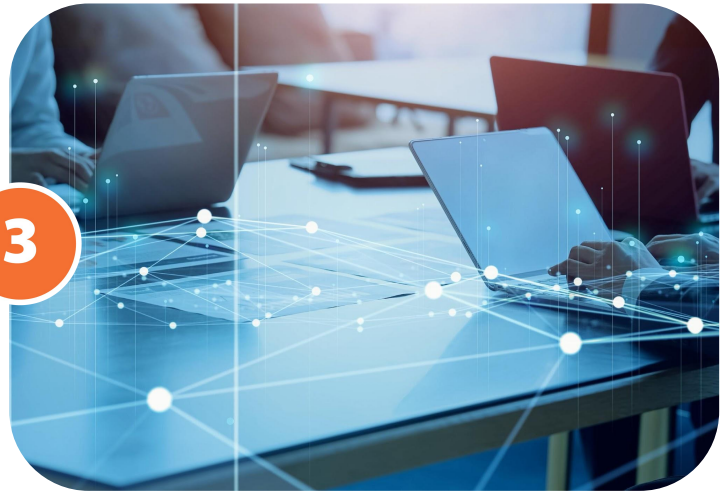
ACTION PLAN & IMPLEMENTATION

4



2

ASSESSMENT



3

KEY PERFORMANCE INDICATORS

I4.0 Improvement Summary Report

- Company Profile
- Key Opportunities
- High Value Improvement Actions
- High Impact KPIs
- Questions
- Summary
- Data

5

1 INDUSTRY 4.0 ASSESSMENT

Input: Data Collection

I4.0 Assessments are relatively common, but many suffer from a general lack of ease of use administering the assessment, from gathering inputs from either too few or incorrect participants, to an inability to provide segmented summary data from different groups within the business, to a disconnect of results to actual business value. Correcting these issues is paramount in achieving meaningful results from an assessment.

1 INPUT DATA COLLECTION

1a

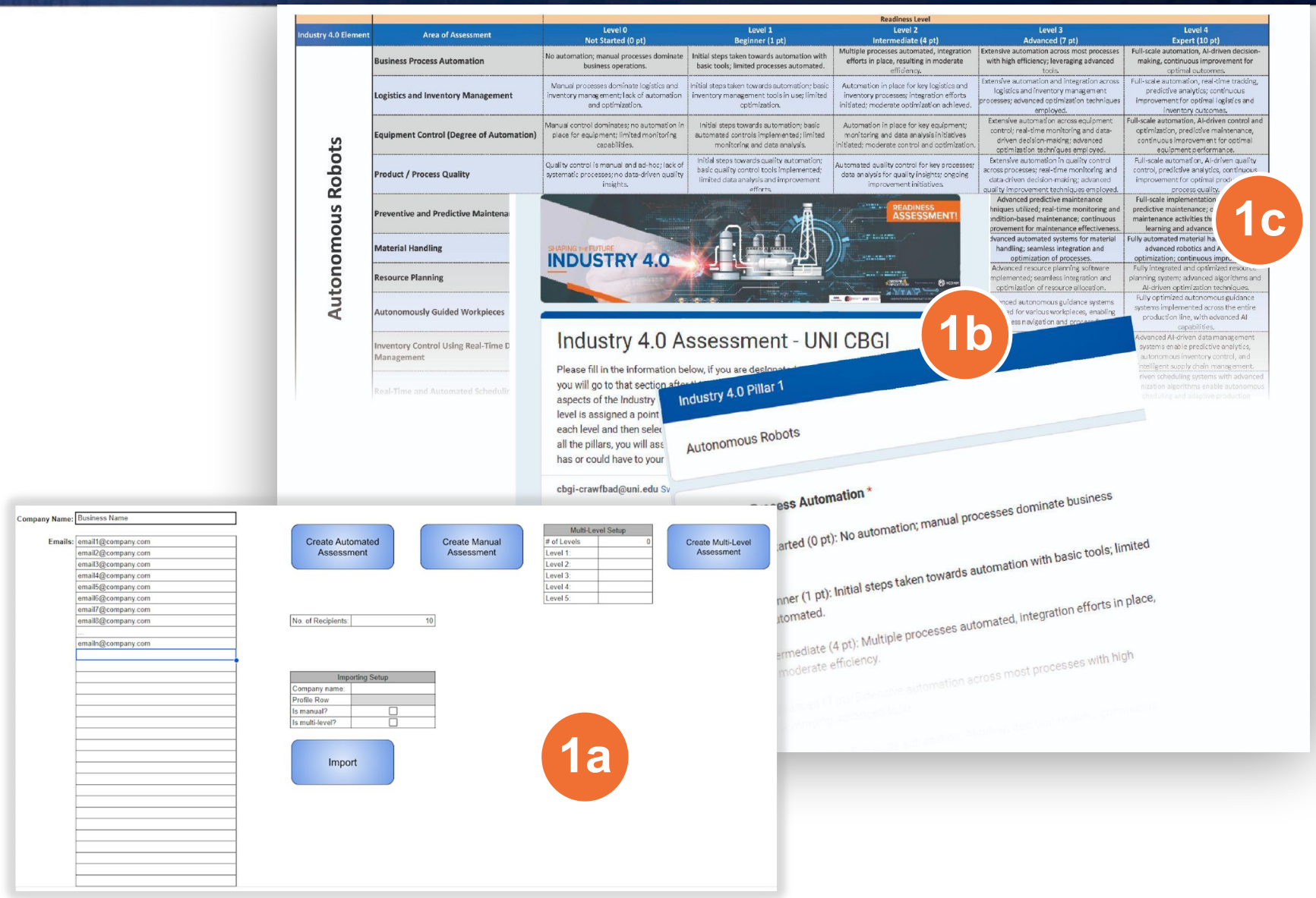
The assessment engagement begins with a signed NDA and names, positions and email addresses for individuals desired to be assessment participants by a company

1b

Broad cross-section of survey data collected by I4.0 pillar, by pillar aspect, from subject matter expert at all levels and from all functions identified by the business being assessed

1c

Survey data is consolidated by company-defined groupings, made available real-time for analysis and discussion



2 INDUSTRY 4.0 ASSESSMENT

Automated Assessment

Once the correct level of assessment data has been collected from the most knowledgeable sources within a business, assessment scoring and the consolidation of scores can be processed real-time. Automated report sets can keep up with inputs provided, and the analyzed data can be split into meaningful groups for further discussion. Automating the assessment frees up time for these individuals to discuss implementation value.

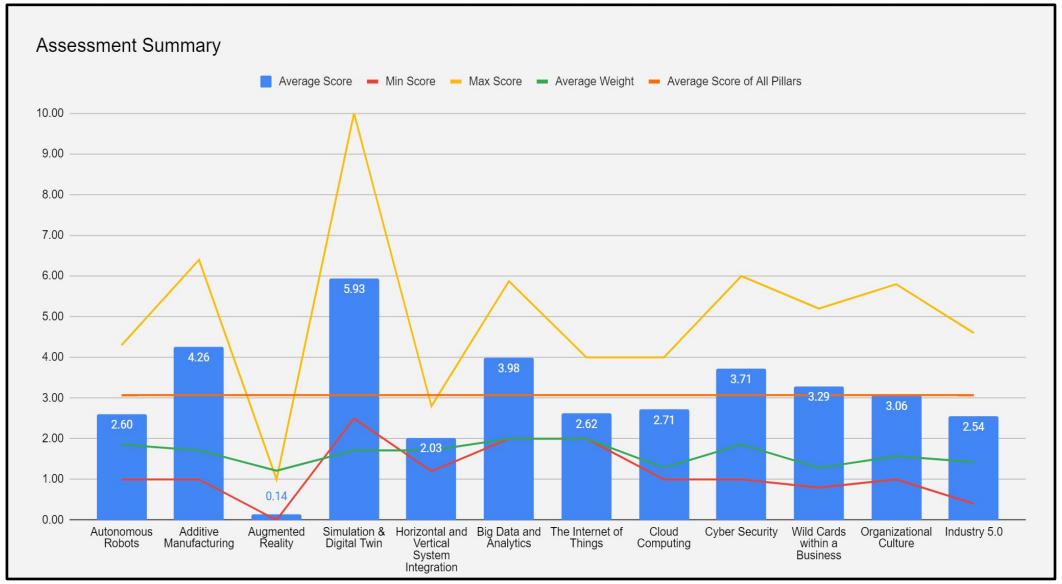
2 AVERAGE SCORE BY PILLAR

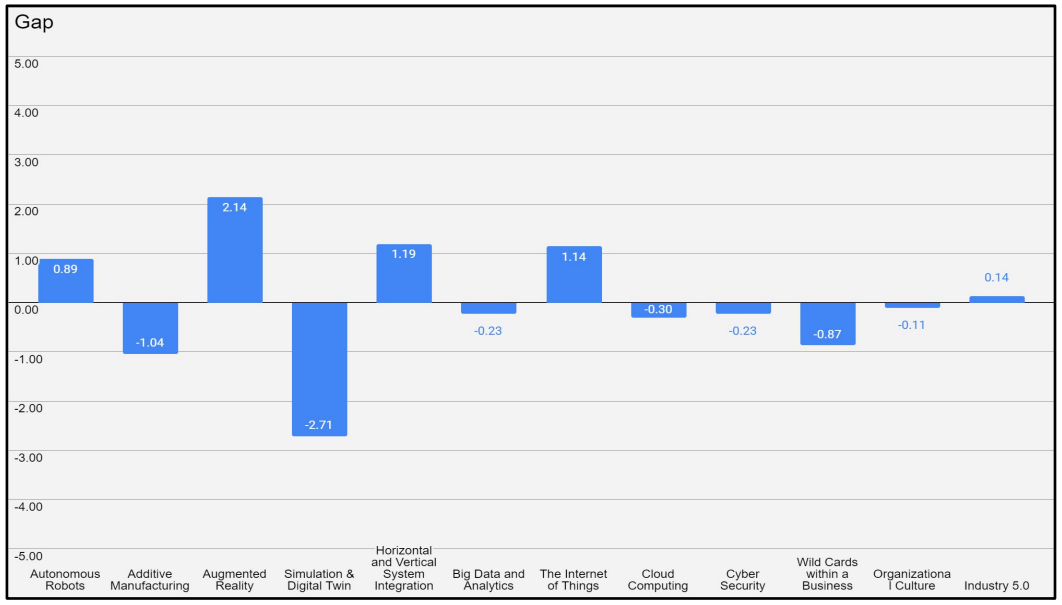
EXAMPLE

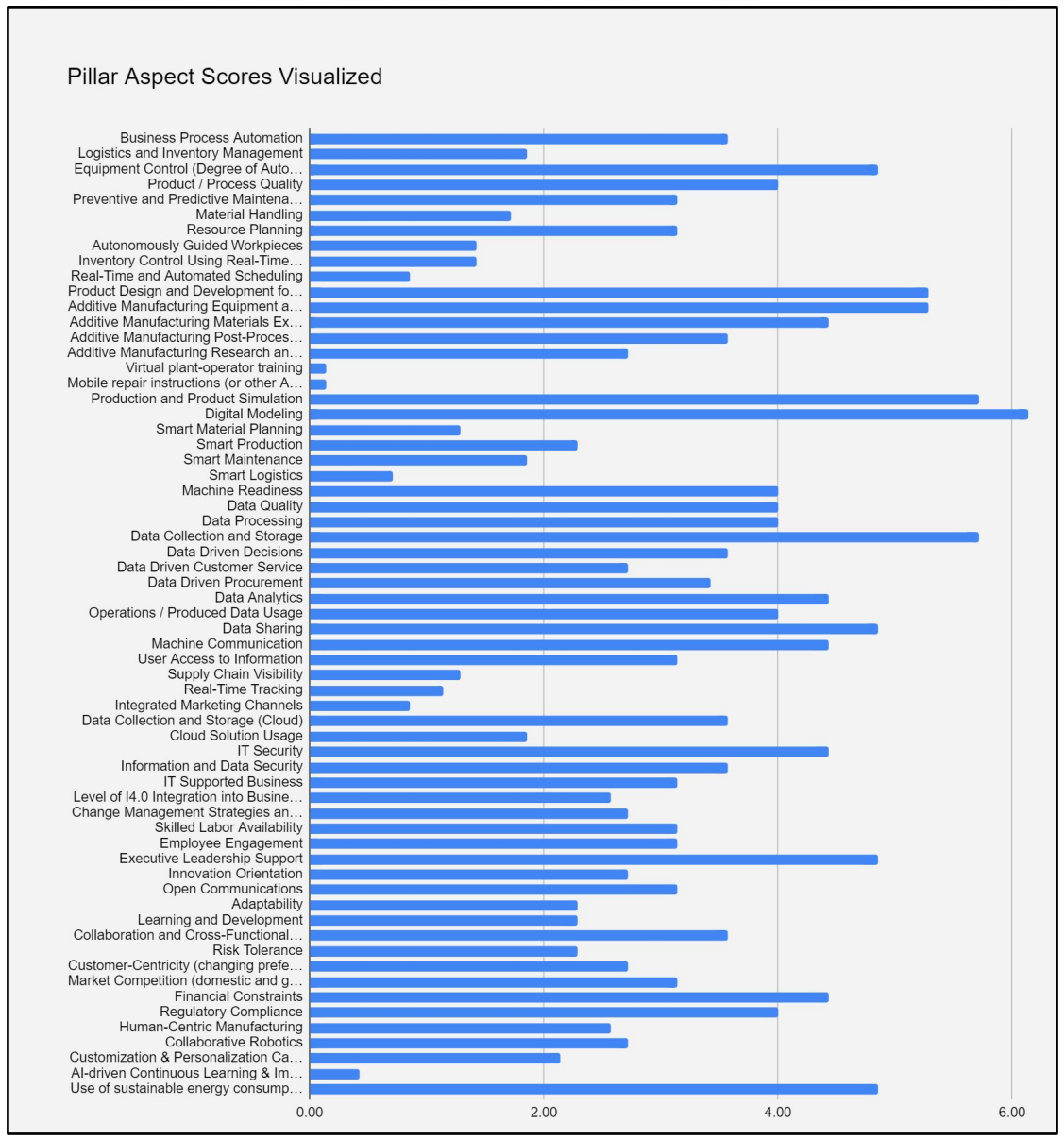
	Pillar	Average Score	Min Score	Max Score	Average Weight	Adjusted Weight	Min Weight	Max Weight	Gap
1	Autonomous Robots	2.40	2.40	2.40	1.00	0.63	1.00	1.00	-0.48
2	Additive Manufacturing	4.60	4.60	4.60	2.00	1.26	2.00	2.00	-0.76
3	Augmented Reality	0.00	0.00	0.00	1.00	0.63	1.00	1.00	1.92
4	Simulation & Digital Twin	4.00	4.00	4.00	1.00	0.63	1.00	1.00	-2.08
5	Horizontal and Vertical System Integration	2.80	2.80	2.80	2.00	1.26	2.00	2.00	1.04
6	Big Data and Analytics	3.63	3.63	3.63	2.00	1.26	2.00	2.00	0.21
7	The Internet of Things	3.33	3.33	3.33	2.00	1.26	2.00	2.00	0.50
8	Cloud Computing	4.00	4.00	4.00	1.00	0.63	1.00	1.00	-2.08
9	Cyber Security	5.00	5.00	5.00	2.00	1.26	2.00	2.00	-1.16
10	Wild Cards within a Business	2.20	2.20	2.20	1.00	0.63	1.00	1.00	-0.28
11	Organizational Culture	2.50	2.50	2.50	2.00	1.26	2.00	2.00	1.34
12	Industry 5.0	2.00	2.00	2.00	2.00	1.26	2.00	2.00	1.84
	Total Average:	3.04	3.04	3.04	1.58	1.00	1.58	1.58	

2 AUTOMATED ASSESSMENT

EXAMPLE





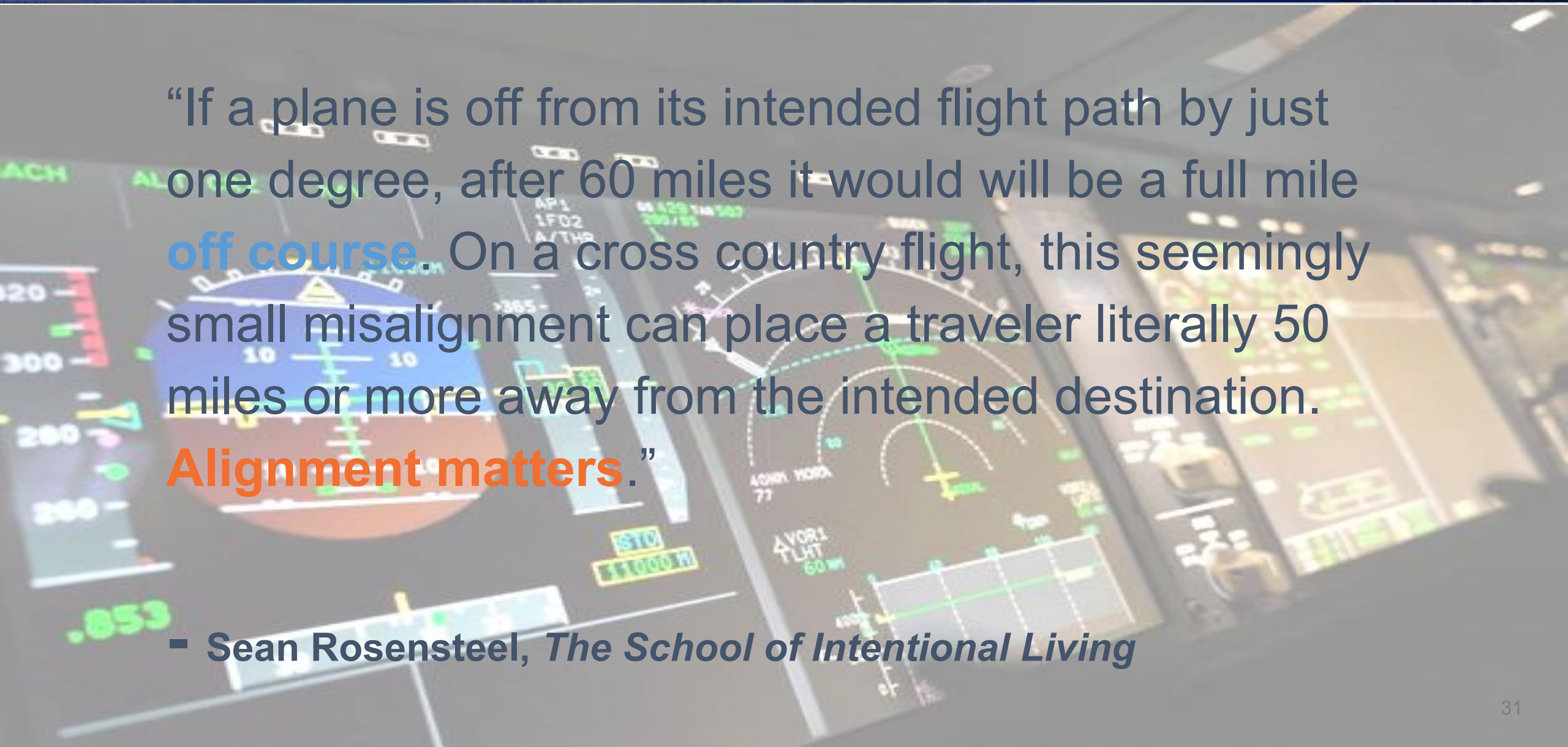


3 Key Performance Indicators (KPIs)

KPI Assessment

Different technologies impact different areas in a business environment. Alignment matters. The connections between I4.0 technologies and the key performance indicators they impact has been proven. Although “your results may vary”, by making good assumptions about the potential improvements possible through technology implementation, a predictive model can be created to focus implementation in the highest value areas.

ALIGNMENT Quote



"If a plane is off from its intended flight path by just one degree, after 60 miles it would will be a full mile **off course**. On a cross country flight, this seemingly small misalignment can place a traveler literally 50 miles or more away from the intended destination. **Alignment matters**."

- **Sean Rosensteel, *The School of Intentional Living***

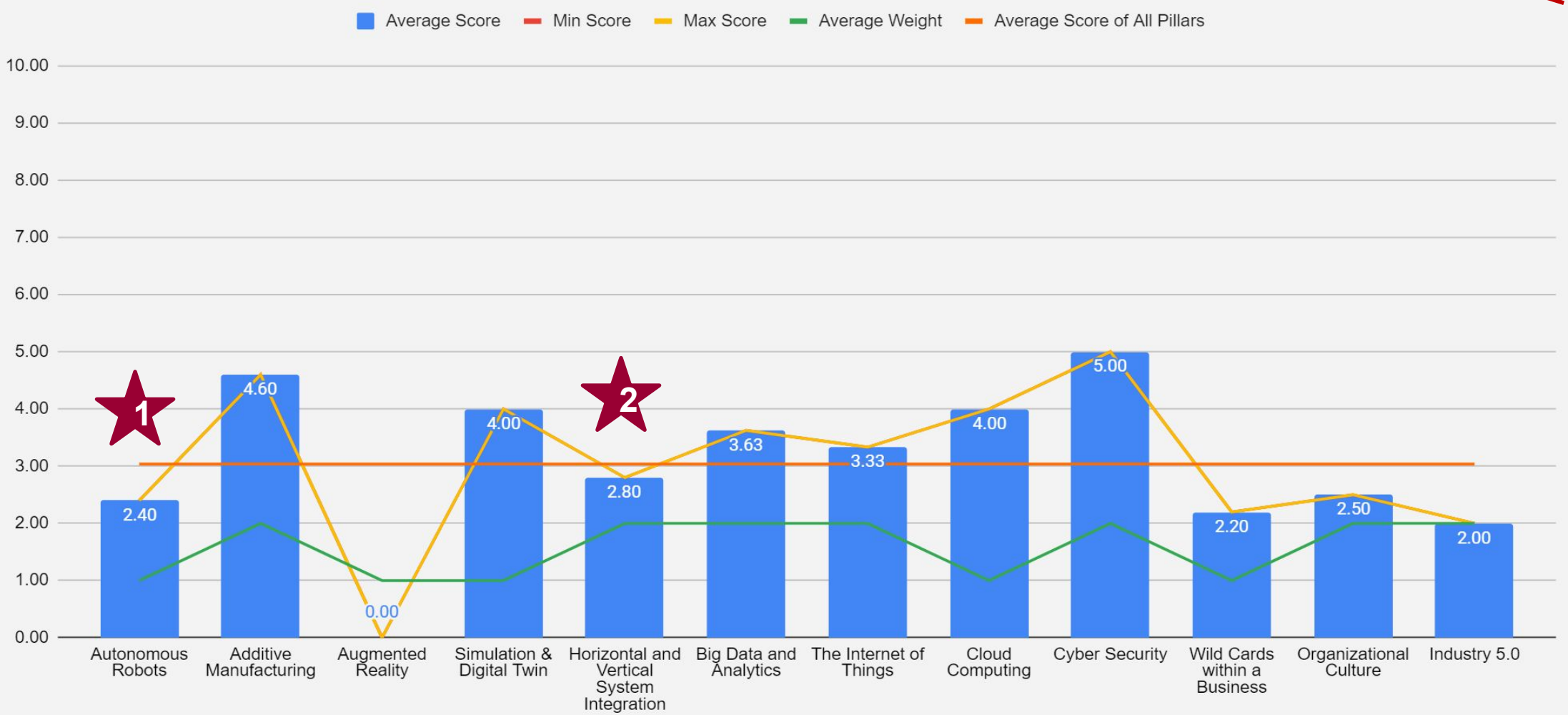
Key Performance Indicators (KPIs)

Alignment Matters!

- Operating Efficiency
- Overall Equipment Effectiveness
- Product and Process Yield (Scrap or Rework $$s)
- Capacity and Capacity Utilization
- Inventory Levels ($$s, turns)
- Data Security
- Improved Customization
- Throughput Reduction
- Prototype Turnaround Time
- Improved Safety (reduced workers comp, etc.)
- And more…

3 SCORE STATISTICS BY PILLAR

EXAMPLE



3 Key Performance Indicators (KPIs)

EXAMPLE

Key Performance Indicator Impacted by Implementation	Industry 4.0 Pillar												
	Autonomous Robots	Additive Manufacturing	Augmented Reality	Horizontal & Vertical System Integraiton	Simulation & Digital Twin	Big Data & Analytics	The Internet of Things	Cloud Computing	Cyber Security	Organizational Culture	Wild Cards within a Business	Industry 5.0
Operating Efficiency	x	x	x	x	x	x	x	x	x	x	x	x
Overall Equipment Effectiveness	x	x	x		x	x	x					x
Product and Process Yield (Scrap or Rework $$s)	x	x	x	x	x	x	x			x	x	
Capacity and Capacity Utilization	x	x			x	x	x					x
Inventory Levels ($$s, turns)	x	x		x	x	x	x				x	x
Data Security					x			x	x	x	x	
Improved Customization	x	x	x		x	x	x					x
Throughput Reduction	x	x		x	x	x	x				x	x
Prototype Turnaround Time	x	x	x		x	x	x					x

Key Performance Indicators **(KPIs)**

Improvement Example ★1:

Perspective: Technology Improvement

EXAMPLE

- **Identified Gap: *Augmented Reality***
- Potential KPI Impacts:
  - Product & Process Yield
  - Improved Customization
  - Prototype Turnaround Time
- Basic Technology Feasibility (Payback)
  - $150K implementation, rolled product yield improvement of 1% in a $30M annual COGs foundry
  - Payback = .5 years
- Additional benefit from other KPI improvements reduces payback time

3 Key Performance Indicators (KPIs)

EXAMPLE

	Industry 4.0 Pillar											
Key Performance Indicator Impacted by Implementation	**Autonomous Robots**	**Additive Manufacturing**	**Augmented Reality**	**Horizontal & Vertical System Integraiton**	**Simulation & Digital Twin**	**Big Data & Analytics**	**The Internet of Things**	**Cloud Computing**	**Cyber Security**	**Organizational Culture**	**Wild Cards within a Business**	**Industry 5.0**
Operating Efficiency	x	x	x	x	x	x	x	x	x	x	x	x
Overall Equipment Effectiveness	x	x	x		x	x	x					x
Product and Process Yield (Scrap or Rework $$s)	x	x	x	x	x	x	x			x	x	
Capacity and Capacity Utilization	x	x			x	x	x					x
A Inventory Levels ($$s, turns)	x	x		x	x	x	x				x	x
Data Security					x			x	x	x	x	
Improved Customization	x	x	x		x	x	x					x
Throughput Reduction	x	x		x	x	x	x				x	x
Prototype Turnaround Time	x	x	x		x	x	x					x

Key Performance Indicators **(KPIs)**

Improvement Example (A):

Perspective: KPI Opportunity Identification

- **Identified Opportunity:** ***Inventory Level Improvement*** EXAMPLE
- Potential I4.0 technology application:
  - Autonomous Robots
  - Simulation & Digital Twin
  - Big Data & Analytics/IoT
- Basic Technology Feasibility (ROI)
  - Data analytics IDs environmental factor changes to improve process yields, resulting in a WIP reduction of $500K
  - Sensors, PLCs and data analysis software cost = $100K
  - Carrying costs on $500K = 25% or $125K annually
  - ROI = $125K/$100K = 125%
- Additional benefit from other KPI improved by data analytic capability implementation improves ROI

4 Business Value Action Plan

Business Value Action Plan

Connecting technology gaps to impacted key performance indicators, and creating a prioritized implementation feasibility study that predicts where business value can be seen, allows a business to create an action plan that is sequenced in value priority order. This plan will have predictable contents based on the technologies selected.

4 Business Value Action Plan

CENTER FOR BUSINESS GROWTH & INNOVATION
CBGI.UNI.EDU
UNI University of Northern Iowa Business & Community Services

CBGI Industry 4.0 Technical Assessment

Visit Date:	January 1, 2024
Assessment of:	Hutcheson Foundry Contact: Todd Hutcheson 8120 Jennings Drive, Suite 128 Cedar Falls, IA 50614 todd.Hutcheson@uni.edu 1 (319) 431-6396

Assessment By:
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Summary of Findings

- Hutcheson Foundry produces castings for the aerospace & defense industry. They are the largest castir supplier in the world for Company A, also doing work for Company B and others. They plan to explo working with the transportation industry soon.
- Hutcheson produces about 10,000 pieces per week on three shifts with a total of 245-250 employees. The produce 120 unique part numbers for Company A, and they would be classified as a high volume/low m manufacturing environment.
- The facility generally consists of older equipment and has a large need for integration, connection and valu improvement mapping of its processes and equipment. It is a progressive, but "target rich" environment.
- The leadership team in Cedar Falls is very open to sharing information and discussing means improvement. They are also open to change and view their own operation with an appropriately critical ey They are anxious to learn, and even more anxious to apply what they learn about I4.0 to improve the facility. Hutcheson has a leadership culture very anxious to learn and implement I4.0 principles in a co effective way that is valued by their customers.

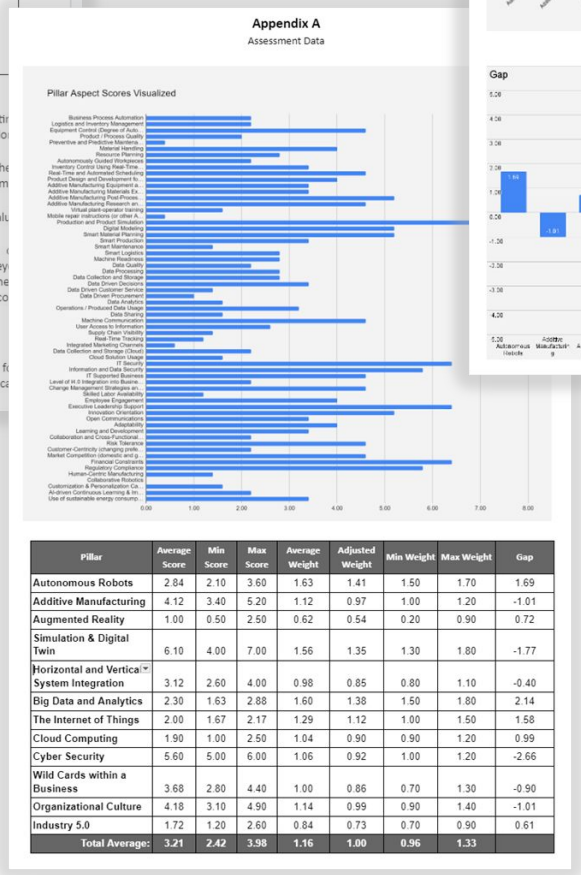
Key Opportunities

- Big Data & Analytics
  - Increase automatic data collection via sensor applications and installation, utilizing cloud storage f data access/integration. Hutcheson collects a lot of data, but it currently resides in loca non-integrated locations making it difficult to analyze in a connected and collective fashion

Appendix B
Assessment Summary Charts

Assessment Summary

Gap



Appendix A
Assessment Data

Pillar Aspect Scores Visualized

Pillar	Average Score	Min Score	Max Score	Average Weight	Adjusted Weight	Min Weight	Max Weight	Gap
Autonomous Robots	2.84	2.10	3.60	1.63	1.41	1.50	1.70	1.69
Additive Manufacturing	4.12	3.40	5.20	1.12	0.97	1.00	1.20	-1.01
Augmented Reality	1.00	0.50	2.50	0.62	0.54	0.20	0.90	0.72
Simulation & Digital Twin	6.10	4.00	7.00	1.56	1.35	1.30	1.80	-1.77
Horizontal and Vertical System Integration	3.12	2.60	4.00	0.98	0.85	0.80	1.10	-0.40
Big Data and Analytics	2.30	1.63	2.88	1.60	1.38	1.50	1.80	2.14
The Internet of Things	2.00	1.67	2.17	1.29	1.12	1.00	1.50	1.58
Cloud Computing	1.90	1.00	2.50	1.04	0.90	0.90	1.20	0.99
Cyber Security	5.60	5.00	6.00	1.06	0.92	1.00	1.20	-2.66
Wild Cards within a Business	3.68	2.80	4.40	1.00	0.86	0.70	1.30	-0.90
Organizational Culture	4.18	3.10	4.90	1.14	0.99	0.90	1.40	-1.01
Industry 5.0	1.72	1.20	2.60	0.84	0.73	0.70	0.90	0.61
Total Average:	**3.21**	**2.42**	**3.98**	**1.16**	**1.00**	**0.96**	**1.33**	

I4.0 Improvement Summary Report

- Company Profile
- Key Opportunities
- High Value Improvement Actions
- High Impact KPIs
- Questions
- Summary
- Data

Industry 4.0 Implementation

Industry 4.0 Implementation

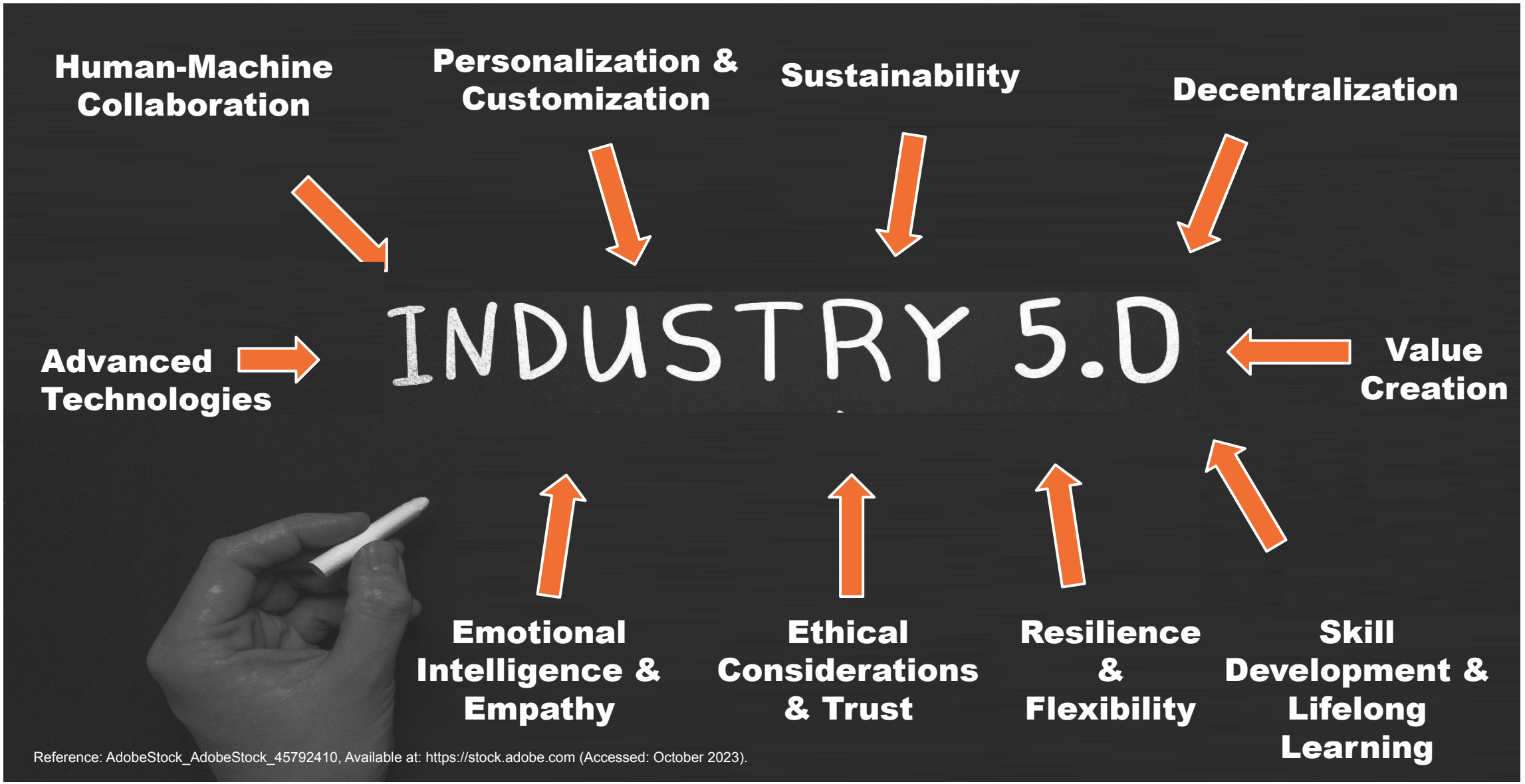
The FOUNDRY 4.0 Partnership works to provide American-based foundries with the competitive edge in technology that optimizes productivity, output, and product quality. These technological innovations create opportunities that help build a dynamic digital ecosystem. Several notable advantages are cost reduction, shortened deadlines, and excellence in quality and customer satisfaction.

What is INDUSTRY 5.0?

- **Industry 5.0 (I5.0)** focuses on the **collaboration between humans and machines**, emphasizing … human touch, craftsmanship and creative
- **I5.0** is aimed at **supporting, not superseding,** humans
- Builds upon **I4.0**, which primarily focused on **digitization, automation, the Internet of Things (IoT), and advanced analytics**
- **I5.0** is about finding the optimal balance of **efficiency and productivity**
- **I5.0** provides **business value** in the areas of:
  - Customization & Flexibility
  - Environmental Sustainability
  - Enhanced Worker Satisfaction
  - Economic Growth
  - Resilience

INDUSTRY 5.0 balances and leverages the interaction between humans and technology

What does INDUSTRY 5.0 OFFER?



Reference: AdobeStock_AdobeStock_45792410, Available at: https://stock.adobe.com (Accessed: October 2023).

SUMMARY: ELEMENTS OF INDUSTRY 4.0

IMPROVEMENT IMPLEMENTATION

I4.0 ASSESSMENT
SPECIAL OPPORTUNITY!

1.	Initial contact made (email, phone, weblink, QR)	**5** min
2.	Discussion of engagement steps and objectives	**15-30** min
3.	Submission of NDA (2 page … protects client)	**15** min
4.	Provide email address list of business participants	**15** min
5.	Link transmitted, survey completed	**15** /person
6.	Draft summary report created, sent, reviewed	**60** mins
7.	Final review with draft review comments completed	**60** mins

- **2-3 hours + …**
- **15 mins/ person + …**
- **$0 cost**

Discussion regarding follow-on project selection and feasibility analysis assistance at the discretion of the assessment partner

https://docs.google.com/forms/d/1J3ts3rpz5DPmPNBXLWVH5rI3_pl87wMCZMdjWpZlWwo/edit

UNI's ASSESSMENT REPORTING TOOL

provides facilitated, efficient & insightful I4.0 assessments

5

Complimentary, confidential access…

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Questions? Email us: cbgi@uni.edu or foundry4.0@ncdmm.org

Scan the QR Code….

But

… there's MORE!

We are building collective **Metal Casting** industry averages …

To date …
we've received:

- 67 inputs from
- 11 companies

Lowest scoring questions …

- Mobile repair instructions using augmented reality
- Artificial Intelligence driven continuous learning & improvement systems
- Virtual plant-operator training
- Autonomously guided workpieces
- Smart logistics
- Smart maintenance
- Collaborative robotics
- Integrated marketing channels
- Supply chain visibility
- Use of sustainable energy consumption & support technologies

Lowest scoring questions in the most “active” pillars …

Autonomous Robots

- Inventory Control Using Real-Time Data Management
- Material Handling

Additive Manufacturing

- Additive Manufacturing Post-Processing and Finishing
- Additive Manufacturing Materials Expertise

The Internet of Things

- Supply Chain Visibility
- Real-Time Tracking

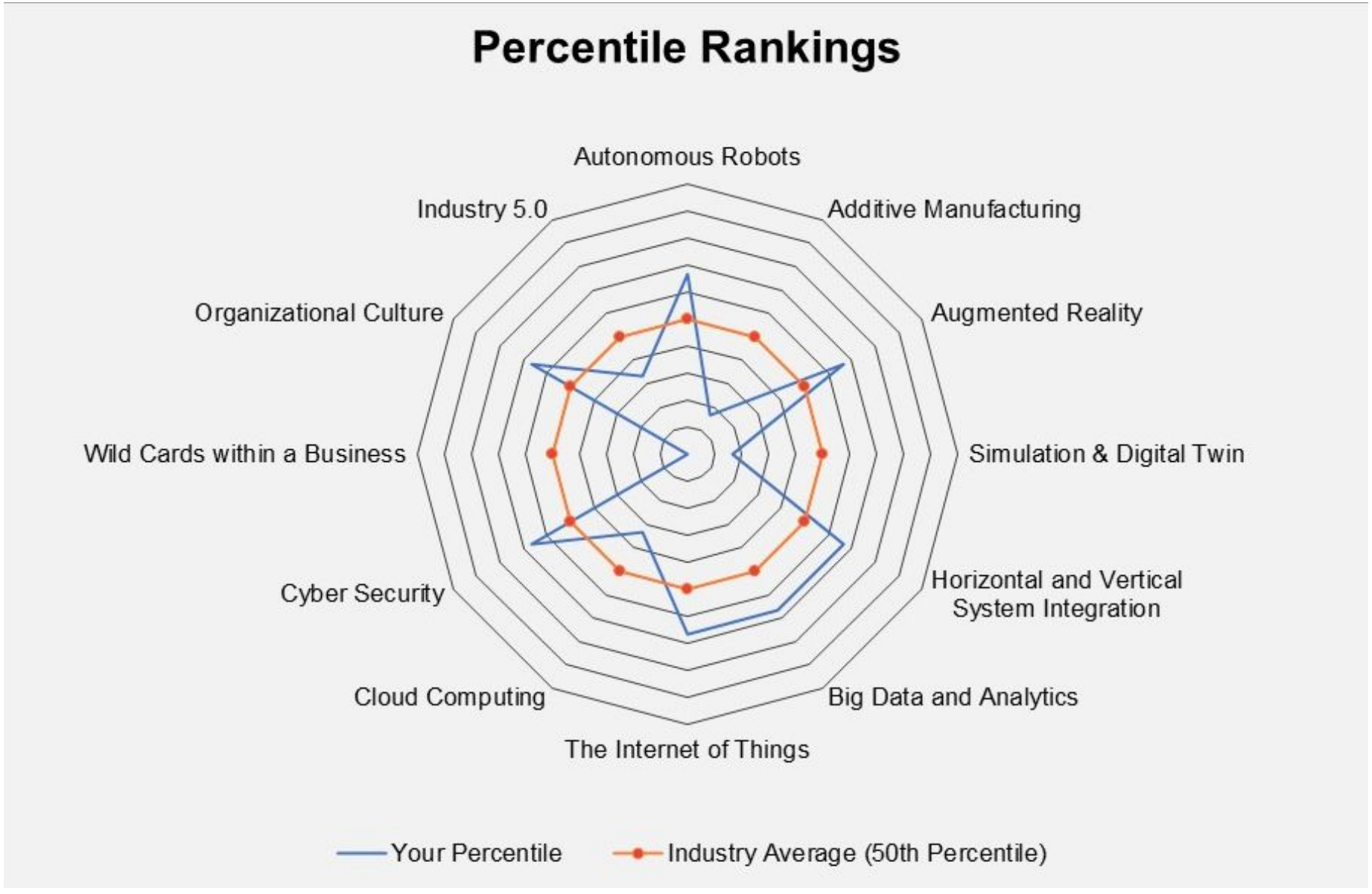
Simulation & Digital Twin

- Production and Product Simulation
- Digital Modeling

Big Data and Analytics

- Data Driven Customer Service
- Data Driven Procurement

We can also begin to provide Company comparisons to Industry Averages …



Stay Tuned!

EXECUTIVE SUMMARY

- Nearly all business sectors are experiencing a **unique set of difficult business headwinds** … and **they will not go away** in the foreseeable future
- **Industry 4.0 technology implementation** can provide a **large boost** in combating these headwinds
- **Industry 4.0 technology assessments** will provide connection to **business value** to **prioritize investments**
- **Industry 5.0** balances and leverages the interaction between **humans and technology**
- Add to Metal Casting industry knowledge! We would be excited to begin an **Industry 4.0 technology assessment** with your company **TODAY!**

OUR GOAL: Enable Application of Foundry 4.0 Concepts to Continue to Improve the Resiliency of the Foundry & Casting Industry

NEXT STEPS

CALL TO ACTION

- Review conference materials for potential additional conversations
- Utilize contacts made to continue collaborative networking discussions
- Contact UNI CBGI to more fully explore topics of interest
- Contact UNI CBGI to begin a F4.0 Assessment Partnership

OUR GOAL: Enable Application of Foundry 4.0 Concepts to Continue to Improve the Resiliency of the Foundry & Casting Industry

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Scan the QR Code….

Q&A

Thank YOU

CONTACT US!

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NOTES:

1. ***This research is sponsored by the DLA-Troop Support, Philadelphia, PA and the Defense Logistics Agency Information Operations, J68, Research & Development, Ft. Belvoir, VA.***

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FOR MORE **INFORMATION**

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https://advanceiowa.com/foundry-40-0

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FOUNDRY 4.0
Technologies revolutionizing the metal casting industry!

IA·CEO
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