Integrating Real-World Competencies: Aligning Sinclair College's Digital Transformation Curriculum with the Ohio Manufacturing Competency Model

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SINCLAIR COLLEGE

OhioTechNet

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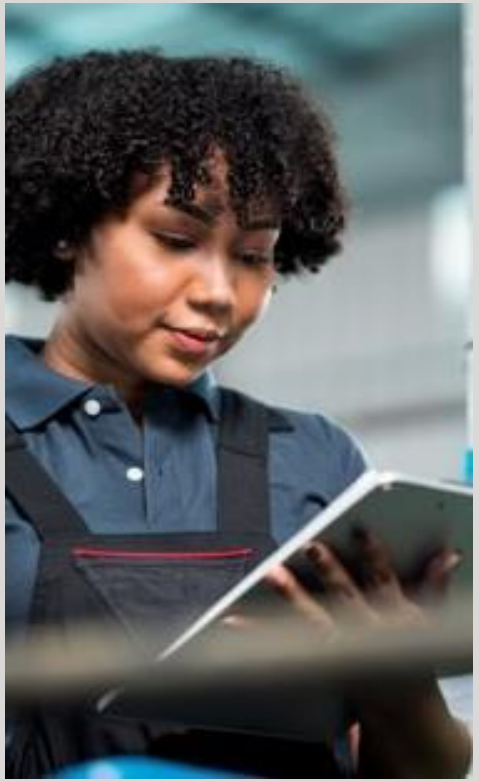


The Ohio Manufacturing Competency Model

The Ohio Manufacturers' Association

Governor's Office of Workforce Transformation | OhioTechNet | OACC Ohio Association of Community Colleges | accenture

OhioTechNet

Vision:
The members of the Ohio Technical Skills Innovation Network, or Ohio TechNet, are nationally recognized for developing & implementing collaborative, innovative solutions that meet manufacturing and technical workforce needs.

Mission:
Ohio TechNet supports workforce development and academic professionals at Ohio educational institutions to incubate, develop and sustain innovative programming that accelerates growth of Ohio's manufacturing & technical workforce.

Purpose:
Ohio TechNet partners benefit from peer-to-peer collaboration, technical assistance and access to resources, making program expansion and innovation at their institution more efficient, faster to implement and easier to sustain.

www.ohiotechnet.org

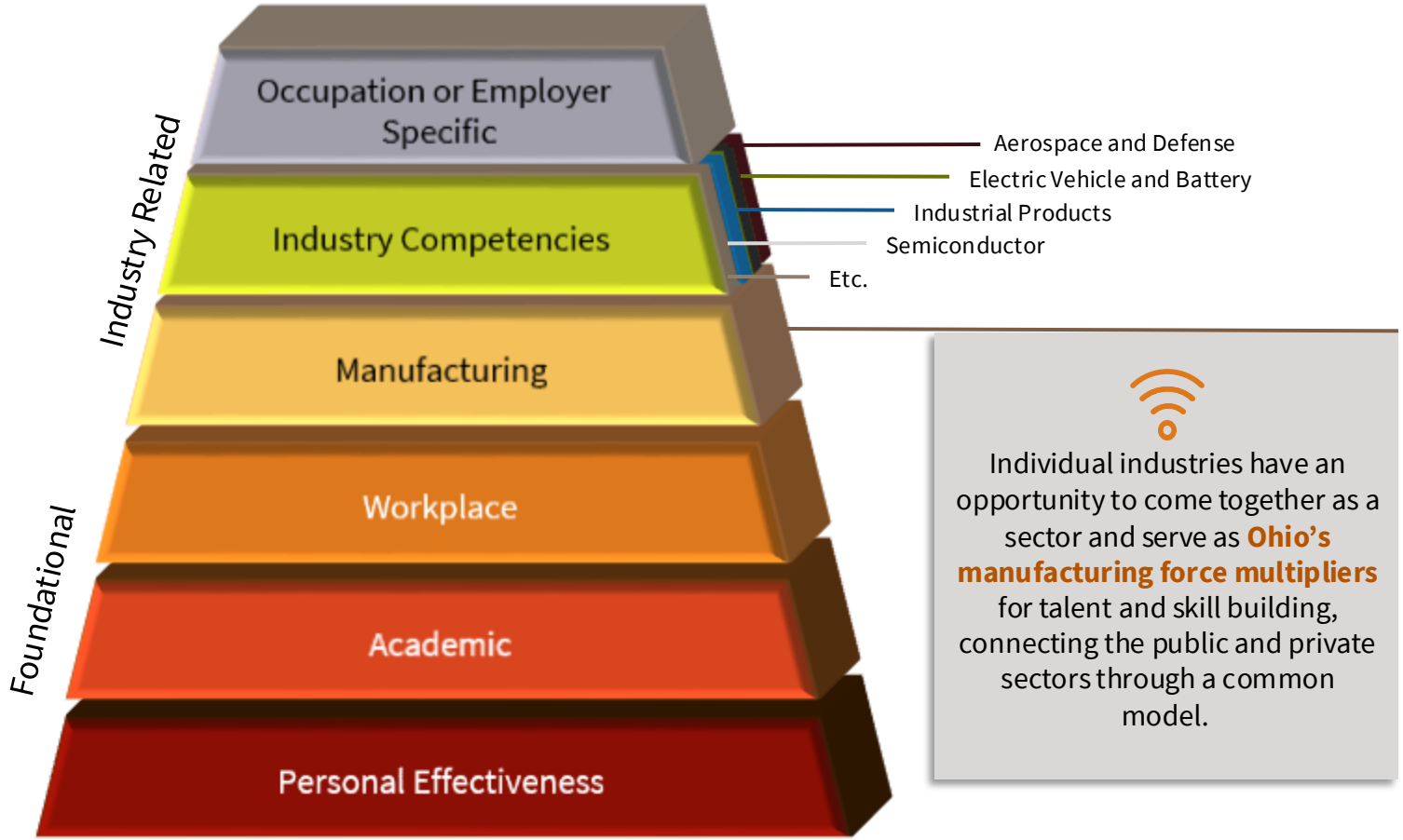
ADDRESSING THE TALENT IMPERATIVE THROUGH OHIO'S MANUFACTURING COMPETENCY BUILDING BLOCKS MODEL

Imperatives

Ohio is growing across a number of manufacturing industries.

Education and workforce training providers are working across each industry to better meet their needs.

Separate approaches to discussing in-demand, critical competencies and skills needs across each industry.



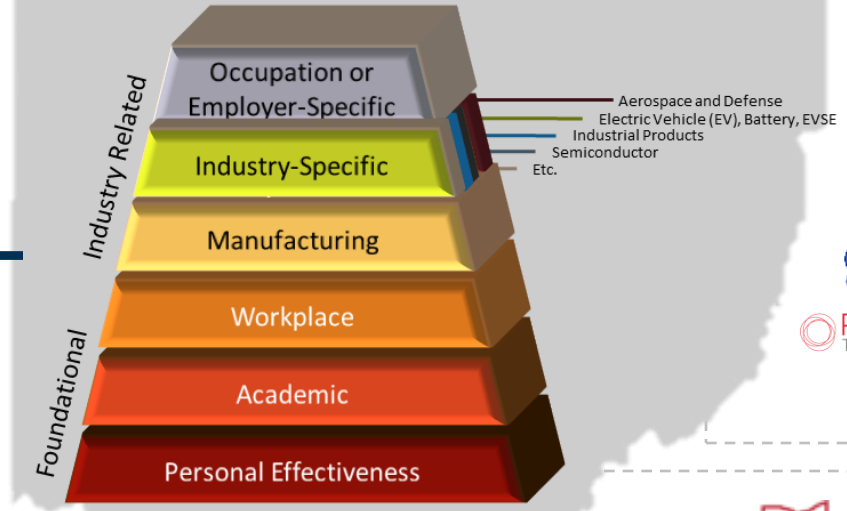
Individual industries have an opportunity to come together as a sector and serve as **Ohio's manufacturing force multipliers** for talent and skill building, connecting the public and private sectors through a common model.

THE OHIO MANUFACTURING COMPETENCY MODEL DEVELOPMENT

Model development had an immense amount of support, participation, and feedback from stakeholders who have all played an invaluable role in creating a unique representation of Ohio's Manufacturing Sector.

The Ohio Manufacturers' Association

OhioTechNet



ISPs

MVMC Mahoning Valley Manufacturers Coalition

MAGNET

COMP Central Ohio Manufacturing Partnership

DRMA Dayton Region Manufacturers Association

Ohio Manufacturers

ultium

ATS

StandardAero

Rhinestahl Corporation

electrify america

intel.

TOSOH

WORKHORSE

Rockwell Automation

LINCOLN ELECTRIC

WORTHINGTON INDUSTRIES

Whirlpool

FOXCONN

BOEING

ARIEL

chargepoint

ABS

ZIN TECHNOLOGIES

PROCESS TECHNOLOGY

OWL

BARNES

HONDA

Ford

LG Energy Solution

Electrification Coalition

NORTHROP GRUMMAN

Aviation Ground Equipment Corp.

Education and Workforce Partners

Governor's Office of Workforce Transformation

JobsOhio

OhioTechNet

OACC Ohio Association of Community Colleges

Workforce Development Board

Department of Education & Workforce

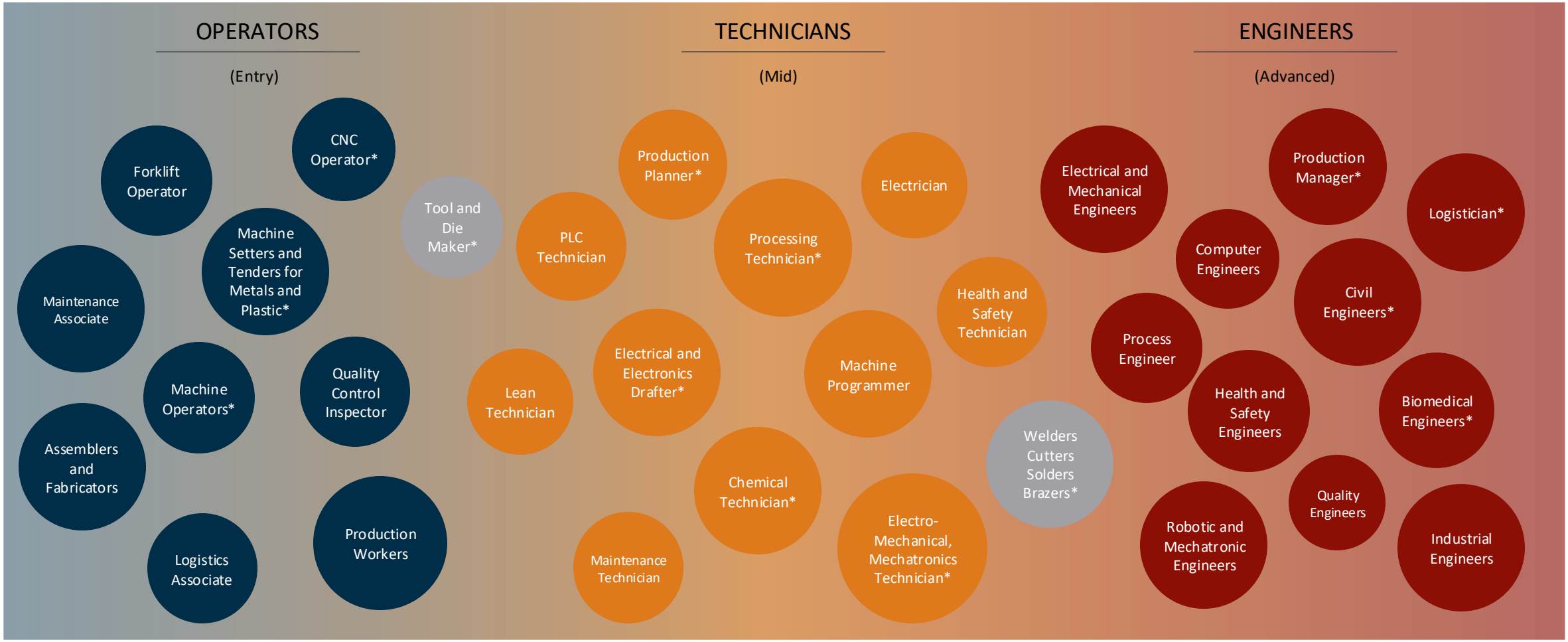
Department of Higher Education

OACTS Ohio Association of Career-Technical Superintendents

Lorain County Community College

SHARED SKILLS ACROSS ENTRY- AND MID- LEVEL MANUFACTURING ROLES

The competency model aims to identify the core skills that are common across manufacturing operator, technician, and engineering roles. While no uniform definition exists for defining “technician” or “operator” since they can be included in a range of occupational areas, these representative occupations can help serve as guardrails or benchmarks for identifying commons skills shared among in-demand roles.



***** = Identified as manufacturing priority occupations through Ohio Executive Order

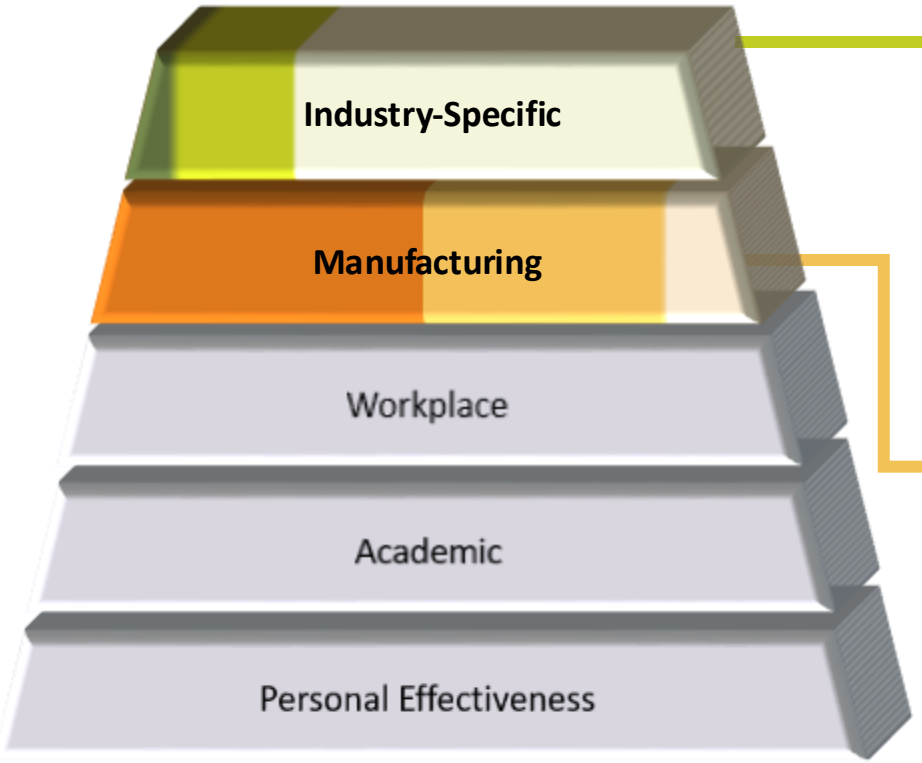
= Specialty occupations that do not exclusively belong to a specific occupation level

COMPARING CRITICALITY ACROSS THE SECTOR AND INDUSTRIES

While industry-specific competencies differentiate workforce needs, one of our key findings revealed that **the most critical knowledge, skill, and abilities (KSAs) were found at the base manufacturing layer**. This overlap in highly critical KSAs required across industries emphasizes the importance of base manufacturing competencies across Ohio.

Criticality:

High *Medium* *Low*



Entry-Level Industry Specific
(238 KSAs)

10% of entry-level KSA statements in the industry layers were deemed *high* criticality

26% were deemed *medium* criticality

64% were deemed *low* criticality

Mid-Level Industry Specific
(294 KSAs)

35% of mid-level KSA statements in the industry layers were deemed *high* criticality

56% were deemed *medium* criticality

9% were deemed *low* criticality

Entry-Level Manufacturing (Shared)
(172 KSAs)

48% of entry-level KSA statements in the base manufacturing layer were deemed *high* criticality

41% were deemed *medium* criticality

10% were deemed *low* criticality

Mid-Level Manufacturing (Shared)
(140 KSAs)

33% of mid-level KSA statements in the base manufacturing layer were deemed *high* criticality

61% were deemed *medium* criticality

6% were deemed *low* criticality

A larger percentage of the most critical knowledge, skill, and ability statements fell within the sector-wide manufacturing base layer as compared to the industry-layers

THE COMPETENCY MODEL HIERARCHY

To help us organize and navigate our ever-growing competency model repositories, we have adopted a four-layer hierarchy structure.

Competency

Competencies are the broadest level of skill categorization. They represent a cluster of related skills or knowledge that collectively contribute to a specific area of expertise (e.g., operational quality, foundations of engineering).

Sub-competency

Sub-competencies are the next level of skill categorization and break down broader competencies into more specific components. They reflect a cluster of skills specific to performing a particular aspect of a job.

Topics

Topics further narrow down the specific activities that fall under each sub-competency. They represent a broader level of skill identification.

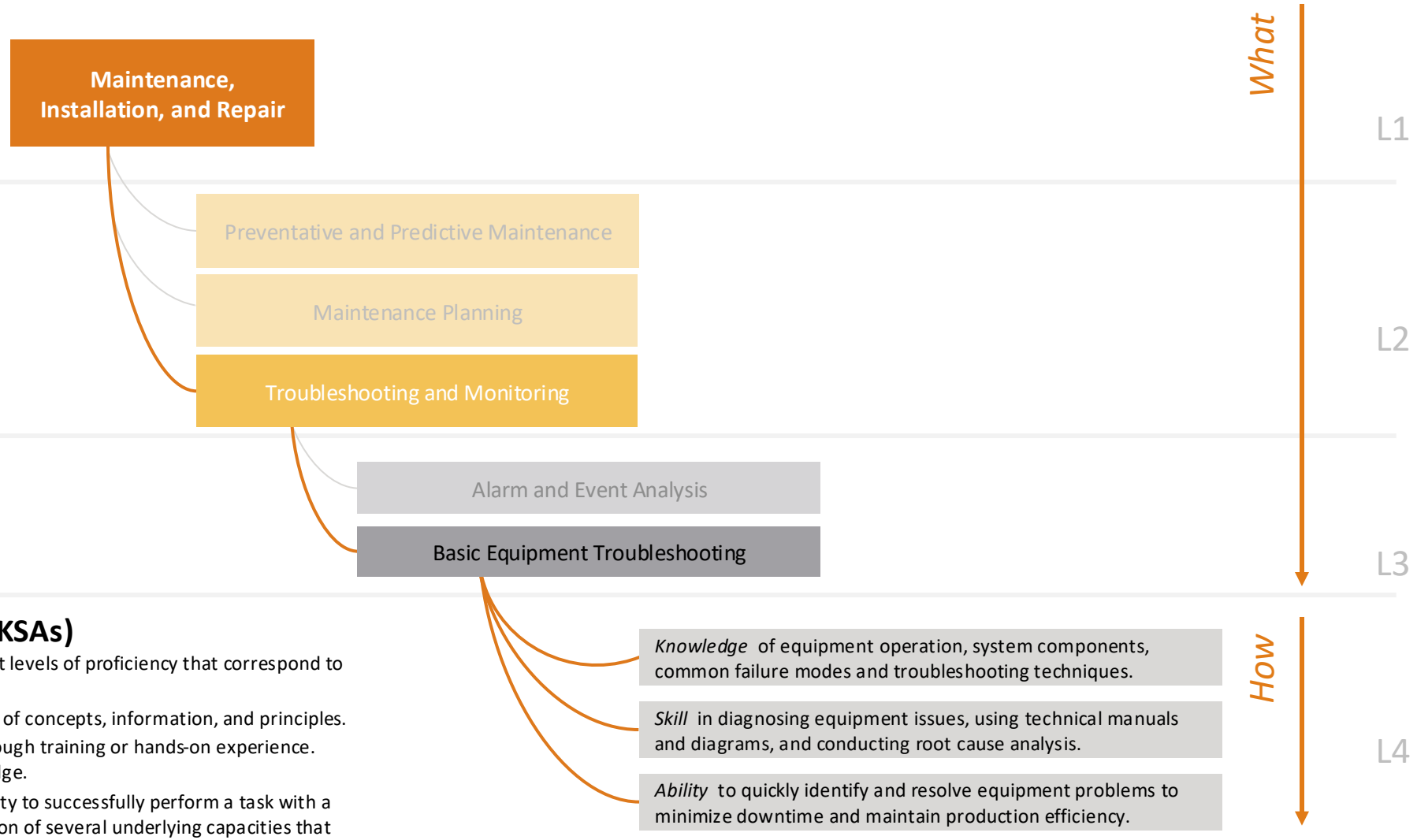
Knowledge, Skills, and Abilities (KSAs)

KSAs are a concise method of identifying the different levels of proficiency that correspond to a specific topic.

Knowledge: The theoretical or factual understanding of concepts, information, and principles.

Skills: The practical, learned capabilities develop through training or hands-on experience. Skills are practical applications of theoretical knowledge.

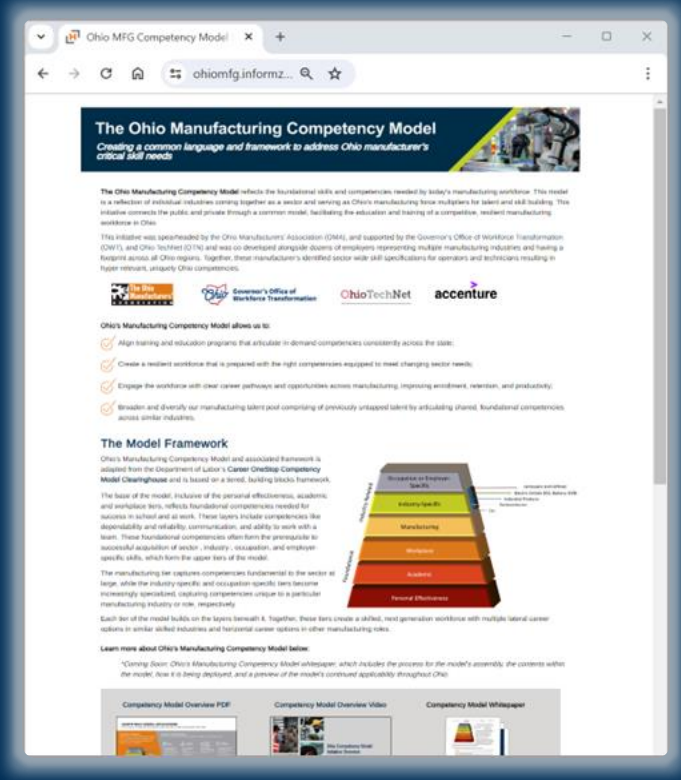
Ability: A demonstrated cognitive or physical capability to successfully perform a task with a wide range of possible outcomes. It is often a collection of several underlying capacities that enable us to learn and perform.



THE OHIO MANUFACTURING COMPETENCY MODEL LANDING PAGE

LANDING PAGE CONTENTS

- ✓ **Five competency model repositories**
- ✓ **Model Overview Video**
- ✓ **Sub-competency one-pagers**
- ✓ **Use Case Overviews**
- ✓ **Competency Model Whitepaper**
- ✓ **Use Case Toolkits**



Curriculum Assessment Training Recording (YouTube): Full session recording on how to run a curriculum assessment and use templates

Curriculum Assessment Instructions and Results Template (PPT): Use case how-to guide and template report for presenting competency coverage and assessment findings.

Curriculum Assessment Template (XSL): Competency and curriculum coverage crosswalk document; includes charts for interpreting assessment results.

https://ohiomfg.informz.net/ohiomfg/pages/Ohio_MFG_Competency_Model_

*Five once the Industry-Specific Semi-Conductor Model is added.

COMPETENCY MODEL REPOSITORIES

There are four competency model repositories – 1) personal effectiveness, workplace, and academic competencies, 2) manufacturing sector-wide competencies, 3) EV, Battery, and EVSE competencies, 4) Aerospace & Defense competencies, and 5) Semiconductor competencies.

OHIO MANUFACTURING COMPETENCY MODEL APPLICATIONS

Extension of the Competency Model's value takes form in the many ways it can be applied or used across the state.

Competency Model Build

Building and customizing a competency model first involves collecting and synthesizing labor market information and then convening manufacturers to customize and validate.

Competency Model Applications

Various use cases can be pursued after a competency model has been established, such as…

Career Pathways

- Identify advancement pathways within an organization or industry.
- Reference tool to develop stackable credentials.

Curriculum Assessment

- Align curriculum to employer and skilled labor needs.
- Highlight curriculum gaps or redundancies.

Regional Training Mapping

- Identify regional training strengths and gaps based on coverage of competencies.

Employee Assessment

- Communicate role-specific competency mastery expectations to employees.
- Gauge employee advancement readiness, succession planning.

Train-the-Trainer Program Enhancement

- Inform on-the-job training programs
- Benchmark for supervisors to encourage continuous learning within teams.

Credential & Apprenticeship Development

- Identify existing credentialling and apprenticeship program gaps.
- Delineate educator and employer skill "responsibility".

Employer & Educator Mapping

- Identify target institutions based on high competency overlap.

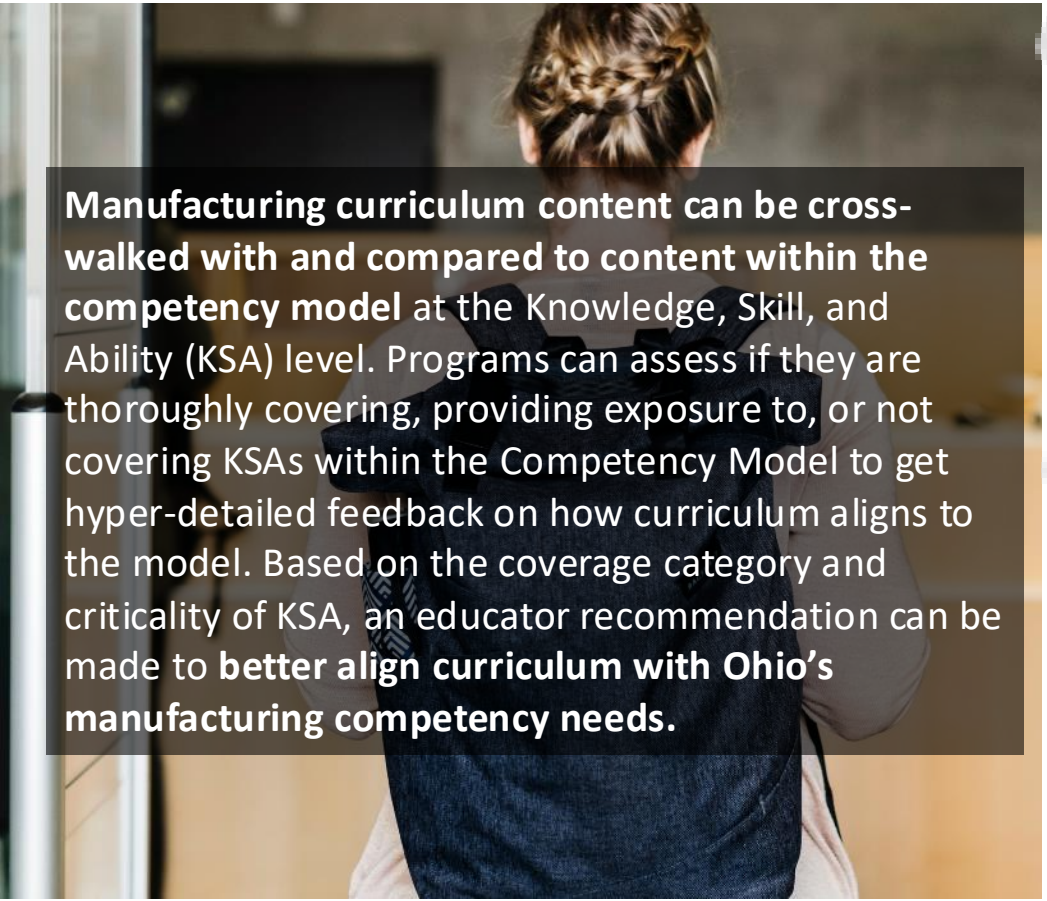
Talent Pipeline Management

- Consistency in job posting language.
- Source a broader pool of qualified candidates.

And many others (e.g., Credit for Prior Learning)…

The Competency Model Clearinghouse and associated framework is adapted from DOL's CareerOneStop.

CURRICULUM ASSESSMENT



Manufacturing curriculum content can be cross-walked with and compared to content within the competency model at the Knowledge, Skill, and Ability (KSA) level. Programs can assess if they are thoroughly covering, providing exposure to, or not covering KSAs within the Competency Model to get hyper-detailed feedback on how curriculum aligns to the model. Based on the coverage category and criticality of KSA, an educator recommendation can be made to **better align curriculum with Ohio's manufacturing competency needs.**

Conducted by Educators | *Utilized by Educators* | *Promoted by OMA and ISPs*

WHAT ARE THE BENEFITS?

- Promotes curricula across ISPs and employers.
- Highlights clear path for educators to pinpoint curriculum areas to enhance.
- Upskills students to be better prepared to enter the workforce.

WHAT QUESTIONS ARE ADDRESSED?

- How can curricula more closely align with Ohio manufacturers' designated competency needs?
- How can ISPs promote curricula that address critical employer needs?
- What additional content can supplement existing manufacturing curricula?

WHAT'S THE PROCESS?

01
Local education programs evaluated against competency model

02
Coverage level identified and classified

03
Recommendation and implementation of curriculum modifications/updates

CATEGORIZING CURRICULUM COVERAGE

The below are definitions and examples of how to differentiate between marking something as a gap, exposure, or thorough coverage within a curriculum or training program. Curriculum assessors should consider the level of depth and breadth with which content is covered and integrated into learning outcomes to help make distinctions.

		EXAMPLES
GAP	A gap in the curriculum refers to the **absence or inadequacy of essential content**, skills, or concepts	• Not present or minimally covered in curriculum • Absence of assignment or activities • Content is included, but it may be isolated in a way that diminishes its importance or relevancy
EXPOSURE	Exposure in the curriculum denotes **surface-level coverage of content**. It provides a basic understanding but lacks the thoroughness needed for mastery.	• Assessments may be simpler, more surface-level evaluations • Fewer resources (e.g., time, equipment) are dedicated to a topic; exposure may be limited to a few lectures or readings • Occasional homework problems, brief case studies
THOROUGH COVERAGE	Thorough coverage in the curriculum implies that **all essential components are addressed**, and the curriculum goes beyond surface-level knowledge.	• Assessment encourages deep understanding and/or application of content learned • Curriculum has clear objectives that reflect deep engagement with material • Considerable resources (e.g., time, equipment) are dedicated to a topic

STRATEGIC UPDATE RECOMMENDATION FRAMEWORK

Strategic recommendations are derived once curriculum coverage is compared against criticality as deemed by Ohio employers.

Curriculum Assessment Output

Manual assessment of curriculum

Manufacturing KSAs

	Criticality	Curriculum Coverage
Knowledge of calibration procedures, precision measurement tools, and equipment accuracy requirements.	High	Gap
Ability to ensure accurate designs that meet GD&T requirements.	High	Exposure
Knowledge of machine preparation activities such as lubrication, restocking of materials, understanding operation and safety.	High	Gap
Skill in reading and interpreting electrical schematics, including wiring diagrams, circuit layouts, and control panel drawings.	High	Thorough Coverage
Skill in identifying opportunities for improved ergonomic workstation layouts.	Low	Gap
Knowledge of GD&T principles and standards for parts manufacturing.	Medium	Thorough Coverage

- "No Changes" Recommendation Type
- "Moderate Changes" Recommendation Type
- "High Priority Changes" Recommendation Type

Sample strategic decisions:

Gap and High Criticality
Prioritize Inclusion
Based on employer input, critical need in industry; recommend bridging the gap and fast-track integration of KSA into curriculum.

Thorough Coverage and High Criticality
Sustain
Maintain the depth and quality of instruction. Regularly update to incorporate newest industry trends.

Gap and Low Criticality
Permissible Gap
Assess the necessity of filling the gap. If there's limited industry demand, consider offering it as an optional workshop or an extracurricular activity.

INSIGHTS DRAWN FROM ASSESSING CURRICULUM

Nine possible strategic recommendations resulted based on all possible KSA criticality – low, medium, high – and curriculum KSA coverage – gap, exposure, thorough coverage – combinations.

Presence in Curriculum
As inferred through curriculum content

Criticality
As deemed by Ohio manufacturers

	Gap	Exposure	Thorough Coverage
Low	**Permissible Gap**: Focus on areas with higher demand and criticality. If there's limited industry demand, consider offering it as an optional workshop or an extracurricular activity. *"Just Right"*	**Decrease Coverage:** Consider de-emphasizing and focusing on providing foundational knowledge. Offer this topic as an elective or integrate it into broader subjects. *"Further discussion warranted"*	**De-emphasize:** Focus on maintaining basic coverage. Consider integrating this topic into broader subjects or offering it as an elective to allow students to explore their interests. *"Too much"*
Medium	**Plan Integration:** Develop a plan for integrating the topic into the curriculum (e.g., curriculum development and faculty training). *"Further discussion warranted"*	**Keep As-is:** Determine if the exposure is sufficient to meet industry demands. If it is, maintain level of coverage in curriculum. If not, consider increasing the depth slightly. *"Just Right"*	**Assess Demand:** Assess the necessity of maintaining full coverage. If the topic is foundational but not evolving rapidly, consider focusing efforts on areas with gaps. *"Further discussion warranted"*
High	**Prioritize Inclusion:** Develop new courses, workshops, or partnerships with industry to ensure students receive in-depth training. Fast-track the integration of this topic into the curriculum. *"Too little"*	**Expand Coverage:** Enhance the curriculum to provide full coverage. Develop specialized courses or modules to delve deeper into the topic. *"Further discussion warranted"*	**Sustain:** Maintain the depth and quality of instruction. Regularly update content to incorporate the latest industry practices and technologies. *"Just Right"*

No changes Medium priority changes High priority changes

INTERPRETING CURRICULUM ASSESSMENT FINDINGS

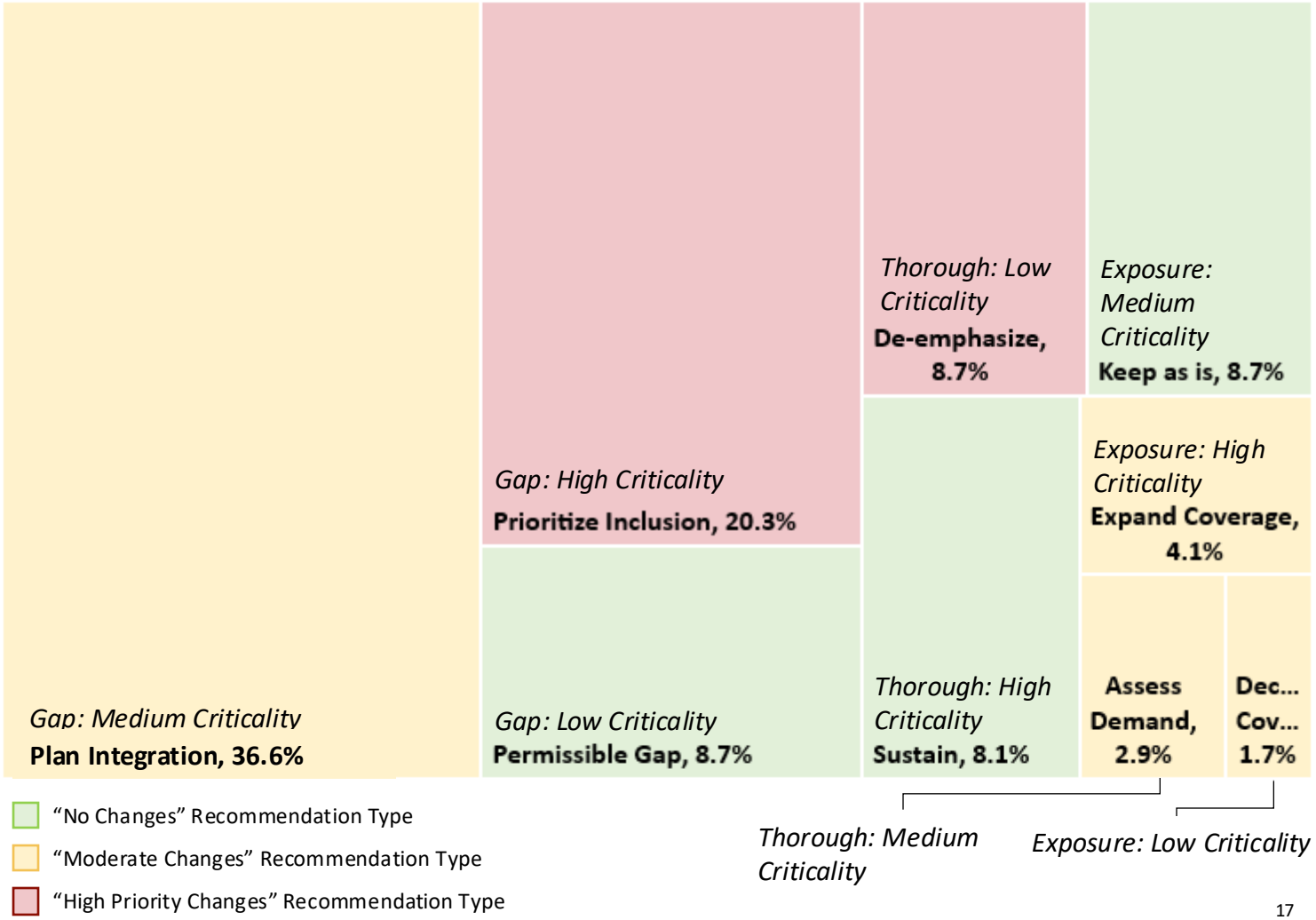
The curriculum assessment excel dashboards consolidate individual KSA recommendations into at-a-glance charts summarizing assessment findings for a sample technician (mid-level) focused program.

- The most **common recommendation category is represented as the largest box**. The corresponding percentage indicates the percent of KSAs that fell within that recommendation type *(note: size of the box does not equate to priority of the change)*

- Recommendation types are shaded based on their priority. For example, KSAs falling within "Prioritize Inclusion" and "De-emphasize" should be addressed first within curriculum.

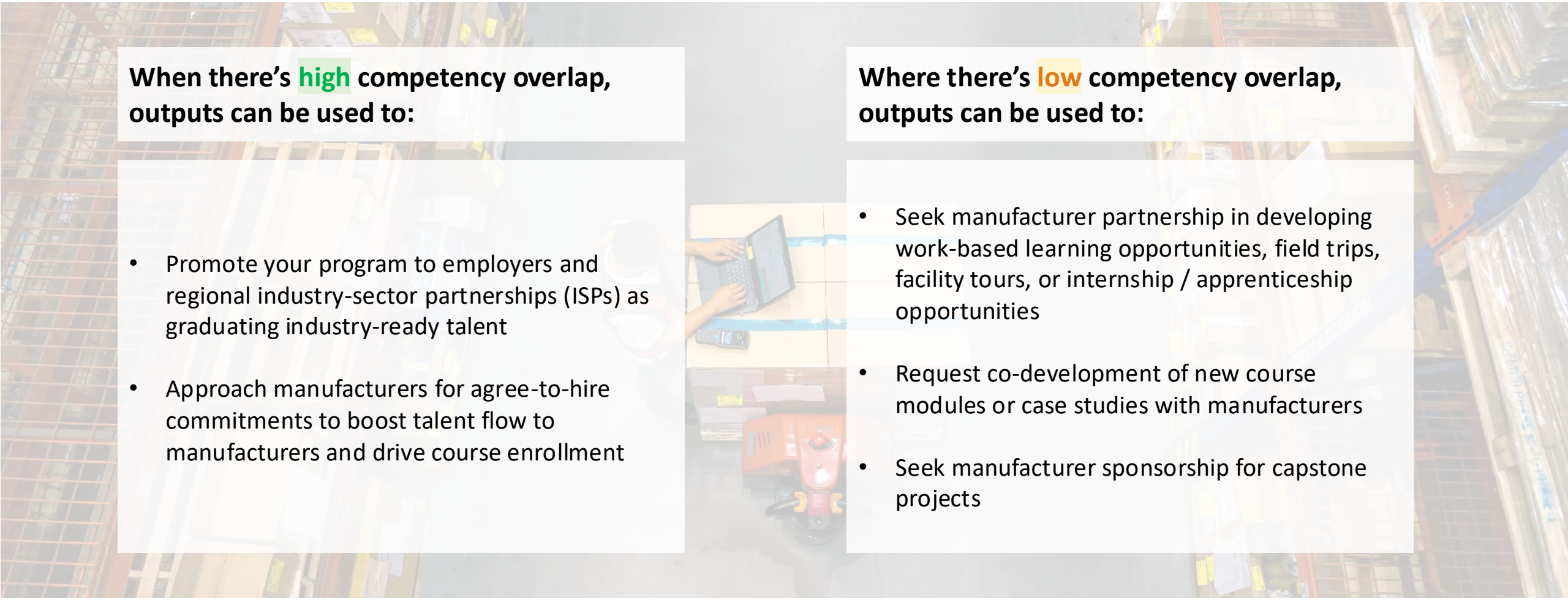
- The graph on the right indicates 36.6% of KSA statements, for example, fell within the "Plan Integration" recommendation type. In other words approx. 36% of mid-level KSAs within the model were medium criticality and missing from curriculum.

SAMPLE ASSESSMENT OUTPUT



USING CURRICULUM ASSESSMENT RESULTS TO DRIVE ALIGNMENT WITH MANUFACTURERS

Assessment results and findings can be used to approach regional manufacturers and spotlight industry-ready talent.



When there's high competency overlap, outputs can be used to:

- Promote your program to employers and regional industry-sector partnerships (ISPs) as graduating industry-ready talent
- Approach manufacturers for agree-to-hire commitments to boost talent flow to manufacturers and drive course enrollment

Where there's low competency overlap, outputs can be used to:

- Seek manufacturer partnership in developing work-based learning opportunities, field trips, facility tours, or internship / apprenticeship opportunities
- Request co-development of new course modules or case studies with manufacturers
- Seek manufacturer sponsorship for capstone projects

COMPETENCY MODEL USE DECISION FRAMEWORK

Below provides directional guidance on knowing how and when to use each tier of the competency model when conducting curriculum assessments.

	Assessing holistic manufacturing program *Program emphasis on broad set of skills relevant to many industries*	**Assessing industry-specific manufacturing program** *When course aims to integrate industry-specific skills with broad manufacturing principles or when industry-specific program covers foundational , pre-requisite content before delving into industry-specific content*	**Assessing industry-focused module or niche component of program** *When module being assess is specialized or for continuing education or professional development courses focused on industry-specific skills only*
Sector-Wide Manufacturing Competency Model			
Industry-Specific Competency Model (e.g., EV, A&D, semiconductor)			
Examples	• OACC's Intro to Manufacturing Program • Tooling U-SME's Certified Manufacturing Associate Program • Introduction to Industrial Processes	• Electric Vehicle Manufacturing Technology • Aerospace and Defense Principles in Manufacturing	• Battery Technology for Electric Vehicles • Semiconductor Manufacturing Techniques

DIGITAL TRANSFORMATION

- **Digital Transformation** is the process of adopting technology to improve products and business outcomes.
- **Digital thread** enables Industry 4.0 technologies that drive Digital Transformation.

FOUNDATIONS IN DIGITAL TRANSFORMATION

Module	Topic
1	What is Digital Transformation?
2	Introduction to Product Lifecycle
3	Problem Solving with Rapid Prototyping
4	Data-Driven Manufacturing
5	Digital Thread Supply Chain Logistics
6	Data Acquisition and Management with Digital Thread
7	Digital Thread and Quality Assurance
8	Industrial Data Preparation and Management
9	Data Analysis, Visualization, and Reporting for Industry 4.0
10	Digital Twin Technology
11	Cybersecurity with Digital Thread
12	Artificial Intelligence and Industrial Applications
13	Human Factors and Change Management with Digital Transformation
14	Capstone Project - Introduction: Assembling the Digital Thread
15	Capstone Project Presentations

FOUNDATIONS IN DIGITAL TRANSFORMATION

Curriculum Content:

- **Each module**
  - Lecture-style PowerPoint presentations
  - Case studies and industry spotlights
  - Career highlights
  - Activities for each module that are low to no cost to complete
  - Learning objectives and terms list
- Instructor guides for each module
- Glossary of terms

CURRICULUM APPLICATIONS

Credit-based coursework

- New coursework development
- Incorporation into existing coursework

Workforce Development Workshops

Train the Trainer models

Current Applications

- Ohio University
- Piqua High School/Upper Valley Career Center

Module	Topic
1	What is Digital Transformation?
2	Introduction to Product Lifecycle
3	Problem Solving with Rapid Prototyping
4	Data-Driven Manufacturing
5	Digital Thread Supply Chain Logistics
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OHIO MANUFACTURING COMPETENCY MODEL

Curriculum Assessment

Assessing current curriculum involves side-by-side comparing Ohio curricula against the competency model at the Knowledge, Skill, and Ability (KSA) level. Each line of the competency model is categorized as either thorough coverage, exposure, or gap based on the coverage in the curriculum being assessed. Based on the coverage category and criticality of KSA, an educator recommendation can be made to better align curriculum with Ohio competency needs.

ALIGNMENT WITH INDUSTRY

Relevance to Industry Needs

- Ensure that learners acquire the KSAs that are in current demand.
- Bridge the gap between education and the real-world needs of employers.

Validation of Curriculum

- Industry-informed KSAs provide an external benchmark, validating that the curriculum is relevant and current with industry expectations.

Adaptability to Changing Trends

- Industry-aligned KSAs reflect the evolving demands of the workforce, ensuring that educational content keeps pace with emerging technologies, practices, and trends.

FOUNDATIONS IN DIGITAL TRANSFORMATION

Module	Topic
1	What is Digital Transformation?
2	Introduction to Product Lifecycle
3	Problem Solving with Rapid Prototyping
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CURRICULUM ALIGNMENT

Module 5: Digital Thread Supply Chain Logistics	1. Introduction to the Digital Supply Chain
	2. Enterprise Resource Planning
	3. A Walk through the Supply Chain

CURRICULUM ALIGNMENT

Number	Type	Description
7.1.2	T	*Material Handling*
7.1.2.1		
7.1.2.2		
7.1.2.3		manner.
7.1.3	T	*Material Storage / Racking and Shelving*
7.1.3.1	K	Knowledge of storage and shelving systems, including rack design, load capacity, and storage space optimization.
7.1.3.2	S	Skill in organizing and storing materials efficiently on racks and shelves, including proper labeling and inventory tracking.
7.1.3.3	A	Ability to facilitate quick retrieval of materials when needed to support manufacturing processes.
7.2	SC	**Inventory Control**
7.2.1	T	*Warehouse Organization*
7.2.1.1	K	Knowledge of warehouse layout and organization principles, including storage zones, shelving arrangements, and aisle configurations.
7.2.		
7.2.		
7.2.		
7.2.		
7.2.2.3	A	Ability to enhance inventory tracking and accuracy by implementing effective labeling practices, minimizing errors in material identification and usage.

7.1.2.1 K Knowledge of product flow within the manufacturing plant and rejection procedures.

7.2.2.1 K Knowledge of labeling standards, barcoding systems, and identification methods used for inventory items.

CURRICULUM ALIGNMENT

		At which occupation level is the KSA relevant?			How critical is this KSA?			
Number	Type	Entry	Mid	Advanced	Criticality - Entry	Criticality - Mid	Criticality - Adv	Where is the entry-level KSA learned
7.								
7.								
7.								
7.1.2.3	A			X			H	
7.1.3	T							
7.1.3.1	K	X				M		C
7.1.3.2	S	X				M		OJT
7.1.3.3	A	X				H		OJT
7.2	SC							
7.2.1	T							
7.2.1.1	K	X				L		C
7.2.1.2	S	X				M		OJT
7.								
7.								
7.								
7.2.2.3	A	X				H		OJT

7.1.2.1 K Entry level KSA; Medium critically, Learned in curriculum.

7.2.2.1 K Entry level KSA; Medium critically, Learned in curriculum.

CURRICULUM ALIGNMENT

Module 5: Digital Thread Supply Chain Logistics	**1. Introduction to the Digital Supply Chain**	**7.1.2.1 K** Knowledge of product flow within the manufacturing plant and rejection procedures	**7.2.2.1 K** Knowledge of labeling standards, barcoding systems, and identification methods used for inventory items.	
	2. Enterprise Resource Planning	**7.2.1.1 K** Knowledge of warehouse layout and organization principles, including storage zones, shelving arrangements, and aisle configurations.	**7.1.3.1 K** Knowledge of storage and shelving systems, including rack design, load capacity, and storage space optimization.	
	3. A Walk through the Supply Chain	**4.3.4.2 S** Skill in analyzing production processes, identifying bottlenecks, and reconfiguring workflows to improve efficiency.	**4.3.2.1 K** Knowledge of root cause analysis (RCA) methodologies, such as failure mode, effects analysis, and fishbone diagrams	**7.2.8.1 K** Knowledge of inventory management principles, including ABC analysis, reorder points, and safety stock calculations.

Thorough coverage

Exposure

Gap

CURRICULUM ALIGNMENT

Number	Type	Description
4.3.4		
4.3.4.1		analysis.
4.3.4.2		
4.3.4.3		

4.3.4.2 S Skill in analyzing production processes, identifying bottlenecks, and reconfiguring workflows to improve efficiency.

		At which occupation level is the KSA relevant?			How critical is this KSA?			
Number	Type	Entry	Mid	Advanced	Criticality – Entry	Criticality – Mid	Criticality – Adv	Where is the entry-level KSA learned
4.3.4								
4.3.4.1								
4.3.4.2								
4.3.4.3								

4.3.4.2 S Entry to mid level KSA; Low to mid level criticality, Learned in curriculum.

CURRICULUM ALIGNMENT

Module 5: Digital Thread Supply Chain Logistics	**1. Introduction to the Digital Supply Chain**	**7.1.2.1 K** Knowledge of product flow within the manufacturing plant and rejection procedures	**7.2.2.1 K** Knowledge of labeling standards, barcoding systems, and identification methods used for inventory items.	
	2. Enterprise Resource Planning	**7.2.1.1 K** Knowledge of warehouse layout and organization principles, including storage zones, shelving arrangements, and aisle configurations.	**7.1.3.1 K** Knowledge of storage and shelving systems, including rack design, load capacity, and storage space optimization.	
	3. A Walk through the Supply Chain	**4.3.4.2 S** Skill in analyzing production processes, identifying bottlenecks, and reconfiguring workflows to improve efficiency.	**4.3.2.1 K** Knowledge of root cause analysis (RCA) methodologies, such as failure mode, effects analysis, and fishbone diagrams	**7.2.8.1 K** Knowledge of inventory management principles, including ABC analysis, reorder points, and safety stock calculations.

Thorough coverage

Exposure

Gap

CURRICULUM ALIGNMENT

Number	Type	Description
4.3	SC	**Continuous Improvement**
4.3.1	T	*Lean Thinking*
4.3.1.1	K	Knowledge of lean principles, methodologies, philosophies, and tools and techniques for waste reduction.
4.3.1.2		
4.3.2		
4.3.2.1		
4.3.2.2		
4.3.2.3	A	Ability to use RCA tools and methodologies to identify and communicate underlying causes.

4.3.2.1 K Knowledge of root cause analysis (RCA) methodologies, such as failure mode, effects analysis, and fishbone diagrams.

		How critical is this KSA?						
Number	Type	Entry	Mid	Advanced	Criticality – Entry	Criticality – Mid	Criticality – Adv	Where is the entry-level KSA learned
4.2.5.2	S			X			M	
4.2.5.3	A		X			H		
4.3	SC							
4.3.1	T							
4.3.1.1	K	X			H			C
4.3.2.3	A		X			M		

4.3.2.1 K Entry level KSA, High criticality, Learned in curriculum.

CURRICULUM ALIGNMENT

Module 5: Digital Thread Supply Chain Logistics	**1. Introduction to the Digital Supply Chain**	**7.1.2.1 K** Knowledge of product flow within the manufacturing plant and rejection procedures	**7.2.2.1 K** Knowledge of labeling standards, barcoding systems, and identification methods used for inventory items.	
	2. Enterprise Resource Planning	**7.2.1.1 K** Knowledge of warehouse layout and organization principles, including storage zones, shelving arrangements, and aisle configurations.	**7.1.3.1 K** Knowledge of storage and shelving systems, including rack design, load capacity, and storage space optimization.	
	3. A Walk through the Supply Chain	**4.3.4.2 S** Skill in analyzing production processes, identifying bottlenecks, and reconfiguring workflows to improve efficiency.	**4.3.2.1 K** Knowledge of root cause analysis (RCA) methodologies, such as failure mode, effects analysis, and fishbone diagrams	**7.2.8.1 K** Knowledge of inventory management principles, including ABC analysis, reorder points, and safety stock calculations.

Thorough coverage

Exposure

Gap

CURRICULUM ALIGNMENT

Module 5: Digital Thread Supply Chain Logistics	**1. Introduction to the Digital Supply Chain**	**7.1.2.1 K** Knowledge of product flow within the manufacturing plant and rejection procedures	**7.2.2.1 K** Knowledge of labeling standards, barcoding systems, and identification methods used for inventory items.	
	2. Enterprise Resource Planning	**7.2.1.1 K** Knowledge of warehouse layout and organization principles, including storage zones, shelving arrangements, and aisle configurations.	**7.1.3.1 K** Knowledge of storage and shelving systems, including rack design, load capacity, and storage space optimization.	
	3. A Walk through the Supply Chain	**4.3.4.2 S** Skill in analyzing production processes, identifying bottlenecks, and reconfiguring workflows to improve efficiency.	**4.3.2.1 K** Knowledge of root cause analysis (RCA) methodologies, such as failure mode, effects analysis, and fishbone diagrams	**7.2.8.1 K** Knowledge of inventory management principles, including ABC analysis, reorder points, and safety stock calculations.

Thorough coverage

Exposure

Gap

BEYOND THE COMPETENCY MODEL

- OMCM provides a strong foundation.
- Included knowledge and skills that extend beyond the current competency model including focusing on emerging technologies like AI, machine learning, and cybersecurity.
- Goal: Future-proof the curriculum to ensure learners are not only equipped for today's industry needs but also prepared for the emerging trends and challenges in Industry 4.0.

Module	Topic
1	What is Digital Transformation?
2	Introduction to Product Lifecycle
3	Problem Solving with Rapid Prototyping
4	Data-Driven Manufacturing
5	Digital Thread Supply Chain Logistics
6	Data Acquisition and Management with Digital Thread
7	Digital Thread and Quality Assurance
8	Industrial Data Preparation and Management
9	Data Analysis, Visualization, and Reporting for Industry 4.0
10	Digital Twin Technology
11	Cybersecurity with Digital Thread
12	Artificial Intelligence and Industrial Applications
13	Human Factors and Change Management with Digital Transformation
14	Capstone Project - Introduction: Assembling the Digital Thread
15	Capstone Project Presentations

FUTURE CURRICULUM REALIGNMENT

Industry KSAs Are Not Static

- Industry needs evolve with technology advancements and new business practices.
- KSAs will need to be updated to meet these changes.

Ongoing Curriculum Evaluation

- Regular review and adaptation of the curriculum is critical to ensure it remains relevant.

Future-Proofing Curriculum

- Ensures learners are equipped not just for today's demands, but also for the future of Industry 4.0.

The Ohio MFG Competency Model

Creating a common language and framework addressing Ohio manufacturers' critical skill needs

MODEL REPOSITORIES

USE CASE TOOLS AND TEMPLATES

MFG ENDORSEMENT

Scan QR code to access the Ohio Manufacturing Competency Model

CONNECT WITH US

- Sinclair College Workforce Development is building Digital Transformation Curriculum for Higher ED, K-12, and Workforce Development.
- Looking for partners to explore Digital Transformation curriculum replication at **no cost**.

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