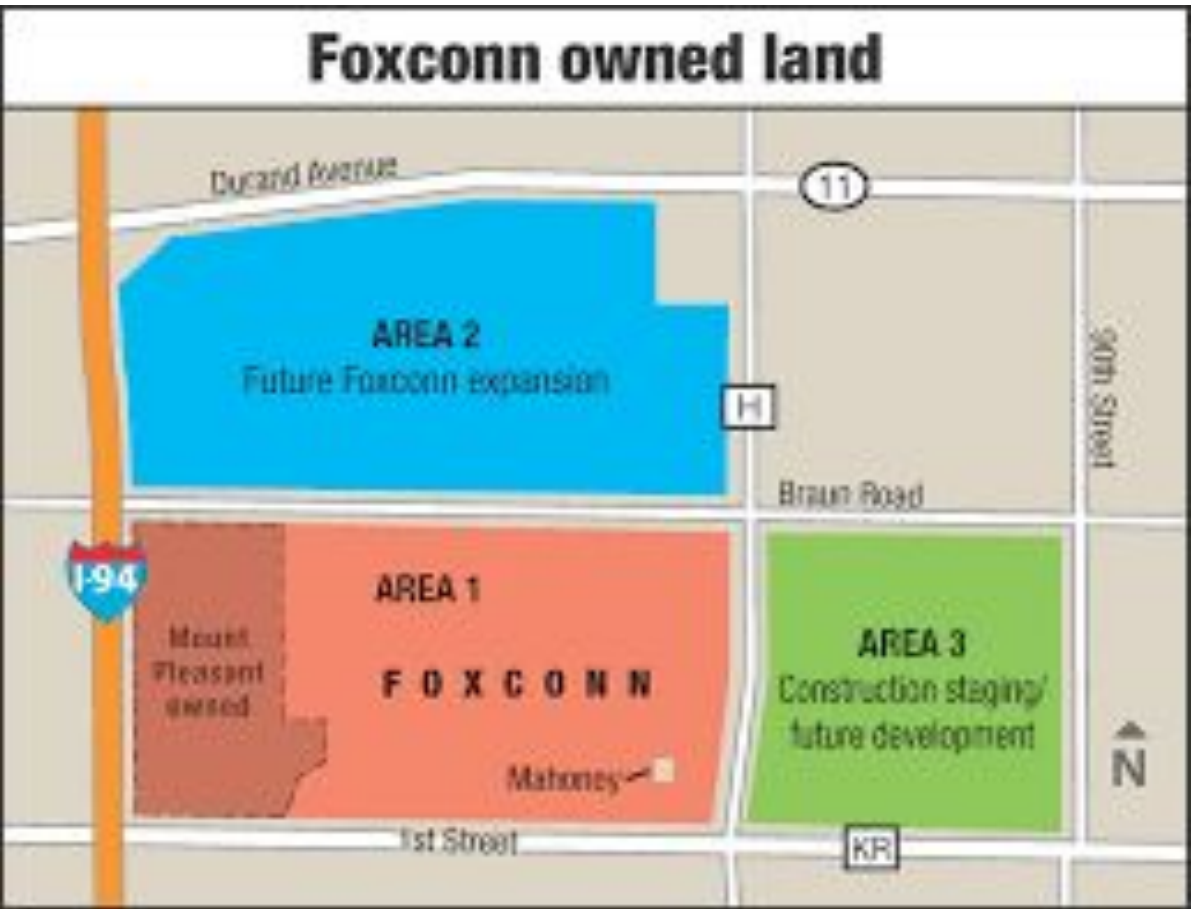# Industry 4.0 and SACA Certifications

Ray Koukari, Dean of Manufacturing, Engineering & IT, Gateway Technical College
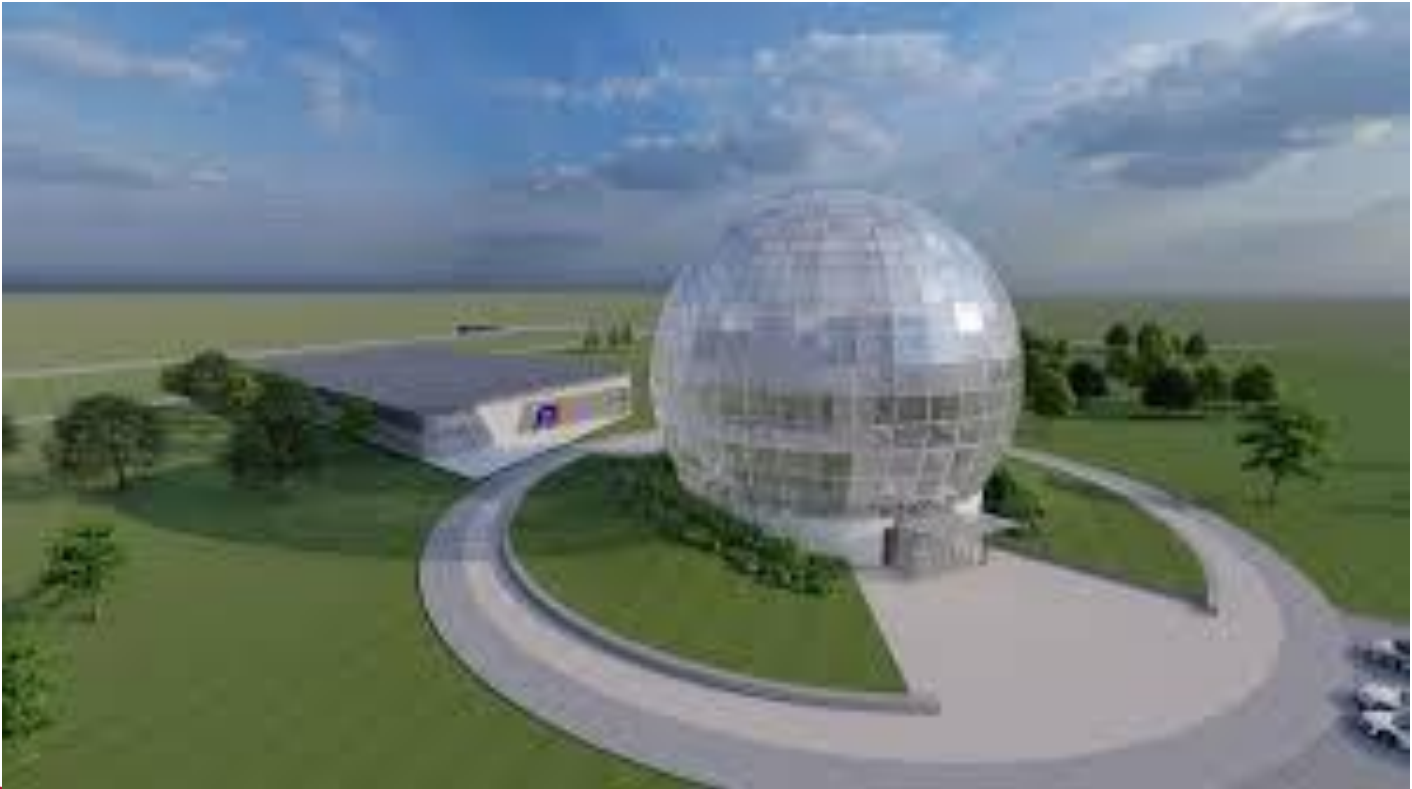**Dr. Josh Gamer**, Dean- Integrated Technology Division, Western

WHAT IS INDUSTRY 4.0
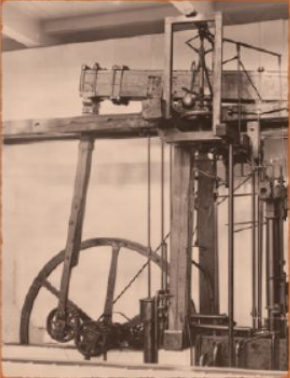
Timeline of Industrial Revolutions

What helped create the Industry 4.0 courses in Wisconsin?

In fall 2017, Gateway was working with Foxconn to create 4 new programs to support their demand. These four programs were approved in the fall 2018.

- Advanced Manufacturing
- IT-Data Analytics
- IT-Cybersecurity
- Supply Chain Management

Advanced Manufacturing Technology (10-664-2)
Associate of Applied Science
Effective 2018/2019

The course sequence shown on this sheet is the recommended path to completion of the program and reflects how courses are regularly scheduled. Courses will be scheduled in the terms indicated here. Courses may be taken out of sequence as long as requisites are met.

√	Course Number		Course Title	Requisites	Notes	Credits	Terms Offered
	664-110	*	Intro to Mechatronics			2	FA
	664-100	*	Intro to Industrial Control Systems			2	FA
	605-113	*	DC/AC I			3	FA
	664-115	*	Interpret Engineering Drawings			2	FA
	804-115		College Technical Math 1	Prereq 834-110	1, 2	5	FA
	801-136		English Composition 1	Prereq 831-103	1, 2	3	FA
	664-105	*	Intro to Industrial Robots	Prereq 664-100; 664-110		2	SP
	664-120	*	Intro to Industrial Internet of Things (IIot)	Prereq 664-100; 664-110		2	SP
	605-114	*	DC/AC II	Prereq 605-113		3	SP
	605-130	*	Digital Electronics	Coreq 605-114		4	SP
	664-102	*	Motor Controls for Advanced Manufacturing	Prereq 664-100		3	SP
	809-195		Economics	Prereq 838-105	1	3	SP
	664-111	*	Machine Mechanisms	Prereq 664-100; 664-110		3	FA
	605-136	*	PLC System Design	Prereq 605-130		3	FA
	664-117	*	Materials and Processes	Prereq 664-100; 664-110		2	FA
	664-116	*	Intro to Mfg Quality Control Systems	Prereq 664-115		2	FA
	664-121	*	Vision and Smart Sensors	Prereq 605-130; 664-102		2	FA
	801-198		Speech	Prereq 838-105	1	3	FA
	606-160	*	Fluid Power and Design			3	SP
	664-122	*	Engineering Project Management			2	SP
	664-112	*	Fundamentals of Machining Processes			3	SP
	664-101	*	PLC Industrial Control System Applications	Prereq 605-136; 664-102		2	SP
	606-138	*	Design Problems	Prereq 605-136; 664-111		2	SP
	809-198		Psychology, Introduction to	Prereq 838-105	1, 2	3	SP
			Minimum Program Total Credits Required			**64**	

High School Advanced Manufacturing

One goal was to get a jump start on the degree by offering courses to high school students.

Created: Introductory Industry 4.0 Certificate

Consisted of four 2-credit courses:

- 664-100 Introduction to Industrial Controls
- 664-110 Introduction to Mechatronics
- 664-105 Industrial Robot Oper. & Prog
- 664-120 Basic Industrial Internet of Things

These courses were adopted in many high schools. Many high schools wrote DWD Fast Forward Advanced Manufacturing Grants to get the equipment in their schools.

Industry 4.0 Equipment
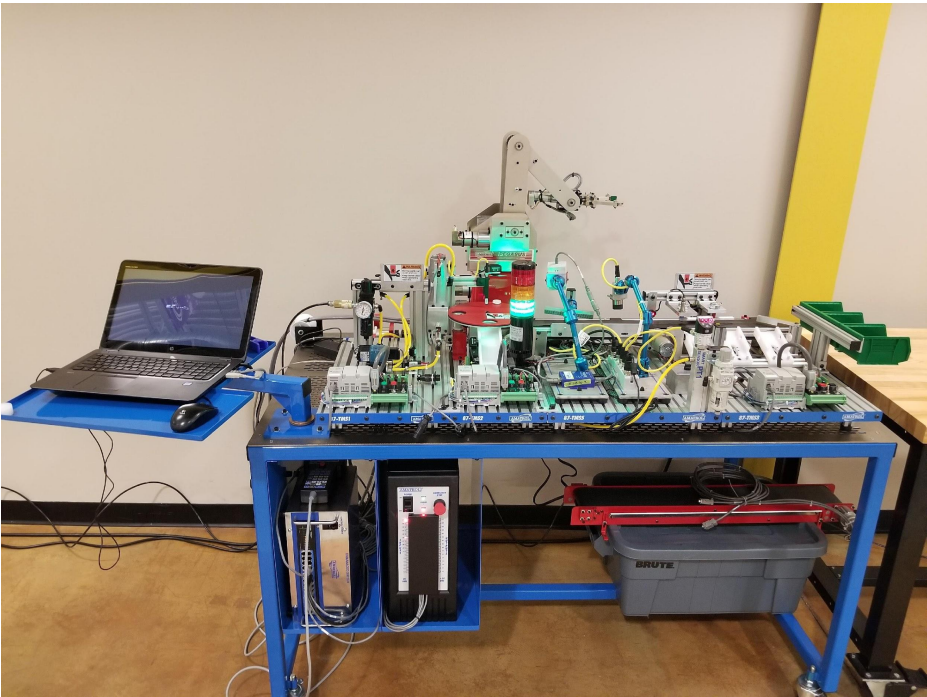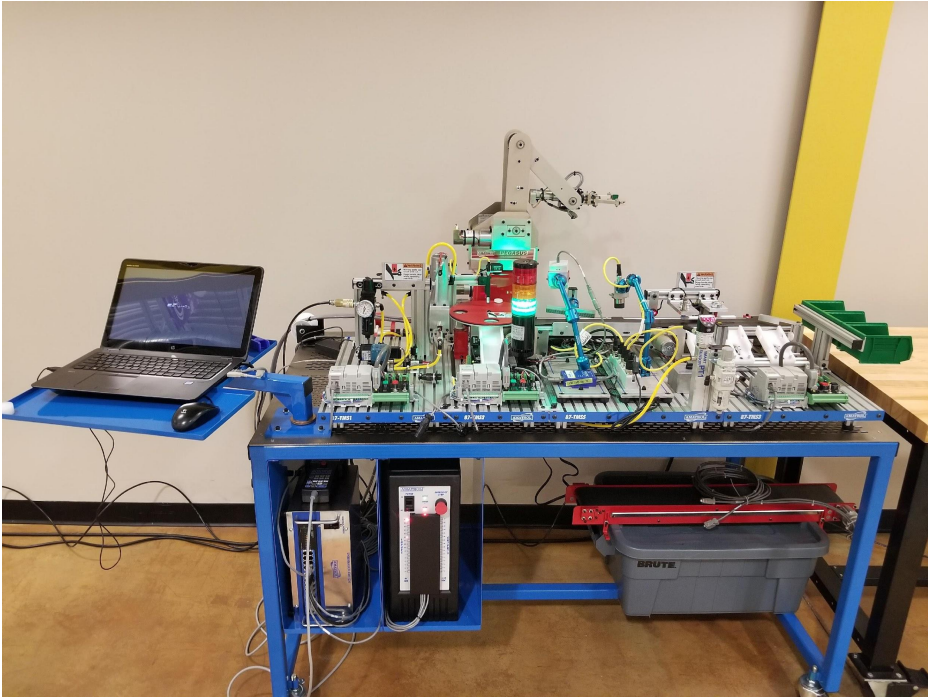
Skill Boss

What is SACA?

- The [Smart Automation Certification Alliance](#) (SACA) is a non-profit organization supported by industry partners and educators.

- SACA's Smart Automation certifications use a modular structure to enable them to fit a wide range of individual needs, industries, and educational environments. SACA offers certifications in three categories: Associate, Specialist, & Professional. Each certification is stackable, allowing individuals to start with one certification and add other certifications to customize their documented skills. Certifications are occupationally-focused, so they prepare individuals for specific occupations in the world of Industry 4.0.

- We are focusing this presentation on the **Associate Certifications**

ASSOCIATE CERTIFICATIONS	SPECIALIST CERTIFICATIONS	PROFESSIONAL CERTIFICATION
Certified Industry 4.0 Associate I *Entry Level - Operations* Industry 4.0 Operations / IT Professionals	**Certified Industry 4.0 Automation Systems Specialist** Install, Troubleshoot Program, Maintain Factory Automation 4.0 Systems — Level I / Level II	**Industry 4.0 Systems Professional I** *Engineering Level* Design, Program, Integrate & Analyze Advanced Robotic/Automation Material Handling 4.0 Systems & Software
Certified Industry 4.0 Associate II *Advanced Level - Operations* Industry 4.0 Operations / IT Professionals	**Certified Industry 4.0 Production Systems Specialist** Operate, Control, Optimize Production 4.0 Systems — Level I / Level II	
Certified Industry 4.0 Associate III *Entry Level - Robotic Systems* Industry 4.0 Operations / IT Professionals	**Certified Industry 4.0 IT Operations Specialist** Install, Troubleshoot, Program IT 4.0 Systems — Level I / Level II	
Certified Industry 4.0 Associate IV *Entry Level - IIoT & Data Analytics, Networks* Industry 4.0 Operations / IT Professionals		

SMART AUTOMATION CERTIFICATIONS
INDUSTRY/OCCUPATION DRIVEN

4 Associate Level Credentials	**6 Specialist Level Credentials**	**Professional Credentials**
Mechatronics	Automation Strand	Professional Engineering Level
Industrial Controls	Production Strand	
Robotics	IT Strand	ABET Consistent
IIoT	2 Levels Each	

Need for Alignment

When SACA developed the certifications with industry and educational partners, they did so in a logical order. This order did not align to the basic offerings of the original Gateway Certification courses. This needed to be addressed and we needed partners in the state technical college system to help us. In response to this need we developed a Grant that was funded by the Wisconsin Technical College System in July 2020. The partners in the grant are Western Technical College, Gateway Technical College, and Chippewa Valley Technical College.

Western's Need

200 annual job openings across our district

New programs of Mechatronics and IoT Integration Specialist

The TVC2.0 work near our Independence campus

NSF grant around expanding Mechatronics education

Guided pathways practices

Step 1: Alignment

- Developed a meeting schedule for faculty and deans to meet
- Created folder structure for [storage of documents](#)
- Focused on what was in each of the Industry 4.0 [courses and SACA certifications](#).
- Faculty from all colleges in the grant took one or multiple certification courses from SACA.
- We found out early that the course 664-105 Industrial Robot Oper. & Prog was 100% aligned to the SACA course Robot Systems Associate. We did realize that many faculty at both the High Schools and Technical Colleges needed Robotic Training which was provided in the grant.

Alignment WIDS changes

- Faculty from each college worked to make the minor changes to each course in their programs.
- Teaching started in Fall 2021 and Spring 2022
- We are looking to meet our grant numbers for students and faculty
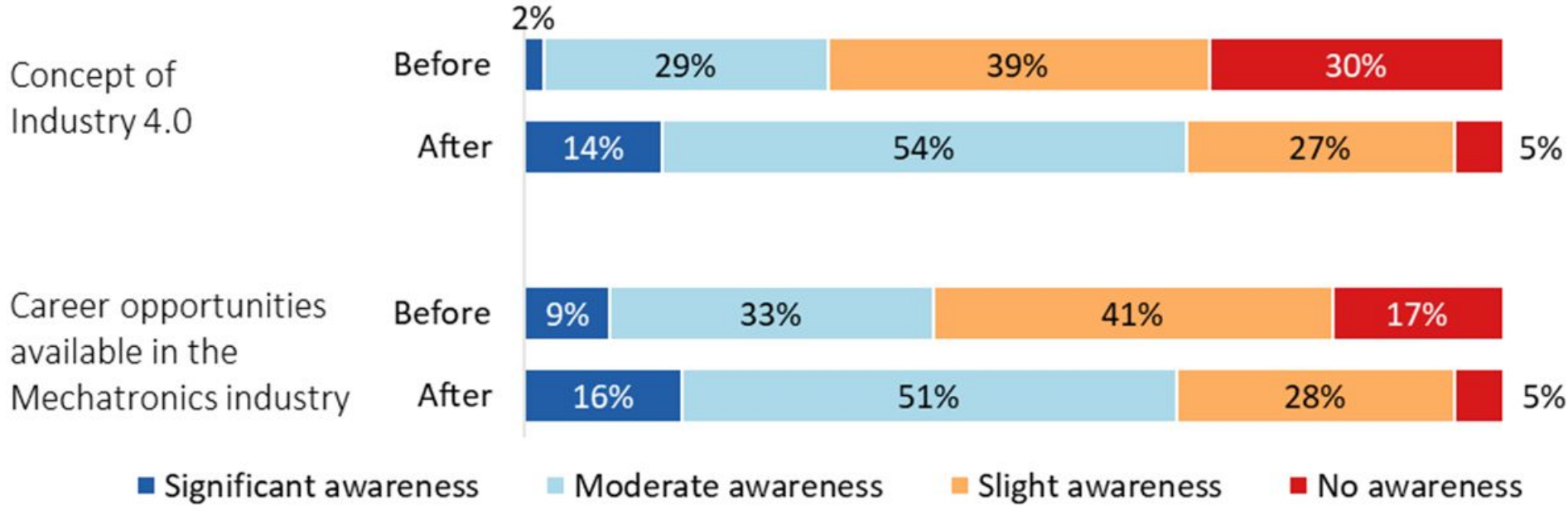
Western's Outcomes

PROFESSIONAL DEVELOPMENT

- 7 teachers trained in robotics including 1 from Lax schools and 1 from Tomah.
- 10 HS students earned SACA credentials

Student Awareness of Industry & Careers

Concept of Industry 4.0
- Before: 2% Significant, 29% Moderate, 39% Slight, 30% No awareness
- After: 14% Significant, 54% Moderate, 27% Slight, 5% No awareness

Career opportunities available in the Mechatronics industry
- Before: 9% Significant, 33% Moderate, 41% Slight, 17% No awareness
- After: 16% Significant, 51% Moderate, 28% Slight, 5% No awareness

Legend: Significant awareness | Moderate awareness | Slight awareness | No awareness

RELATIONSHIPS

Lessons Learned

- There was more work on the part of faculty than initially thought.
  - Alignment of the courses
  - Certification courses
  - Robotic training

Sustainability

Offering the Introduction to Industry 4.0 courses aligned to the SACA standards means that high school and college students can quickly gain industry recognized certifications. SACA associate courses also now qualify for ACT 59 CTE funds.

Questions

- Q&A