

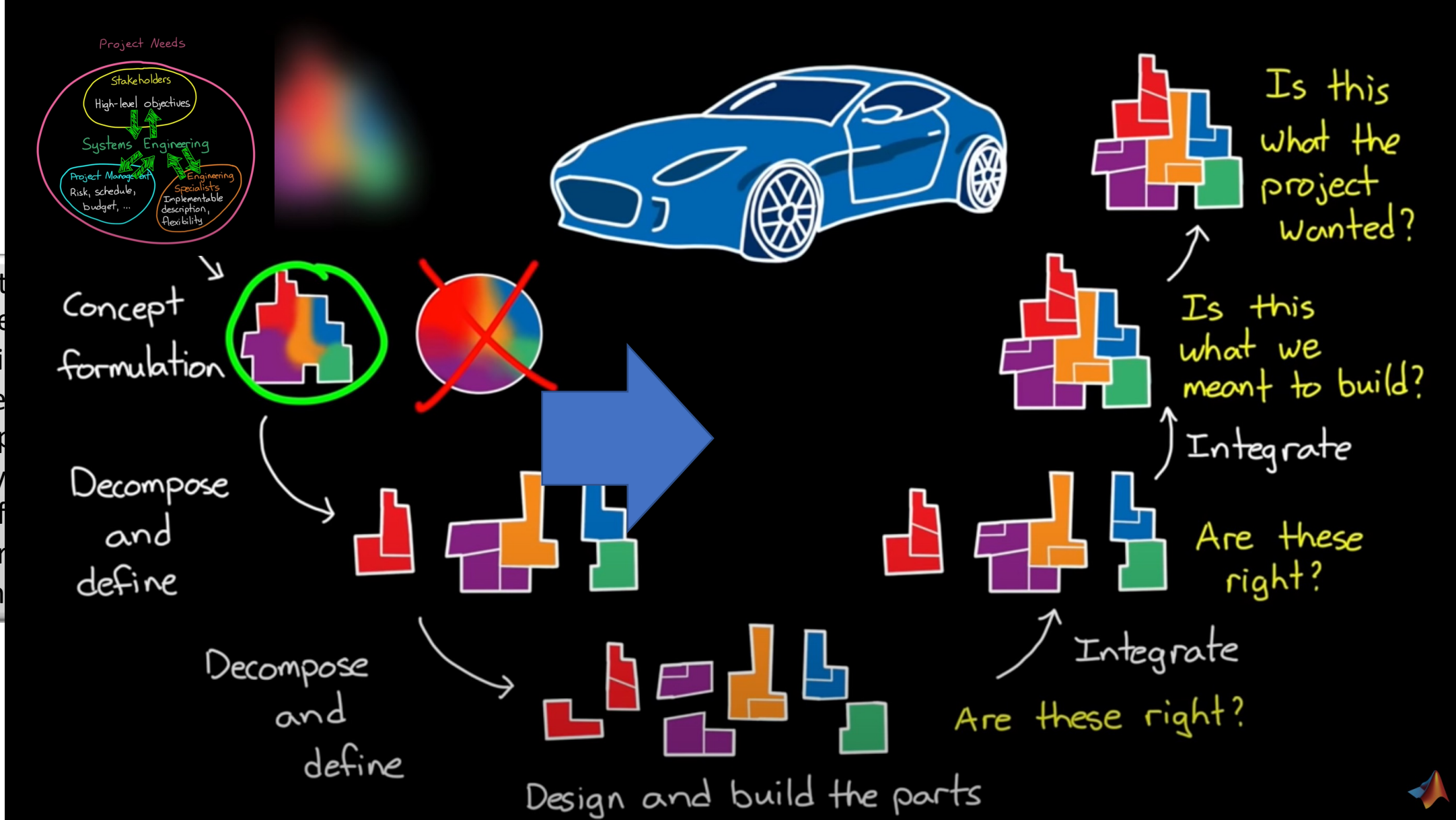
Systems Engineering Technology in the Community College

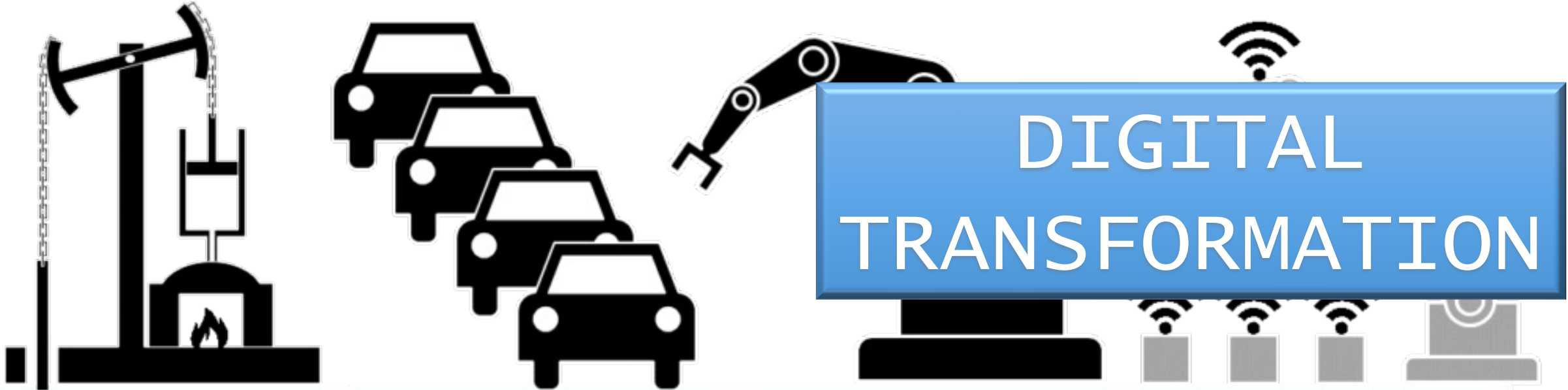


Chris Crumbly

Institute for Digital Enterprise Advancement

Executive Director





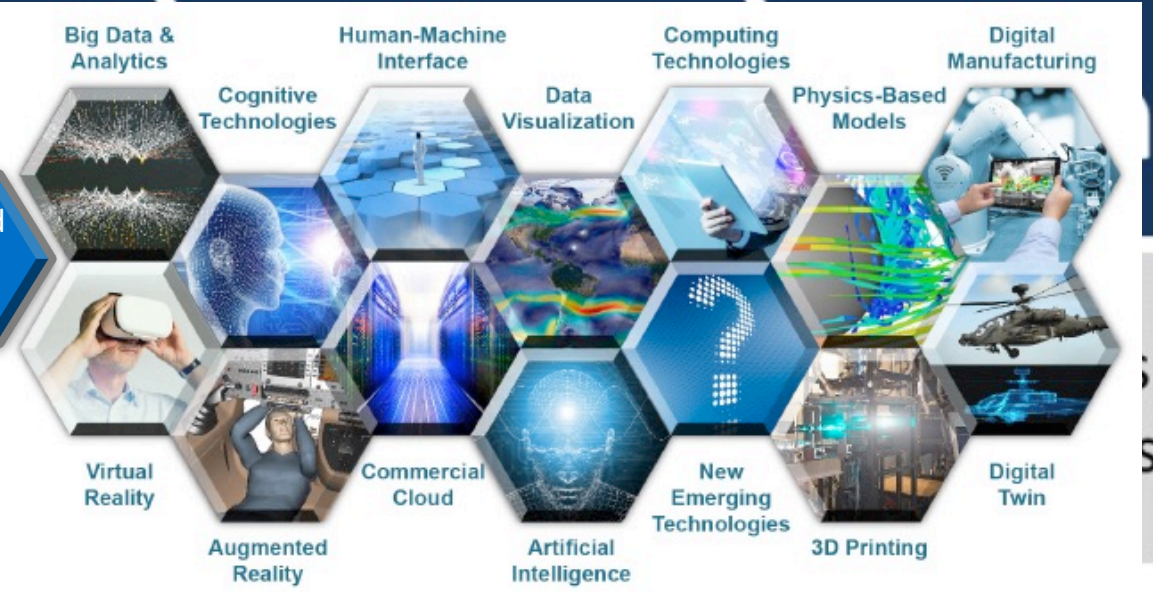
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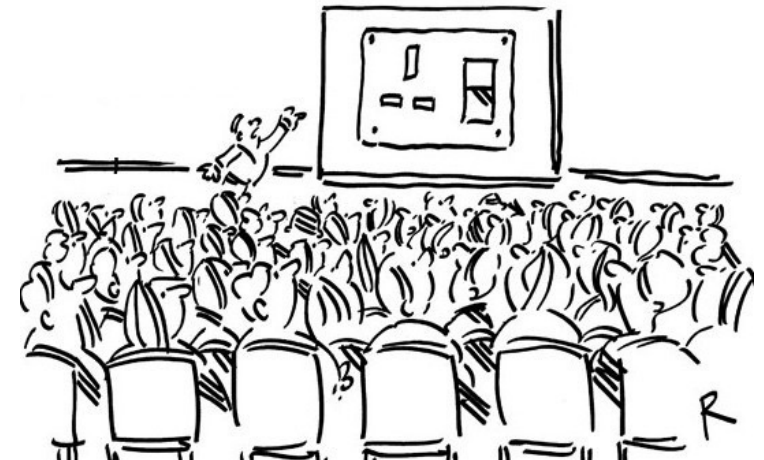
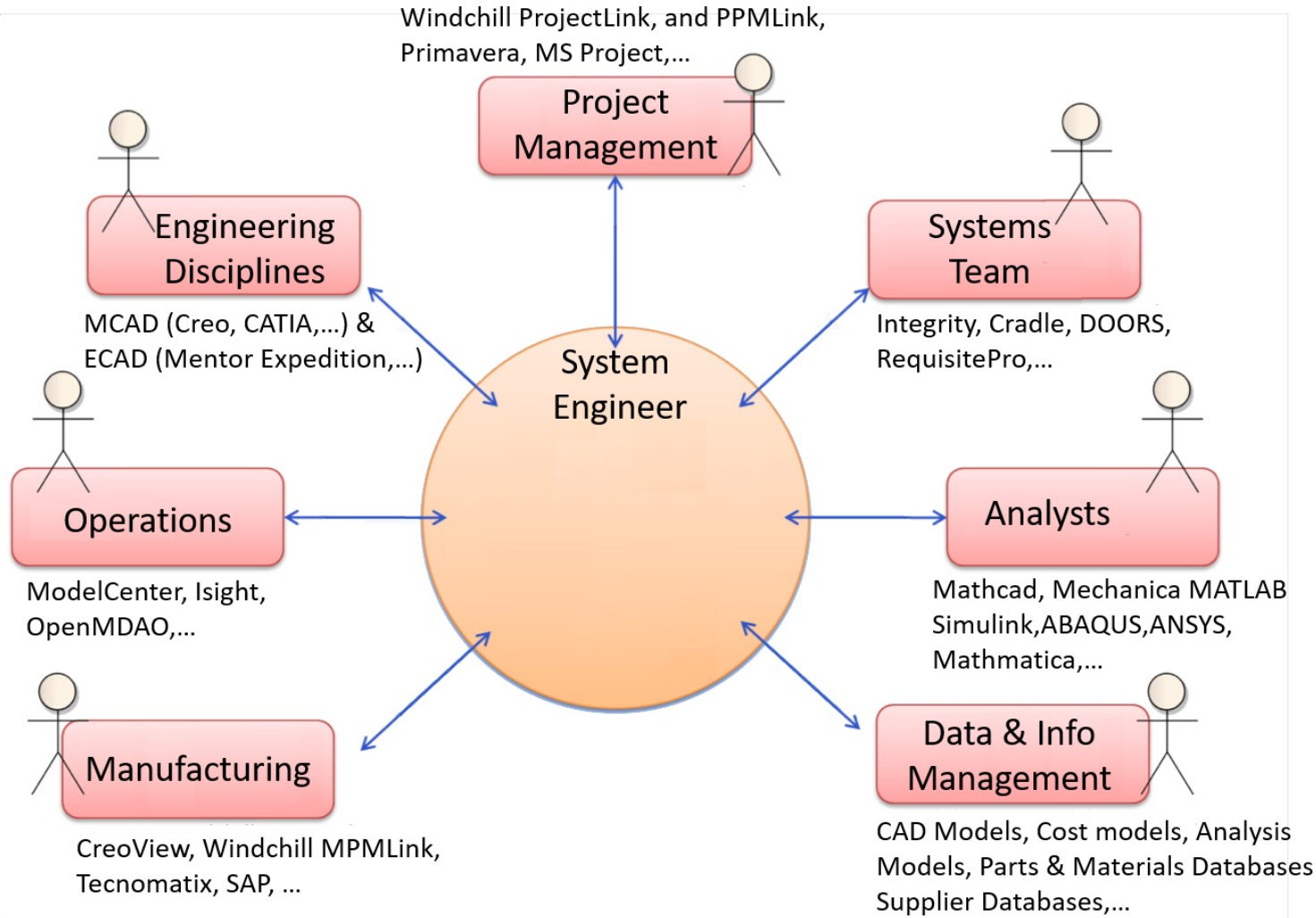
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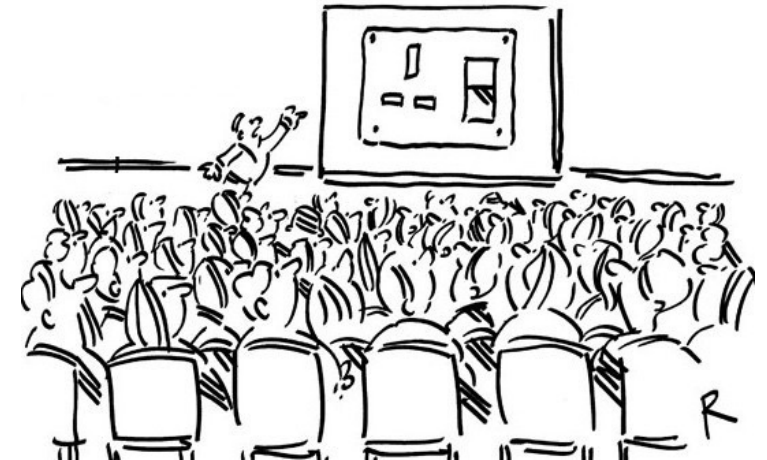
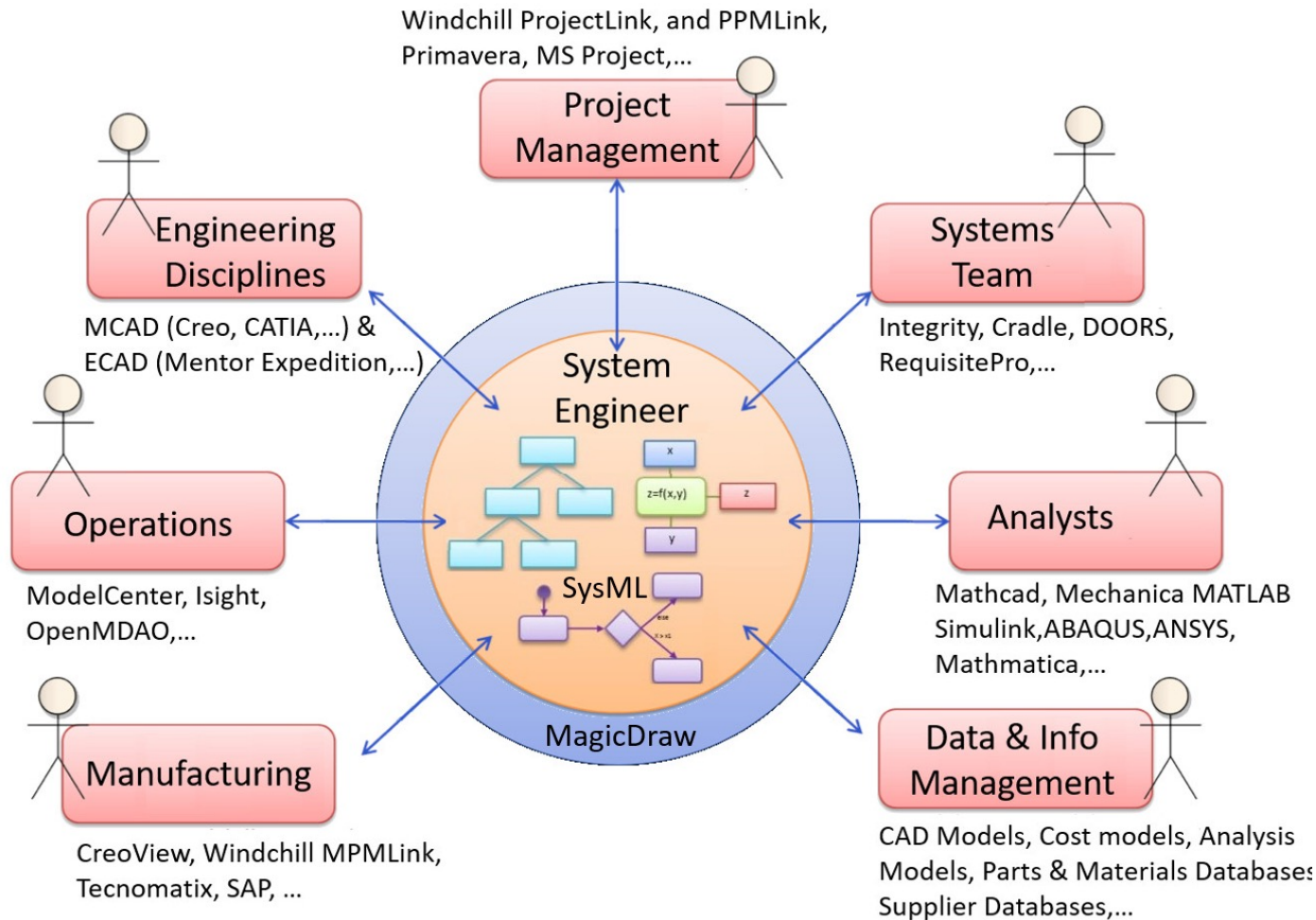
Model-Based
Systems
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1. **Ensure the product satisfies the Customer and Stakeholders**
2. *Connect the product and organizational parts, find the gaps*
3. **Optimize the system and facilitate compromise**
4. *Reduce the confusion and risk caused by complexity*

- Now the SE has available robust tools for system definition
- Those tools can link the project team like never before
- Those linkages can be customized for the project
- Together these tools can form a “single source of truth”
- Fully connected, the MBSE tools can form a backbone of a “digital thread”
- Key steps toward the digital future
 - Commit to implementing MBSE
 - Educate the workforce to move into the future

IDEA recommends and can provide education to:

1. Systems Modelers to handle the complex MBSE modeling and modeling IT overhead (SET Graduates and Interns)
2. System Engineers familiar with MBSE and capable of architecting, creating, interpreting and utilizing models (ala carte level of penetration)
3. Project Team Members who are aware and understand the use of MBSE
4. Management who understands the best implementation of MBSE for their company



USG Industrial Base Investment



Academic Partners



Digital Engineering Applications for Industry



Non-Profit Implementation



System Engineering Technician Degree Goals

Problem Statement

- Technology Development takes too long in the U.S. Our adversaries are rapidly advancing in **high-tech fields** such as hypersonics
- The US Government has increasingly turned to Model Based Systems Engineering (MBSE) to accelerate R&D by efficiently automating manual analysis processes and integrating disparate digital tools

Challenge

- The supply of a competent systems engineering technical workforce does not meet demand for a trained workforce that can build, manipulate, and exploit MBSE tools in the needed SysML (Systems Modeling Language) format

The SET Approach



- Follow the analog from Computer Aided Design/Computer Aided Manufacturing (CAD/CAM) technician discipline and develop a new 2-year degree Systems Engineering Technician training program with the pathfinder at Calhoun Community College

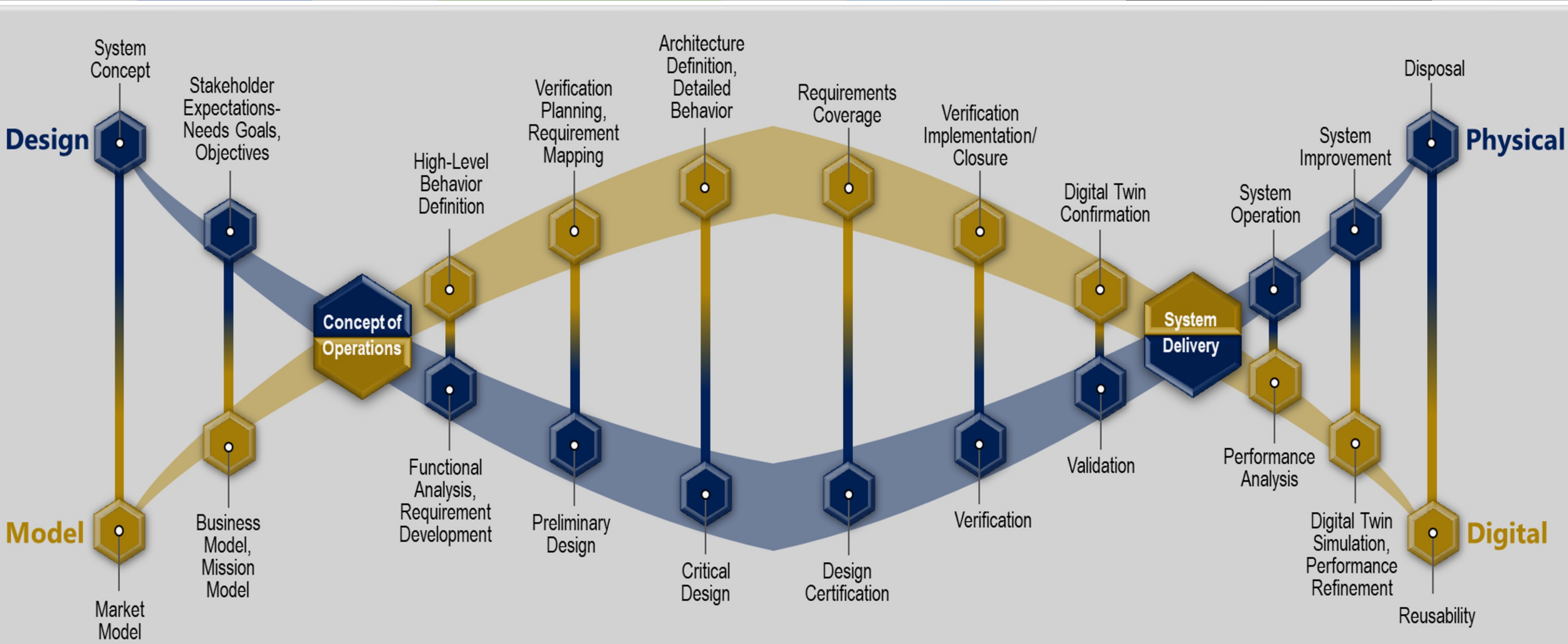
Objective

- Fill increasing government and industry demand for MBSE/digital engineering capabilities to reduce product time to market
- implement 24-month SET degree through community colleges which should appeal to incoming freshmen and career transitioning professionals including returning veterans

Plan of Action

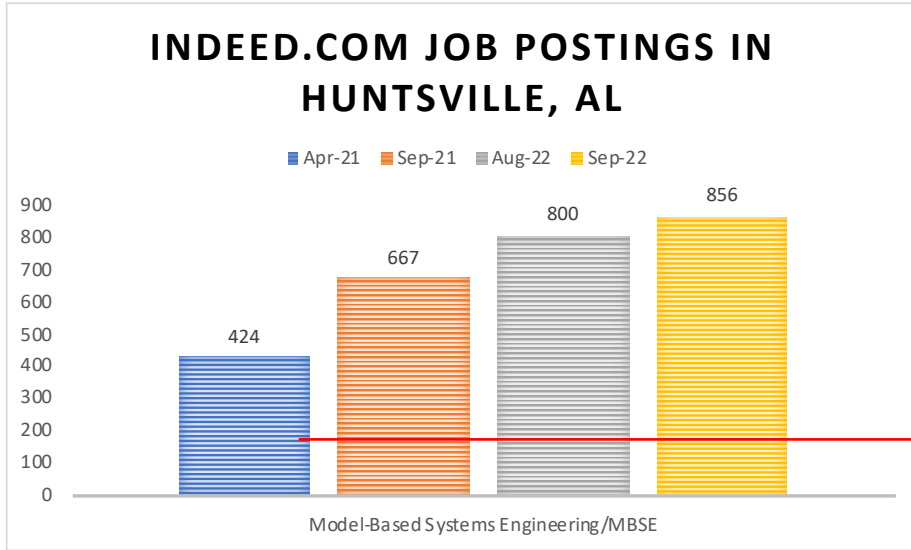
- Initiate a pathfinder instruction program at Calhoun (began Aug 2021)
- Expand across the nation through community and technical colleges
- Move upstream to high schools and downstream to universities
- Provide professional instruction to practicing engineers

Institute for Digital Enterprise Advancement (IDEA) – A non-profit, national collaborative center for identifying, sharing, and recommending Digital Engineering and Manufacturing best practices and applications in the workplace



Systems Engineering Technology (SET) AAS Degree Major Course Requirements

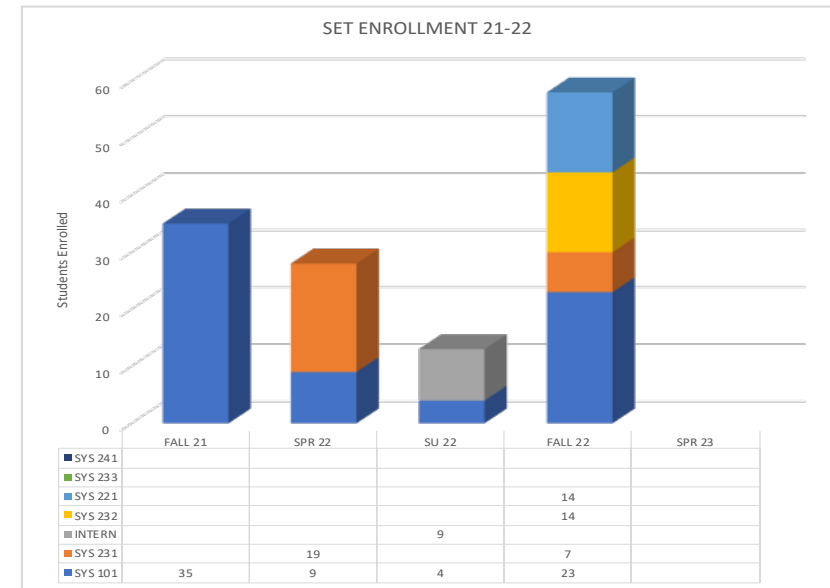
				Credits
★	<u>INTRO</u>	CIS 134	IT Fundamentals (<i>CompTIA</i> ® <i>ITF+</i>)	3
		SYS 101	Introduction to Systems Engineering	3
	<u>SECURITY</u>	CIS 199	Network Communications (<i>CompTIA</i> ® <i>Network+</i>) OR	3
		CIS 270	Cisco CCNA I	
		CIS 280	Network Security (<i>CompTIA</i> ® <i>Security+</i>)	3
★ ★ ★	<u>PROGRAMMING</u>	CIS 202	Python Programming	3
		CIS 207	Introduction to Web Development	3
		CIS 251	C++ Programming	3
		CIS 266	Software Engineering with Secure Coding	3
		CIS 285	Object-Oriented Programming	3
		SYS 231	Systems Modeling I	3
		SYS 232	Systems Modeling II	3
★ ★	<u>DATABASE</u>	CIS 222	Database Management Systems	3
		SYS 221	MBSE in the Digital Environment	3
★	<u>CAPSTONE</u>	SYS 241	Systems Engineering Technology Capstone	3



163 SE Degrees conferred in 2021 across all Alabama schools

Universities are not meeting local demand

SET enrollment reached 44 students after just 3 semesters— at our first school



A portrait of a man with a beard and mustache, wearing a purple and white checkered button-down shirt, standing against a light grey wall.

Bryan

A portrait of a woman with long brown hair, wearing a red floral patterned blouse, standing against a light grey wall.

Linda

A portrait of a young man with curly brown hair, wearing a blue polo shirt with a red logo, standing against a light grey wall.

Jackson

The holistic concept of SE is very appealing to me because one generally has a broader view of projects than the other “pure” engineering fields. Being a lover of engineering and associated tasks, but not being an engineer, this seemed to be the perfect niche for me...I hope for and am working and looking for actual MBSE exposure which would be of great significance as more companies transition MBSE and DE.

The opportunity to apply my classroom skills in the workforce is incredibly valuable. In addition to building my resume with new programming skills, exposure to the workplace environment reinforces the classroom curriculum.

I have an opportunity lined up at Auburn University that allows me to get a bachelor's degree in systems and industrial engineering and possibly a master's in the same thing at the same time...My skills-based SET experience will give me a unique perspective and ability to contribute to classes.

1. Systems Modelers to handle the complex MBSE modeling and modeling IT overhead

- A. Associate of Applied Science Degree in Systems Engineering Technology-
 - 1) Currently offered at Calhoun Community College, expansion across the US is expected
 - 2) Includes instruction in System Engineering as well as MBSE tools, and languages
 - 3) Student internships/Apprenticeship with MBSE implementing organizations to provide real experience
- B. Continuing Education through SET Academy

Associates
Degree

2. System Engineers familiar with MBSE and capable of creating and interpreting models

- A. Certificate Programs Currently Under Development
 - 1) Prep for OMG Certified Systems Modeling Professional Level- Intermediate
 - 2) Education in the relationship of the MBSE to System Engineering practices
- B. Semester-length course leading to a certificate demonstrating modeling competency

Certificate

3. Professional Education Courses

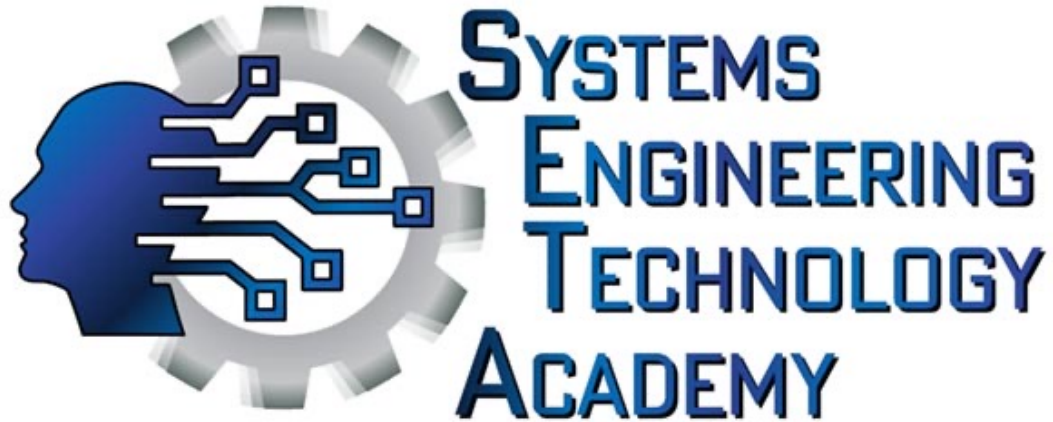
- A. Short course in MBSE implementation, benefits, implications, and costs (8 hours)
- B. Short course in MBSE familiarization and relationships with other project functions (40 hours)
- C. Expanded Courses with "Hands-On" Modeling Instruction (under development)

Professional
Education

4. University-Level Electives and/or Short-term Certificates

- A. Industrial and Systems Engineering Elective
- B. Add-on Certificates for Modeling

University
Level



- *SET course content (plug and play)*
 - *Blackboard*
 - *Canvas*
- *Adjunct instructors*
 - *In person*
 - *Online*
- *Train the trainer programs*
- *Professional Education Programs (noncredit)*
 - *Full course content*
 - *Instructors available from IDEA*
- *Ongoing support from IDEA*
- *Continuous updates as MBSE tools mature*

Panel Discussion

Thank you for your attention

We are happy to answer any questions you may have