



33rd Annual **INCOSE**
international symposium

hybrid event

Honolulu, HI, USA
July 15 - 20, 2023



Systems Engineering Technology:

Closing the MBSE Modeling Gap through Community College



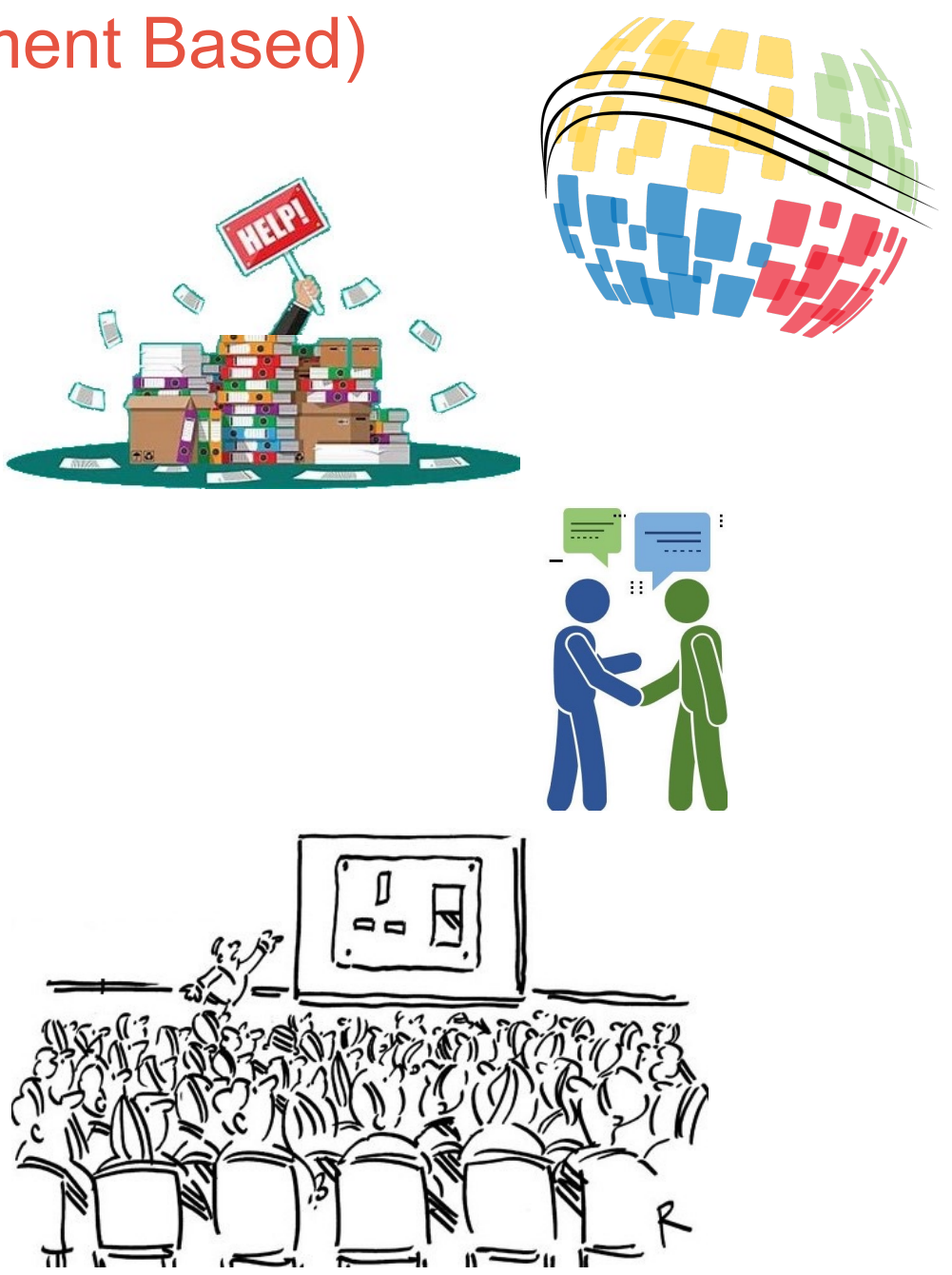
Chris M. Crumbly, Executive Director
Susan Askew, Subject Matter Expert
Institute for Digital Enterprise Advancement
www.idea-set.org

Model-Based Systems
Engineering (MBSE)
remains a mystery to
many organizations

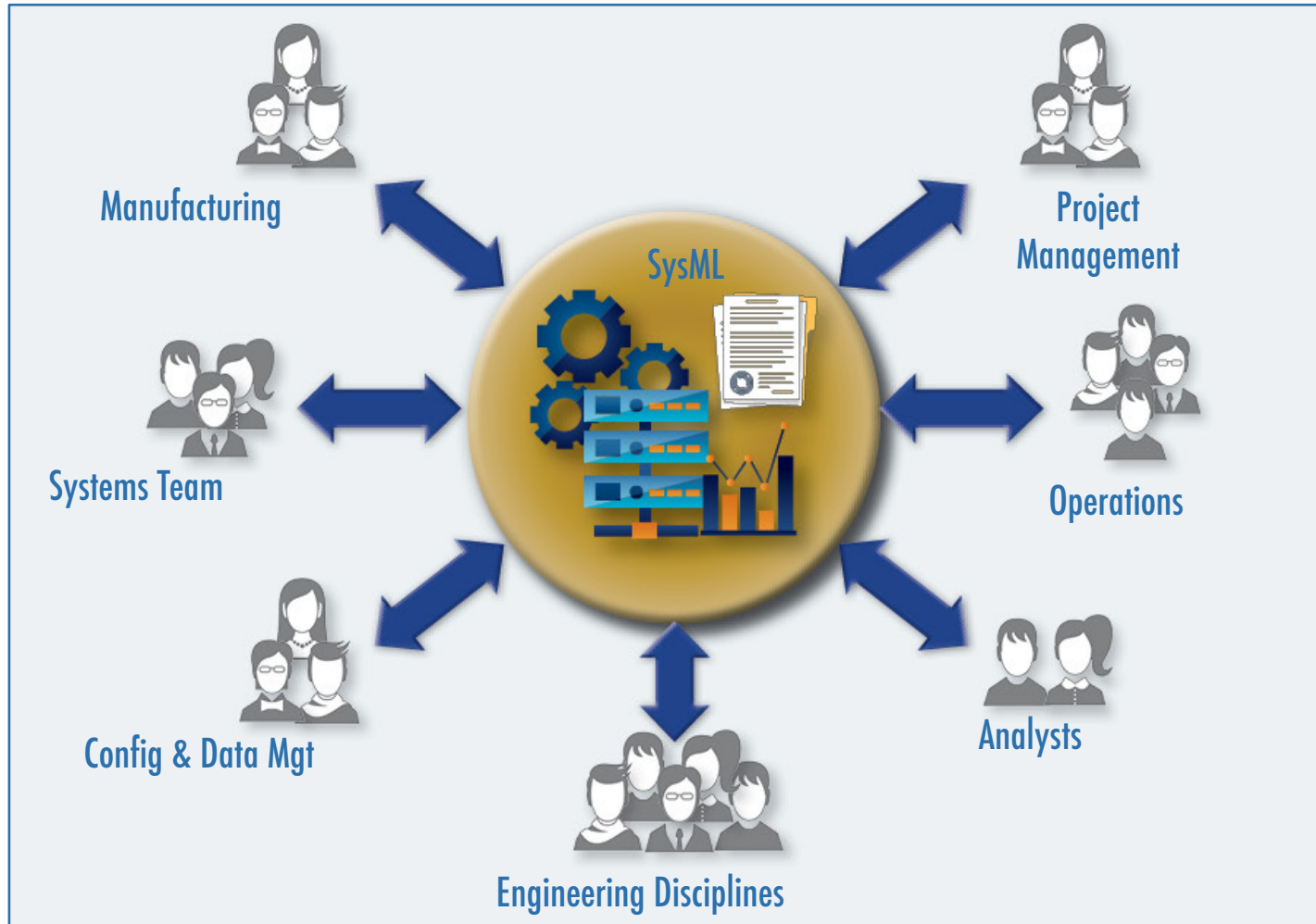


I DON'T KNOW WHAT IT IS... BUT I KNOW WE NEED TO DO IT.

The Systems Engineer's Environment (Document Based)



The Systems Engineer's Environment (Model-Based)



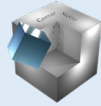
1. **Ensure the product satisfies the Customer and Stakeholders**
2. **Optimize the system and facilitate compromise**
3. *Connect the product and organizational parts, find the gaps*
4. *Reduce the confusion and risk caused by complexity*

Systems Engineering Technology (SET) Solution

Problem Statement

MBSE shortens the DDT&E life-cycle but the **supply** of practitioners does not meet the workforce **demand**

USG Industrial Base Investment



CORNERSTONE
Cornerstone of the American Military
competitive edge



Academic Partners



Auburn
University

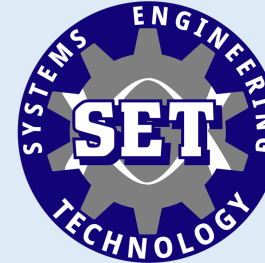


CALHOUN
COMMUNITY COLLEGE



INSTITUTE FOR
DIGITAL
ENTERPRISE
ADVANCEMENT

Nonprofit Partner



The SET Approach

Develop a **Systems Engineering Technology** degree modeled after the CAD Technician 2-year degree

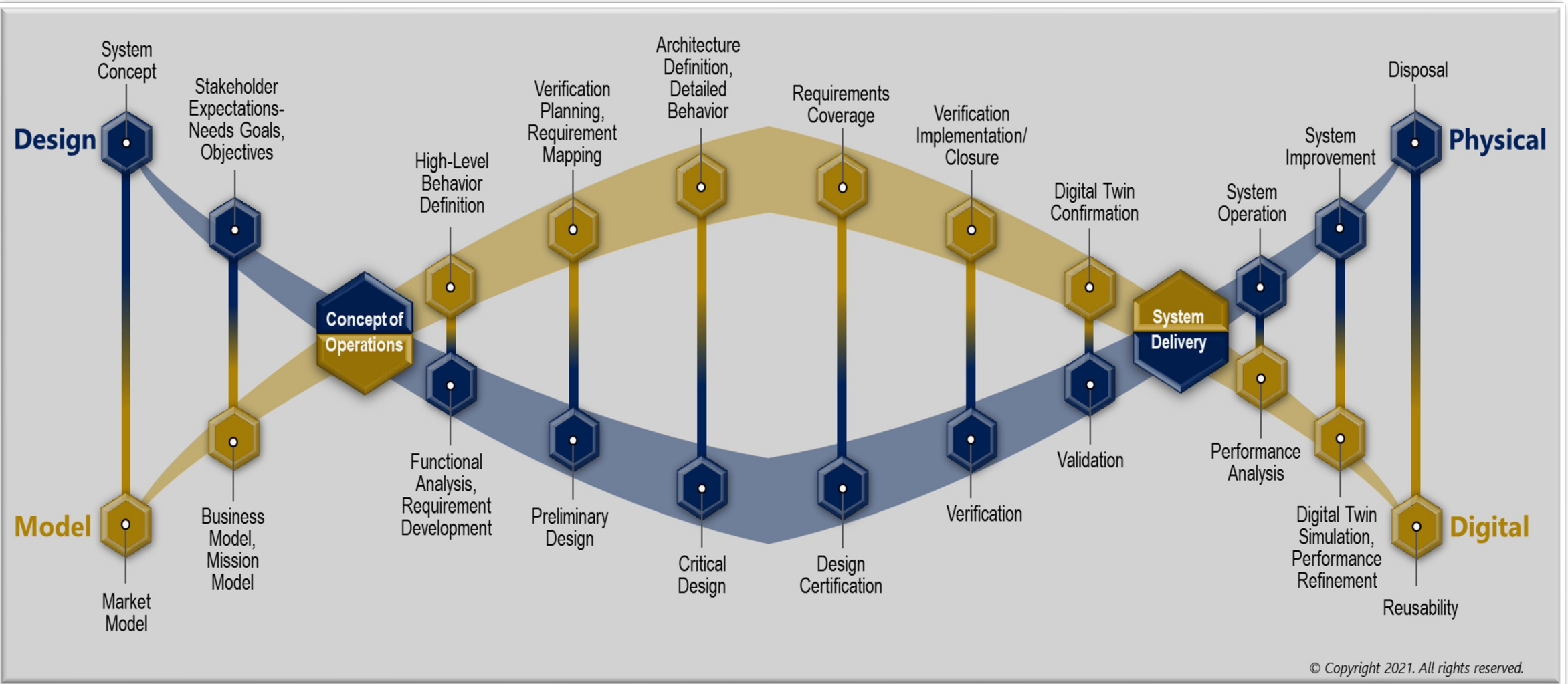
Plan of Action

- Implement the pathfinder SET curriculum at Calhoun (8/21)
- Deploy SET in DDT&E communities across the nation
- Move upstream to high schools and downstream to universities
- Provide professional instruction to practicing engineers

IDEA MBSE Helix for Instruction



Demonstrating the digital transformation of the systems engineering life cycle



Filling the MBSE Gap

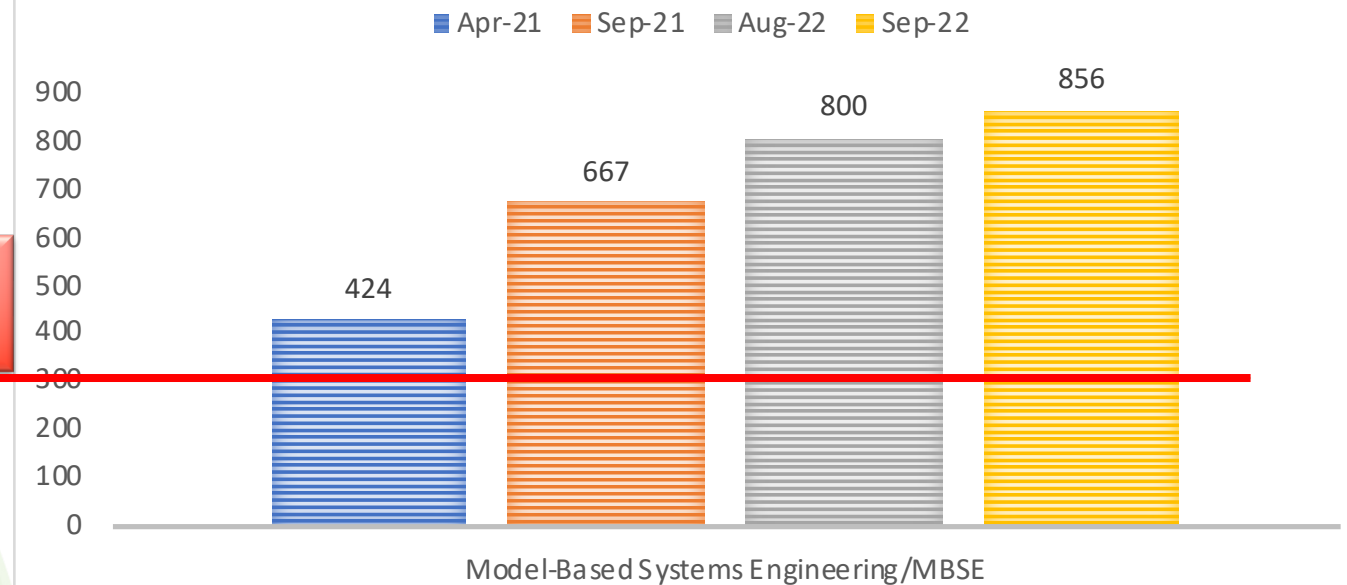
Universities are not meeting regional demand for MBSE practitioners

Key Aerospace and Defense Organizations in Huntsville, AL

- NASA
- US Army Missiles and Space
- US Army Aviation
- US Army Material Command
- Missile Defense Agency
- Boeing
- Lockheed Martin
- Aerojet Rocketdyne
- L3 Harris
- Raytheon
- More than 300 A&D companies
- >\$160B in Federal Funds Annually

163 SE Degrees
conferred in 2021 across
all Alabama schools

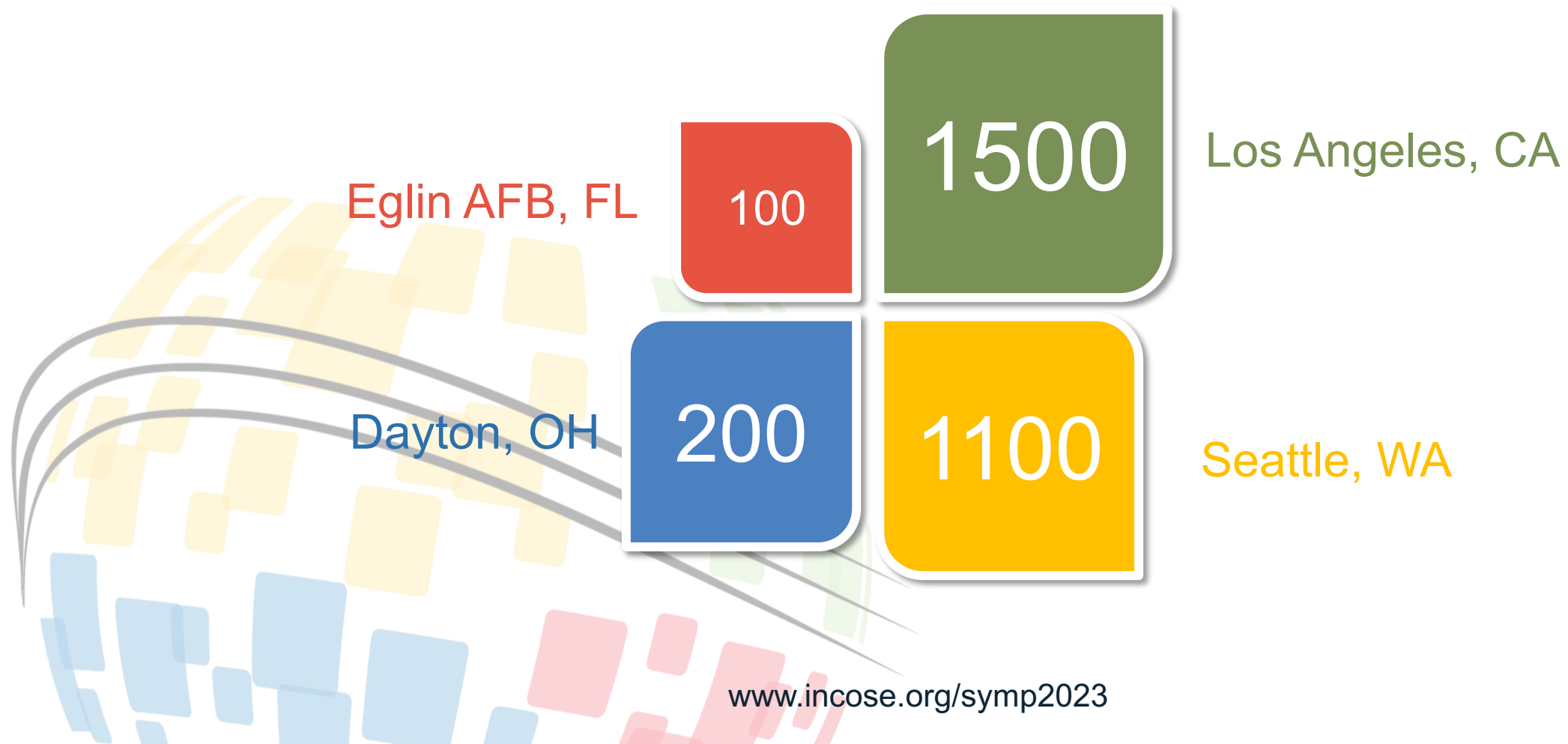
INDEED.COM JOB POSTINGS IN HUNTSVILLE, AL



SET enrollment reached 44 students in 4 semesters—at one school alone

Digital Transformation is Coming to a City Near You

MBSE Job Postings April 2023 (indeed.com)



Range of Educational Opportunities - IDEA

Associate Degree for Systems Modelers (or short certificate)

- Associate of Applied Science Degree in Systems Engineering Technology-
- Student internships/Apprenticeship with MBSE implementing organizations to provide real experience

Associate
Degree

Professional Education Courses

- Short course in MBSE implementation, benefits, implications, and costs (8 hours)
- Short course in MBSE familiarization and relationships with other project functions (40 hours)

Professional
Education

System Engineering Certificate Demonstrating MBSE Competency

- Certificate Programs Currently Under Development
- Semester-length course leading to a certificate demonstrating modeling competency

Certificate

University-Level Electives and/or Short-term Certificates

- Industrial and Systems Engineering Elective
- Add-on Certificates for Modeling

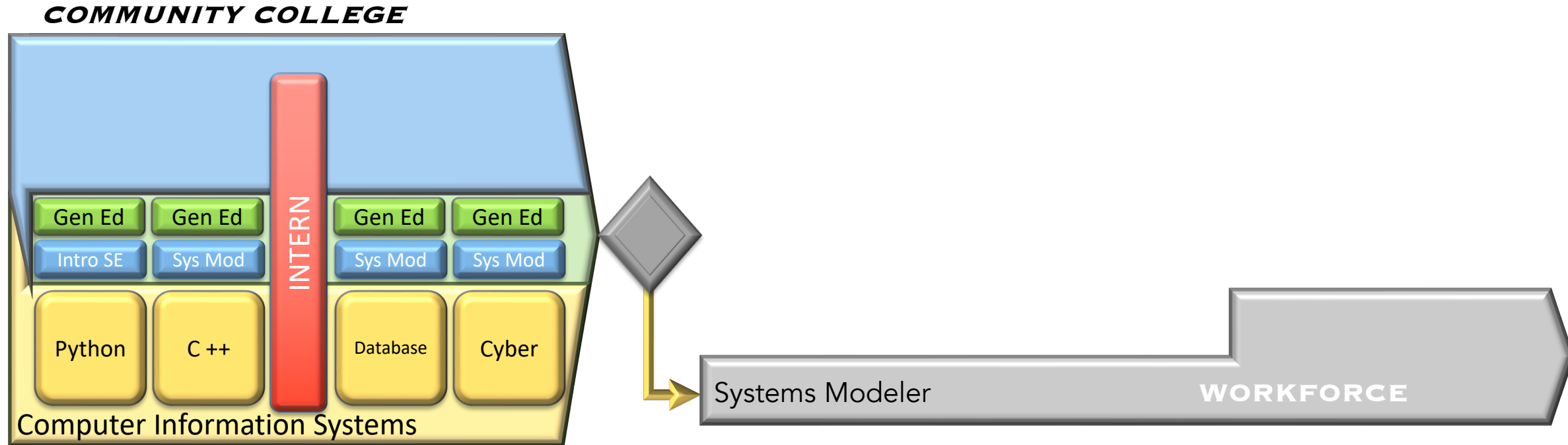
University
Level

High School and Middle School Modules

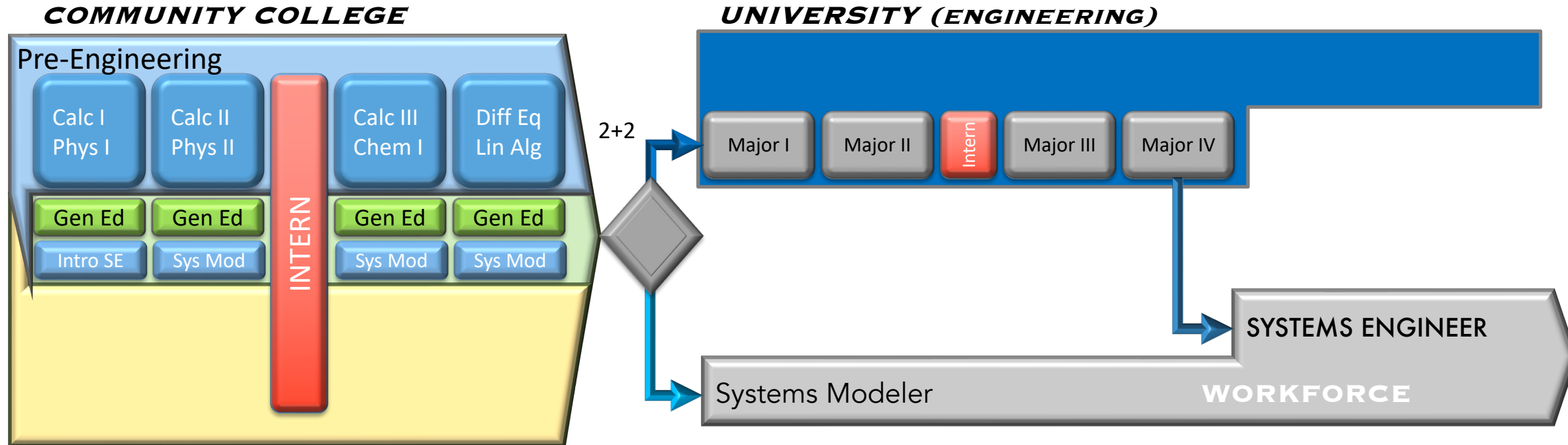
- Introduce system engineering concepts early
- Provide alternate pathway for STEM career

Secondary
Education

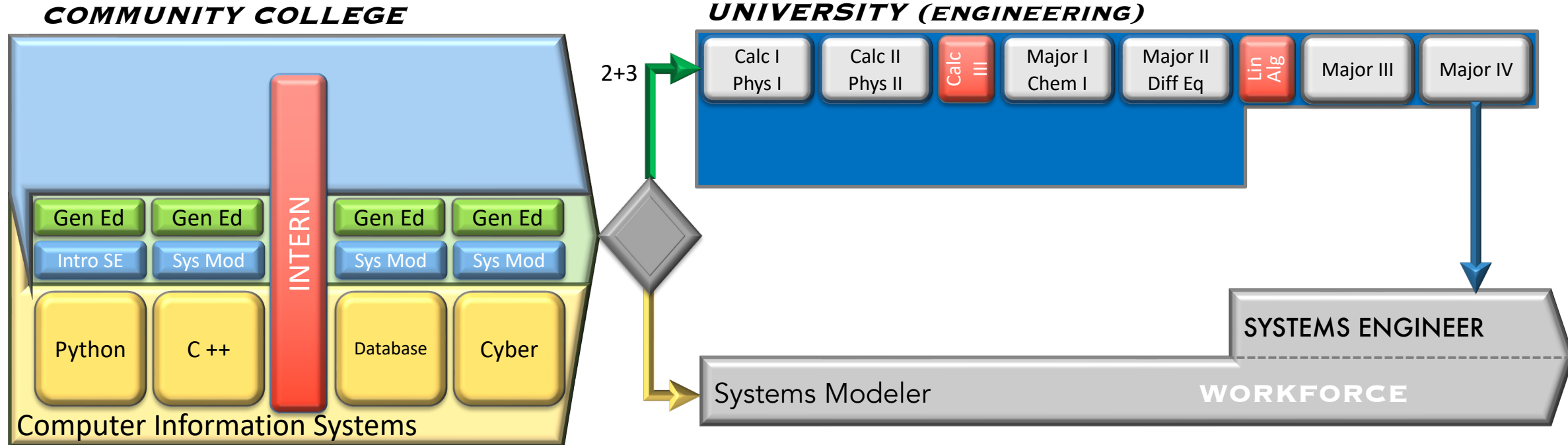
Computer Information Systems: SET Concentration (Pathway 1)



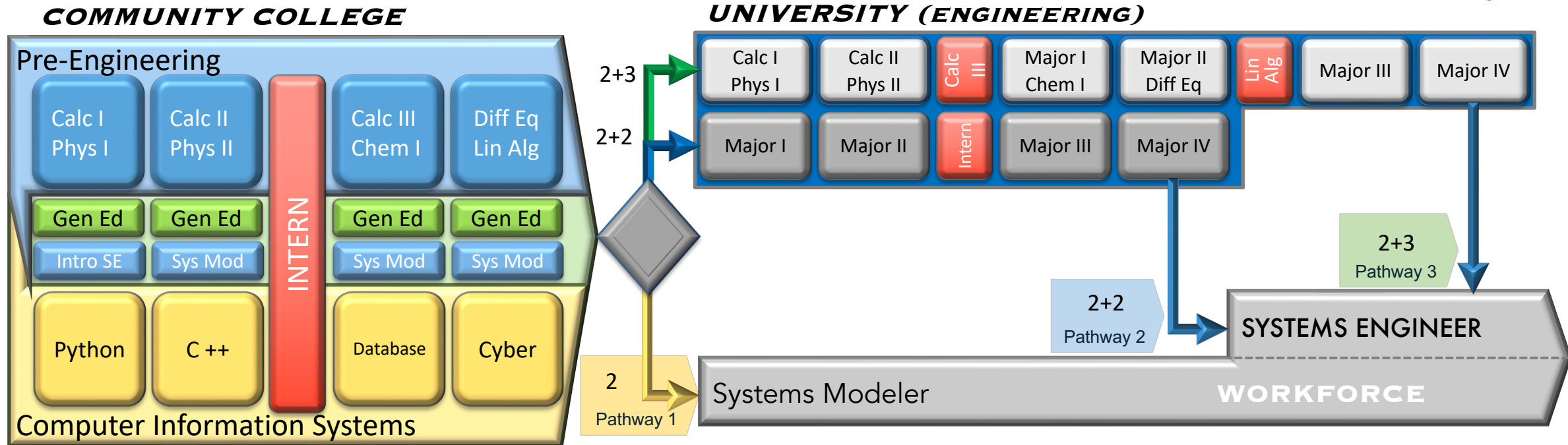
Pre-Engineering: SET Concentration (Pathway 2)



Computer Information Systems: SET Concentration, then University (Pathway 3)



3 MBSE Workforce Pathways



Systems Engineering Technology Courses

SYS 101: Intro to Systems Engineering	SYS 231: Systems Modeling I	SYS 233: Systems Modeling III
SYS 221: MBSE in the Digital Environment	SYS 232: Systems Modeling II	SYS 241: SET Capstone

Linda



**Nontraditional student, with a
Master of Psychology Degree**

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.

Jackson



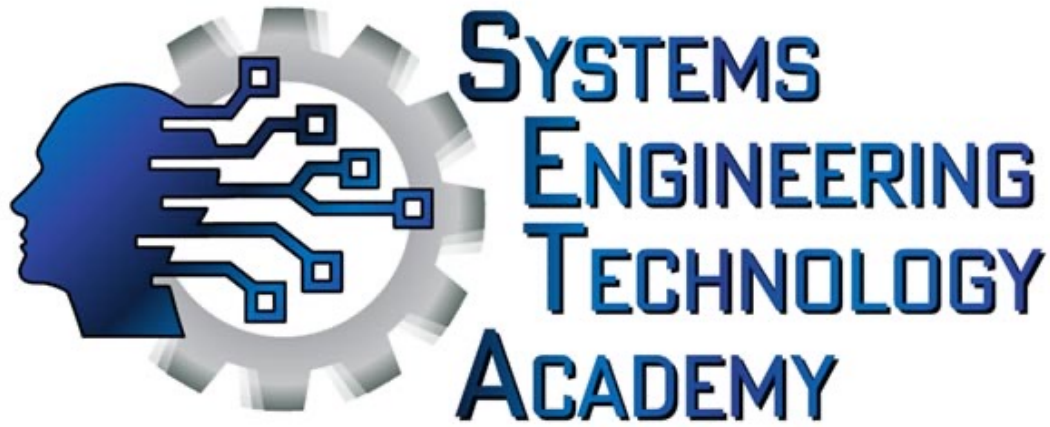
**Nontraditional Student pursuing a 2+3
Engineering Degree after SET**

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.

MEET SOME OF OUR SET STUDENTS

SYSTEMS ENGINEERING TECHNOLOGY ACADEMY

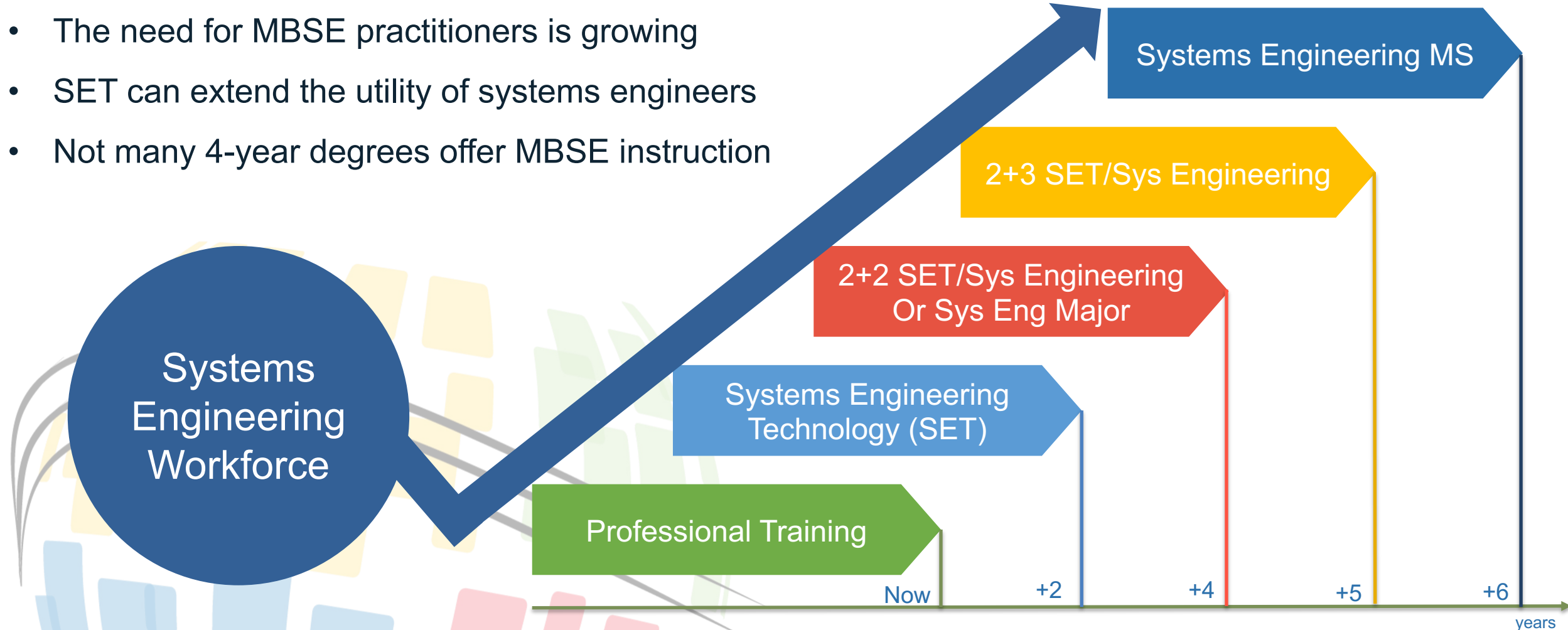
Sustainment Through the SET Academy



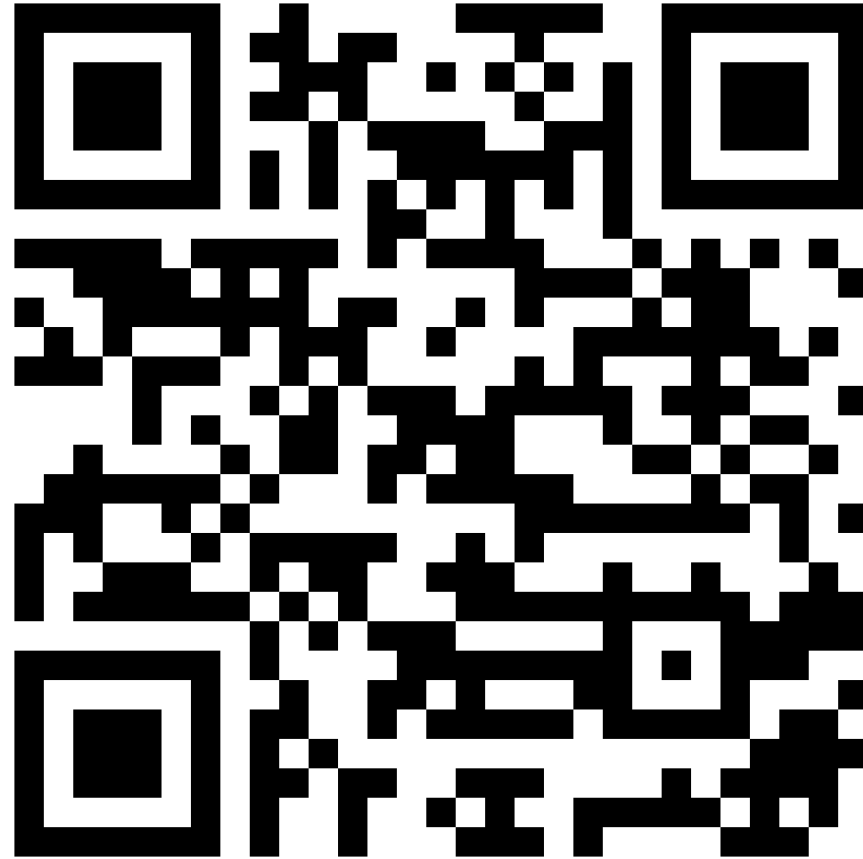
- *SET course content (plug and play)*
 - *Blackboard*
 - *Canvas*
- *Train the trainer programs*
- *Professional Education Programs (noncredit)*
- *Adjunct instructor sourcing*
- *Ongoing support from IDEA*
- *Continuous updates as MBSE tools mature*

SET Accelerates MBSE Acceptance

- The need for MBSE practitioners is growing
- SET can extend the utility of systems engineers
- Not many 4-year degrees offer MBSE instruction



Questions



Use this QR code for more information on SET

Or this link: <https://idea-set.org/>



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www.incose.org/symp2023