



International Council on Systems Engineering
A better world through a systems approach

Building your future: Competency and career pathways in Systems Engineering

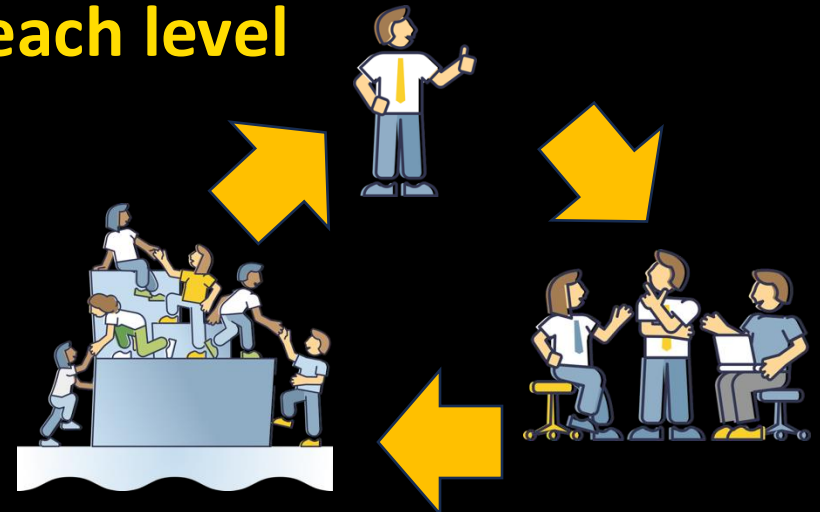
Professor Emma Sparks
Rector and Dean
UNSW Canberra, Australia



SYSTEMS ENGINEERING
VISION 2035

**Start with the
future**

Examine each level



THIS TALK

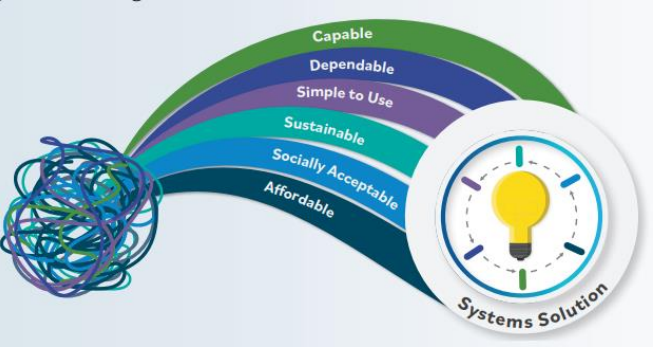
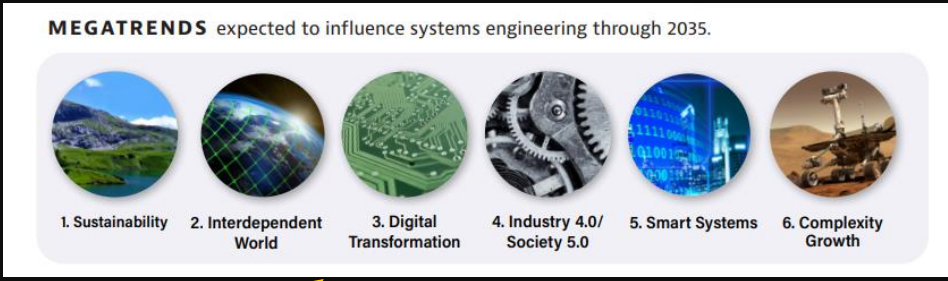
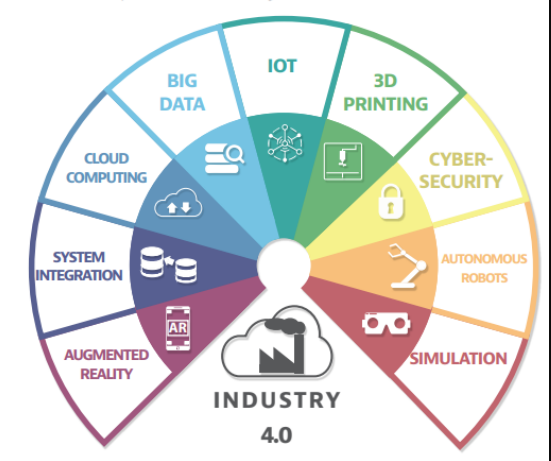
Share resources



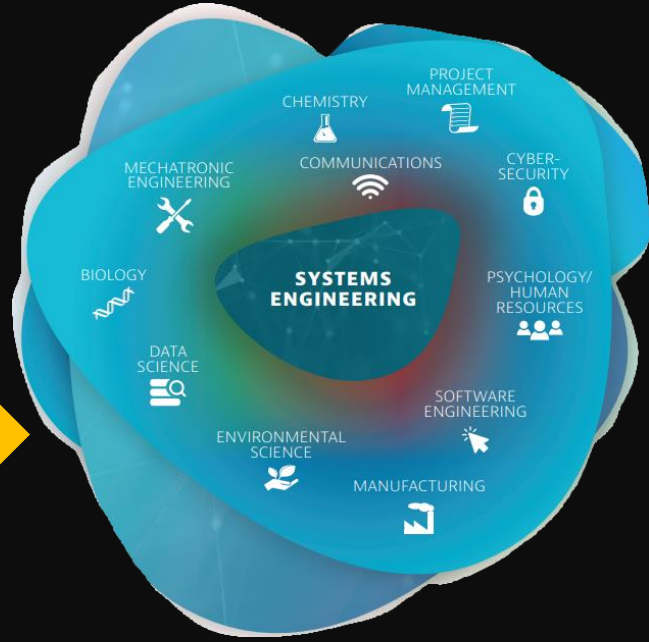
Share actionable advice



SYSTEMS ENGINEERING VISION 2035



transforms



MAJOR SHIFTS



Methods and Tools

- Increased adoption of digital engineering where digital models are comprehensively integrated across the enterprise and within supply chains
- Increased reliance on computational and analytical decision support tools, streamlined into workflows and processes



Projects

- Systems engineering projects will be more diverse, reflecting the complexity increase and the multidisciplinary composition of current and future systems
- Increase shift towards the design, realization and assurance of Cyber-physical-human System of Systems

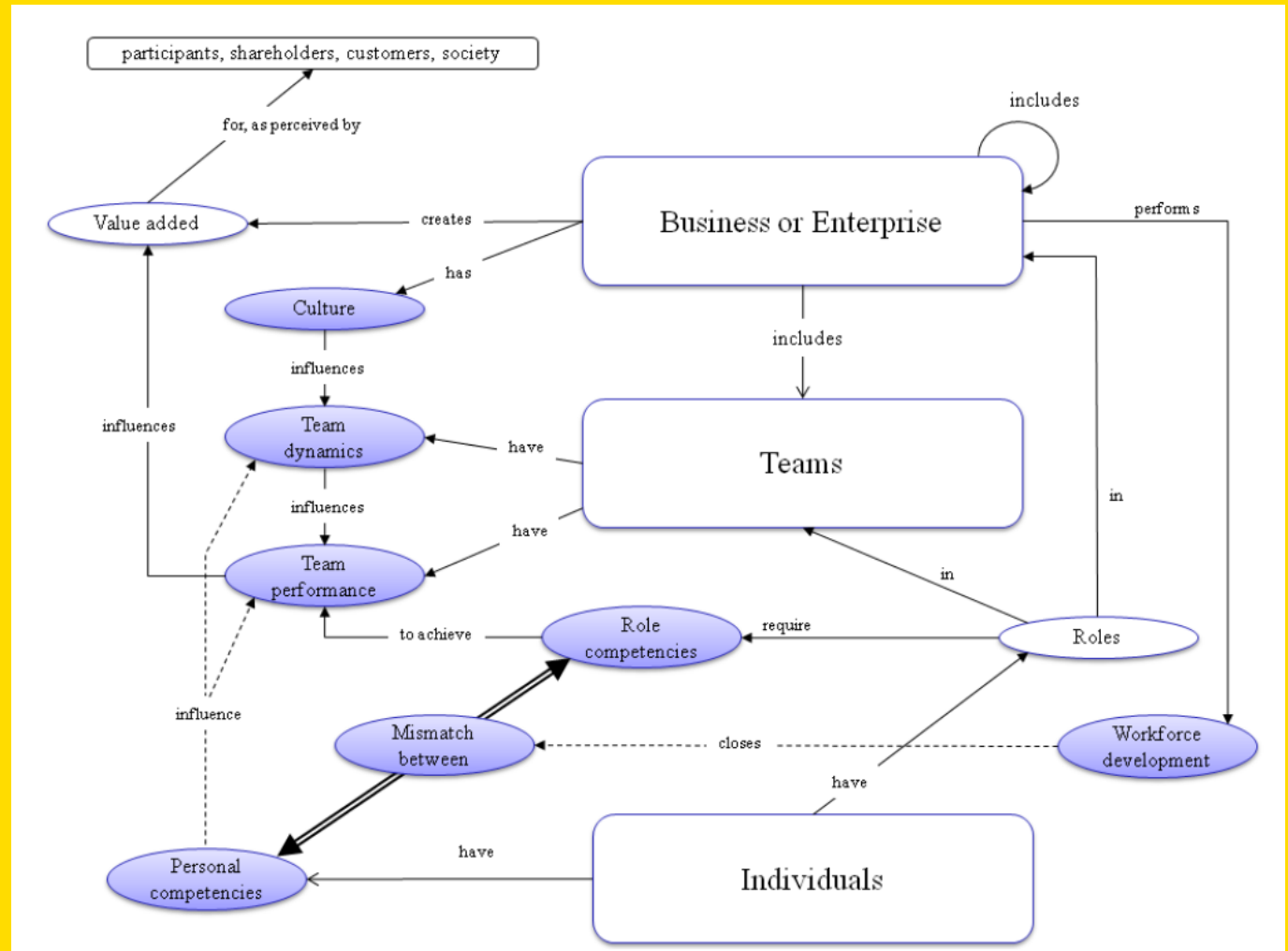


Teams

- Human-AI teams will become increasingly common, allowing the team to make better, faster, and more informed decisions
- As complexity grows, dispersed and multidisciplinary 'team of teams' will generate collective System of Systems views supported by digital tools.

Systems Engineering: Creating Value

The
fundamentals
remain the
same...



Source: Determining Needed Systems Engineering Capabilities in Businesses and Enterprises. (27 May 2025). *SEBoK*, . Retrieved 19:03 UTC, June 6, 2025 from https://sebokwiki.org/w/index.php?title=Determining_Needed_Systems_Engineering_Capabilities_in_Businesses_and_Enterprises&oldid=75439.

Enabling Systems Engineering



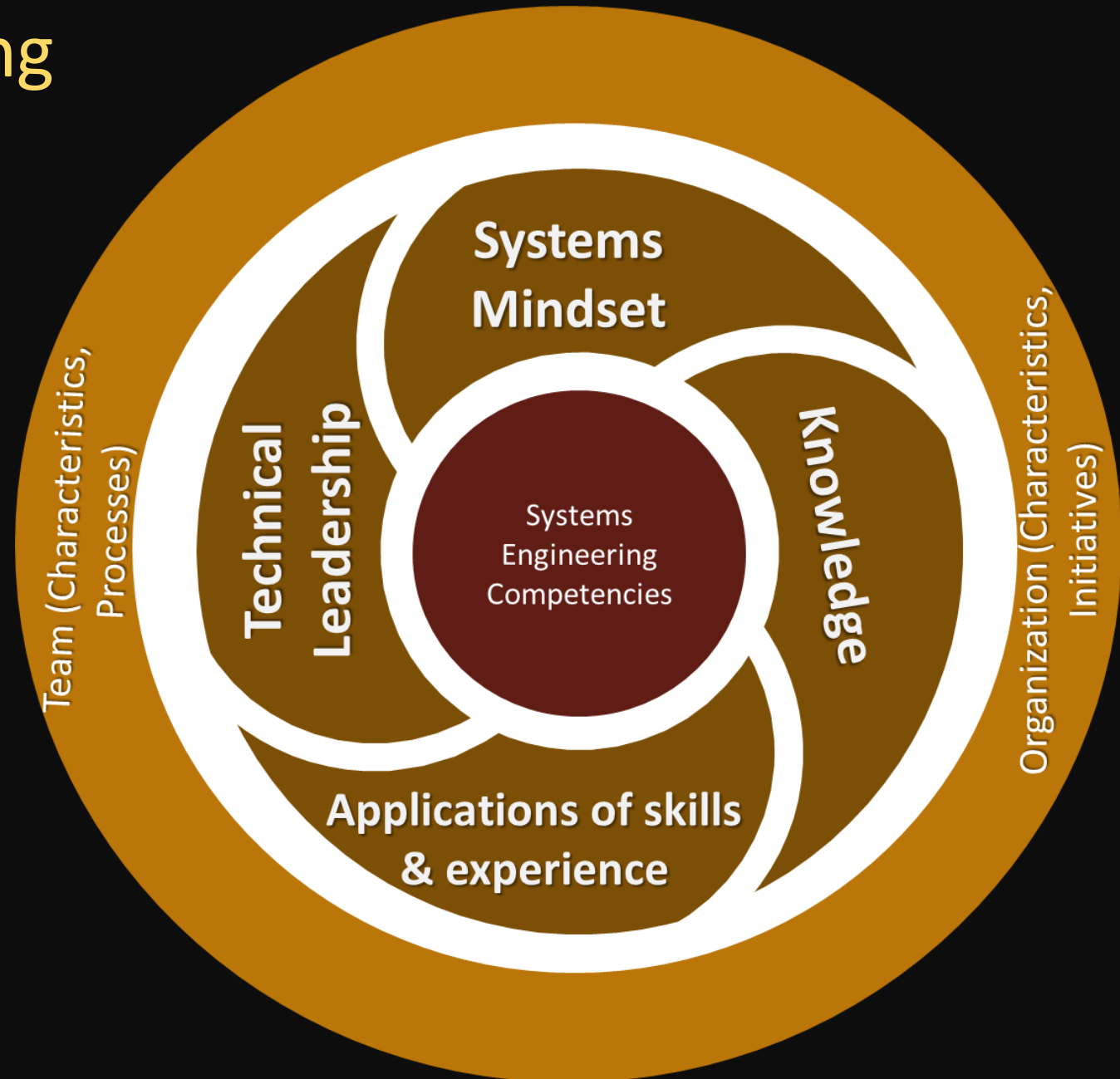
Individuals



Teams

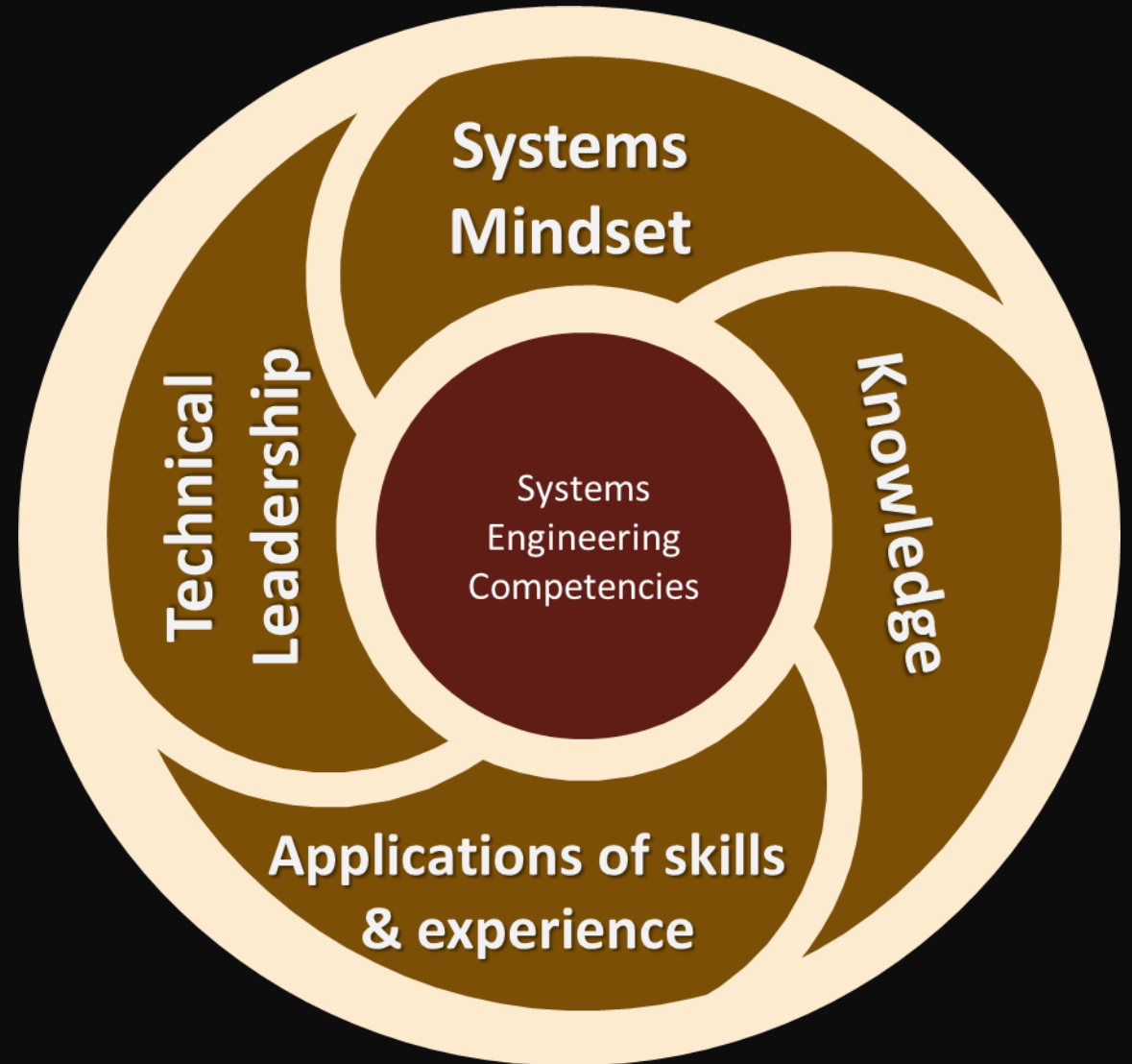


Organizations





Systems Engineers



I am part of a *bigger ecosystem*
...I add value through the
multiple roles I perform

I seek to understand
the big picture

I seek and cultivate
meaningful connections
in everything I do

I think *about systems*
and *in systems*

Systems Mindset

I act with *purpose*

Uncertainty and ambiguity are
inevitable...I develop effective
ways to cope with them



Knowledge areas



Systems Engineering

SE theories, SE lifecycle, System of Systems, Digital Engineering

Domain Knowledge

Aerospace, Defence, Health, Transportation, Finance, Biomedicine, Infrastructure,

Hard Sciences Knowledge

Project Management, operations, and other engineering disciplines,

Soft Science Knowledge

Social science, Leadership, Ethics, Future science, Education

Technologies

Simulation, AI, 3-D printing, VR

Lifelong Learning

Align passion, roles (present and future) and opportunities

Create a learning habit

Start small, identify a first step, support it and provide reinforcement.

Use Competency Frameworks (e.g. INCOSE) as a tool for designing purposeful learning experiences

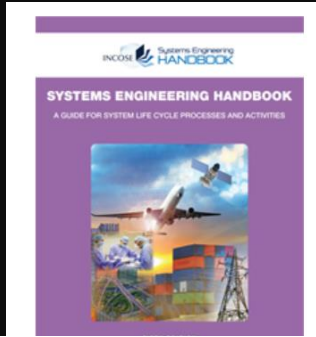


SEBoK

RESOURCES

LEVERAGE.....

CAREER SUPPORT



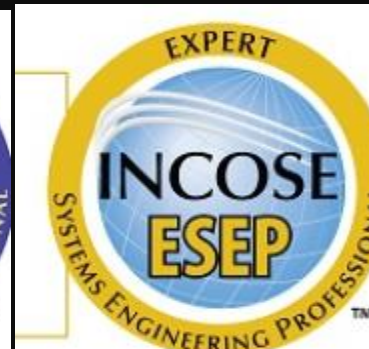
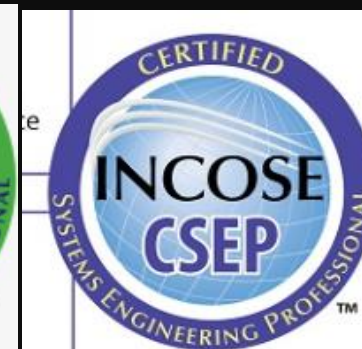
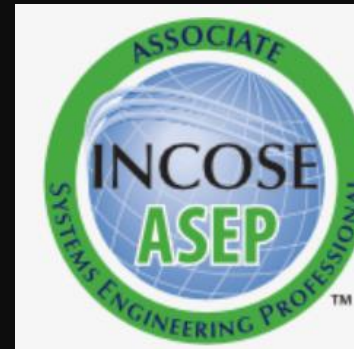
INCOSE Career Center
Connecting talent with opportunity



CERTIFICATION

COMMUNITY
& NETWORK

**Events, Student Divisions,
Working Groups, Chapters**



Career Pathway



University



Junior SE

ASEP



Senior SE

CSEP



Chief Engineer

ESEP

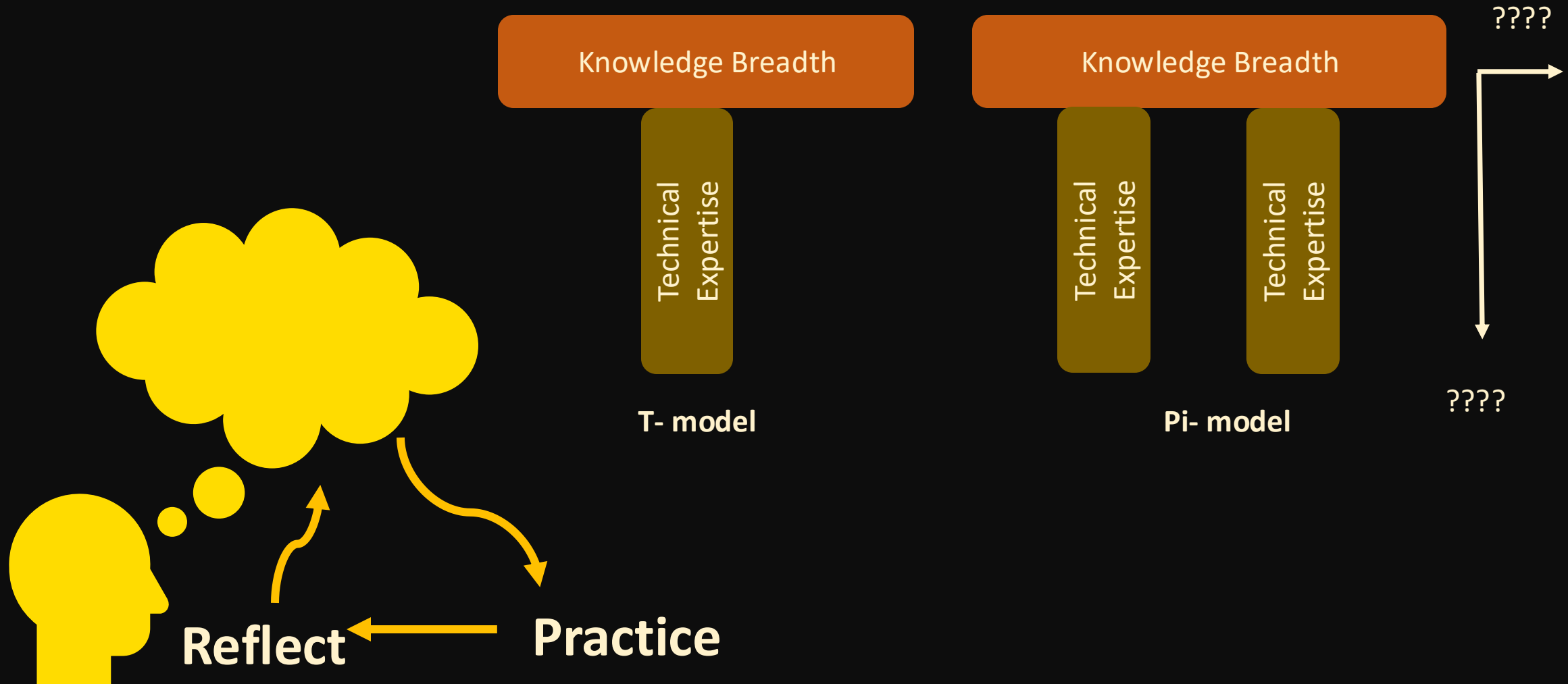
NOT

It is ~~✗~~ a ladder

.....it is a jungle gym



Be purposeful in shaping your career and...



Harness opportunities and serendipities...on the way



ON-THE-JOB TRAINING



COACHING AND MENTORING

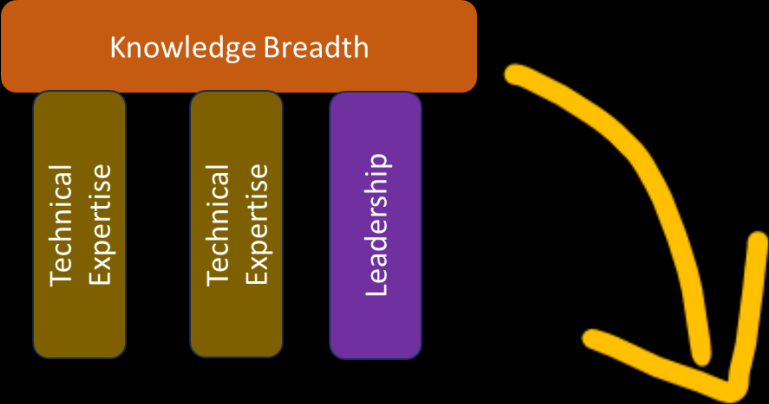


**STRETCH
ASSIGNMENTS**

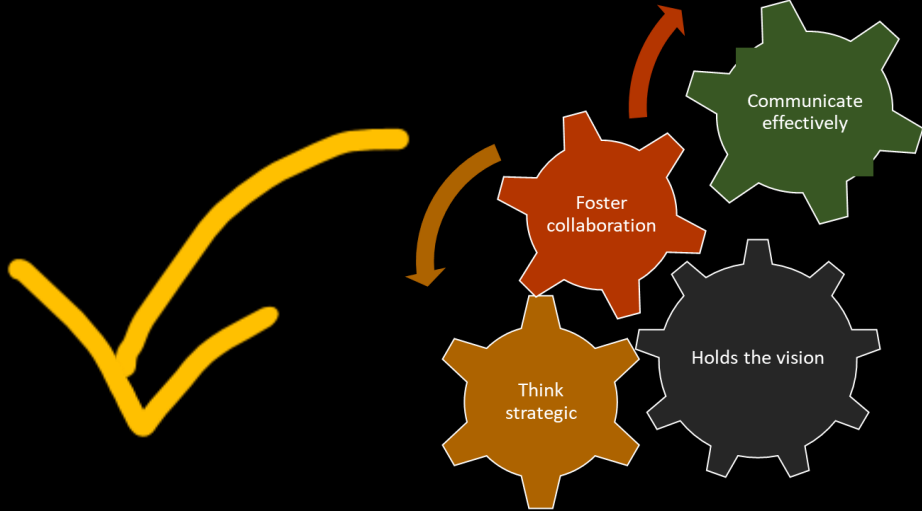


JOB ROTATIONS

Add leadership to your 'depth'



Create and maintain the strategic thread

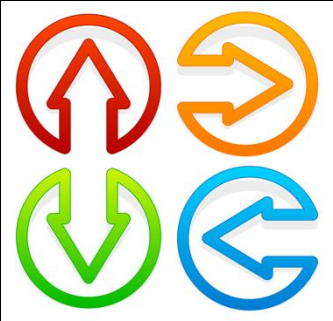


TECHNICAL LEADERSHIP

Lead through others
(Empower, Inspire, Educate)



Lead from all directions
(top, down, side, outside)



TECHNICAL LEADERSHIP



Mentoring
(technical,
career,
organizational)

Learning about
different
leadership
theories and
styles



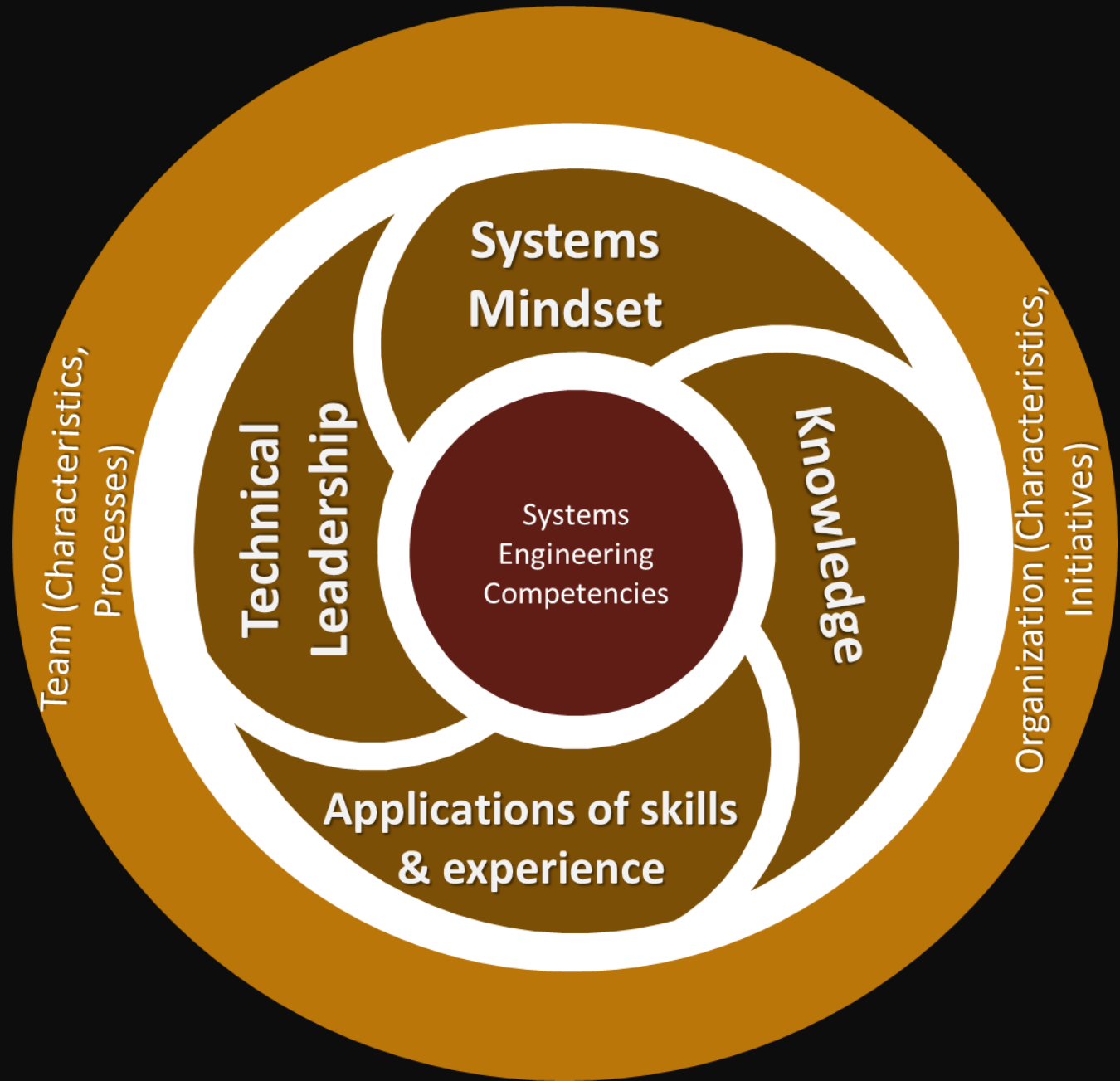
Active
participation in
professional
societies

Participation in
technical
leadership
programs





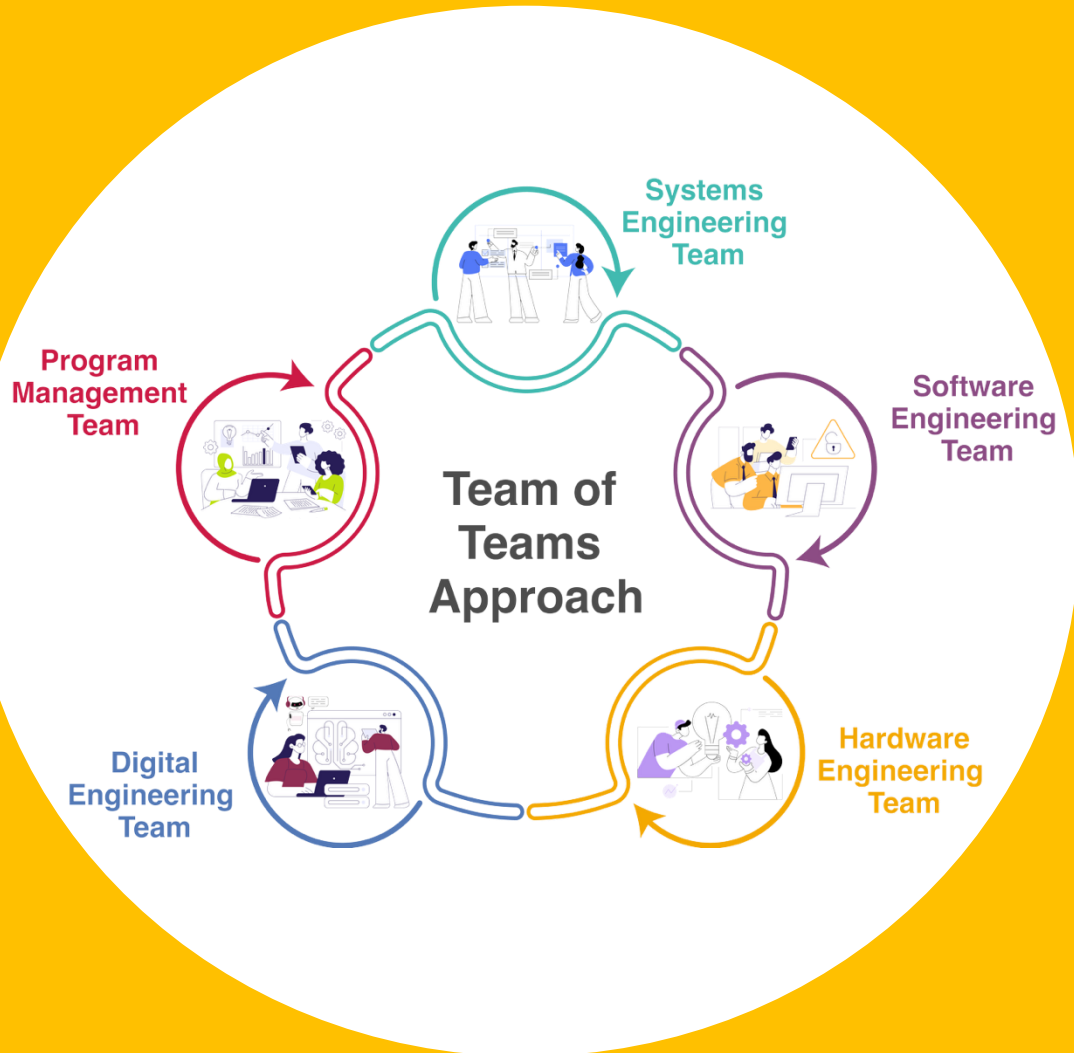
Systems Engineering Teams



Teams are SYSTEMS



	Groups	Teams
Individuals	Independent	Interdependent
Purpose	Individual	Shared
Identity	I/me	We/us
Cohesion	Non/limited	High
Products	Individual	Collective
Conflict management	Avoided, reactive	Planned, proactive



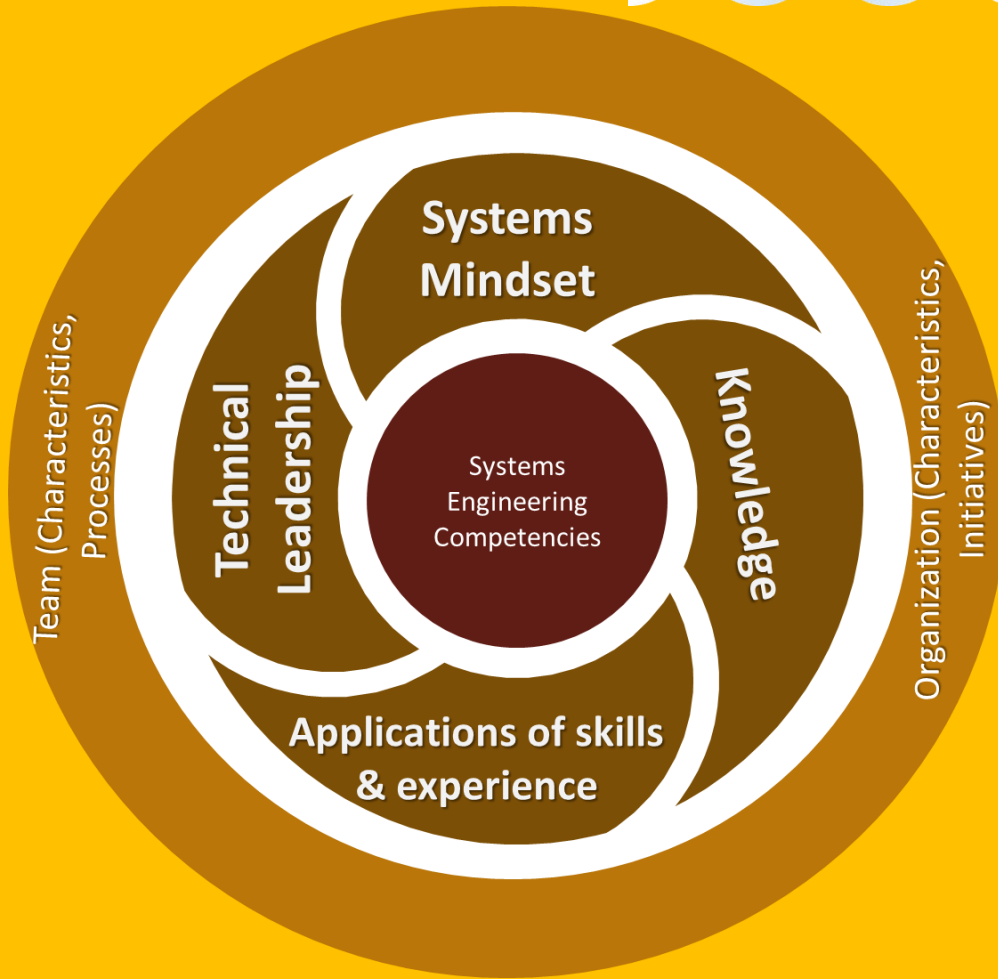
Attributes

- Composition
- Experience
- Diversity
- Coherence

Building and maintaining cohesive teams

- Pilot projects
- Joint learning activities
- Peer mentoring

Organizations



Creating and nurturing team-based culture.

Experience-enhancing initiatives

Technical leadership development programs

Knowledge exchange initiatives (e.g. publishing incentives)

Knowledge management initiatives
Education and training support (e.g. study relief, tuition reimbursement)

You are here!



Engage



Connect



Share

Do you want to know more? (1/2)

Systems Mindset

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Do you want to know more? (2/2)

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