



QT Canberra | Australia

29 April – 1 May 2019

SYSTEMS ENGINEERING TEST AND  
EVALUATION CONFERENCE 2019



SYSTEMS SCIENCE & ENGINEERING FOR A BETTER AUSTRALIA [SETE2019.COM.AU](http://SETE2019.COM.AU)

# A CASE for Standardising SE Competency

Ray Hentzschel ESEP, CPENG, EngExec



QT CANBERRA | AUSTRALIA

29 APRIL – 1 MAY 2019

# AGENDA

- Australian Certification Landscape
- Intro to ISO/IEC JTC1/SC7
- Intro to ISO/IEC 24773
- Mapping the INCOSE SECF
- Further INCOSE developments



QT CANBERRA | AUSTRALIA

29 APRIL – 1 MAY 2019

**AECS**



# Certification Landscape

## CPEng

Bachelor Engineering

+

Professional Interview

1. Deal with ethical issues
2. Practise competently
3. Responsible for Engineering Activities
4. Develop safe and sustainable solutions
5. Engage with relevant community and stakeholders
6. Identify, assess and manage risks
7. Meet legal and regulatory requirements
8. Communication
9. Performance
10. Take action
11. Judgement
12. Advanced engineering knowledge
13. Local engineering knowledge
14. Problem Analysis
15. Creativity and Innovation
16. Evaluation

+





# SETE

QT CANBERRA | AUSTRALIA

29 APRIL – 1 MAY 2019

## SE Function

1. Requirements Engineering
2. Risk and Opportunity Management
3. Information and Configuration Management
4. Technical Planning
5. Technical Monitoring and Control
6. Architecture/Design Development
7. Verification and Validation
8. Acquisition and Supply
9. System Operation and Management
10. Life Cycle Process Definition and Management
11. Systems Integration
12. Systems and Decision Analysis
13. Specialty Engineering
14. Organisational Project Enabling Activities

+



# Certification Landscape

## CSEP

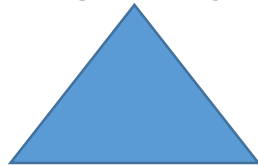
Technical Degree

+

INCOSE Knowledge Exam  
or SE Accredited degree



INCOSE SE Handbook



ISO/IEC/IEEE 15288:2015



# Certification Landscape Comparison

QT CANBERRA | AUSTRALIA

29 APRIL – 1 MAY 2019

## CSEP

## CPEng

Technical Bachelor Degree

Bachelor of Engineering

Demonstrated SEBoK understanding

No base SE knowledge

5 year's Verified Breadth and Depth experience

3 year's general experience

Independent assessment

Self and employer assessment

Aligned with international best practice

No alignment with BoK

Aligned with international standards

No alignment/consistency

Not yet recognised nationally

Well marketed by EA

No Interview

Professional Interview

Cheaper

Expensive

Sampled CDP Assessment

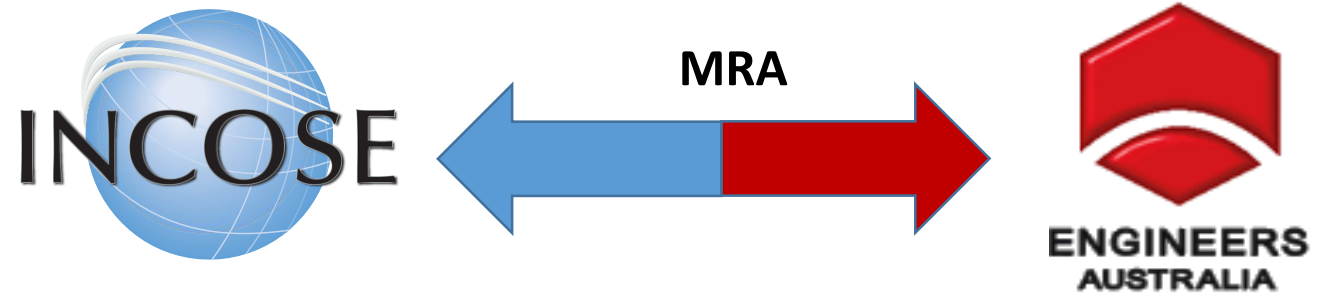
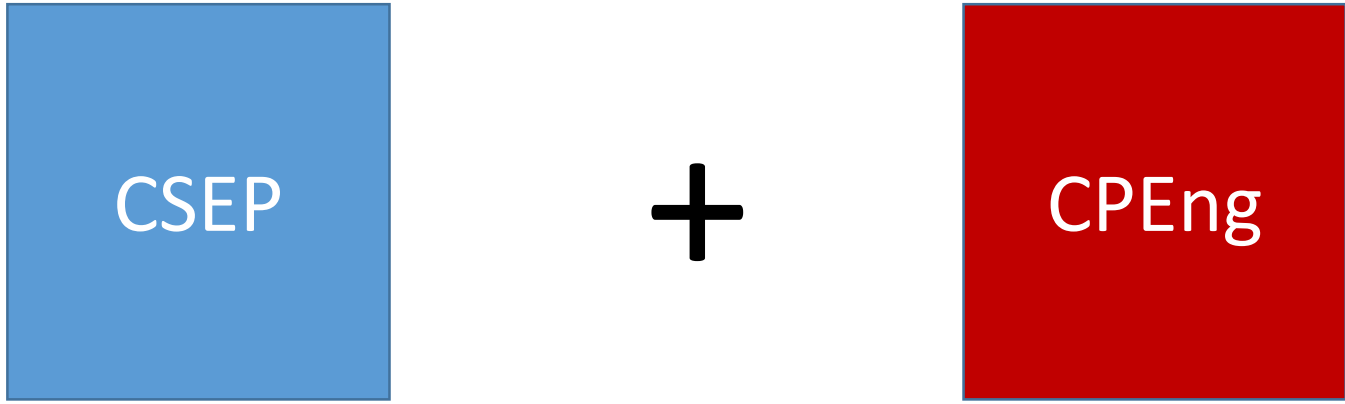
Comprehensive CPD Assessment



# Certification Landscape

QT CANBERRA | AUSTRALIA  
29 APRIL – 1 MAY 2019

## CASE

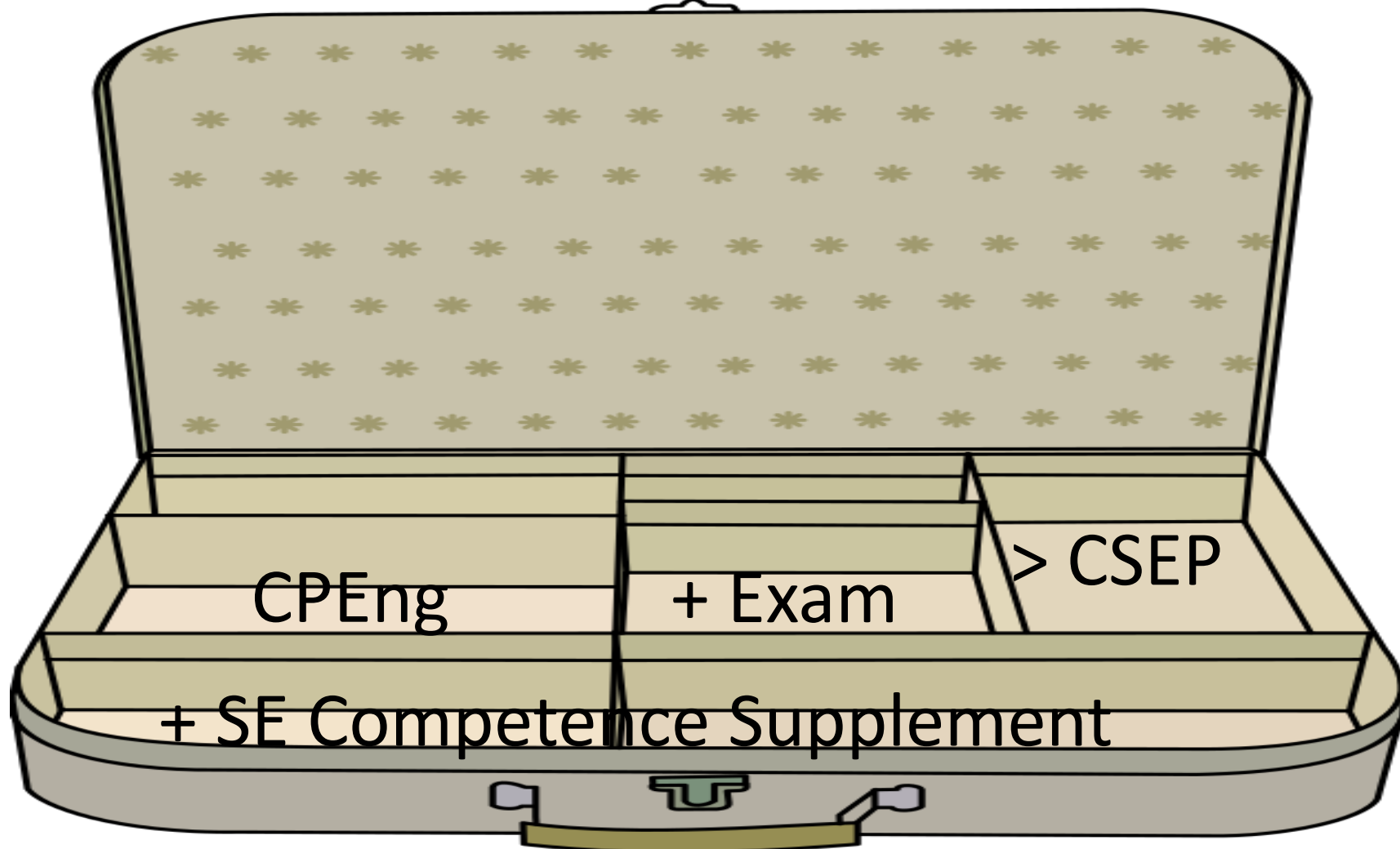




QT CANBERRA | AUSTRALIA

29 APRIL – 1 MAY 2019

# Packing the CASE Pathway 1



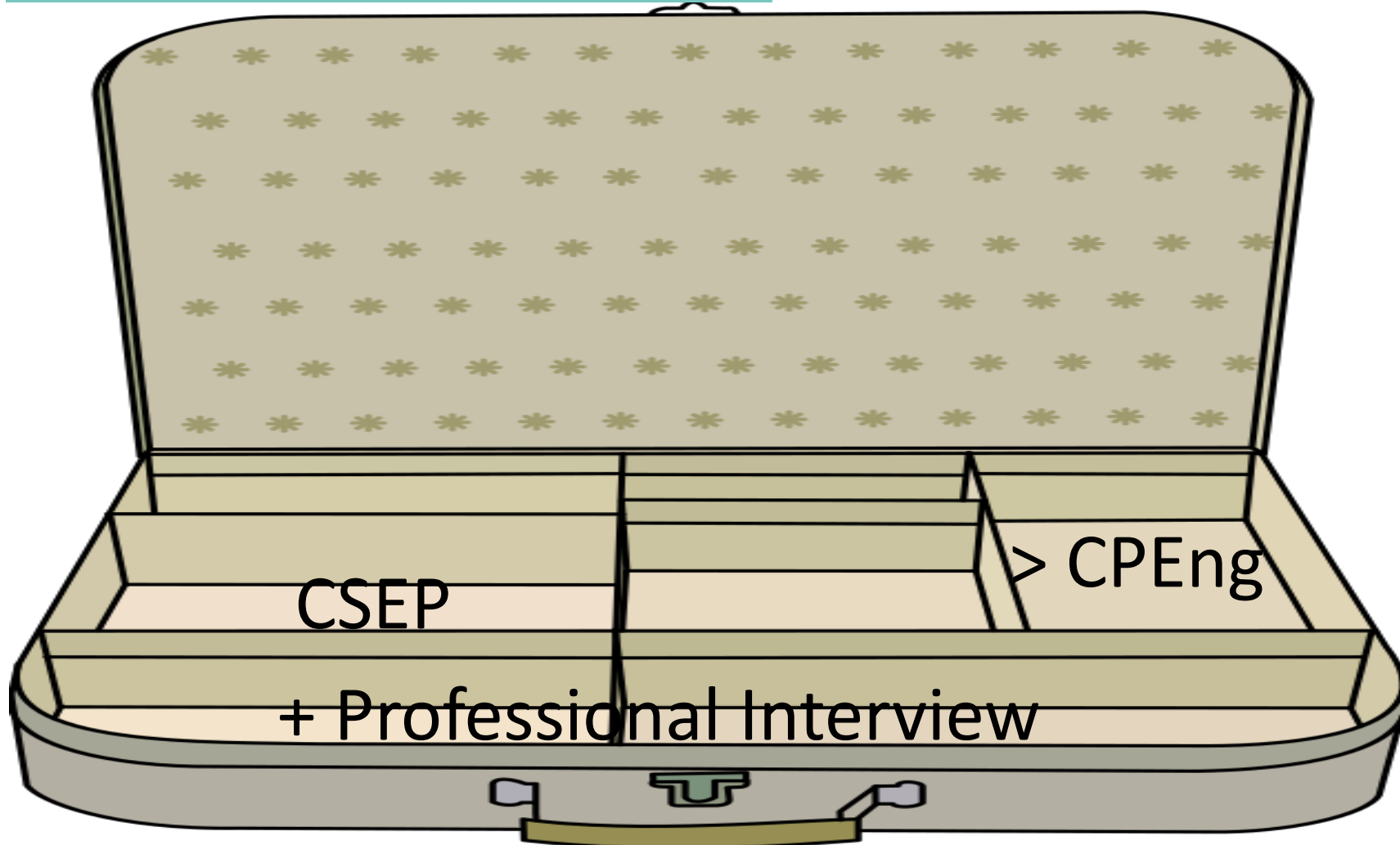




# Packing the CASE Pathway 2

QT CANBERRA | AUSTRALIA

29 APRIL – 1 MAY 2019

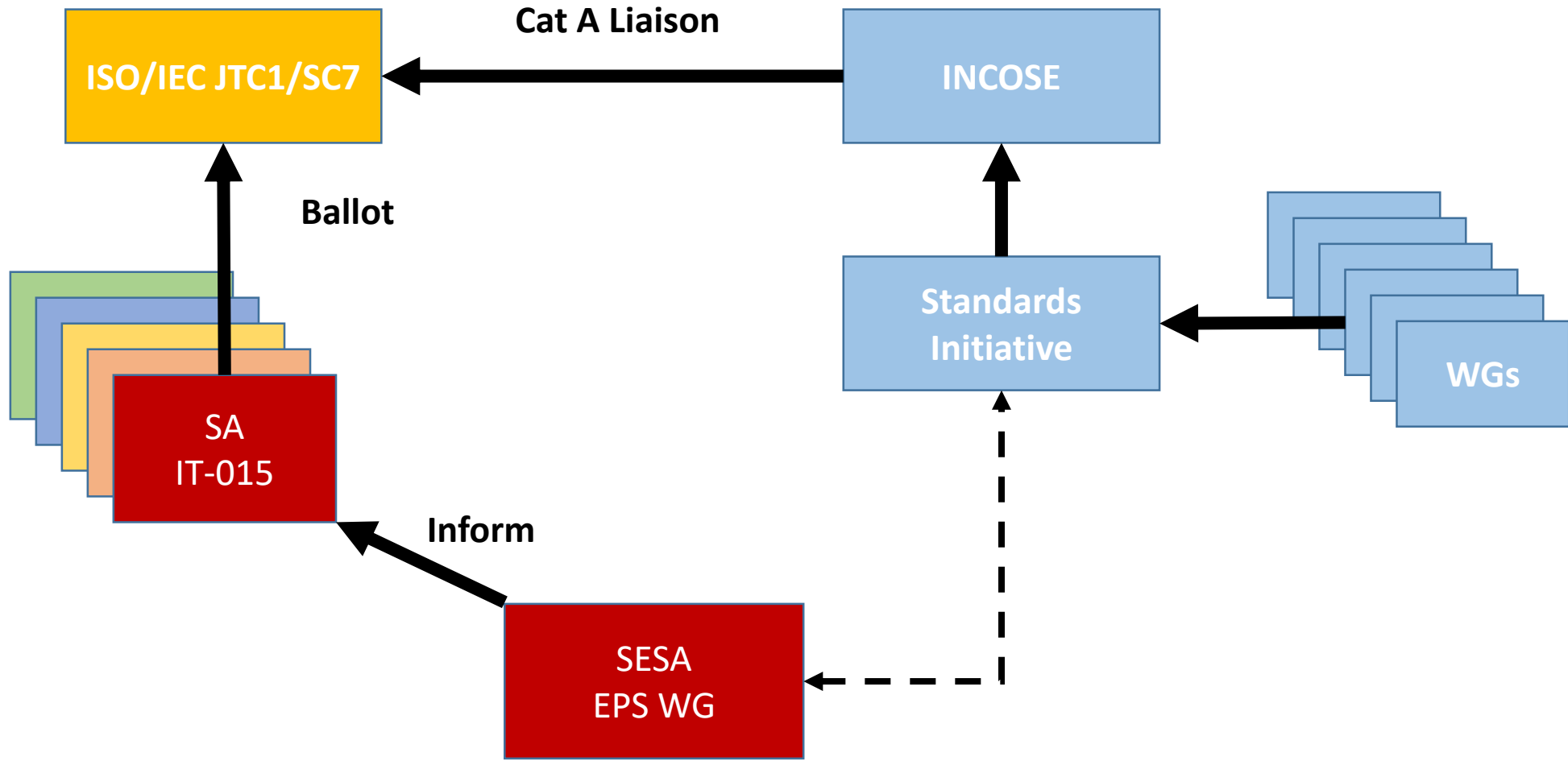






**QT CANBERRA | AUSTRALIA**  
**29 APRIL – 1 MAY 2019**

# ISO/IEC JTC1/SC7 Software and Systems Engineering

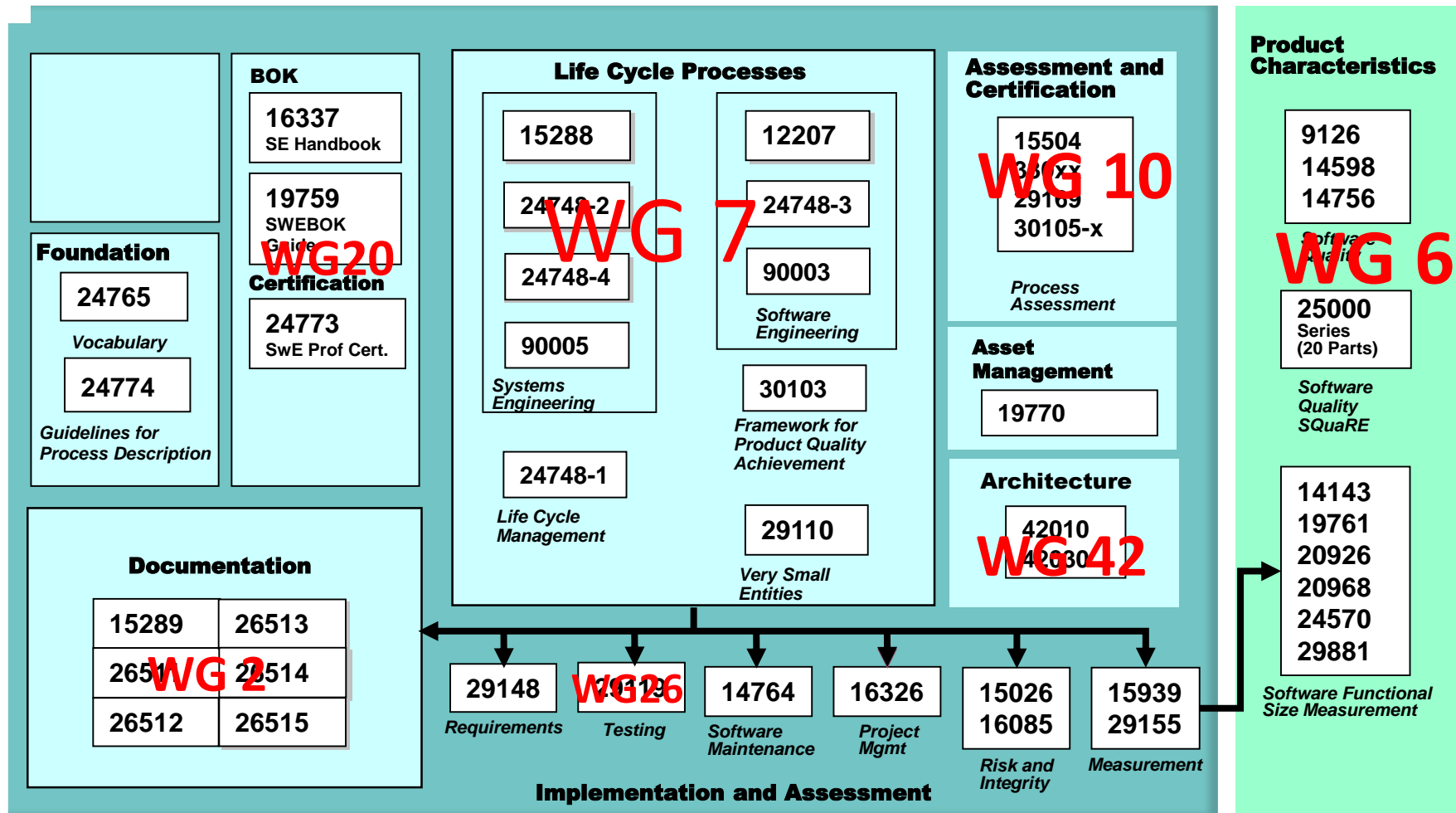




**QT CANBERRA | AUSTRALIA**  
**29 APRIL – 1 MAY 2019**



**ISO/IEC JTC1/SC7**





QT CANBERRA | AUSTRALIA

29 APRIL – 1 MAY 2019

**WG20**

**ISO/IEC 24773**

## ISO/IEC 24773 - Software and Systems Engineering – Certification of Software and Systems Engineering Professionals

- Part 1: General Requirements **Published**
- Part 2: Guidance Regarding Description of Knowledge, Skills and Competencies contained in Schemes
- Part 3: Systems Engineering
- Part 4: Software Engineering

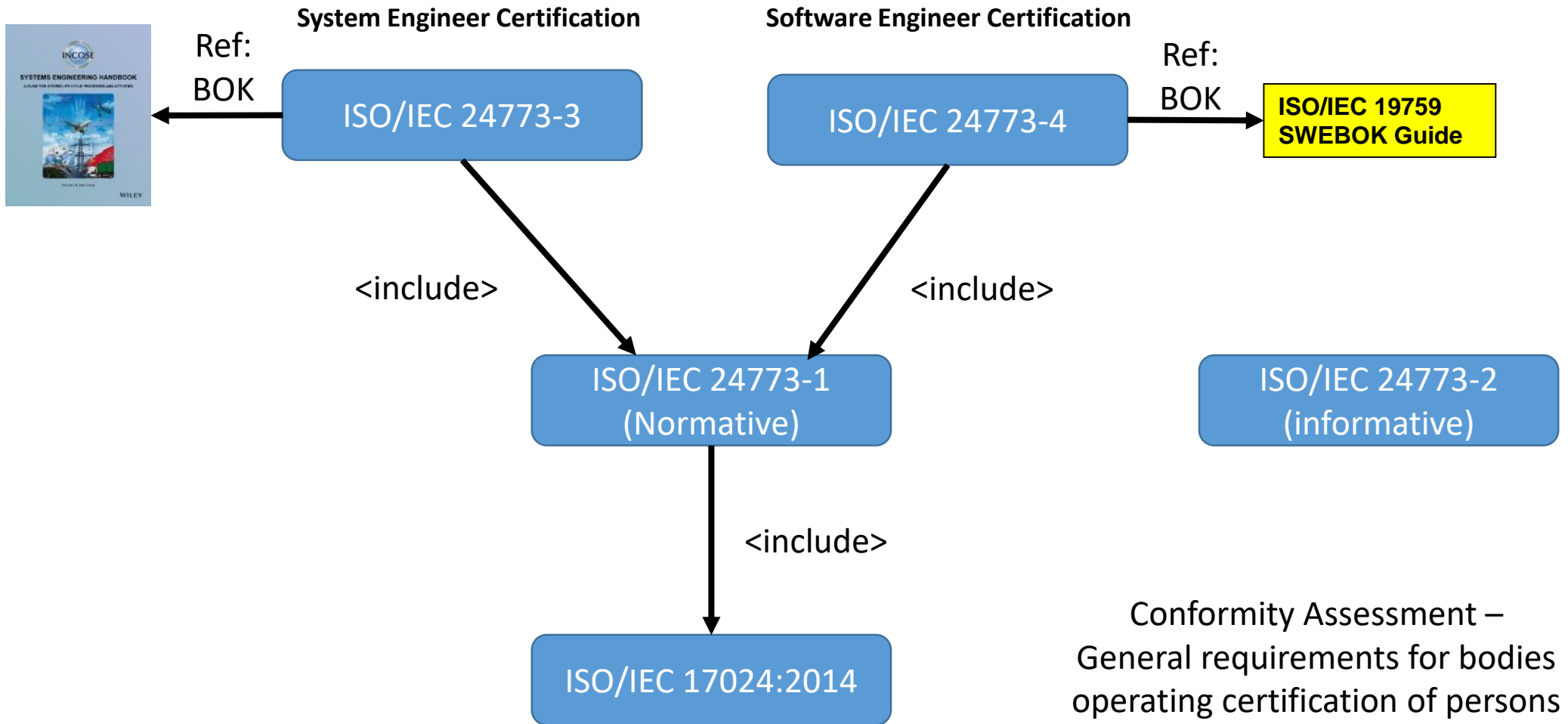


**QT CANBERRA | AUSTRALIA**  
**29 APRIL – 1 MAY 2019**



# ISO/IEC 24773

## Normative Relationships



Conformity Assessment –  
 General requirements for bodies  
 operating certification of persons



QT CANBERRA | AUSTRALIA

29 APRIL – 1 MAY 2019

# ISO/IEC 24773 Elements



Candidate



Knowledge	Cognitive Level
Knowledge 1	Description
Knowledge 2	Description

- Aware of
- Know
- Can explain
- Can discuss

Skill	Knowledge	Performance Level
Skill 1	Required cognitive level	Description
Skill 2	Required cognitive level	Description

- Can execute +
- Proficient in skill
- Can teach

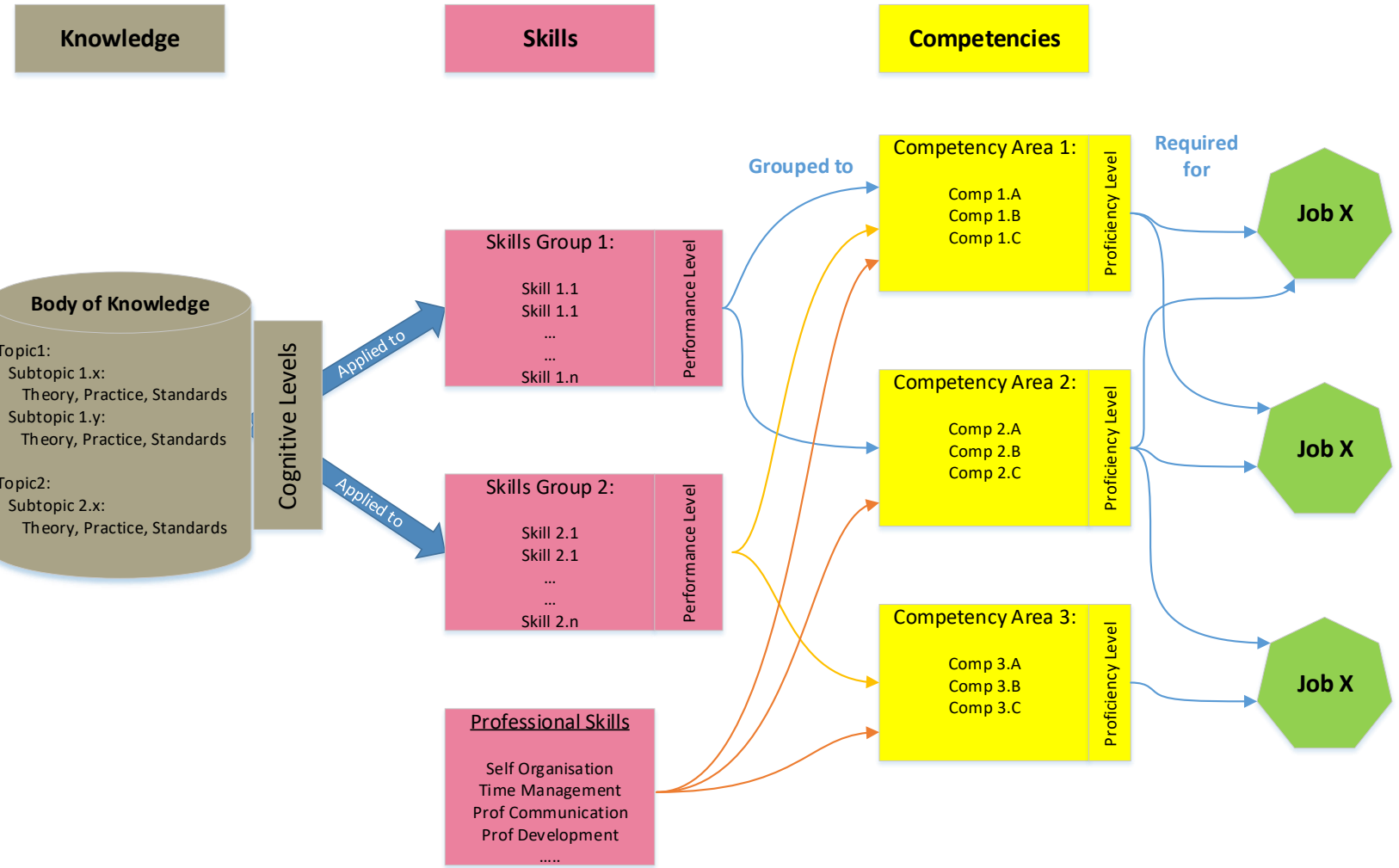
Competence	Skill	Proficiency Level
Competency 1	Required performance level	Description
Competency 2	Required performance level	Description

- Aware
- Supervised Practitioner
- Practitioner
- Lead Practitioner
- Expert



**QT CANBERRA | AUSTRALIA**  
**29 APRIL – 1 MAY 2019**

# ISO/IEC 24773 Certification Application





QT CANBERRA | AUSTRALIA

29 APRIL – 1 MAY 2019

# Conformance Components

- Job Name – expressing Knowledge and Skills
- Tasks – required for the job (Ref: Lifecycle processes)
- Accountability, Responsibility, Autonomy, Authority
- BoK – Cognitive and Performance Levels
- Minimum educational qualifications
- Code of Ethics
- Recertification requirements





QT CANBERRA | AUSTRALIA

29 APRIL – 1 MAY 2019



# Systems Engineering Competency Framework

This INCOSE Technical Product was developed and produced in conjunction with the following contributors:







QT CANBERRA | AUSTRALIA

29 APRIL – 1 MAY 2019

# Evaluation Methods

## **INCOSE Systems Engineering Competency Framework Annex E: Guide to Competency Evaluation (TBP IS 2020?)**

### **ISO/IEC 24773-1**

- Examination
- Inspection of work products or deliverables
- Interview
- Direct Monitoring and observation of work performance
- Records of past experience, achievements, deliverable



SETE



ENGINEERS  
AUSTRALIA



SESA



INCOSE



SOUTHERN CROSS  
ITER  
CHAPTER

QT CANBERRA | AUSTRALIA

29 APRIL – 1 MAY 2019

# CSEP Transformation

**Knowledge + Experience <= Competence**



**Knowledge U Skill = Competence**

**Cognitive**

**U**

**Performance**

**=**

**Proficiency**

ISO/IEC  
24773-3

SE BoK

SEP Functional  
Areas

SE Competency  
Framework



QT CANBERRA | AUSTRALIA

29 APRIL – 1 MAY 2019

## INCOSE Pillars

Professional  
Development  
Portal

Beta 2020

Systems  
Engineering  
Competency  
Framework

IS 2018

Certification  
Program  
(SEP)

Trial UK



QT CANBERRA | AUSTRALIA

29 APRIL – 1 MAY 2019

# Questions





QT CANBERRA | AUSTRALIA

29 APRIL – 1 MAY 2019