INCOSE EMEA Workshop 2019

Modelling as enabler of reliability

Albertyn Barnard

10 October 2019

Workshop agenda

09:30 Welcome - Albertyn
Introduction of René as co-chair and Michiel as facilitator
Michiel will lead 'getting to know each other' exercise

09:45 Presentations from different domains, 10 min each, followed by 5 min discussion

1.	Albertyn Barnard	ASML	Modelling as enabler of reliability
2.	Jan De Laet	PINS	Integrated medical development process
3.	Gerrit Muller	TNO	Conceptual modelling
4.	Fred Huizinga	ASML	Vision on future role of CAE in ASML
5.	Corrie Taljaard	SKA	RAM and support modelling
6.	Niels Malotaux	NM Consulting	Reliability by design

11:30 Open discussion to conclude session
Recap Learnings & Strategy, complete poster
Decision on re-establishment of RE working group

12:00 End

What are objectives of workshop?

1. To learn / to network / to discuss / to challenge / to stimulate

2. To decide on role of reliability engineering working group in INCOSE
   - Should INCOSE have a RE working group?
   - What should this working group do?
     - SE HDBK v5, SEBoK, new technologies, system reliability (only)?

What is reliability?

Will it fail?

- why will it fail?
- when will it fail?

Reliability engineering is everything you do today to prevent product failure tomorrow.

Albertyn Barnard

What is reliability?

When is a system reliable?

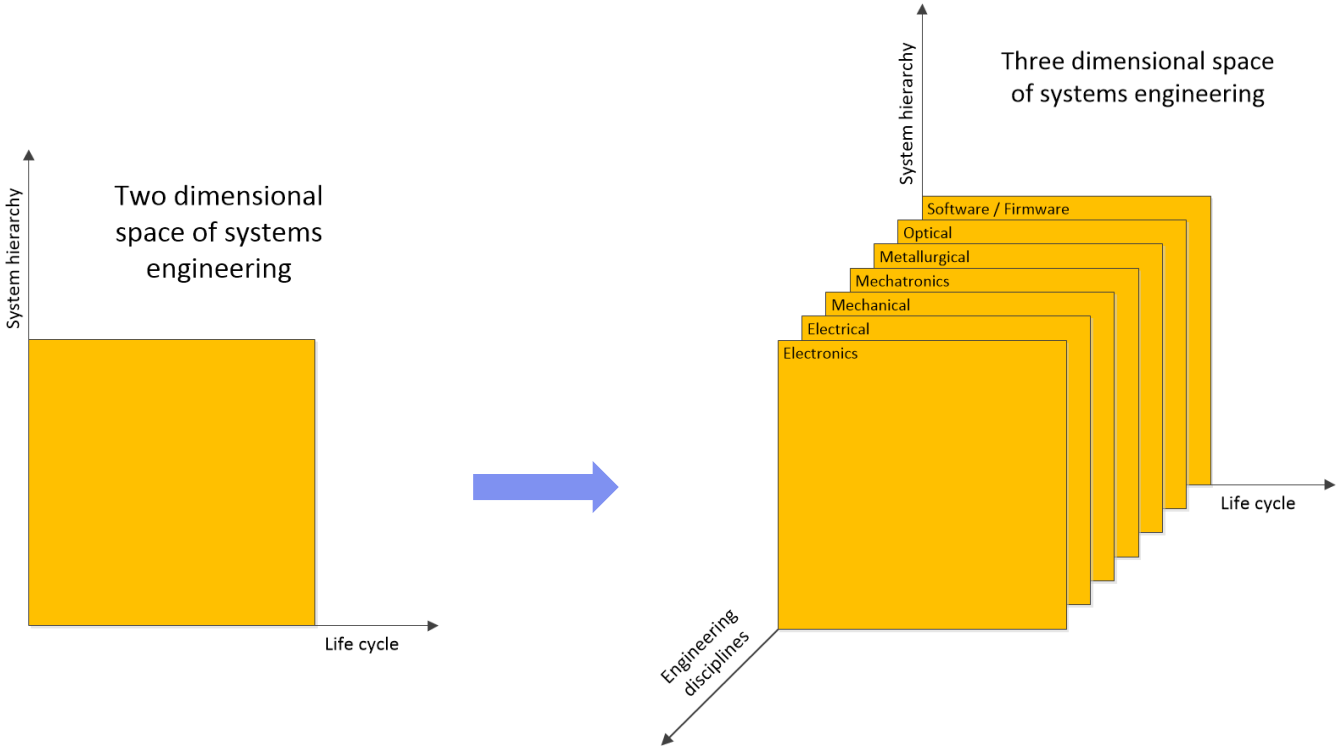
Old paradigm

A system is reliable if it fails no more than an agreed number of times during a given period.

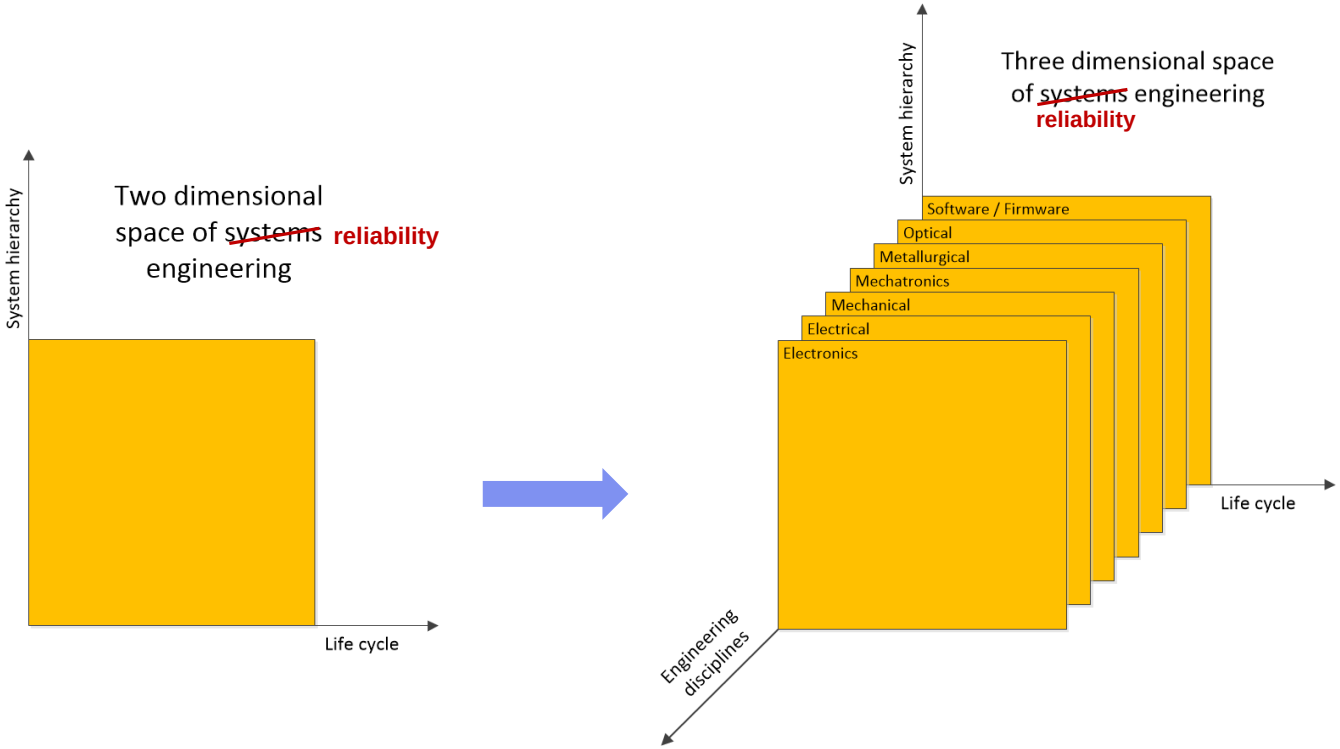
New paradigm

A system is reliable if it operates as required for a given period without failure.

What is reliability engineering?



What is reliability engineering?

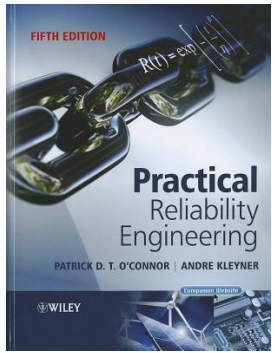


What is reliability engineering?

- Understand overall objectives of reliability engineering (in order of priority):

  1) To prevent failures.
  2) To correct causes of failures.
  3) To cope with failures.
  4) To predict reliability.

Patrick O'Connor



What is design-for-reliability?

Simulation, FEA, CFD

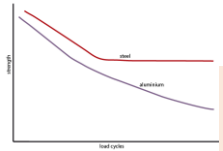
Architecture, components, interfaces

Design (what)

Environment (where)

Environmental conditions

EMC, Thermal, HALT & HASS



Failure mechanisms (why)

Operating conditions (how)

DFMEA, FTA, Physics-of failure

Failure modes and failure mechanisms

MBSE, DfR

Use, operating and support conditions

RCM, PHM, FRACAS

To understand reliability, you have to study the interaction between design, environment, operating conditions, and failure modes and failure mechanisms.
If you do not have knowledge of this interaction, you do not understand reliability.