



UNIVERSITEIT VAN PRETORIA  
UNIVERSITY OF PRETORIA  
YUNIBESITHI YA PRETORIA

## Faculty of Engineering, Built Environment and Information Technology

Fakulteit Ingenieurswese, Bou-omgewing en  
Inligtingtegnologie / Lefapha la Boetsenere,  
Tikologo ya Kago le Theknolotši ya Tshedimošo

# CPS testing update

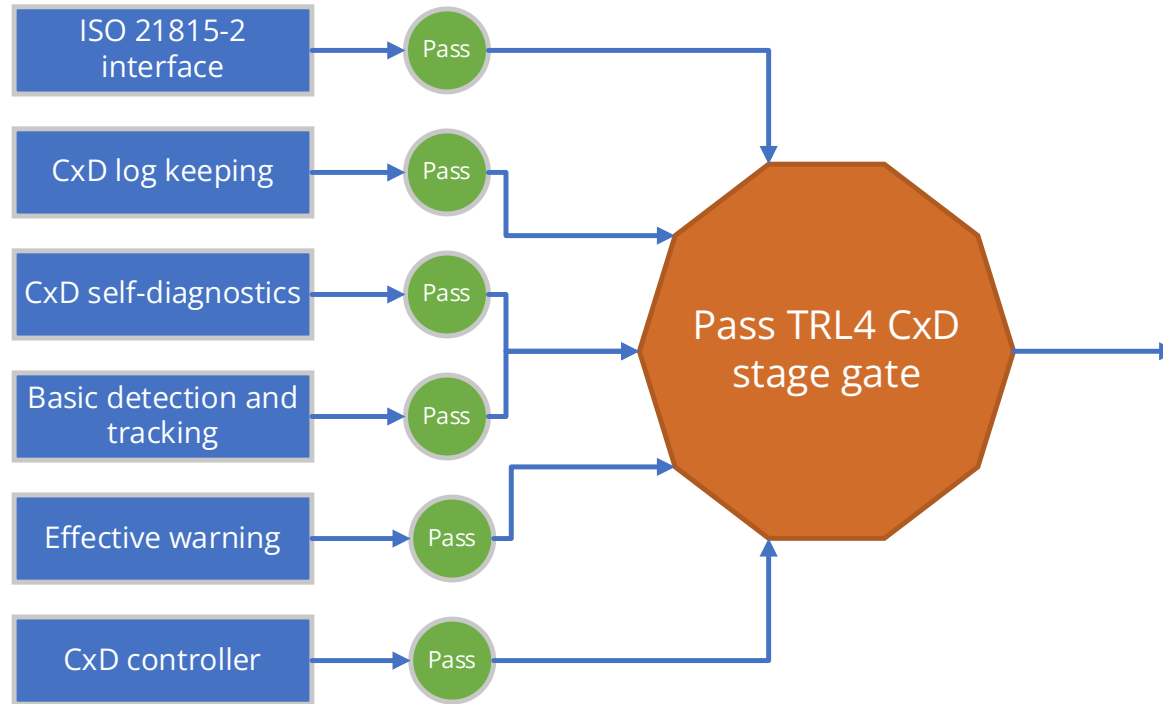
Dr Herman Hamersma, Pr Eng  
31 August 2023

Make today matter



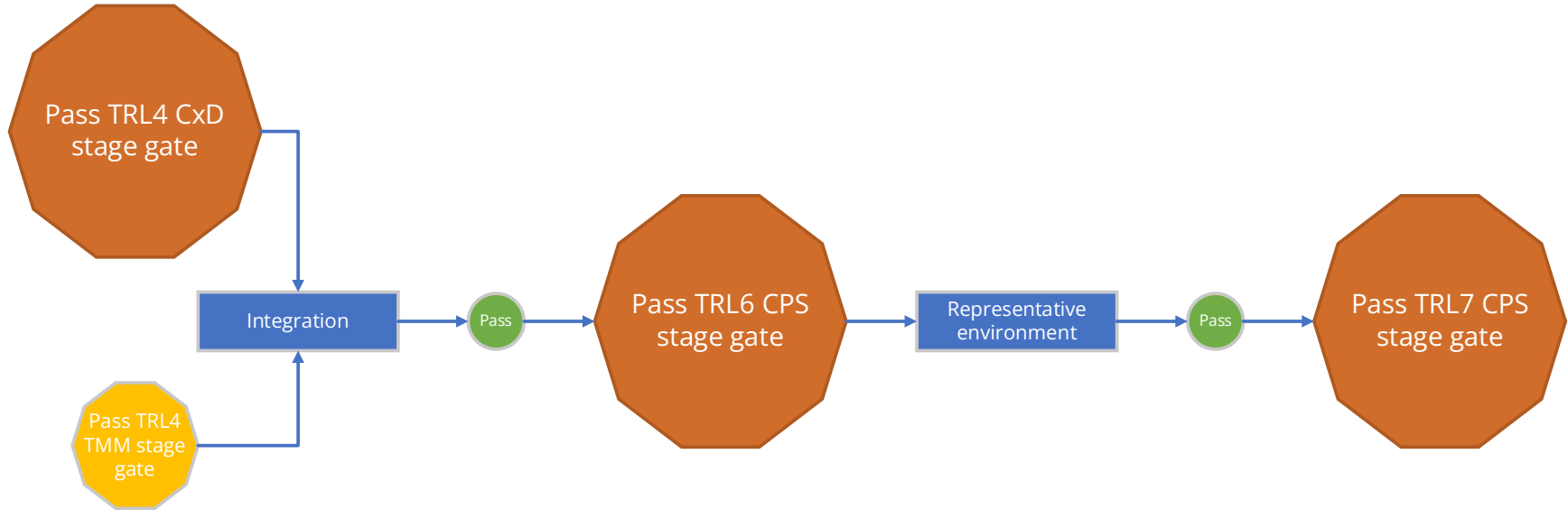
# Test stage gates

CxD testing



# Test stage gates

CxD testing



# Testing

## TMM

No.	TRL	Test protocol	Status
1	4	TMM ISO 21815 Interface Test	Tested commercially
2	4	TMM Log keeping test	Tested commercially
3	4	TMM Machine sensing test	Ready
4	4	TMM self - diagnostic test	Tested commercially
5	4	Surface TMM Machine Controller Test	Ready
6	4	Underground TMM Machine Controller Test	Ready

# Testing

## CxD TRL4

No.	TRL	Test protocol	Status
7	4	CxD ISO 21815 Interface Test	Tested commercially
8	4	CxD Log keeping Test	Tested commercially
9	4	Surface TMM CxD Self-diagnostic Test	Tested commercially
10	4	Underground TMM CxD Self-diagnostic Test	Tested commercially
11	4	Surface TMM Effective Warning Test	Ready
12	4	Underground TMM Effective Warning Test	Ready

# Testing

## CxD TRL4

No.	TRL	Test protocol	Status	Comment
13	4	Surface TMM CxD Basic Detection and Tracking Test	On track	Test planned for next week
14	4	Underground TMM CxD Basic Detection and Tracking Test	On track	Test planned for next week
15	4	Surface TMM CxD Scenario Test	On track	Hardware being commissioned, dry run planned for 13-14 September
16	4	Underground TMM CxD Scenario Test	On track	Test planned for next week

# Testing

CxD TRL6+

No.	TRL	Test protocol	Status	Comment
18	6	Surface TMM CPS Integration Test	Ready	
19	6	Underground TMM CPS Integration Test	Ready	
17	4	Underground CxD Robustness Test	On track	Test planned for next week
20	7	Surface TMM Advanced CxD Test	Ready	

# Key takeaways

- Current focus is on TRL4 ISO interface, log keeping and self-diagnostics (both CxD and TMM)
  - Suppliers and OEMs stumbling at this first, basic step
  - Having a test booked does not mean the test will be successful
  - Without the fundamentals in place, there is very little point in proceeding
    - This may have an impact on any exemptions submitted to the DMRE
  - Clear, direct communication with developers, not sales/marketing, essential for test success



# Key takeaways

- We are aware of the pressure from the DMRE, doing our utmost to support the industry
- Tests are currently being booked for October, but more advanced testing requires the fundamentals to be in place
  - Bookings are made on a first-come-first-served basis, PO is your ticket to a slot
  - Currently only making bookings for ISO, LK, SD
  - Suppliers enquiring about more advanced testing are placed on a waiting list.
- Lack of OEM buy-in, adoption of ISO 21815-2 interface remains a problem
  - Need high-level engagement with OEMs
  - Gap in the market being filled by third-party interface suppliers

# Other issues

- Suppliers, especially CxD suppliers, realizing the value of MOSH CPS Test regime
  - Emphasizing Section 21 bearing fruit
- Mines poorly aligned with & poorly informed about MOSH documentation & testing
  - Under severe pressure from regulator
  - Making bad, uninformed decisions under pressure



# Thank you



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