

# Completing the Elizabeth line

5 April 2023

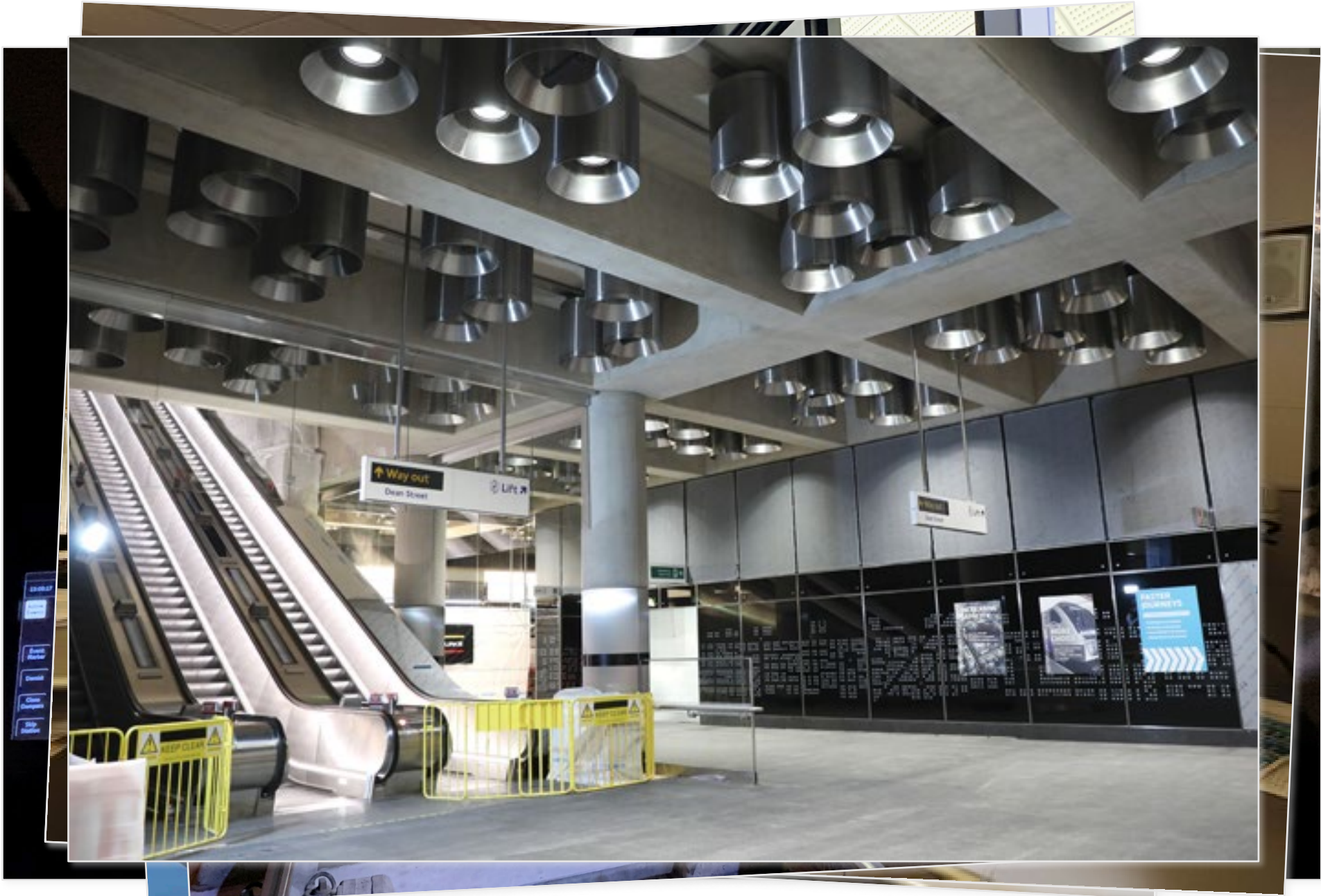


# Systems Integration

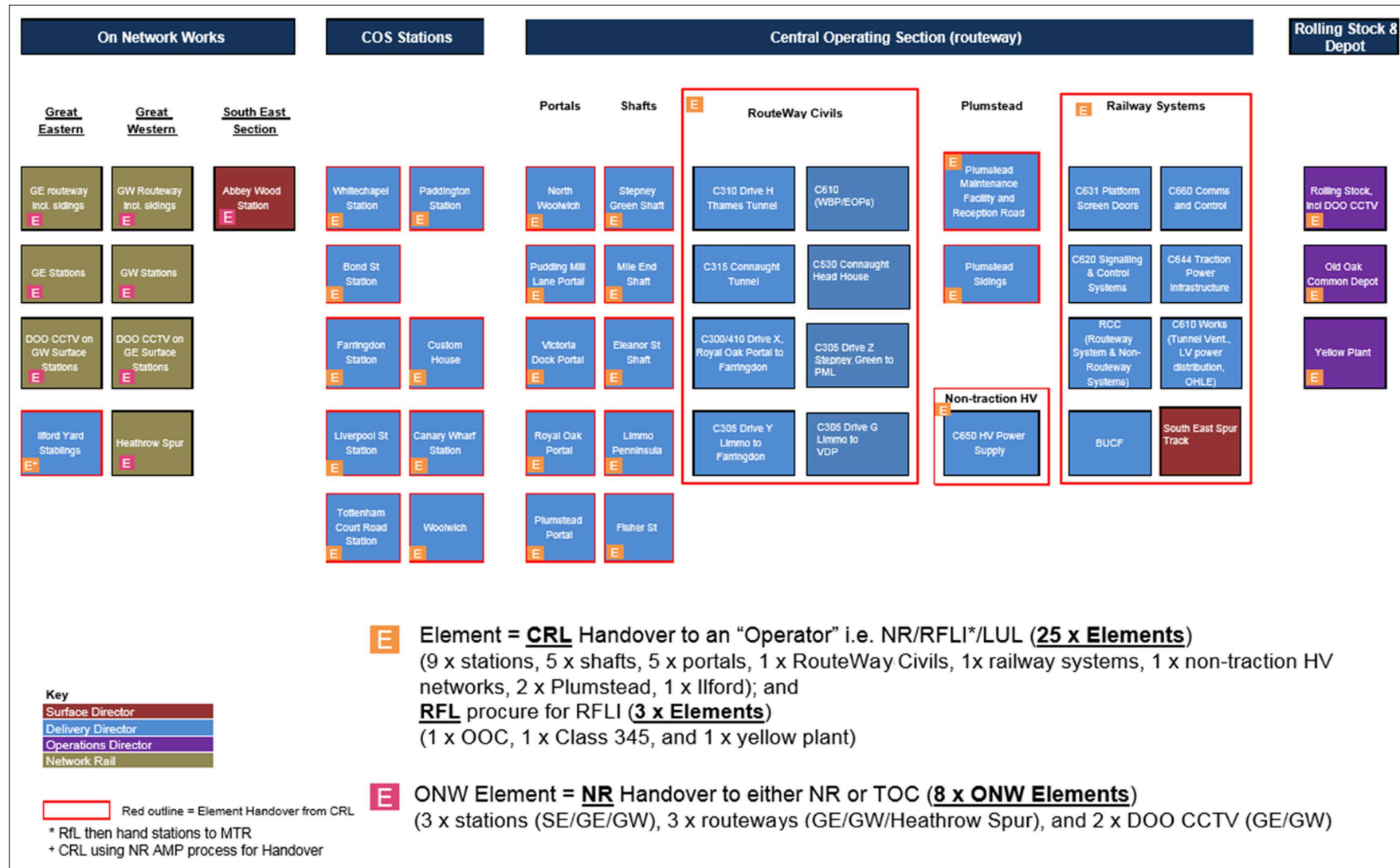
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Colin Brown Former Technical Director

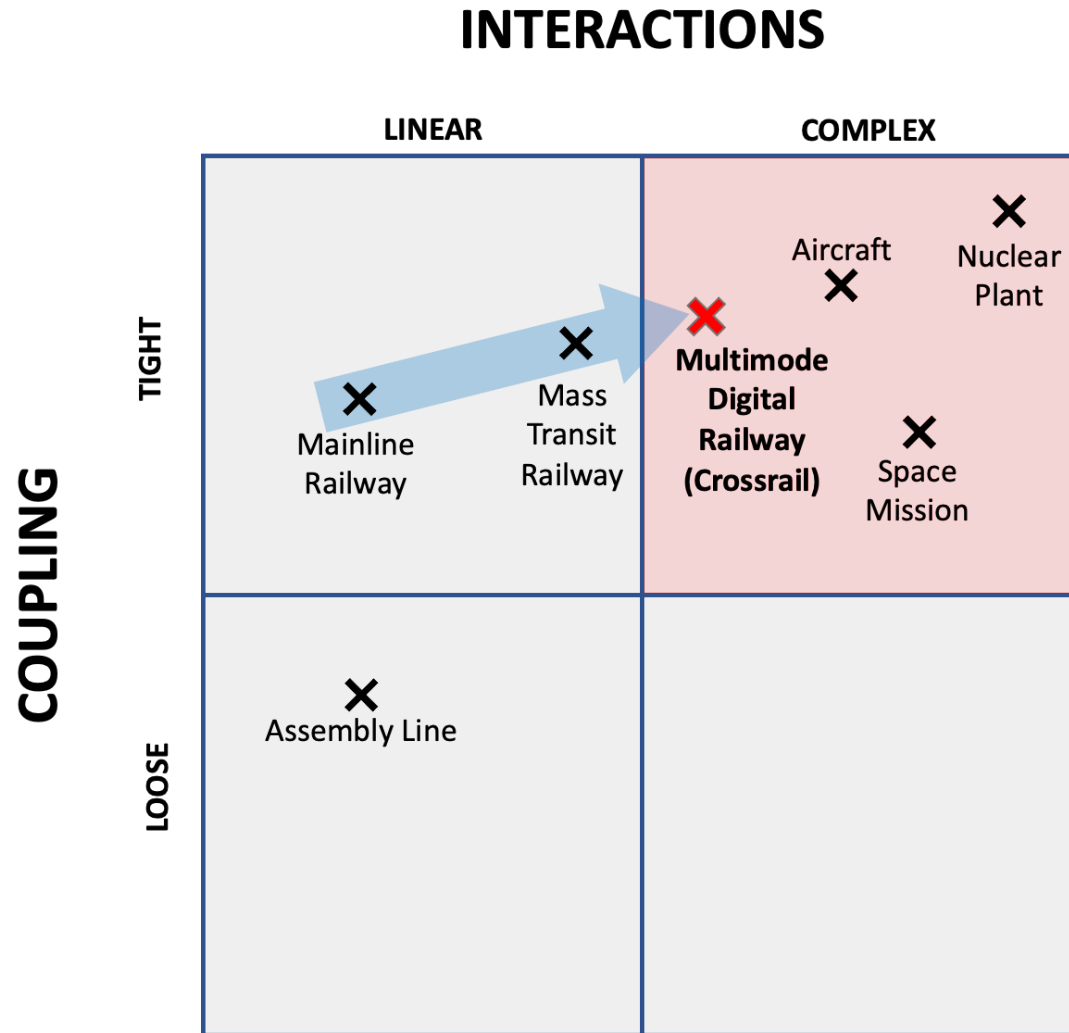




# Complexity

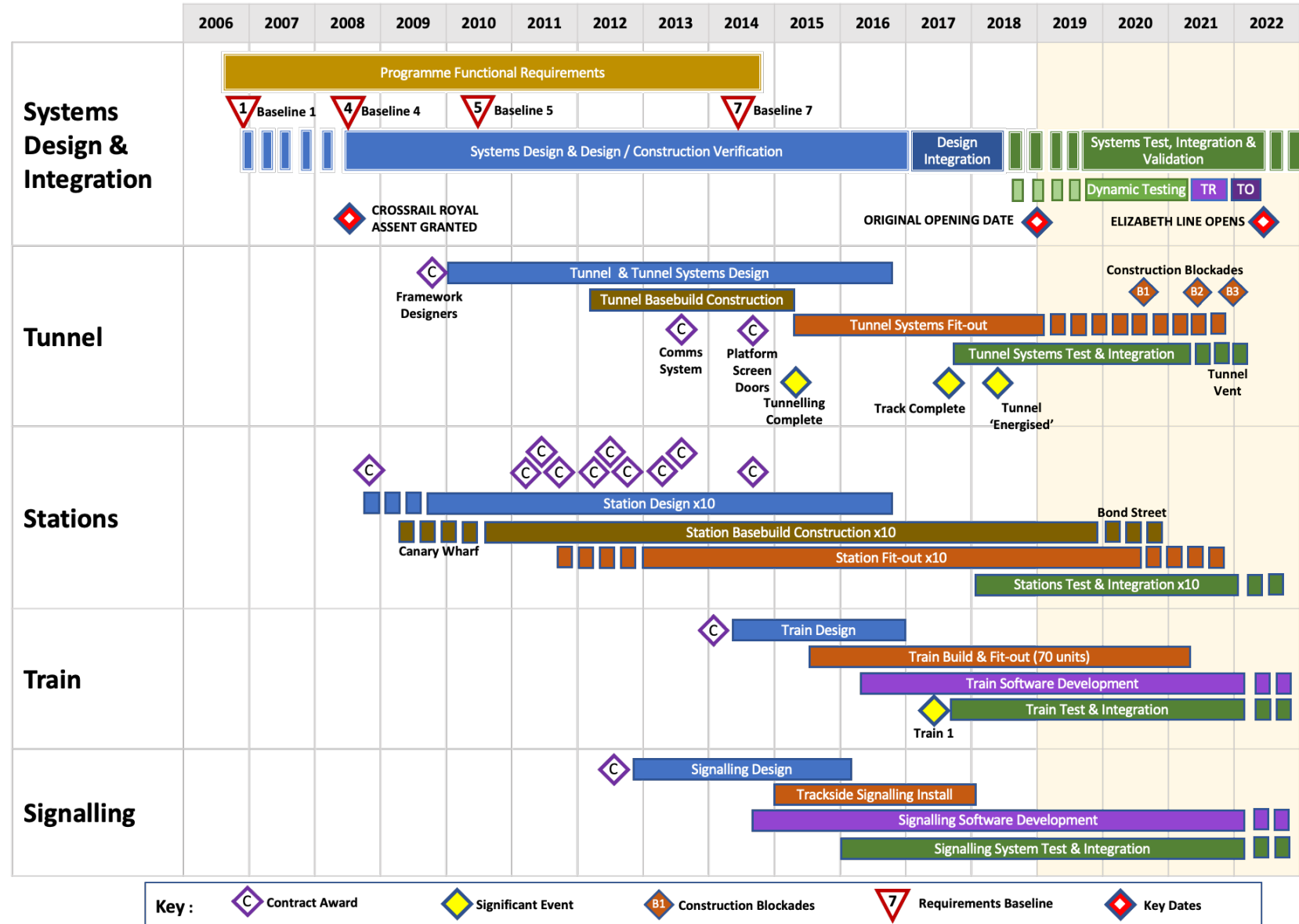


# Complexity

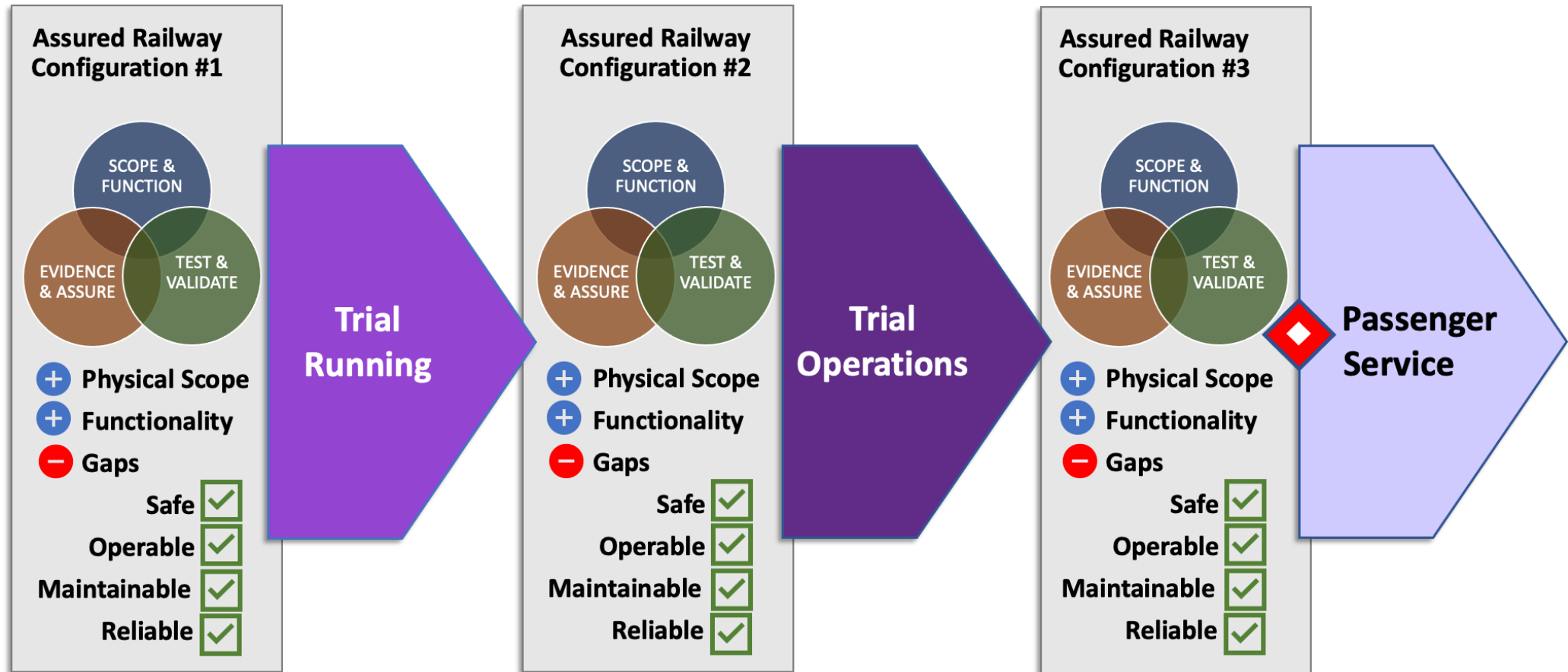


Adapted from Figure 3.1 Interaction / Coupling Chart, Normal Accidents, Charles Perrow 1999

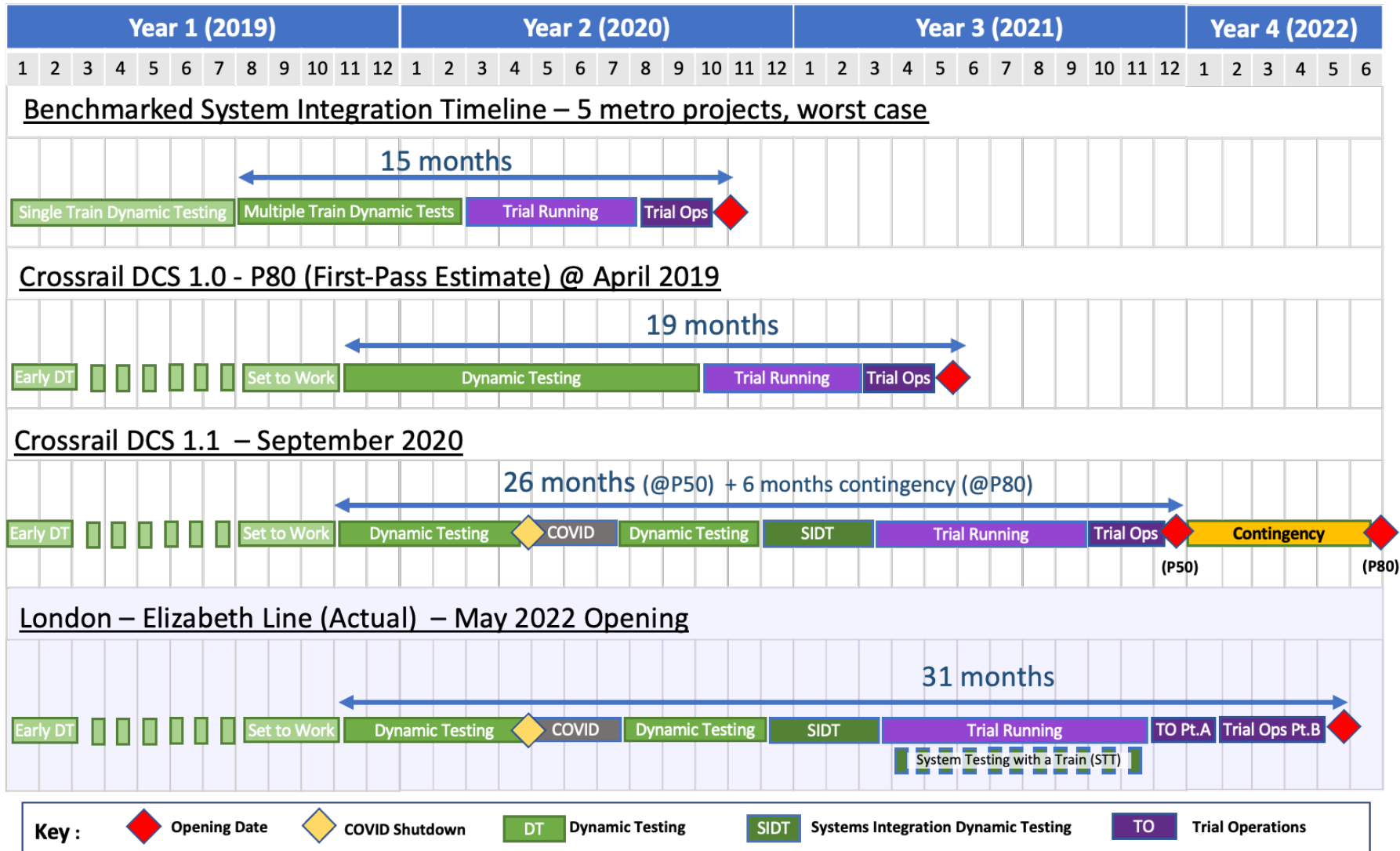
# Hindsight



# Deliver in Stages

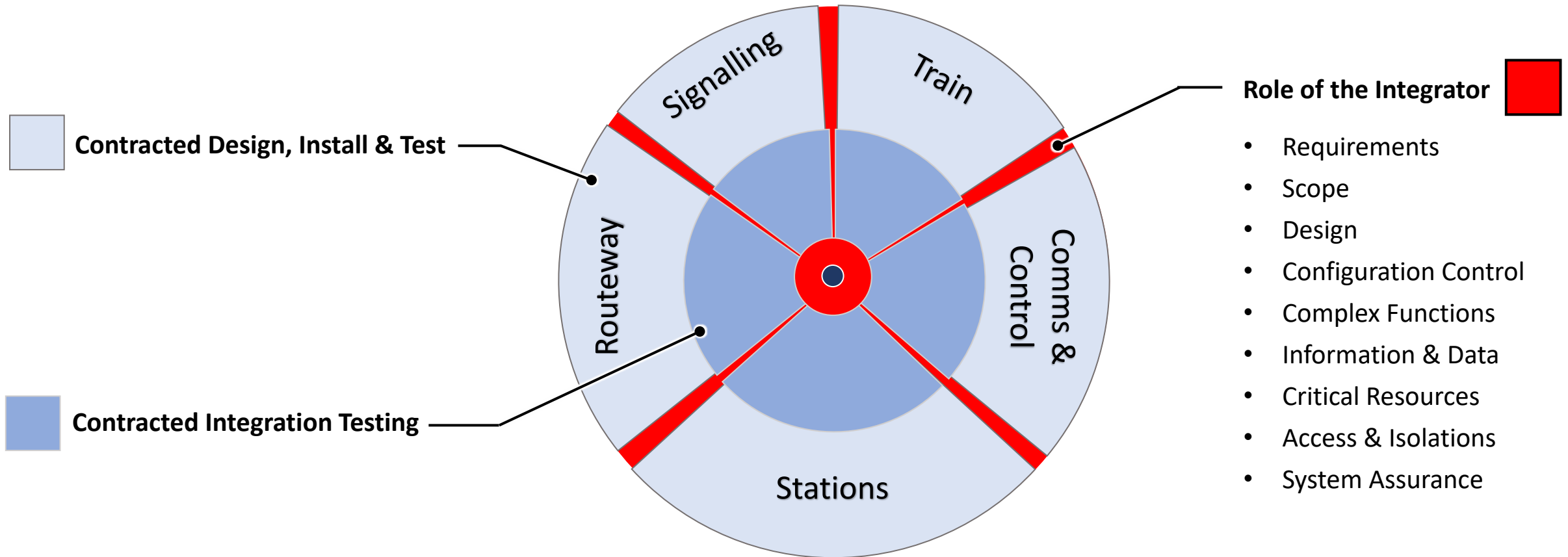


# Get a Grip on Complexity

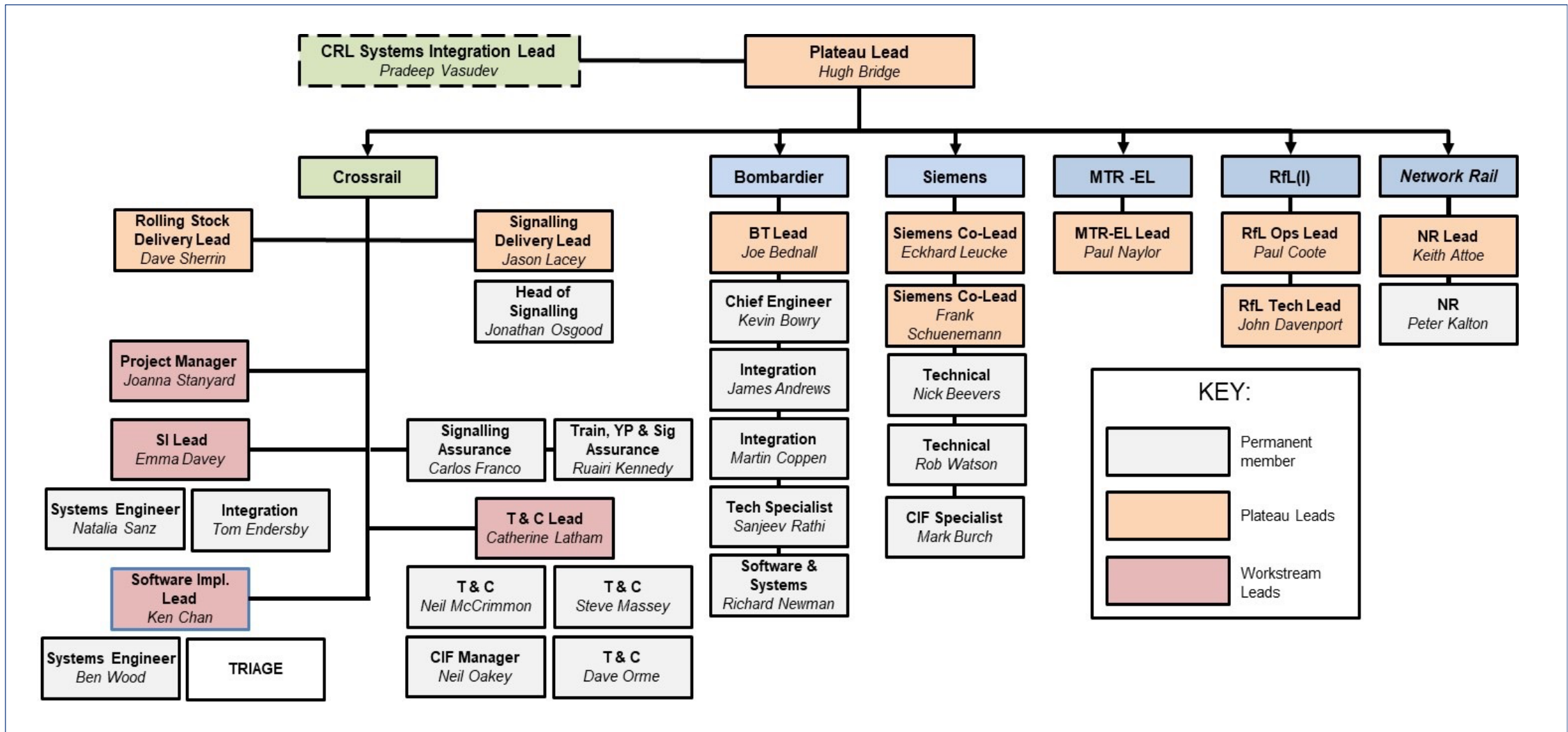




# Integrate from the Top

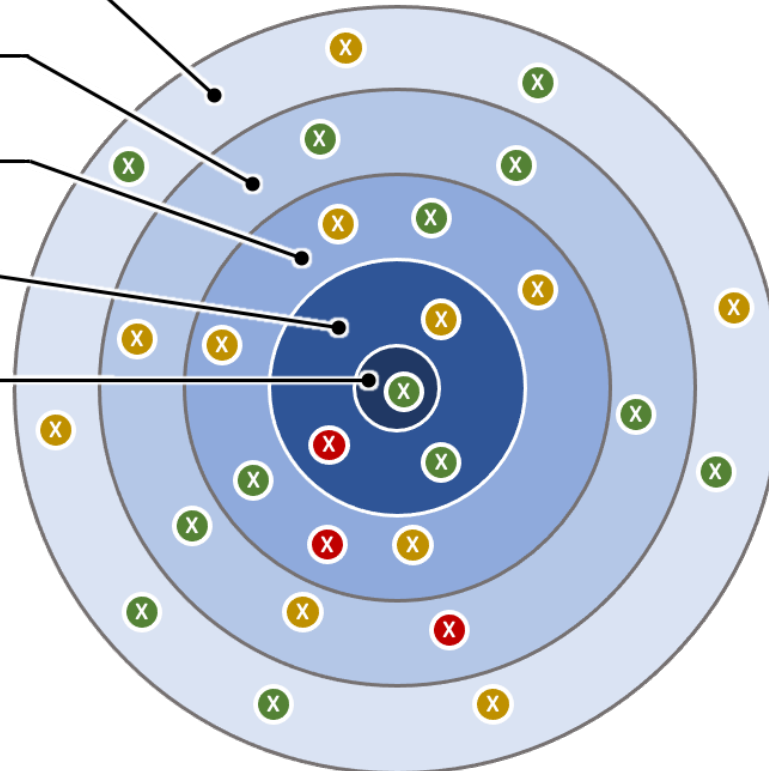
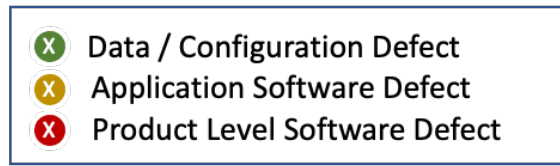


# Integrate from the Top

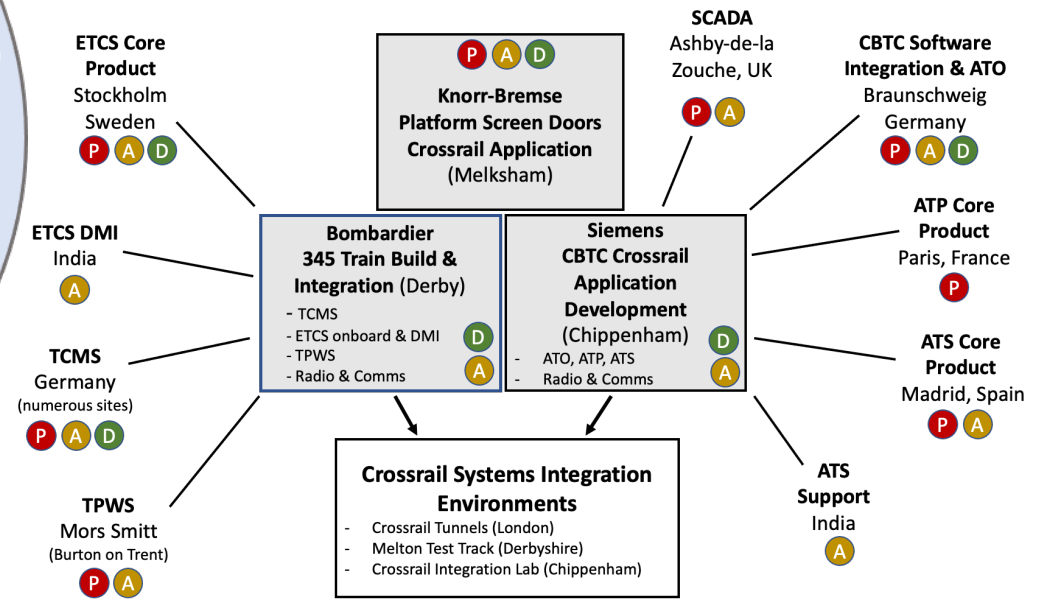


# Take a Hard Line on Software

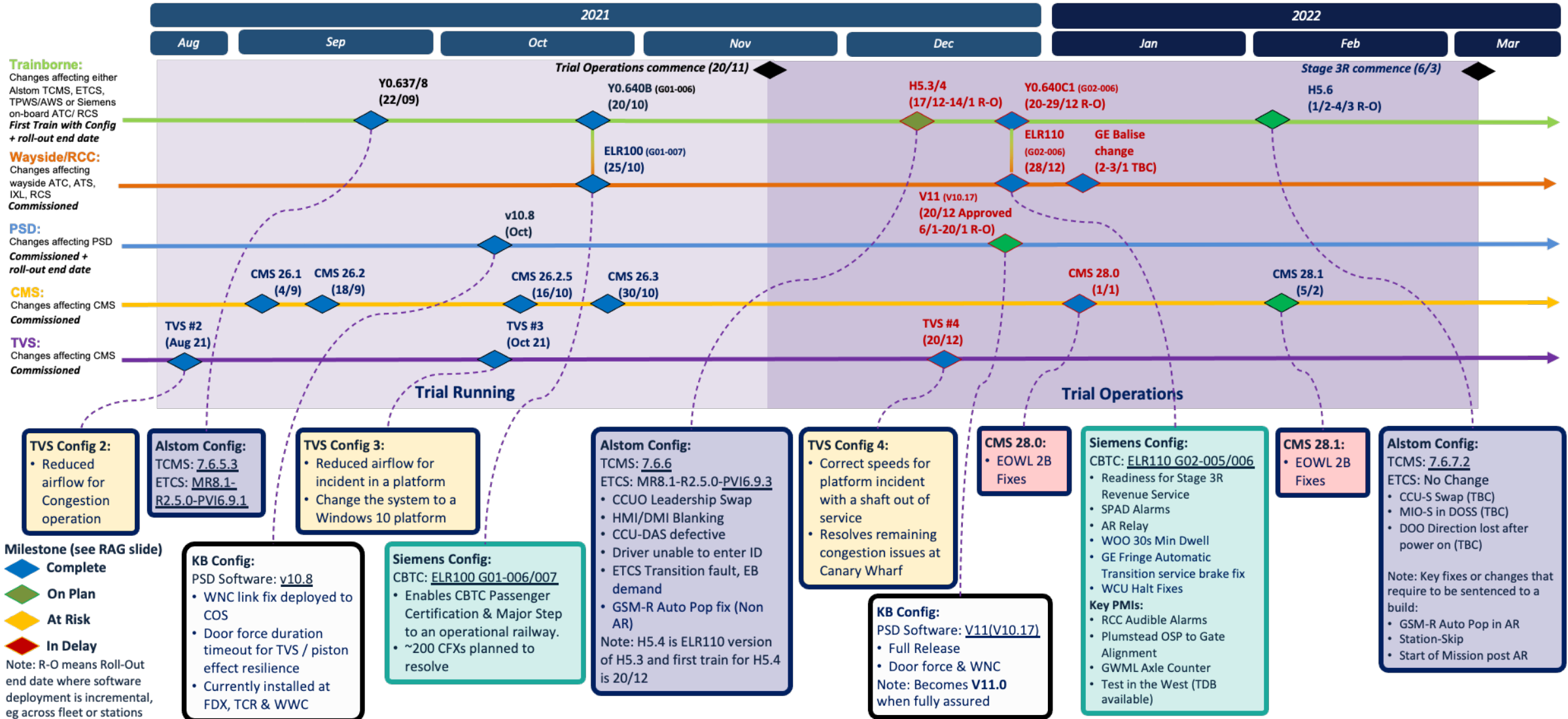
- LAYER 1, Static System Testing**  
(switch on and set to work)
- LAYER 2, Dynamic System Testing**  
(single train)
- LAYER 3, Transition Testing**  
(single train)
- LAYER 4, Dynamic Testing**  
(multiple trains)
- LAYER 5, Full-Service Testing**  
(Trial Running / Trial Operations)



Software Layer	Software Development Time	Unit Testing & Assurance Time	Schedule Risk & Potential Impact
PRODUCT <span style="color: red;">P</span>	6 – 9 months	> 6 months	<b>High</b> +12 months
APPLICATION <span style="color: yellow;">A</span>	1-2 months	1-2 months	<b>Medium</b> 3-4 months
DATA <span style="color: green;">D</span>	1-2 weeks	1-2 weeks	<b>Low</b> 1 month



# Take a Hard Line on Software





Teams

Kevin Cooper Phil Clayton Barber Susanne

Binns Chris Houston Matt Brown Colin

Fuller Nicola Bridge Hugh Readings Paul Stenner Justin

16:49 [Video Off] [Audio On] [Share] [More] [Hand] [Chat] [People] [End Call]

VP FN SJ BS KC RP Binns Chris Houston Matt Bridge Hugh

