



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

Bespoke vs. Open Architectures

– the impact on cyber resilience

Geoffrey Brennan

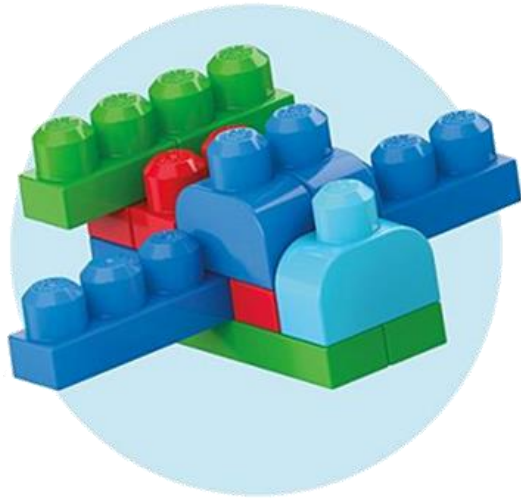


QT CANBERRA | AUSTRALIA

29 APRIL – 1 MAY 2019

Approaches

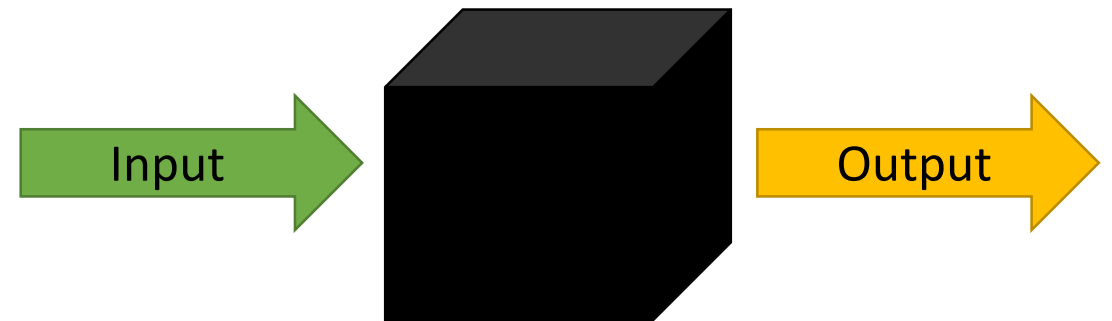
Open System Architecture



“a technical architecture that adopts open standards supporting a modular, loosely coupled and highly cohesive system structure that includes publishing of key interfaces within the system and full design disclosure.”

(Department of Defense, 2013)

Bespoke Architecture





QT CANBERRA | AUSTRALIA

29 APRIL – 1 MAY 2019

Use in Mission Critical Systems

US Navy – Open Architecture Framework

US Department of Defense – Modular Open Systems Approach

US Air Force – Mission Systems Open Architecture Science and Technology (MOAST)

US Army – Common Operating Environment (COE)

Future Airborne Capability Environment (FACE)

UK Government – Open Standards Principles

STANAG 4754 – NATO Generic Vehicle Architecture

Australian Land Combat System Architecture (LCSA)

Generic Vehicle Architecture

Generic Soldier Architecture



QT CANBERRA | AUSTRALIA

29 APRIL – 1 MAY 2019

Cyber-resilience

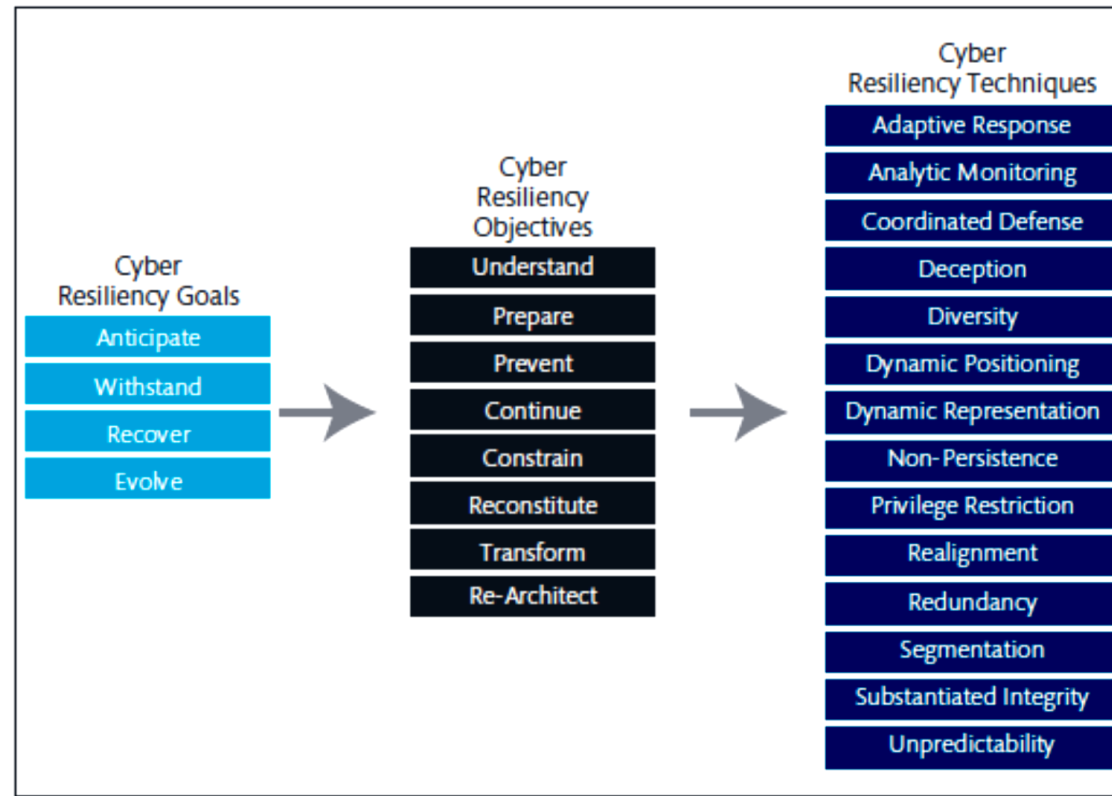


Figure 1. Cyber Resiliency Engineering Framework



QT CANBERRA | AUSTRALIA

29 APRIL – 1 MAY 2019

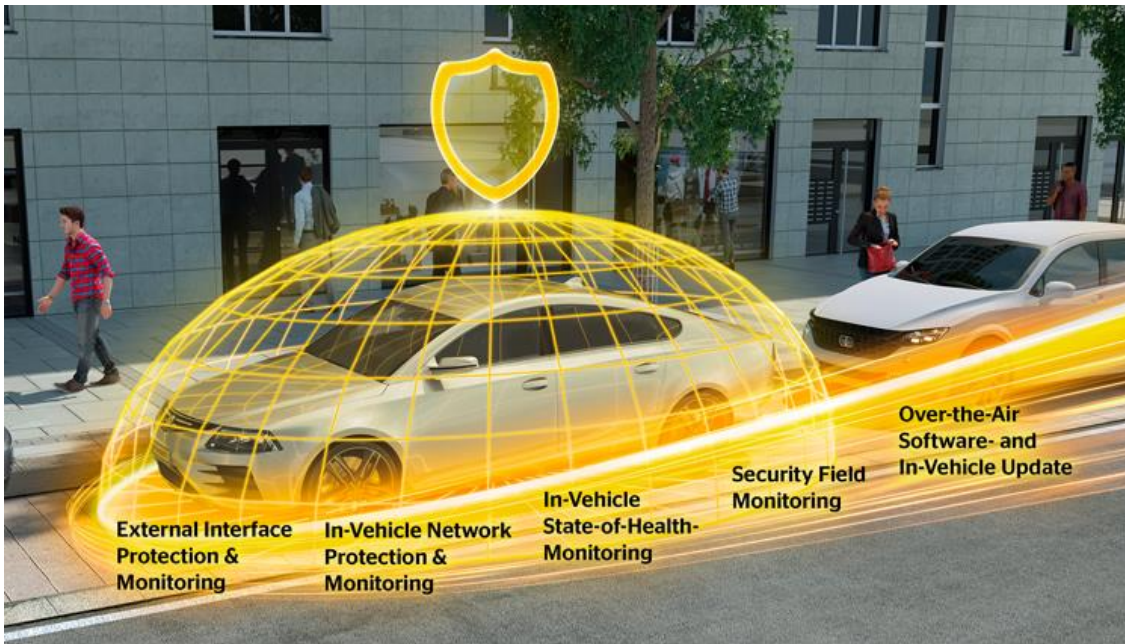
Bespoke Architecture

ADVANTAGES

- Inherently integrated – fewer gaps
- Well understood baseline
- Bespoke design restricts threat reconnaissance
- Interface definition and management becomes responsibility of the vendor

DISADVANTAGES

- Proprietary knowledge for system monitoring / threat detection
- Threat mitigations based on 'in-time' assessment at design
- Major engineering changes to address emerging threats



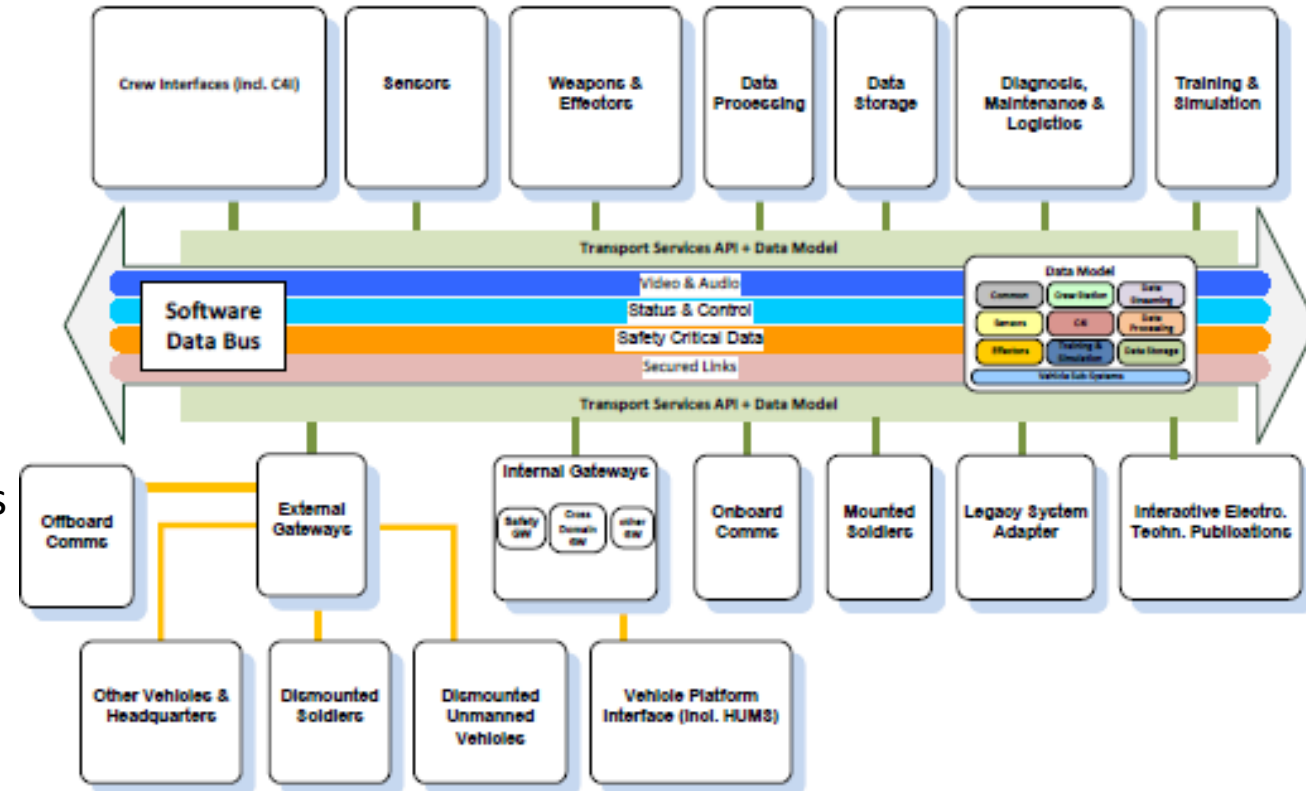
Open Architecture

ADVANTAGES

- Known interface standards
 - Able to understand and/or outsource system monitor and auditing
- Able to replace sub-systems when compromised
- Able to maintain tech refresh in pace with threat evolution

DISADVANTAGES

- Monitoring and assessment may be limited to interfaces only
- Increased difficulty in maintaining baseline
- Open standards facilitate threat reconnaissance
- Component interface may support lateral movement between sub-systems
- Interface definition and management becomes liability on the customer





QT CANBERRA | AUSTRALIA

29 APRIL – 1 MAY 2019

Recommendations

Open Architecture

Suited for:

- Major project, significant scope
- Long period in-service
- Capacity to manage architectural overhead



Image: <http://www.australiandefence.com.au/land/lynx-for-land-400-phase-3>

Bespoke Architecture

Suited for:

- Minor capability
- Short period in-service
- Desire to outsource architectural overhead



Image: <http://www.defensereview.com/prox-dynamics-pd-100-black-hornet-prs-personal-reconnaissance-system-palm-sized-nano-uas-micro-helicopter-drone-provides-cargo-pocket-isr-capability-for-infantry-recon-ops-video/>