



Cybersecurity Resilience for Connected and Automated Vehicles

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A HORIBA COMPANY

- Introduction
- UK activities on cybersecurity for CAV
- Towards operational resilience for CAV



MIRA is part of HORIBA Automotive Test Systems

HORIBA Automotive Test Systems



Semiconductor

Medical

Scientific

Process & Environmental



Est. **1946**

620+
global staff

39
major facilities

35+
companies on site

MIRA Technology Park
Europe's leading automotive technology cluster

University
partnerships

62 mile (100km)
proving ground

Centre of excellence in transport R&D

Located in the UK





Vehicle Resilience

Changes in our industry causing increased risks

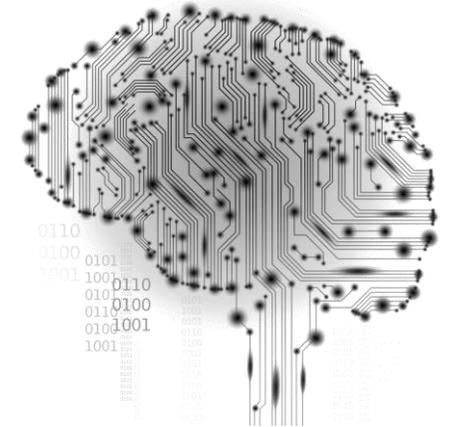
40%

Portion of Vehicle Architecture comprising Electrical and Electronic components



Artificial Intelligence

Decision making increasingly data-driven



50-100

Typical Number of Micro Processors in Modern Vehicles



New Technologies

Electrified, connected, automated

100 Million

Lines of Code in Complex Vehicles & Growing

Growth of new technologies (Connectivity/Cloud, ADAS/Autonomy & V2X)

Risk of rapid integration (EM Susceptibility, Poor Connectivity, Cybersecurity Vulnerabilities)



ACHIEVING TRUSTED AND RESILIENT MOBILITY

Achieving public trust means establishing unquestioning reliance on resilient and dependable technology, supported by strong legal and assurance frameworks.

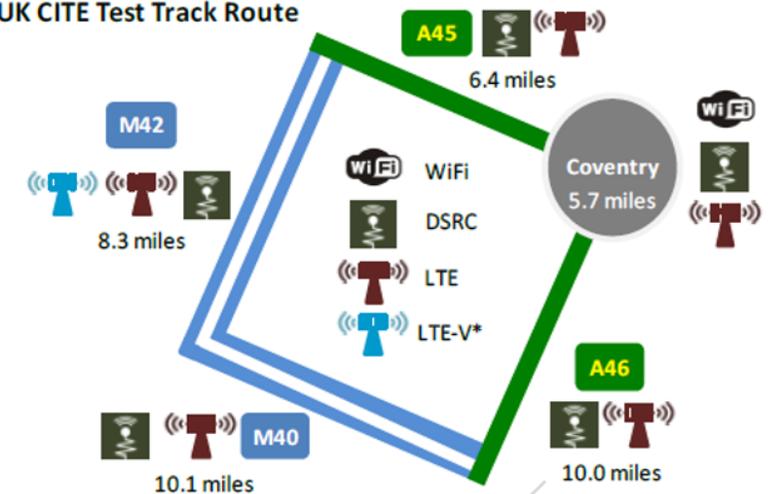


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- **UK Connected Intelligent Transport Environment** a collaborative research project funded by InnovateUK
- **Purpose** - to create an advanced environment for testing connected and autonomous vehicles
- **Timescale** - the project ran from July 2016 until December 2018
- **Partners** - Visteon, Jaguar Land Rover, Coventry City Council, Coventry University, Highways England, HORIBA MIRA, Huawei, Siemens, Vodafone and WMG
- A road route consisting of over 40 miles of urban, inter-urban, expressway and motorway was used to trial V2X communications technologies
- HORIBA MIRA played a key role in the cybersecurity work package, specifically:
 - Threat Analysis and Risk Assessment
 - Cybersecurity testing
 - Best practice cybersecurity guidelines for deployment



UK CITE Test Track Route



The 5StarS consortium

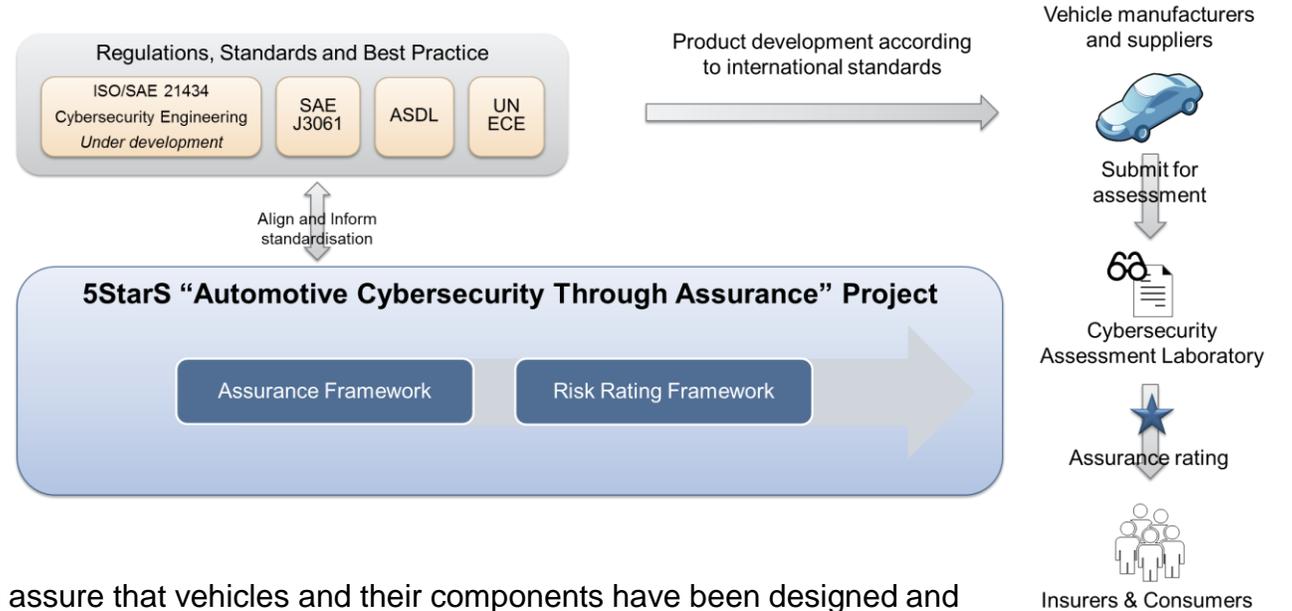
Led by HORIBA MIRA, working together with Thatcham Research, Axillium Research, Ricardo and Roke

Automotive Cybersecurity Through Assurance

A collaborative research project funded by **InnovateUK** to address cybersecurity for connected and autonomous vehicles

Project objectives:

- Research and develop an innovative assurance methodology to assure that vehicles and their components have been designed and tested to the relevant cybersecurity standards
- Research and develop a consumer and insurer oriented rating framework, analogous to existing EuroNCAP type ratings for vehicle safety
- Align with relevant existing and emerging standards and regulations



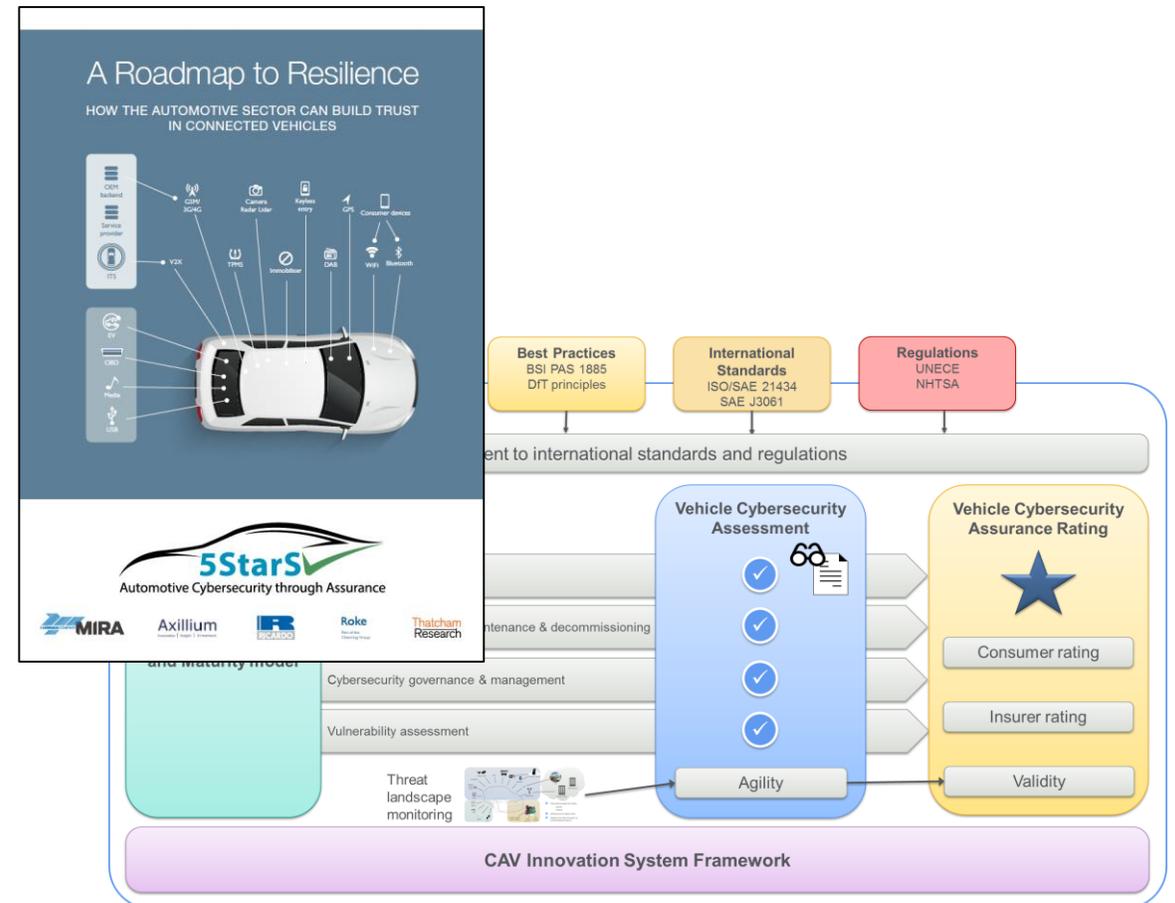
The project developed proposals for a cybersecurity assurance framework, addressing the challenge of establishing meaningful ways of providing cybersecurity assurance to consumers

www.5starsproject.com



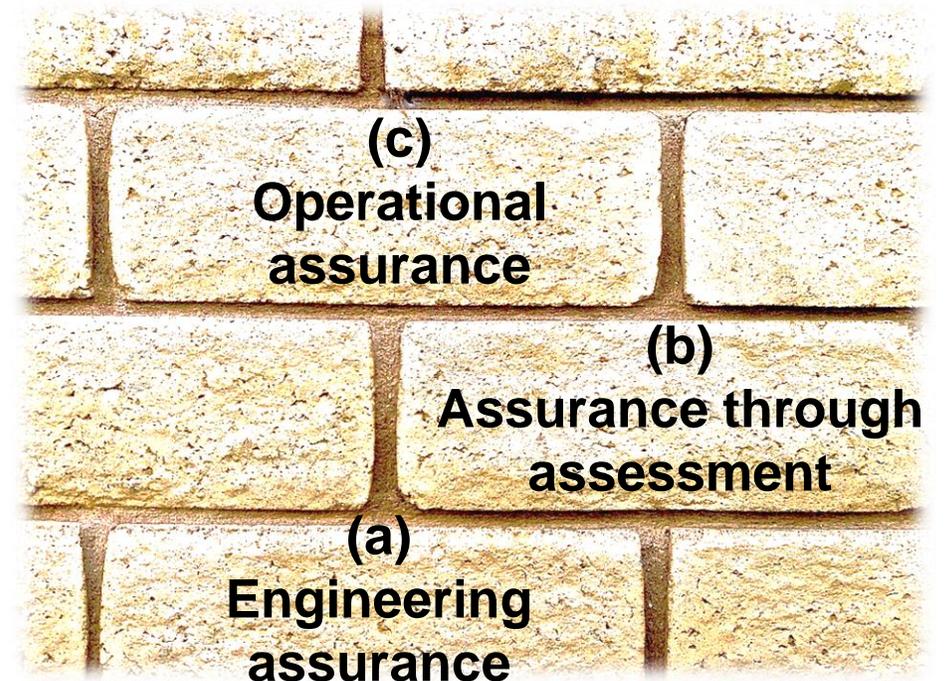
Proposed Roadmap to Assurance

- In June 2019 we published a white paper with recommendations for a cybersecurity assurance framework consisting of a **vehicle assessment** and **rating system**
www.5starsproject.com
- The first version provides a meaningful but achievable level of assurance, **aligned to ISO/SAE 21434 and UNECE draft regulation**
- The framework can be supplemented as the level of cybersecurity in the automotive industry matures



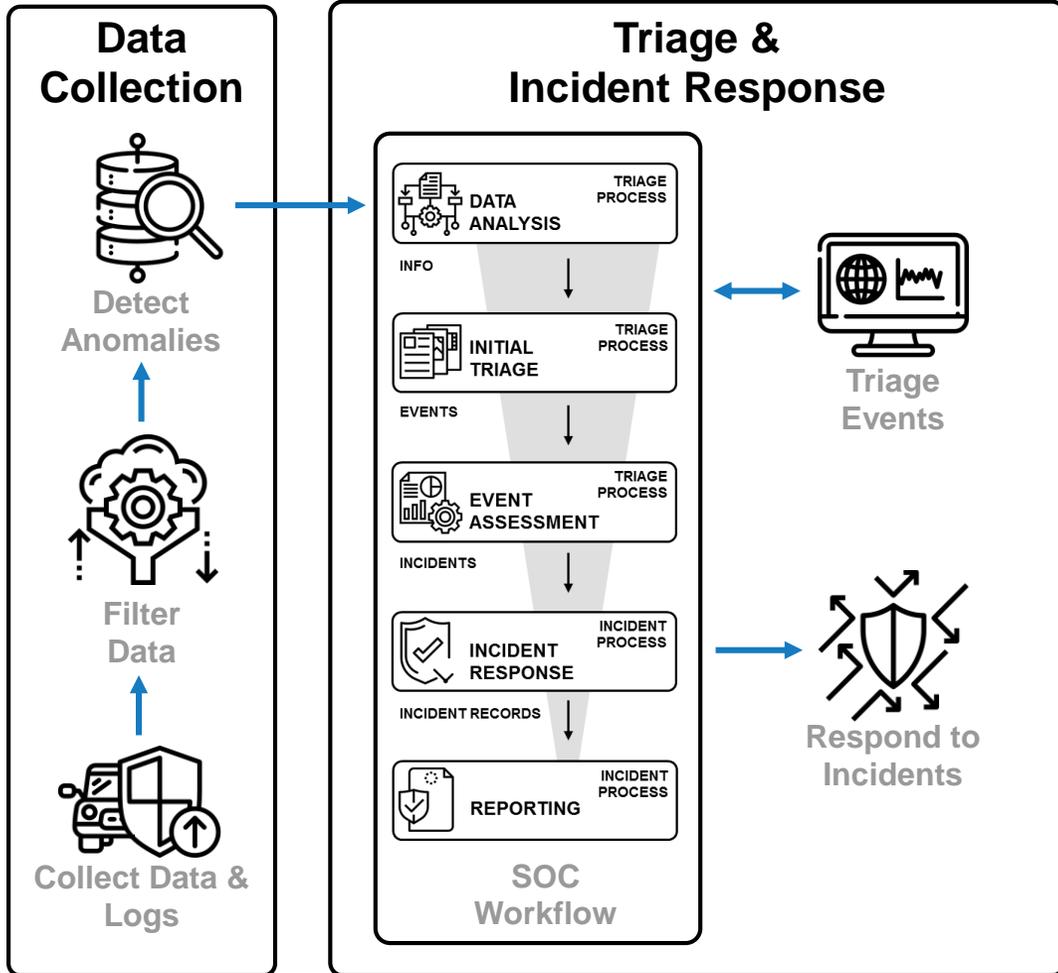
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- Security cannot be measured and is not absolute, but we can talk about **assurance**
- Assurance means **confidence** rather than **guarantee**
- How confident can we be that:
 - a) The **engineering** of the product has taken cybersecurity into account and addresses the relevant threats
 - b) The **implementation** of the product achieves the expected level of security
 - c) Appropriate processes are in place to respond to incidents during the **operational lifetime** and are effective
- Assurance is more than just testing, it is **built up** based on a combination of activities throughout the lifecycle





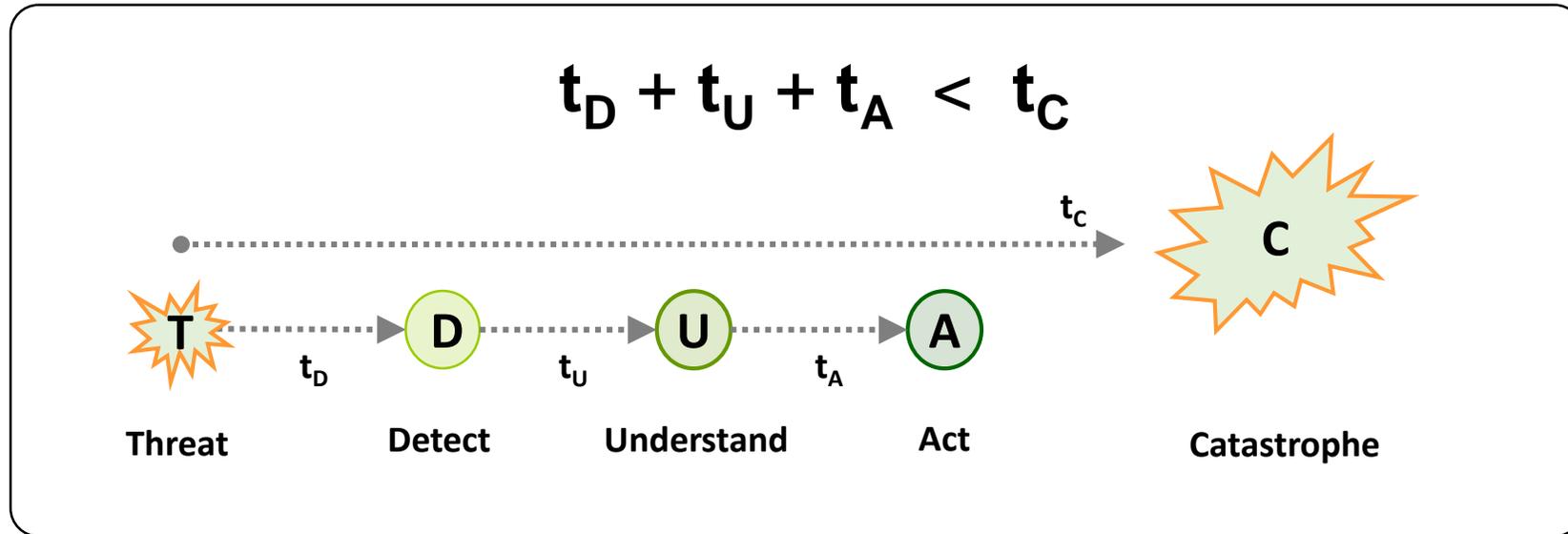
Cybersecurity Operations



**DETECT
UNDERSTAND
& REACT**
to threats...



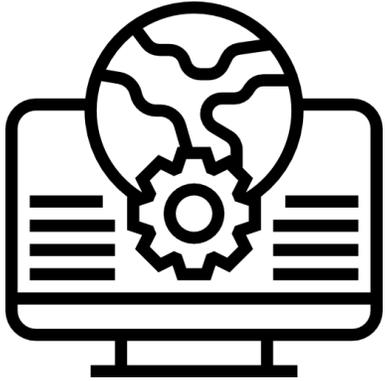
The ideal is to **Detect**, **Understand** and **Act**, before the threat results in catastrophe



Acknowledgement: AESIN / Auto Council

R&D required to:

- Develop methods to **model, optimise and measure** these parameters
- Develop **sustainable assurance and legal arguments** for resilience



R&D MUST SUPPORT GLOBAL ISSUES

not just National issues...

International Standards

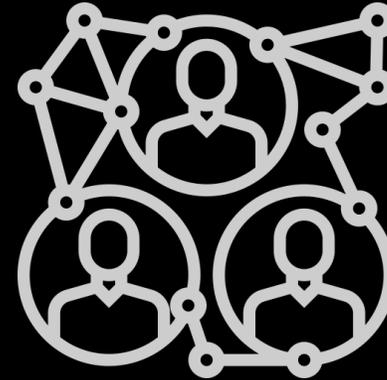


- Engineering
- Test
- Operations

Assurance Initiatives



- Consumers
- Insurers



GOVERNMENT INDUSTRY & ACADEMIC

collaboration...

Government Funding



- New Facilities
- New Methods

Joint Initiatives



- Skills

This challenge requires a collaborative approach



RESILIENT BY DESIGN |
RESILIENT IN OPERATION |