

EuroAsiaSPI²2017

European & Asian System & Software Process Improvement and Innovation

Transformation of System Engineering Principles into Modern Car Design

Alexander Much, Richard Messnarz, Christian Kreiner, Miklos Biro

EuroAsiaSPI 2017

“There is no design without discipline.
There is no discipline without
intelligence.” –Massimo Vignelli

“Always design a thing by considering
it in its next larger context. A chair in a
room, a room in a house, a house in an
environment, an environment in a city
plan” – Eero Saarinen

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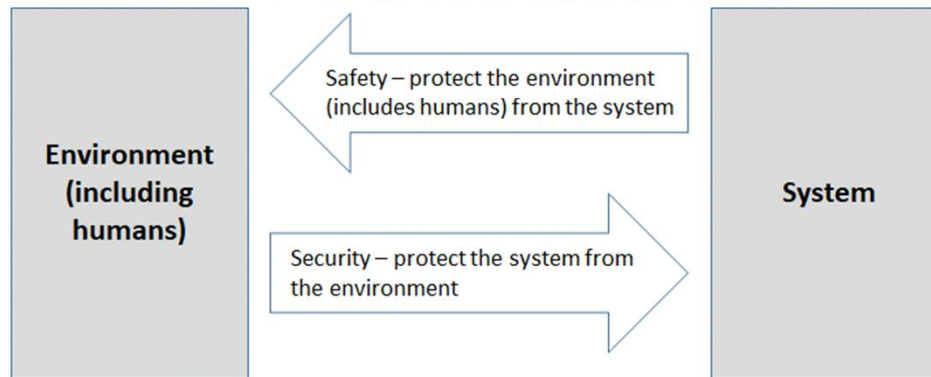
The ECO System Layer Model

Dependable vehicle

GEAR 2030 to manage the required skills to produce vehicles which are safe and secure and self driving

AQUA Eco System to manage the quality of such complex environments and systems

Eco System with Cloud Functions Connected to Vehicle Functions which are Connected to a Sequence of Component Functions



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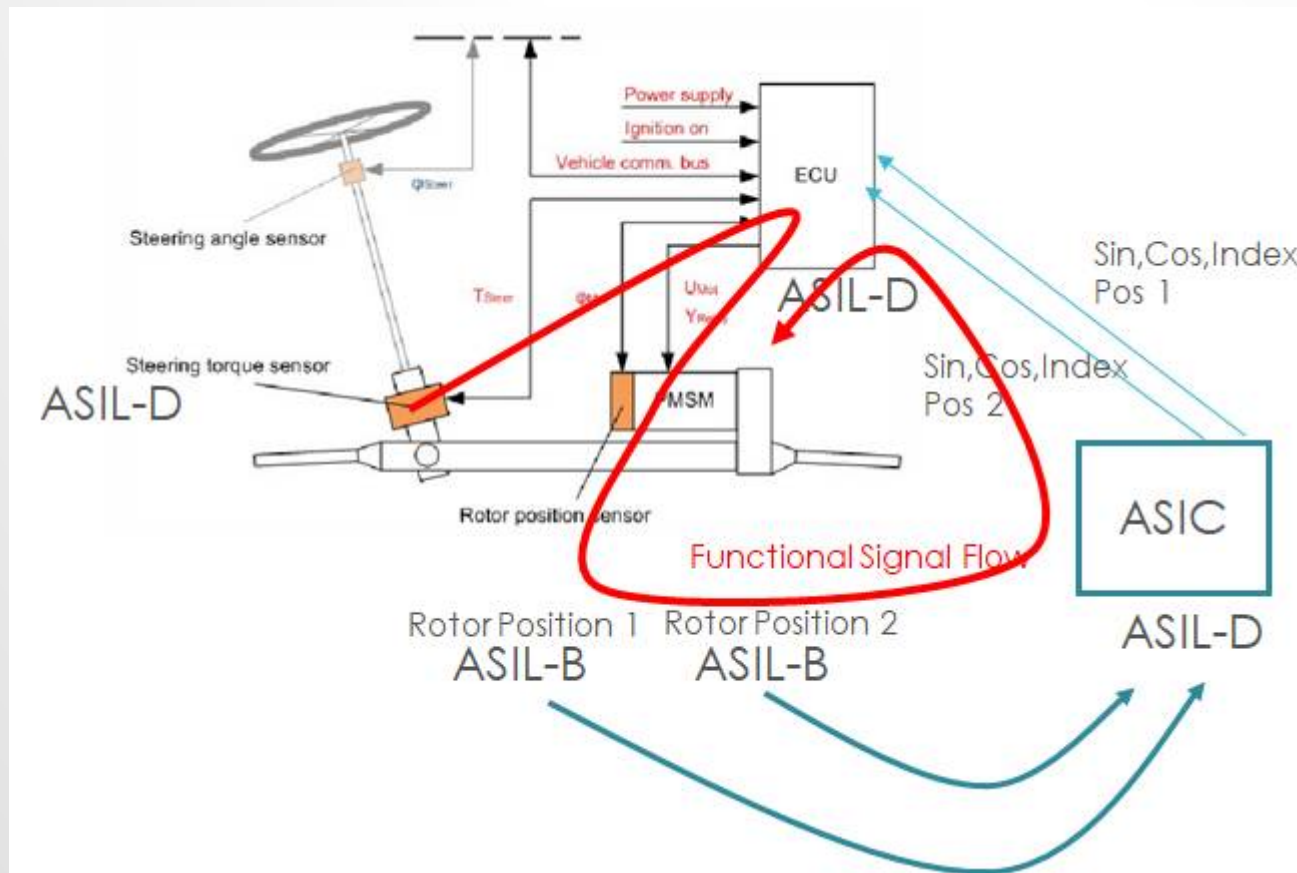
The ECO System Layer Model

- GEAR 2030
 - Identify the impact on employment in the EU, prepare approaches for mitigating possible negative consequences and develop a strategy for ensuring that the necessary skills will be available in 2030
 - ACEA European Automobile Manufacturers' Association
 - CLEPA European Association of Automotive Suppliers
- AQUA – Knowledge Alliance for Quality in Automotive
 - Integrated view of functional safety, Automotive SPICE and Six Sigma
 - Missing is Cybersecurity still
 - Taught at 5 universities in 4 countries
 - ECQA – European Certification and Qualification Association - Certificates in Industry (leading Tier 1 use it)
- SOQRATES (group of ca. 20 Tier 1 in electronics and Automotive)
 - Functional Safety
 - Cybersecurity
 - Traceability
 - Best practices and state of the art need to be exchanged

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Infrastructure and Change of Safe State

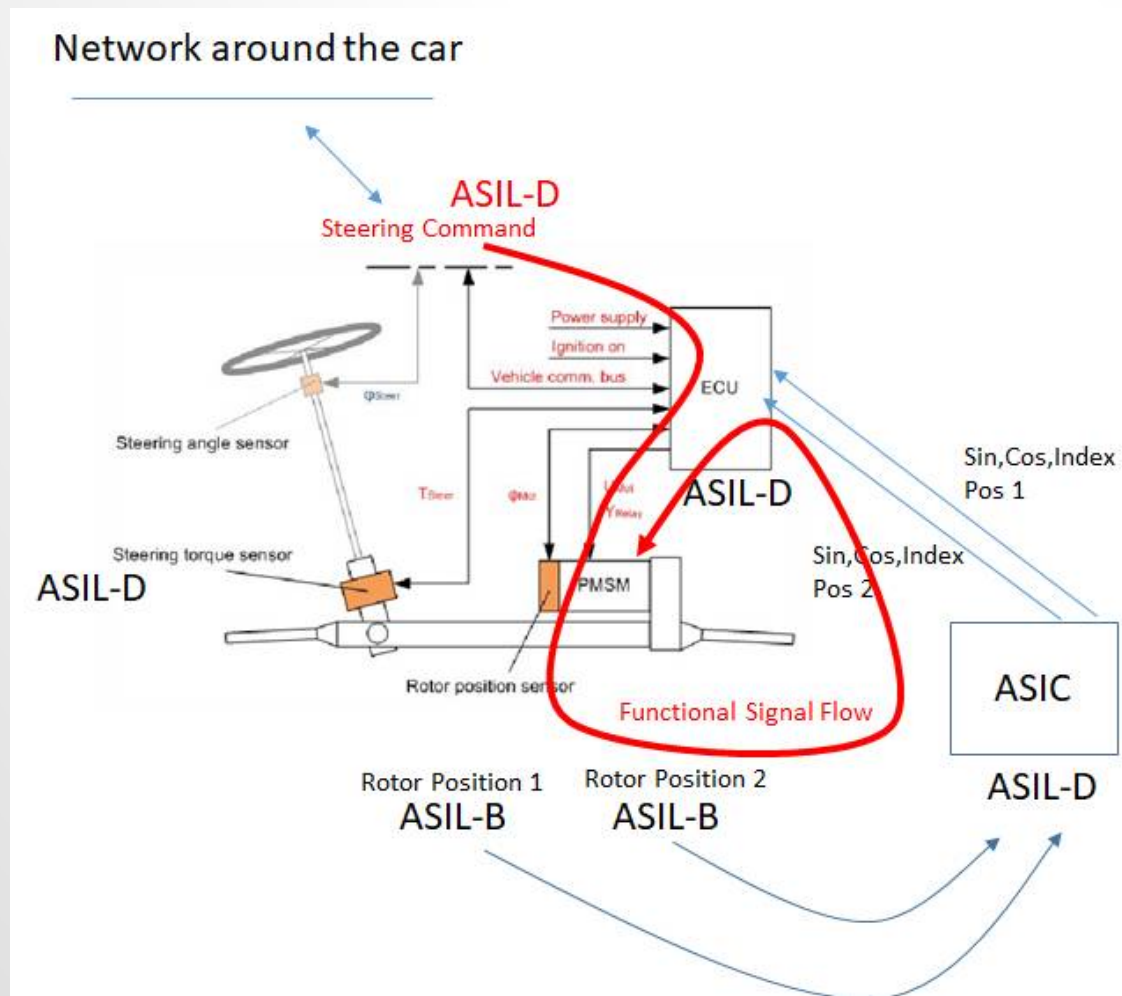
- CURRENT DESIGN



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Infrastructure and Change of Safe State

- FUTURE NETWORKED DESIGN CHANGES SAFE STATES



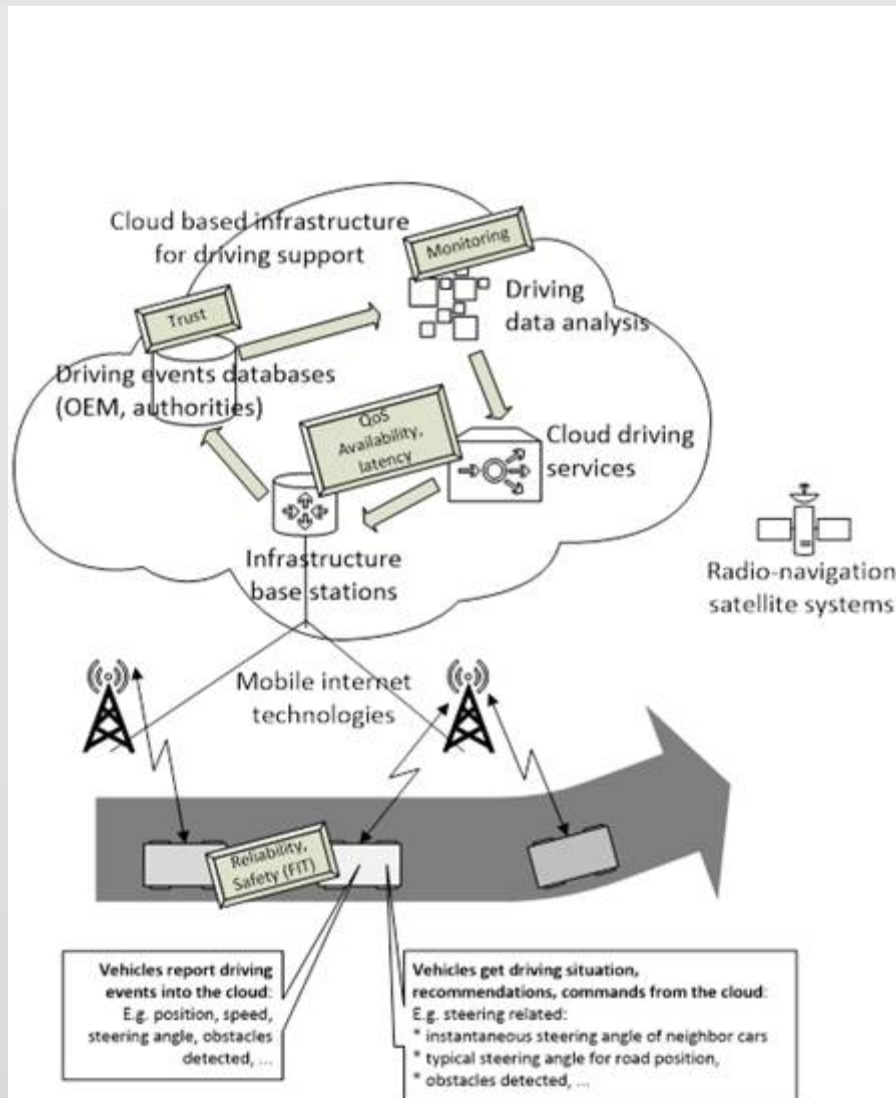
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More and More Standards

- ISO 9001, ISO/TS 16949
 - Quality
- MISRA
 - MISRA C, MISRA C++, CERT-C
- ISO 17691
 - Security
- Assessment and Reference Models
 - ISO 15504, ISO 12207, Automotive SPICE, VDA Blue Gold Book
- SAE J3061, ISO 27000
 - Cybersecurity
- ISO 26262, IEC 61508
 - Functional Safety

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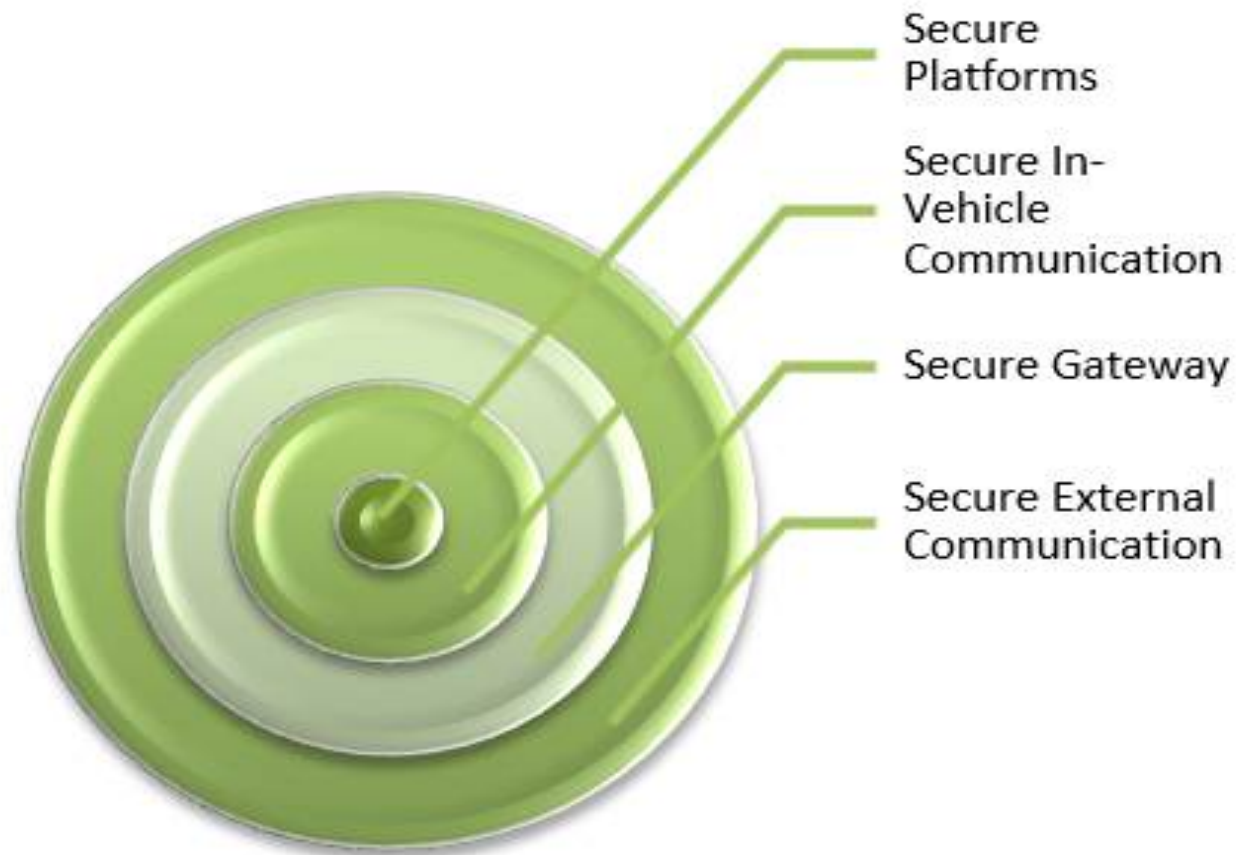
Car as a Pool of Functions in an Infrastructure



- Cloud based functions influence vehicle functions which control component functions
- Behaviour is driven by data in the cloud
- Non deterministic learning behaviour of cars is expected
- Rules of ethics for cars in an infrastructure
- Cloud intelligence?

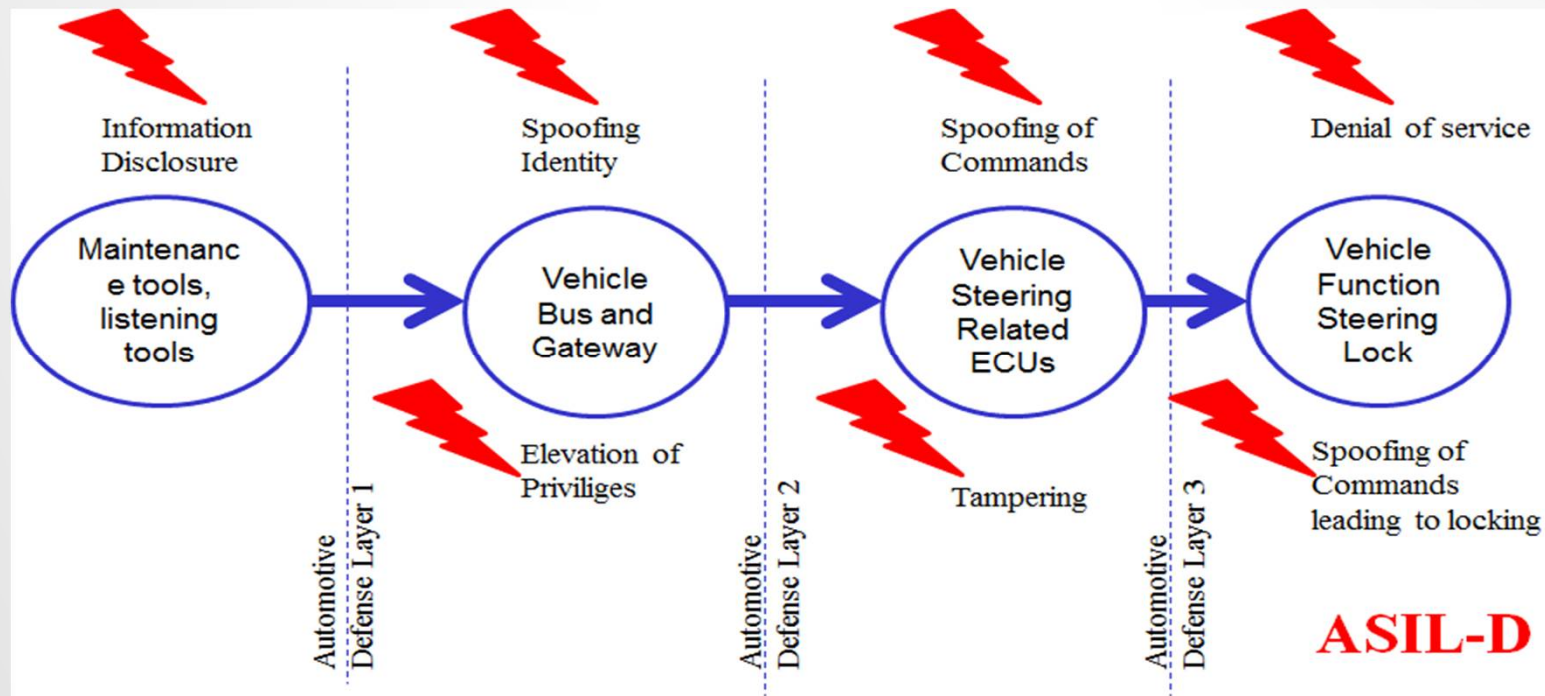
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Layer Model for Cybersecurity



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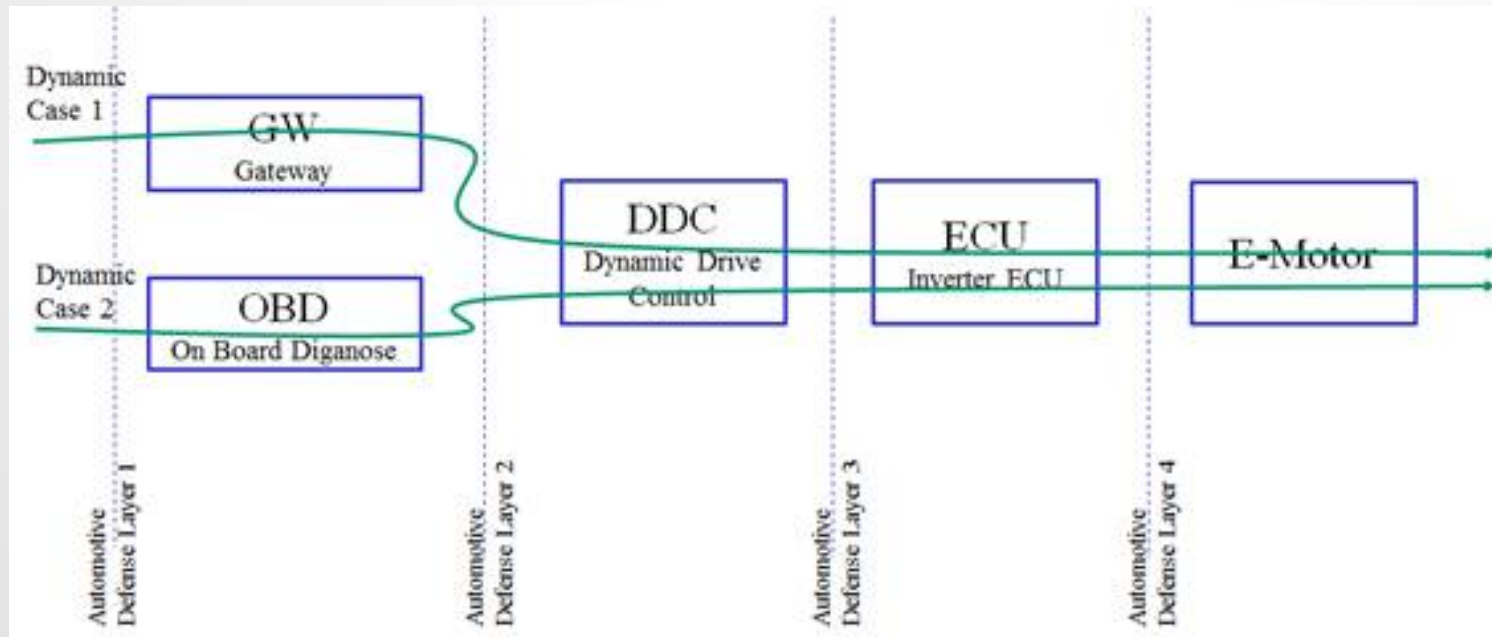
Static Design based on Layer Models



- Each Layer offers Detection and Defense Mechanisms
- Reference STRIDE Concept

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Signals Encrypted and Tracked Along the Dynamic Signal Path



- Each Functional flow bases on data and signals (signal flow)
- This flow needs to be monitored, encrypted and tracked

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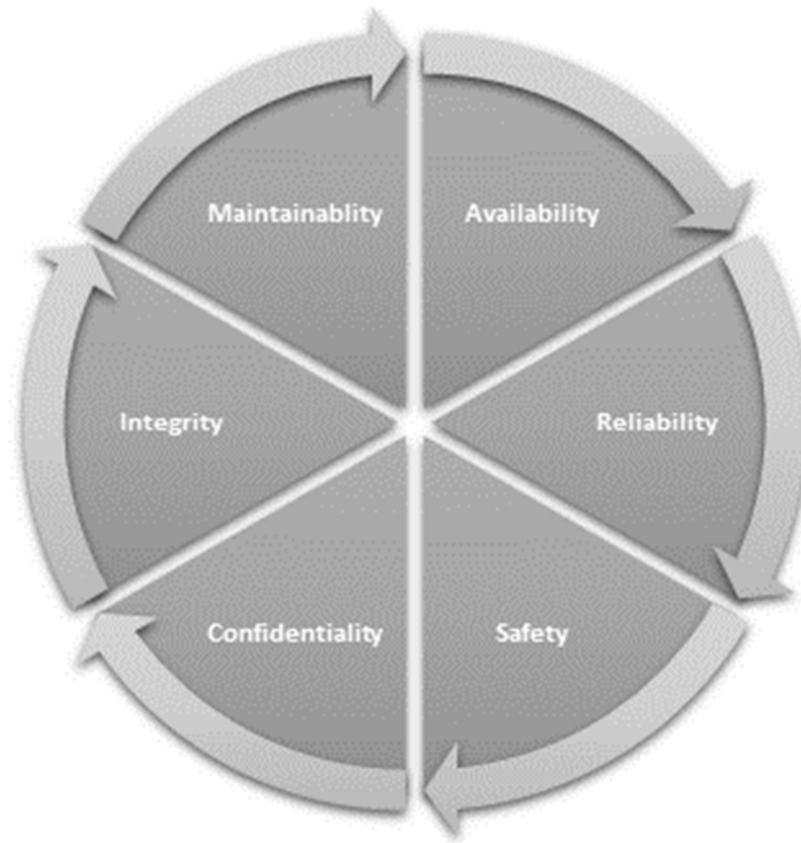
Changes will come with the innovation

- New commercial models need
- New Ethics Guidance needed
- New laws need for insurance of systems
- Integration of Different Product Aspects and Skills Needed

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Changes will come with the innovation

- ALL ASPECTS NEED TO BE INTEGRATED



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“Always design a thing by considering it in its next larger context. An electronic in a component, a component in a car, a car in an infrastructure, an infrastructure in a cloud intelligence, a cloud intelligence on a planet, a planet connected with planets” – Eero Saarinen – “Extended”.

“Everything should be made as simple as possible, but not simpler.” –Albert Einstein