Work-in-Progress: Emerging E/E-Architectures as Enabler for Automotive Honeypots

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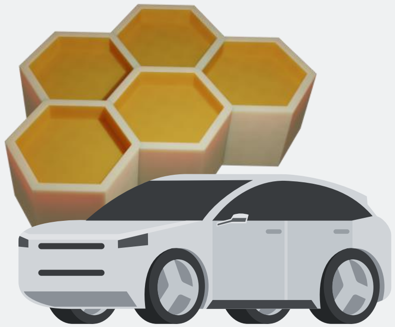
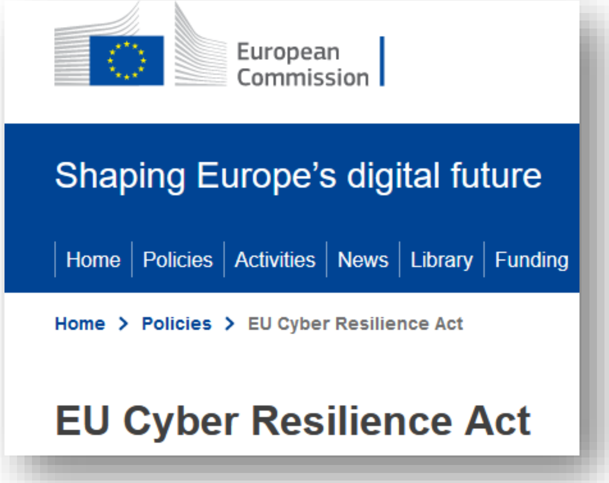
Emerging E/E-Architectures as Enabler for Automotive Honeypots

Agenda



1. Introduction
2. State of Automotive Honeypots
3. Opportunities for In-Vehicle Honeypots
4. Concept for Internet-deployed Honeypots
5. Q&A

Introduction
Regulations, norms, and real-world incidents



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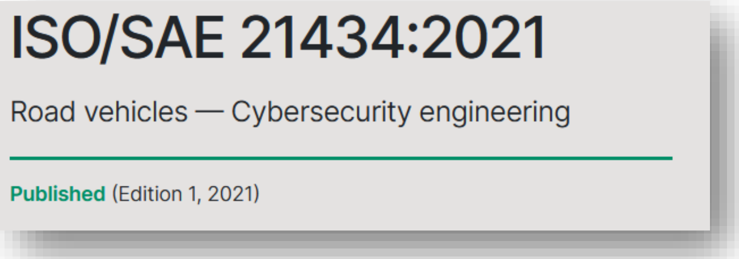
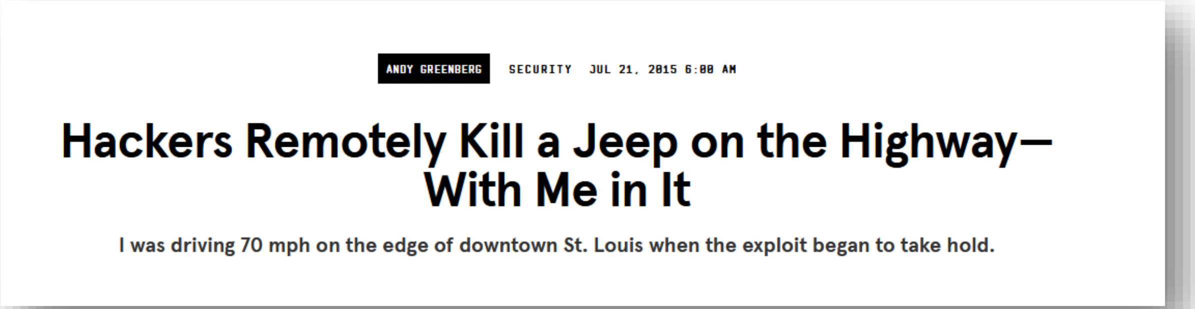
EU Cyber Resilience Act



ISO/SAE 21434:2021

Road vehicles — Cybersecurity engineering

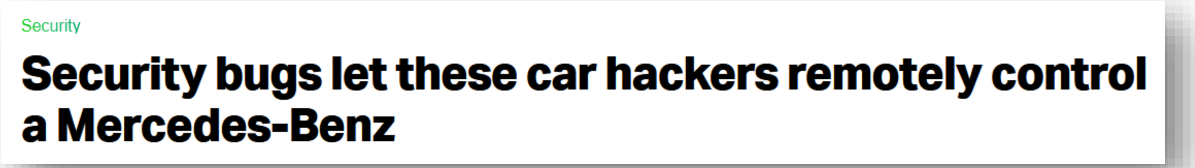
Published (Edition 1, 2021)



ANDY GREENBERG SECURITY JUL 21, 2015 6:00 AM

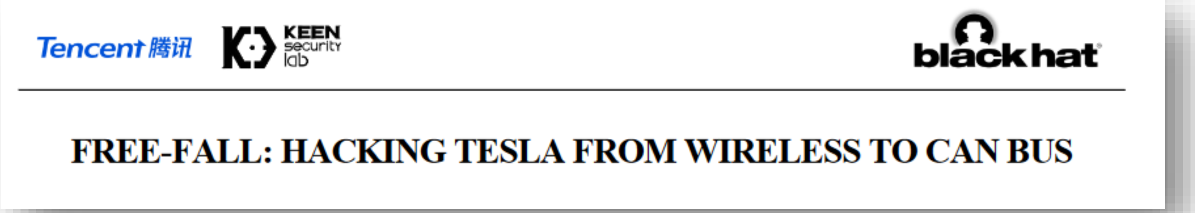
Hackers Remotely Kill a Jeep on the Highway—With Me in It

I was driving 70 mph on the edge of downtown St. Louis when the exploit began to take hold.



Security

Security bugs let these car hackers remotely control a Mercedes-Benz



Tencent腾讯 KEEN security lab black hat

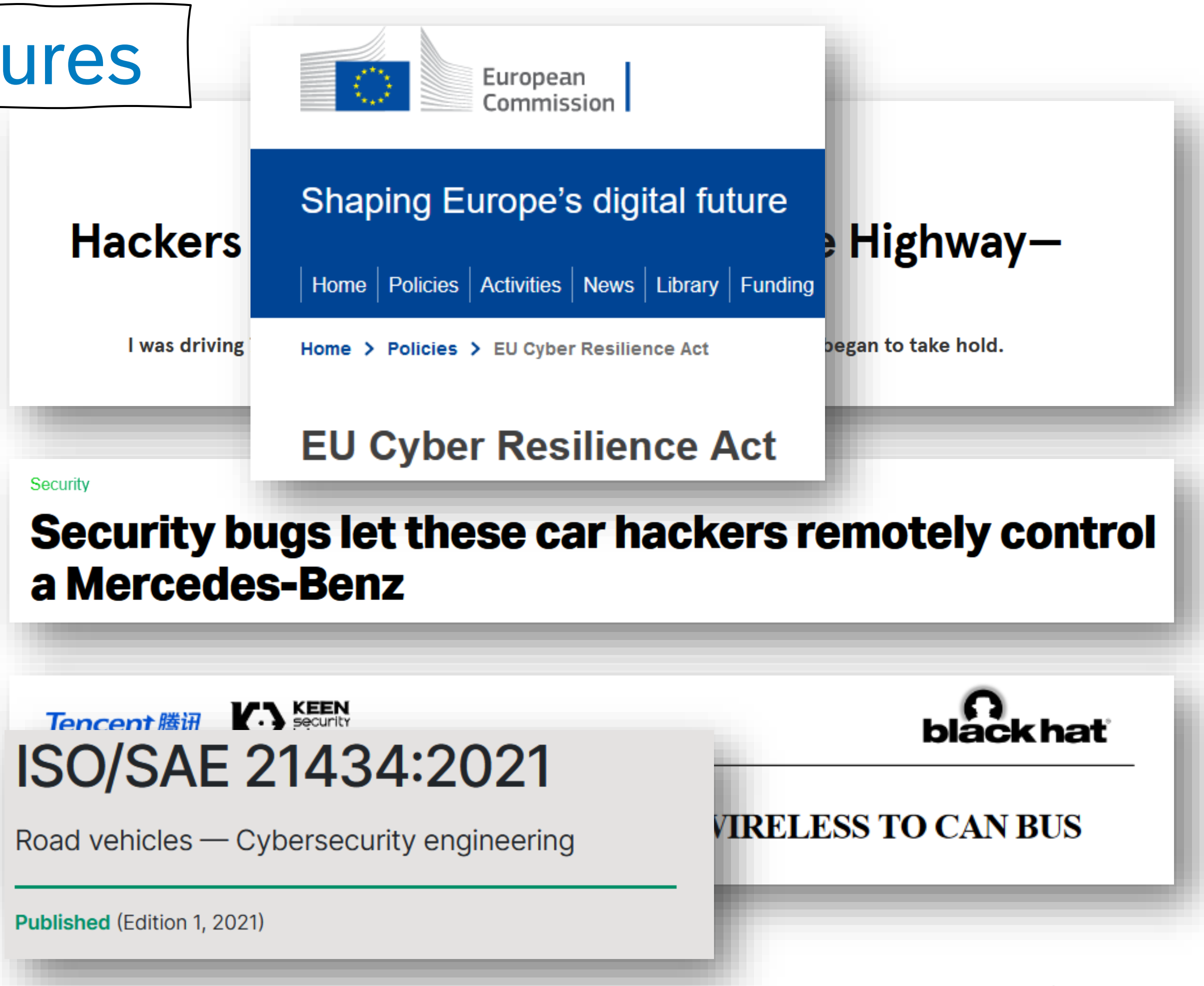
FREE-FALL: HACKING TESLA FROM WIRELESS TO CAN BUS

Introduction

Regulations, norms, and real-world incidents

& countermeasures

- Hardening (a lot)
- Upcoming efforts in intrusion detection (& prevention)
- Threat intelligence/attack landscape monitoring?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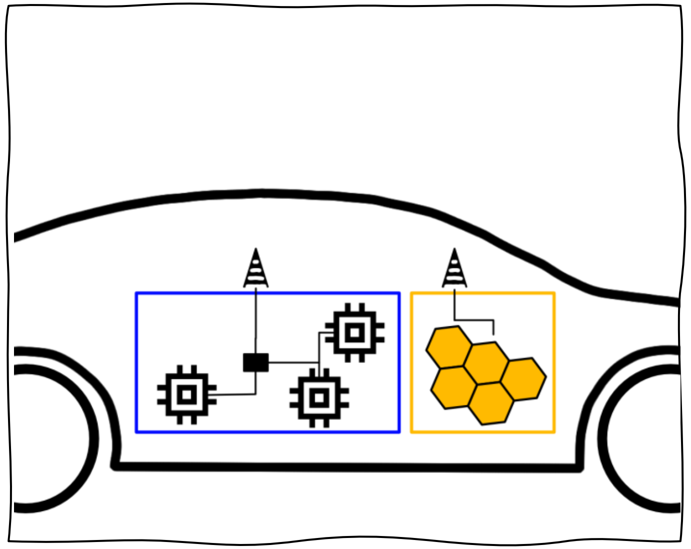
IRELESS TO CAN BUS

2

State of Research Automotive Honeypots

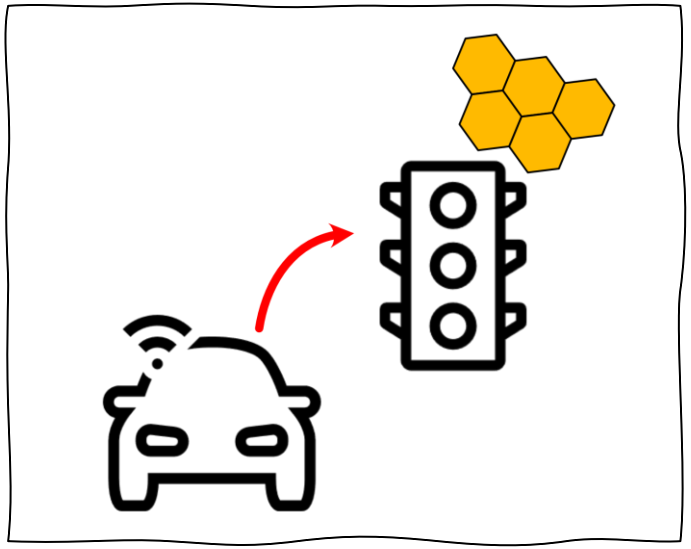
Research on Automotive Honeypots

State of Research



In-vehicle honeypot

- Realistic environment
- Separate hardware
- Real vehicle data



V2X honeypot

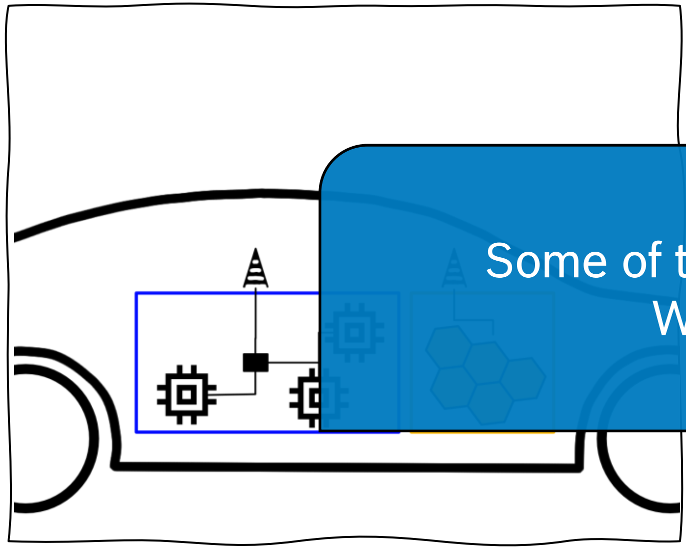
- Attacks on moving vehicles
- Infrastructure honeypots

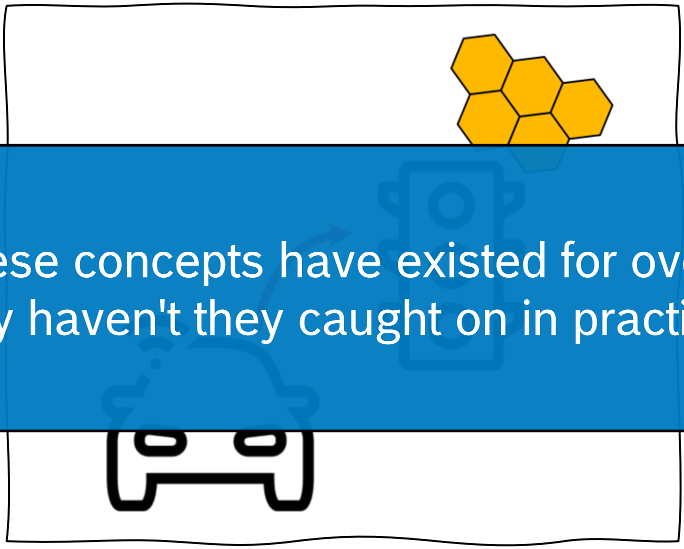
  e.g., charging stations for EVs

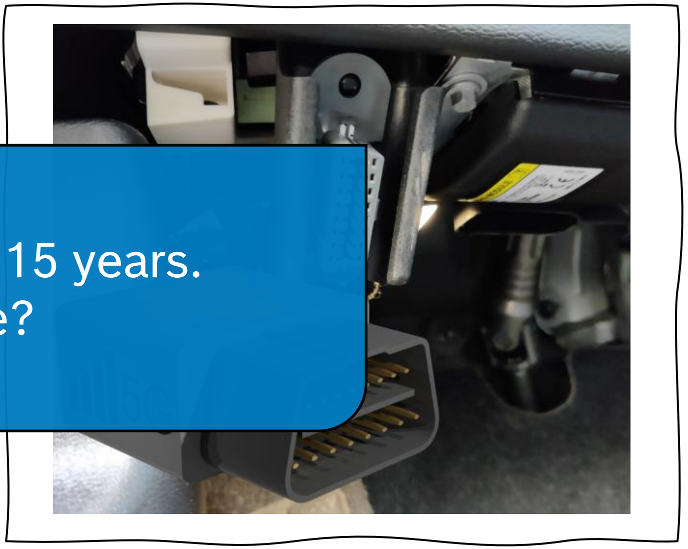
IoT honeypot

- OBD-II dongles (debug interface)
- IoT components on the Internet

Research on Automotive Honeypots
State of Research







Some of these concepts have existed for over 15 years.
Why haven't they caught on in practice?

In-vehicle honeypot

- Realistic environment
- Separate hardware
- Real vehicle data

V2X honeypot

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Automotive Honeypot Research

Limitations of Current Approaches

Credibility

&

Accessibility

Limited data
&
Simulation quality

Utilization
of findings

3

Opportunities for In-Vehicle Honeypots

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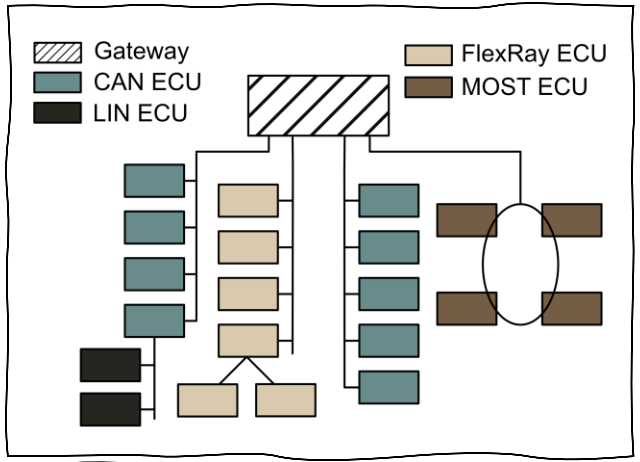
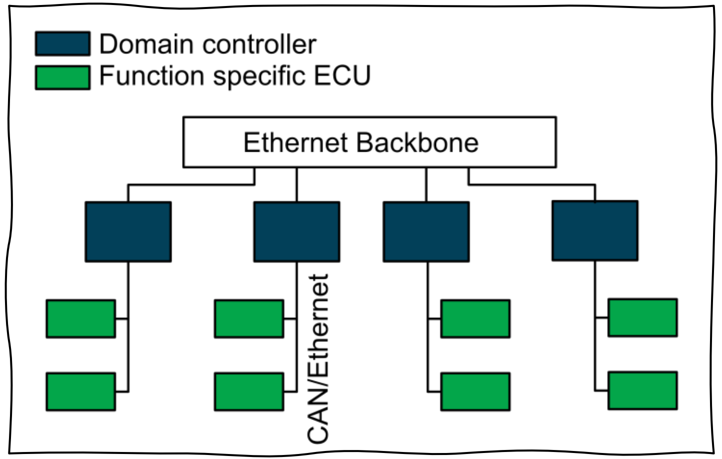
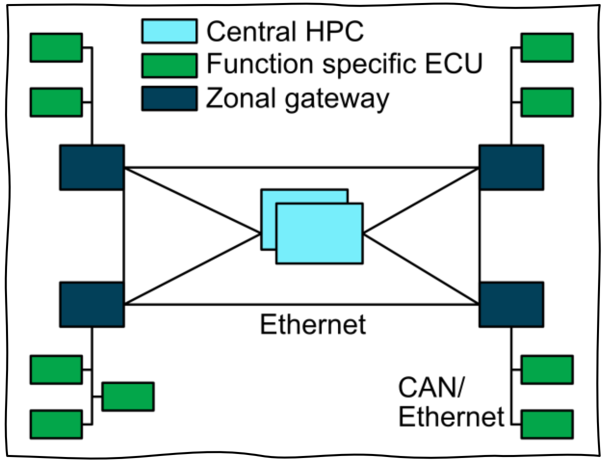
Emerging E/E-Architectures
From gateway to zone



Gateway architecture



Domain architecture



Zonal architecture

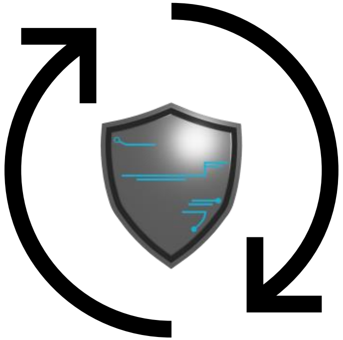
De-couple hardware and software

Centralize resources & increase performance

High Performance Computing

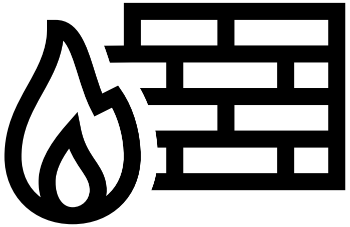
From gateway to zone

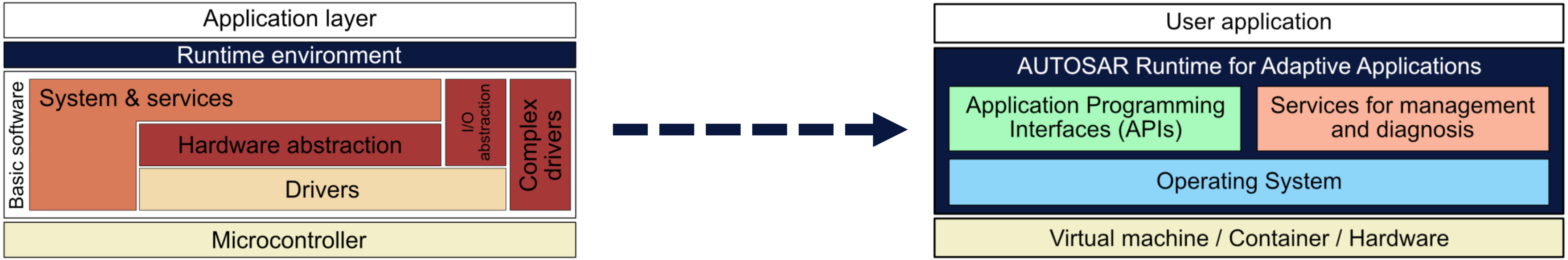
Security updates



Deployment resources

Network segmentation





Application layer

Runtime environment

Basic software

System & services

Hardware abstraction

I/O abstraction

Complex drivers

Drivers

Microcontroller

User application

AUTOSAR Runtime for Adaptive Applications

Application Programming Interfaces (APIs)

Services for management and diagnosis

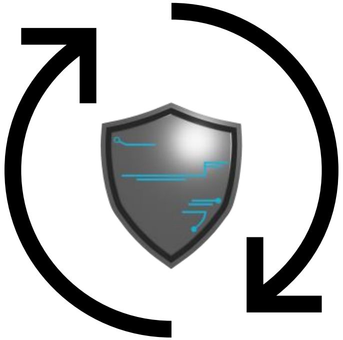
Operating System

Virtual machine / Container / Hardware

High Performance Computing

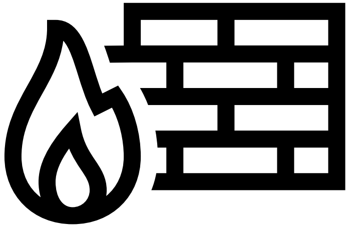
From gateway to zone

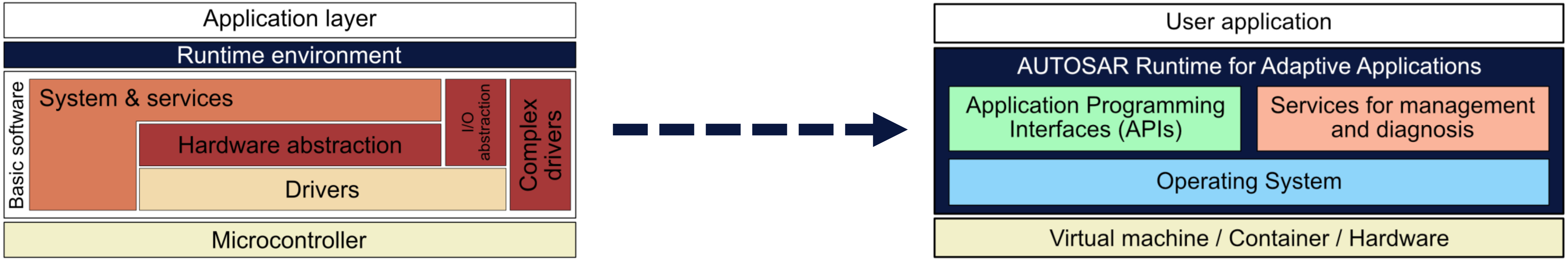
Security updates



Deployment resources

Network segmentation





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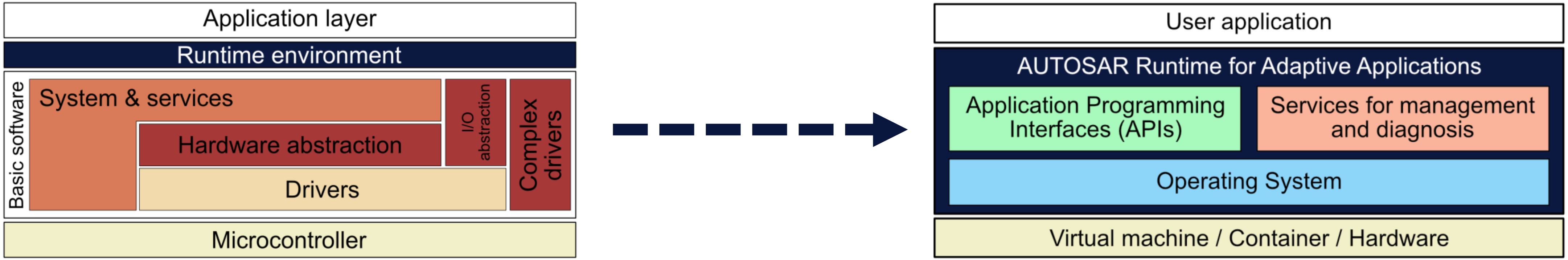
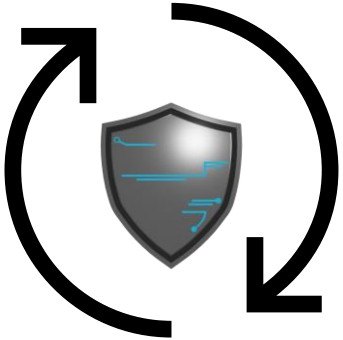


High Performance Computing
Remaining limitations

Security updates



Deployment resources

Network segmentation

How many incidents will an in-vehicle honeypot realistically register?

In-Vehicle honeypot as additional layer of intrusion detection.

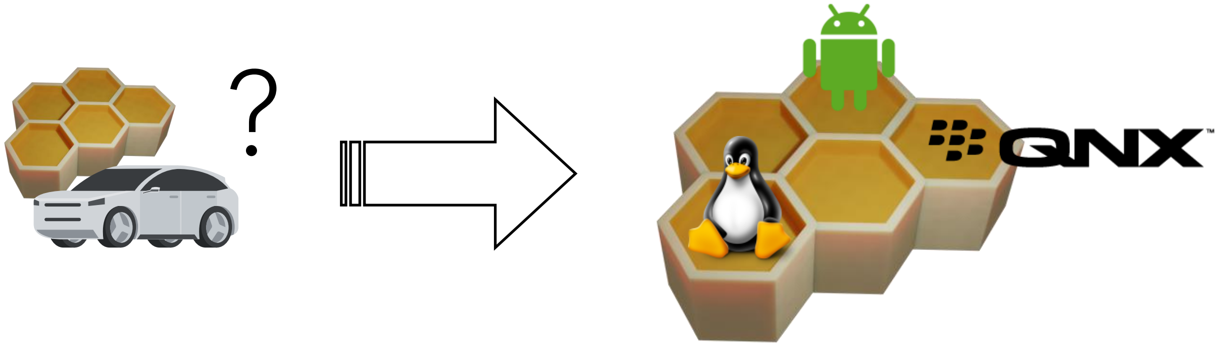
Different solution for threat landscape monitoring.

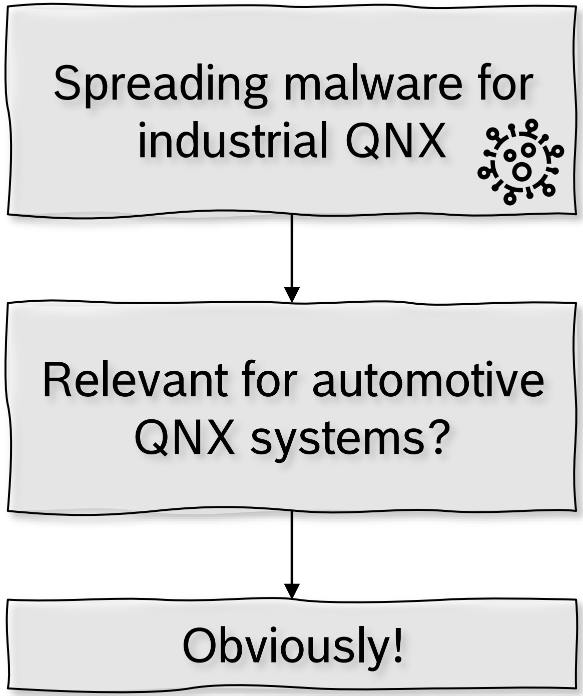
4

Concept for Internet-deployed Honeypots

Threat Landscape Monitoring
Internet deployments with LI Honeypots

- How do we convincingly place an automotive honeypot on the public Internet?




Spreading malware for industrial QNX

Relevant for automotive QNX systems?

Obviously!

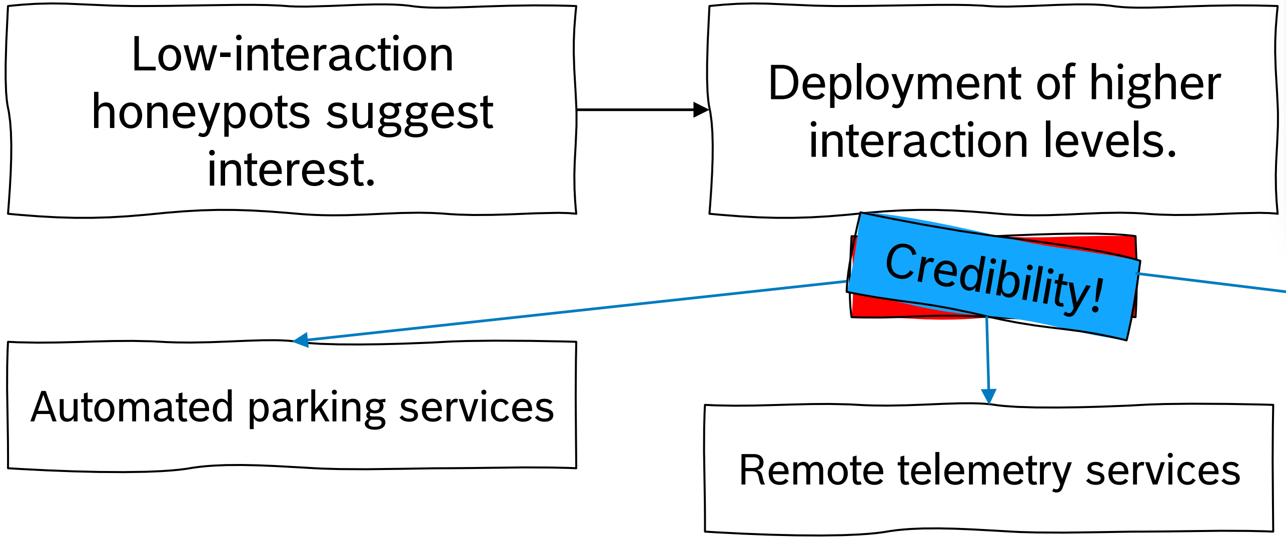
- Instead use low-interaction honeypot
  - Mimic systems and service also found in other domains ((I)IoT, mobile, IT)
  - Monitor general interest in related systems and services
  - Low development and maintenance effort

Threat Landscape Monitoring

Can we catch advanced attackers?

Medium- and high-interaction honeypots are a great tool for additional insights.

- High development and maintenance cost
- Low credibility on the public Internet (hopefully)



Low-interaction honeypots suggest interest.

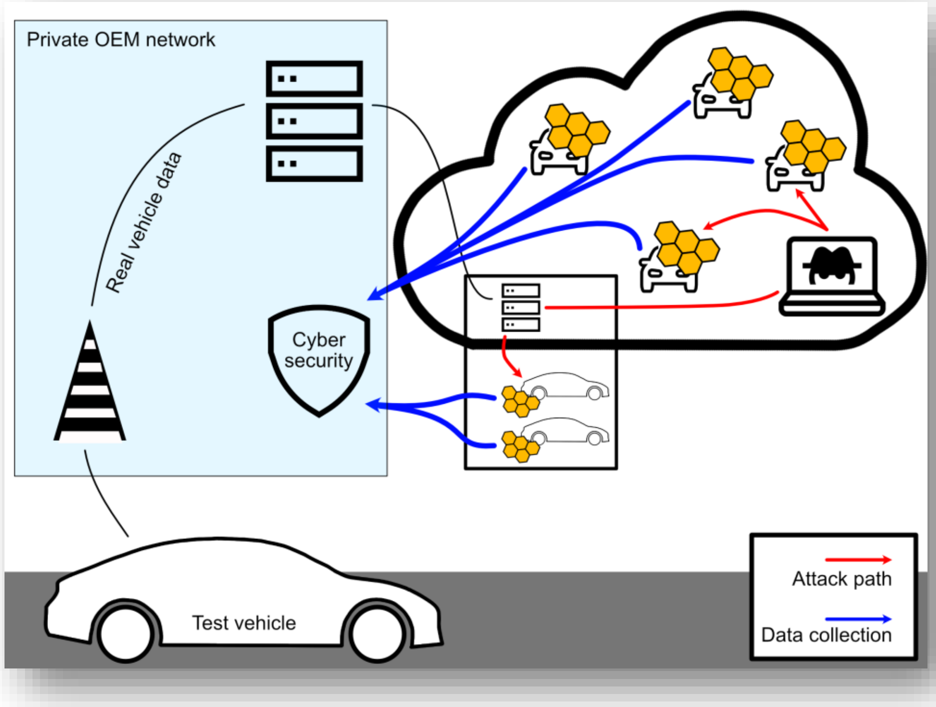
Deployment of higher interaction levels.

Credibility!

Automated parking services

Remote telemetry services

Test vehicle portals



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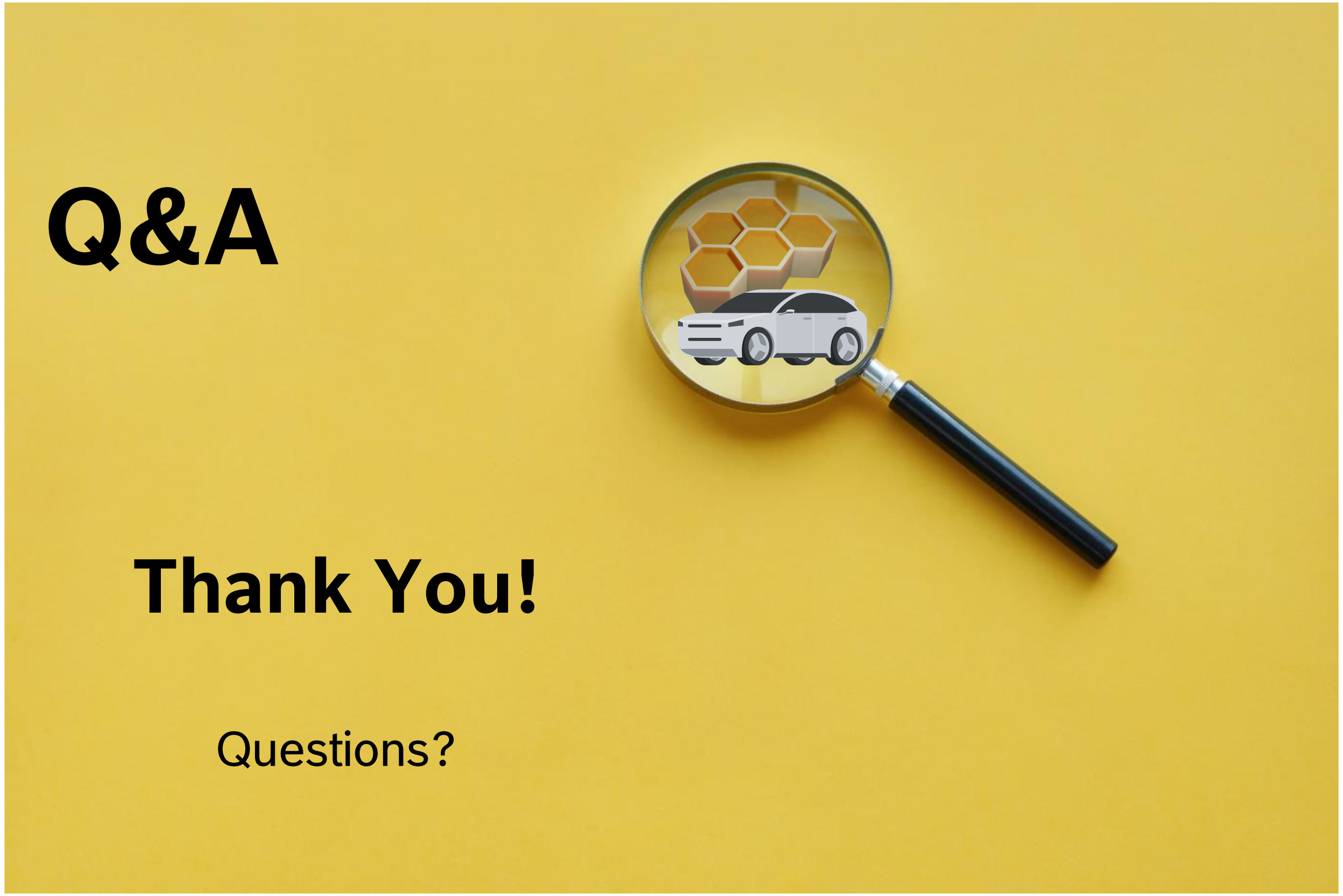

Q&A

Thank You!

Questions?