Block Harbor. Cybersecurity

The People Problem in Vehicle Cybersecurity – Great Services and Automation

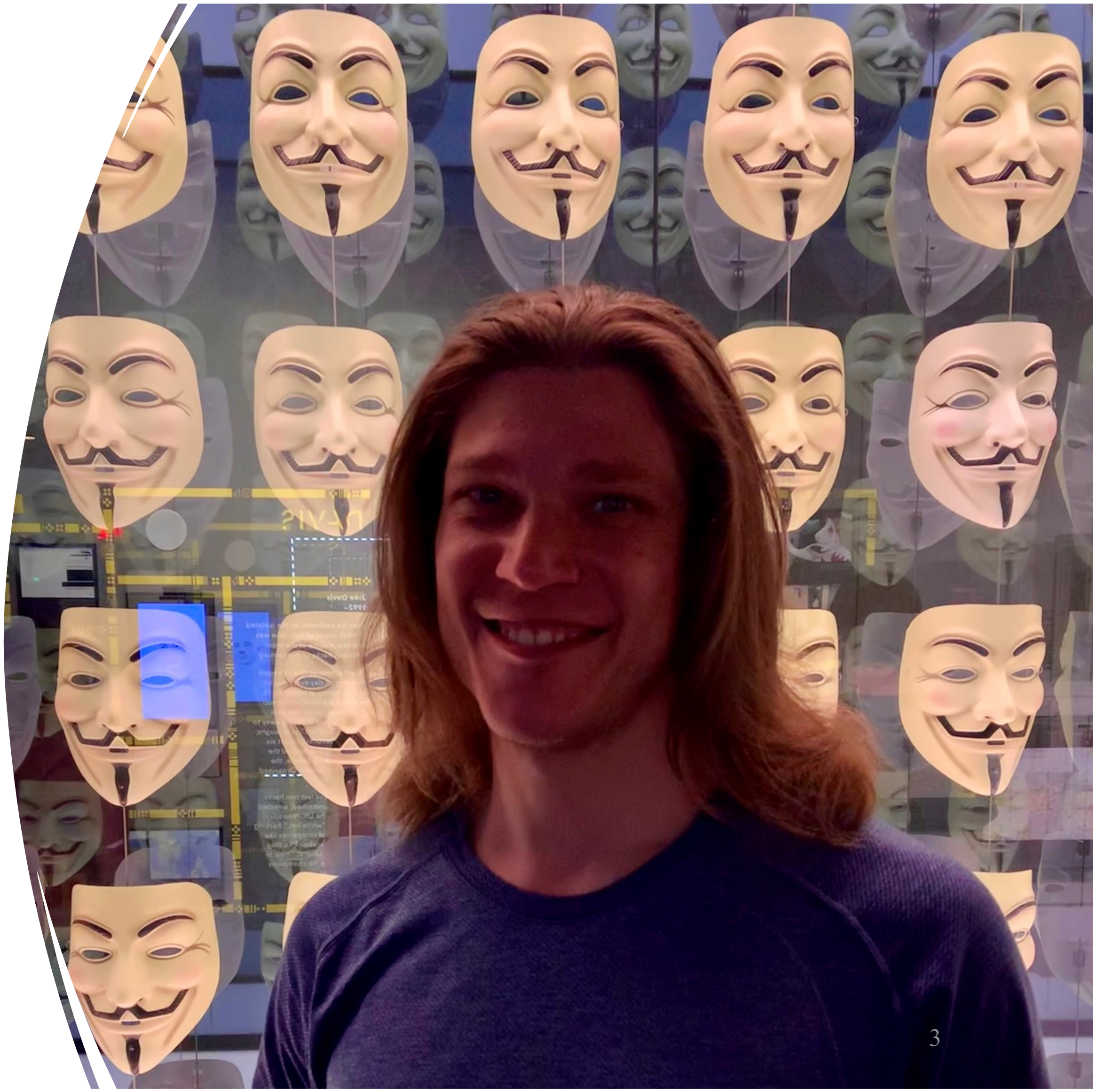
About me

Bryan Blancke

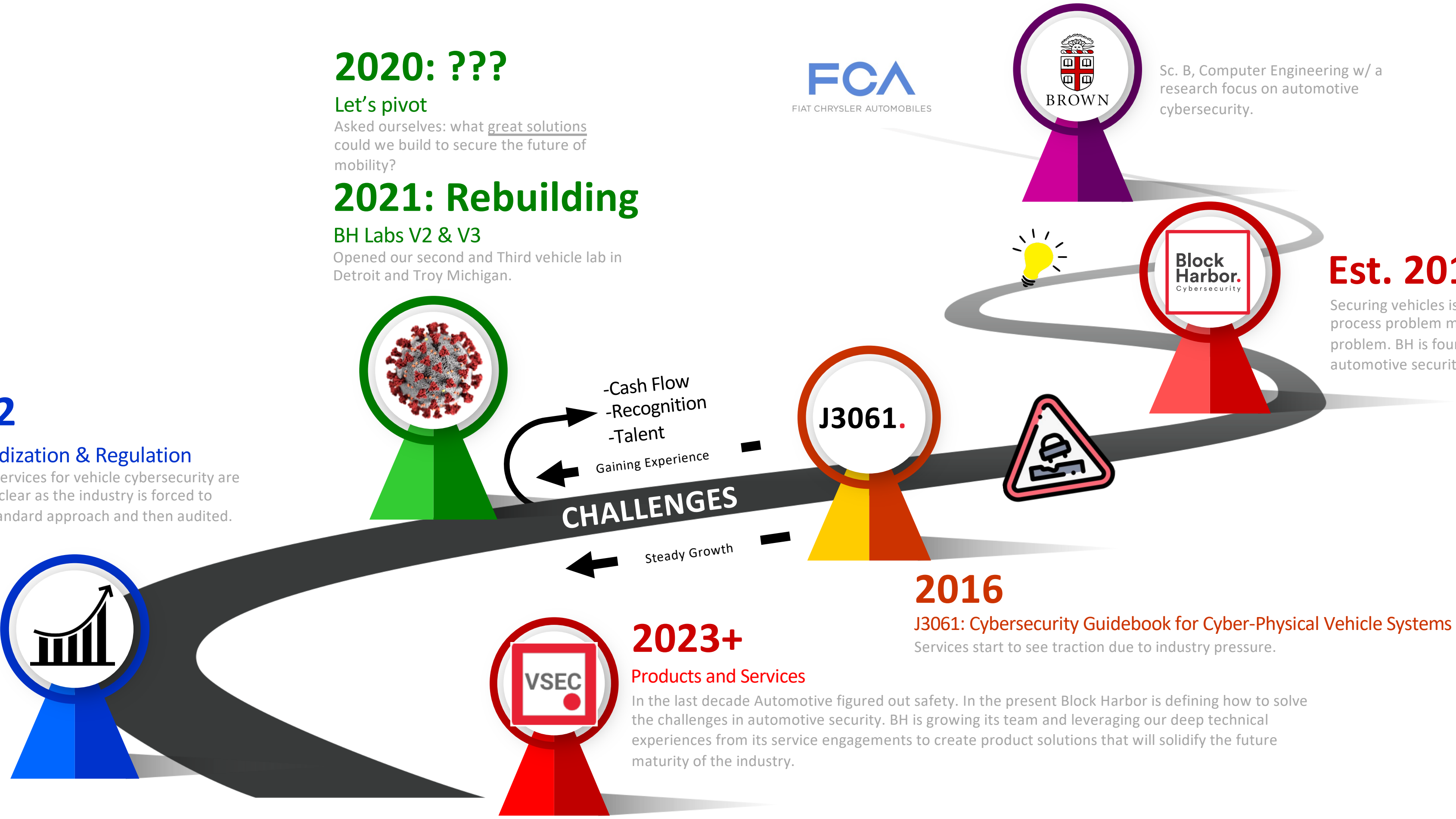
Director of Labs at Block Harbor

Leading the teams for automotive security testing, new product solutions and research

- Electrical Engineering
  - ❖ **Michigan State University**
- CISSP holder 2018
- Top 3 in Defcon Car Hacking Village 2018-2022
- Focused in Automotive & Cybersecurity since 2013



Our Journey



Sc. B, Computer Engineering w/ a research focus on automotive cybersecurity.

Est. 2014

Securing vehicles is a people and process problem more than a technical problem. BH is founded as an automotive security service provider.

2016

J3061: Cybersecurity Guidebook for Cyber-Physical Vehicle Systems

Services start to see traction due to industry pressure.

2020: ???

Let's pivot

Asked ourselves: what great solutions could we build to secure the future of mobility?

2021: Rebuilding

BH Labs V2 & V3

Opened our second and Third vehicle lab in Detroit and Troy Michigan.

2022

Standardization & Regulation

Common services for vehicle cybersecurity are becoming clear as the industry is forced to adopt a standard approach and then audited.

2023+

Products and Services

In the last decade Automotive figured out safety. In the present Block Harbor is defining how to solve the challenges in automotive security. BH is growing its team and leveraging our deep technical experiences from its service engagements to create product solutions that will solidify the future maturity of the industry.

MISSION

BUILDING GREAT SOLUTIONS FOR AUTOMOTIVE CYBERSECURITY TO KEEP MOBILITY SAFE.

VISION

A WORLD WHERE TECHNOLOGY & PEOPLE COEXIST SAFELY.

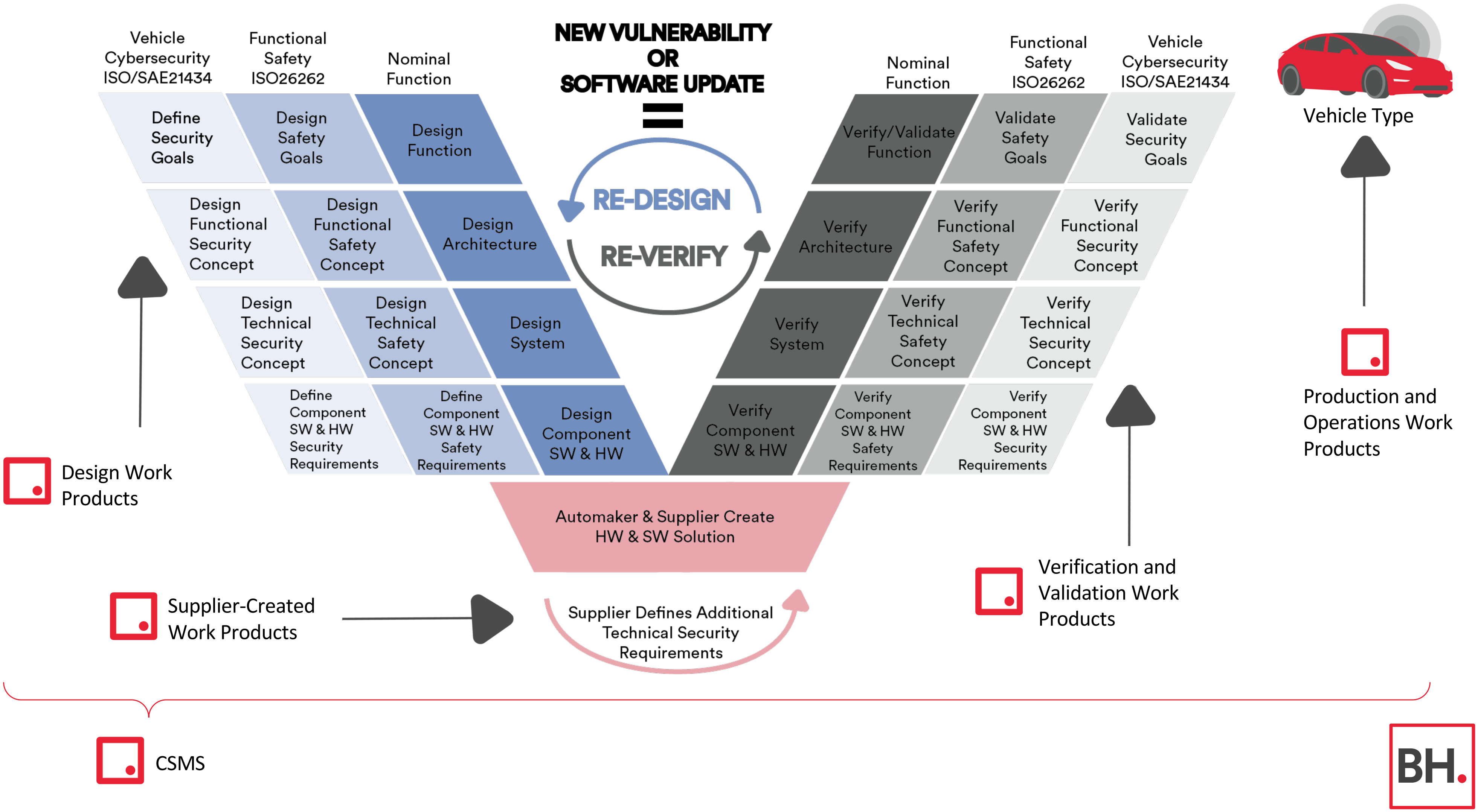
Security for Safety

Hunger for Success

Innovate the Industry

Pride in our Effort

Great Solutions. Where to start?



Vehicle Cybersecurity ISO/SAE21434

Functional Safety ISO26262

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Automaker & Supplier Create HW & SW Solution

Supplier Defines Additional Technical Security Requirements

Vehicle Type

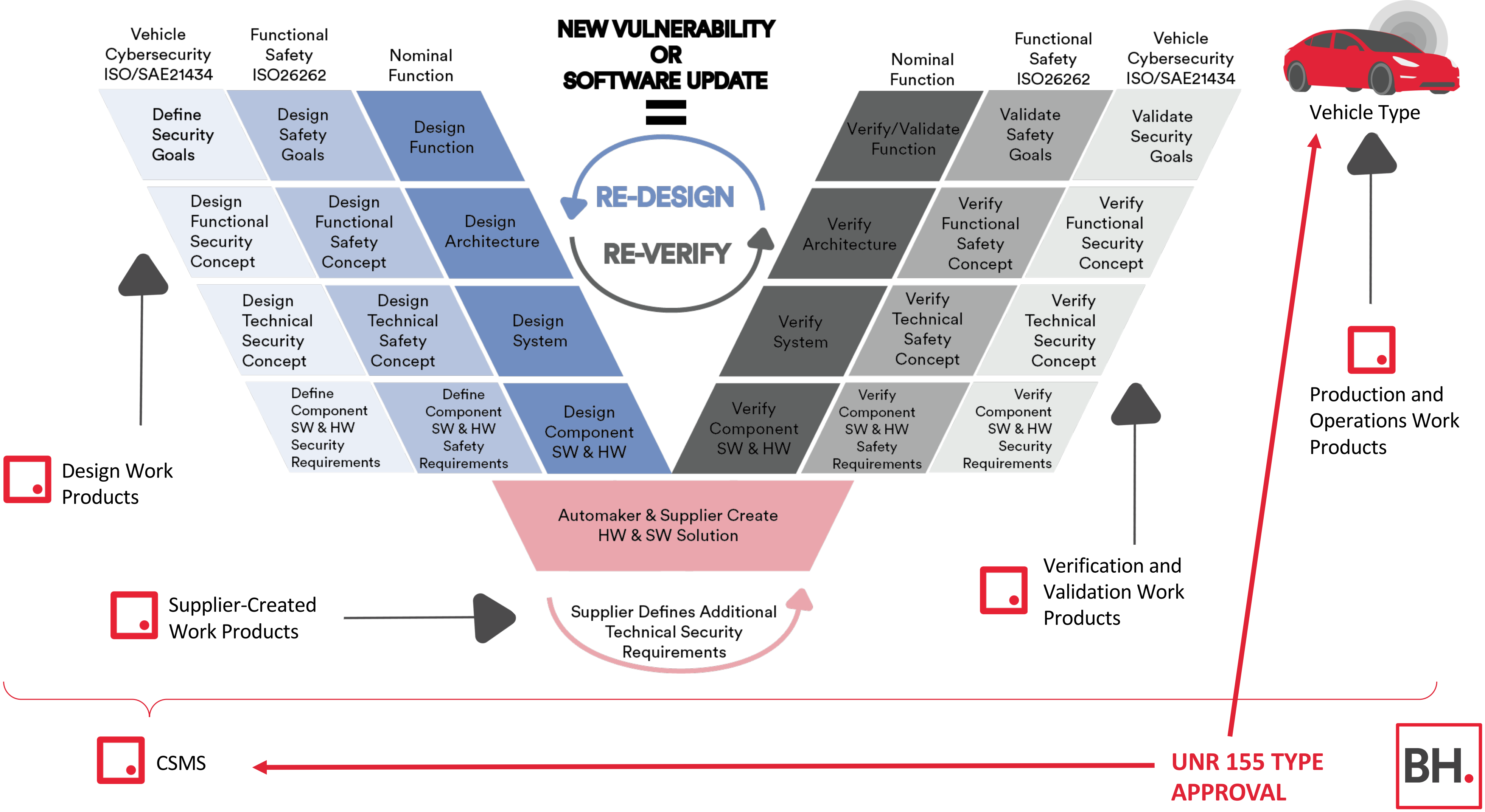
Production and Operations Work Products

Design Work Products

Supplier-Created Work Products

Verification and Validation Work Products

CSMS



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Design Work Products

Supplier-Created Work Products

Verification and Validation Work Products

Production and Operations Work Products

Vehicle Type

CSMS

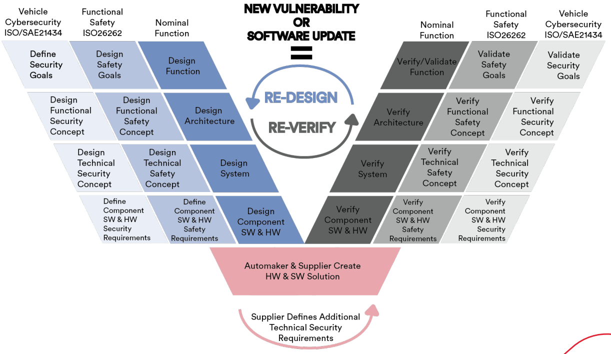
UNR 155 TYPE APPROVAL

Work products throughout the lifecycle of the vehicle for regulatory approval.

It takes a lot of hands. It’s a people problem.

It takes a lot of tools. It’s an integration and automation problem.

The People Problem



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Automaker & Supplier Create HW & SW Solution

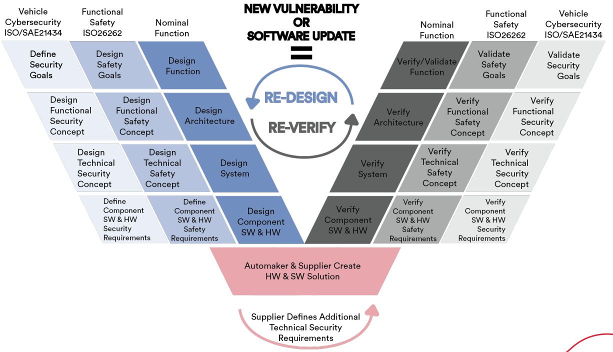
Supplier Defines Additional Technical Security Requirements

Key challenges we run into:

- **One person** cybersecurity teams.
- Trying to use pre-21434 processes and tools.
- **Siloed** organizations.
  - Poor information exchange and organization
- Cybersecurity efforts are seen as **abrasive**.
  - Internal resistance can be high
- Cybersecurity is treated as important but **not always a priority** – tasked with the job, but not equipped to do it well.
  - Top level leadership must support cybersecurity as a priority
- Key activities are skipped or left incomplete making future steps in the V model ineffective
  - Everything falls on Pentesting at the end which is costly

So, who are the vehicle security engineers tackling this?

The People Problem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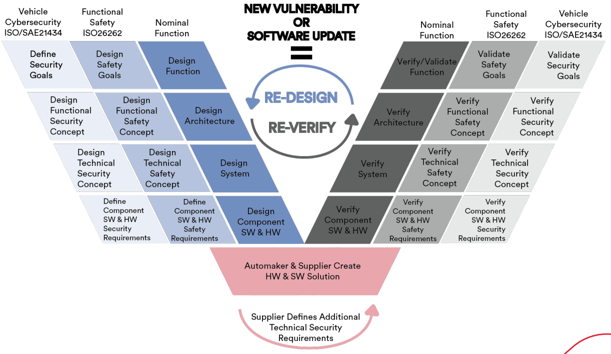
- IT security folks that pivoted.
- Automotive engineers that pivoted.
- Functional safety folks that took on additional responsibility.
- Recent graduates from the extremely new vehicle cybersecurity programs.
- Car hackers that turned it into a career.

The People Problem



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What does it mean to be a good automotive security engineer, anyway?

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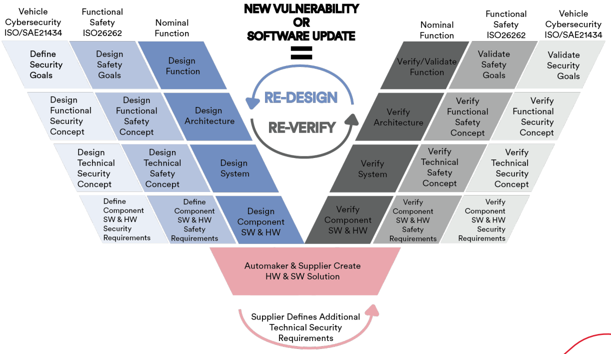
Understands…

- the fundamental cyber risks to vehicles.
- how vehicles are made and the technical details.
- the distribution of cyber responsibility through the supply chain.
- the standards and regulations well.
- how to build scalable processes to support in meeting the standards and regulations.

What does it mean to be a good automotive security engineer, anyway?

The People Problem



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- Stressed.
- Overworked.
- Unequipped.
- Turning over.
- Underpaid.

And there sure are a lot of job openings…

What does it mean to be a good automotive security engineer, anyway?

WALSH COLLEGE

UNIVERSITY OF DETROIT MERCY

Washtenaw Community College

EASTERN MICHIGAN UNIVERSITY

ST. CLAIR COLLEGE

University of Windsor

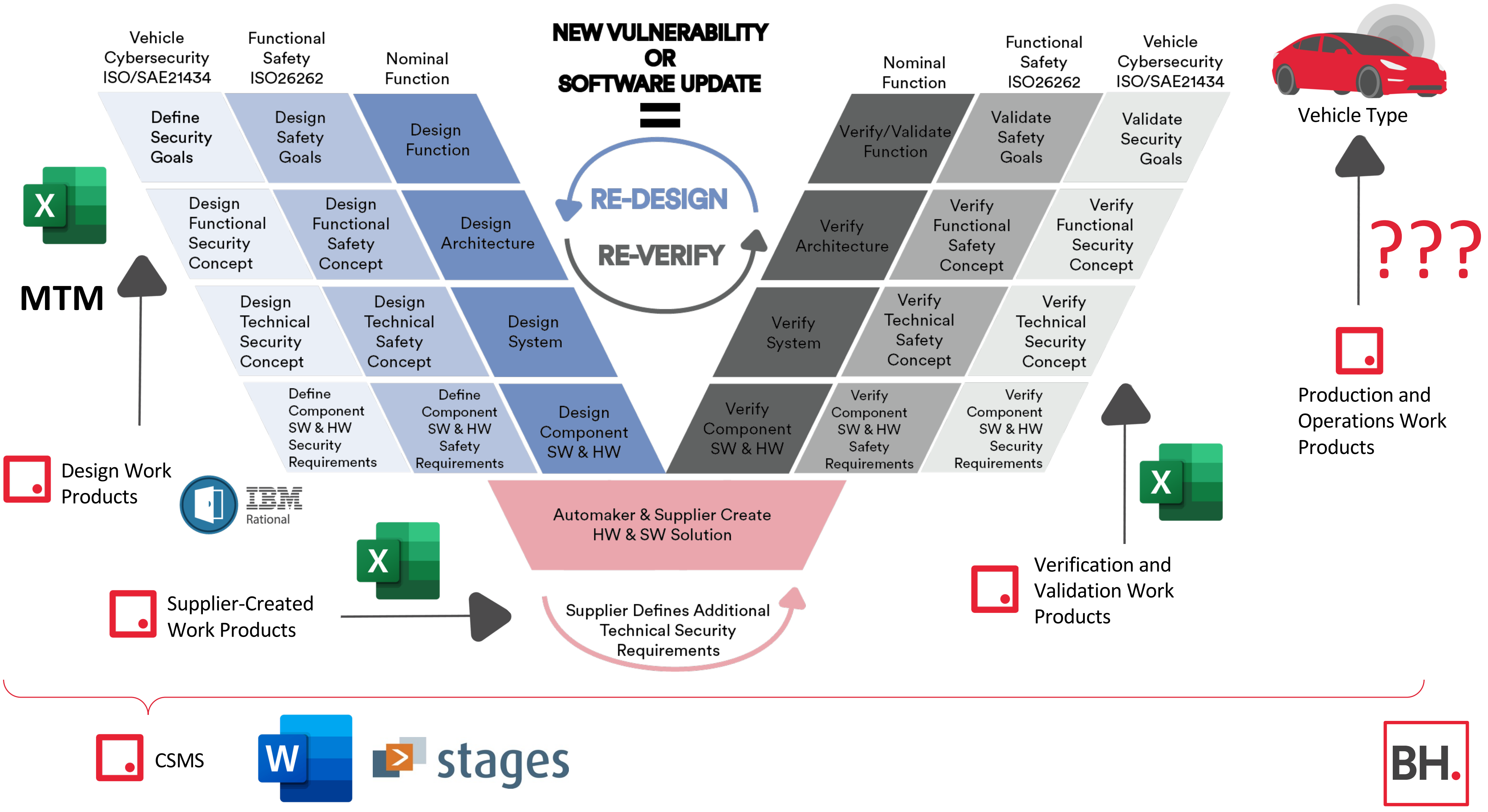
AUTO-ISAC
Automotive Information Sharing and Analysis Center

Work products throughout the lifecycle of the vehicle for regulatory approval.

~~It takes a lot of hands. It’s a people problem.~~

It takes a lot of tools. It’s an integration and automation problem.

What about the toolchain, then?



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MTM

Design Work Products

IBM Rational

Supplier-Created Work Products

Verification and Validation Work Products

Vehicle Type

???

Production and Operations Work Products

CSMS

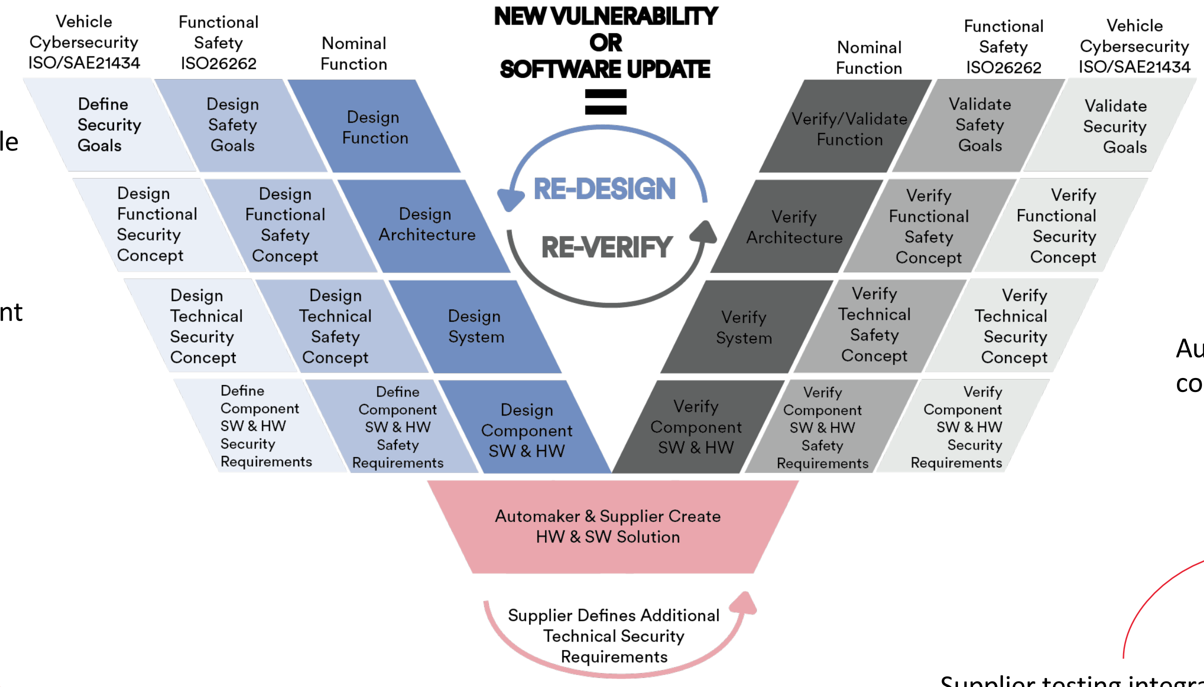
stages

BH.

It’s a logical toolset to start with. But what do we think it should look like?

The first time around…

Traceable and maintainable TARAs/Concepts at the Vehicle, System, and Component layers, integrated with Requirements Management System (RMS).



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Automaker & Supplier Create HW & SW Solution

Supplier Defines Additional Technical Security Requirements

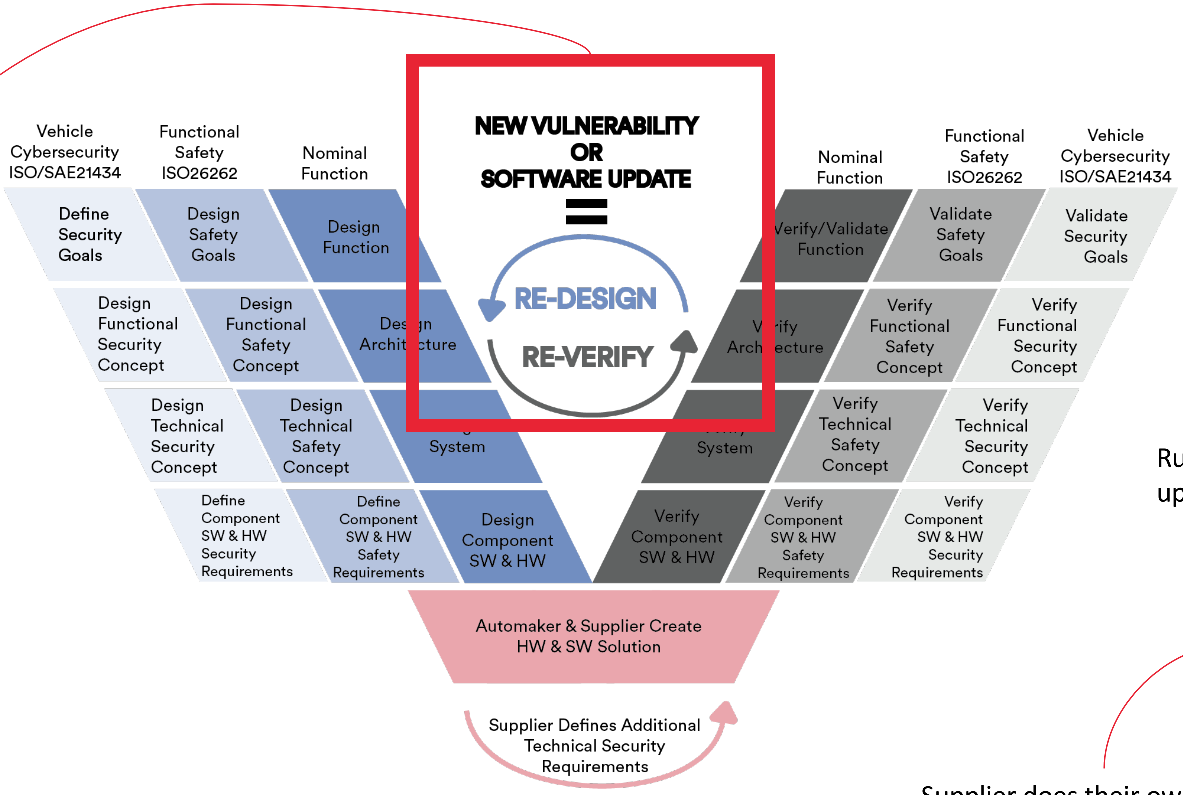
TARAs/Concepts are integrated with supplier-performed TARAs/Concepts

Supplier testing integrated into Automaker V&V process.

Automated V&V integrated with corresponding TARAs/Concepts

Monitoring in Production & Operations.

Maintenance…



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Automaker & Supplier Create HW & SW Solution

Supplier Defines Additional Technical Security Requirements

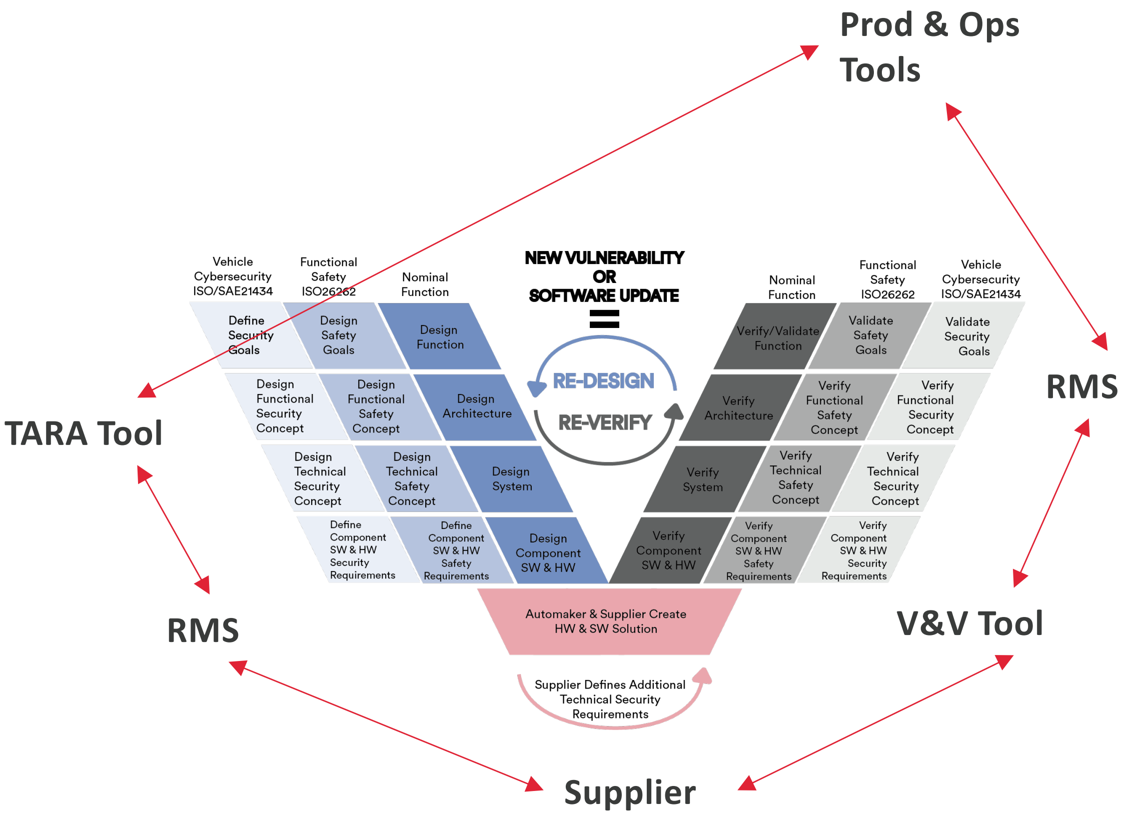
Update TARA, Cybersecurity Concept

Work with supplier to get update or patch created

Supplier does their own V&V

Run automated V&V tests to update work products.

Release patch.



Prod & Ops Tools

TARA Tool

RMS

Supplier

V&V Tool

RMS

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Work products throughout the lifecycle of the vehicle for regulatory approval.

~~It takes a lot of hands. It’s a people problem.~~

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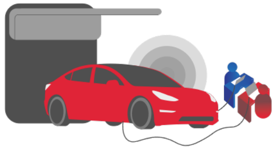
So, why does Block Harbor exist? What value do we add?

Block Harbor. Great Services First



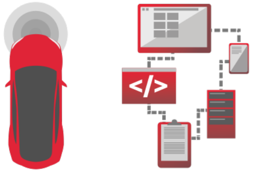
Vehicle Cybersecurity Labs

Vehicle/Subsystem/Component Penetration Testing

Vehicle/Subsystem/Component Fuzzing

Verification/Validation-as-a-Service (VaaS)

Vehicle Cybersecurity Lab Buildout

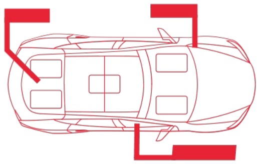


Vehicle Security Operations

Vehicle Security Operation Center (VSOC)

Vehicle/Subsystem/Component Threat Analysis & Risk Assessment (TARA)

Vehicle Cybersecurity Management System (CSMS)



Vehicle Cybersecurity Consulting

ISO/SAE 21434, WP.29, & More

Some of our great customers.

Ford

DENSO

MAN

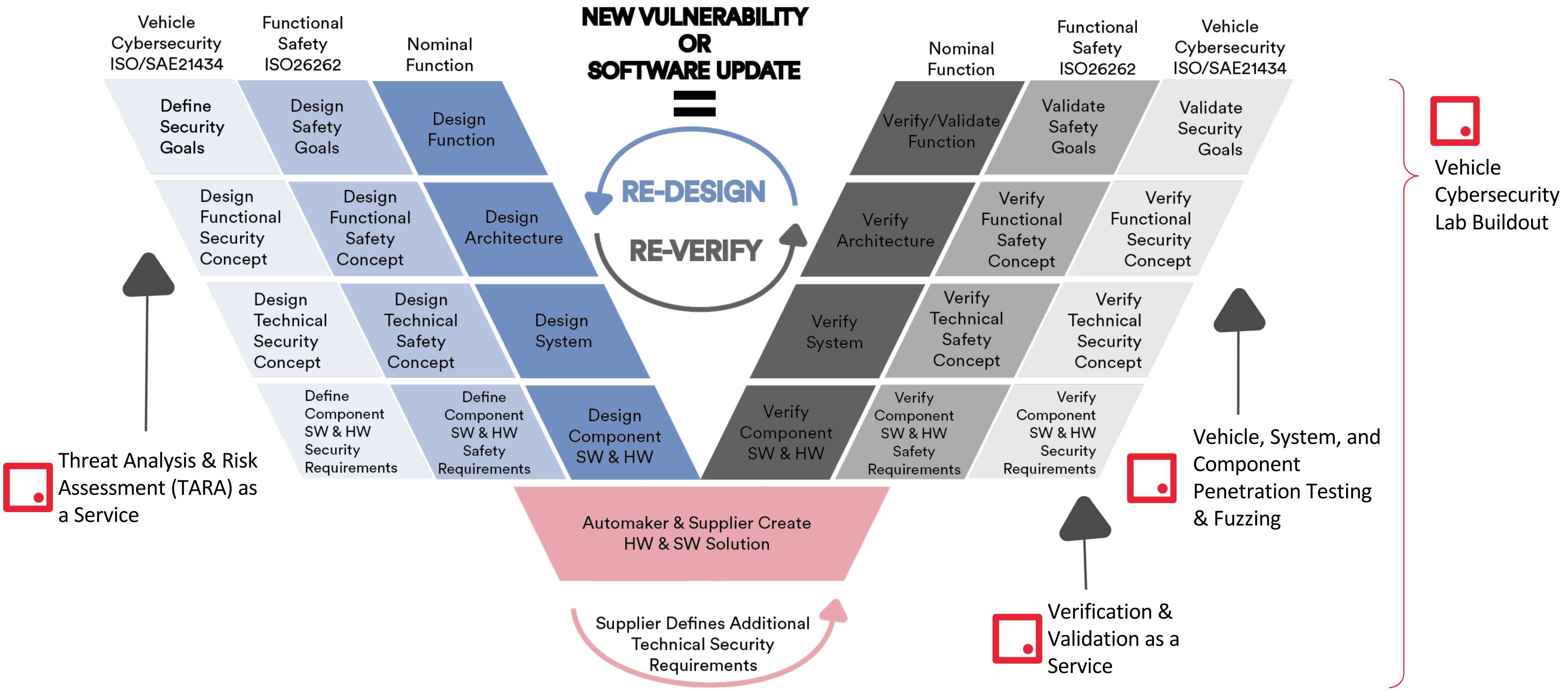
STELLANTIS

GENTHERM

LORDSTOWN

LOCOMATION

est. 2014 in Detroit.



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Automaker & Supplier Create HW & SW Solution

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Threat Analysis & Risk Assessment (TARA) as a Service

Vehicle, System, and Component Penetration Testing & Fuzzing

Verification & Validation as a Service

Vehicle Cybersecurity Lab Buildout

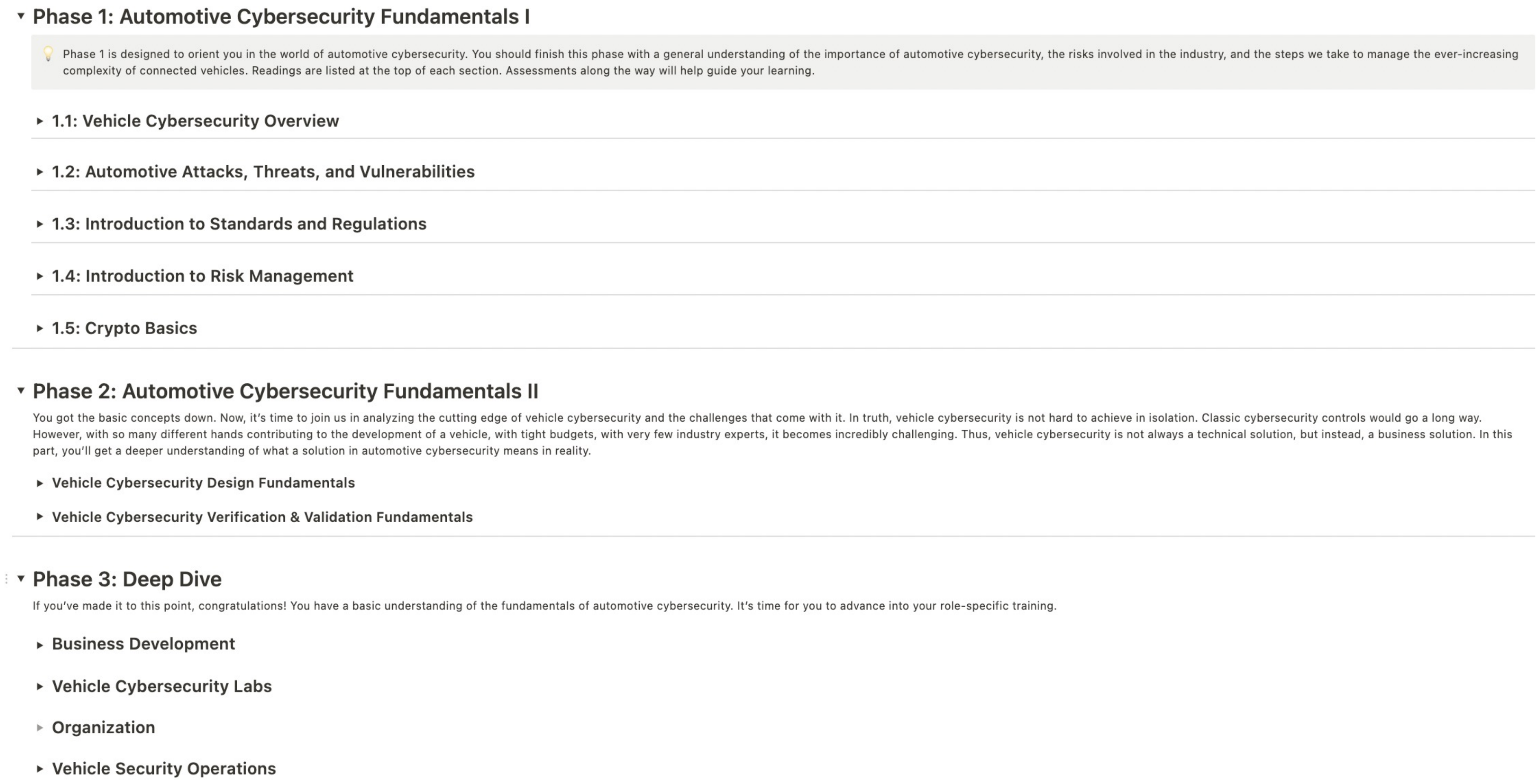
Vehicle Cybersecurity Management System (CSMS)

Vehicle Cybersecurity Consulting: ISO/SAE 21434, UNECE WP.29, & more

Vehicle Security Operation Center

How are we addressing the people problem?

The Plunge



Phase 1: Automotive Cybersecurity Fundamentals I

Phase 1 is designed to orient you in the world of automotive cybersecurity. You should finish this phase with a general understanding of the importance of automotive cybersecurity, the risks involved in the industry, and the steps we take to manage the ever-increasing complexity of connected vehicles. Readings are listed at the top of each section. Assessments along the way will help guide your learning.

1.1: Vehicle Cybersecurity Overview

1.2: Automotive Attacks, Threats, and Vulnerabilities

1.3: Introduction to Standards and Regulations

1.4: Introduction to Risk Management

1.5: Crypto Basics

Phase 2: Automotive Cybersecurity Fundamentals II

You got the basic concepts down. Now, it's time to join us in analyzing the cutting edge of vehicle cybersecurity and the challenges that come with it. In truth, vehicle cybersecurity is not hard to achieve in isolation. Classic cybersecurity controls would go a long way. However, with so many different hands contributing to the development of a vehicle, with tight budgets, with very few industry experts, it becomes incredibly challenging. Thus, vehicle cybersecurity is not always a technical solution, but instead, a business solution. In this part, you'll get a deeper understanding of what a solution in automotive cybersecurity means in reality.

Vehicle Cybersecurity Design Fundamentals

Vehicle Cybersecurity Verification & Validation Fundamentals

Phase 3: Deep Dive

If you've made it to this point, congratulations! You have a basic understanding of the fundamentals of automotive cybersecurity. It's time for you to advance into your role-specific training.

Business Development

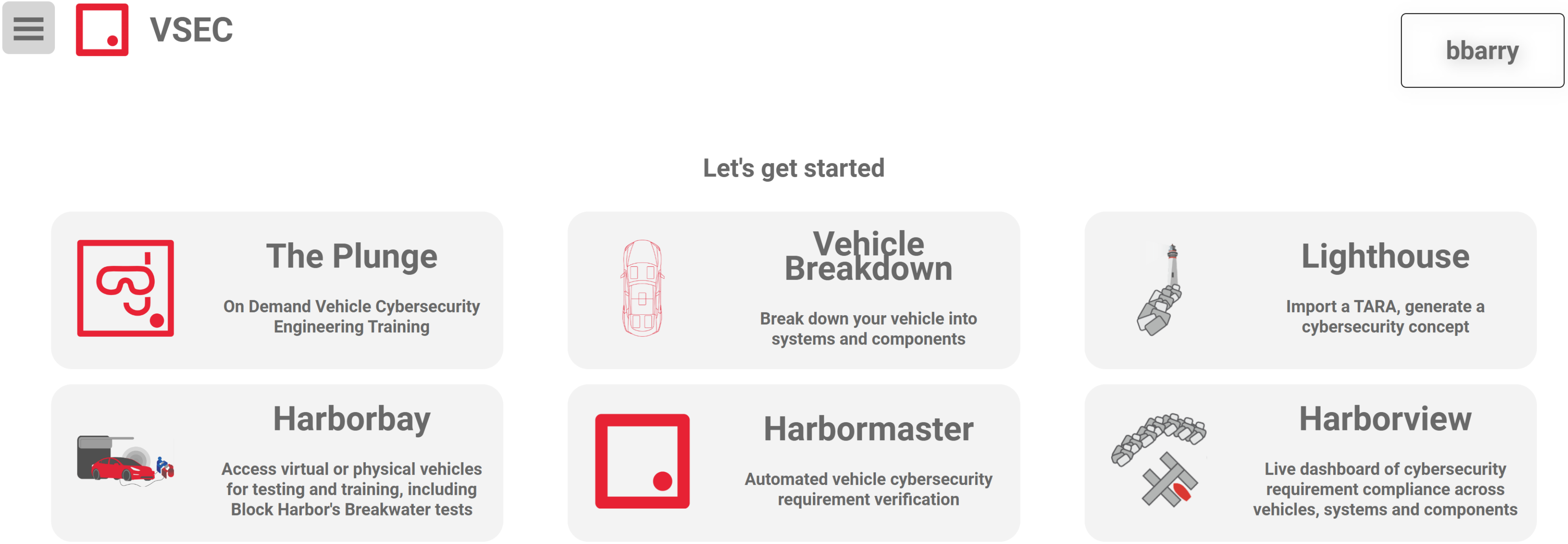
Vehicle Cybersecurity Labs

Organization

Vehicle Security Operations

But really, two birds with one stone: tools for automation.

Block Harbor. Great Solutions



VSEC

bbarry

Let's get started

The Plunge

On Demand Vehicle Cybersecurity Engineering Training

Vehicle Breakdown

Break down your vehicle into systems and components

Lighthouse

Import a TARA, generate a cybersecurity concept

Harborbay

Access virtual or physical vehicles for testing and training, including Block Harbor's Breakwater tests

Harbormaster

Automated vehicle cybersecurity requirement verification

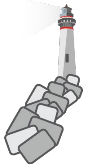
Harborview

Live dashboard of cybersecurity requirement compliance across vehicles, systems and components

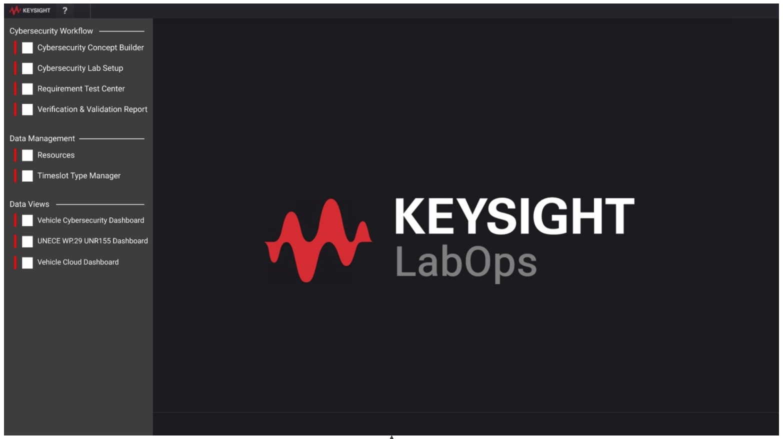
Harbormaster.

Our solution for Automated Verification & Validation (V&V) for Vehicle Cybersecurity built on top of Keysight's Lab Operations platform.

BH designed this solution that we call Harbormaster. BH sets up and operates labs around co-designed Keysight HW/SW tailor built for ISO/SAE 21434 and UNR 155 V&V.

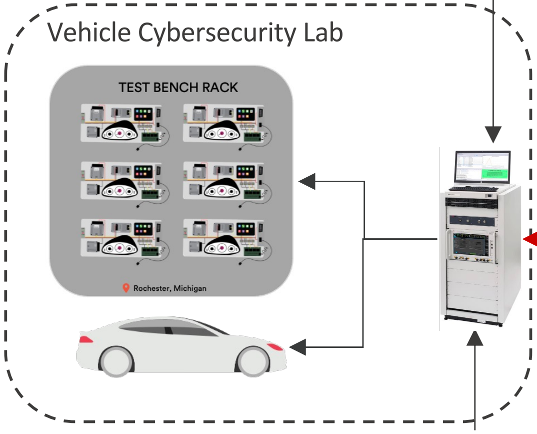


Harbormaster.



Keysight LabOps platform orchestrates testing and manages results for UNR 155.

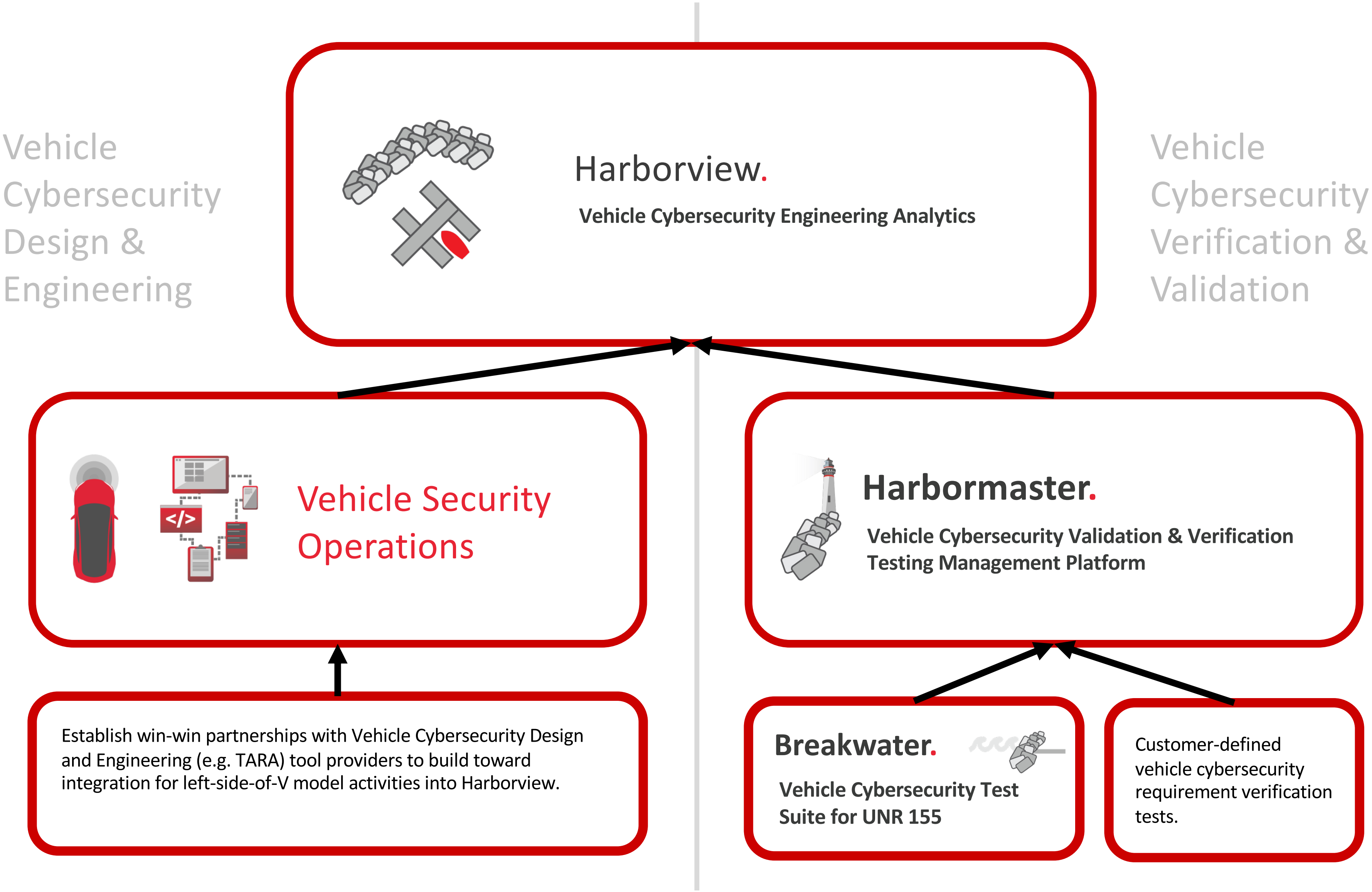
Vehicle cybersecurity V&V test results



Keysight Automotive Cybersecurity Testing Platform

Breakwater: a suite of **base vehicle cybersecurity test scenarios for UNR 155 Mitigations**

Breakwater.



Vehicle Cybersecurity Design & Engineering

Harborview.

Vehicle Cybersecurity Engineering Analytics

Vehicle Cybersecurity Verification & Validation

Vehicle Security Operations

Harbormaster.

Vehicle Cybersecurity Validation & Verification Testing Management Platform

Establish win-win partnerships with Vehicle Cybersecurity Design and Engineering (e.g. TARA) tool providers to build toward integration for left-side-of-V model activities into Harborview.

Breakwater.

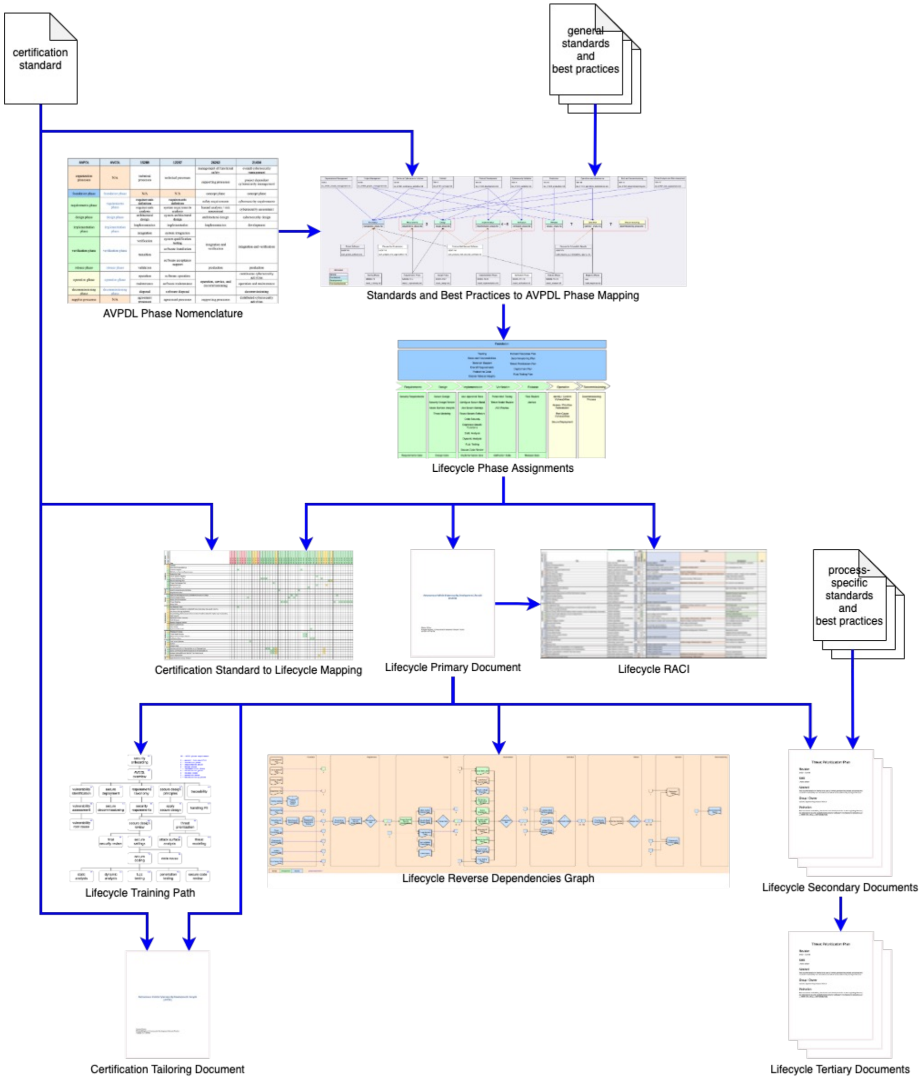
Vehicle Cybersecurity Test Suite for UNR 155

Customer-defined vehicle cybersecurity requirement verification tests.

Further open and research projects.

Open Source CSMS, AVCDL

The **AVCDL** is a set of identified processes, requirements of those processes, generated products, and mappings from the generated products to their corresponding certification standard (**ISO/SAE 21434**, **UNECE WP.29 R155-7**) work products: for the purpose of ensuring the creation of secure systems.



certification standard

general standards and best practices

AVPDL Phase Nomenclature

Standards and Best Practices to AVPDL Phase Mapping

Lifecycle Phase Assignments

Certification Standard to Lifecycle Mapping

Lifecycle Primary Document

Lifecycle RACI

process-specific standards and best practices

Lifecycle Training Path

Lifecycle Reverse Dependencies Graph

Lifecycle Secondary Documents

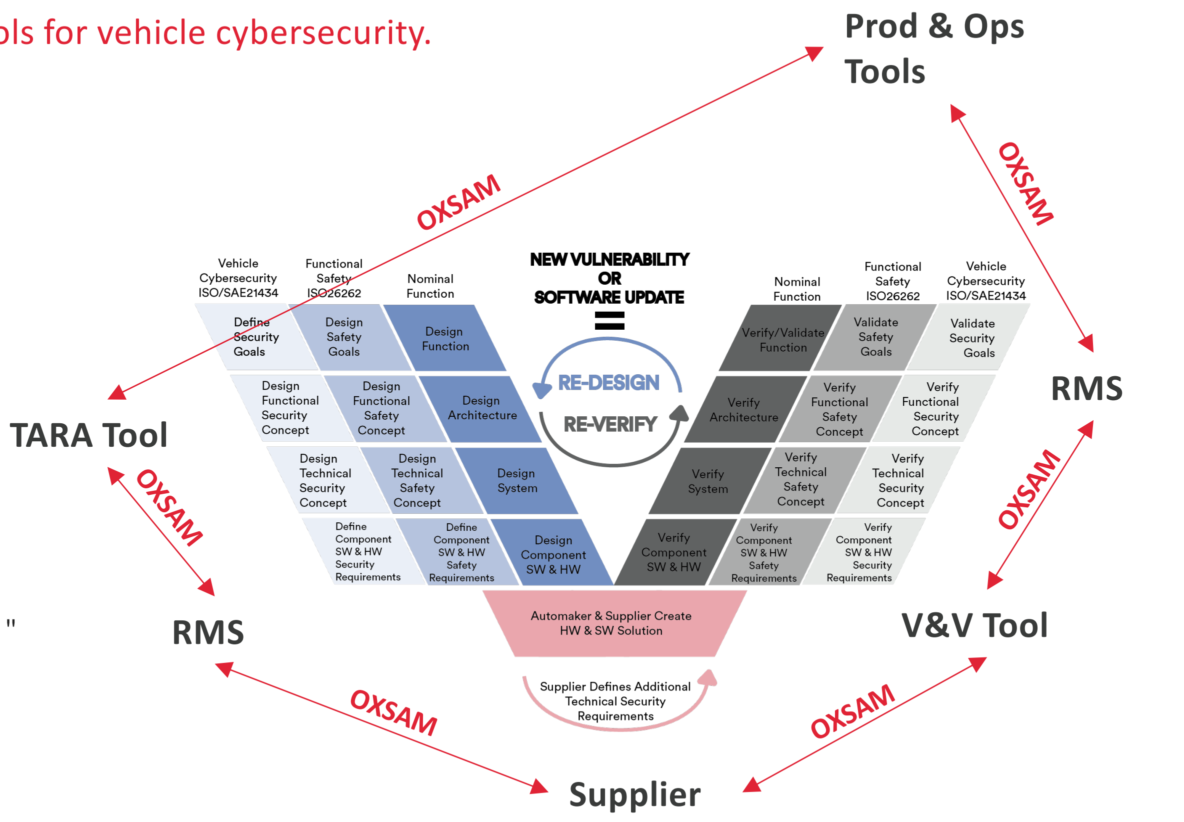
Certification Tailoring Document

Lifecycle Tertiary Documents

https://github.com/nutonomy/AVCDL, Lead: Charles Wilson

OpenXSAM – Data exchange format between tools for vehicle cybersecurity.

```
<openXSAM>
   <ItemDefinition>
      <Functions>…</Functions>
      <Components>…</Components>
      <Data>…</Data>
      <Channels>…</Channels>
   </ItemDefinition>
   <CSConcept>
      <Risks>
            <Risk name="Confidentiality of UDS-
            based FOTA update on CAN 7"
            treatment="REDUCE">
               <CSGoal verificationStatus="passed"
               validationStatus="passed">
                  <CSRequirement
                  verificationStatus="passed"
                  validationStatus="passed">
                  </CSRequirement>
               </CSGoal>
            </Risk>
      </Risks>
   </CSConcept>
</openXSAM>
```



Prod & Ops Tools
OXSAM
OXSAM
TARA Tool
OXSAM
RMS
OXSAM
Supplier
OXSAM
V&V Tool
OXSAM
RMS
Vehicle Cybersecurity ISO/SAE21434
Functional Safety ISO26262
Nominal Function
NEW VULNERABILITY OR SOFTWARE UPDATE =
RE-DESIGN
RE-VERIFY
Nominal Function
Functional Safety ISO26262
Vehicle Cybersecurity ISO/SAE21434
Define Security Goals
Design Safety Goals
Design Function
Verify/Validate Function
Validate Safety Goals
Validate Security Goals
Design Functional Security Concept
Design Functional Safety Concept
Design Architecture
Verify Architecture
Verify Functional Safety Concept
Verify Functional Security Concept
Design Technical Security Concept
Design Technical Safety Concept
Design System
Verify System
Verify Technical Safety Concept
Verify Technical Security Concept
Define Component SW & HW Security Requirements
Define Component SW & HW Safety Requirements
Design Component SW & HW
Verify Component SW & HW
Verify Component SW & HW Safety Requirements
Verify Component SW & HW Security Requirements
Automaker & Supplier Create HW & SW Solution
Supplier Defines Additional Technical Security Requirements

Open data format for tool integration for real-time vehicle cybersecuri engineering.

Other BH Projects

- 2021 Ford Mach E, demonstration/research vehicle.
- Virtual Vehicle Cybersecurity Lab: enable remote interfacing on physical vehicle products to reduce the hardware needs for research and training.
- ASRG
- ASRG Threat Catalog – Database of threats.
- ASRG CVEs – Database of CVEs focused specifically on vehicles.

At Block Harbor, we’ve been building great solutions to keep mobility safe since 2014.

We have the right onboarding program to build competent people to perform our services.

We build great products to automate the workload for UNR 155, and we’re building the ecosystem of products and services to support in making vehicle cybersecurity engineering efficient.

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