EDGE-DRIVEN INSIGHTS: STAYING AHEAD OF MARKET DEMANDS

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APTIV

Aptiv at a glance

$14.4B
REVENUE

$2.4B
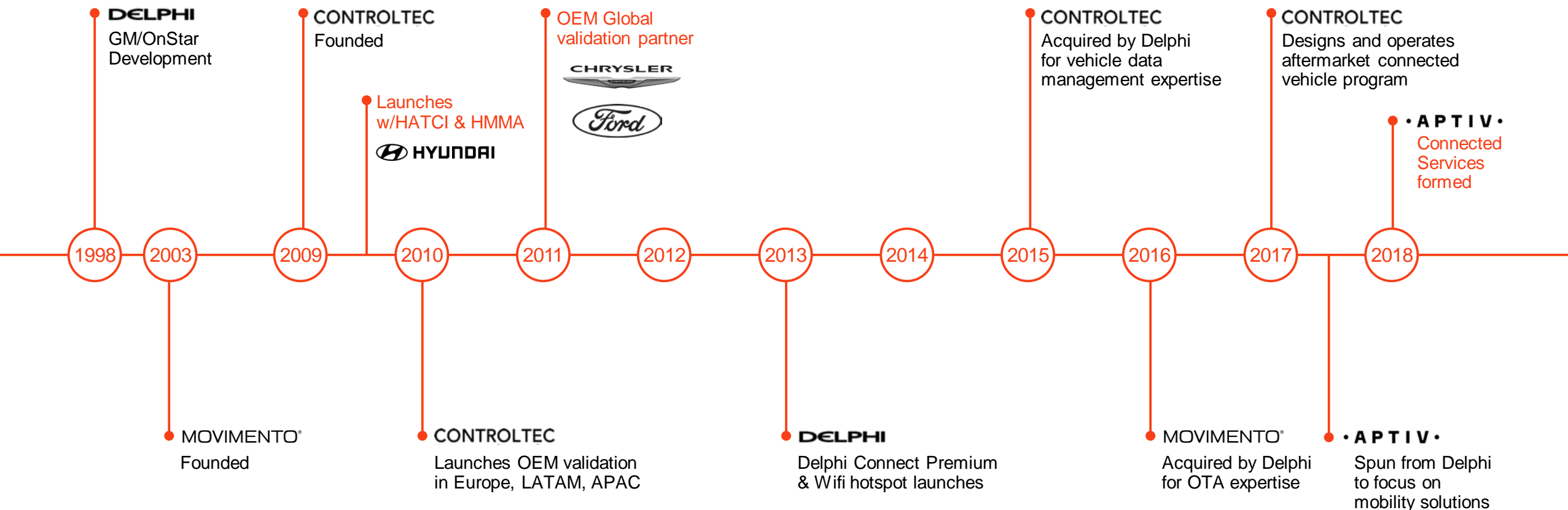EBITDA

15
TECHNICAL CENTERS

18,000+
ENGINEERS

160,000
EMPLOYEES

44
COUNTRIES

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Rich history of delivering connected vehicle value

1998 — DELPHI
GM/OnStar Development

2009 — CONTROLTEC
Founded

2010 — Launches w/HATCI & HMMA — HYUNDAI

2011 — OEM Global validation partner
CHRYSLER
Ford

2015 — CONTROLTEC
Acquired by Delphi for vehicle data management expertise

2017 — CONTROLTEC
Designs and operates aftermarket connected vehicle program

2018 — APTIV
Connected Services formed

Timeline: 1998 · 2003 · 2009 · 2010 · 2011 · 2012 · 2013 · 2014 · 2015 · 2016 · 2017 · 2018

2003 — MOVIMENTO
Founded

2010 — CONTROLTEC
Launches OEM validation in Europe, LATAM, APAC

2013 — DELPHI
Delphi Connect Premium & Wifi hotspot launches

2016 — MOVIMENTO
Acquired by Delphi for OTA expertise

2018 — APTIV
Spun from Delphi to focus on mobility solutions

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As automated driving and mobility solutions grow, the amount of data that needs to be **processed increases** **exponentially**

Winners will have a **robust data strategy** & utilize the dynamic edge **efficiently**

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The incoming flood of data from autonomous vehicles

AUTONOMOUS VEHICLES
4,000 GB
per vehicle, each day

CAMERAS
~20 - 40 MB
per second

RADAR
~10 - 100 KB
per second

SONAR
~10 - 100 KB
per second

GPS SYSTEMS
~50 - 100 KB
per second

LIDAR
~10 - 70 MB
per second

CEE Automotive | November 2019 | Aptiv

Challenges with the proliferation of ADAS data

PROCESSING ON THE EDGE IS CRITICAL TO A ROBUST DATA STRATEGY

Processing data of advanced technologies and deep systems knowledge across subsystems of the the vehicle has the following considerations …

…requires a different approach to what is usually considered for big data

PERFORMANCE CRITICAL

Need to constantly monitor for performance and make time critical decisions

MUST BE ACTIONABLE

Data needs to be insightful and provide direction for immediate action

DYNAMIC & EVOLVING

Is perpetually updated (i.e. hyper-localized maps & perception) to reflect the environment

ROBUST DATA STRATEGY

Only targeted data is sent to the cloud

EDGE IS CRITICAL

On-vehicle computing for critical features and managing transmission bandwidth

LEVERAGES CONNECTIVITY

Multi-modal OTA, which also support transition from manual to automated modes

● A P T I V ●

Aptiv mobile data acquisition system (AMDAS)

OVERVIEW OF AMDAS DATA ENGINEERING OFFERING

Collect, store, upload analyze, and create value from all safety electronic-related data…

…glean customer & vehicle safety feature insights to offer increased value to OEMs, suppliers, dealers, fleets, smart cities, and end customers

ANALYTICS TOOLSETS

On-board tool is part of the reliable and insightful insight-driven analytics toolset enabled by an end-to-end solution

PRODUCT DEVELOPMENT

Enabling increases in product development efficiency through analytics and insights delivered to development and validation teams

REAL TIME

Capture correct data in real time to enable issue discovery & resolution

SEMI-AUTONOMOUS VALIDATION

Robust development / validation data collection enabler for semi-autonomous vehicle systems

IMPROVED RELIABILITY

Increase test scenario exposure for better reliability

● A P T I V ●

Las Vegas Commercial Deployment Progress

75
AUTOMATED VEHICLES

1,000,000+
AUTONOMOUS MILES TRAVELED

FIRST COMMERCIAL AMOD DEPLOYMENT ON LYFT RIDE HAILING NETWORK

2,700+
DESTINATIONS SERVED

4.95 STAR USER RATING OUT OF 5
★ ★ ★ ★ ★

2018

80,000+
PAID AUTONOMOUS RIDES

9 OUT OF **10** WOULD RIDE AGAIN

• A P T I V •

AMDAS delivers value to customers

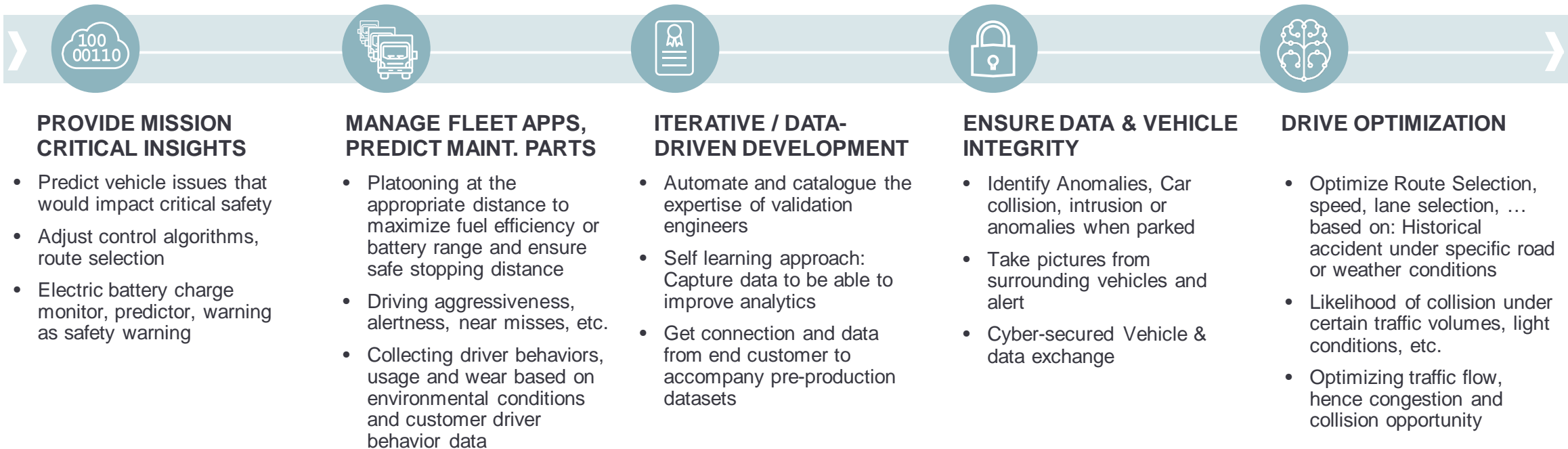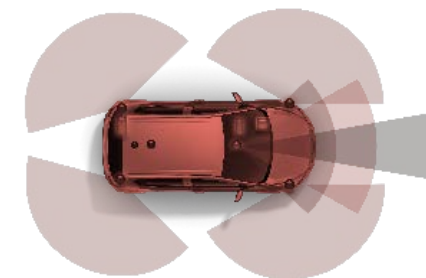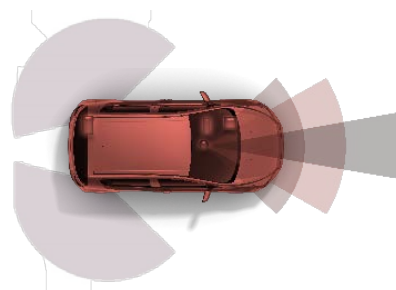Safety data services key customer value levers

- Optimize vehicle TCO
- Reduce accidents
- Safer/more reliable road infrastructure
- Reduce development cost and time

LEVEL 2   **LEVEL 2+**   **LEVEL 3-**   **LEVEL 3+**

PROVIDE MISSION CRITICAL INSIGHTS

- Predict vehicle issues that would impact critical safety
- Adjust control algorithms, route selection
- Electric battery charge monitor, predictor, warning as safety warning

MANAGE FLEET APPS, PREDICT MAINT. PARTS

- Platooning at the appropriate distance to maximize fuel efficiency or battery range and ensure safe stopping distance
- Driving aggressiveness, alertness, near misses, etc.
- Collecting driver behaviors, usage and wear based on environmental conditions and customer driver behavior data

ITERATIVE / DATA-DRIVEN DEVELOPMENT

- Automate and catalogue the expertise of validation engineers
- Self learning approach: Capture data to be able to improve analytics
- Get connection and data from end customer to accompany pre-production datasets

ENSURE DATA & VEHICLE INTEGRITY

- Identify Anomalies, Car collision, intrusion or anomalies when parked
- Take pictures from surrounding vehicles and alert
- Cyber-secured Vehicle & data exchange

DRIVE OPTIMIZATION

- Optimize Route Selection, speed, lane selection, … based on: Historical accident under specific road or weather conditions
- Likelihood of collision under certain traffic volumes, light conditions, etc.
- Optimizing traffic flow, hence congestion and collision opportunity

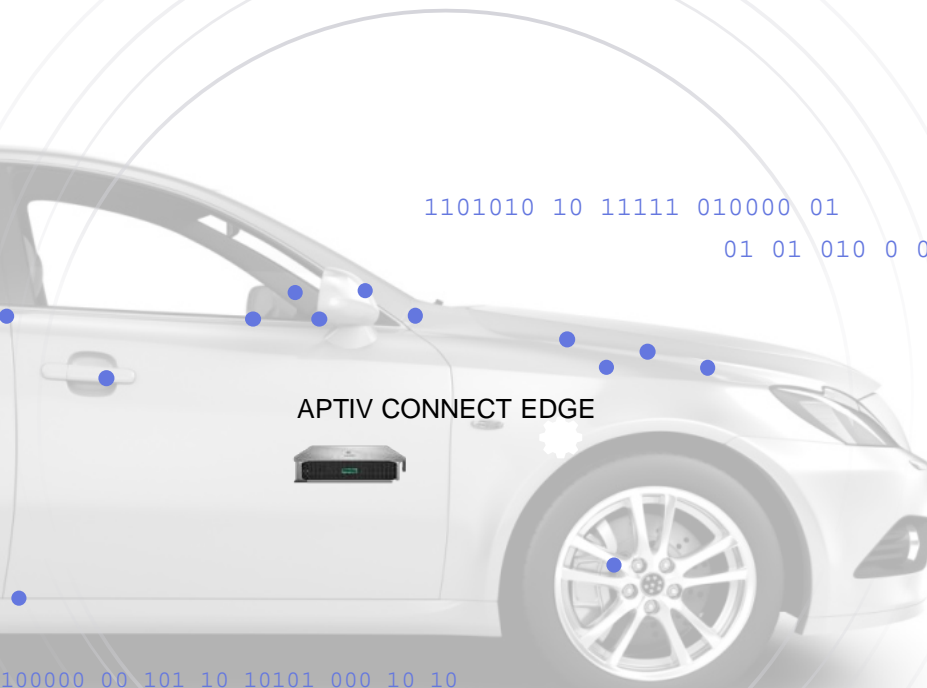•APTIV•

Real-time edge-driven insights

① Vehicle data is analyzed and processed using **real time analytics** to augment the raw data capture

② Only requested data is transmitted via cellular, **lowering transmission fees,** while raw data is manually loaded on to our **high performance computing center**
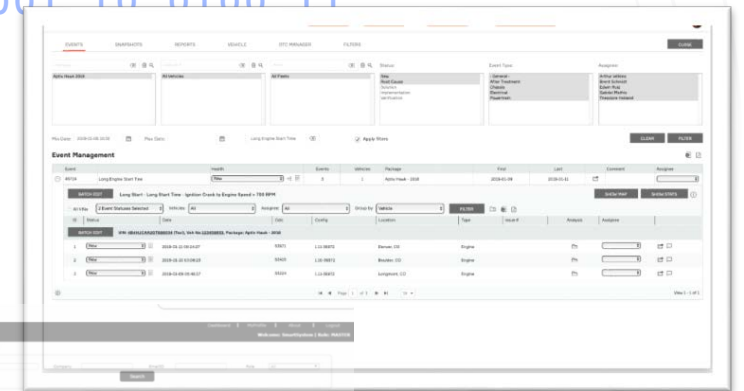
③ **Real time** response capability with urgent data while raw data is used to **train and develop** perception and planning algorithms

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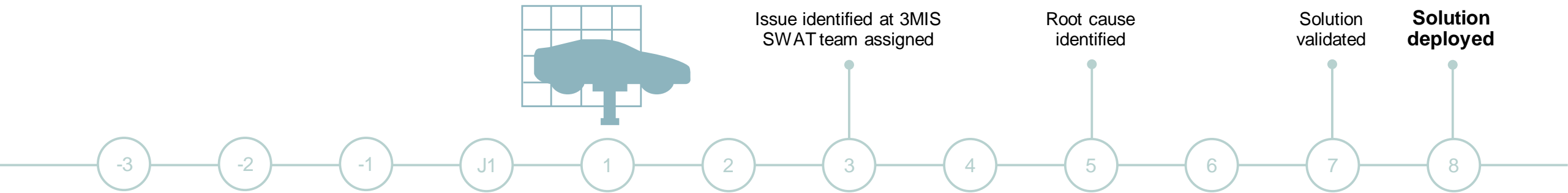
01 01 010 0 000001111

00101 1 1 000

001 00 1 1 10 11 00001 10 0100 11

APTIV CONNECT EDGE

100000 00 101 10 10101 000 10 10

EXCESS DATA NOT SENT ON
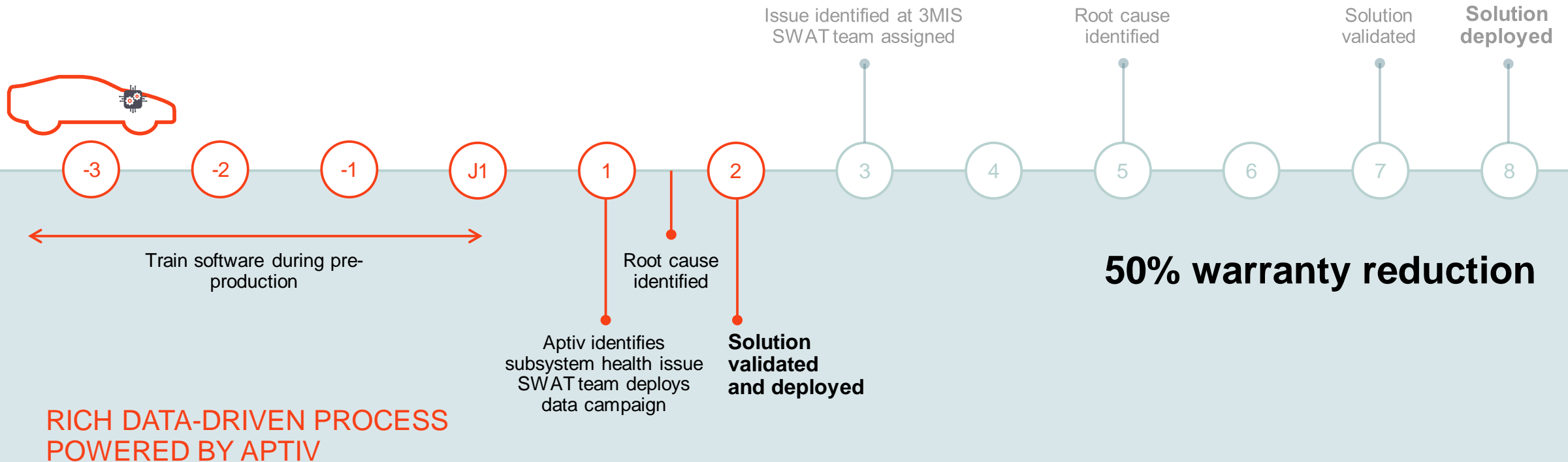
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Current process does not use a flexible, configurable data approach

TYPICAL OEM WARRANTY PROCESS

Issue identified at 3MIS
SWAT team assigned

Root cause
identified

Solution
validated

**Solution
deployed**

-3   -2   -1   J1   1   2   3   4   5   6   7   8

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Ability to deploy data campaigns is critical to ensure new technologies meet quality standards

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Train software during pre-production

Root cause
identified

50% warranty reduction

Aptiv identifies
subsystem health issue
SWAT team deploys
data campaign

**Solution
validated
and deployed**

RICH DATA-DRIVEN PROCESS
POWERED BY APTIV

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