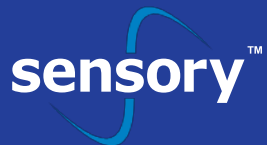


# Seamless Voice AI: Leveraging Sensory's in- vehicle solution on Arm within the Siemens EDA PAVE360





# Leader in On-Device AI Technology



## Full voice and vision technology suite

- Voice wake word, speech to text, voice and sound ID
- Face ID and behavioral recognition



## Always on, always available

- No need to rely on network connections



## Complete data privacy and control

- Data never leaves the device



## Most flexible & efficient edge AI performance

- Run across nearly ALL Arm cores
  - M0 to the 720 and beyond!



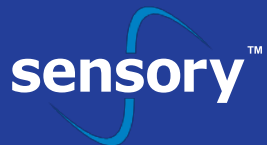
## Lowest cost of ownership

- No cloud infrastructure required, OTA updates



## Market proven, variable languages & custom solutions





# Sensory Technologies Are Widely Deployed

## Market Proven



**Over 200  
Licensees**



**3 Billion  
products shipped**

Every major country in the world!



### **Works in Real World Conditions**

- Built in noise immunity
- Compatible with 3rd party noise tech



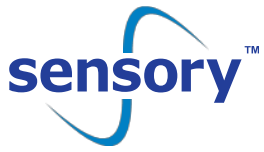
### **Tools, Test Lab, Data, Unique Intellectual Property and More!**



### **Historical focus on Consumer Electronics**

- Now targeting a comprehensive  
**Automotive** in-car assistant

Google	Tencent 腾讯	Microsoft	amazon
HONDA	HARMAN	Panasonic AUTOMOTIVE	GARMIN
waze	Jabra	plantronics	GoPro
MIZUHO	LG	Lenovo	NEC
Spotify	FUJITSU	zoom	PELOTON
Samsung SMART TV	SAMSUNG	motorola	Honeywell
poly	Canon	VW	logitech
BENTLEY	HUAWEI	KYOCERA	NOKIA
UNIVERSAL ELECTRONICS	CHRYSLER	StanleyBlack&Decker	MITSUBISHI



# The Sensory Automotive Solution

**Sensory's solution integrates the latest generation of voice and facial AI technologies that together provide the foundation for:**



A fully integrated hands-free interface for global car platforms



Voice and vision analytics to improve safety and awareness



Entirely on device for speed and privacy

## The Technology Suite

Custom Wake-words



Natural language automotive command and control



Simultaneous voice ID to continuously identify speaker

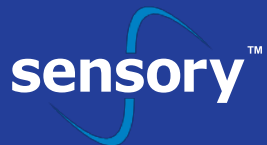


Facial analytics to assess gaze and distracted driving

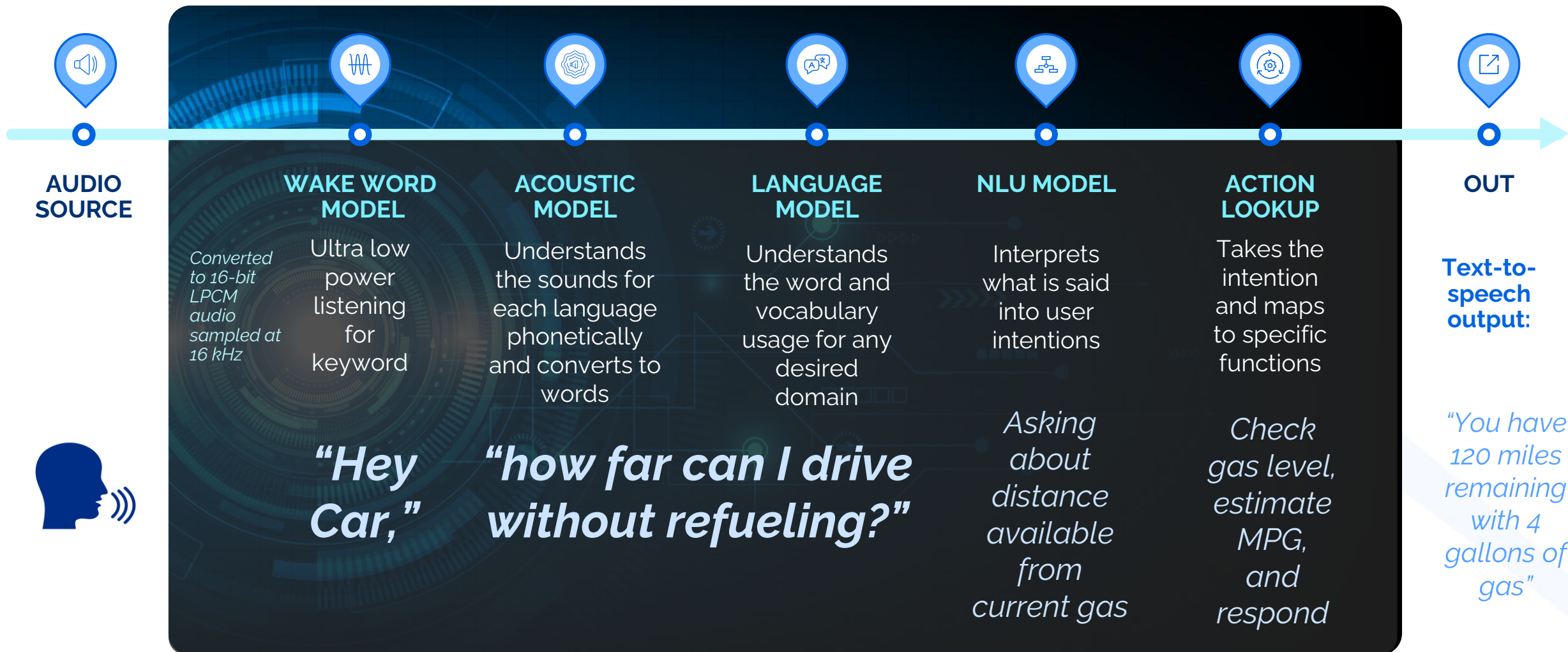


Emergency Vehicle Detection and Sound Alerts

Continuous large vocabulary speech-to-text



# Technology Delivers an Intuitive Voice Interface





# Sensory with LLM's





Sensory is continuously updating our linguistic models and adding support for new languages.  
**With models as small as 20MB!**

Status		Status		Status		Status	
Afrikaans	✓	Dutch	✓	Hindi	✓	Polish	✓
Arabic (MSA)	✓	English	✓	Hungarian	✓	Portuguese	✓
Belarusian	✓	English (AU)	✓	Indonesian	✓	Russian	✓
Bengali	✓	English (IN)	✓	Italian	✓	Spanish	✓
Bulgarian	✓	English (UK)	✓	Japanese	✓	Swahili	✓
Cantonese	2024	Finnish	✓	Korean	✓	Swedish	✓
Catalan	✓	French	✓	Malay	2024	Thai	✓
Croatian	✓	German	✓	Mandarin (CN)	✓	Turkish	✓
Czech	✓	Greek	✓	Mandarin (TW)	2024	Ukrainian	✓
Danish	✓	Hebrew	✓	Norwegian	✓	Vietnamese	✓

## Sensory SoundID identifies multiple sounds for monitoring and alerts



### Emergency Vehicle Detection

- Required for autonomous driving
- Important driver safety aid
- Siren types from around the world



### Active sound monitoring while parked

- Baby cry, dog bark, glass break





# Automakers Face Unprecedented Complexity & Opportunity

A New Approach to Automotive Development is Needed



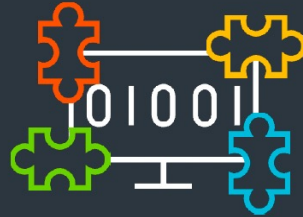
More Autonomy



Advanced User Experiences



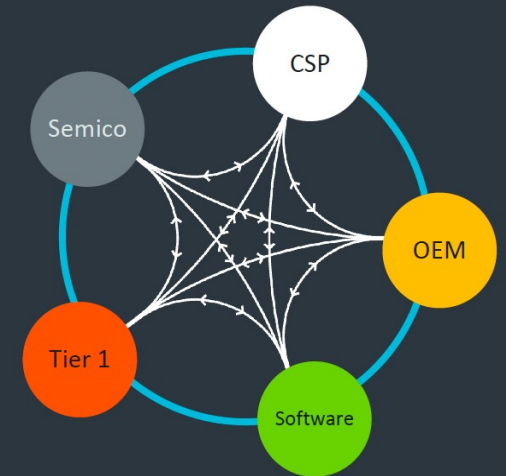
Electrification



Growing Software Complexity



Increased Demand  
for AI Capable  
Compute



New Challenges and  
Opportunities for the  
Industry Demand New  
Solutions

# A Portfolio That Scales From Bumper to Bumper

Arm Automotive Enhanced (AE) Technology with Market-Leading Safety

## INDUSTRY LEADING ARM AE PORTFOLIO TO DATE

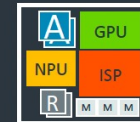
- + AE Cortex-A CPUs
- + AE Cortex-R CPUs
- + Safety-Enabled Cortex-M
- + AE Mali GPUs
- + AE Mali ISPs
- + AE System IP



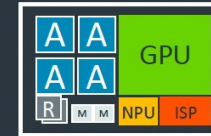
AUTO  
MCU



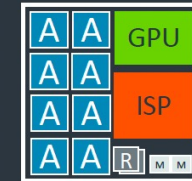
ZONAL  
CONTROLLERS



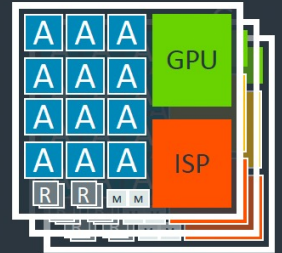
VISION



COCKPIT



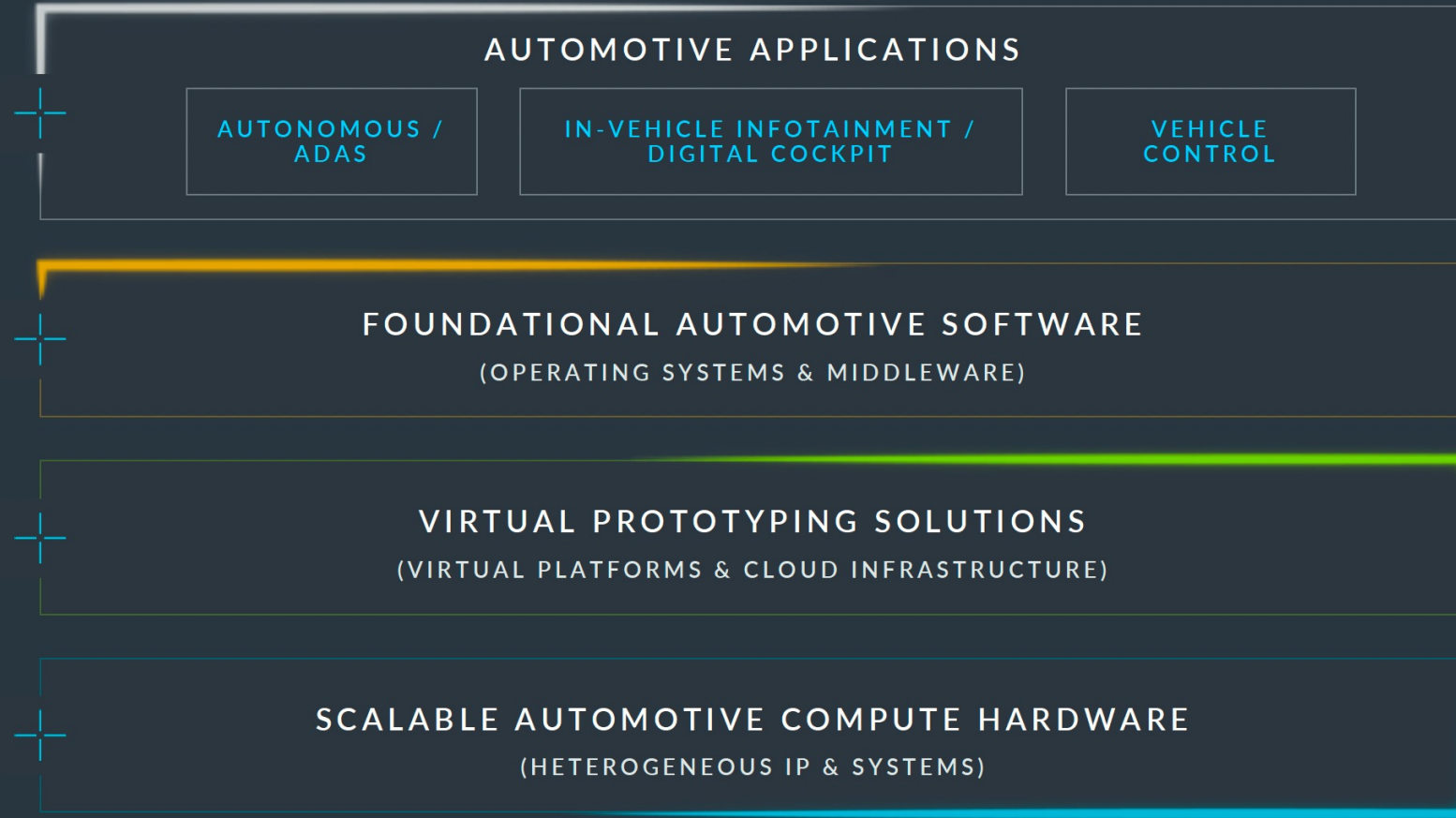
ADAS L2+



AV

# The Automotive Technology Stack

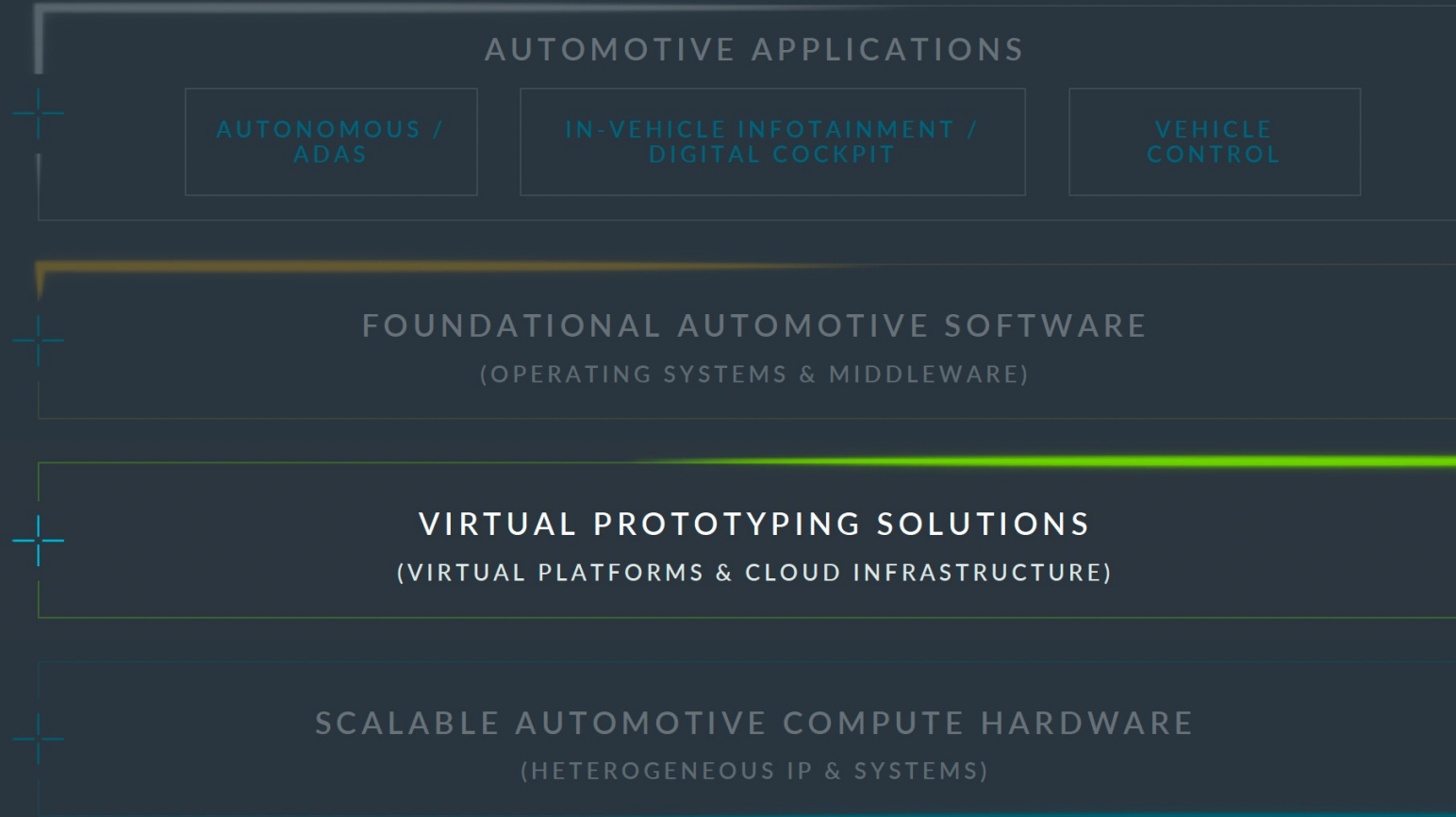
## A Complex Landscape That Requires Collaboration





# The Automotive Technology Stack

Software Development Can Begin Ahead of Silicon with Virtual Prototyping



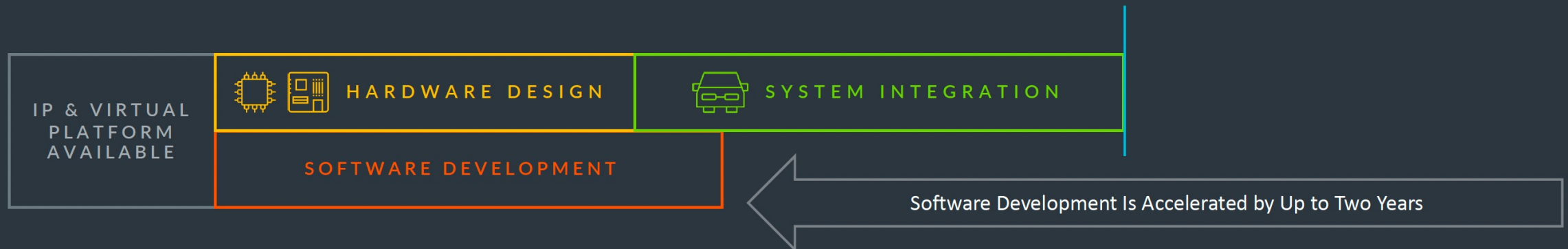
# Accelerating Software Development by up to Two Years

Faster Development and Deployment Leveraging Cross-Industry Investment

## Traditional, Serialized Development Approach



## Virtual Platforms Enabled Development of Next Generation SDVs

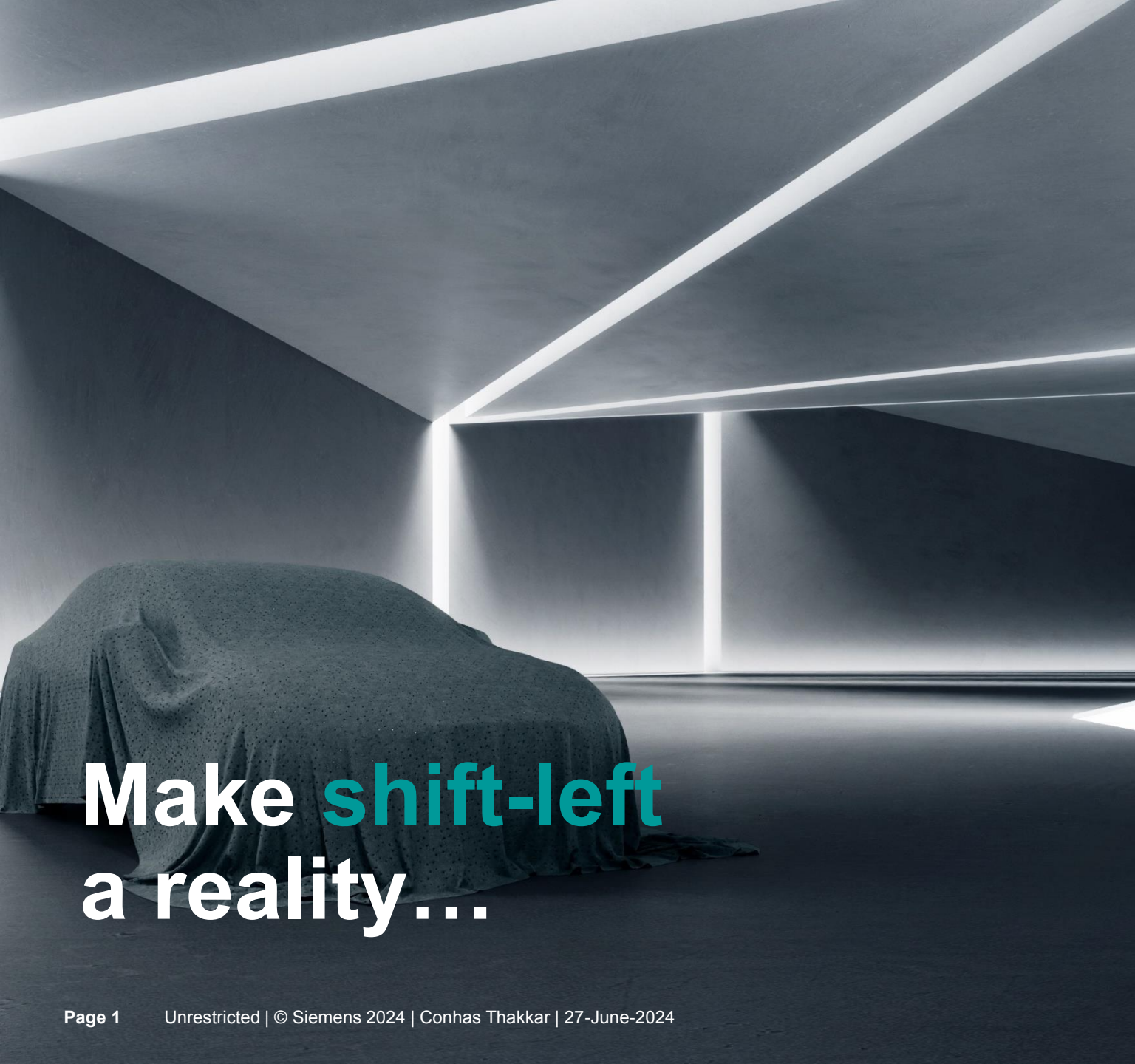


# Accelerating Development for the Arm Software Ecosystem

## Virtual Prototyping Enables Early Foundational and Application Software Development







Make **shift-left**  
a reality...

# PAVE360 digital twin

- High-speed simulations for **early software development**
- **Optimization** of hardware and software

That’s why Siemens, Arm and ecosystems partners are working together  
To “shift-left” the SDV

SIEMENS

Shift the SDV left with **PAVE360**  
accelerated pre-silicon  
development environment

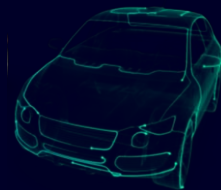
arm

Uses PAVE360 to enable  
developers to access the new **Arm  
Cortex-A720AE** pre-hardware

aws

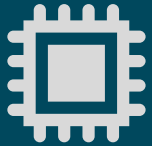
Hosts PAVE360 to provide  
**unprecedented simulation speeds**  
on the cloud for the Cortex-A720AE

Developing software for the SDV and the Arm Cortex-A720AE today, with PAVE360



# What's different about PAVE360?

## SDV digital twin components



Cortex-A720AE

## Are mapped...

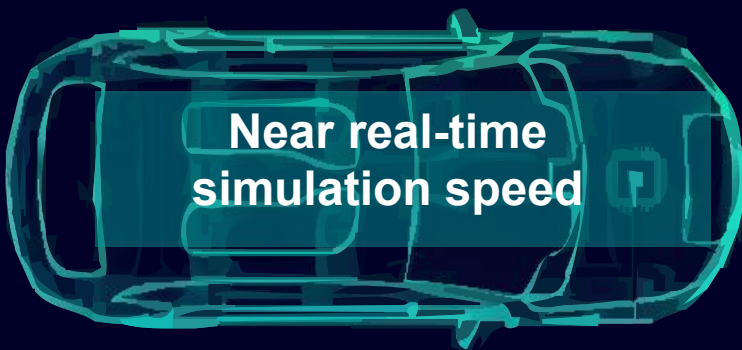


PAVE360 pre-silicon  
development  
environment

## ...to optimized cloud resources



PAVE360 maps  
capacity to meet...  
customer need – i.e.  
speed, or cost  
efficiency



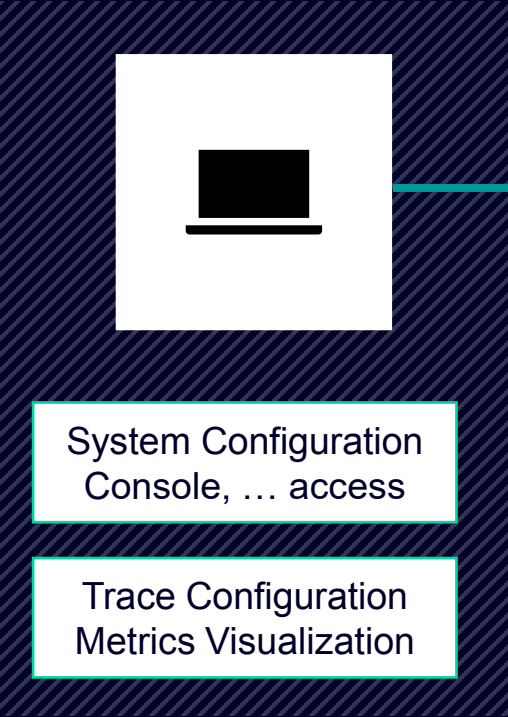
## What does this mean for software application developers?

- Embedded environment as close to the target SoC as you'll get
- Native cloud development of complex vehicle software
- In familiar IDE based environment
- Near real-time simulation speed, much faster than virtual models (QEMU/ SystemC...)

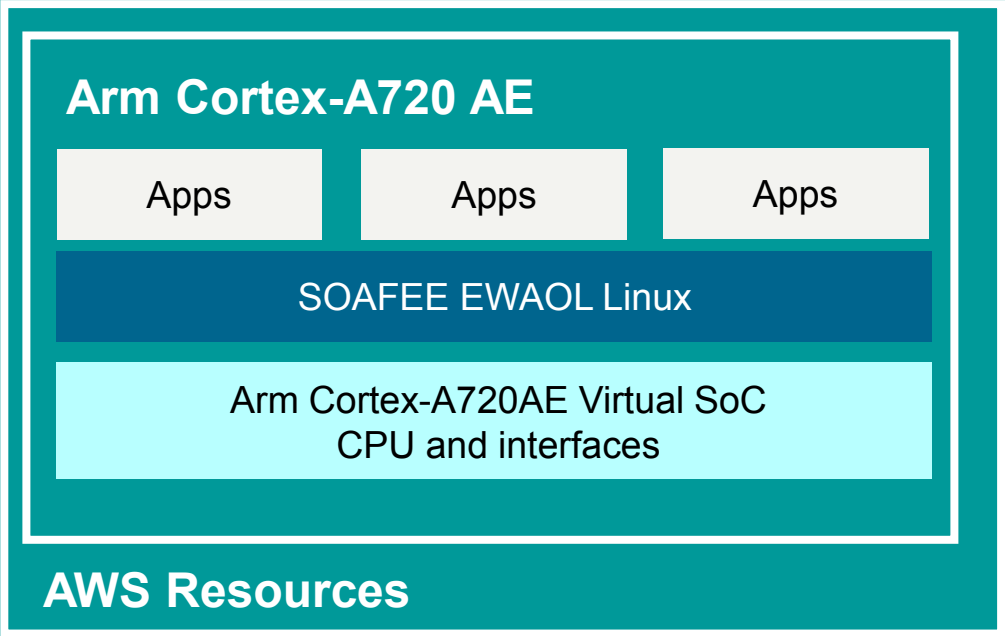
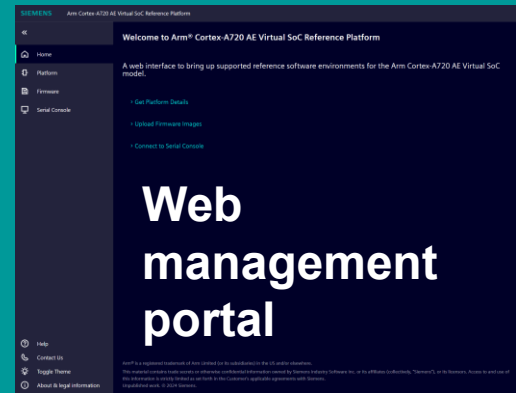


# PAVE360 pre-silicon development environment helps software partners with Arm Cortex-A720AE bring up today

## PAVE360 IDE

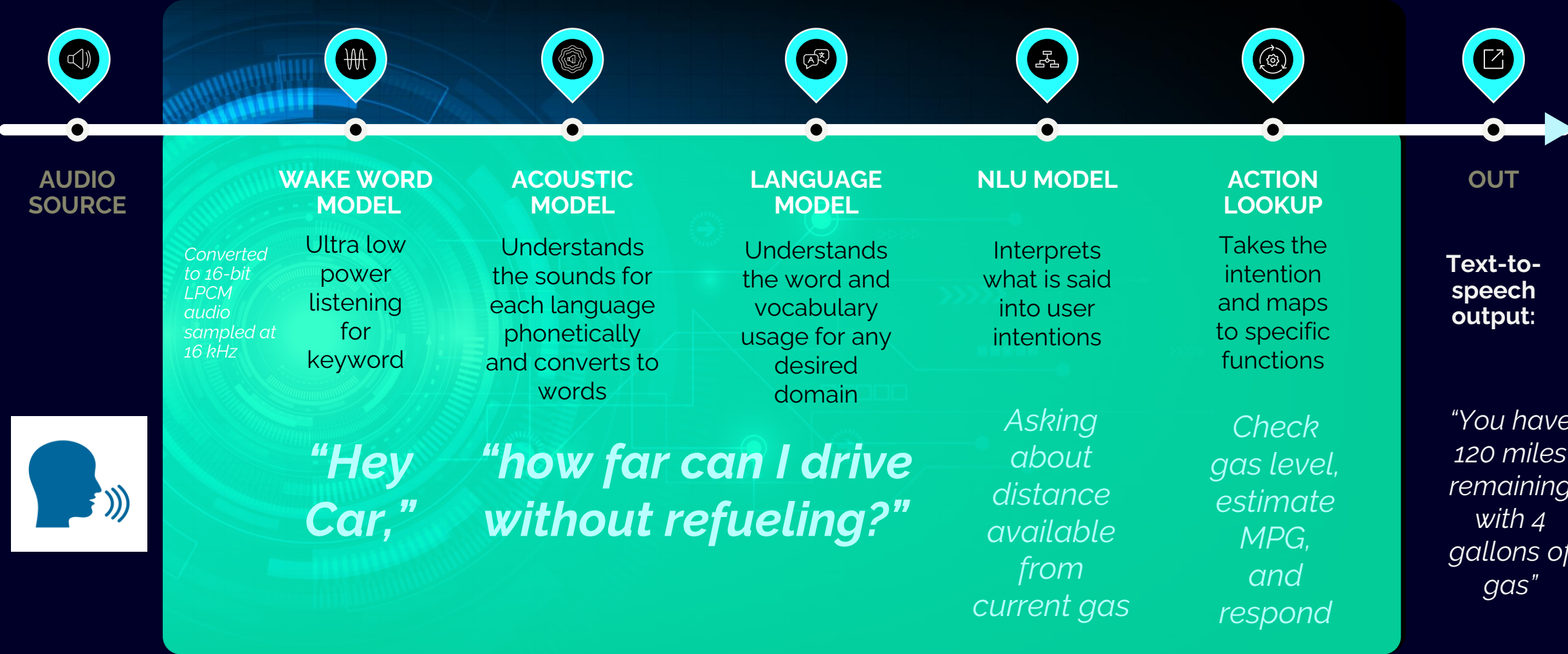


## PAVE360 AWS Chamber



Provides reference software (EWAOL containerization), OS, middleware and SW development tools/IDE

# Sensory Inc. on Siemens Pave360 solution



# Contact

Published by Siemens DI SW EDAGS IPT

**Conhas Thakkar**

Principal Solution Architect

Otto-Hahn-Ring 6

81739 München

Germany

**Phone +49 152 26685864**

**E-mail [conhas.thakkar@siemens.com](mailto:conhas.thakkar@siemens.com)**