Innovation in System Design Enablement

Cadence Design Systems, Inc.
Graser Technology Conference October 2015

Social trends driving multiple layers of technology

Social trends create market opportunities

IoT is spawning the need for “System of Systems” product creation

Smart home

$70B industry by 2018

Wearables

111M units shipping in 2018

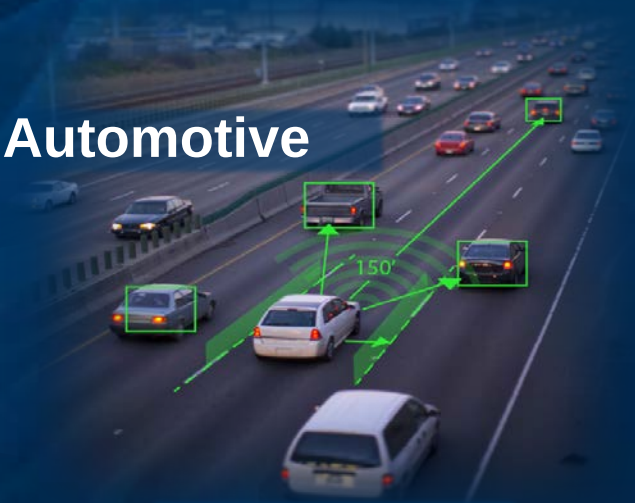
Cloud computing

3.3 ZB traffic with 25% CAGR

Mobility

50B devices by 2020

Automotive



Self-driving cars by 2025

Sources:
idc.com
cisco.com
marketsandmarkets.com

Video – smart enable wearable

Standalone devices are increasingly commodities – today's opportunities are in making smart devices part of smart systems

Traditional standalone residential thermostat

Little differentiation

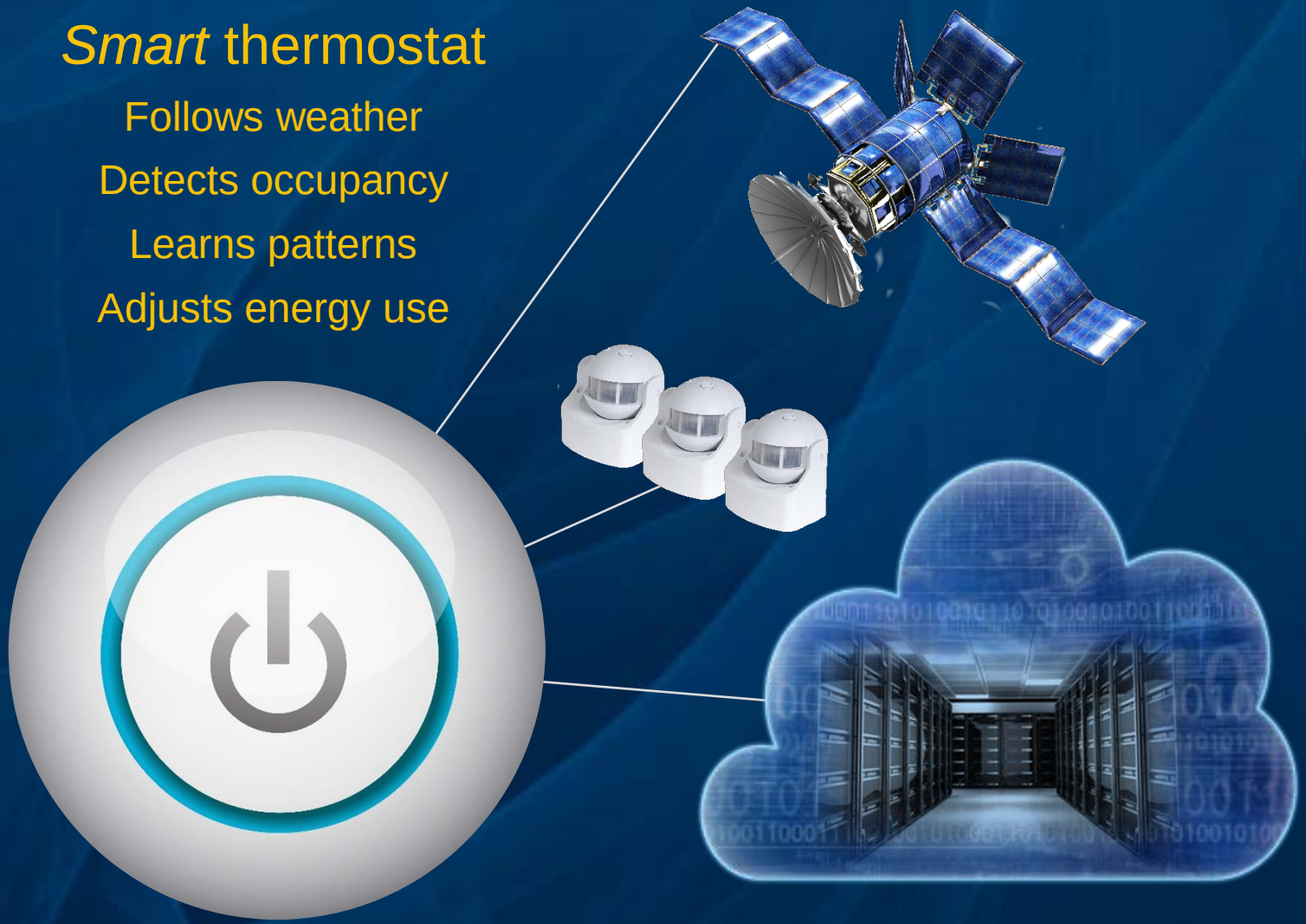
Smart thermostat

Follows weather

Detects occupancy

Learns patterns

Adjusts energy use



Systems, the new reality

Example: Smart automobile – system of systems

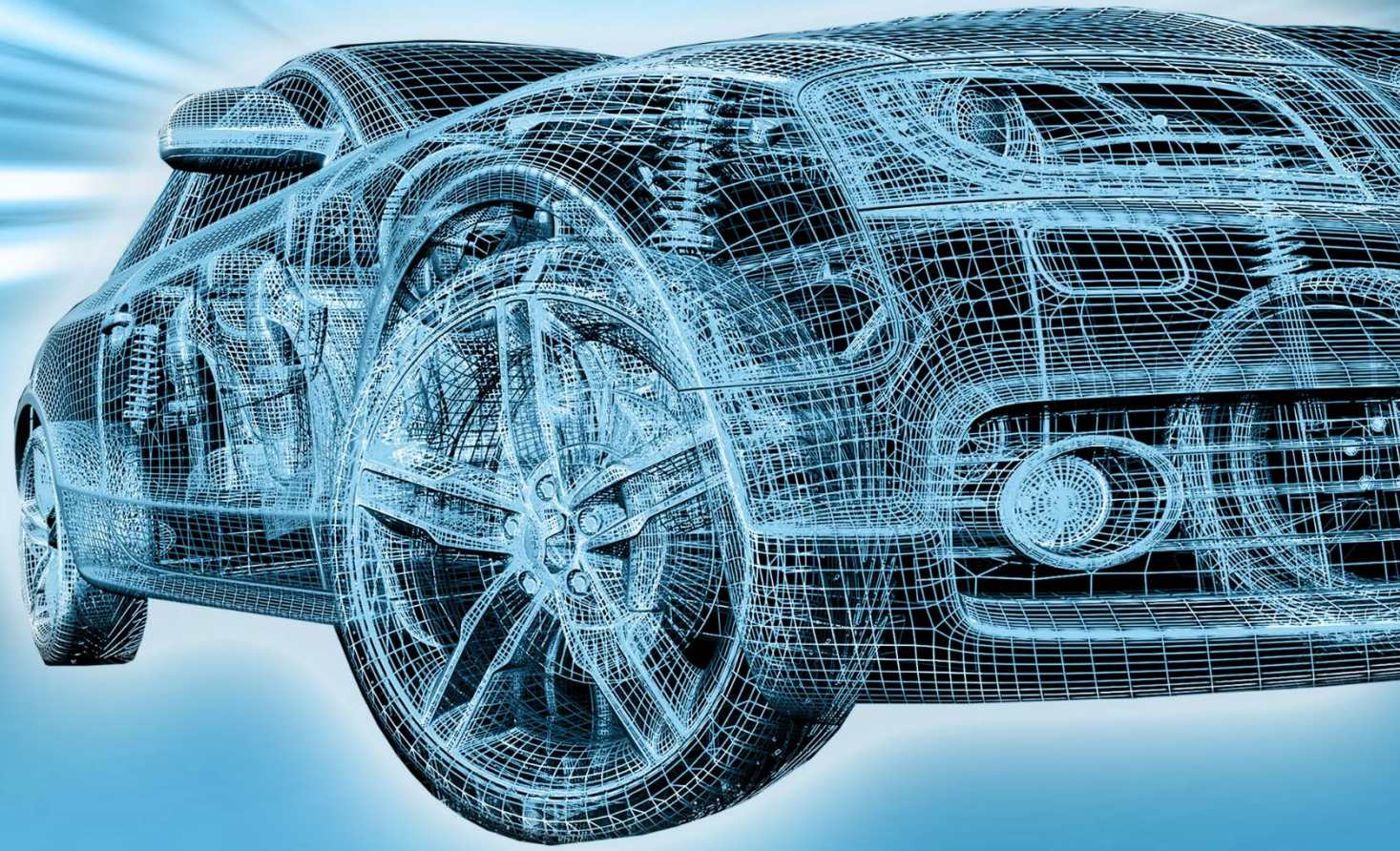
Infotainment

ADAS (advanced driver assistance)

Functional Safety

Automotive Ethernet

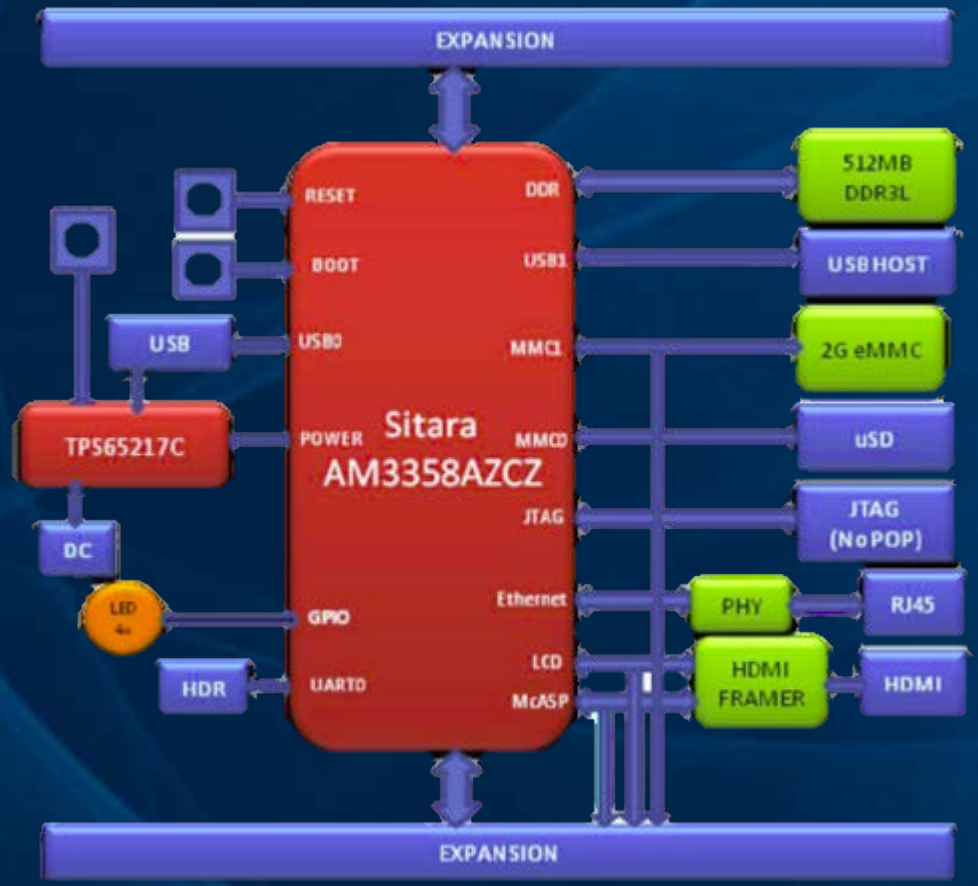
ECU (electronic control unit)



Video- illustrating system-of-systems

Systems-of-Systems Design Enablement Challenges

System Design Enablement Challenges
System Level design



- Authoring of system-level architecture
- Support for hierarchical sub-systems and substrates
- Scalability and flexibility for different users and design scenarios
- Ability to understand and manage bus (interface) objects
- Easy to adopt/use and productive

System Design Enablement Challenges
Team and design process collaboration

- Concurrent engineering across a team and Geographies
- Management and analysis of BOM
- Collaborative environment for managing design data and process
- Real-time visibility and metrics for engineering & project managers of ongoing project and design team status
- Integrate with key enterprise solutions that drive the product development process

Why Manage Team and Design Data?

It will improve quality and your time to market

20%

Reduction in product respins

10%

Decrease in overall PCB development time

Current methods take too long and lead to errors

Up to 29%

Of design time is spent **manually searching** for PCB related information

Up to 26%

Of design time is spent **fixing** data integrity issues

PCB design data is complex

44%

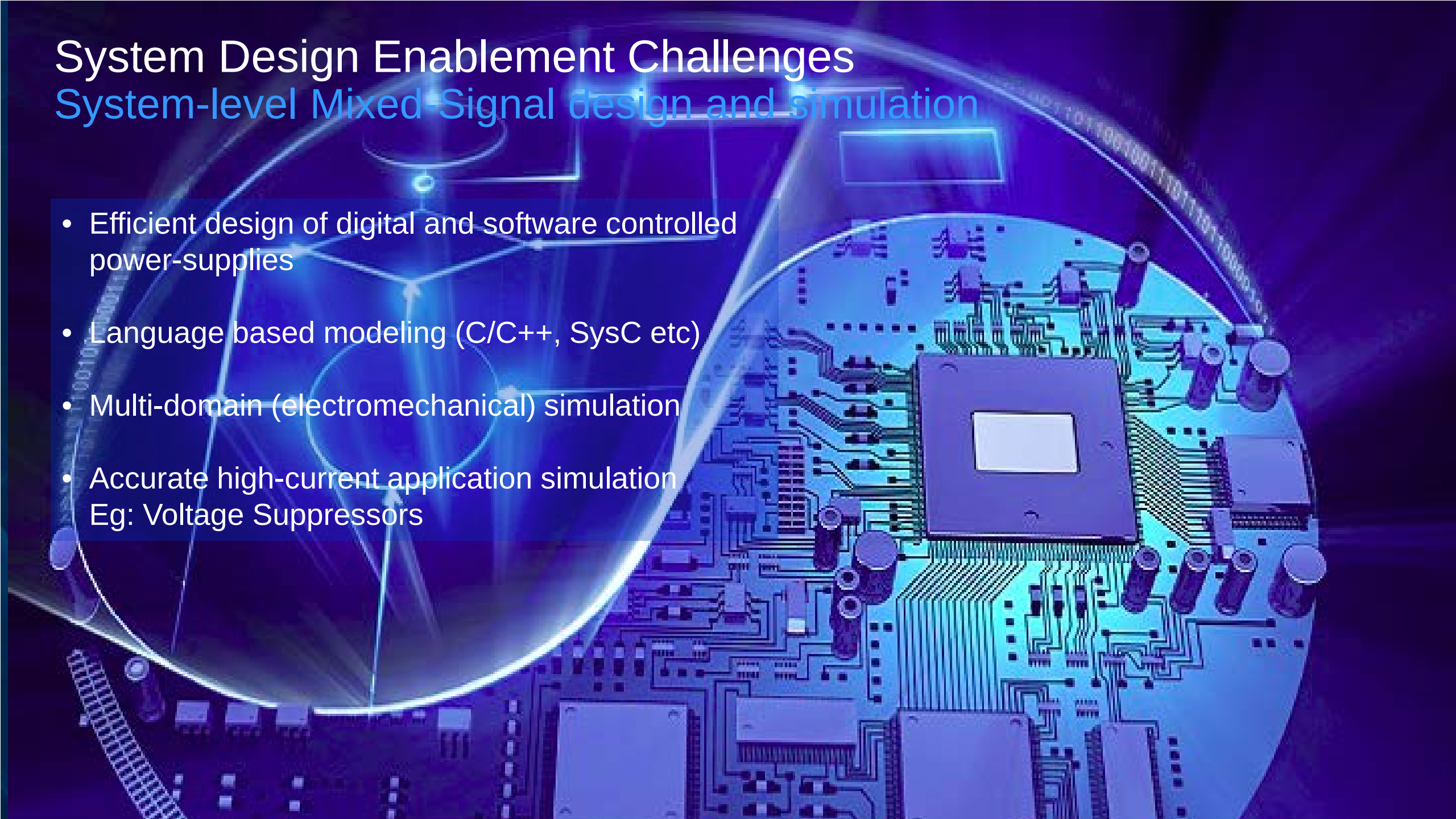
of respondents cited complexity of PCB as their top data management challenge

Manual or custom methods often don't work and cant scale

* source: Aberdeen Group 2014 study

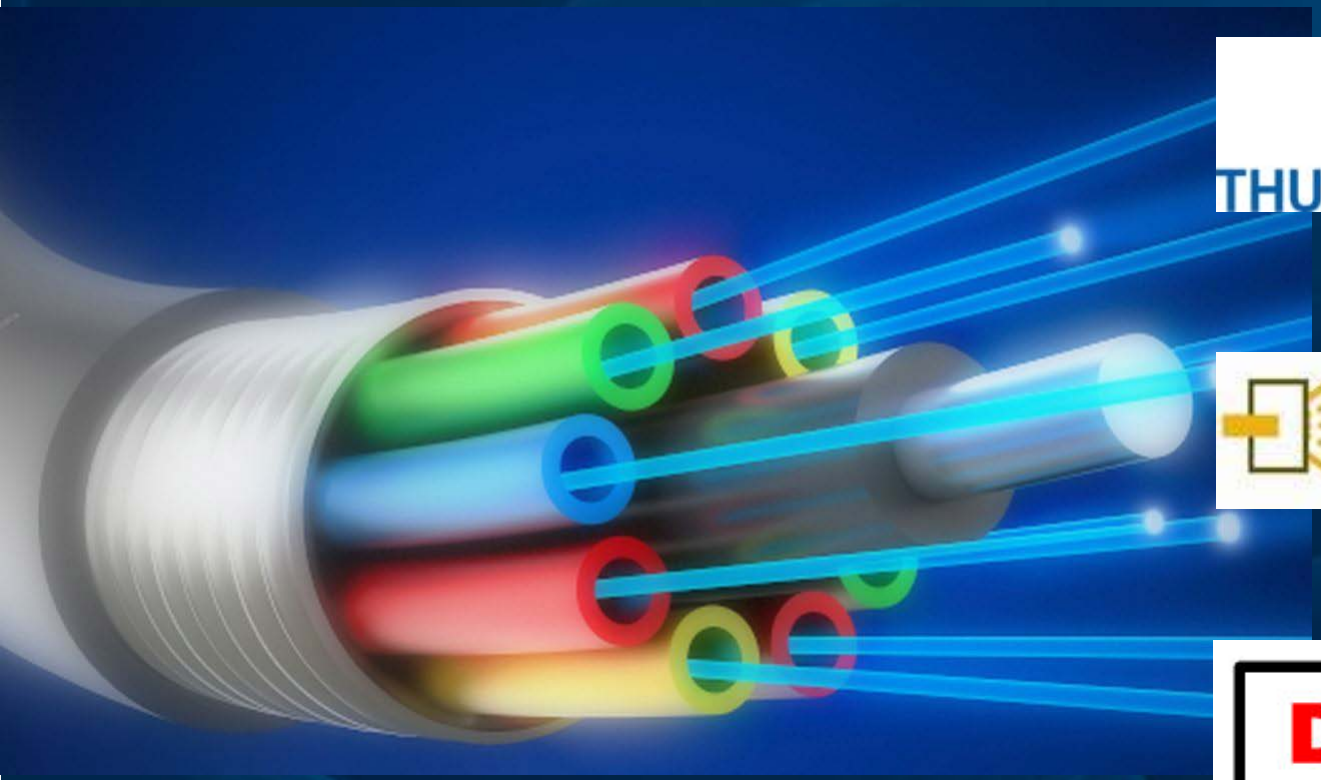
System Design Enablement Challenges

System-level Mixed-Signal design and simulation



- Efficient design of digital and software controlled power-supplies
- Language based modeling (C/C++, SysC etc)
- Multi-domain (electromechanical) simulation
- Accurate high-current application simulation
  Eg: Voltage Suppressors

System Design Enablement Challenges
Interface protocol driven design



PCI EXPRESS
3 – 5 – 8 Gbps

THUNDERBOLT
10 Gbps

Serial Attached SCSI
12 Gbps

DDR4
2133 – 4266
1.2 – 1.05V

- Predictable compliant implementation
- Interfaces as intelligent design objects
- Ability to author and implement as a hierarchical and relational object
- Visualization of interface at all hierarchy levels
- Manipulation of interface at all hierarchy levels
- System-level interface compliance validation

System Design Enablement Challenges
3D Enabled Design

- Enclosure aware folded electronics design
- Non-planar interconnect surfaces
- Multiple substrate optimization
- Collaboration with enclosure design teams

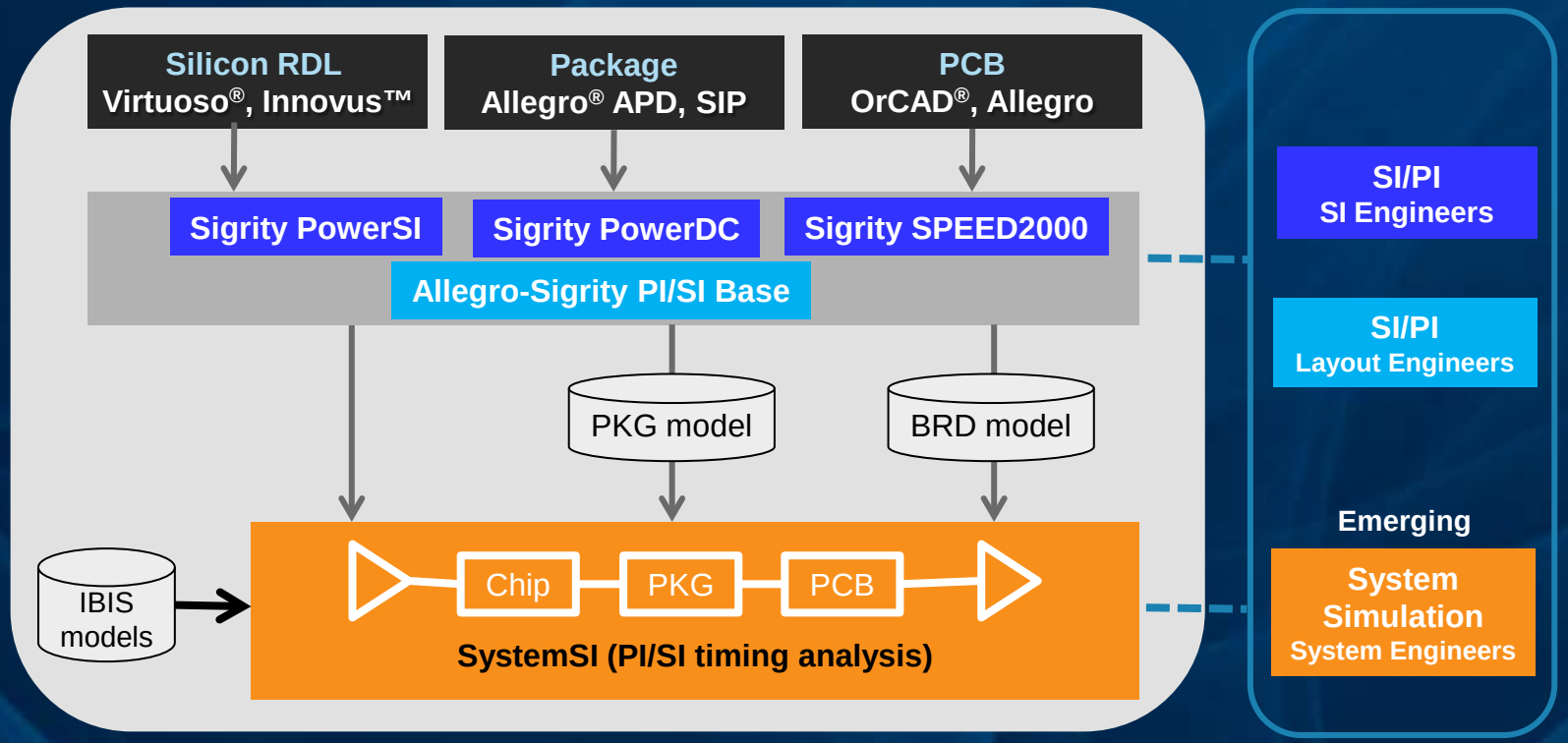
System Design Enablement Challenges
Manufacturing Collaboration for NPI

- Manufacturing verification, optimization and signoff
- Optimized and reliable handoff to manufacturing
- Managed manufacturing collaboration

Allegro/OrCAD & Sigrity contribution to System Design Enablement

Integrated chip / package / board / system design and analysis

Solutions

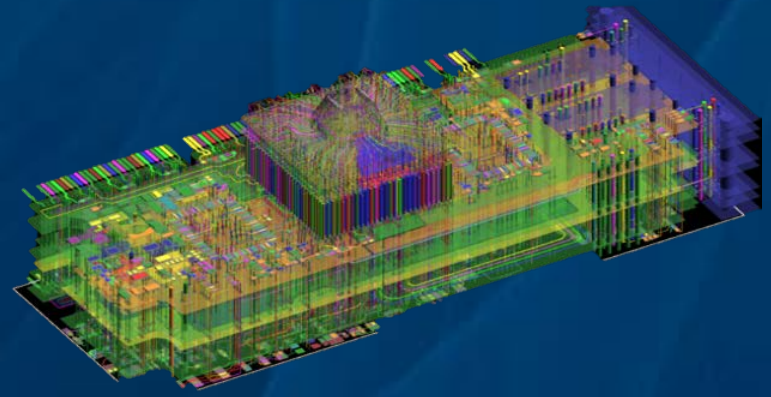


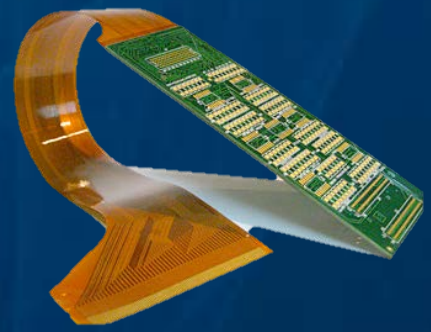
SI/PI
SI Engineers

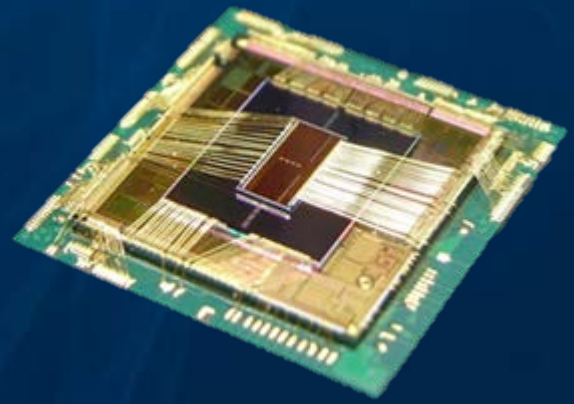
SI/PI
Layout Engineers

Emerging

System Simulation
System Engineers







RFIC **Connectors** **Rigid-Flex** **IoT** **Multi-Fabric**

Companies building systems with Cadence

Huawei

- A World leading provider of global Information and Communications Technology (ICT) solutions

- Why Cadence?
  - High density & high-speed interconnect designs
  - High-speed PCB/IC Package SI signoff
  - Chip-Package-Board co-design

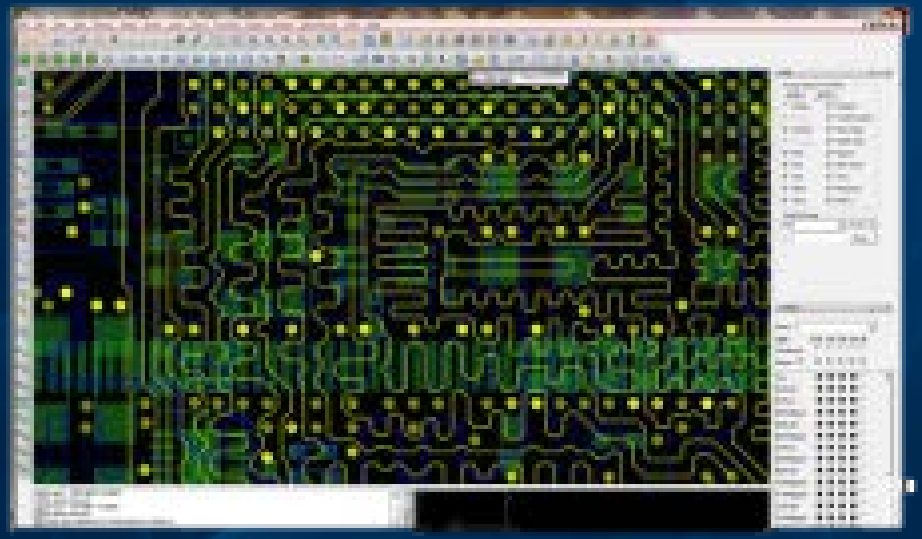
Whirlpool

World leading appliance maker

- Recently acquired European Indesit brand
- Mentor Xpedition user
  - Longtime Pspice user
- Why Cadence?
  - Integration with PTC Windchill
  - PSpice integration with PCB flow
  - Scalable offering
- Transitioned all design teams to OrCAD/Allegro

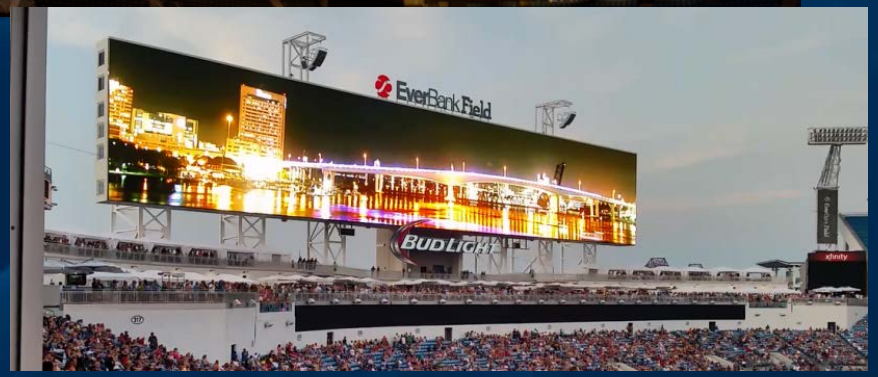
Aldec

- FPGA based prototyping board
  - HES-7 - ASIC and SoC Prototyping Board
- Why Cadence?
  - Allegro High speed PCB design and routing
  - Constraint driven flow
  - FPGA design-in optimization



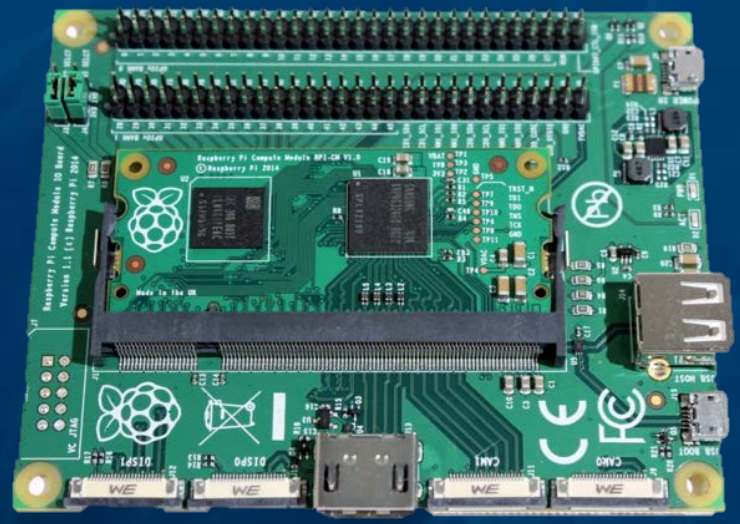
Daktronics
PADS Replacement

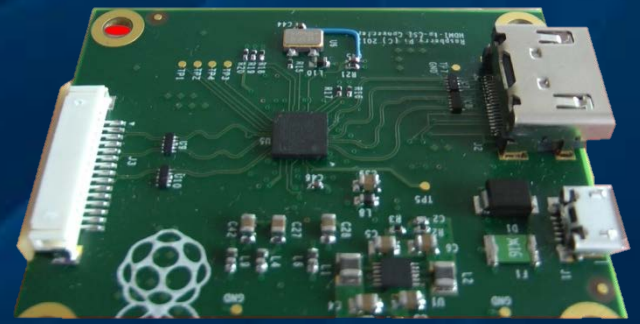
- Maker of scoreboards and video systems
- PADSLogic and PADS user for 15+ years
- Data management issues drove deal
  - Customer jost design causing schedule delays
- PTC integration and scalable OrCAD/Allegro solution



Raspberry Pi

- Compute module and interface board allows students & entrepreneurs to rapidly prototype IoT devices, develop apps and validate market opportunity
- Design is multilayer
  - Broadcom BCM2835 powered
  - HDMI 1.3 1080p
  - USB2
  - 20Megapixal camera support
- Designed with OrCAD and Allegro





Daqri
Altium Replacement

- IoT / Augmented Reality Startup
  - Smart industrial safety helmet
  - Head's up display and virtual keyboad
- Needed integration with existing PLM solution
  - Arena PLM with Capture CIS
- Moved to full OrCAD solution

System Design Enablement

From end product down to chip level Cadence is with you

IP

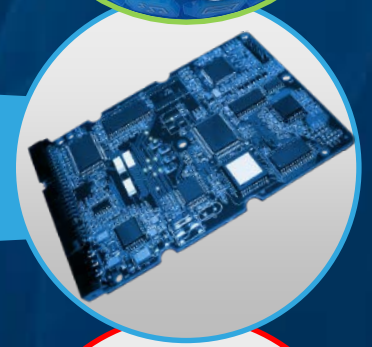
Mobile | Consumer | Cloud Datacenter | Auto | Medical | • • •

System analysis
HW-SW verification
Software applications
Software development

SYSTEM INTEGRATION

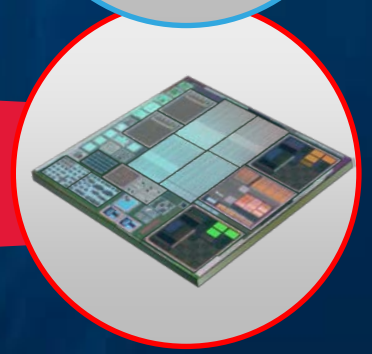
PCB design
Package design
SI/PI and thermal analysis
Manufacturing Integration
Mechanical co-design

PACKAGE and BOARD



Design and implementation
IP/SoC verification
Software drivers

CHIP
(Core EDA)



Partnerships with Ecosystem Leaders