



# Connected Teams, Connected Code, and the Connected Device: The Challenges of IoT Software Delivery

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CTO, Electric Cloud

# Every Business is a Software Business

Embedded/IoT



Mobile



Enterprise, Web/IT



“Software is eating the world”  
*Marc Andreessen, Aug 2011*

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“ Software is now  
the primary driver of  
innovation & disruption.”









# IoT is Everywhere. How does that change our world?

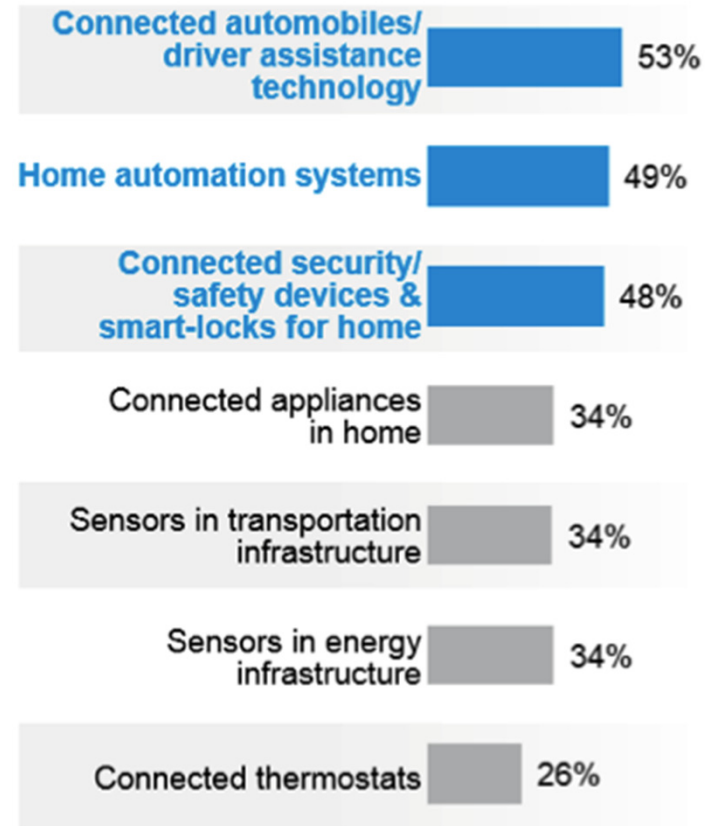


1. Accessible from anywhere
2. Automatically optimizes for cost/comfort
3. Automatically adjusts based on “presence”
4. Provides individual and aggregate reporting
5. Updates delivered continuously OTA



## What are People Working On?

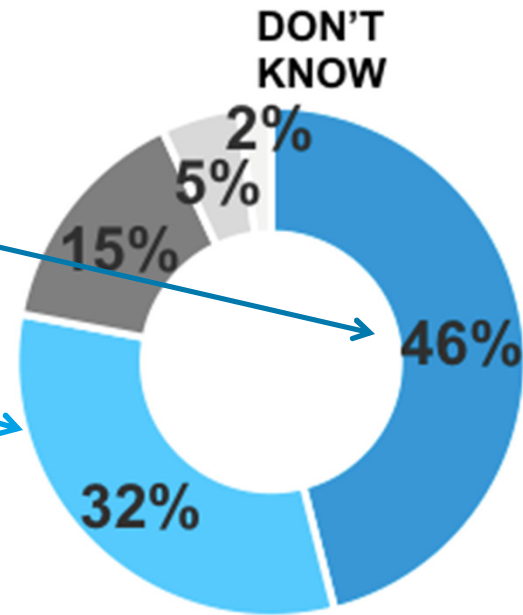
Types of connected devices respondents say will have the largest market opportunity in five years.



HP online survey of 610 developers and IT, 2015

## What do Developers think?

Respondents who classify the IoT as "transformative", "important"



HP online survey of 610 developers and IT, 2015



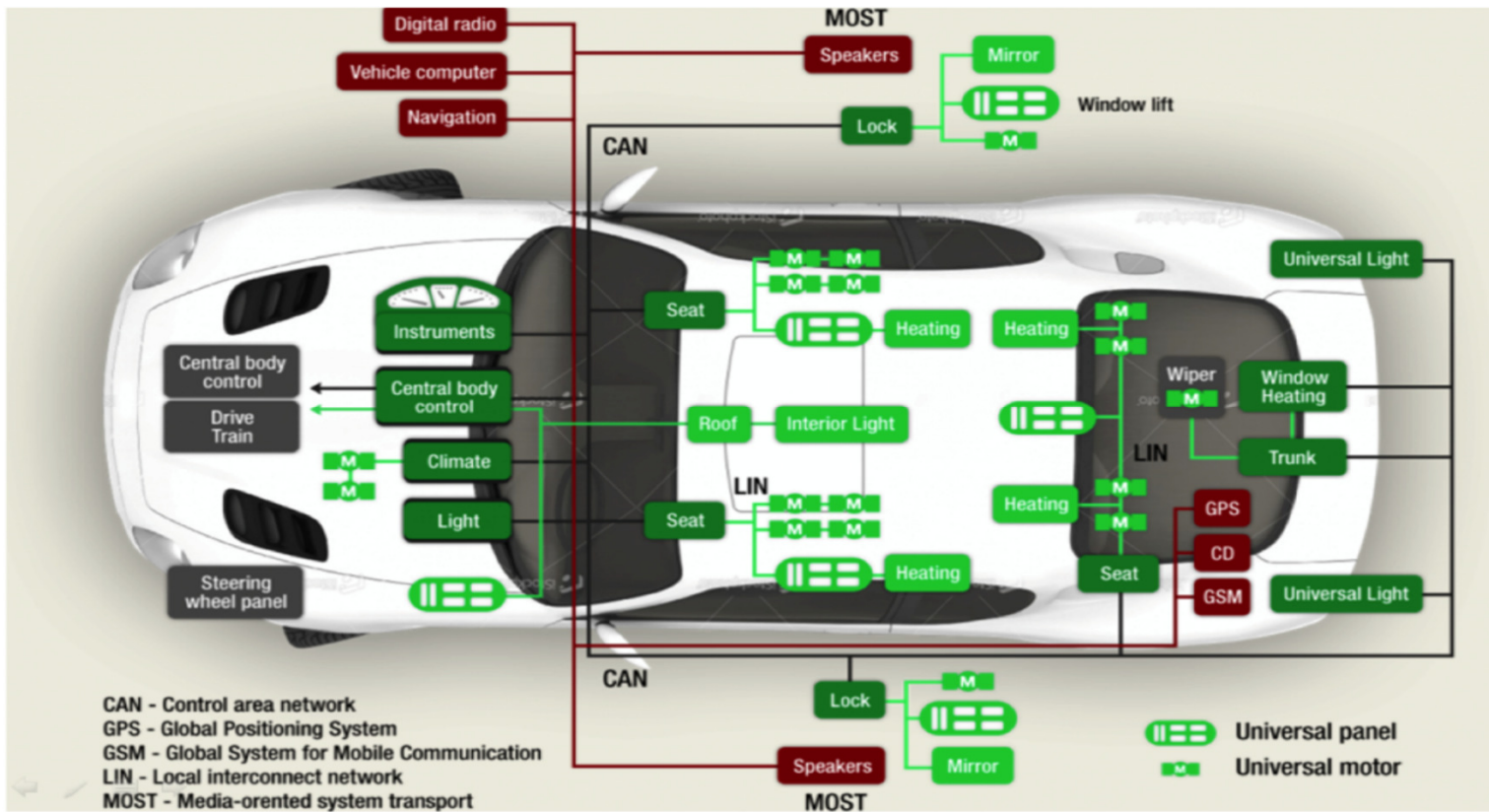
# 26B by 2020

Gartner Prediction  
on the Internet of Things  
(excluding PCs, tablets, phones)



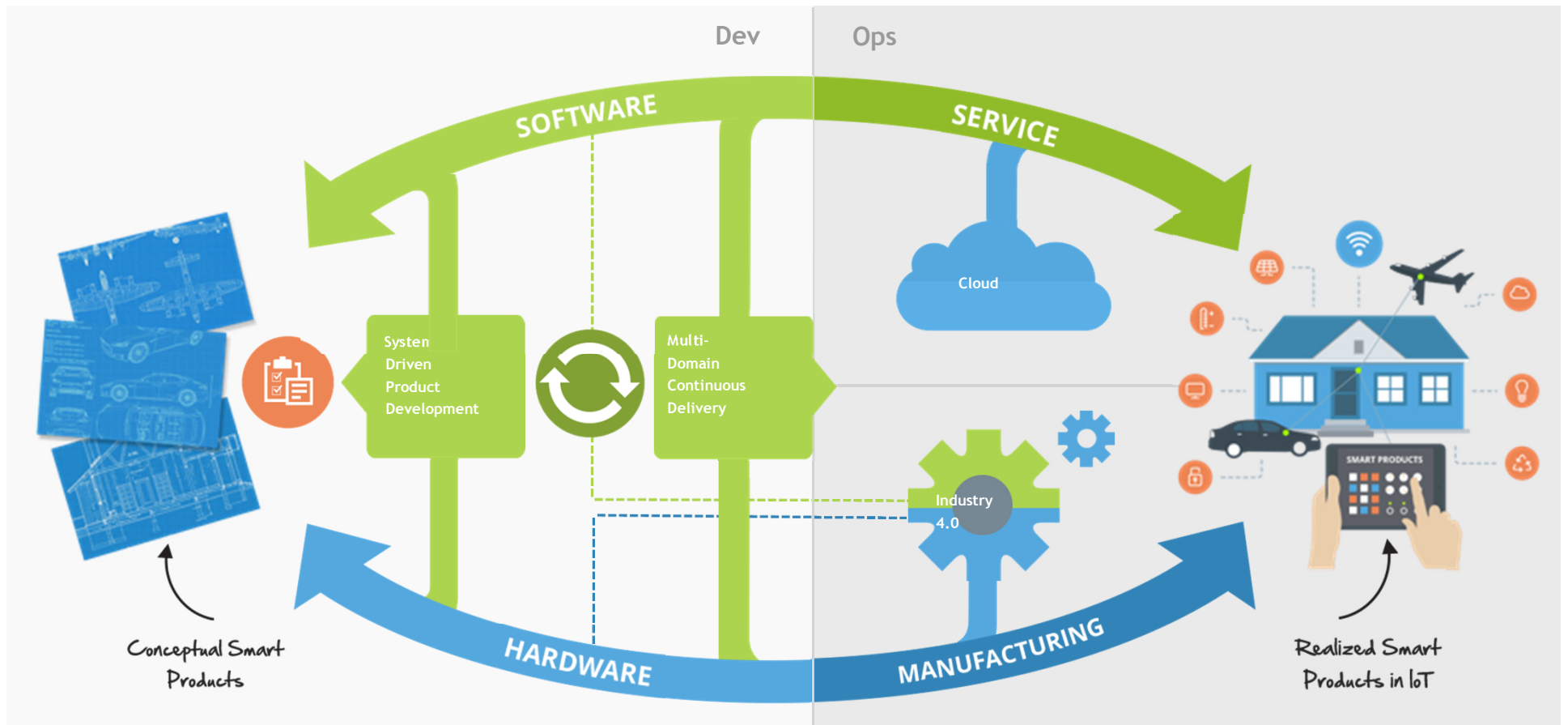


# Today's cars have over 300m lines of code

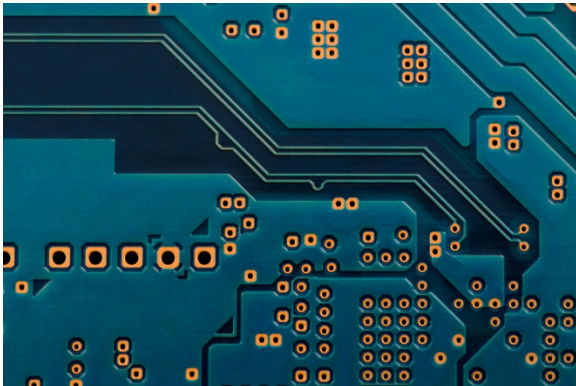


# A Complex Delivery Pipeline

# IoT: A Complex Environment



## Three Applications, one user experience



*Embedded Software in the Device*



*Big-data backend app*



*Mobile app for end-user controls*

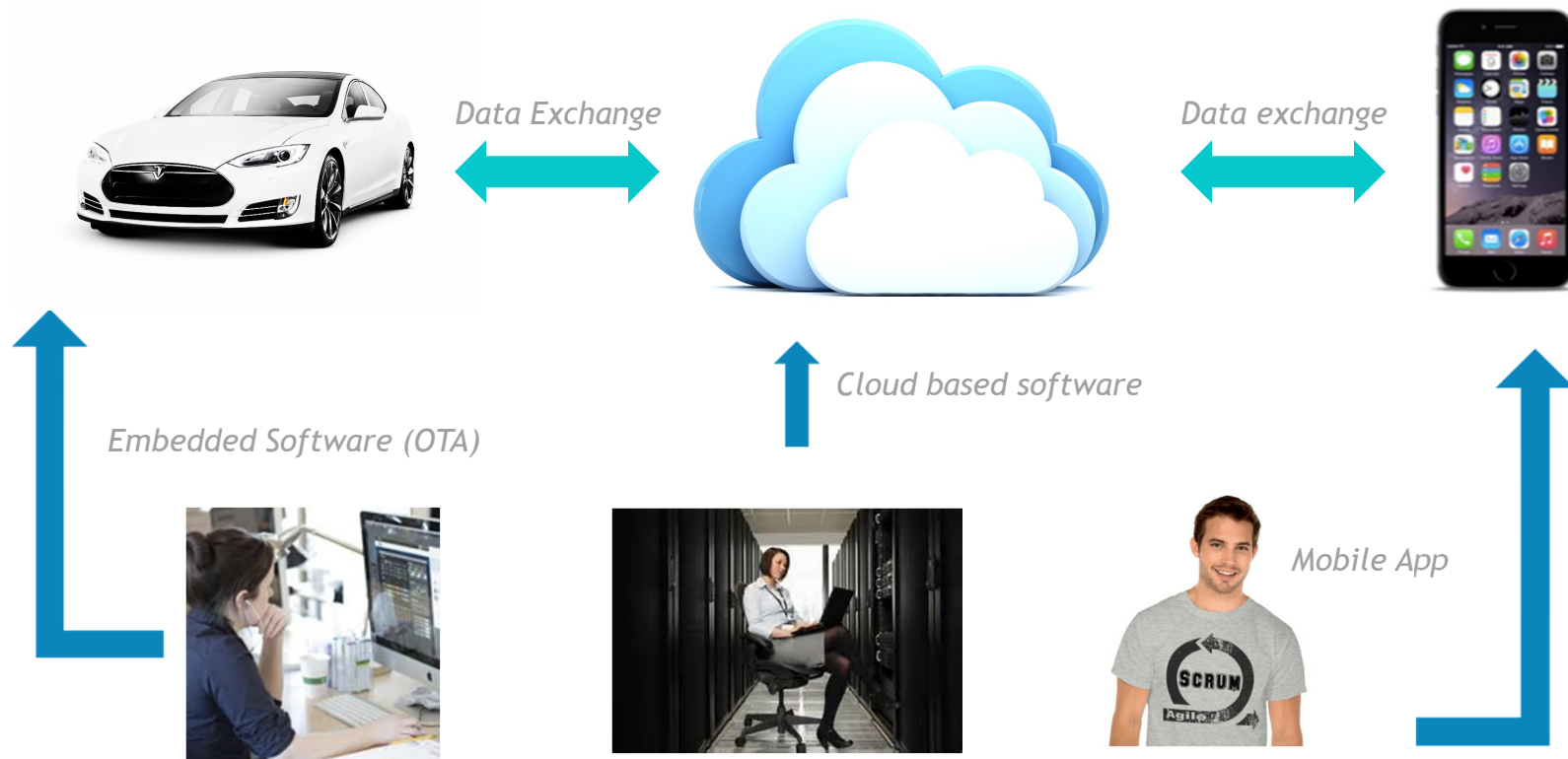
- Different Teams
- Different Tools
- Different Development Practices
- Different Deployment Targets / Stacks



Connecting  
it All



# Connected Car: Example of IoT Service's Components



# Challenges



## Demand for More Frequent, OTA Updates

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# Logistics and Coordination of Different Engineering teams (+Minimizing Friction)



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# Long and Challenging Integration Test Cycle







# Skyrocketing Infrastructure Costs

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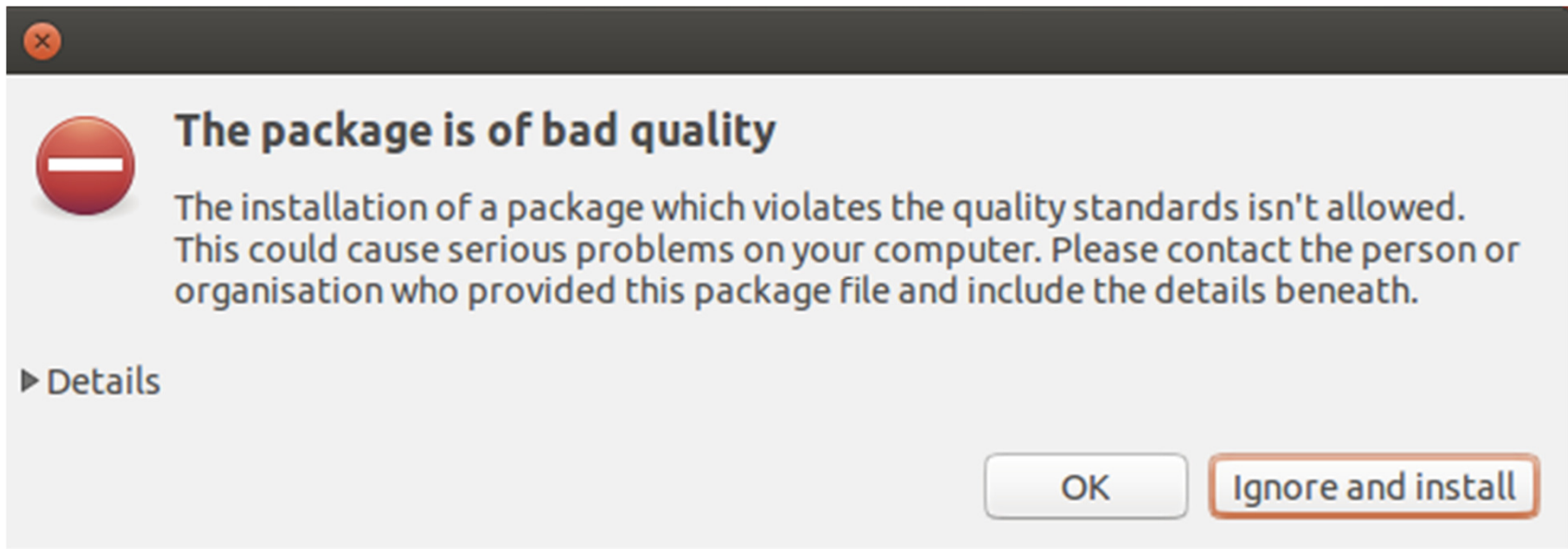
# Continued Focus on Reducing Development Costs and Cost Overruns





The image shows the interior of a SpaceX spacecraft. In the foreground, there is a control panel with four large touchscreens displaying flight data and a central joystick. The word "SPACEX" is visible on the panel. Behind the control panel, there are several rows of seats with black frames and yellow seats, each equipped with a black harness. The floor is made of a diamond-plate metal. A semi-transparent white box with a blue grid pattern is overlaid in the center, containing the text "Visibility and Compliance Concerns" in blue font.

# Visibility and Compliance Concerns



# Quality Issues



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## Customers Want Value. Quickly.



“ In the age of the consumer, empowered buyers demand a new level of customer obsession ”



Amy DeMartine, **Forrester**

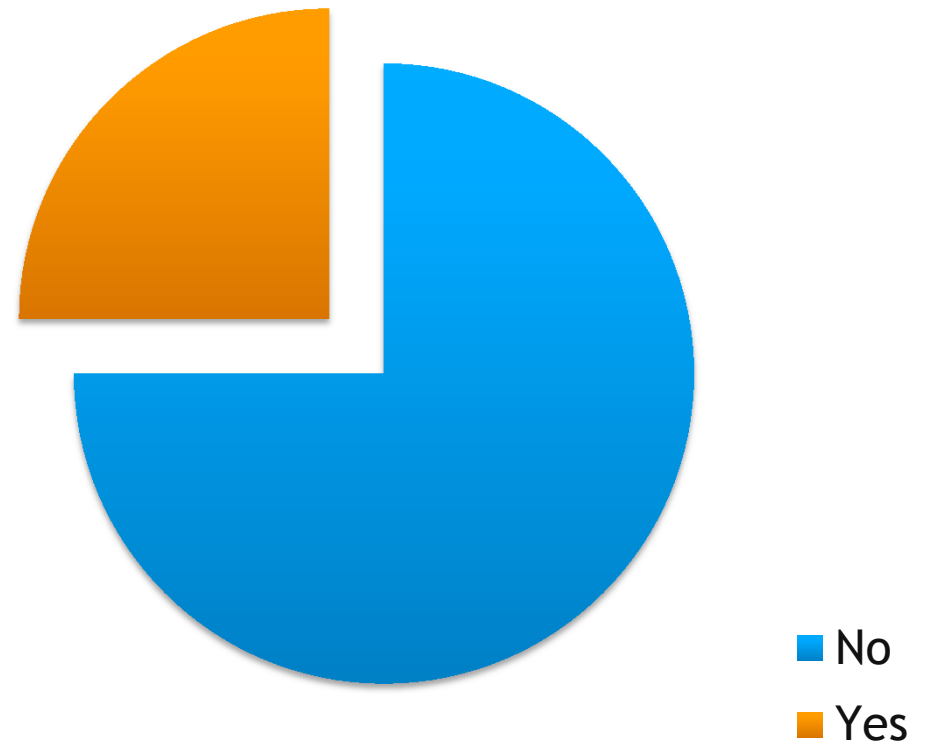


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## Are we there yet?

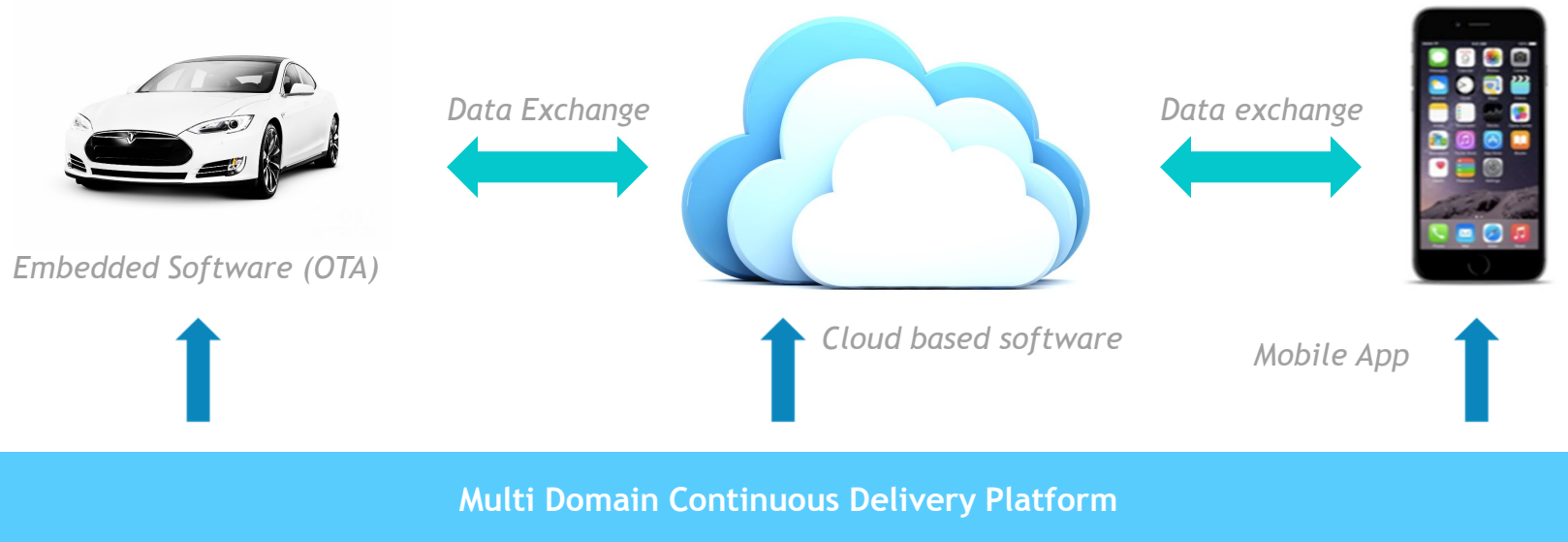


“Are you able to deliver new software to production as fast as the business demands?”



Based on a 2015 survey of 90+ IT Managers, Directors, Sr. Directors and VPs,  
Electric Cloud and Forrester Research Survey

# Continuous Delivery of IoT Services



# How Do Others Do It?



Shared Goals

Can-Do-Culture

Self-Awareness

Expectations

Measure-ability

Technology





Automate!

Build Quality In

Done Means Done

~~It Worked in Dev...~~

Shrink Cycle Times

Keep Improving











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## Best Practices:

- End-to-End Visibility and Traceability:
  - Connect and orchestrate PLM, ALM, CD, OTA workflows
  - Integrate data of all product components into single EBOM
  - Global team visibility
- Accelerated Delivery:
  - Remove error-prone, labor intensive manual tasks and transitions or hand off among hardware, software, and delivery teams
  - Reducing Design-to-Deliver cycles across hardware and software teams
  - Parallelize and accelerate various tasks in elastic private / semi-private cloud
- Predictable Quality:
  - Test integrated systems earlier and more often
  - Consistent build, test, release environment to prevent environmental bugs
  - Accelerated compliance verification and on-demand compliance report



# Who Does DevOps? Our Customers

<p>Networking</p> 	<p>Mobile Devices</p> 	<p>Semiconductor</p> 	<p>ISV, Internet &amp; Entertainment</p> 	<p>Financial Services</p> 
<p>Automotive</p> 	<p>Medical Devices</p> 	<p>Aerospace / Defense</p> 	<p>Heavy Industry</p> 	<p>Other Systems</p> 

# The Value of DevOps and Continuous Delivery



**10X**

faster TTM



**90%**

higher quality



**100%**

cross-team  
visibility



**74%**

reduced costs



**75%**

improved  
utilization



HUAWEI



SIEMENS



CISCO

SPACEX



splunk>

PayPal

Raytheon



# Cisco

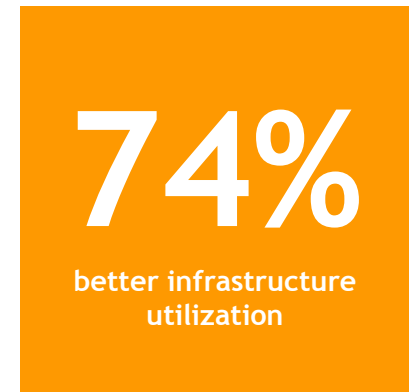
## Transformative Benefits

### Challenges

- Long delays between releases
- Lack of test automation leading to high number of escaped bugs
- Poor resource utilization, maintenance overhead

### Solution

- Centralized CD approach
- Dynamic creation of workflows



# Qualcomm

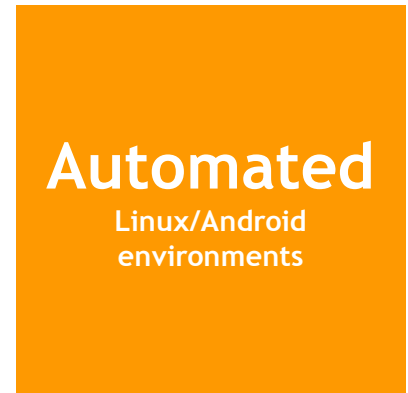
Transformative Benefits

## Challenges

- Velocity:
  - 2500+ Developers
  - WW distribution
  - 100,000 jobs/day
  - Complex workflows

## Solution

- Customized dashboards
- Global rollout



# GE Energy

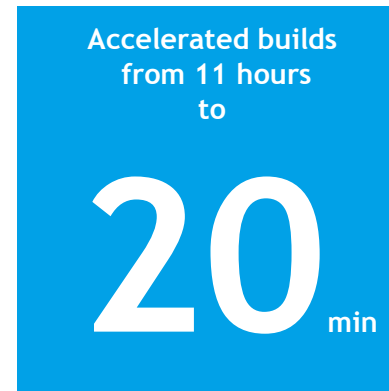
## Transformative Benefits

### Challenges

- 13 global dev locations, 10-15 teams; 800+ developers
- Moving from Waterfall to Agile
- Long build times (10-15 hours)
  - 1 build per month
  - Broken builds
  - Manual tests took weeks

### Solution

- Build Acceleration
- CI as A Service with integrated Preflights





# Ericsson

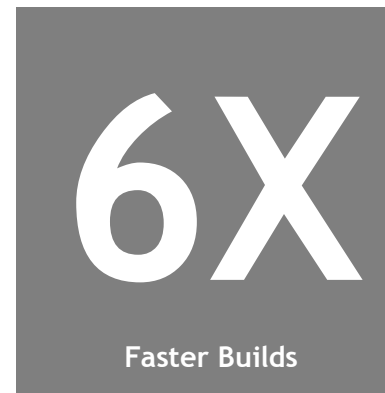
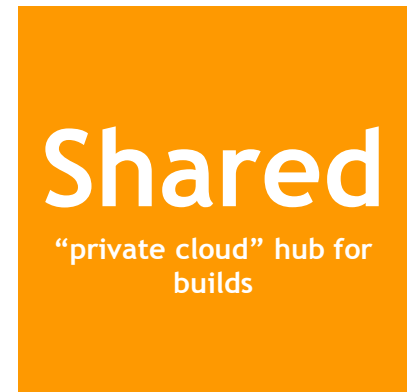
## Transformative Benefits

### Challenges

- Hyper-competitive markets and diverse product lines
- Over 2500 developers
- Poor developer productivity, time to market, unreliable builds, difficult to maintain
- Poor resource utilization, maintenance overhead

### Solution

- Centralized CD infrastructure
- Deployment as a service



# EMC

## Transformative Benefits

### Challenges

- Multi-site (US/China) Multiple OS
- 1400 Devs, supported by US Build and Release Team
- Consolidating 3 business units
- Adopting Agile
- Scheduling slips, lower quality, higher cost of administration

### Solution

- Centralized CD infrastructure
- Build acceleration



A blurred city street scene with light trails from traffic, creating a sense of motion. The text "Q&A" is centered in the image.

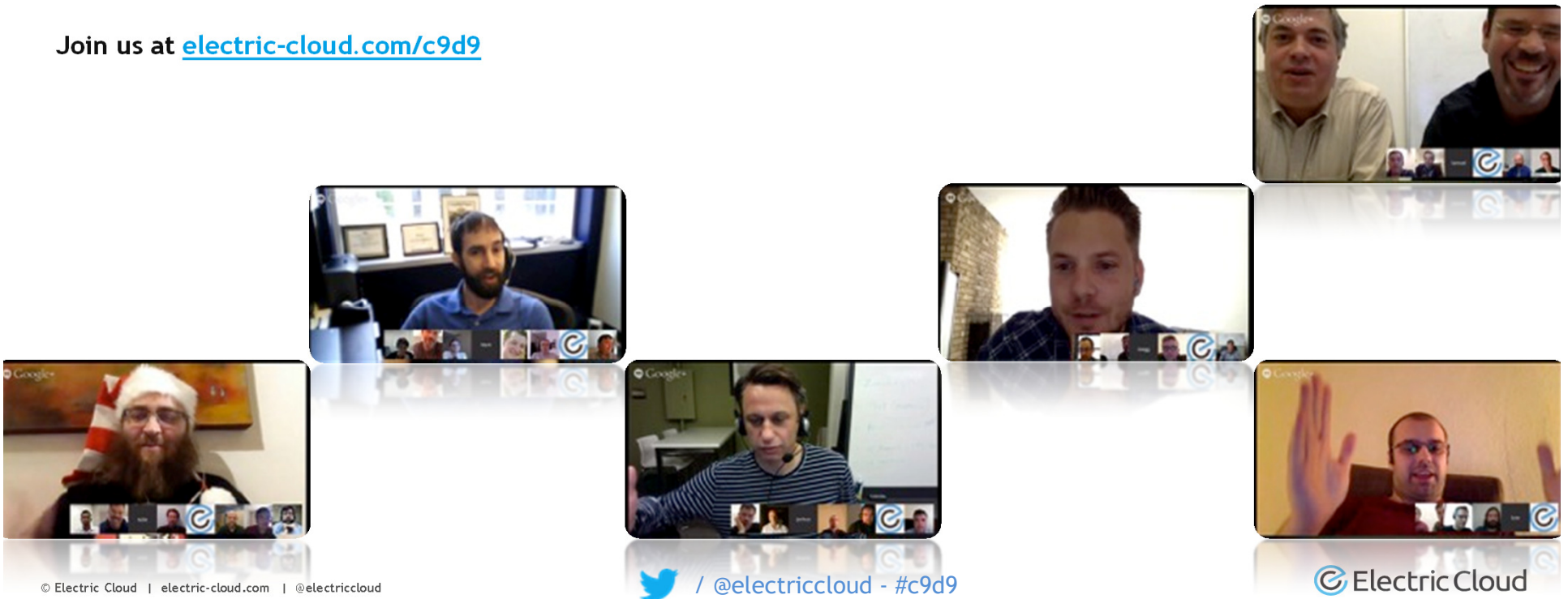
**Q&A**

# Continuous Discussions (#c9d9)

c9d9 0123456789  
c9ntinuous  
d9scussion

An open forum to discuss  
Agile, DevOps and Continuous Delivery.

Join us at [electric-cloud.com/c9d9](https://electric-cloud.com/c9d9)



A blurred city street scene with light trails in shades of orange, yellow, and blue. The text "Thank You" is centered in the middle of the image.

**Thank You**