Microsoft's techs and modern technological trends

SEP 30 2017

Top 10 Technology Trends

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http://www.gartner.com/technology/research/top-10-technology-trends/
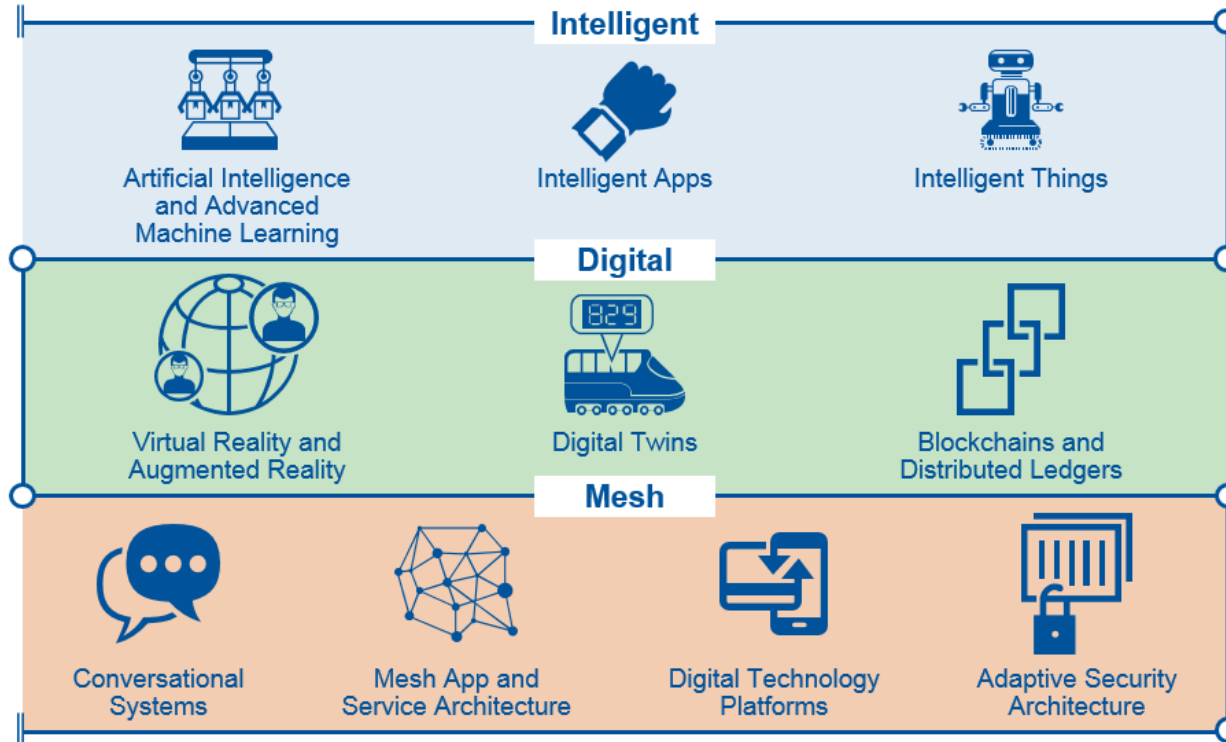
Intelligent:
AI and Advanced Machine Learning

Microsoft Cognitive Services

Vision	Speech	Language	Knowledge	Search
Computer Vision	Translator Speech	Language Understanding Intelligent Service(LUIS)	Recommendations	Bing Autosuggest
Content Moderator	Bing Speech API	Bing Spell Check	Knowledge Exploration	Bing News Search
Face	Speaker Recognition	Web Language Model	Entity Linking Intelligence	Bing Web Search
Emotion	Custom Speech Service	Text Analytics	Academic Knowledge	Bing Entity Search
Video		Translator	QnA Maker	Bing Image Search
Video Indexer		Linguistic Analysis	Custom Decision Service	Bing Video Search
Custom Vision Service				Bing Custom Search

https://microsoft.com/cognitive-services/

Azure Machine Learning Service

Data -> Predictive model -> Operational web API in minutes

Data

Blobs and Tables
Hadoop (HDInsight)
Relational DB (Azure SQL DB)

ML STUDIO

Integrated development environment
for Machine Learning

API

Model is now a web
service that is callable

Monetize the API through
our marketplace

Clients
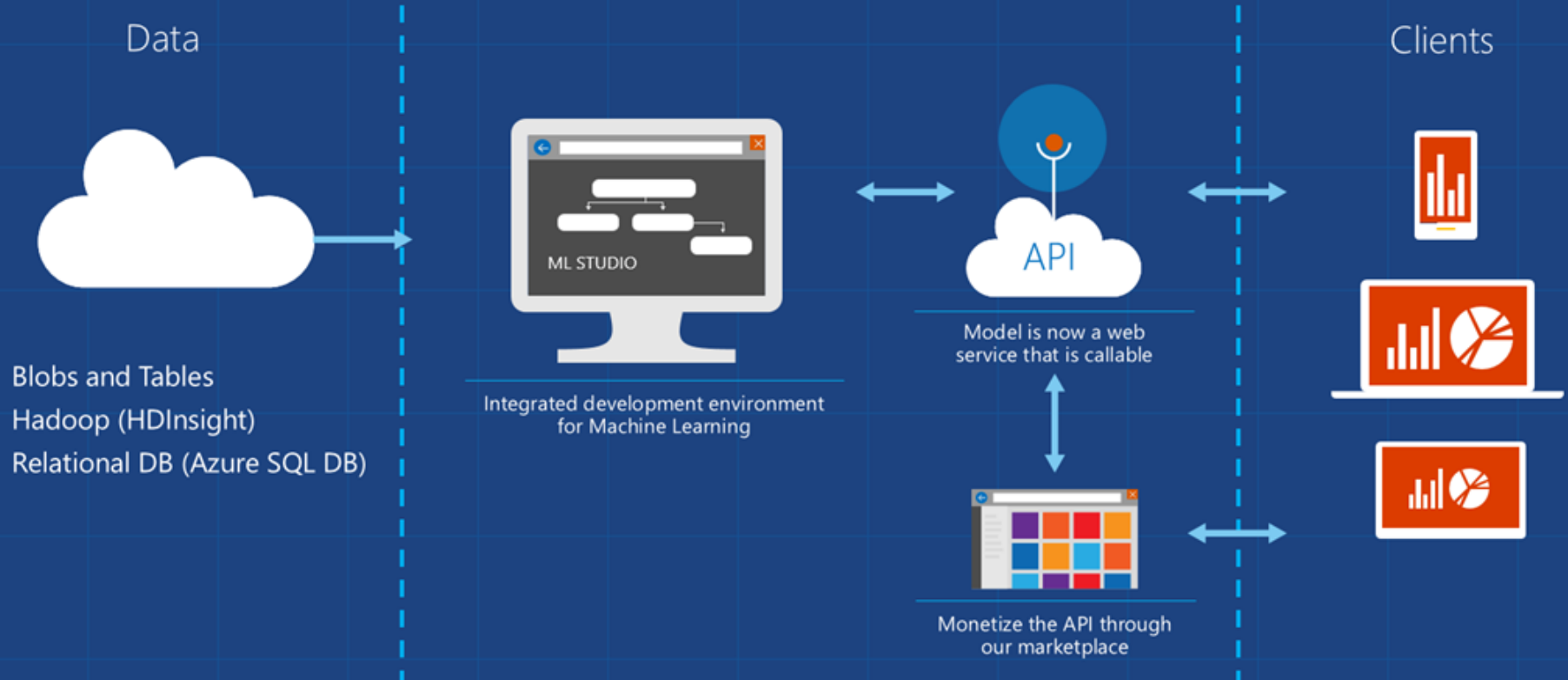
Deep Machine Learning

"CNTK is Microsoft's open-source, cross-platform toolkit for learning and evaluating deep neural networks."

- open-source model
  - created by Microsoft Speech researchers (Dong Yu et al.) 4 years ago
  - on **GitHub** since Jan **2016** under permissive license
  - nearly all development is out in the open
- growing use Microsoft product groups
  - all have full-time employees
  - CNTK trained models are already being tested in production, receiving real traffic
- external contributions e.g. from MIT and Stanford
- Linux, Windows, .Net, docker, cudnn5
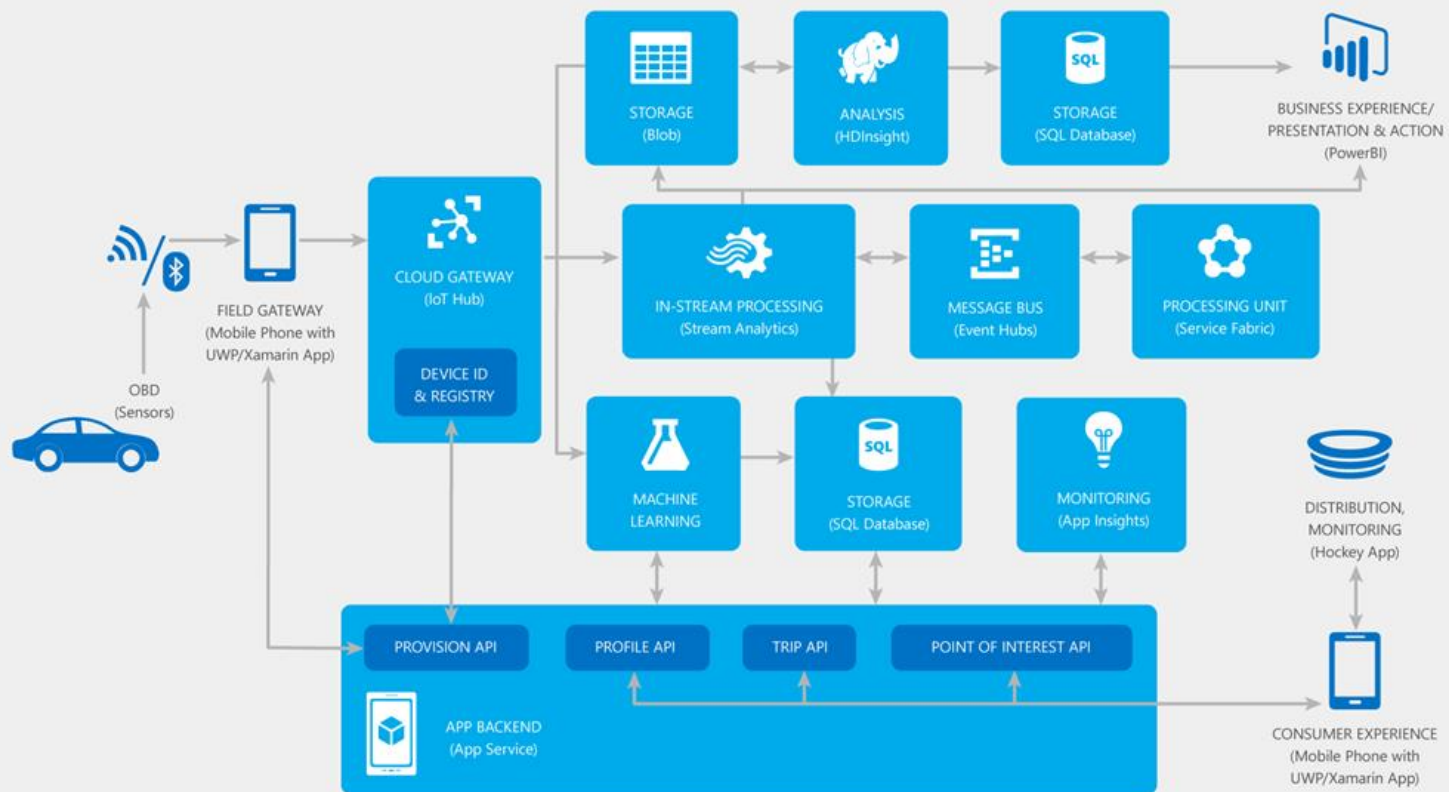 - Python, C++ and C# APIs coming soon

https://www.microsoft.com/en-us/cognitive-toolkit/

Intelligent:
Intelligent Apps

Intelligent App
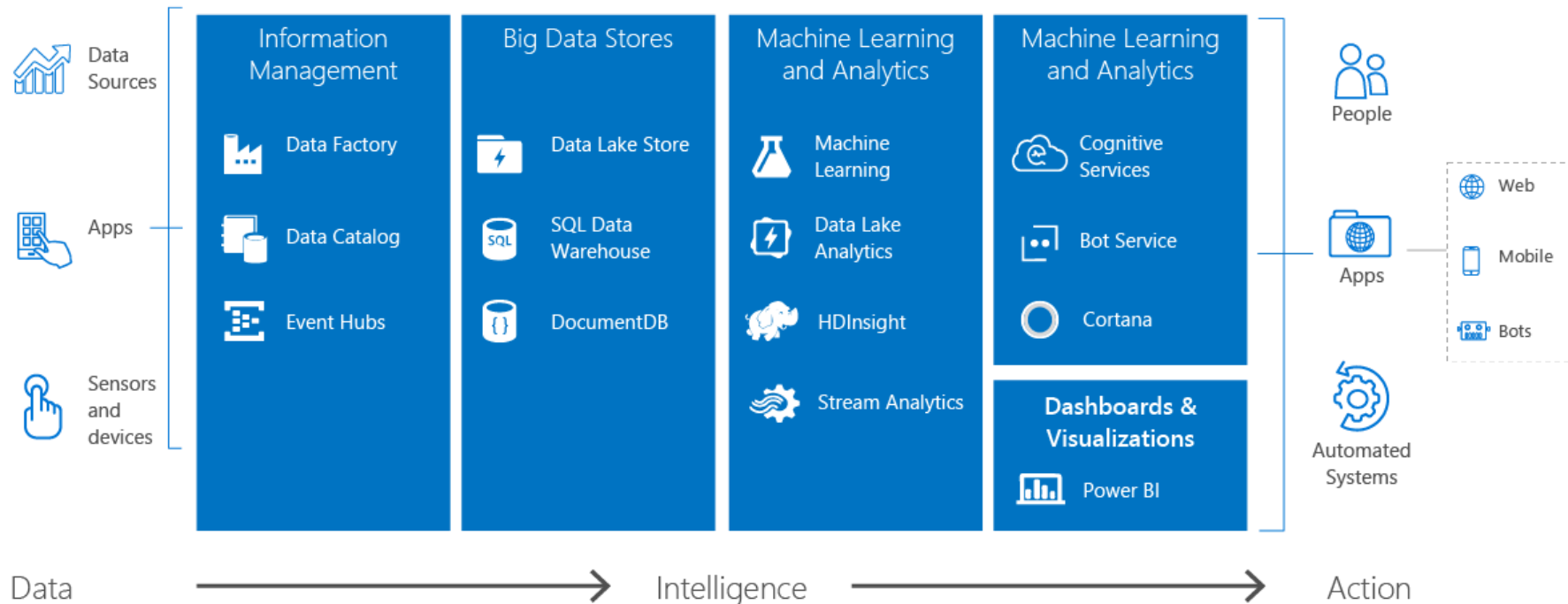
Intelligent:
Intelligent Things

Azure IoT Solution Architecture

Windows 10 IoT Devices

Windows 10 IoT for industry devices
Desktop Shell, Win32 apps, Universal apps and drivers
Minimum: 1 GB RAM, 16 GB storage
X86/x64

Windows 10 IoT for mobile devices
Modern Shell, Mobile apps, Universal apps and drivers
Minimum: 512 MB RAM, 4 GB storage
ARM

Windows 10 IoT Core
Universal Apps and Drivers
No shell or MS apps
Minimum: 256MB RAM, 2GB storage
X86/x64 or ARM

+

Windows Updates

Visual Studio & UWP

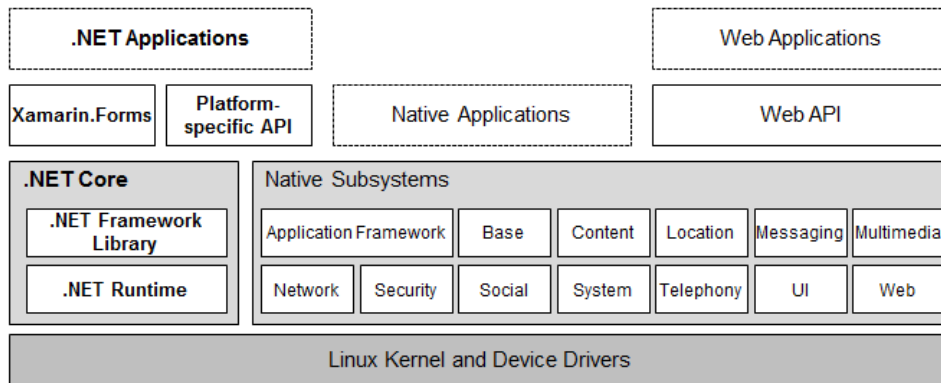New User Interfaces

Security & Identity

AllJoyn
Integrated Device Connectivity

Microsoft Azure IoT

Tizen .NET Architecture

.NET Applications						Web Applications	
Xamarin.Forms	Platform-specific API	Native Applications				Web API	

.NET Core		Native Subsystems					
.NET Framework Library		Application Framework	Base	Content	Location	Messaging	Multimedia
.NET Runtime		Network	Security	Social	System	Telephony	UI	Web

Linux Kernel and Device Drivers

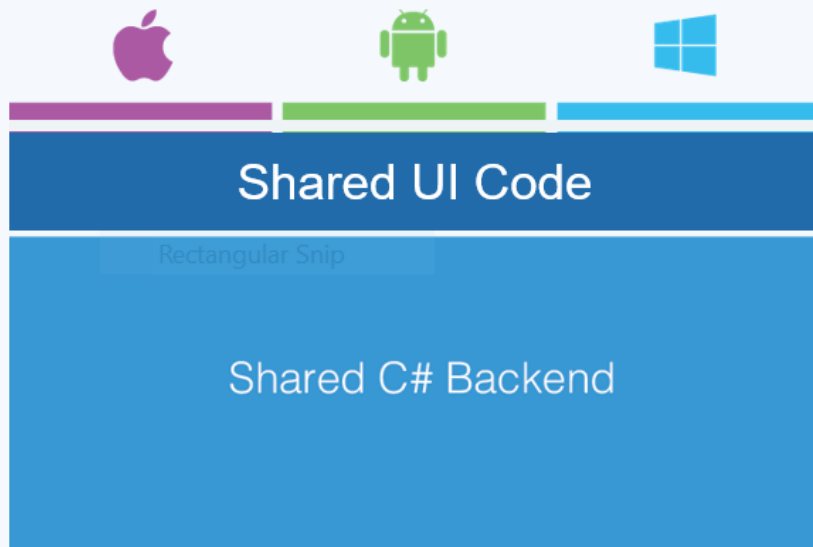# Xamarin / Xamarin.Forms

Traditional Xamarin approach
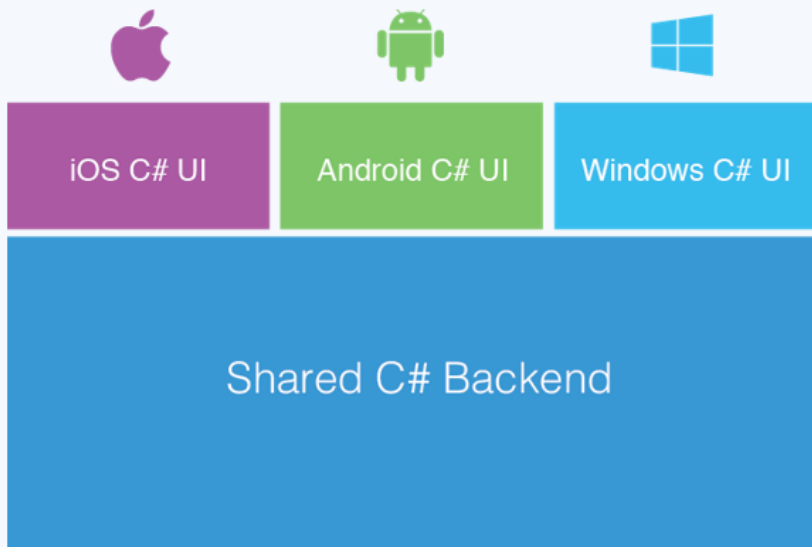
With Xamarin.Forms:
more code-sharing, native controls

| iOS C# UI | Android C# UI | Windows C# UI |

Shared C# Backend

Shared UI Code

Rectangular Snip

Shared C# Backend

Digital:
Virtual reality (VR) and
Augmented reality (AR)

Mixed reality

Hololens
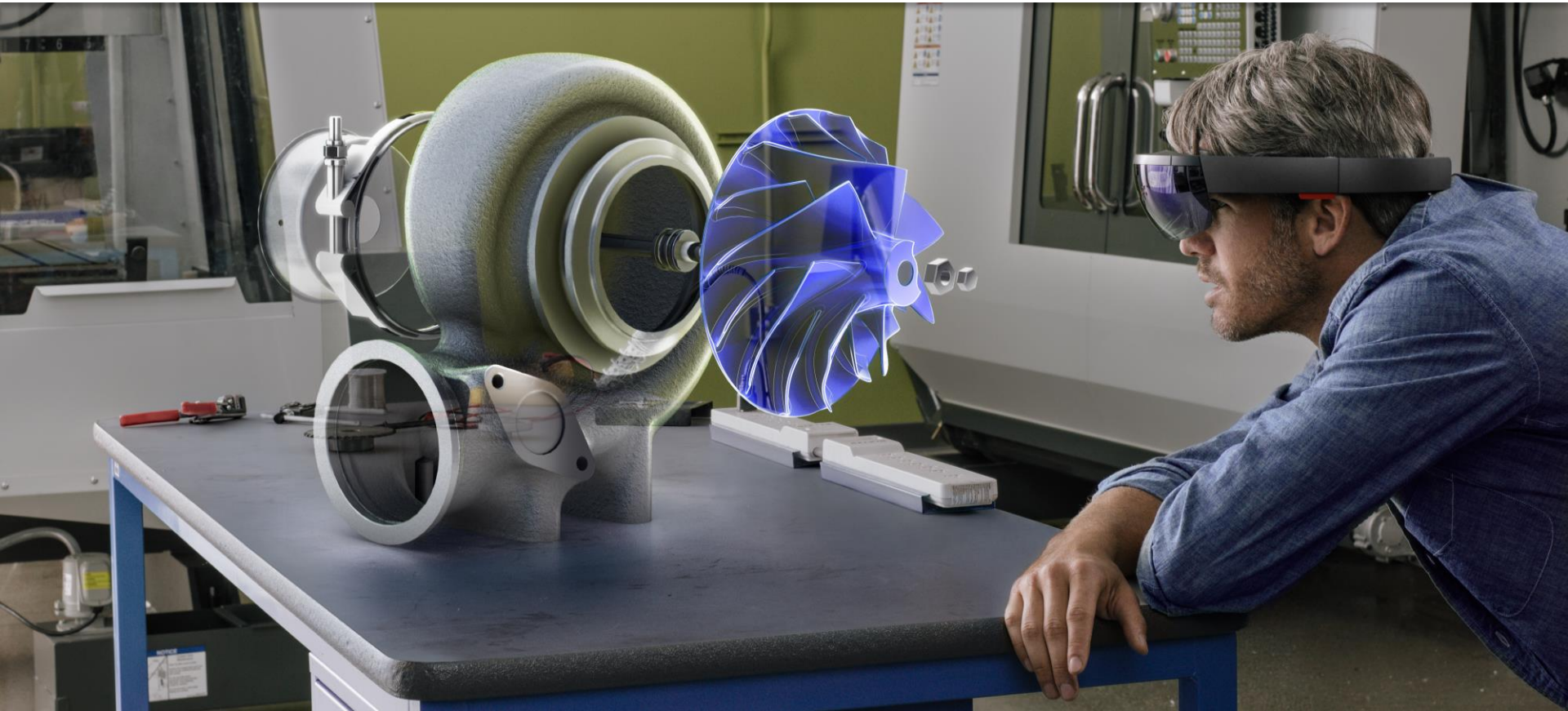
Digital:
Digital Twin

New Class of Digital Twin

Digital Twin evolution

Information Mirroring* Model	Digital Simulations, 3D Printing	Intelligent & Connected IoT Services	Mixed Reality, Cognitive and AI
Digital Twin as concept R&D & engineering focused Dedicated workstations and servers	Collaboration, simulation and workflow across global enterprise Browser and web access	Connected devices - Data unification between physical and virtual worlds IoT, big data analytics, cloud	Holographics and AR/VR Cognitive services Artificial Intelligence
1985-2002 (18 years)	**2003–2014** (12 years)	**2014–2016** (3 years)	**2017**

Powerful 3D modeling and analysis Remote programming CNCs, robots...	Digital design, virtual assembly, and simulation before physical commitment 3D printing goes mainstream	Rapid feedback across design, manufacturing, operation Products augmented with digital services	Guided interactions Blended human-machine collaboration Autonomous and self healing

- *Dr. Michael Grieves and John Vickers – University of Michigan

Digital Twin Solution Architecture
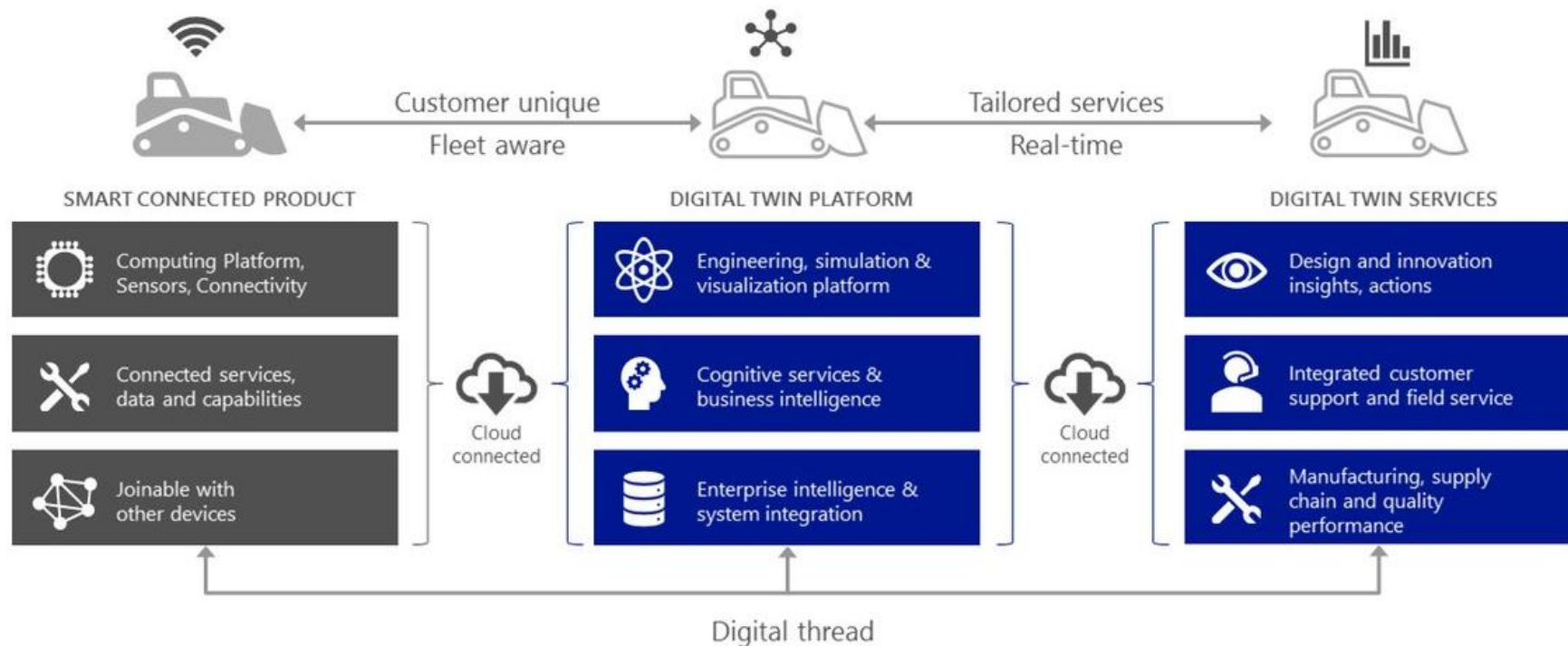
Digital:
Blockchain and Distributed ledgers

Blockchain as a Service

A cryptographically secure, shared, distributed ledger

Cryptographically secure

Blockchain applies tried-and-true digital signature technology to create transactions that reduce fraud and establishes trust and accountability.

Ledger

A write once, read many database that is an immutable record of every transaction. If a mistake is made, you must post a compensating transaction to correct it – no updating or deleting is allowed.

Shared

Blockchains have little value within a single organization. The more organizations or companies that participate, even competitors, the more streamlined the process will be and the greater the value.

Distributed

The more replicas there are, the more authentic the ledger becomes.

Azure Blockchain solutions

Ethereum Consortium
Microsoft

STRATO Blockchain LTS
BlockApps

Chain Core Developer Edition
Chain

Ethereum Studio - Blockchain
ether.camp

Emercoin Blockchain
Emercoin

http://azure.microsoft.com/solutions/blockchain/

Mesh:
Conversational system

Cortana

Cortana on Windows 10 devices

Because Cortana is available across device types, she's able to help you even more effectively

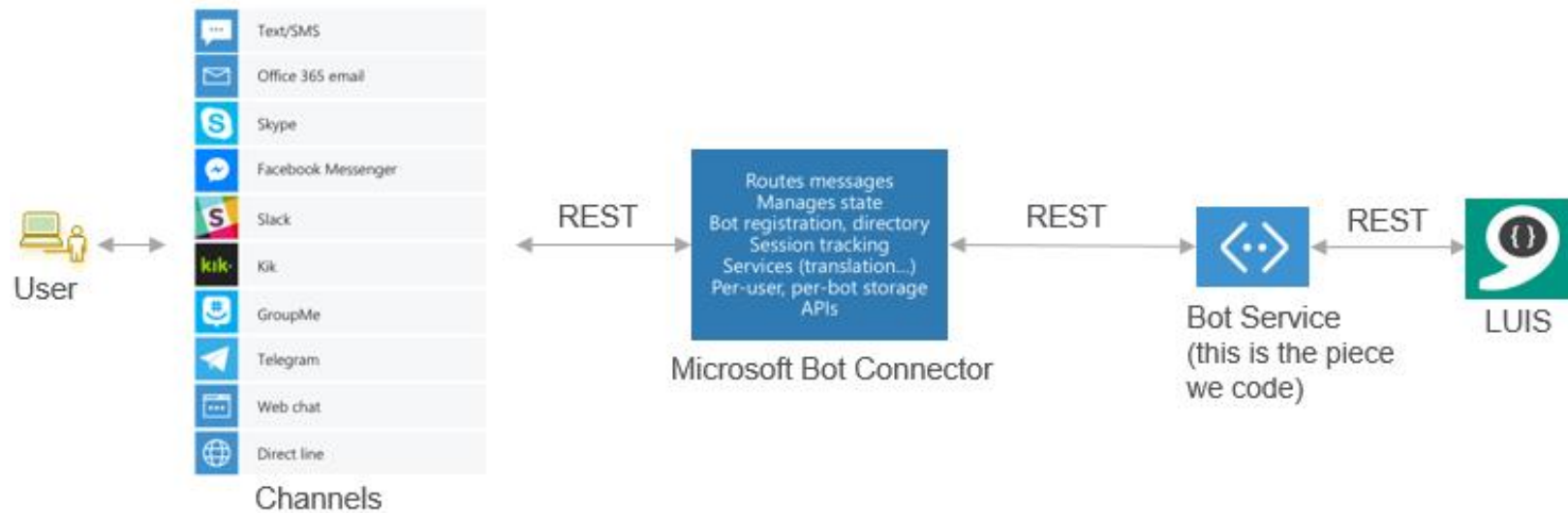| Cortana was first available on Windows phones	Then Cortana came to Windows 10 PCs, tablets, Windows Holographic and Xbox	With upcoming Windows 10 Creators Update, Cortana will be available on Windows 10 IoT Core devices with displays

Cortana & Amazon Alexa

Bot framework

User

Channels
- Text/SMS
- Office 365 email
- Skype
- Facebook Messenger
- Slack
- Kik
- GroupMe
- Telegram
- Web chat
- Direct line

REST

Microsoft Bot Connector
Routes messages
Manages state
Bot registration, directory
Session tracking
Services (translation...)
Per-user, per-bot storage
APIs

REST

Bot Service
(this is the piece
we code)

REST

LUIS

Mesh:
Mesh App and Service Architecture

Service Fabric

Azure Functions

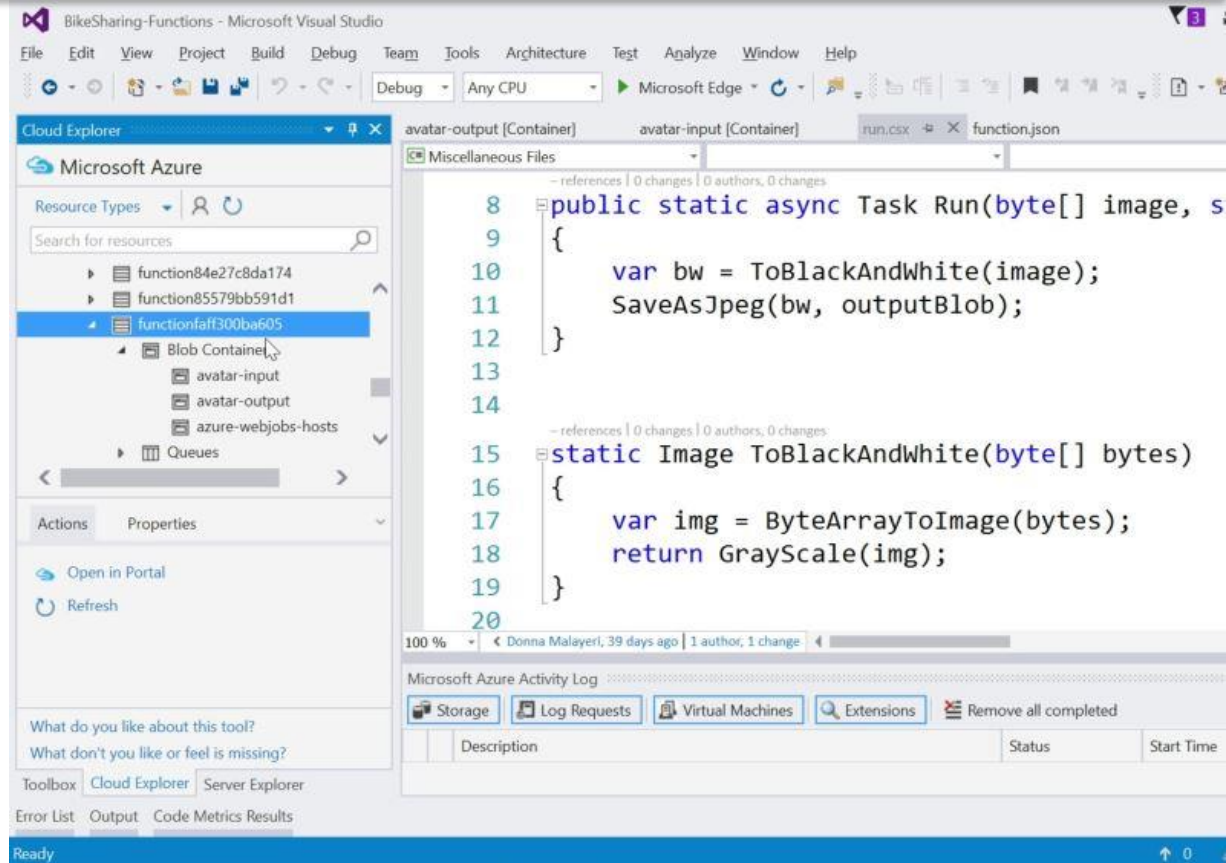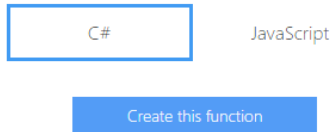- Serverless compute
- Trigger on events in Azure + external services
- Pay only per execution
- C#, F#, Node.js, Python,...

1) Choose a scenario:

Timer	Data processing	Webhook + API
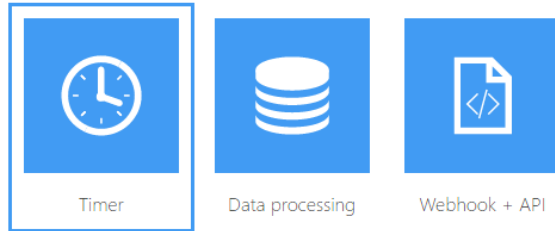
2) Choose a language:

If you'd prefer another supported language, choose "Create a function from scratch".

C#	JavaScript

Create this function

Azure Functions

Microsoft Azure Resource groups > BikeSharing-Functions > Function app

Report a bug   🔍 Search resources   erehrlic@microsoft.co...
MICROSOFT

Function app
BikeSharing-Functions

Search my functions

+ New Function

◆ AvatarPhotoProcess

</> Develop   >

⚡ Integrate

⚙ Manage

🔍 Monitor

◆ MarketingRequestHandler

🔧 Function app settings

⚡ Quickstart

Code (run.csx)   [Save]   [Run]

📋 Logs   📁 View Files   ⚙ Test   🔑 Keys

```
 1  #r "Newtonsoft.Json"
 2
 3  using System;
 4  using System.IO;
 5  using System.Net;
 6  using System.Net.Http;
 7  using System.Net.Http.Headers;
 8  using Newtonsoft.Json;
 9
10  public static async Task Run(byte[] image, string filename, Stream outputBlob, IAsyncCollector<Face> demographicsTable, TraceWriter log)
11  {
12      using (var ms = new MemoryStream(image))
13      {
14          outputBlob.Write(image, 0, image.Length);
15      }
16
17      // call Cognitive Services Vision API
18      string result = await AnalyzeImageAsync(image);
19      log.Info(result);
20
21      if (String.IsNullOrEmpty(result))
22      {
23          return;
24      }
25
26      ImageData imageData = JsonConvert.DeserializeObject<ImageData>(result);
27      foreach (Face face in imageData.Faces)
28      {
29          face.PartitionKey = "ProfileImageUpload";
30          face.RowKey = Guid.NewGuid().ToString();
31          await demographicsTable.AddAsync(face);
32      }
33  }
34
35  static async Task<string> AnalyzeImageAsync(byte[] image)
36  {
37      using (var client = new HttpClient())
38      {
39          var content = new StreamContent(new MemoryStream(image));
40          var url = "https://api.projectoxford.ai/vision/v1.0/analyze?visualFeatures=Faces";
```

Mesh:
Digital Technology Platforms

Azure

Platform Services

Security & Management
- Portal
- Active Directory
- Multi-Factor Authentication
- Automation
- Key Vault
- Store / Marketplace
- VM Image Gallery & VM Depot

Compute
- Cloud Services
- Service Fabric
- Batch
- Remote App

Web and Mobile
- Web Apps
- API Apps
- API Management
- Mobile Apps
- Logic Apps
- Notification Hubs

Developer Services
- Visual Studio
- Azure SDK
- Team Project
- Application Insights

Hybrid Operations
- Azure AD Connect Health
- AD Privileged Identity Management
- Backup
- Operational Insights
- Import/Export
- Site Recovery
- StorSimple

Integration
- Storage Queues
- Biztalk Services
- Hybrid Connections
- Service Bus

Analytics & IoT
- HDInsight
- Machine Learning
- Data Factory
- Event Hubs
- Stream Analytics
- Mobile Engagement

Data
- SQL Database
- SQL Data Warehouse
- Redis Cache
- Search
- DocumentDB
- Tables

Media & CDN
- Media Services
- Content Delivery Network (CDN)

Infrastructure Services

Compute
- Virtual Machines
- Containers

Storage
- BLOB Storage
- Azure Files
- Premium Storage

Networking
- Virtual Network
- Load Balancer
- DNS
- Express Route
- Traffic Manager
- VPN Gateway
- Application Gateway
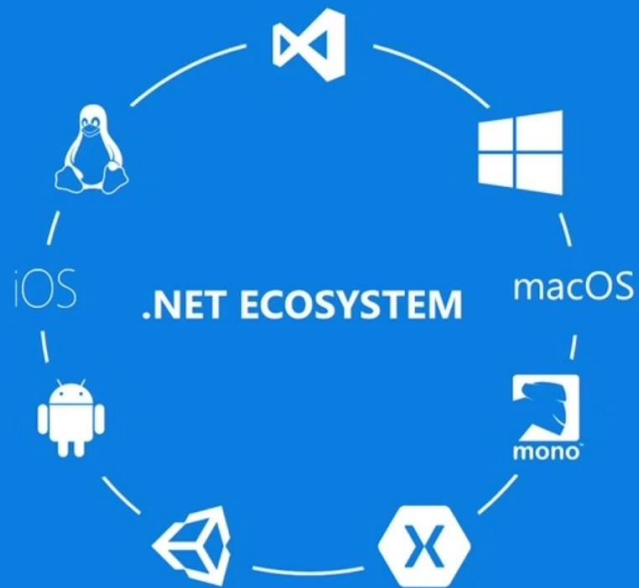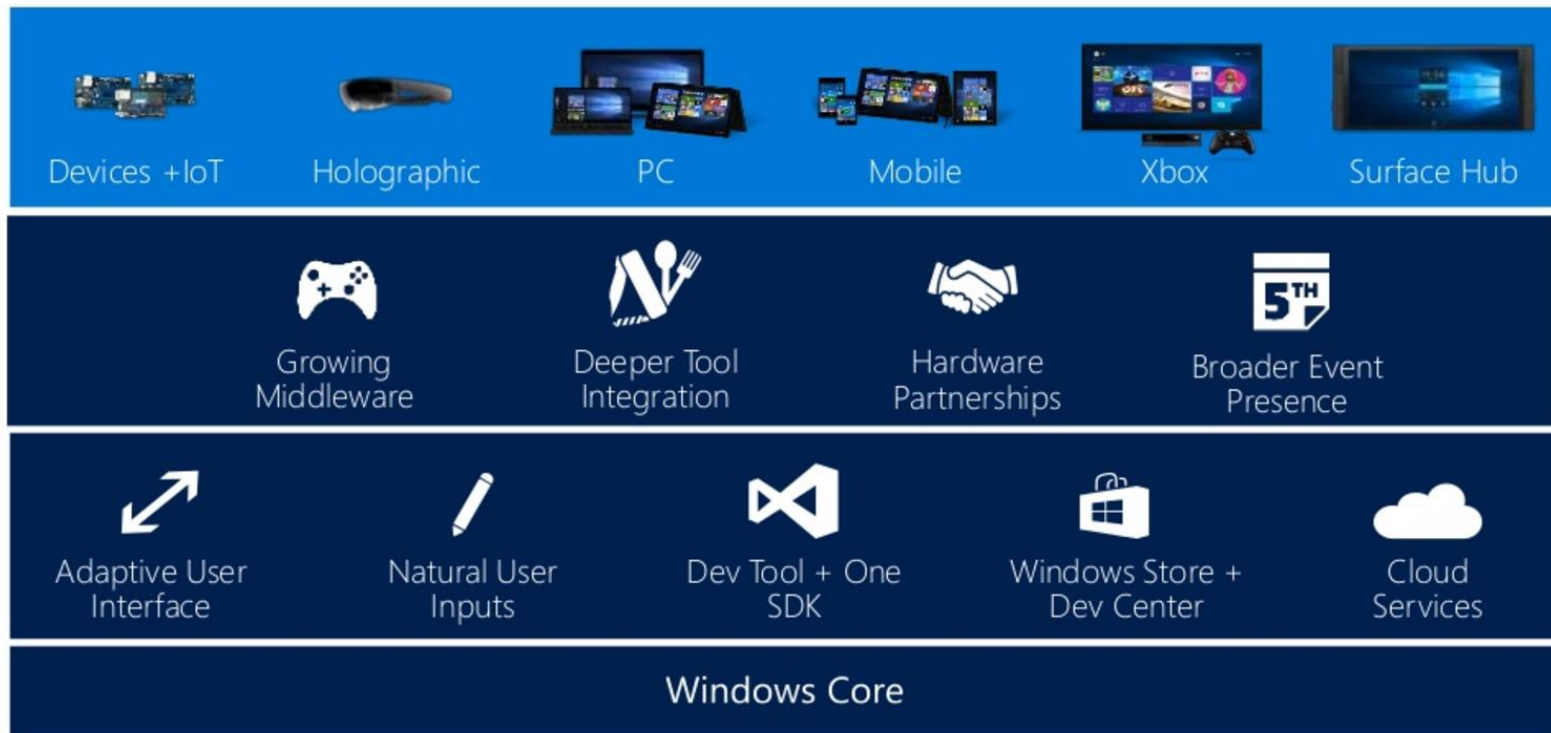
Datacenter Infrastructure (24 Regions, 19 Online)

The Windows Development Ecosystem

Mesh:
Adaptive Security Architecture

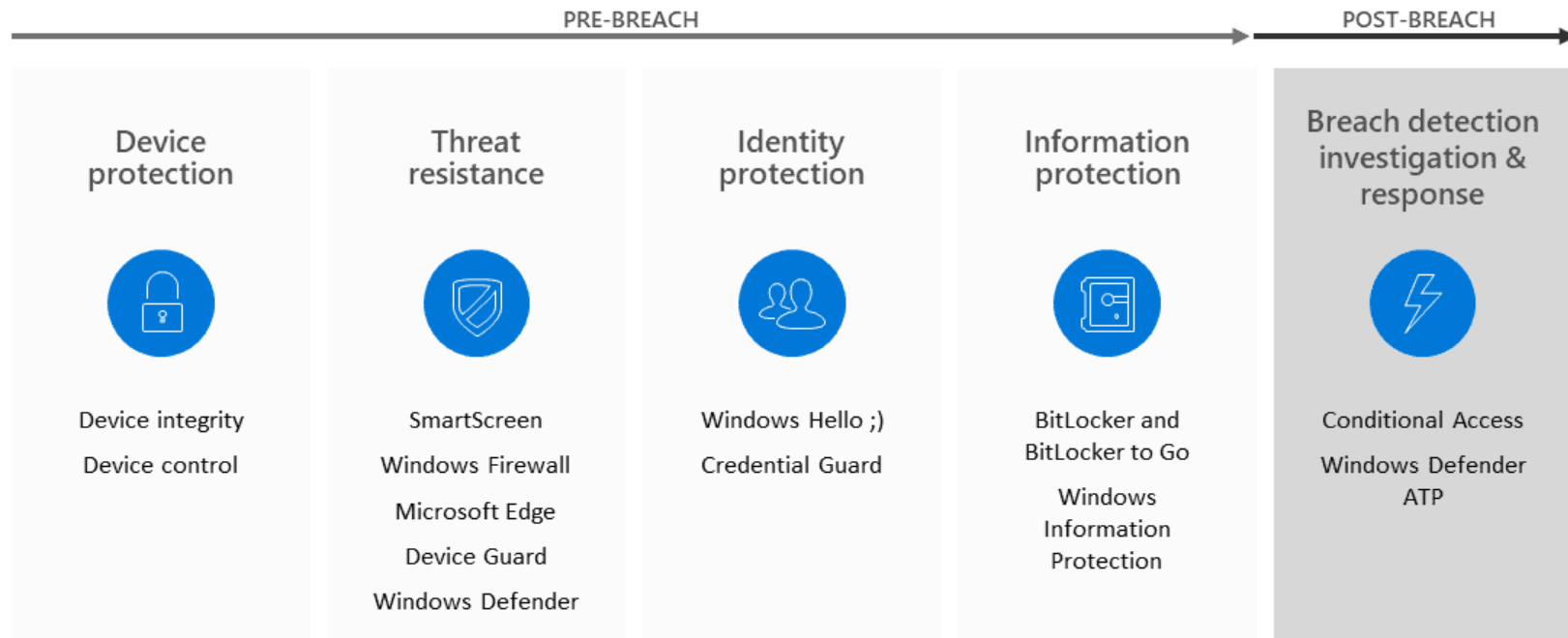The Adaptive Security Architecture

Predict · Prevent · Respond · Detect · Continuous Monitoring and Analytics

Gartner

THE **WINDOWS 10** DEFENSE STACK

PROTECT, DETECT & RESPOND

PRE-BREACH → | POST-BREACH →

Device protection	Threat resistance	Identity protection	Information protection	Breach detection investigation & response
Device integrity	SmartScreen	Windows Hello ;)	BitLocker and BitLocker to Go	Conditional Access
Device control	Windows Firewall	Credential Guard	Windows Information Protection	Windows Defender ATP
	Microsoft Edge			
	Device Guard			
	Windows Defender			

Azure Security Center

Find vulnerabilities and remediate quickly

Continuously monitor the security of your machines, networks, and Azure services using hundreds of built-in security assessments or create your own. Use actionable security recommendations to remediate issues before they can be exploited.

Limit your exposure to threats

Enable adaptive threat protections to reduce exposure to attacks. Block malware and other unwanted code by applying application controls adapted to your specific workloads and powered by machine learning. Enable just-in-time, controlled access to management ports on Azure VMs to drastically reduce surface area exposed to brute force and other network attacks.

Detect and respond swiftly to attacks

Use advanced analytics and the Microsoft Intelligent Security Graph to get an edge over evolving cyber attacks. Leverage built-in behavioral analytics and machine learning to identify attacks and zero-day exploits. Monitor networks, machines, and cloud services for incoming attacks and post-breach activity. Streamline investigation with interactive tools and contextual threat intelligence.

Thank you!

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