

Tertiary Education for the 4th Industrial Revolution

Dr. Alexandros Papaspyridis

Director

Education Industry, Asia Pacific Japan

alexpa@microsoft.com

Key anchors

- Disruption
- Digital Transformation
- Skills
- Hybrid Cloud
- IT outside IT & Research as a Service
- Connected Campus
- AI, bots & cognitive services

Disruption

Age of Disruption

- ▶ Industry:
 - ▶ New business models: Airbnb, Uber, x as a service
 - ▶ Reduced lifespan of leaders
- ▶ Political: de-globalization->localization
- ▶ Economic:
 - ▶ fiscal austerity,
 - ▶ rise of Asia middle-class



Technology

- ▶ Enablers:
 - ▶ cloud,
 - ▶ mobile, 5G
 - ▶ VR/AR/MR
- ▶ Disruptors:
 - ▶ Blockchain,
 - ▶ ML
- ▶ Reimagined:
 - ▶ robotics,
 - ▶ genomics,

Need to catch up

- ▶ security,
- ▶ privacy,
 - ▶ GDPR
- ▶ regulation,
- ▶ education models,
- ▶ work models,
- ▶ inclusion

Worldwide Higher Education

Current world

Global models that have stood firm for decades are failing, technological innovation is opening new doors and a growing middle class is creating unprecedented demand. At a time of extraordinary economic and demographic change, Elizabeth Gibney explores five trends that are transforming the face of global higher education

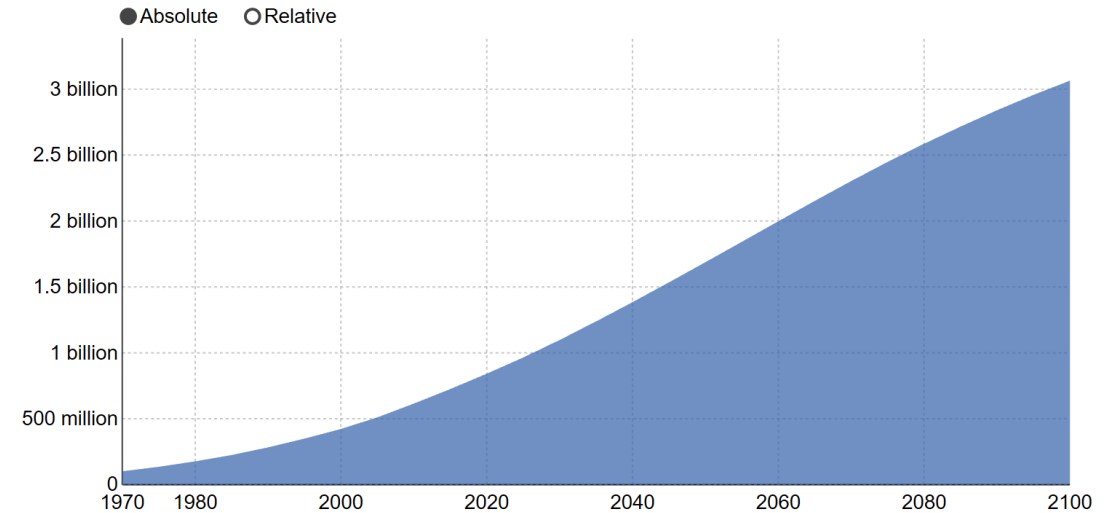


Projected world population by level of education

Our World
in Data

This visualization shows the Medium projection by the International Institute for Applied Systems Analysis (IIASA). The researchers who created this projection describe it as their "middle of the road scenario that can also be seen as the most likely path".

Under 15 No Education Incomplete Primary Primary Lower Secondary Upper Secondary Post Secondary



Source: IIASA (Global Projection – Medium SSP2)

OurWorldInData.org/world-population-growth/ • CC BY-SA

In the last 15 years, Global Higher Education Student Population has grown by **100M Students every 5 Years**

This is the equivalent to adding an entire US Market each year

Growth continues to track, by 2040 the HE market will nearly double from 726M to 1.4B

Chart:

<https://ourworldindata.org/projections-of-future-education/>

Source of Data:

Wittgenstein Centre for Demography and Global Human Capital (2015).
Wittgenstein Centre Data Explorer Version 1.2.

Disruption in Education

Now:

- ▶ Datacenter goes to the cloud -> HPC, Research aaS
- ▶ MOOC: Coursera, Open edX
 - ▶ Flipped classroom has already happened, the use of lecture theater will decline
 - ▶ How do you leverage this & redefine the value you offer?
 - ▶ MOOCs similar to textbooks
- ▶ B2C in K-12; self flip the classroom

Emerging:

- ▶ MR/AR/VR
- ▶ Extending the reach beyond 18-25: Lifelong learning, reskilling

Future:

- ▶ AI
- ▶ Rebalancing digital literacy, coding skills with K-12
- ▶ 3rd party assessments

Riding the Perfect Storm Waves



Digital Transformation

Drivers for DT

- ▶ Online first customer experience
- ▶ Customers using mobile devices & social networks
- ▶ Globalised businesses
- ▶ IoT, connectivity

Vision for Digital Transformation

Imagine if you could...

Engage Your Customers

Deliver personalized, rich, connected experiences in omnichannel journeys, platforms & devices your customers choose.

Empower Your Employees

Keep up with your fast-moving customers, efficiently collaborating anywhere, anytime accessing the information they need to make data driven decisions

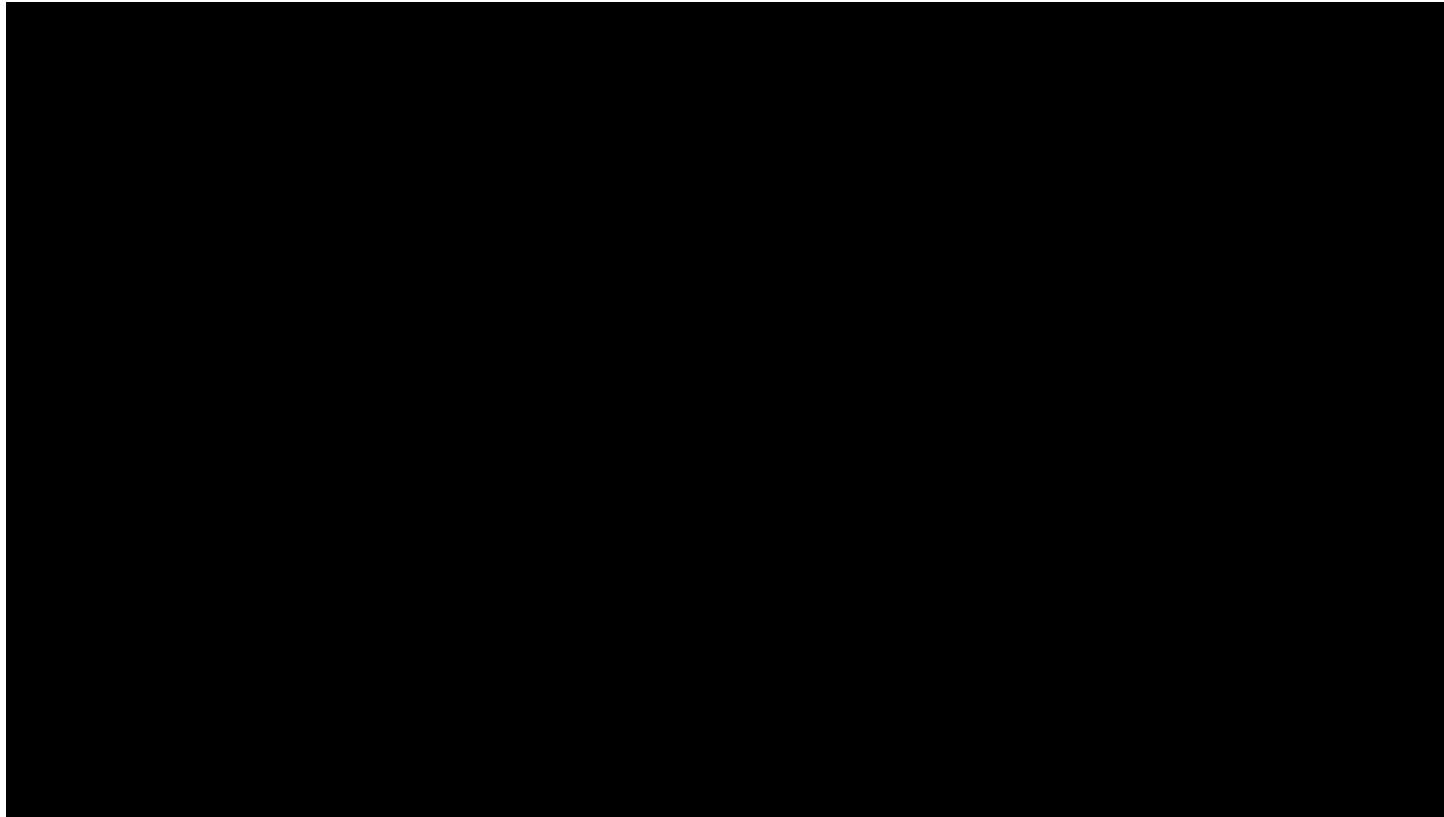
Optimize Your Operations

Increase the flow of information across your entire business operations, better manage your resources, and keep your business processes synchronized across all boundaries. and ecosystem chains

Transform Your Products

Expand the reach of your business using digital channels, understand how your products are used, and develop new xaaS business models

Rolls Royce: Engine as a Service



<https://azure.microsoft.com/en-us/resources/videos/rolls-royce-and-microsoft-collaborate-to-create-new-digital-capabilities/>

DT Implications for IT

- ▶ Supporting massive & global scaling
- ▶ Be closer to the customer anywhere in the world
- ▶ Doing more, faster
- ▶ Shifting IT value from managing data centers and servers towards higher value
 - ▶ Hybrid cloud

What you need to get right in DT?

- ▶ Vision
 - ▶ Customer experience
- ▶ Cohesive data
 - ▶ Leverage ML/AI
- ▶ Digital Culture of fast experimentation
 - ▶ Drive impact in weeks, not years

Digital Transformation in Education

Imagine if...

- Imagine if you could proactively identify students needing additional support and coordinate the additional resources necessary to improve performance and contribute to a higher academic rating for the school.
- Imagine if you could provide students the means to effectively plan, connect, collaborate, research, and gain insight from others whether physically or virtually on campus.
- Imagine if you could use “on demand,” unlimited statistical and computing capabilities, and become known for research credibility, precision, time to results, and innovation?
- Imagine if you could provide students the means to effectively plan, connect, collaborate, research, and gain insight from others whether physically or virtually on campus.



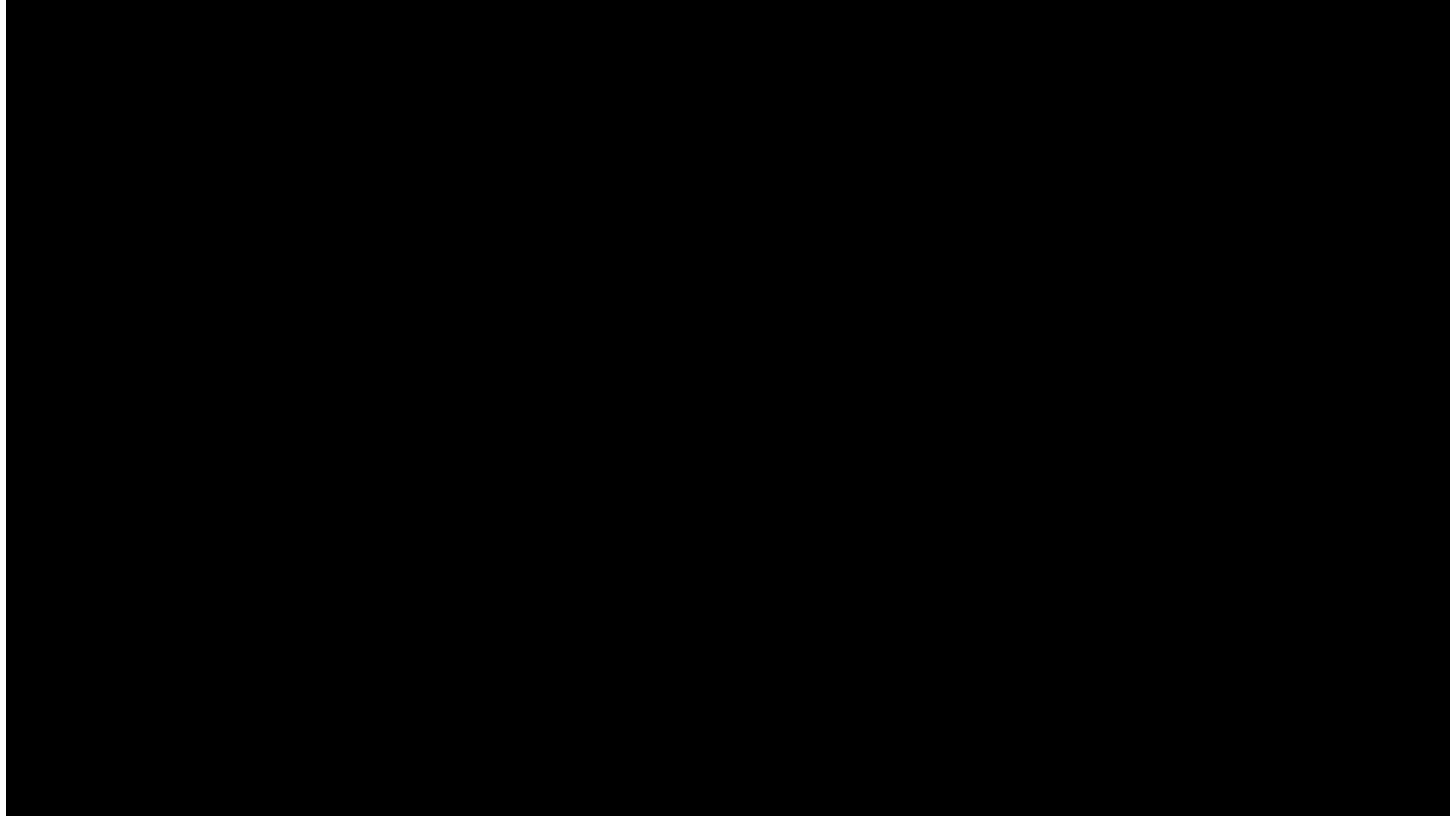
Engage Your
Students

Empower
Your
Educators

Optimize
Your
Operations

Transform
Learning

CAE VimedixAR transforms medical education with Microsoft HoloLens



<http://www.youtube.com/watch?v=bQ6d040qf8c>

Skills for the 4th Industrial Revolution

- ▶ Not just domain knowledge but skills
 - ▶ Cognitive and cross-functional
- ▶ From teaching to learning to learn
- ▶ Must support
 - ▶ Experiential
 - ▶ Cross-discipline
 - ▶ Anywhere, anytime
- ▶ Continuous future proofing

Top 10 skills

in 2020

1. Complex Problem Solving
2. Critical Thinking
3. Creativity
4. People Management
5. Coordinating with Others
6. Emotional Intelligence
7. Judgment and Decision Making
8. Service Orientation
9. Negotiation
10. Cognitive Flexibility

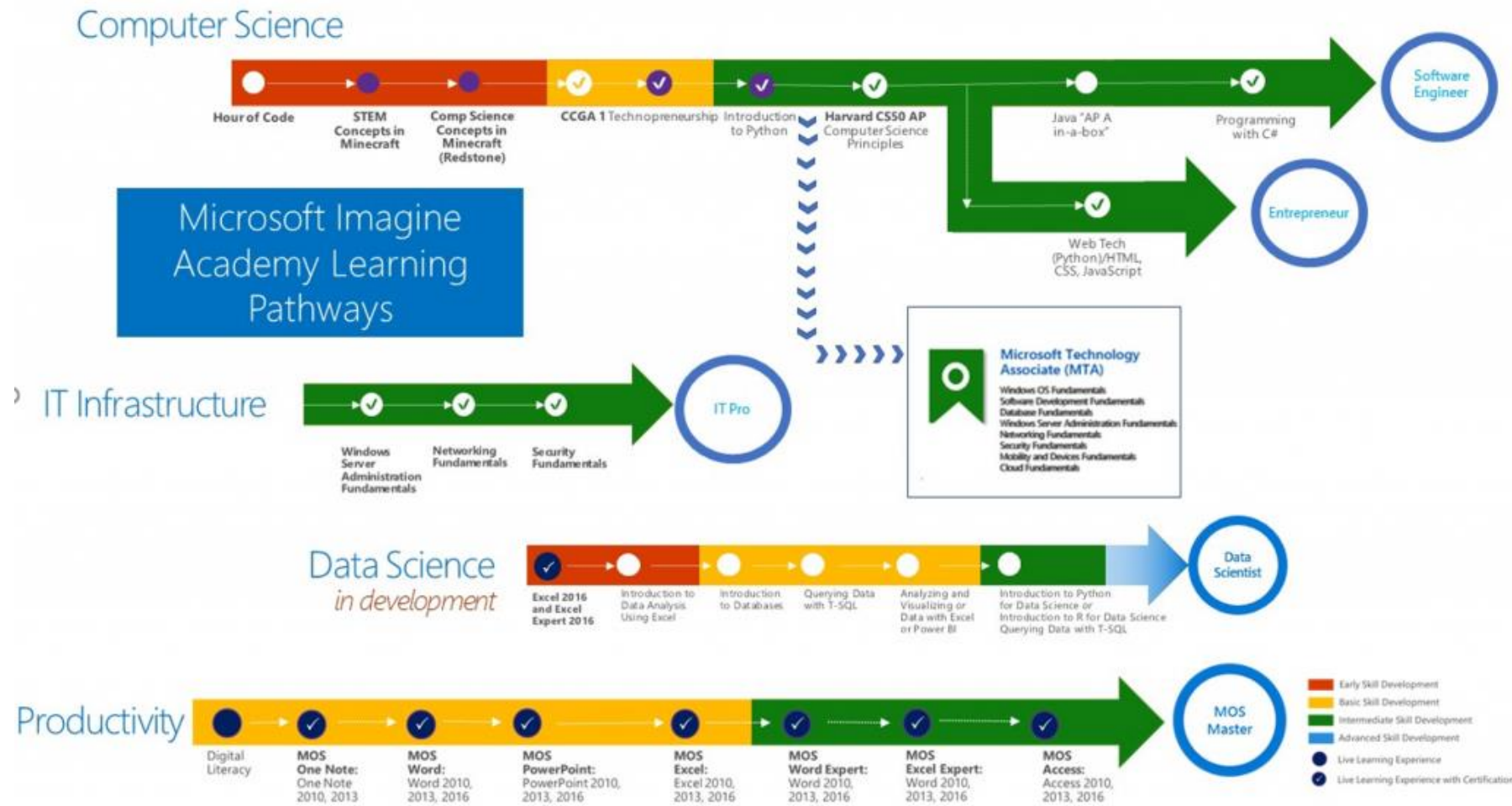
in 2015

1. Complex Problem Solving
2. Coordinating with Others
3. People Management
4. Critical Thinking
5. Negotiation
6. Quality Control
7. Service Orientation
8. Judgment and Decision Making
9. Active Listening
10. Creativity



Source: Future of Jobs Report, World Economic Forum

Computing Skills for all



Data Science on edX



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Microsoft Professional Program in Data Science



Gain the skills you need to get the data science job you want.

[See Courses](#)

Data Science Curriculum Courses

 Microsoft Analyzing and Visualizing Data with Power BI Current Self-Paced	 Microsoft Analyzing and Visualizing Data with Excel Current Self-Paced	 Microsoft Querying with Transact-SQL Current Self-Paced	 Microsoft Essential Statistics for Data Analysis using Excel Current Self-Paced
 Microsoft Programming with R for Data Science Current Self-Paced	 Microsoft Programming with Python for Data Science Current Self-Paced	 Microsoft Developing Intelligent Apps and Bots Current Self-Paced	 Microsoft Introduction to Python for Data Science Current Self-Paced
 Microsoft Introduction to R for Data Science Current Self-Paced	 Microsoft Applied Machine Learning Current Self-Paced	 Microsoft Principles of Machine Learning Current Self-Paced	 Microsoft Data Science Essentials Current Self-Paced
 Microsoft Data Science Orientation: Microsoft Professional Current Self-Paced	 Microsoft Implementing Predictive Analytics with Soark in Current Self-Paced	 Microsoft Data Science Professional Project Current Self-Paced	 Microsoft Analyzing Big Data with Microsoft R Server Current Self-Paced

POWERED BY
OPENedX on Microsoft Azure

Azure

Azure hyperscale data centers



Asia Pacific

Region	Location
Southeast Asia	Singapore
East Asia	Hong Kong
Australia East	New South Wales
Australia Southeast	Victoria
China East	Shanghai
China North	Beijing
Central India	Pune
West India	Mumbai
South India	Chennai
Japan East	Tokyo, Saitama
Japan West	Osaka
Korea Central	Seoul
Korea South	Busan
Newly announced	
Australia Central 1	Canberra
Australia Central 2	Canberra



ISO/IEC



CSA/CCM



ITAR



CJIS



HIPAA



IRS 1075

Platform Services

Security & Management

- Portal
- Azure Active Directory
- Azure AD B2C
- Multi-Factor Authentication
- Automation
- Scheduler
- Key Vault
- Store/ Marketplace
- VM Image Gallery & VM Depot

Services Compute

- Cloud Services
- Service Fabric
- Batch
- RemoteApp

Integration

- Storage Queues
- BizTalk Services
- Hybrid Connections
- Service Bus

Media & CDN

- Media Services
- Content Delivery Network (CDN)

Web and Mobile

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

Developer Services

- Visual Studio
- Azure SDK
- VS Online
- App Insights

Data

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

Analytics & IoT

- HDInsight
- Machine Learning
- Stream Analytics
- Data Lake
- Data Factory
- Event Hubs
- Data Catalog
- IoT Hub
- Mobile Engagement

Hybrid Operations

- Azure AD Health Monitoring
- AD Privileged Identity Management
- Domain Services
- Backup
- Operational Analytics
- Import/Export
- Azure Site Recovery
- StorSimple

Infrastructure Services

OS/Server Compute

- Virtual Machines
- Container Service

Storage

- BLOB Storage
- Azure Files
- Premium Storage

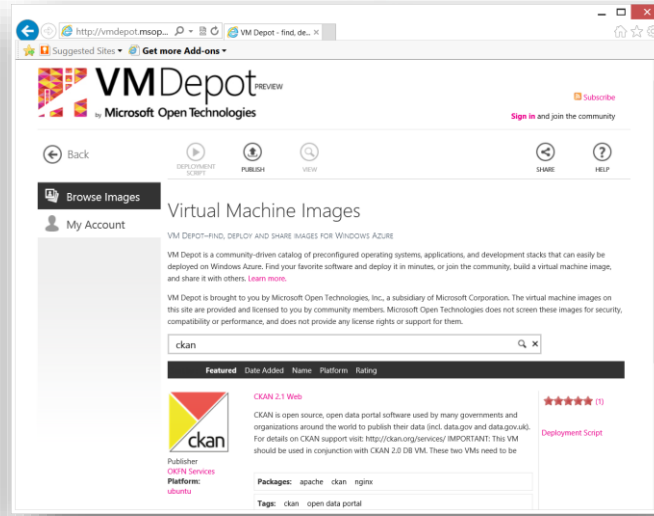
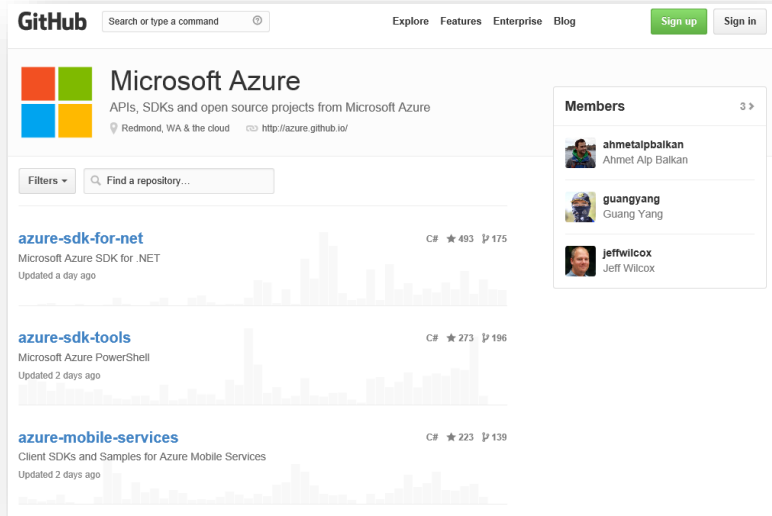
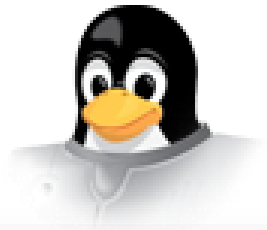
Networking

- Virtual Network
- Load Balancer
- DNS
- Express Route
- Traffic Manager
- VPN Gateway
- App Gateway

Datacenter Infrastructure (42 Regions)



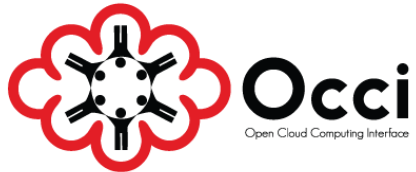
Open and Flexible



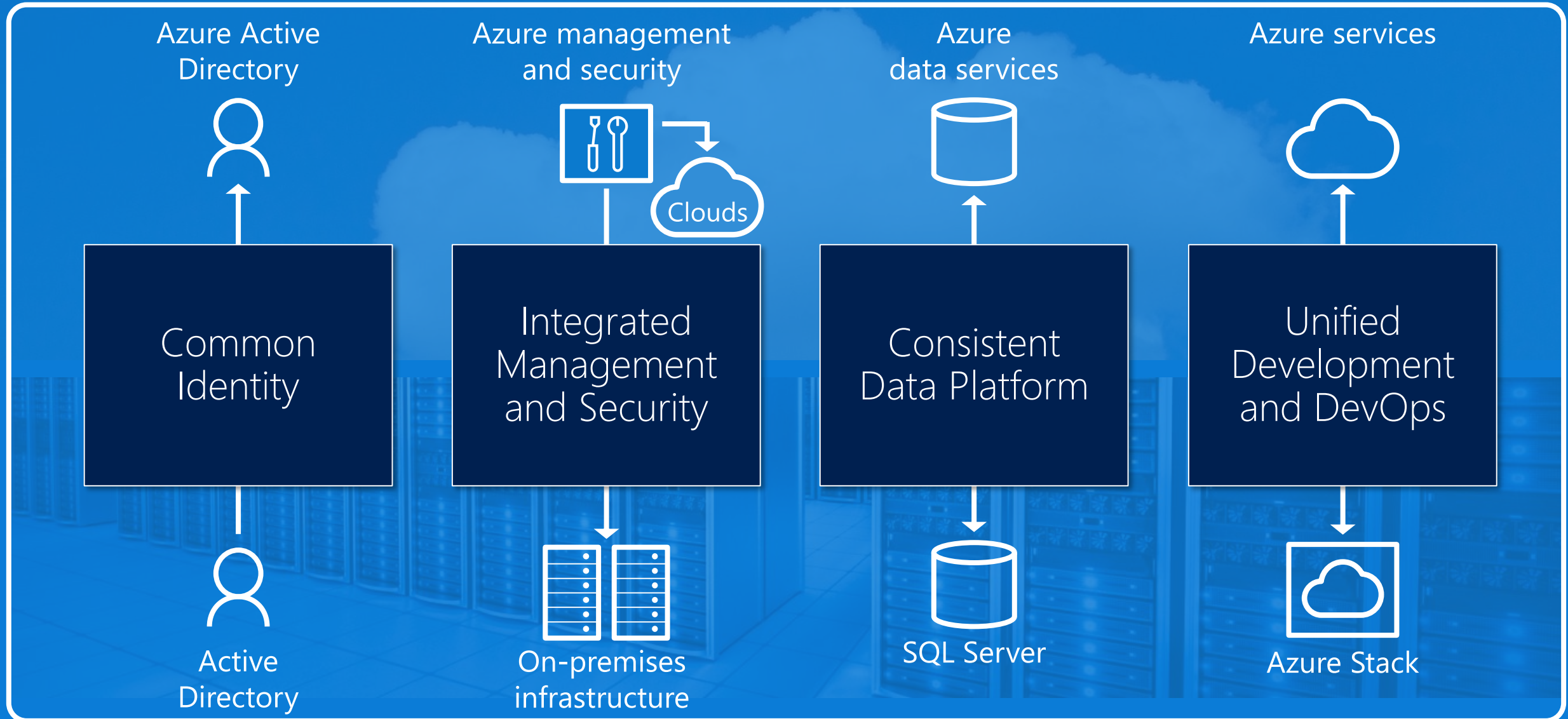
European Grid Infrastructure



OpenNebula.org
Flexible Enterprise Cloud Made Simple



Microsoft Azure: The consistent Hybrid Cloud



IT outside IT

- ▶ Moore's law renders hardware investments quickly obsolete
 - ▶ Datacenter TCO not sustainable vs. hyperscale cloud
 - ▶ From Capex to Opex, but need procurement shift
- ▶ Researchers procure cloud services directly bypassing IT
 - ▶ Flexibility, quick implementation, updated technology
 - ▶ No procurement efficiency
 - ▶ No efficiency at organizational level by pooling and optimizing resource allocation
- ▶ IT must be a research partner to academics, you need to reimagine central IT in Universities



Playing offence: digital transformation

Research-as-a-Service

- ▶ Central IT must embody disruption of IT in research
- ▶ Embark on digital transformation of Central IT
- ▶ Develop Research as a Service on a hybrid cloud
 - ▶ Move from an obsolete by design HPC center & disparate servers
 - ▶ Improve cost by pooling requirements
 - ▶ Simplify contracting
- ▶ Do it better and faster, become an agile business partner
 - ▶ Azure IaaS/PaaS cloud and a complete SaaS offering on O/365 and Dynamics/365
 - ▶ Enable researchers to focus on research

Connected Campus

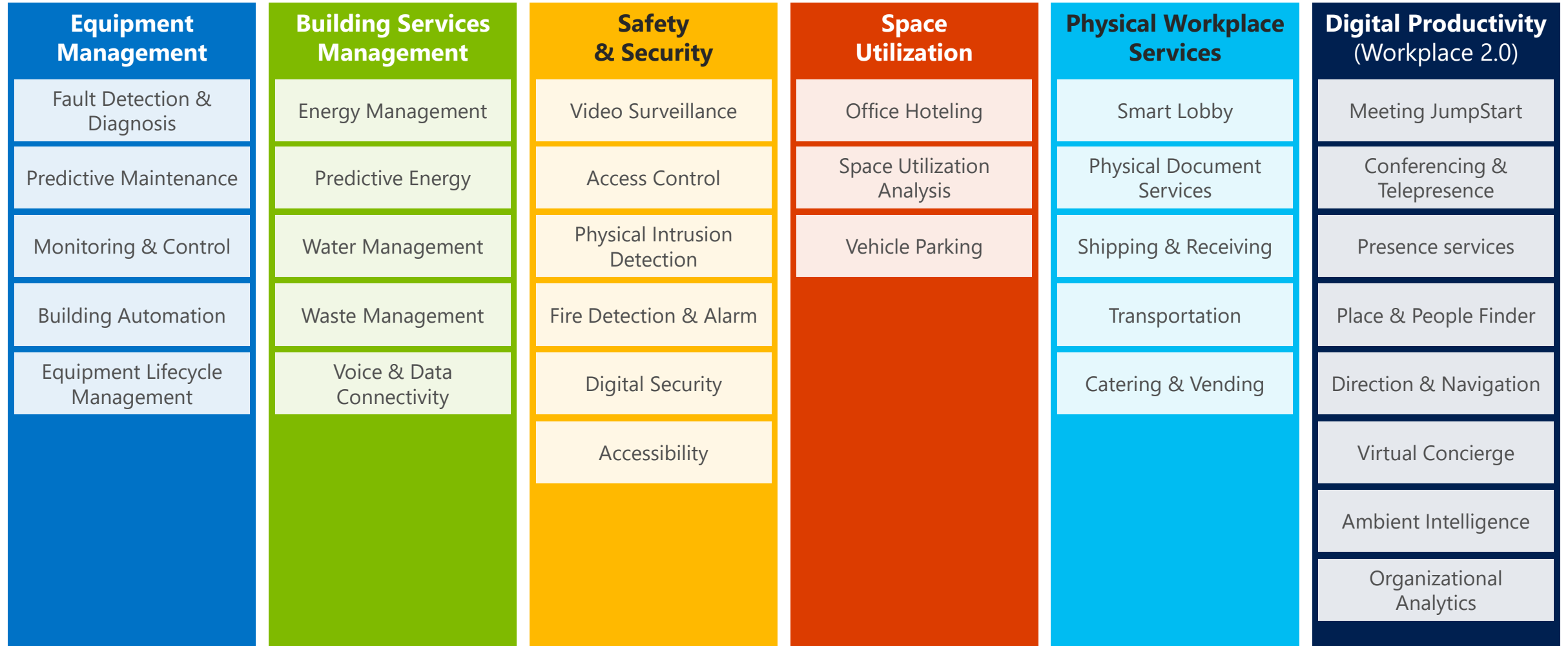
The Connected Campus



The Connected Campus as a Source of Innovation

- ▶ There is a lot of interest in smart cities:
 - ▶ Smart buildings, occupant aware, optimizing resources
 - ▶ smart parking & traffic lights
 - ▶ Administrators to anticipate needs & manage disruptions
- ▶ But where do you test and improve these concepts?
- ▶ Imagine if ...
 - ▶ Your campus is the smart part in your city
 - ▶ If you can attract startups & large enterprises to test new ideas & deploy new technologies
 - ▶ Students & researchers run projects and collect data
 - ▶ Creating an ecosystem around your Connected Campus
 - ▶ While helping you to get your Campus even smarter
 - ▶ Engaging & Improving satisfaction of the community

Smart Spaces Map



Microsoft AI

For every person and every organization



Agent

Digital Assistants

Cortana, Bots



Applications

Deeper knowledge Improved insight

Mail, Office,
Dynamics 365



Services

Cortana Intelligence Suite

Cognitive Services



Infrastructure

Azure

CPU/GPU at scale
FGPA

Cognitive Services



Vision



Language



Speech



Search



Knowledge

Computer vision
Face
Emotion
Content Moderator
Video
Video Indexer
Cognitive Services Labs

Text analytics
Spell check
Web language model
Linguistic analysis
Translator

Speaker recognition
Speech

Web search
Image search
Video search
News search
Autosuggest

Academic knowledge
Entity linking service
Knowledge exploration
Recommendations
QnA maker

Custom
Vision Service

Custom
Language
Understanding

Custom
Speech Service

Custom
Search

Custom
Decision Service

THE BENEFITS OF BOTS & BOT FRAMEWORK

Reach users where they are, on any platform

Engage customers in a natural way; conversationally and in context

Expose products & services in messaging platforms, where users are highly engaged

Use AI to improve the customer experience and reduce the need for human intervention

<https://dev.botframework.com/>

Lilian Rincon, Yasmin Khan, Cortana, Silver Cup
5 members 10:23 pm

@Silver Cup Flat White, please

Silver Cup 10:23 pm
I'll get that ready for you Lilian. Would anyone else like something?

Americano Flat White Iced Latte

10:23 pm
@Silver Cup Americano, please

Silver Cup 10:23 pm
I'll get that ready for you Gurdeep. Would anyone else like something?

Americano Flat White Iced Latte

Yasmin 10:23 pm
@Silver Cup Iced Latte, please

Silver Cup 10:23 pm
I'll get that ready for you Yasmin

Silver Cup 10:23 pm
Where should I deliver?

Send to my location Choose another place

10:23 pm
@Silver Cup Send to my location

Type a message here

📎 🎤 📺

CONVERSATIONAL UI & BOTS ARE CREATING NEW BUSINESS OPPORTUNITIES

DELIGHT CUSTOMERS

24x7 Customers Service – always get an answer

Direct customer to best resource to assist



OPEN NEW CHANNELS

Deliver intelligent services that customers value – increase customer loyalty

Drive new revenue streams



DRIVE DOWN COST

Adopt low cost channel for customers

Triage contacts – answer common basic needs without human agents



Shake not stir through digital transformation

Engage Your Students

Engage with students with conversational UI & bots

Improve graduation rates
Student Performance Analytics
Personal learning with Learning Management Systems

Empower Your Academics

Research resources as a Service, as and when you need

Facilitate Classroom Collaboration

Optimize Your Operations

Reduce costs with Azure, the consistent hybrid cloud which is open and flexible

Optimise resources with Connected Campus

Transform Your Learning Products

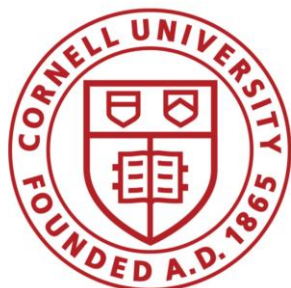
Connected Campus ecosystem model

Data Science Curriculum on Open edX

Open, shared & repeatable research data

References

Carnegie Mellon Sees a Way to Cut Energy Use by 20 Percent with Cloud Machine Learning Solution



Cornell's eBird delivers insights from biodiversity data with Microsoft's cloud

University of California

Using advanced analytical and visualization tools to research and teach

Covering millions of years' worth of warming trends within a class term is a challenge; managing the massive volumes of data, charts, videos, illustrations, and other support materials is even more daunting.



"The struggle with science is how to manage data."

Professor
Management



Customer
Massey University
Products and Services
Operations Management Suite
System Center Operations Manager
System Center Service Manager

Leading New Zealand University Frees IT Support for Innovation with Cloud Management

Research scientist uses Microsoft Cloud technology for high-energy physics computing

Purdue university transforms IT management with holistic monitoring and reporting solution



University
of Victoria

June 6, 2014

Randall
project,
petabyte



Empowering every
person and organisation
on the planet to achieve
more

Key Contacts in NZL:

Katrien Pagnaer

kpagnaer@microsoft.com

Karl De Borst

karl.deborst@microsoft.com

Thank you

Dr. Alexandros Papaspyridis
alexpa@microsoft.com