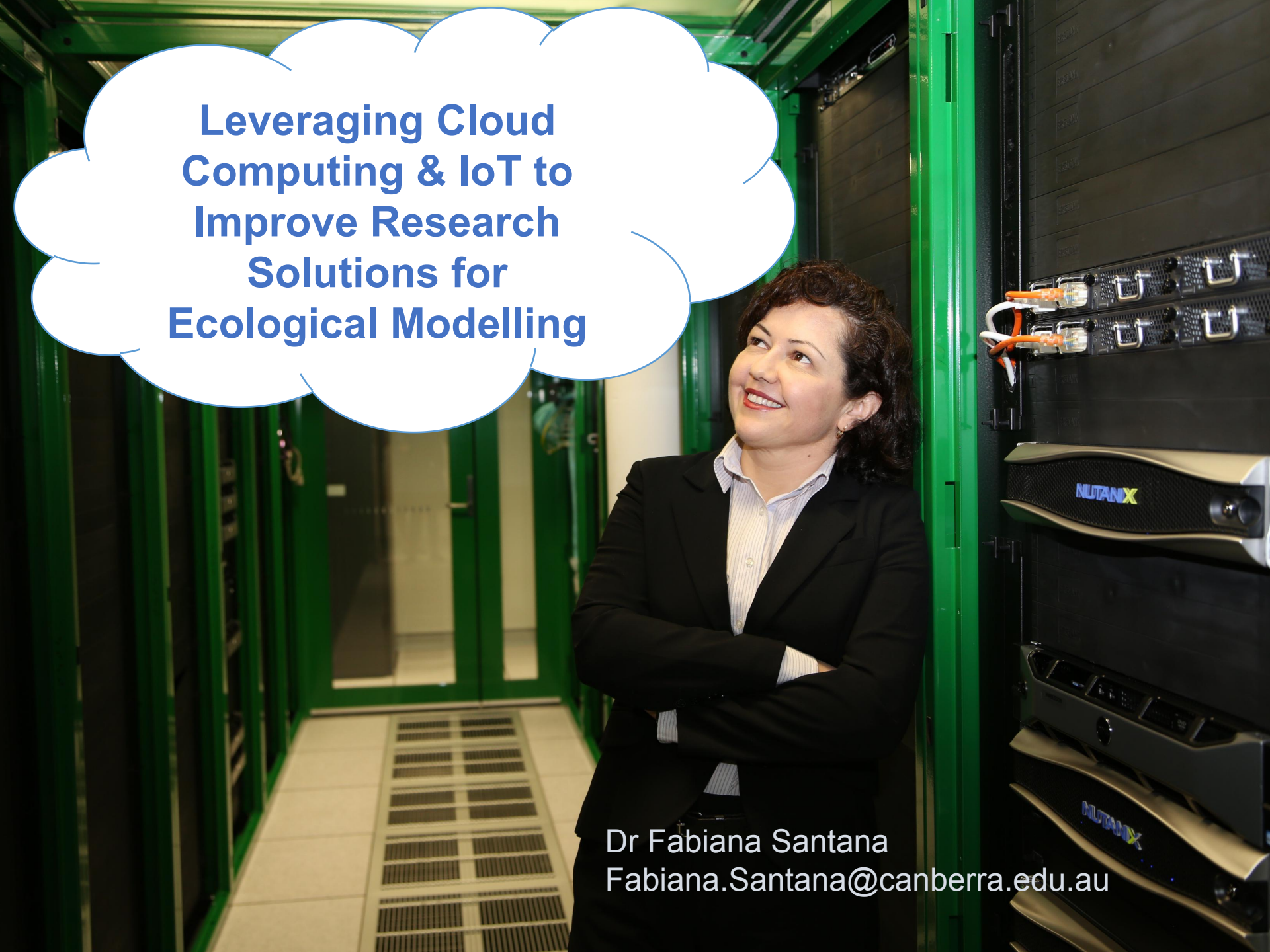
Leveraging Cloud Computing & IoT to Improve Research Solutions for Ecological Modelling



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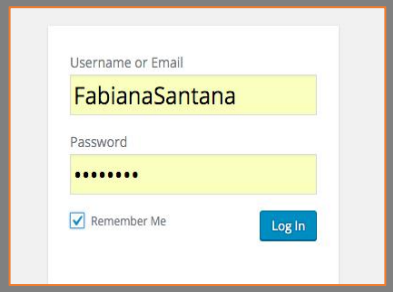
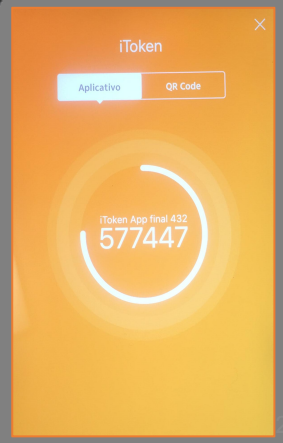
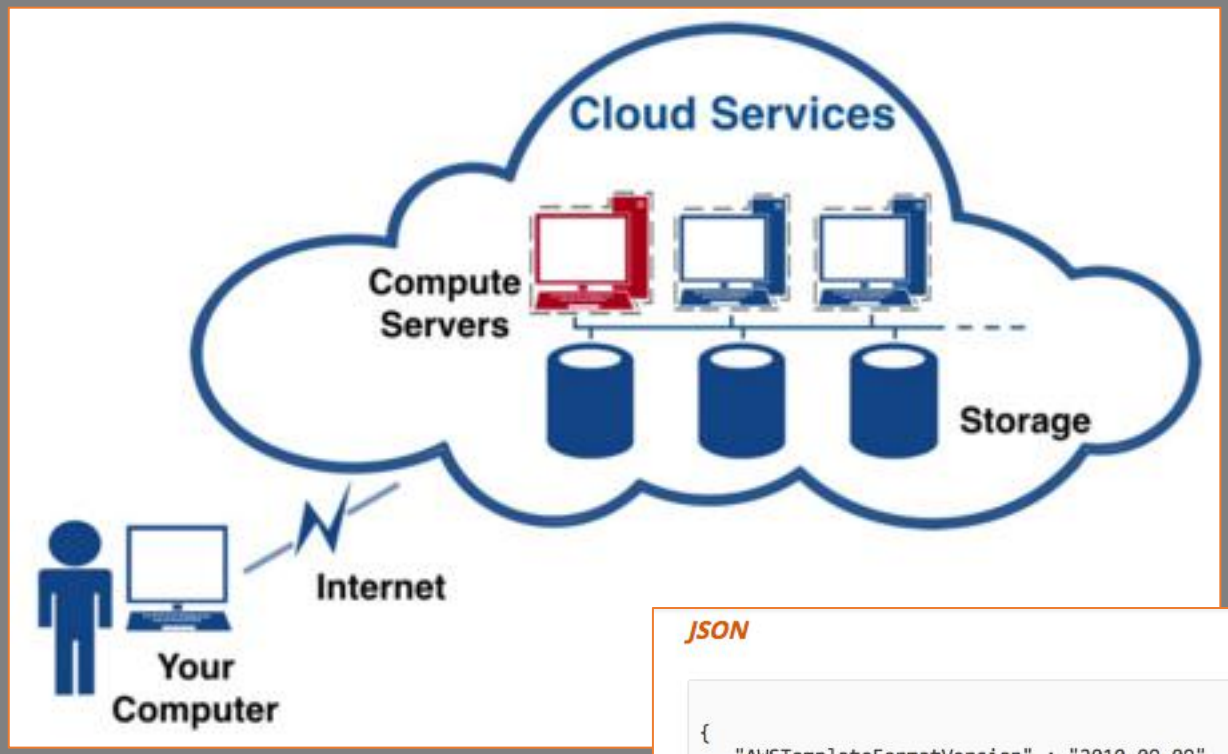
Internet

Web Servers

Application Servers







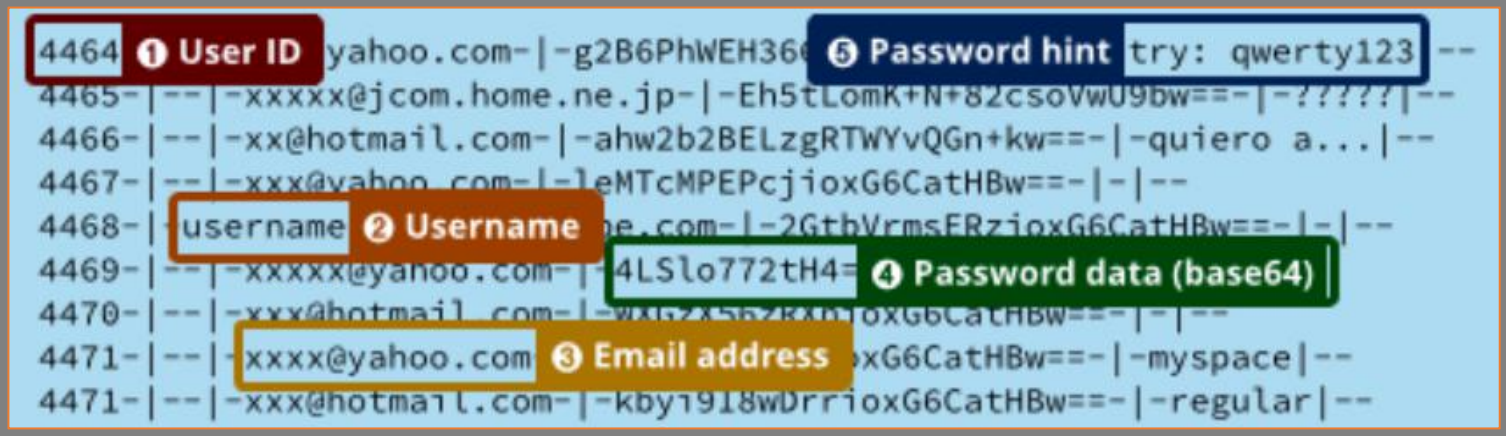
☑ Time to market
☑ Agility
☑ Provision of resources

JSON

```
{
   "AWSTemplateFormatVersion" : "2010-09-09",
   "Description" : "Ec2 block device mapping",
   "Resources" : {
      "MyEC2Instance" : {
         "Type" : "AWS::EC2::Instance",
         "Properties" : {
            "ImageId" : "ami-79fd7eee",
            "KeyName" : "testkey",
            "BlockDeviceMappings" : [
               {
                  "DeviceName" : "/dev/sdm",
                  "Ebs" : {
                     "VolumeType" : "io1",
                     "Iops" : "200",
                     "DeleteOnTermination" : "false",
                     "VolumeSize" : "20"
                  }
               },
               {
                  "DeviceName" : "/dev/sdk",
                  "NoDevice" : {}
               }
            ]
         }
      }
   }
}
```

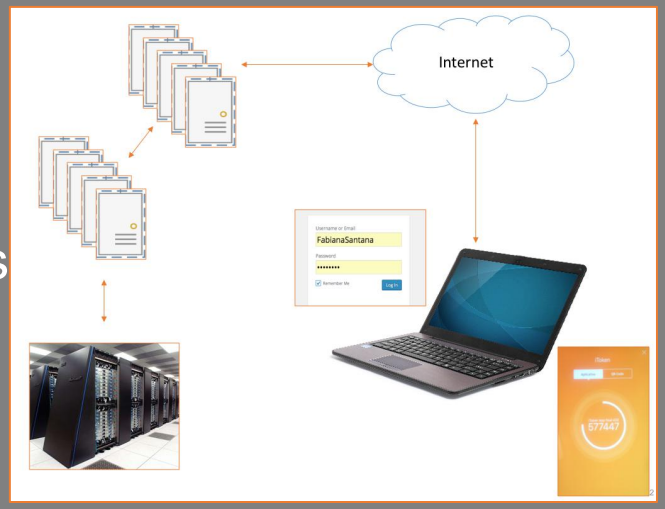
Adobe's October 2013 data breach

- 38,000,000 customers affected



Twitter 2013 data breach

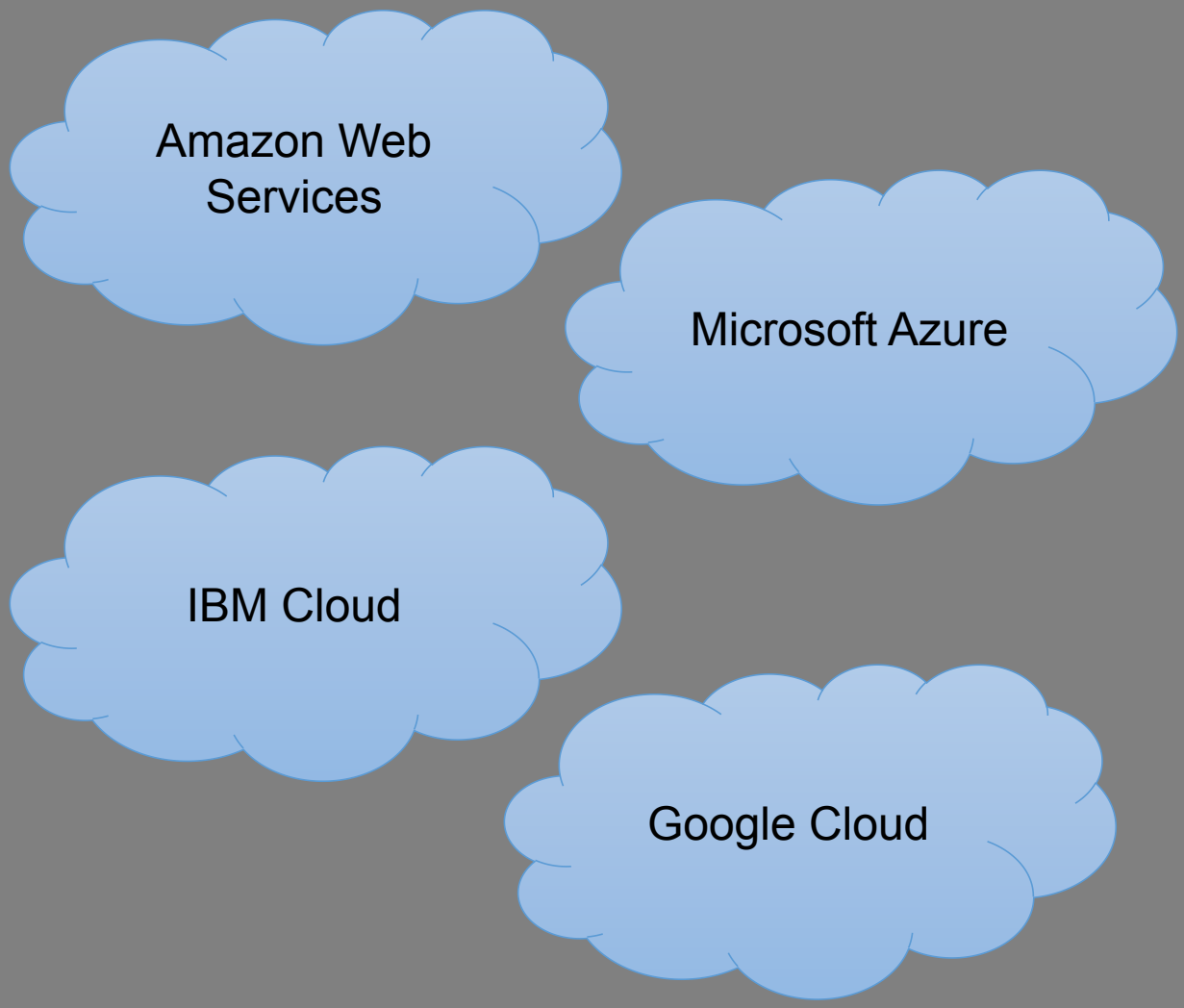
- 250,000 accounts hacked
- Usernames, email addresses and passwords



Yahoo 2014 data breach

- 500,000,000 accounts
- $35,000,000 fine for failing to disclose the data breach
- Verizon got a $350,000,000 "discount" when acquiring Yahoo

Security Investments – Major Providers



☑ Time to market
☑ Agility
☑ Provision of resources
☑ Security

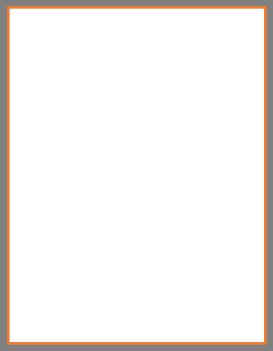
YOU WILL BE HACKED…

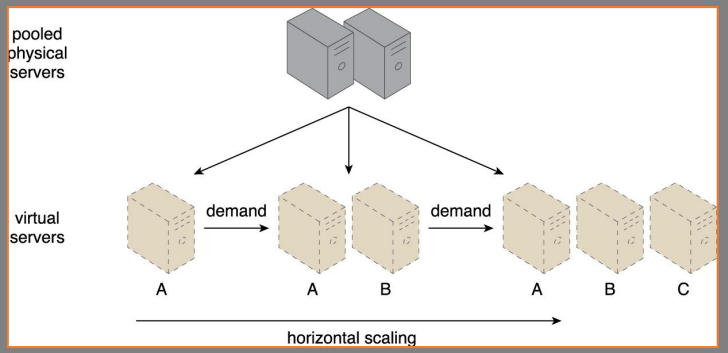
But it's unlikely the cloud provider will be the main responsible for it!

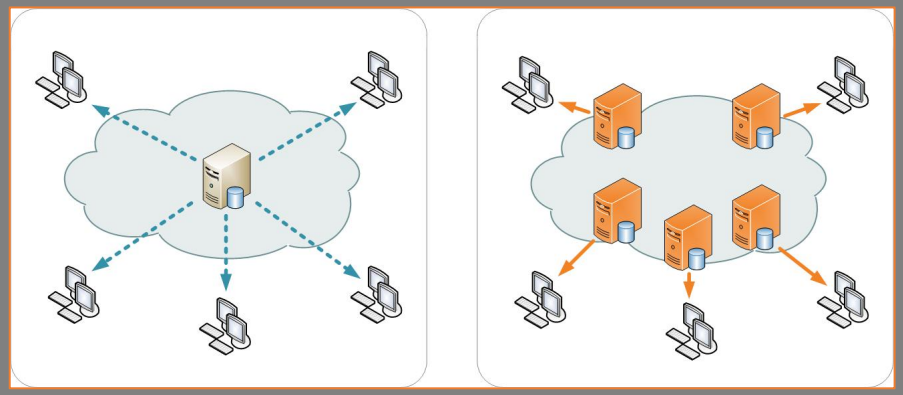
Privacy

☑ Time to market
☑ Agility
☑ Provision of resources
☑ Security
☑ Privacy ???

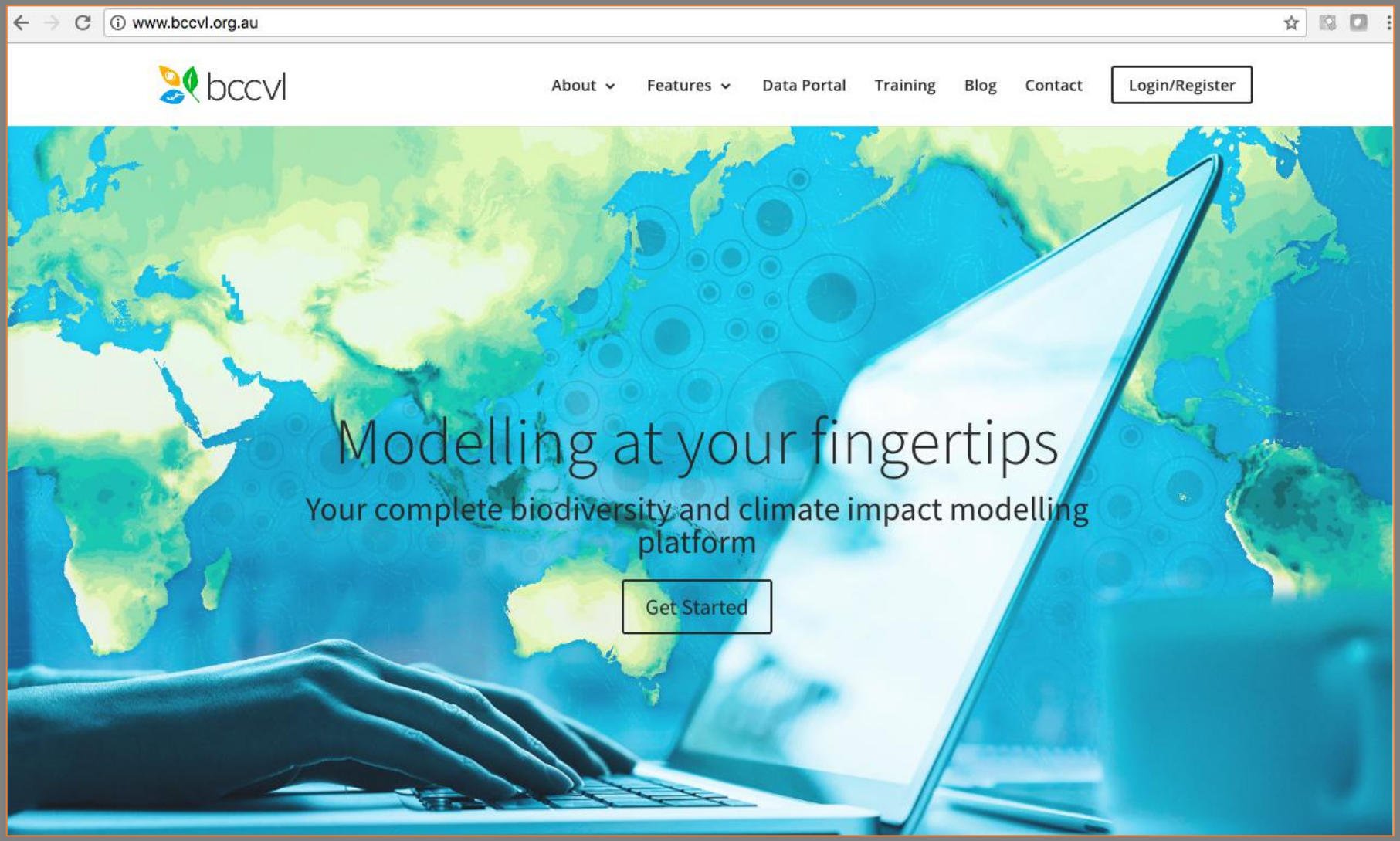
Now, why do I really like cloud?







Clouds supporting science – Virtual Labs



Clouds supporting science – Virtual Labs

Interactive Coding T

ecocloud gives you access to s
machines in the Nectar cloud.

Virtual Desktop

The virtual desktop service

CoESRA Virtual D

This Virtual Desktop env
based virtual desktop er
Kepler Scientific Workfl
and Biodiverse.

Point-and-click tools

This is a catalogue of popular tools used in ecosciences. These are external tools to the *ecocloud* Platform and the links will take you to the respective websites for each tool.

Think there's a tool missing? Let us know here.

ALA Spatial Portal

The Spatial Portal is a rich research interface to exploring and investigating the data held in the Atlas of Living Australia.

BCCVL

The Biodiversity and Climate Change Virtual Laboratory (BCCVL) is a "one stop modelling shop" that simplifies the process of biodiversity-climate change modelling. It provides access to curated datasets, modelling workflows and support and training content.

MCAS-S

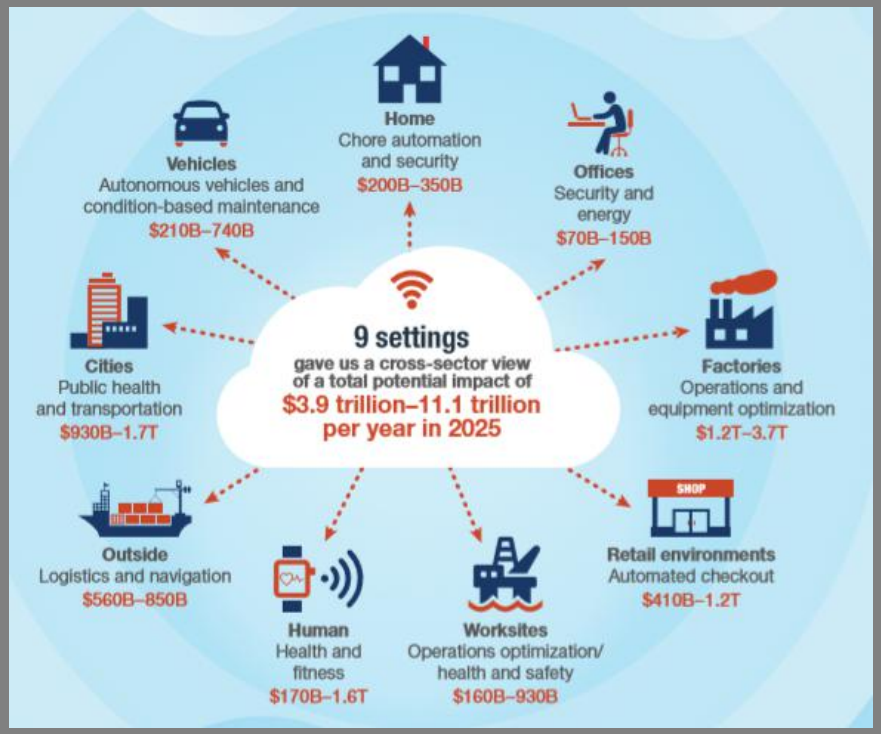
The Multi-Criteria Analysis Shell for Spatial Decision Support (MCAS-S) is a tool designed for decision-makers. It shows transparently how mapped information can be combined to meet an objective. MCAS-S allows stakeholders to see the effects that their decisions may have. Currently, MCAS-S is only available as a software download, however we're working with the MCAS-S team to bring this into a cloud solution.

AURIN

AURIN provides urban and built environment researchers with access to diverse sources of data, data integration capabilities, and capability for interrogating those data to make informed decisions about urban environments based on realistic scenarios and evidence-based analysis.

Why Is the *Cloud of Things* so important?

- Global GDP in 2025 est.
  $99.95 Trillion



- McKinsey Global Research
- 150 IoT Use Cases Globally
- 300 IoT applications
- Settings, not Industry

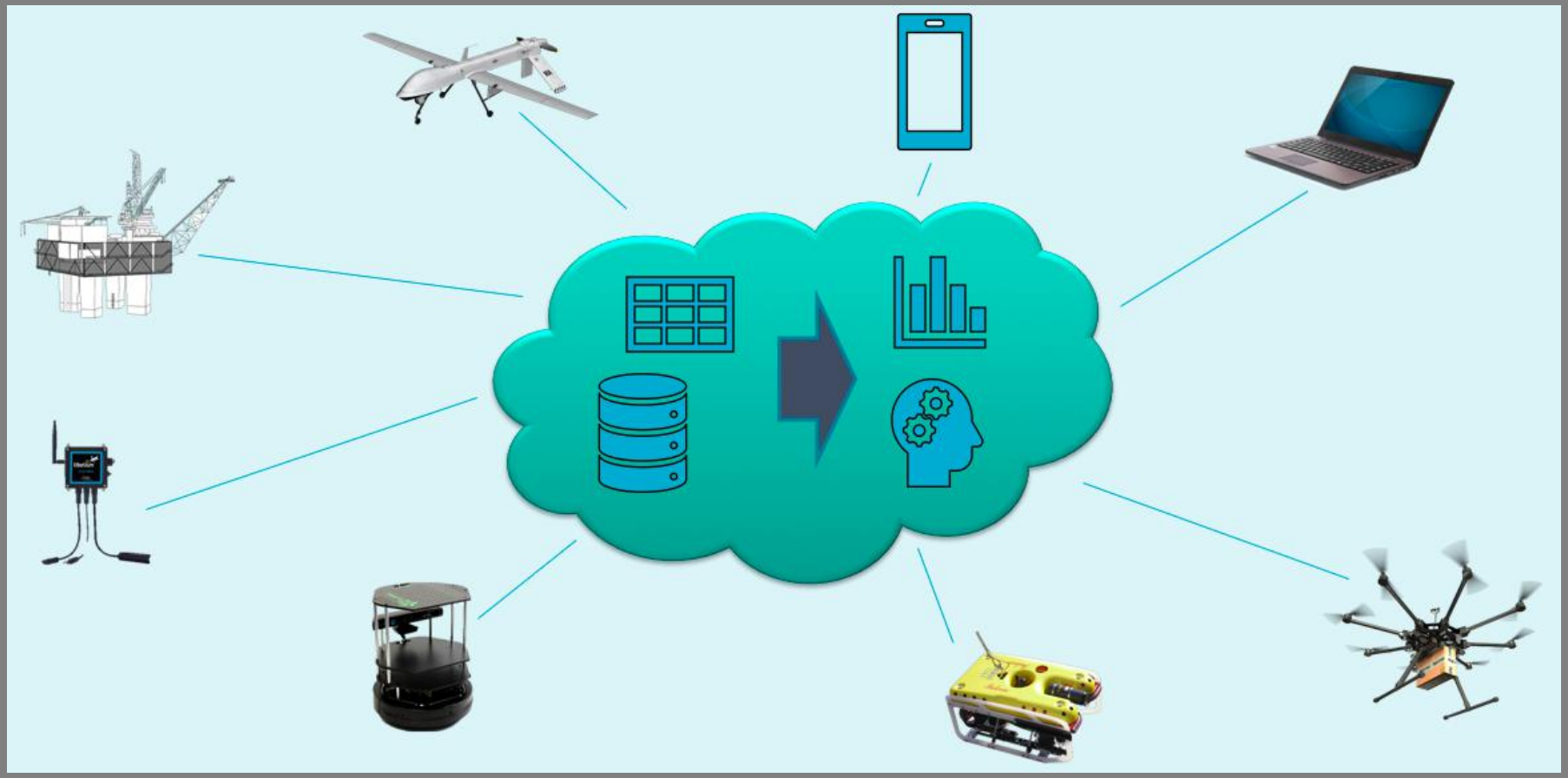
- Interoperability in the Cloud of Things: “situations in which two or more IoT systems must work together can account for about 40 percent of the total value that can be unlocked by the Internet of Things”

"On average, interoperability is necessary to create 40 percent of the potential value that can be generated by the Internet of Things" – *McKinsey Global Institute*

Translation: Interoperability in the Cloud of Things is worth about $2.88T.

Per annum.

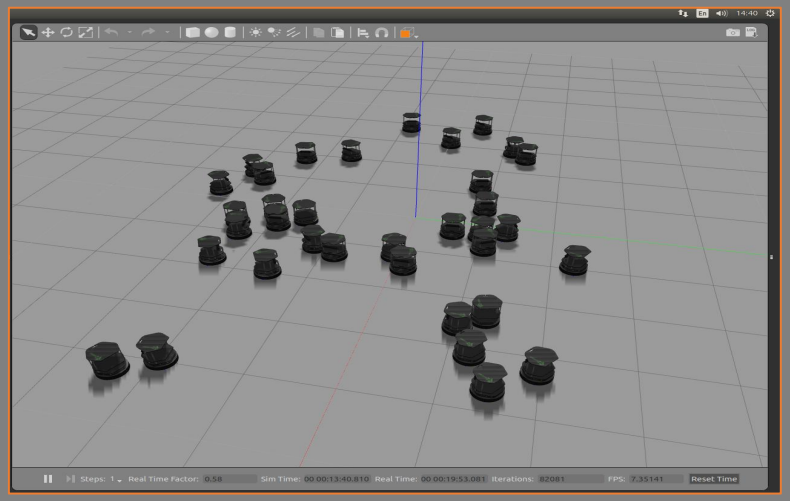
Clouds supporting science – The Cloud of Things



Clouds supporting science – The Cloud of Things

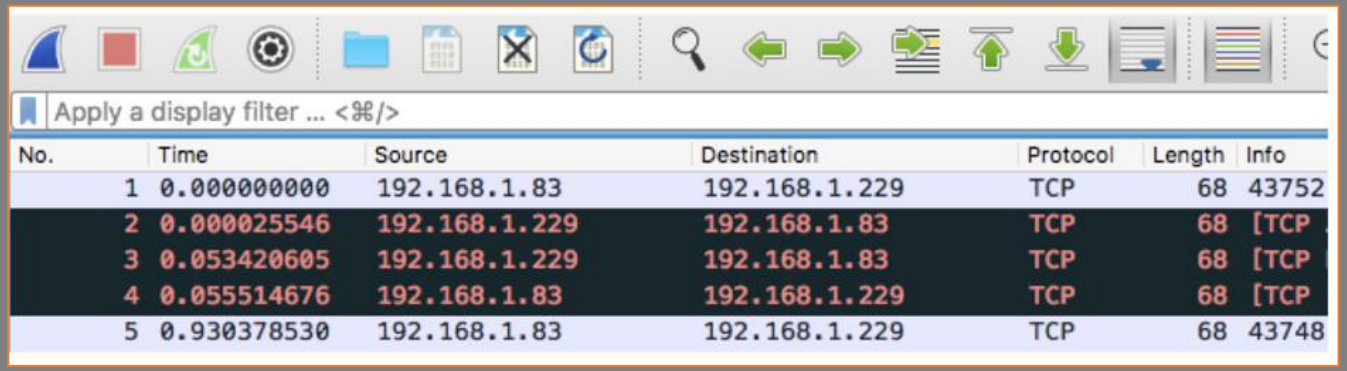
Results SO FAR

Turtlebots Integrated



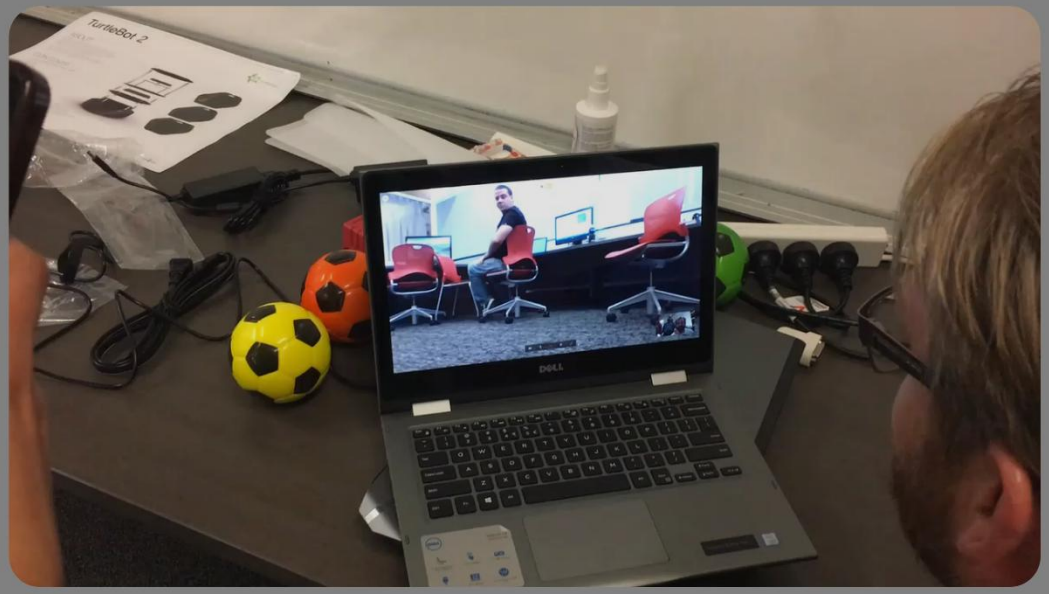
Simulators & Assessment of Cloud Capacity

Monitoring of Network Latency



Clouds supporting science – The Cloud of Things

Results



Clouds supporting science – The Cloud of Things

Potential Contributions in Different Areas

- **Applied Science**
- Cloud Research
- Internet of Things & Robotics
- Cybersecurity
- Privacy
- Direct Application to Industry

Clouds supporting science – The Cloud of Things

Next Steps

Things in the *Cloud of Things*:

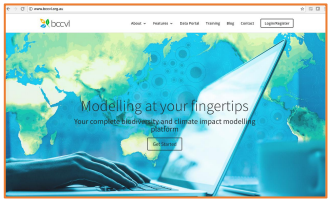
Data Acquisition/Sharing

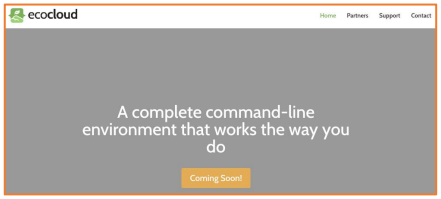
Management

Monitoring

Modelling/Data Po

ALA Spatial Portal





Remote Management

Migratory Species