Internet der Dinge – Die nächste Katastrophe?

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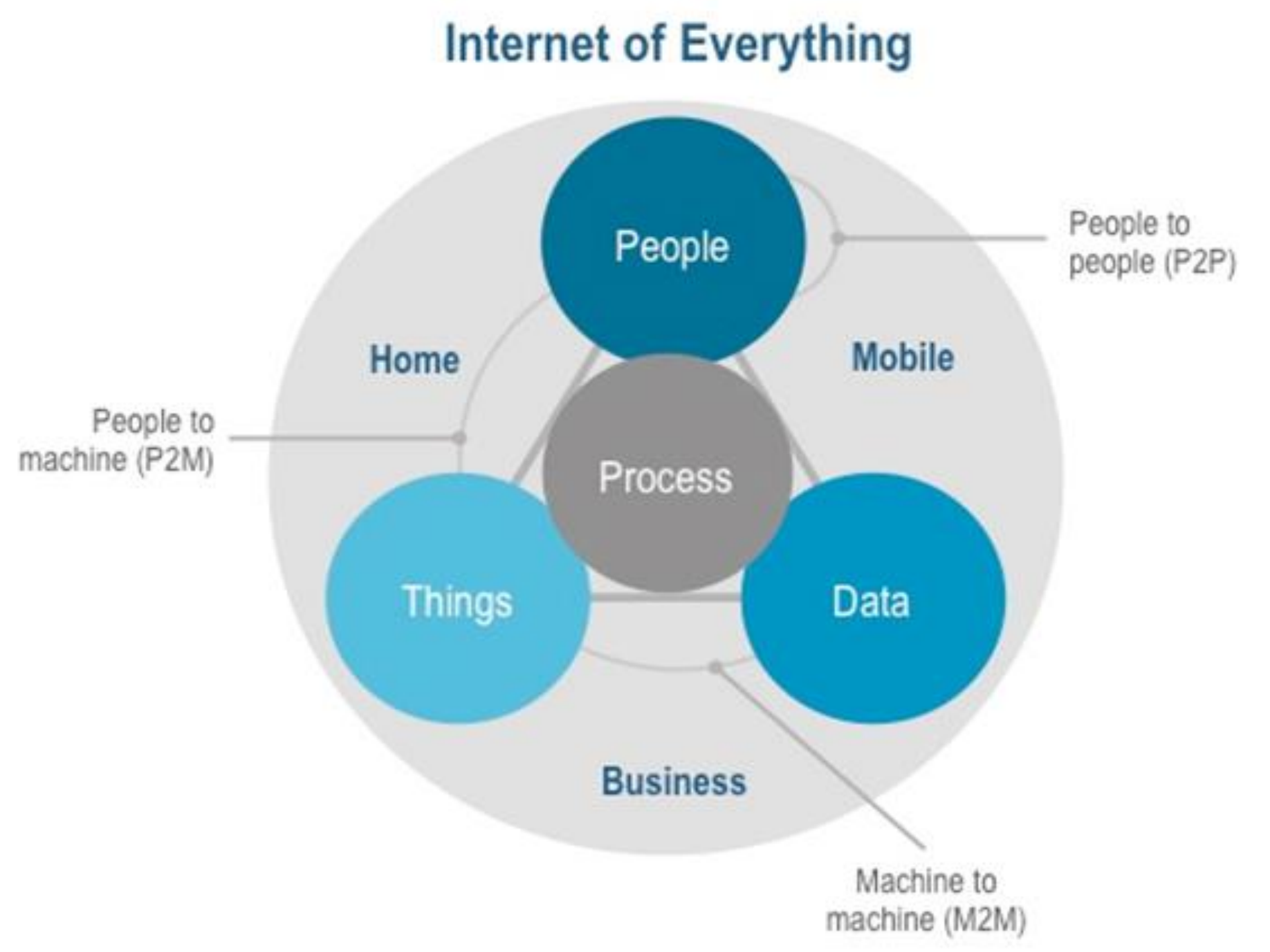
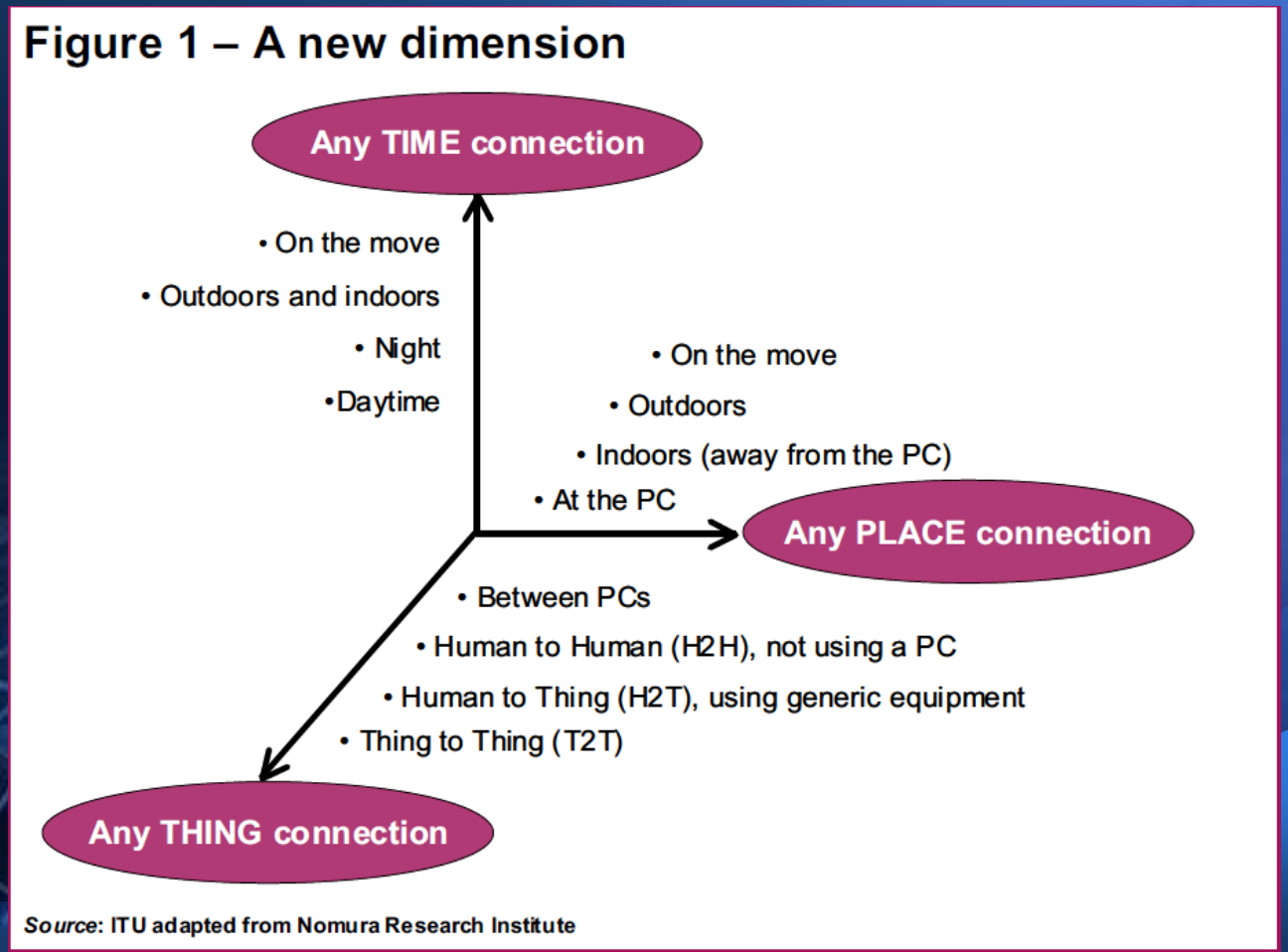
- Leiter IT- und Medienforensiklabor
- Geprüfter Datenschutzbeauftragter (SGS TÜV)
  - diverse Mandate als Externer Datenschutzbeauftragter
- Geprüfter IT-Sicherheitsbeauftragter (SGS TÜV)
- ISO27001 Auditor (SGS TÜV)
- Certified Ethical Hacker (CEH)
- Computer Hacking Forensic Investigator (CHFI)
- Security Analyst (ECSA)
- Licensed Penetration Tester (LPT)
- Cobit Practitioner
- …

Inhalt


Internet of Everything
People
People to people (P2P)
Home
Mobile
People to machine (P2M)
Process
Things
Data
Business
Machine to machine (M2M)

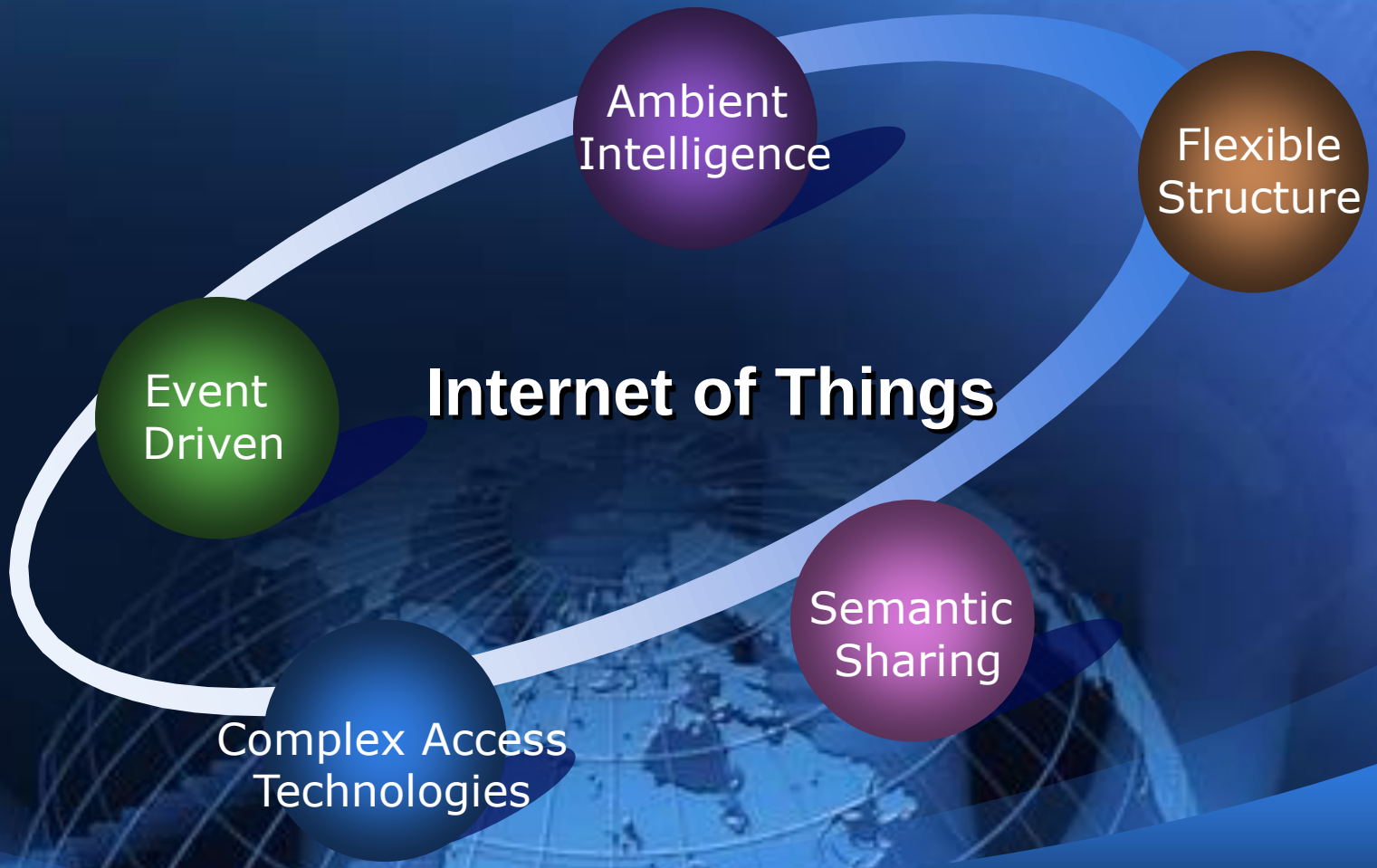
What is the Internet of Things?

From any time,any place connectivity for anyone, we will now have connectivity for anything!

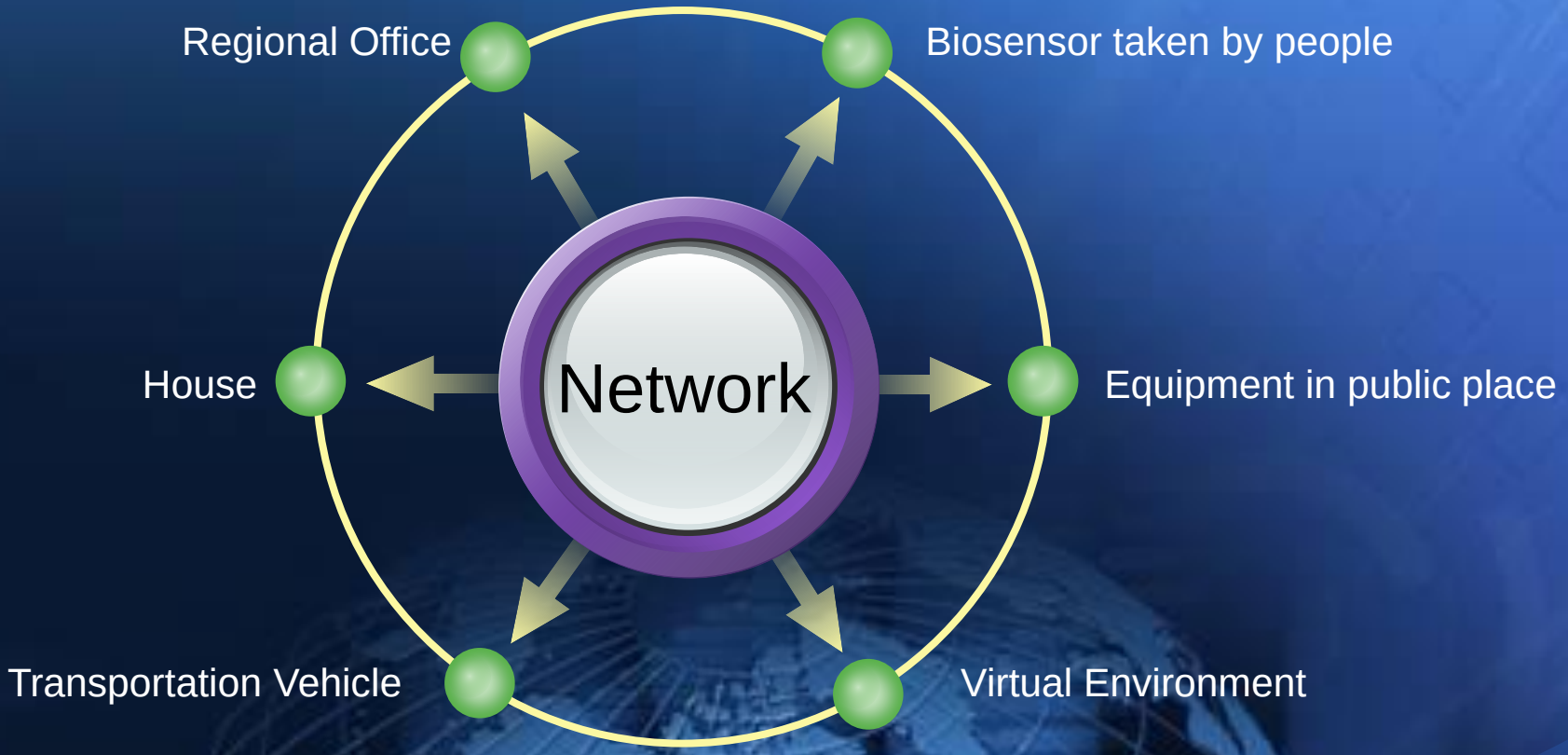


What's the Internet of Things

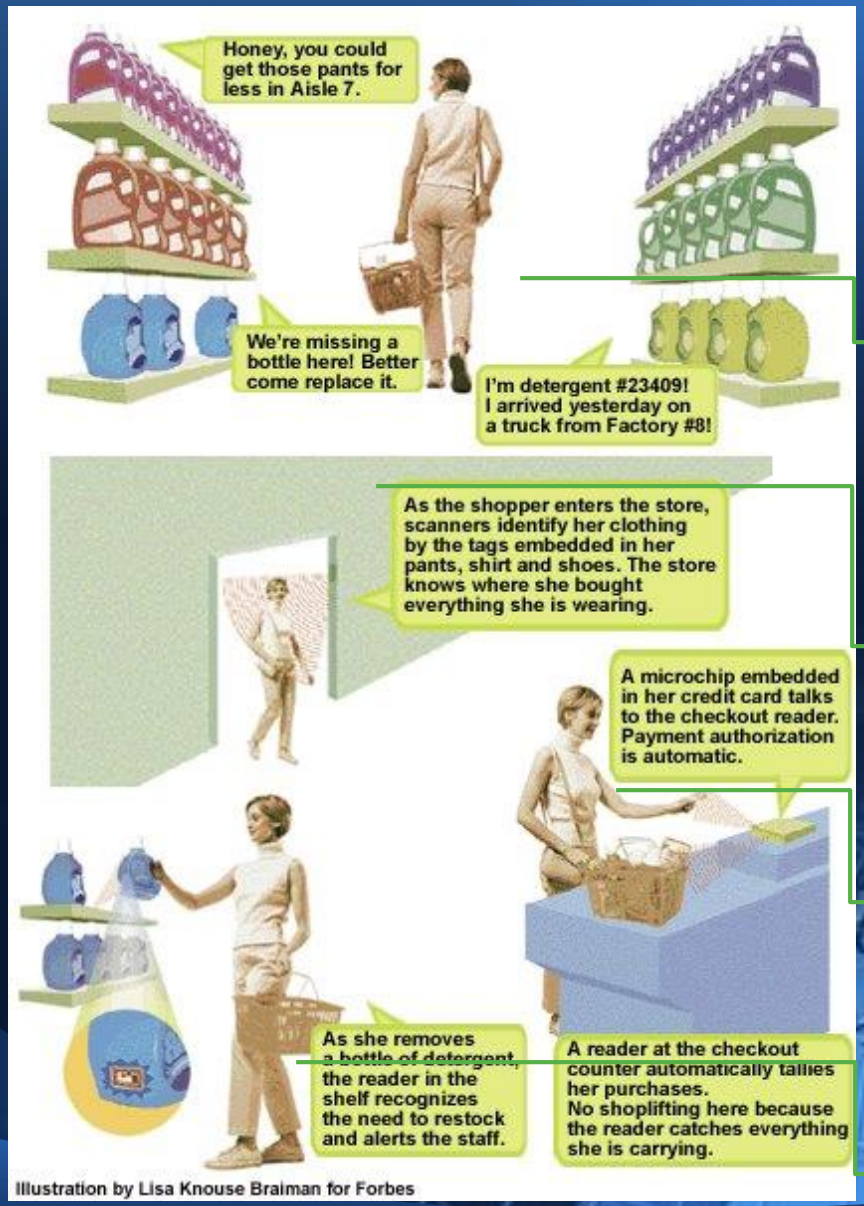
Characteristics



The application of IoT(1)



The application of IoT(2)



Scenario: shopping

(2) When shopping in the market, the goods will introduce themselves.

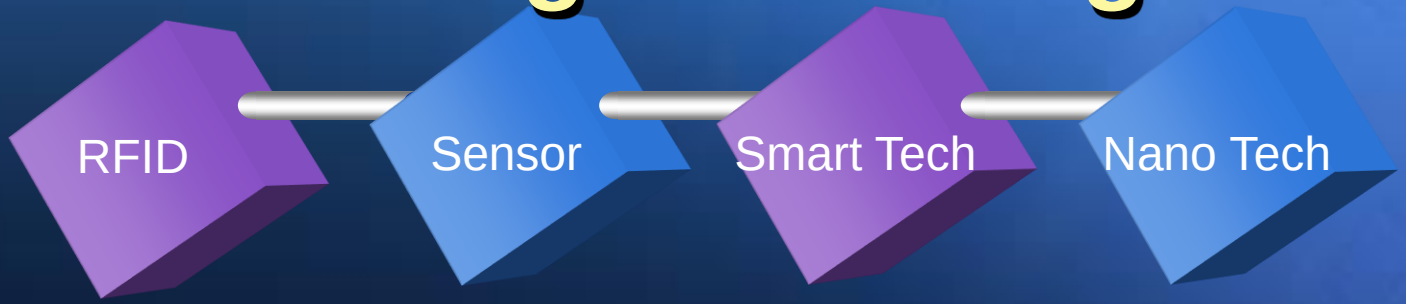
(1) When entering the doors, scanners will identify the tags on her clothing.

(4) When paying for the goods, the microchip of the credit card will communicate with checkout reader.

(3) When moving the goods, the reader will tell the staff to put a new one.

State of the Art of IoT

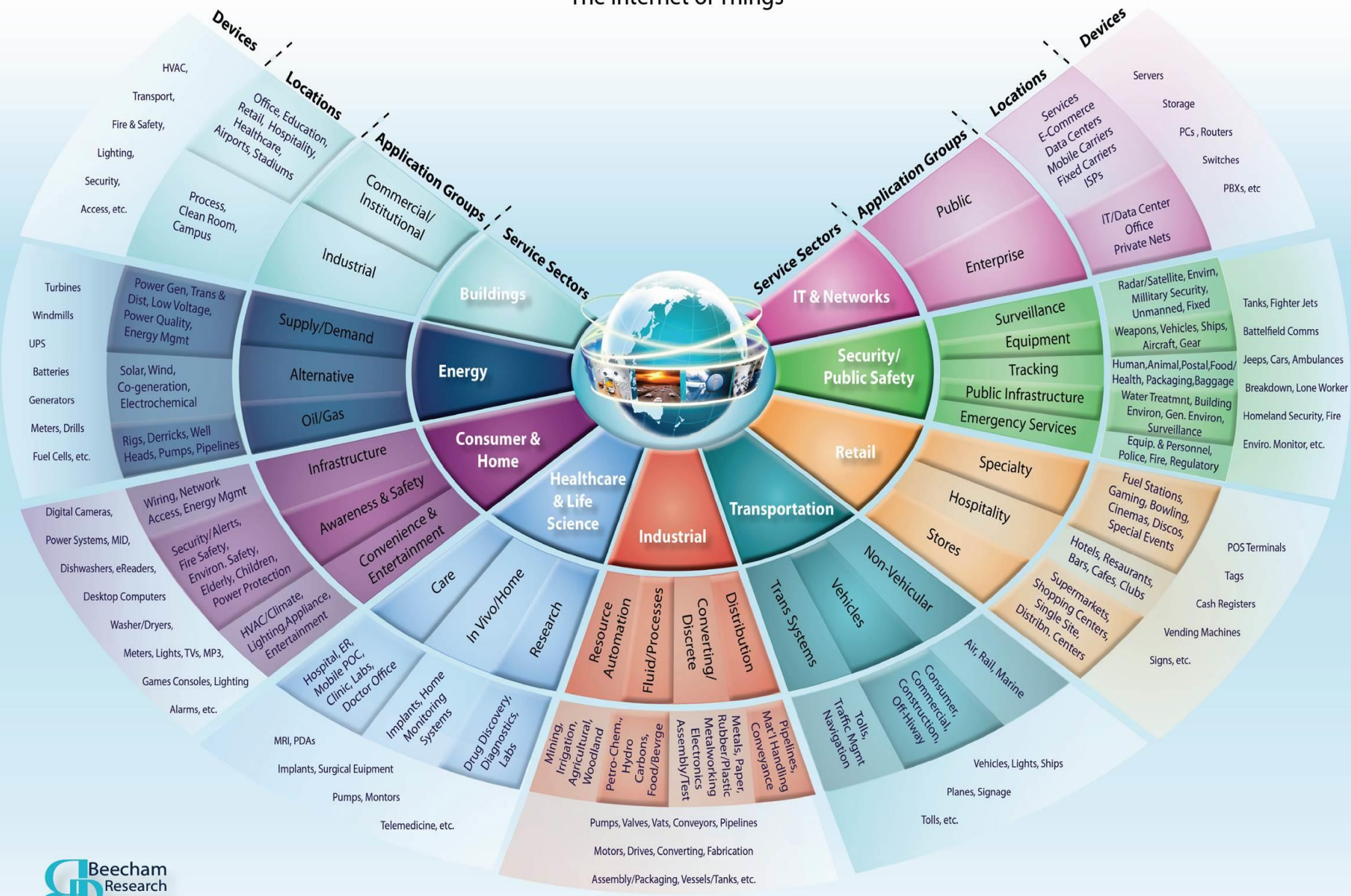
Enabling Technologies



RFID	Sensor	Smart Tech	Nano Tech
To identify and track the data of things	To collect and process the data to detect the changes in the physical status of things	To enhance the power of the network by devolving processing capabilities to different part of the network.	To make the smaller and smaller things have the ability to connect and interact.

M2M World of Connected Services

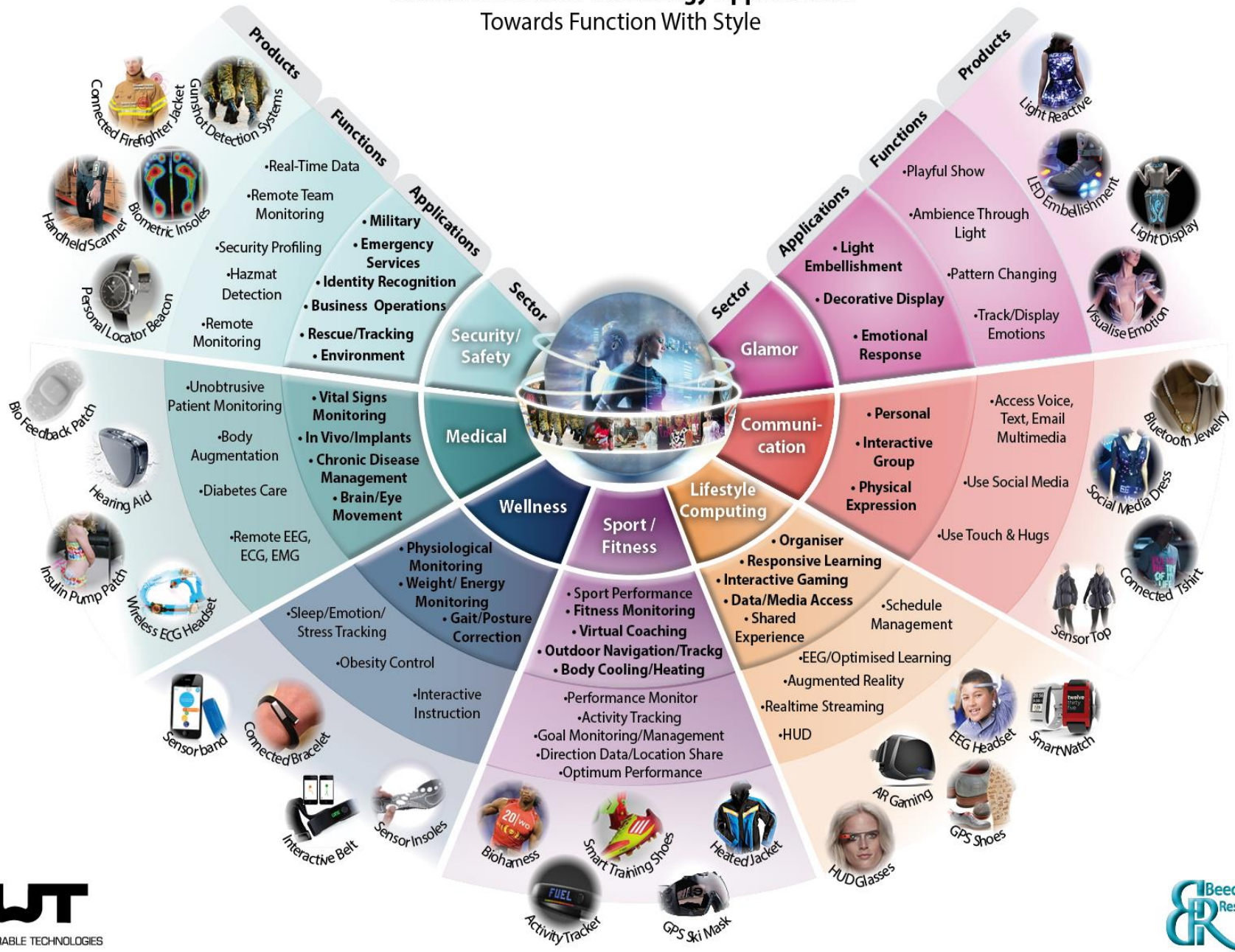
The Internet of Things



Beecham Research

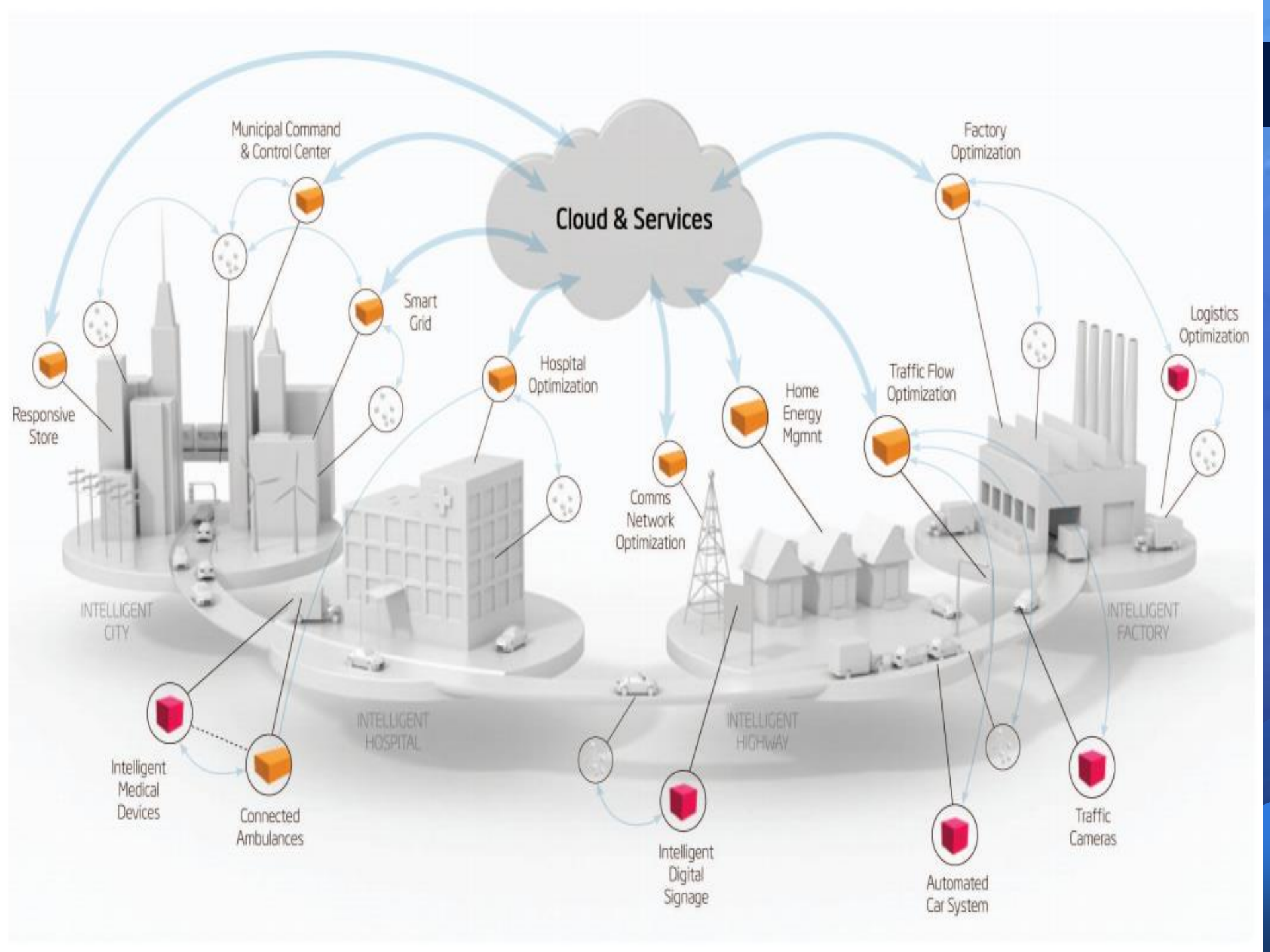
World of Wearable Technology Applications:

Towards Function With Style

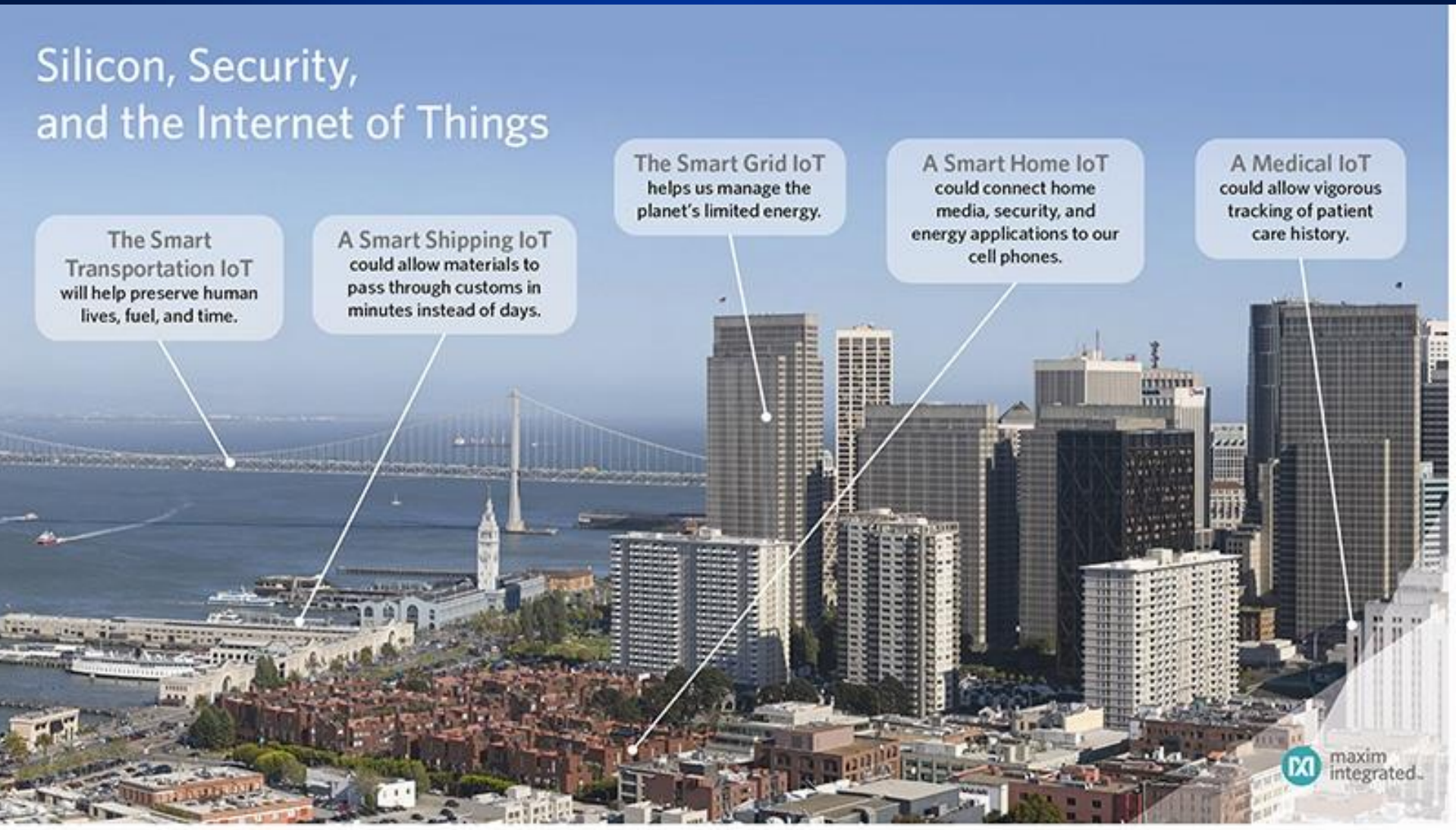


WEARABLE TECHNOLOGIES

Beecham Research

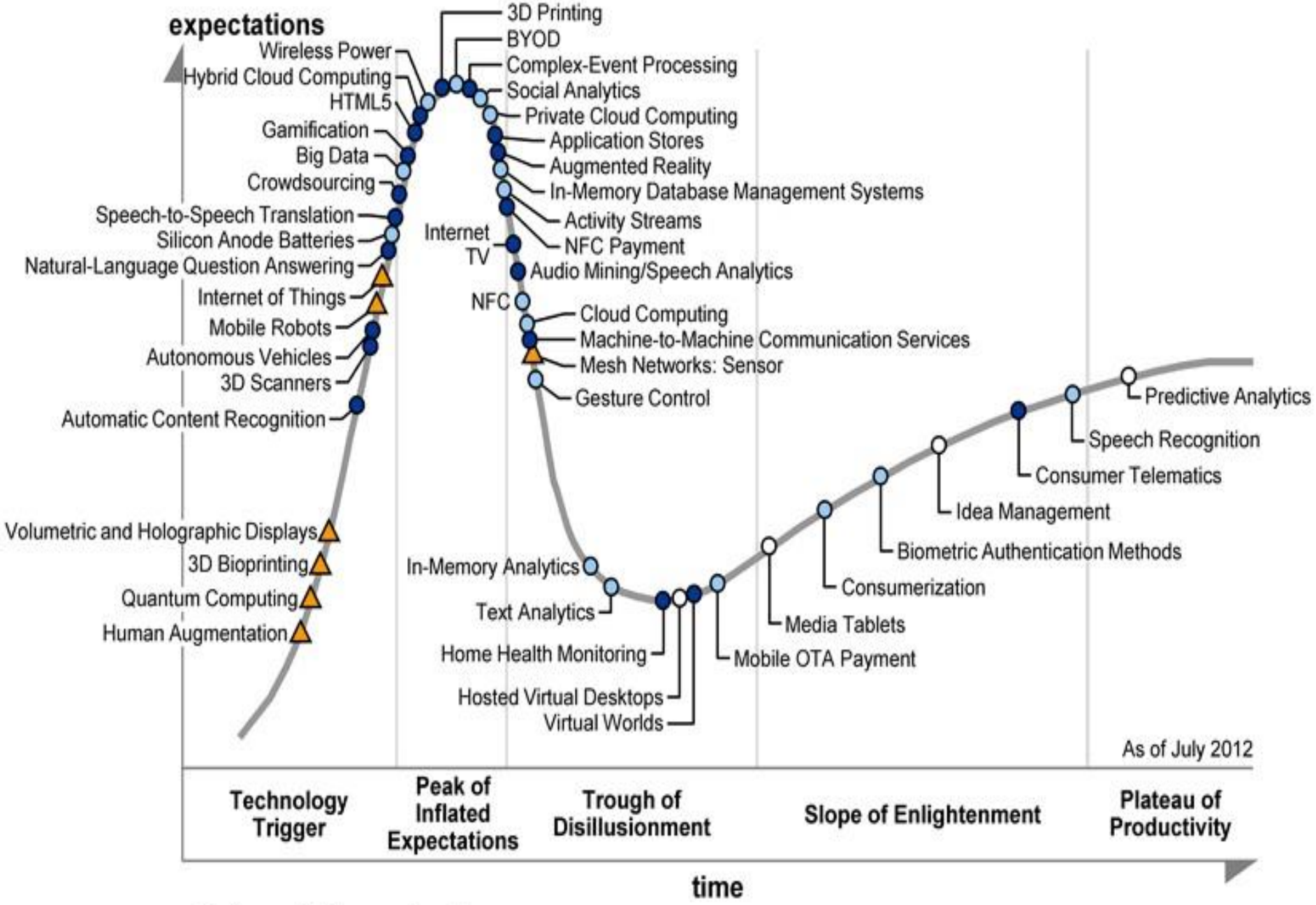

Cloud & Services
Municipal Command & Control Center
Factory Optimization
Smart Grid
Logistics Optimization
Hospital Optimization
Traffic Flow Optimization
Home Energy Mgmnt
Responsive Store
Comms Network Optimization
INTELLIGENT CITY
INTELLIGENT FACTORY
INTELLIGENT HOSPITAL
INTELLIGENT HIGHWAY
Intelligent Medical Devices
Connected Ambulances
Intelligent Digital Signage
Automated Car System
Traffic Cameras


Satellite communications
Terrestrial broadcast
Mobile
Intermodal communications
Navigation
Metropolitan-area network
Vehicle-to-vehicle
Safety systems
Passenger information
Travel assistance
Traffic signs
Wireless local-area network
Adaptive cruise control
Trip planning
Fleet management
Toll collection

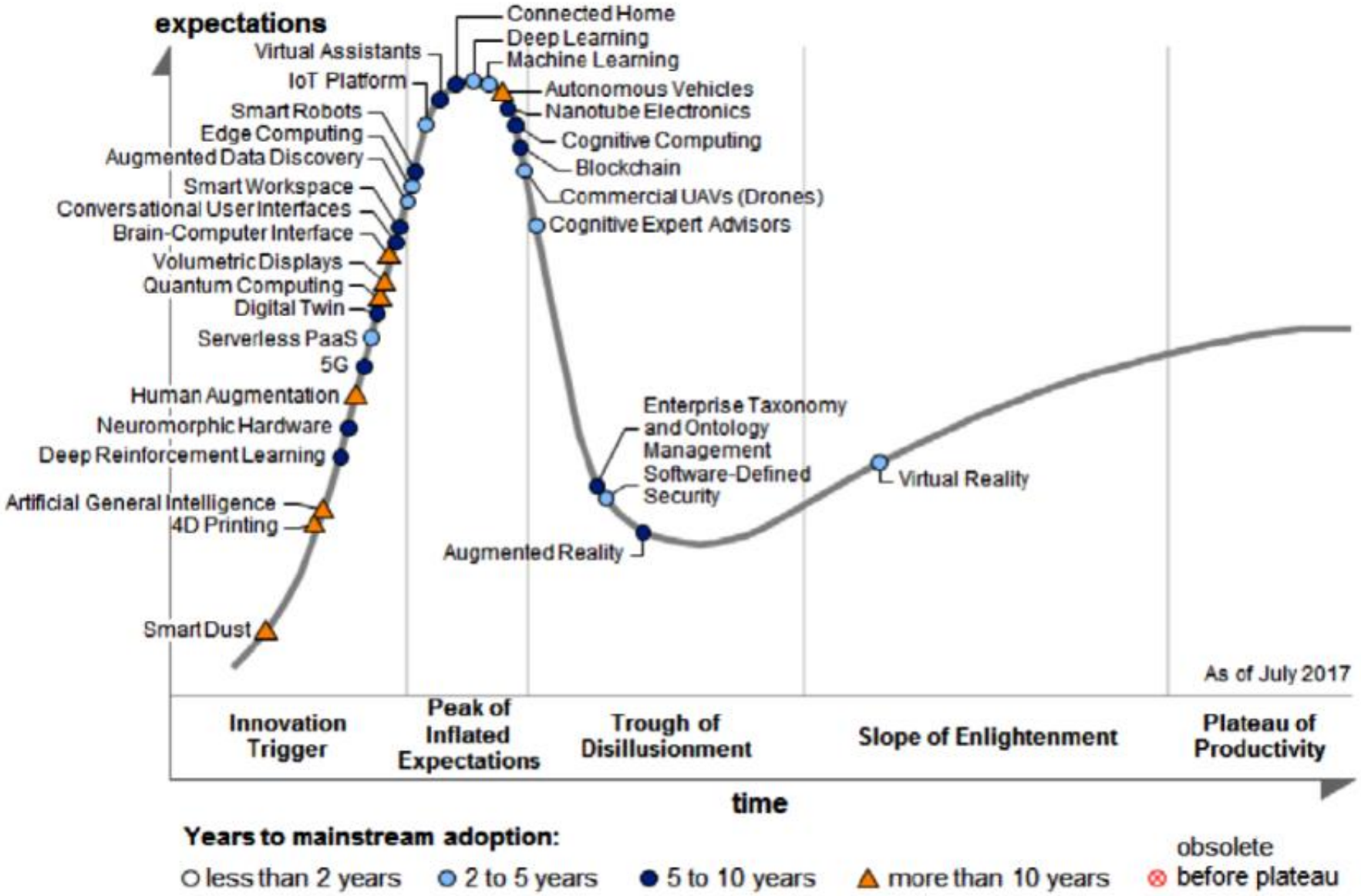

Silicon, Security,
and the Internet of Things
The Smart Transportation IoT
will help preserve human lives, fuel, and time.
A Smart Shipping IoT
could allow materials to pass through customs in minutes instead of days.
The Smart Grid IoT
helps us manage the planet's limited energy.
A Smart Home IoT
could connect home media, security, and energy applications to our cell phones.
A Medical IoT
could allow vigorous tracking of patient care history.
maxim integrated

Smart home


Motion sensor
Door Control
Environmental monitoring
HVAC Control
Light Control
Home Automation
Control your home from the touch of a button!
Window Control
STB


expectations
3D Printing
BYOD
Complex-Event Processing
Social Analytics
Private Cloud Computing
Application Stores
Augmented Reality
In-Memory Database Management Systems
Activity Streams
NFC Payment
Audio Mining/Speech Analytics
Cloud Computing
Machine-to-Machine Communication Services
Mesh Networks: Sensor
Gesture Control
Wireless Power
Hybrid Cloud Computing
HTML5
Gamification
Big Data
Crowdsourcing
Speech-to-Speech Translation
Silicon Anode Batteries
Natural-Language Question Answering
Internet of Things
Mobile Robots
Autonomous Vehicles
3D Scanners
Automatic Content Recognition
Internet TV
NFC
Volumetric and Holographic Displays
3D Bioprinting
Quantum Computing
Human Augmentation
In-Memory Analytics
Text Analytics
Home Health Monitoring
Hosted Virtual Desktops
Virtual Worlds
Predictive Analytics
Speech Recognition
Consumer Telematics
Idea Management
Biometric Authentication Methods
Consumerization
Media Tablets
Mobile OTA Payment
As of July 2012
Technology Trigger
Peak of Inflated Expectations
Trough of Disillusionment
Slope of Enlightenment
Plateau of Productivity
time
Plateau will be reached in:
less than 2 years
2 to 5 years
5 to 10 years
more than 10 years
obsolete before plateau

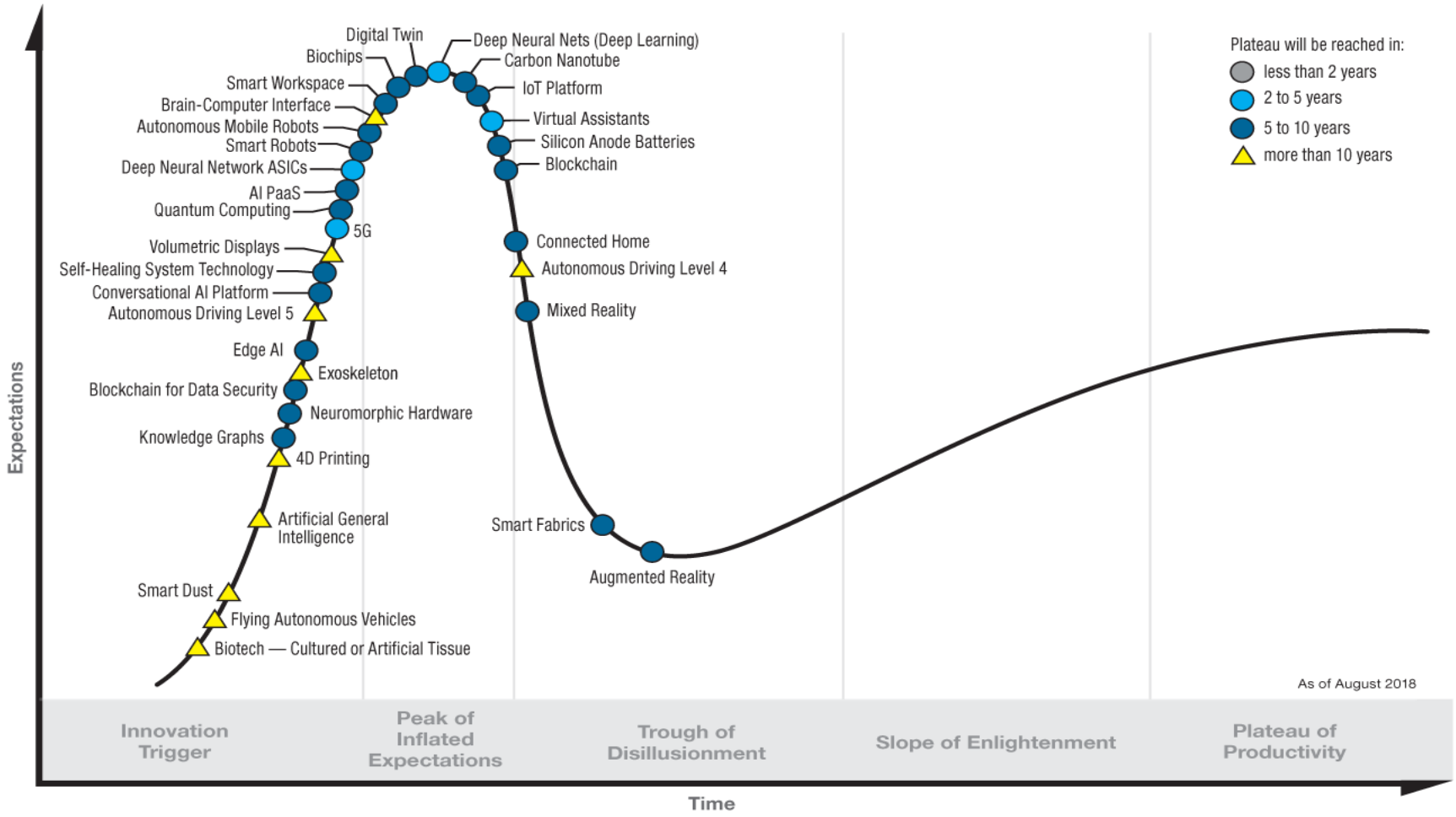
Gartner's Hype Cycle for Emerging Technologies, 2017



Note: PaaS = platform as a service; UAVs = unmanned aerial vehicles

Source: Gartner (July 2017)

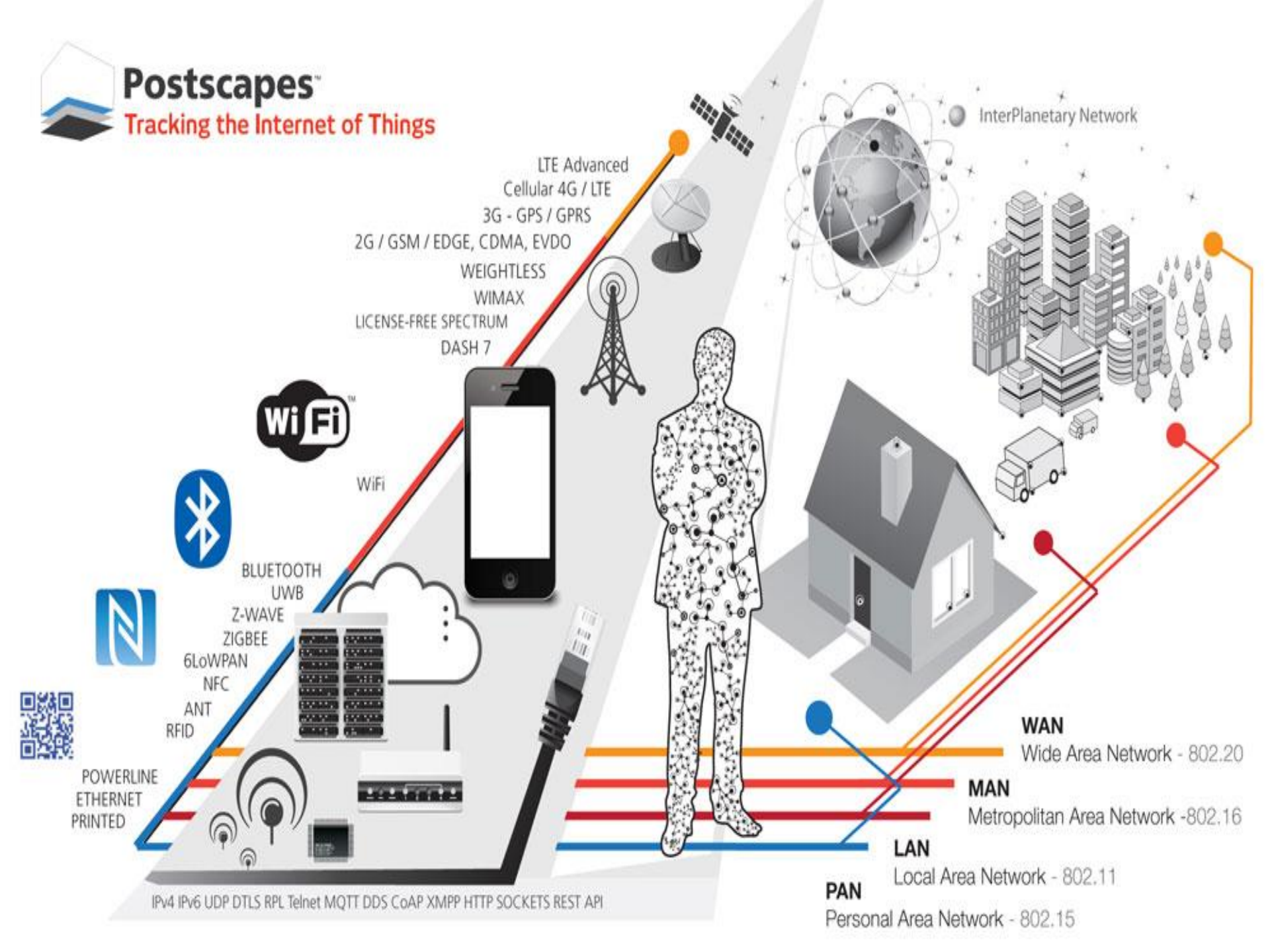
Hype Cycle for Emerging Technologies, 2018



gartner.com/SmarterWithGartner

Source: Gartner (August 2018)

Gartner

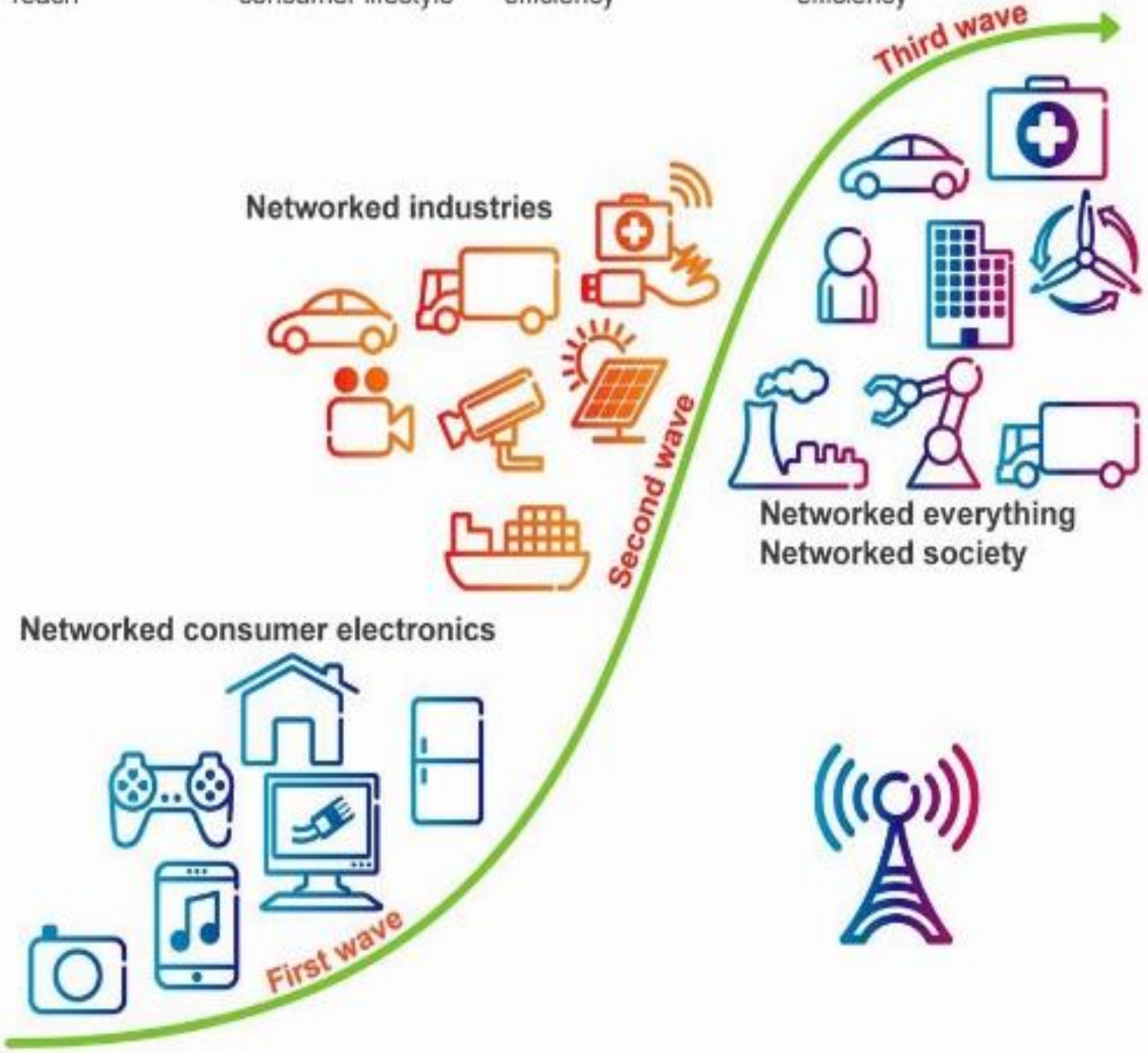

Postscapes
Tracking the Internet of Things
InterPlanetary Network
LTE Advanced
Cellular 4G / LTE
3G - GPS / GPRS
2G / GSM / EDGE, CDMA, EVDO
WEIGHTLESS
WIMAX
LICENSE-FREE SPECTRUM
DASH 7
WiFi
WiFi
BLUETOOTH
UWB
Z-WAVE
ZIGBEE
6LoWPAN
NFC
ANT
RFID
POWERLINE
ETHERNET
PRINTED
IPv4 IPv6 UDP DTLS RPL Telnet MQTT DDS CoAP XMPP HTTP SOCKETS REST API
WAN
Wide Area Network - 802.20
MAN
Metropolitan Area Network -802.16
LAN
Local Area Network - 802.11
PAN
Personal Area Network - 802.15

Improved reach

Improved value – consumer lifestyle

Improved process efficiency

Improved human efficiency



Intelligent Systems for a More Connected World

WHAT ARE INTELLIGENT SYSTEMS?

Intelligent Systems are devices that transform how we travel, shop, make things and more.

7 Connected Devices per Person

By 2020 each person will own an average of 7 connected devices[1].

COMMUNICATIONS

Connected
Shares data through Internet and the cloud

Managed
Can be remotely monitored, updated and power controlled

Secured
Protects data against malware, theft and tampering

#2 Data Breach

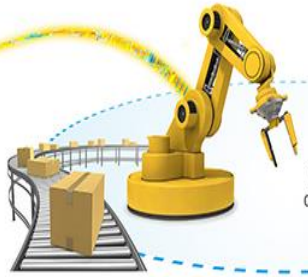
Medical data disclosure is the second most breached source of data[2].

MEDICAL

71% of Shoppers are Multi-Channel...

based on respondents planning their 2011 holiday shopping[3].

RETAIL



30% Annual Growth Rate

Projected increase in connected machine-to-machine devices over the next 5 years[4].

INDUSTRIAL

23.6M Connected Cars

23.6 million cars will have Internet access by 2016, rising from 8.7 million in 2010[5].

VEHICLES

1) Cisco, "The Internet of Things: How the Next Evolution of the Internet Is Changing Everything", April 2011
2) Bloor Research, "Security challenges in the US healthcare sector" White Paper, December 2010, http://www.mcafee.com/us/resources/white-papers/wp-bloor-healthcare-security.pdf
3) Deloitte U.S., 2011 Annual Holiday Survey, http://www.deloitte.com/assets/Dcom-UnitedStates/Local%20Assets/Documents/Consumer%20Business/us_retail_AnnualHolidaySurvey_2011_pr_102611.pdf
4) McKinsey Global Institute analysis, "Big data: The next frontier for innovation, competition, and productivity", June 2011)
5) Wall Street Journal, http://online.wsj.com/article/SB10001424052702304066504576349763614933844.html, estimate from research firm, Frost & Sullivan

intel
Intelligent Systems

POPULATION EXPLOSION:
The Internet of Things will include
26 BILLION
units installed by 2020.*

REVENUE EXPLOSION:
The Internet of Things product and service suppliers will generate incremental revenue exceeding
$300 BILLION
by 2020.*

VALUE EXPLOSION:
The Internet of Things will result in
$1.9 TRILLION
in global economic value-add through sales into diverse end markets.*

* Source: Gartner, Forecast: The Internet of Things, Worldwide, 2013, 18 November 2013

5 TIPS FOR MONETIZING THE $1.9 Trillion INTERNET OF THINGS

1 Simplify
Build a single device model that contains all capabilities and capacity then use licensing and entitlement management to configure.

2 Differentiate
Drive more value from your device with software and monetize all aspects of your solution.

3 Drive Revenue
Device + software + licensing helps drive new, recurring revenue streams.

4 Grow Market
Move into new markets quickly by slicing and dicing your product by features, capacity, and more.

5 Protect Your IP
Protect your devices and applications against IP theft with licensing.

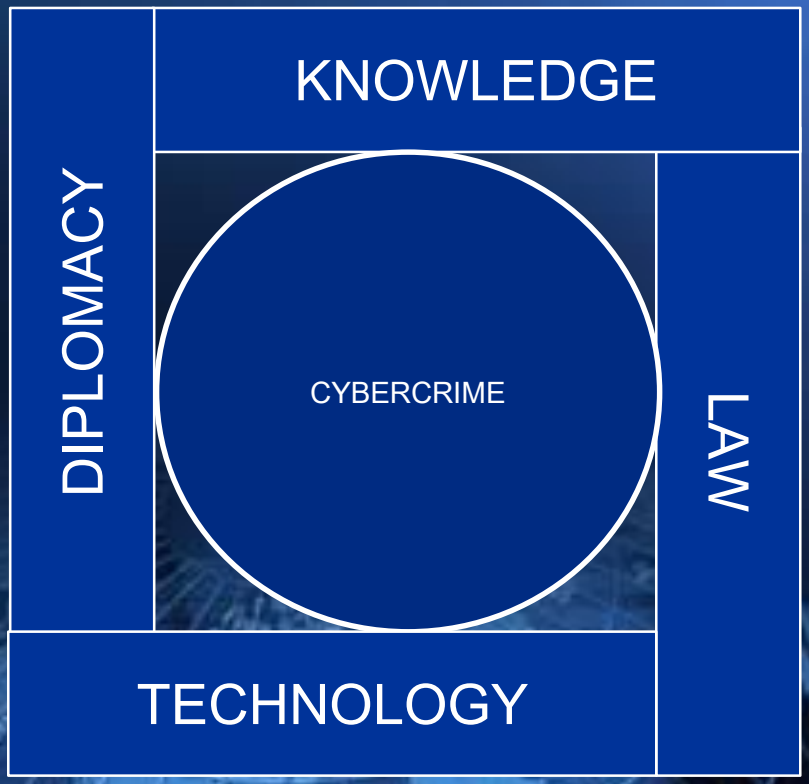
Statistik

- Internet-Nutzer
- Datenverkehr
- Speicherkapazität
- Nutzerverhalten

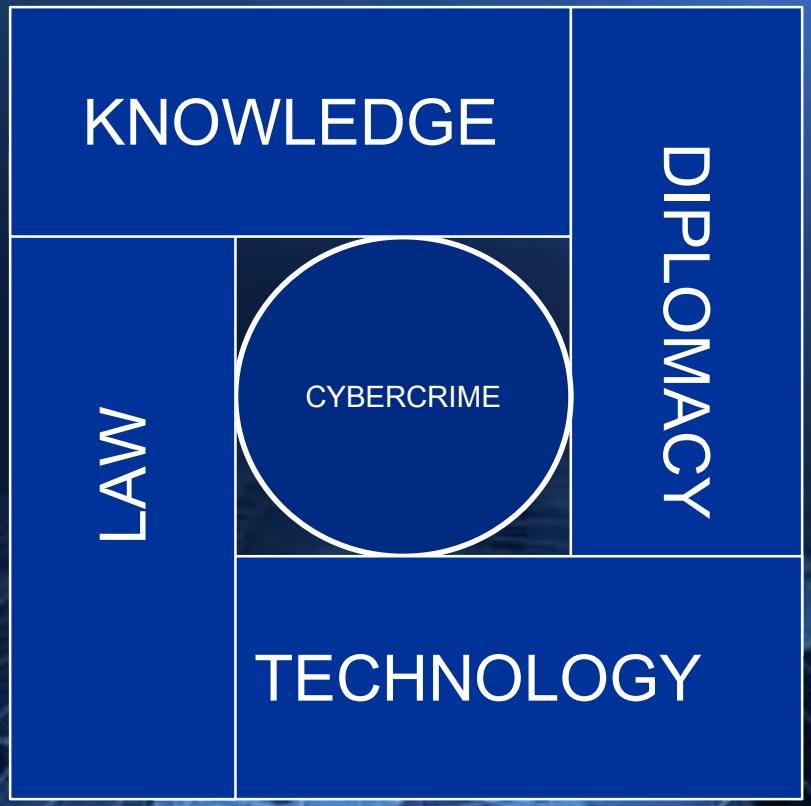
4 leading sources of trouble

- ERRORS
- DISASTERS
- EMPLOYEES
- CRIMINALS

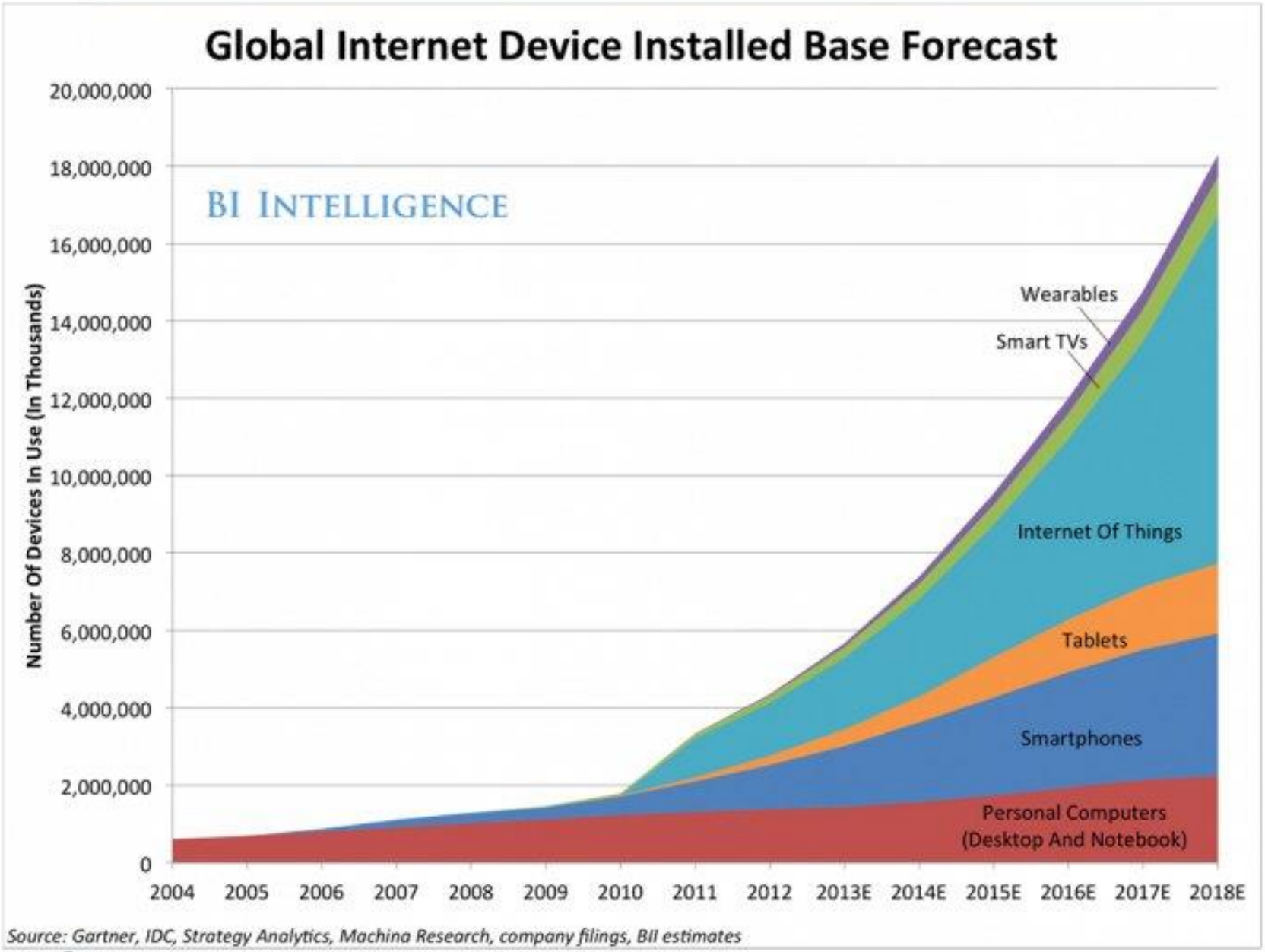
4 dimensions of society's response to cybercrime



We need to improve in all areas of cybercrime

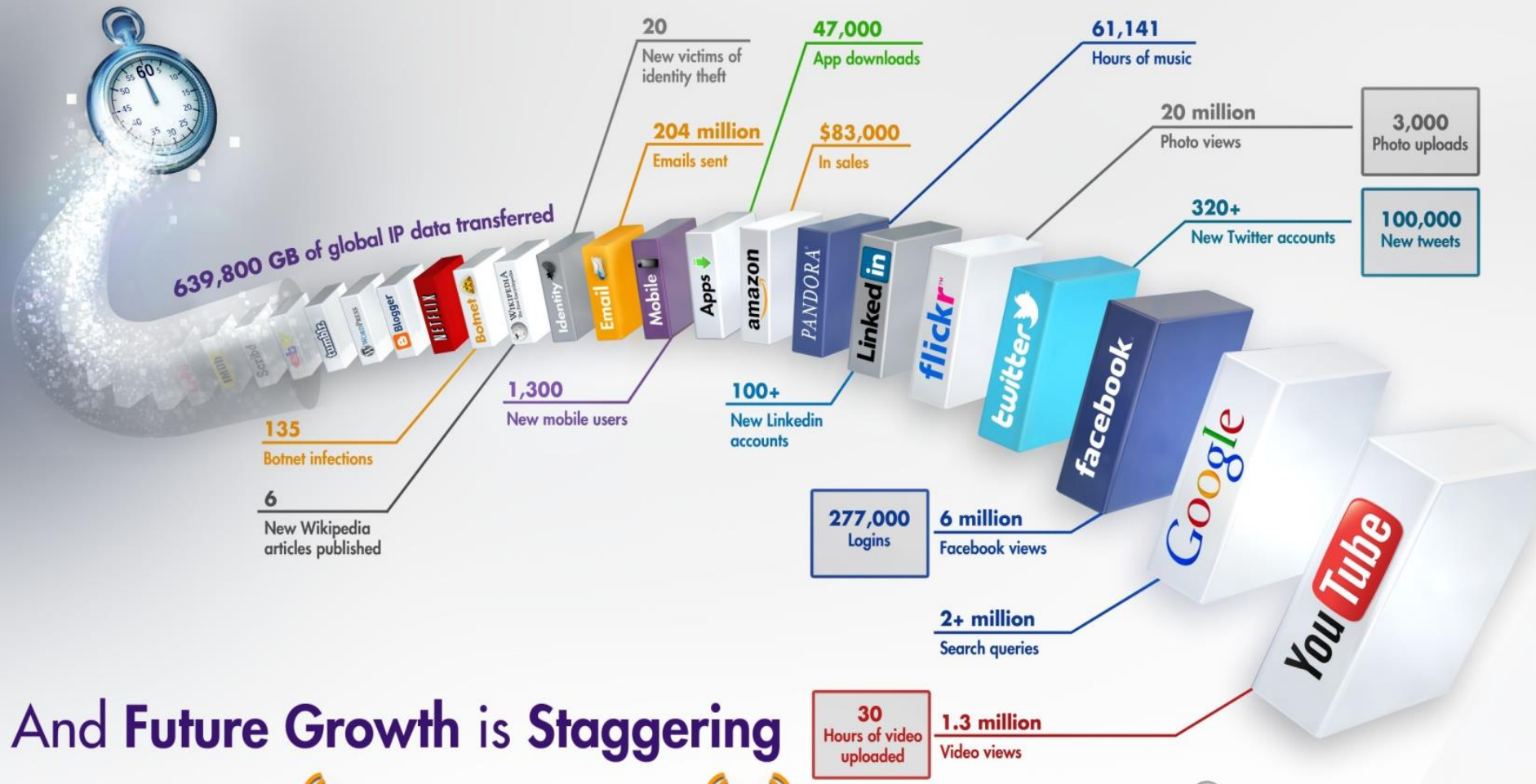


Tech Chart of the Day



BUSINESS INSIDER

What Happens in an **Internet Minute?**



And **Future Growth** is **Staggering**

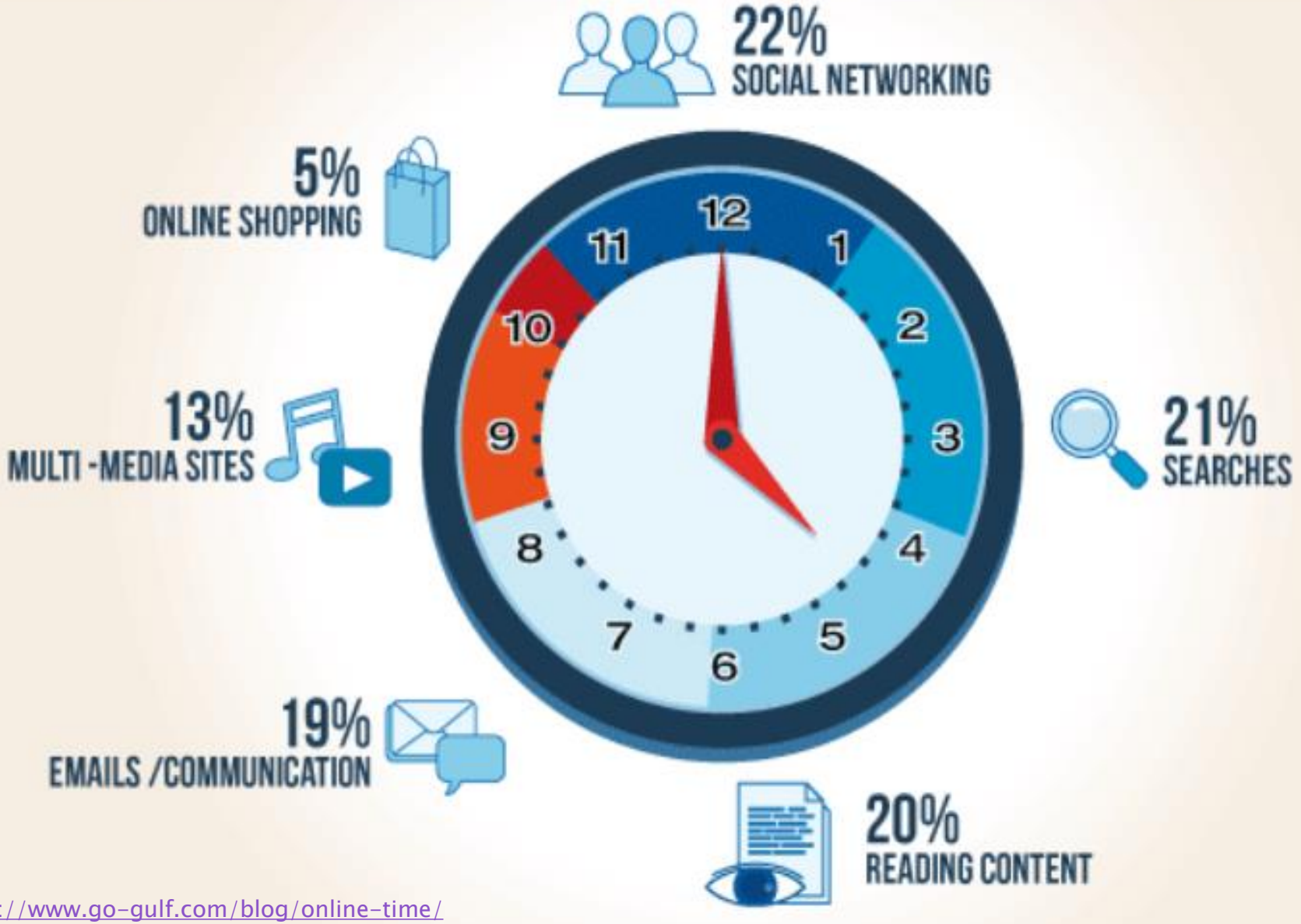
Today, the number of networked devices = the global population

By **2015**, the number of networked devices = **2x** the global population

In **2015**, it would take you **5 years** to view all video crossing IP networks each **second**


IN 60 SECONDS...
1 NEW DEFINITION IS ADDED ON urban
1,600+ READS ON Scribd.
13,000+ HOURS MUSIC STREAMING ON PANDORA
12,000+ NEW ADS POSTED ON craigslist
370,000+ MINUTES VOICE CALLS ON skype
98,000+ TWEETS
20,000+ NEW POSTS ON tumblr.
THE LARGEST SOCIAL READING PUBLISHING COMPANY!!
New Craigslist Ads
320+ NEW twitter ACCOUNTS
13,000+ iPhone APPLICATIONS DOWNLOADED
100+ NEW LinkedIn ACCOUNTS
1 associatedcontent NEW ARTICLE IS PUBLISHED
THE WORLD'S LARGEST COMMUNITY CREATED CONTENT!!
QUESTIONS ASKED ON THE INTERNET...
100+ Answers.com
40+ YAHOO! ANSWERS
6,600+ NEW PICTURES ARE UPLOADED ON flickr
600+ NEW VIDEOS
50+ WordPress DOWNLOADS
25+ HOURS TOTAL DURATION
70+ DOMAINS REGISTERED
695,000+ facebook STATUS UPDATES
125+ PLUGIN DOWNLOADS
60+ NEW BLOGS
168 MILLION EMAILS ARE SENT
694,445 SEARCH QUERIES
1,700+ Firefox DOWNLOADS
1,500+ BLOG POSTS
79,364 WALL POSTS
510,040 COMMENTS
Google
Google Search
GO-Globe.com

HOW PEOPLE SPEND THEIR TIME



http://www.go-gulf.com/blog/online-time/


Social Bookmarks
Comment & Reputation
Crowdsourced Content
Pictures
Blog Platforms
LiveCasting - Video and Audio
Wiki
Blogs/Conversations
Music
Blog Communities
Events
Micromedia
Lifestreams
Documents
Specific to Twitter
Video Aggregation
SMS/Voice
Video
Social Networks
Location
Niche Networks
Customers Service Networks
The Conversation
The Art of Listening, Learning, and Sharing
Brought to you by
Brian Solis and JESS3
digo
DISQUS
SmugMug
flickr
newsvine
hubdub
mixx
reddit
digg
magnolia
sezwho
intensedebate
BlogTalkRadio
Zoomr
qik
blogTV
USTREAM
kyte
TWiki
wetpaint
MOVABLE TYPE 4
Ask
Google
blogpulse
Technorati
Shyftr
Bloglines
tangler
blogged
MyBlogLog
last.fm
PANDORA
twitter
tumblr.
identi.ca
Plurk
Utterz
socialthing!
friendfeed
facebook
Lifestream.fm
LIFE2.0
Swurl
Ping.fm
Tweet Scan
SUMMIZE
socializr
Zvents
Actéva
MADE IT
.docstoc
Scribd
thinkfree
Twemes
twitpic
twitxr
pinger
ojott
kwiry
pingme
YouTube
REVVER
metacafe
viddler
blip.tv
brightkite
DOPPLR
TripIt
facebook
LinkedIn
bebo
Ning
plaxo
hi5
CrowdVine
yelp
Google
YAHOO! GROUPS

HOW PEOPLE -SPEND THEIR TIME- ONLINE

AVERAGE TIME SPENT BY :

Global Internet user per month: **16 HOURS**

US Internet user per month: **32 HOURS**

http://www.go-gulf.com/blog/online-time/

INTERESTING FACTS

More than **56%** of Social Networking Users have used Social Networking Sites for spying on their partners.

Brazilians have the highest online friends averaging **481** friends per user, whereas Japanese have the least average of only **29** friends.

Chinese users spend the maximum time of more than **5** hours a week, in shopping online.

More than **1 Billion** Search Queries per day on Google.

4 Billion views per day on Video Sharing Website YouTube. Video content of more than **60 hours** gets uploaded every minute onto YouTube.

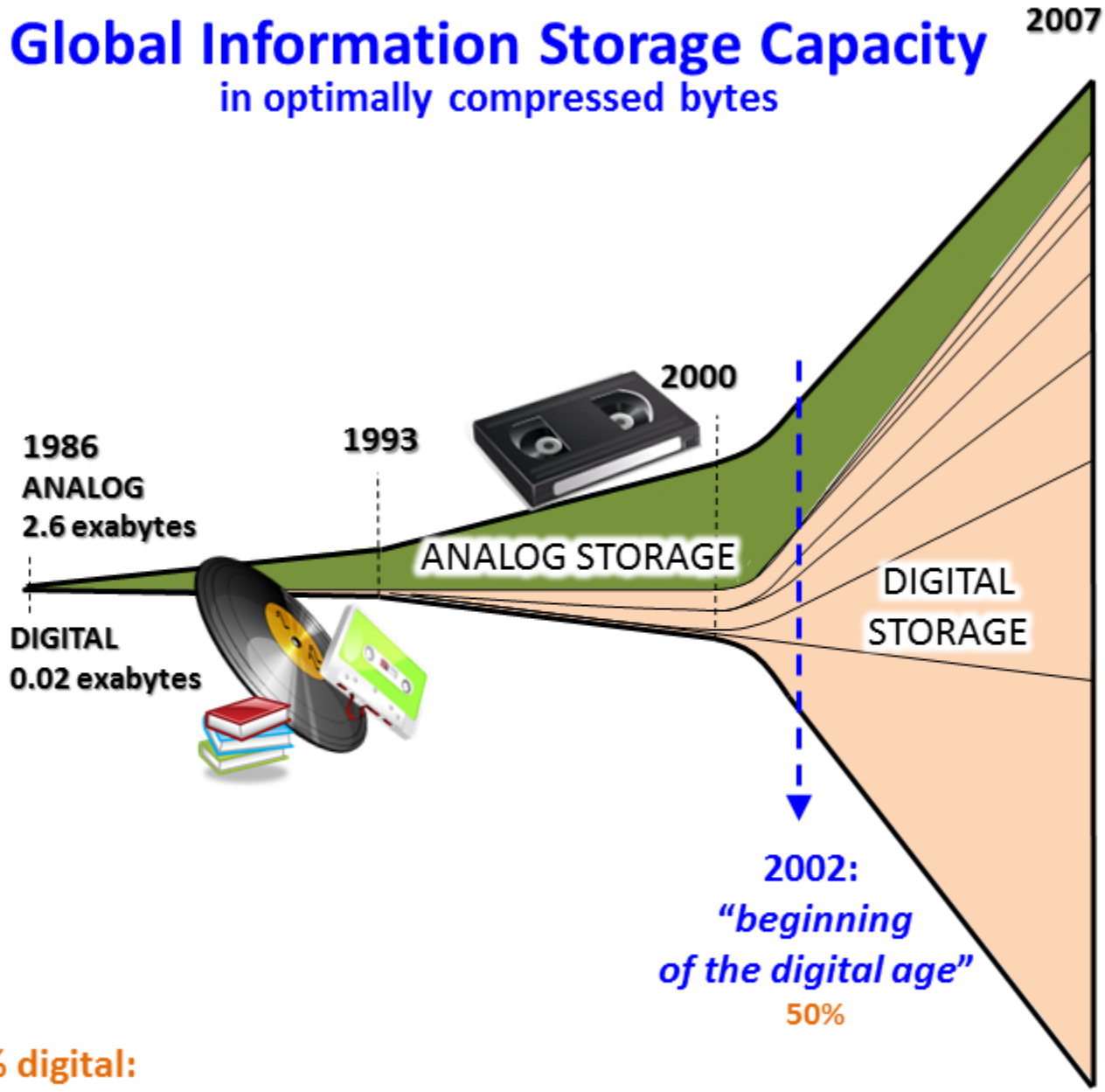
More than **250 Million** Tweets per day.

More than **800 Million** updates on Facebook per day

http://www.go-gulf.com/blog/online-time/

Global Information Storage Capacity

in optimally compressed bytes



2007 ANALOG
19 exabytes

- Paper, film, audiotape and vinyl: 6 %
- Analog videotapes (VHS, etc): 94 % **ANALOG**

DIGITAL

- Portable media, flash drives: 2 %
- Portable hard disks: 2.4 %
- CDs and minidisks: 6.8 %
- Computer servers and mainframes: 8.9 %
- Digital tape: 11.8 %
- DVD/Blu-ray: 22.8 %

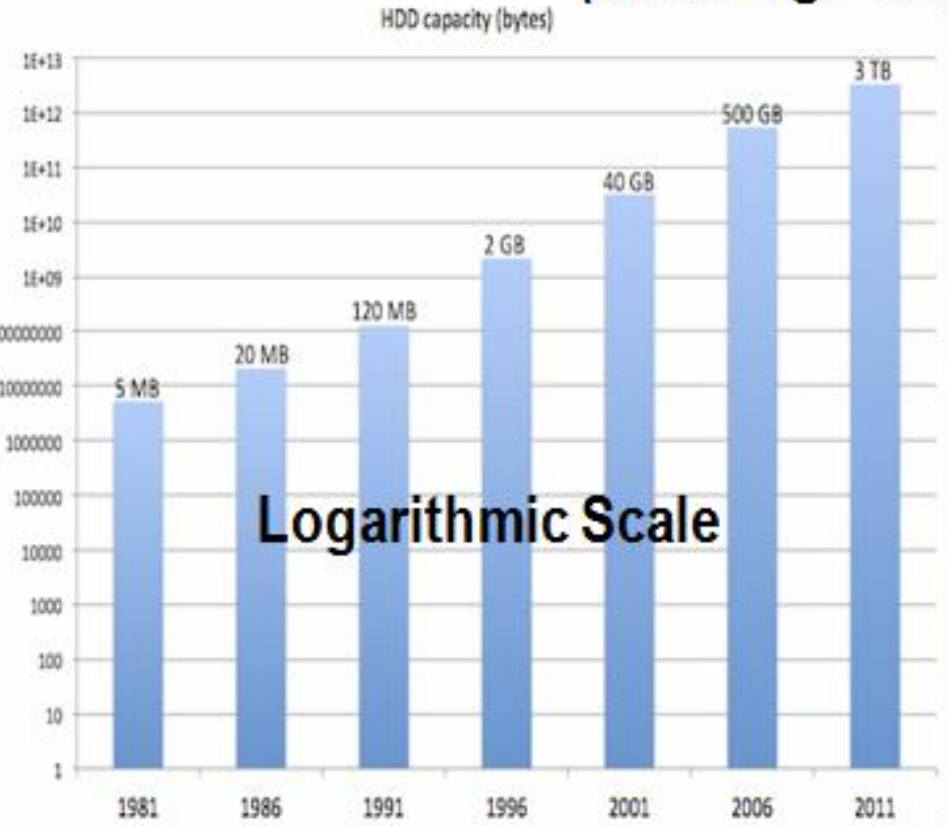
- PC hard disks: 44.5 %
  123 billion gigabytes

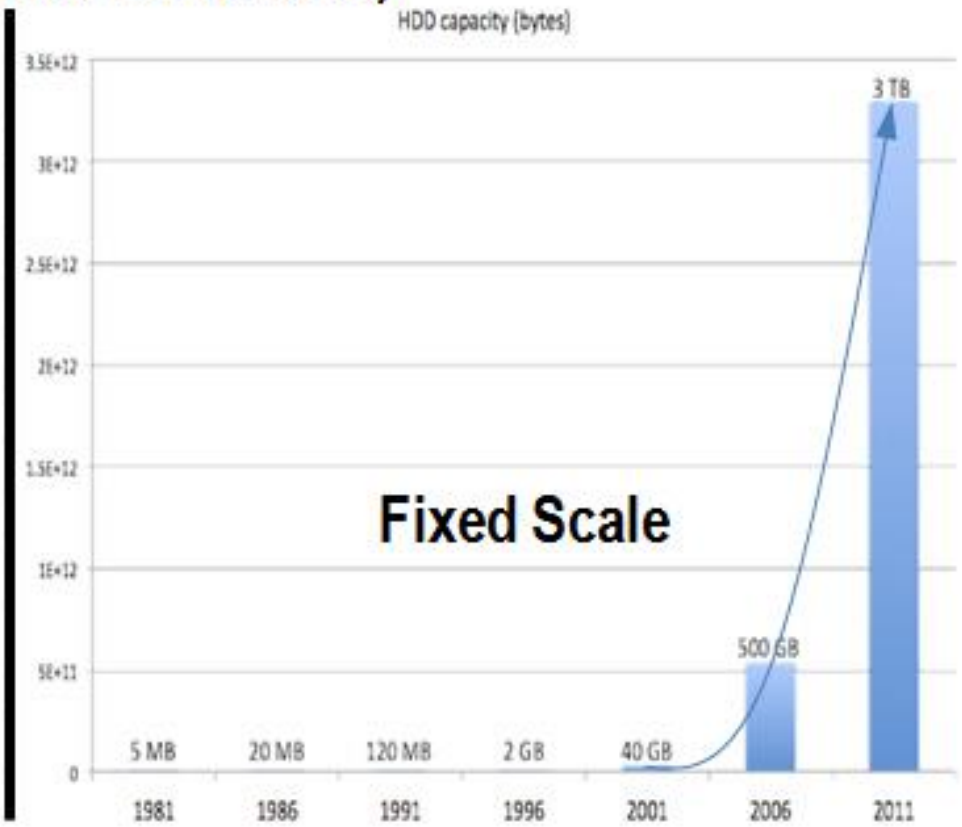
- Others: < 1 % (incl. chip cards, memory cards, floppy disks, mobile phones, PDAs, cameras/camcorders, video games)

DIGITAL
280 exabytes

Source: Hilbert, M., & López, P. (2011). The World's Technological Capacity to Store, Communicate, and Compute Information. *Science*, 332(6025), 60 –65. http://www.martinhilbert.net/WorldInfoCapacity.html

Storage Capacity over Time (Showing PC Hard Drive Disk)





Storage

- **Storage:** Die Fähigkeit des Unternehmens Informationen sicher zu halten. Z… Unternehmensansatz - Datenhaltung bewegt sich weg von der Lagerung dicht an einzelnen Programmen / Projekten / Anwendungen hin zur Lagerung, die als ein Unternehmen Mission / Funktion verwaltet gekoppelt ist.

- Unterschiedliche, heterogene Speicher werden auch in der Zukunft die Norm sein. Synchronisation verteilter Daten ist die wichtigste Voraussetzung. Gleichzeitiger gemeinsamer Zugriff auf große Dateien und Speichersystemen. Datenverschlüsselung,

- **„More Meta than Data.“**

Terabyte (1024 Gigabyte)
1 Terabyte: 50,000 trees made into paper and printed
2 Terabytes: An academic research library
10 Terabytes: Printed collection of US Library of Congress
100 Terabytes: The entire internet websites

Petabyte (1024 Terabyte)
1 Petabyte: 3 years of EOS data
10 Petabytes: All US academic research libraries
100 Petabytes: All printed material

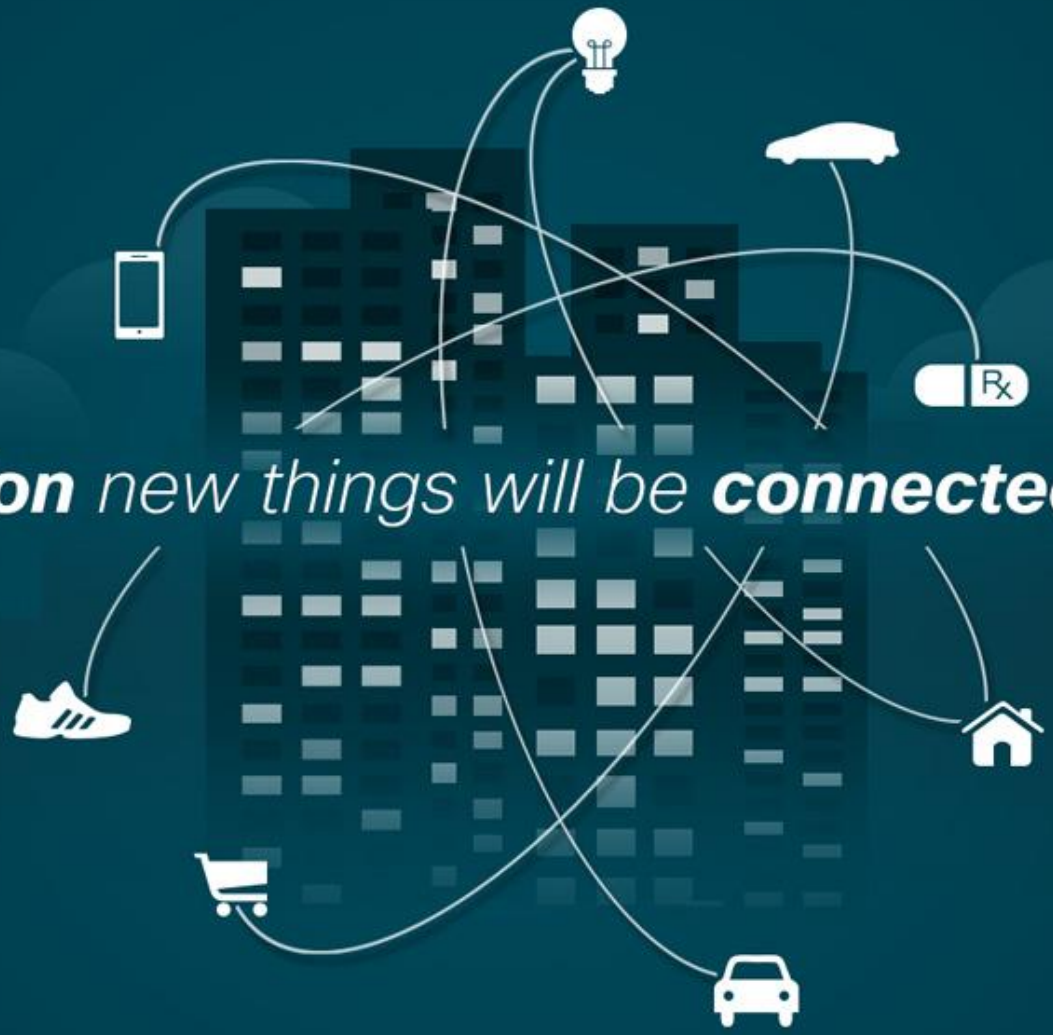
Exabyte (1024 Petabyte)
1 Exabytes: All words ever spoken by human beings

Zettabyte (1024 Exabyte)

Yottabyte (1024 Zettabyte)
1 Yottabyte: Everything that there is

THE INTERNET **OF EVERYTHING** IS HERE.

As the Internet evolves, so will we.



***37 billion** new things will be **connected by 2020**.*

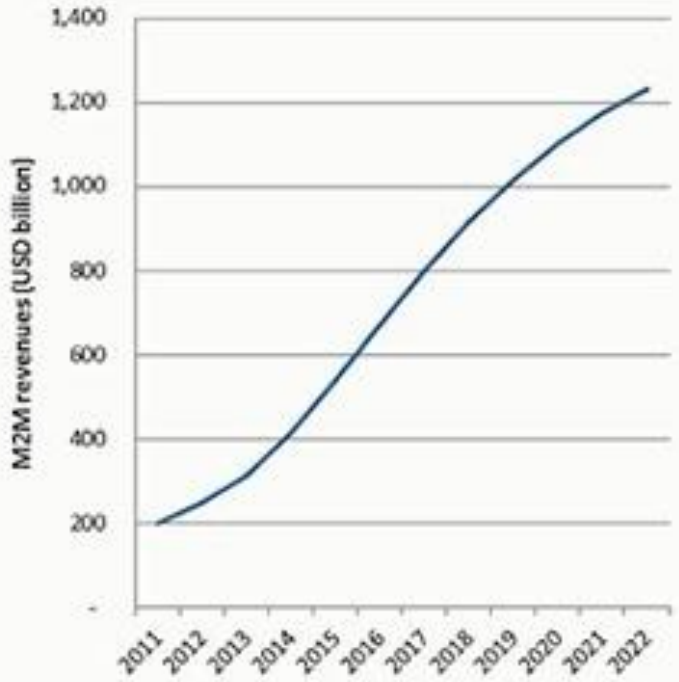
#IoE #TomorrowStartsHere

cisco

By 2022, M2M will be a USD 1.2 trillion opportunity

Total revenue from machine-to-machine, 2011-22

Source: Machina Research 2012



- **Total M2M revenue will grow from USD200 billion in 2011 to USD1.2 trillion in 2022, a CAGR of 18%**
- **Total revenue includes:**
  - device costs where connectivity is integral to the device
  - module costs where devices can optionally have connectivity enabled
  - monthly subscription, connectivity and traffic fees

Machina Research

Big data—a growing torrent

$600 to buy a disk drive that can store all of the world's music

5 billion mobile phones in use in 2010

30 billion pieces of content shared on Facebook every month

40% projected growth in global data generated per year vs. **5%** growth in global IT spending

235 terabytes data collected by the US Library of Congress by April 2011

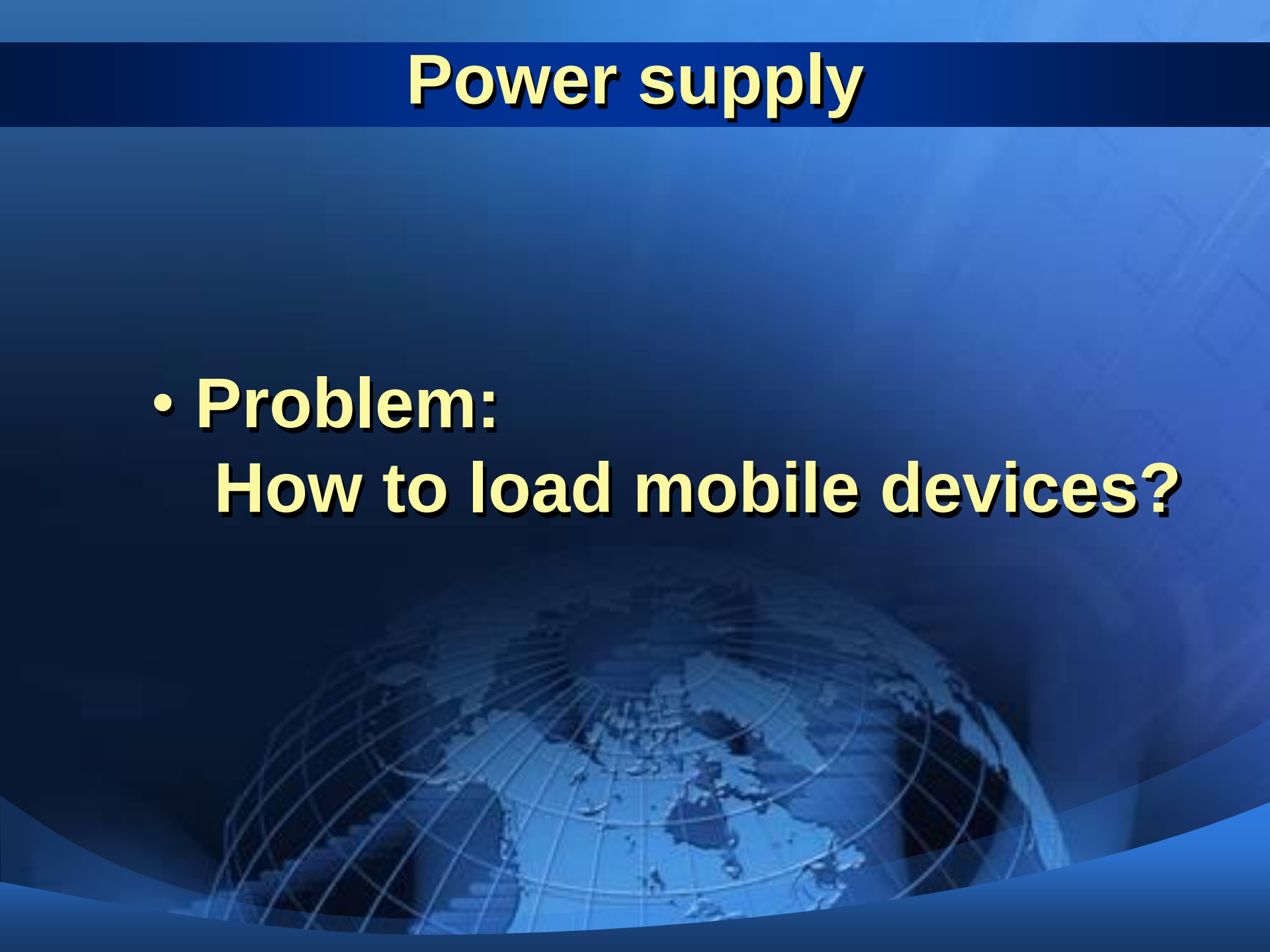
15 out of 17 sectors in the United States have more data stored per company than the US Library of Congress

$5 million vs. $400

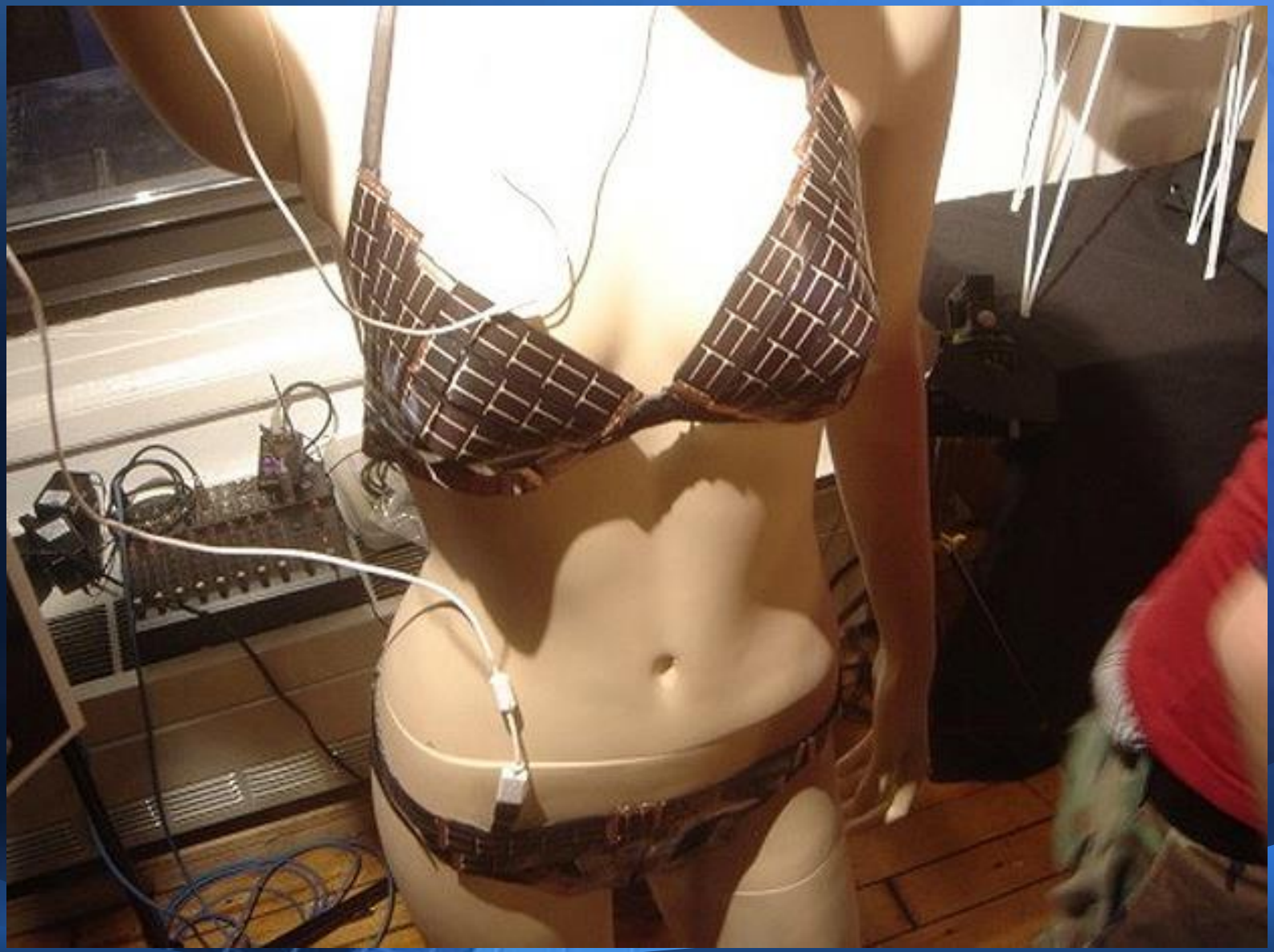
Price of the fastest supercomputer in 1975[1] and an iPhone 4 with equal performance

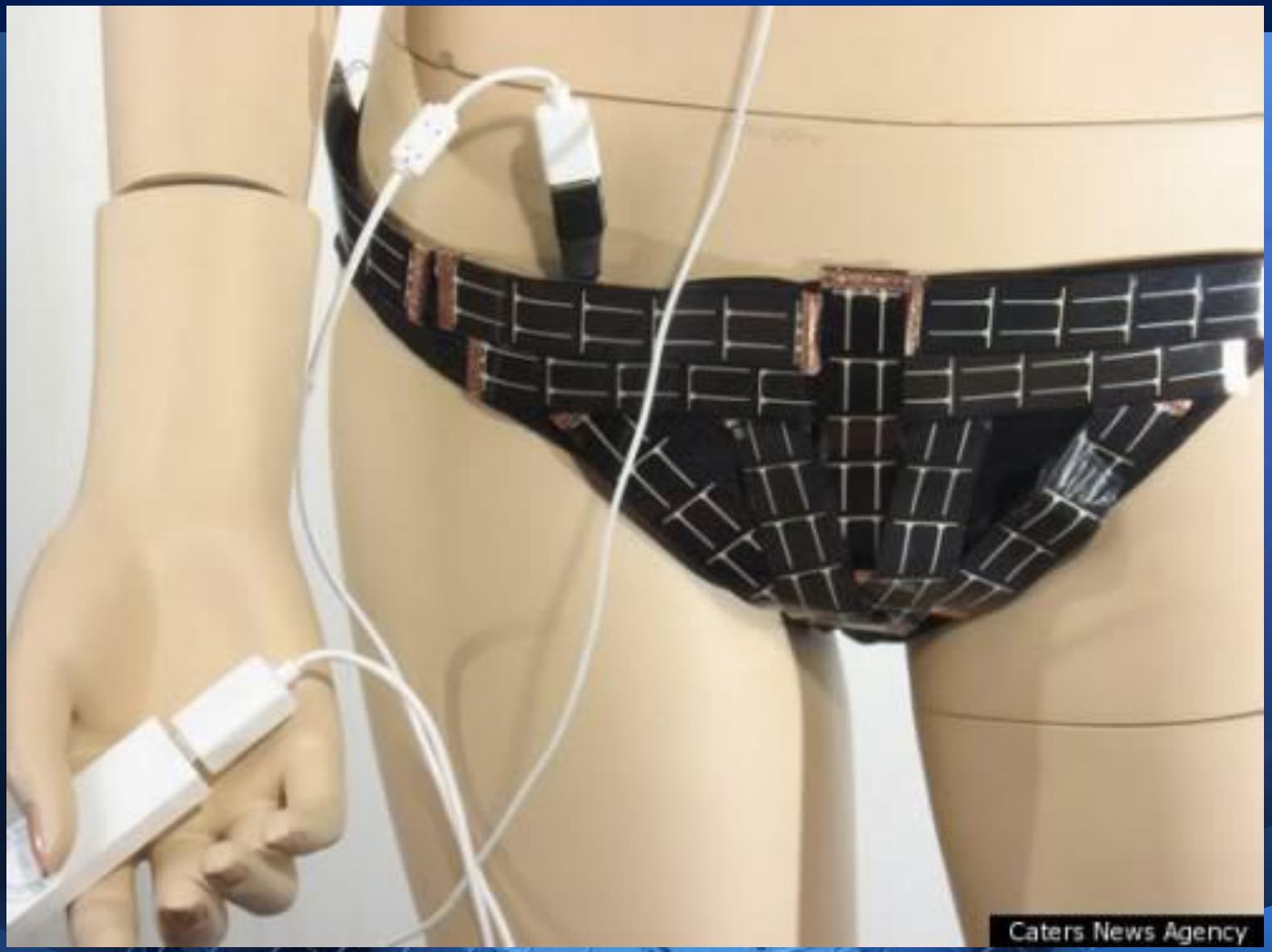
Power supply

- **Problem:**
  How to load mobile devices?

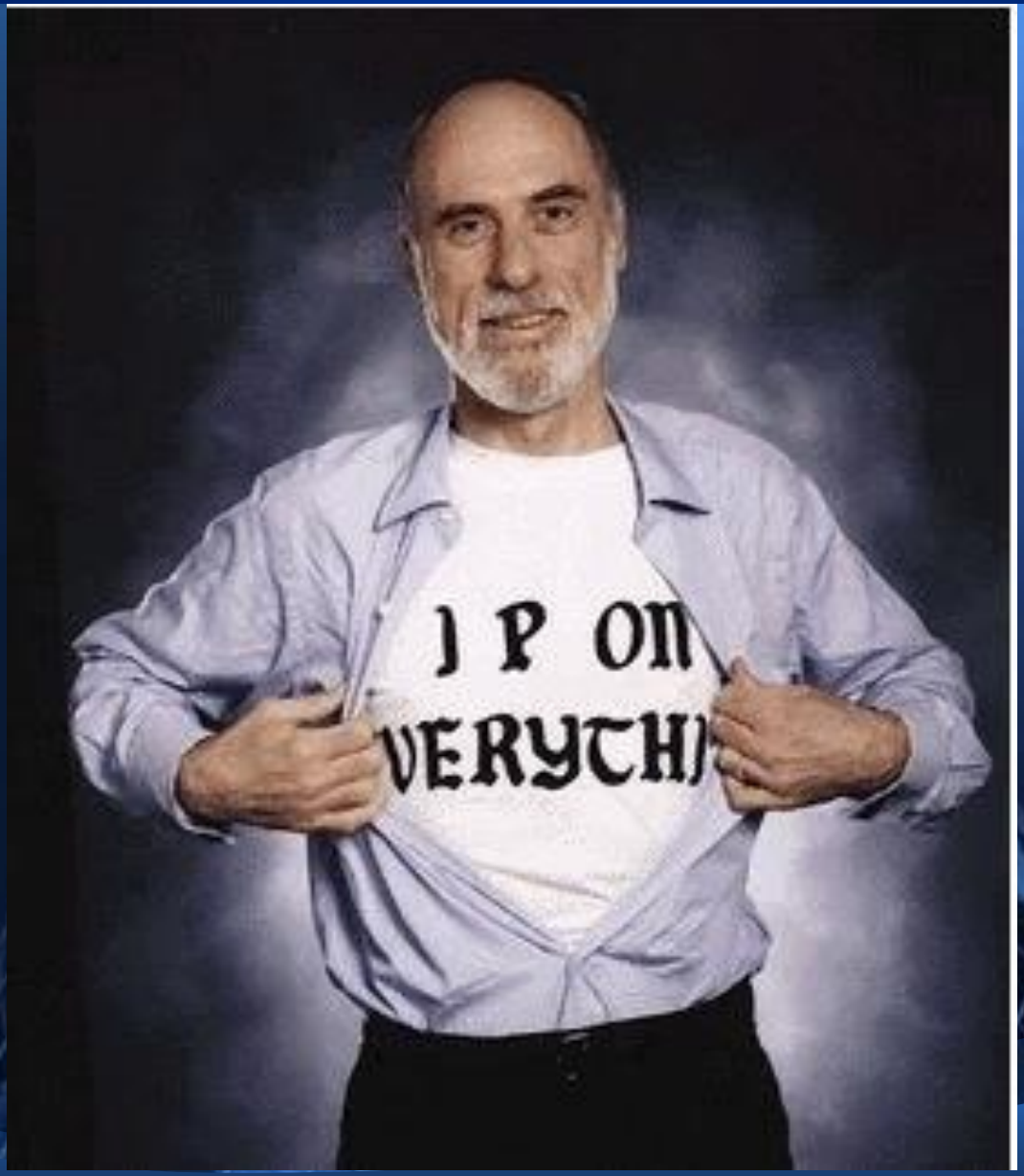


Solar Bikini




Caters News Agency

Vincent Cerf 1992



Zusammenfassung

1. IoT bzw. IoE wird den Markt für kleine und große Unternehmen nivellieren
2. Real-time on-the-ground Information wird völlig neue Bewegungs- und Verhaltensmuster erkennen (Big Data)
3. Menschen werden die Kontrolle behalten
4. Standardisierung wird zunehmend wichtig
5. Sicherheit muß verstärkt bei allen neuen Entwicklungen berücksichtigt werden
6. Glänzende Zukunft / Berufschancen für Safety / Security / Forensik, Datenschutz, Informatik

4. Konsequenzen - I

Wie brauchen viel mehr

- Geld,
- Planstellen
- Manpower
- Ausbildung, Qualifizierung, Weiterbildung

  um unsere kritischen Infrastrukturen zu schützen (gilt für alle Bundesbehörden, Landesbehörden, Verwaltungen, Unternehmen,…)

7. Konsequenzen - II

Klare Richtlinien,

Arbeitsanweisungen,

Branchenspezifische Zertifizierungen,

Regelung des Umganges mit Sicherheitstools,

Anonymisierung der Meldungen,

Was passiert nach der Meldung???

Cybersecurity-Versicherung abschließen! (z.B. HisQox)

Kooperation – Beratung
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Maßnahmen

- „IoT and Smart Home Security“
- „Cybersecurity und Schutz kritischer Infrastrukturen“
- Produkte, Projekte, Services
- Sicherheitsüberprüfungen, Audits
- Security Check,
- Vulnerabilitätstests,
- Penetrationstests,
- Computerforensische Untersuchungen

Vielen Dank für die Aufmerksamkeit

Tod durch Powerpoint !!!