

AUDIT HORIZONS

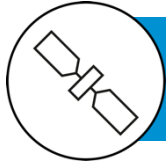
Digital Innovation in a Connected World

Perspectives,
Opportunities & Risks



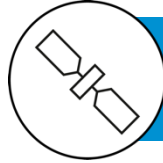


SES The World's Leading Satellite Operator



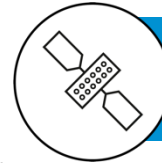
GEO wide beam

- ▲ Over 50 satellite constellation
- ▲ Reaching 325 million TV households worldwide



GEO HTS

- ▲ Expanding GEO HTS fleet
- ▲ Improving value proposition for data applications



MEO HTS

- ▲ 16 satellite constellation plus 4 more launching in 2019 and 7 from 2021
- ▲ High throughput, lowest latency
- ▲ 5 years ahead of competition

Fleet

67

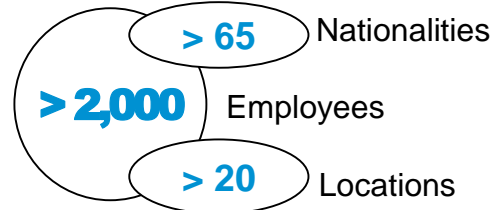
Satellites

Coverage

99%

of the globe
and world
population
covered

Presence

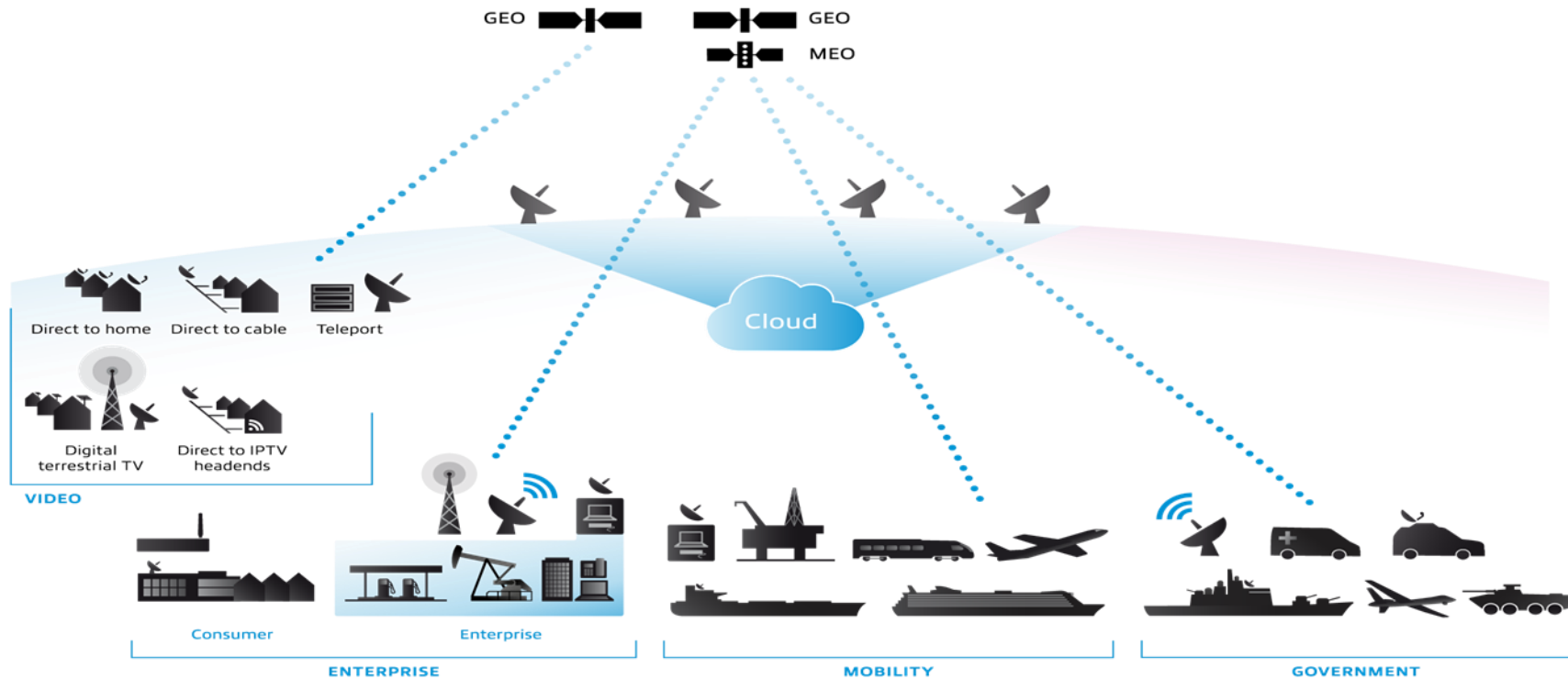


Revenue

2B

Revenue
in euros

SES The World's Leading Satellite Operator



Ce que vous vous ne verrez pas...

PENETRATION INTERNET & MOBILE

Population
7.3 milliards



Internautes
3 milliards



Réseaux sociaux
2.2 milliard



Abonnés
us



Urban
F

Pénétration Internet
41%

Taux pénétration
30%

Pénétration Mobile
96%

All predictions are «fake news»?

Innovation is Disruptive



The risk that rapid expansion of innovative solutions will challenge traditional business models and their operations



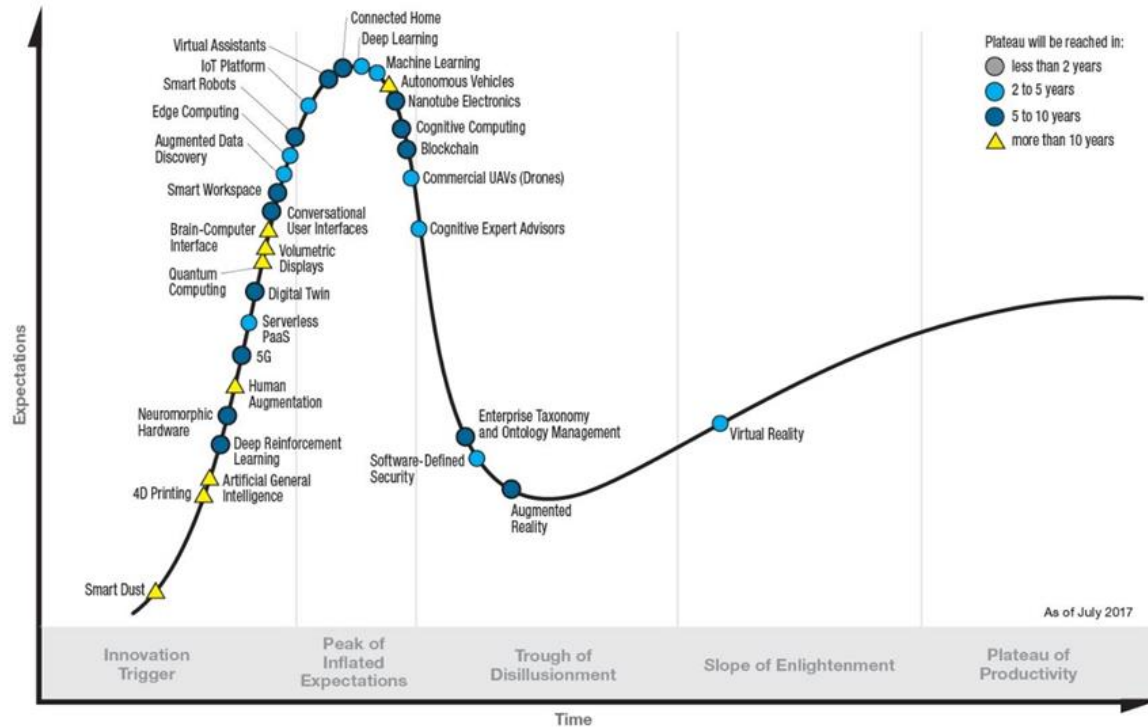
Evolving
Customer
Expectations

Evolving
Customer
Experience



Emerging technologies have their own change curve

Gartner **Hype Cycle** for Emerging Technologies, 2017



How do you manage innovation?



Entrepreneurship

Agility

Flexibility

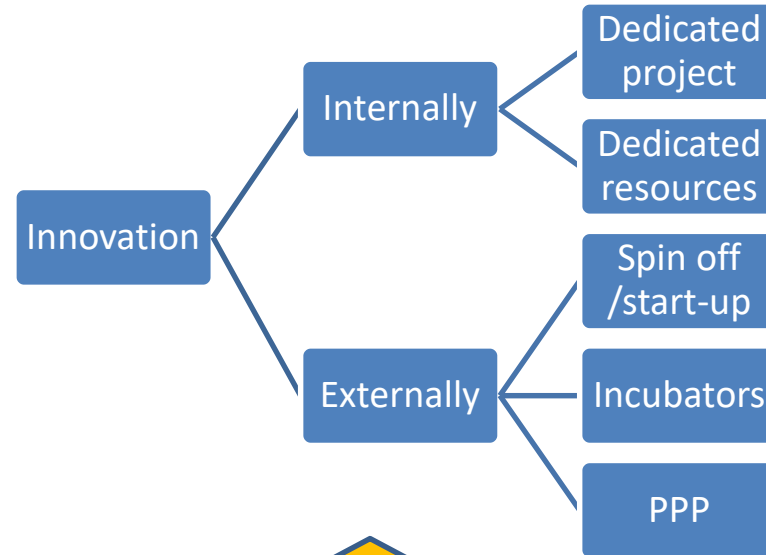
Dynamism

Acceleration

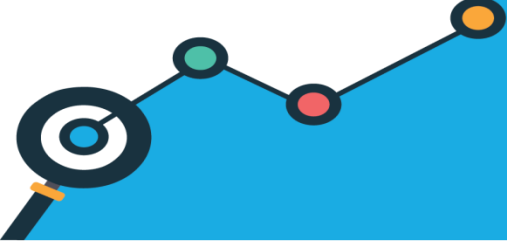
Ambition

Independence

Resources – Investment & Talents



ICS:
Empowerment
& Trust



LUXEMBOURG AT THE FOREFRONT OF SPACE TECHNOLOGY DEVELOPMENTS

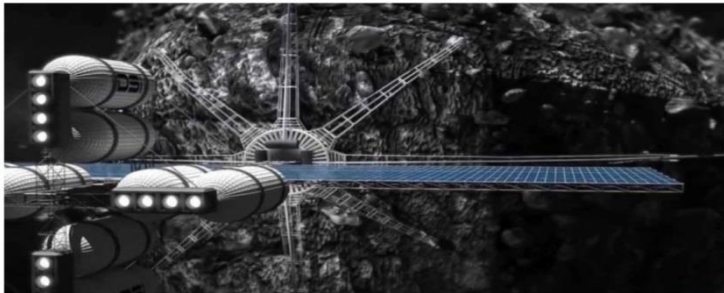
MINING ASTEROIDS... FROM LUXEMBOURG

If it is possible to mine asteroids for minerals, then this is just the kind of niche activity that excites the Grand Duchy's policy makers. So is this a metaphorically or literally far-fetched idea?

Luxembourg Wants to Be a Global Leader in Asteroid Mining

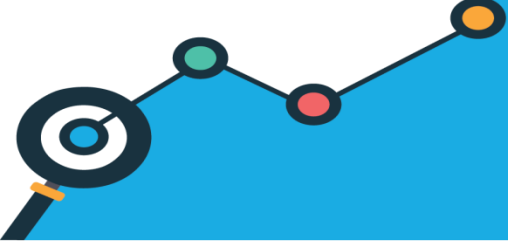
George Dvorsky
2/03/16 1:25pm · Filed to: SPACE MINING

9.5K 9 5



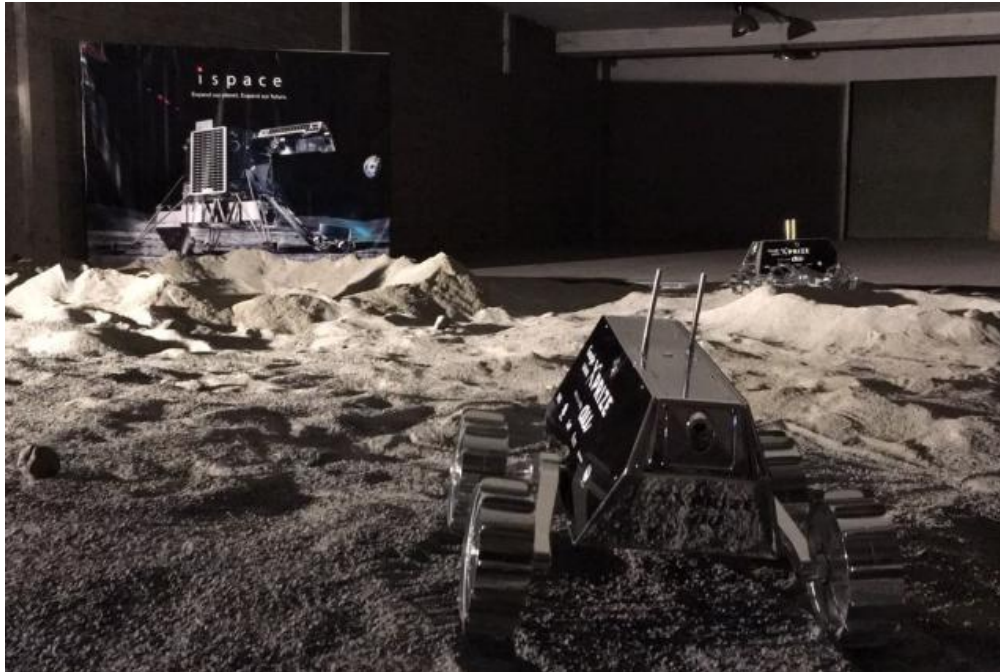
Luxembourg to fund Space Mining for the Future

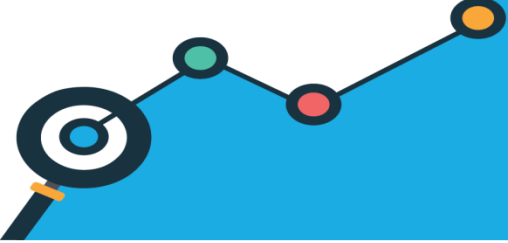




LUXEMBOURG AT THE FOREFRONT OF SPACE TECHNOLOGY DEVELOPMENTS

Dans les sous-sols du Paul Wurth Incub, la plate-forme de test d'Ispace est ouverte au grand public, au même titre qu'un «space café»



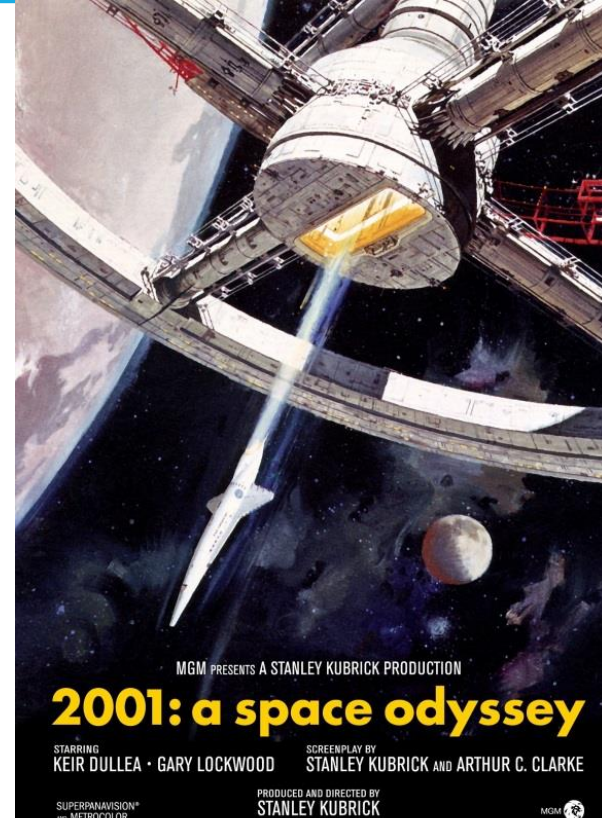
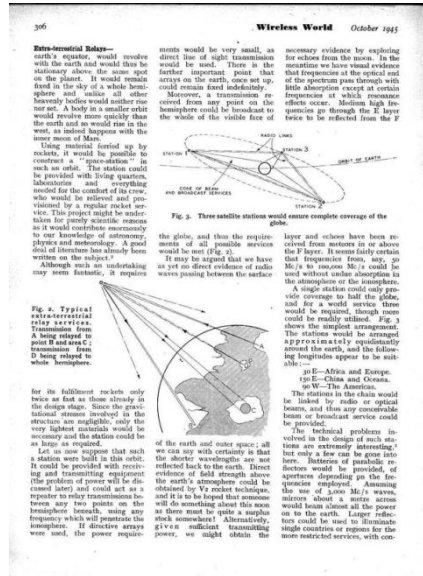


Is reality exceeding the fiction?

1968 view on 2001

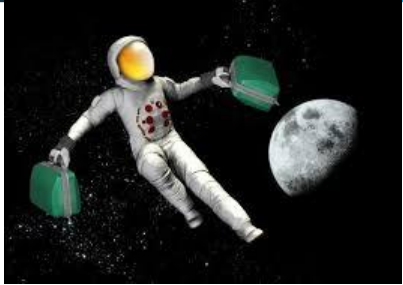


Sir Arthur Charles Clarke,
1917-2008
Wireless World magazine 1945





What's Up With Space Tourism?



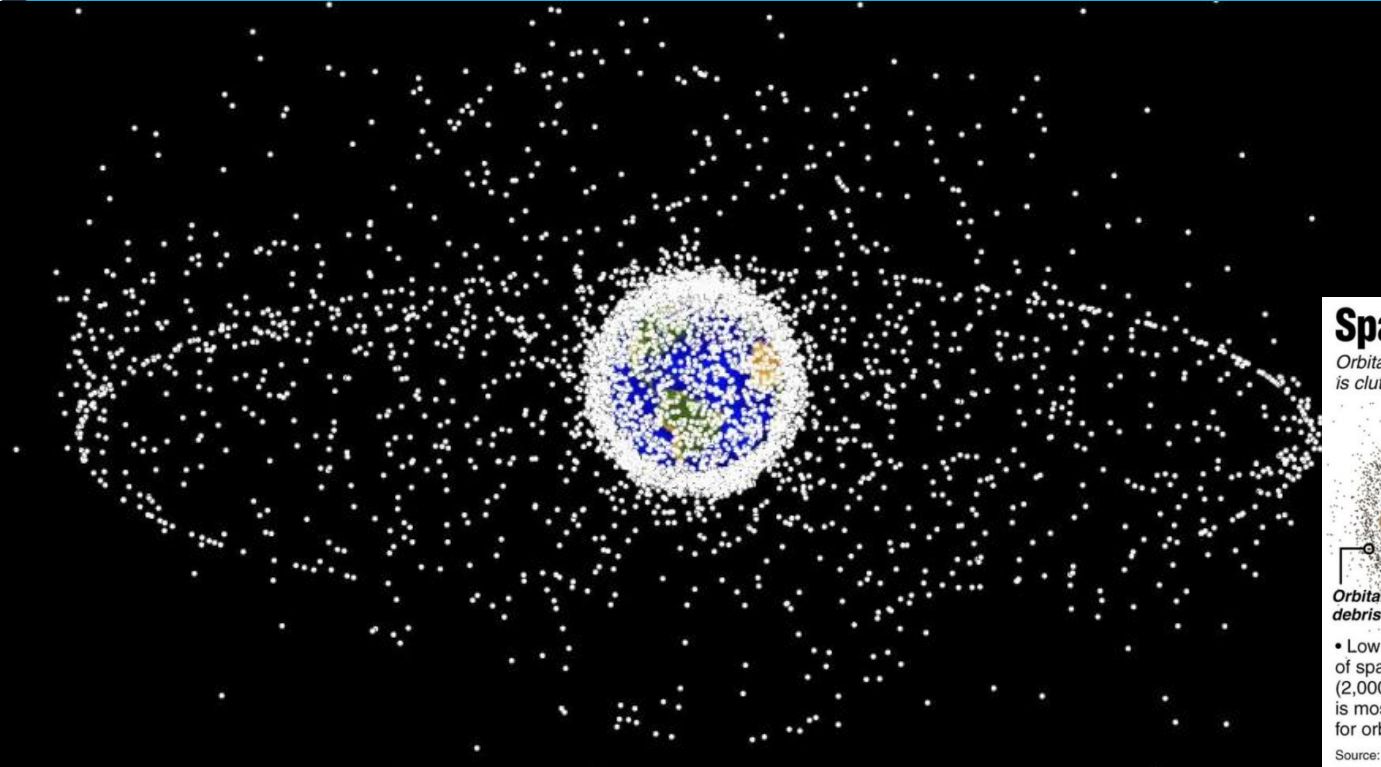
What's Up With Space Tourism?

Richard Branson says Virgin Galactic will be in space for test flights 'in weeks not months'

- "We should be in space within weeks, not months. And then we will be in space with myself in months and not years," the Virgin founder and CEO told CNBC at the Barclays Asia Forum in Singapore Tuesday.
- The serial entrepreneur, who owns the commercial space flight company Virgin Galactic, has invested in space travel since 2004 and was initially expected to go to space himself before April of this year.

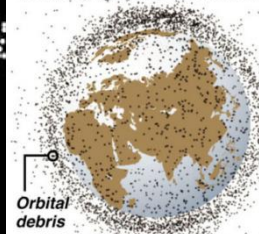


Transforming a **THREAT**...



Space debris

Orbital debris, any man-made, nonfunctional object orbiting Earth, is cluttering space and can sometimes cause trouble.



- Low Earth orbit region of space, within 1,240 mi. (2,000 km) of Earth's surface, is most concentrated area for orbital debris

Source: NASA

Breakdown of debris

- 17% Rocket bodies
- 19% Mission-related debris
- 22% Non-functional spacecraft
- 42% Fragmentation debris
 - Fuel, batteries, paint flakes

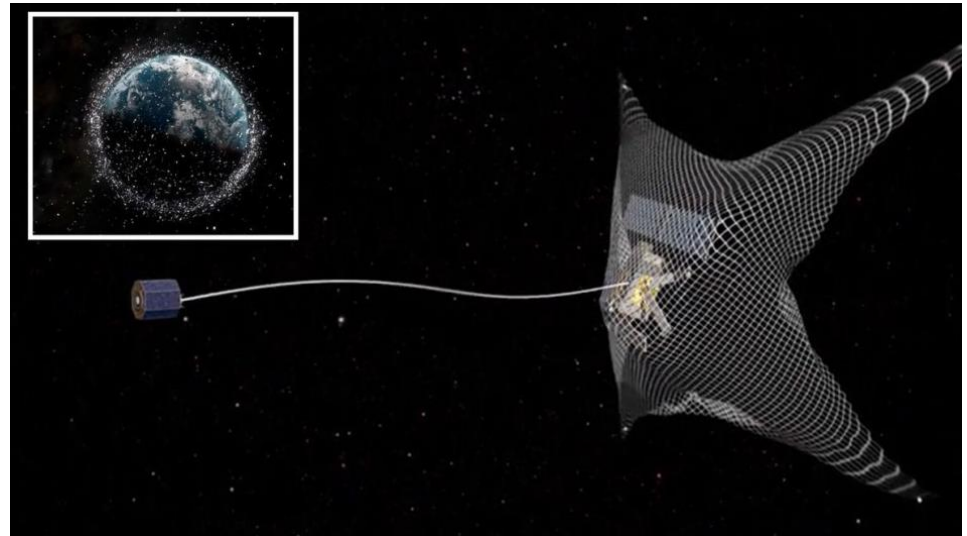
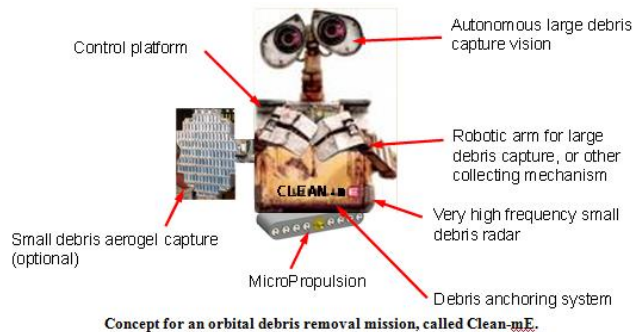
- 11,000 objects greater than 4 in. (10 cm)
- 100,000 objects between 0.4-4 in. (1-10 cm)

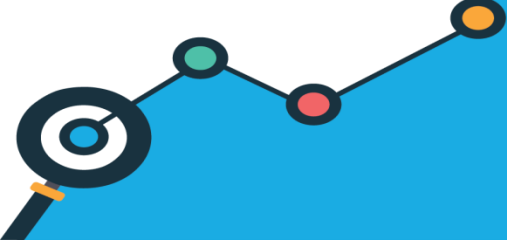
... into an **OPPORTUNITY**



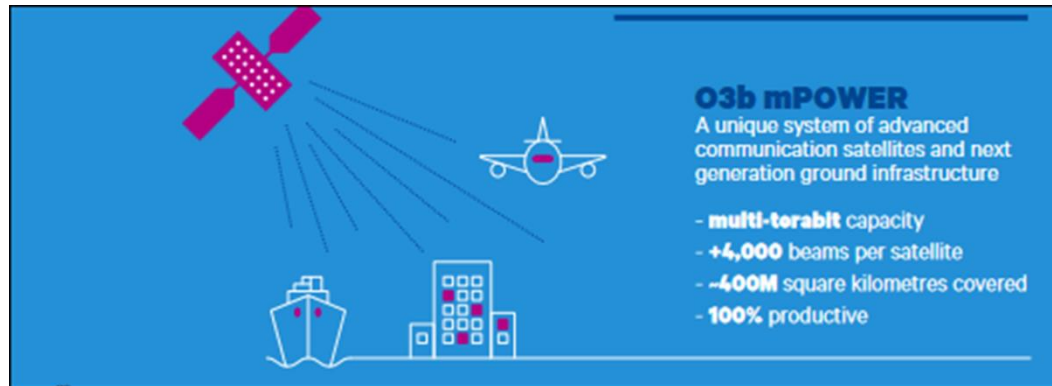
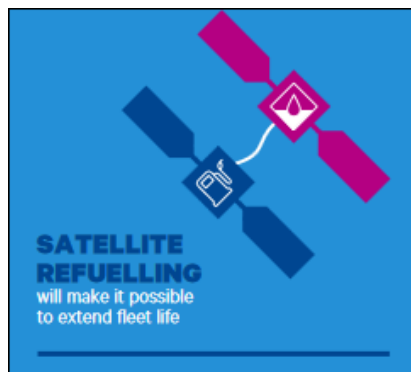
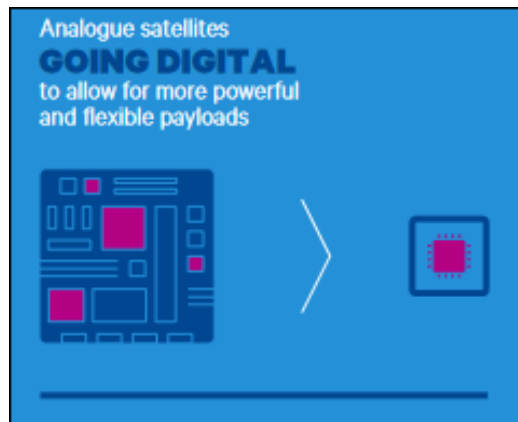
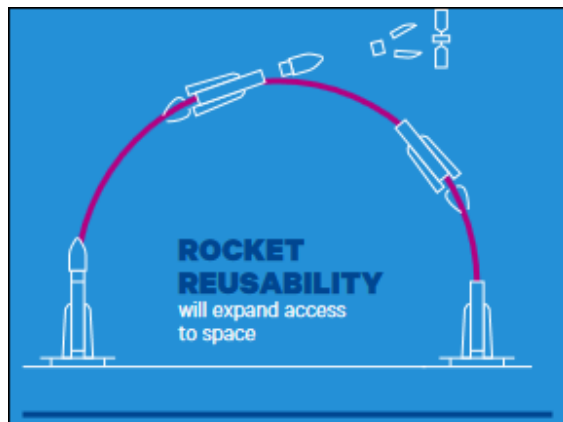
858 views | Sep 19, 2018, 08:06am

RemoveDEBRIS: UK Satellite Is The First To Clean Up Space Junk

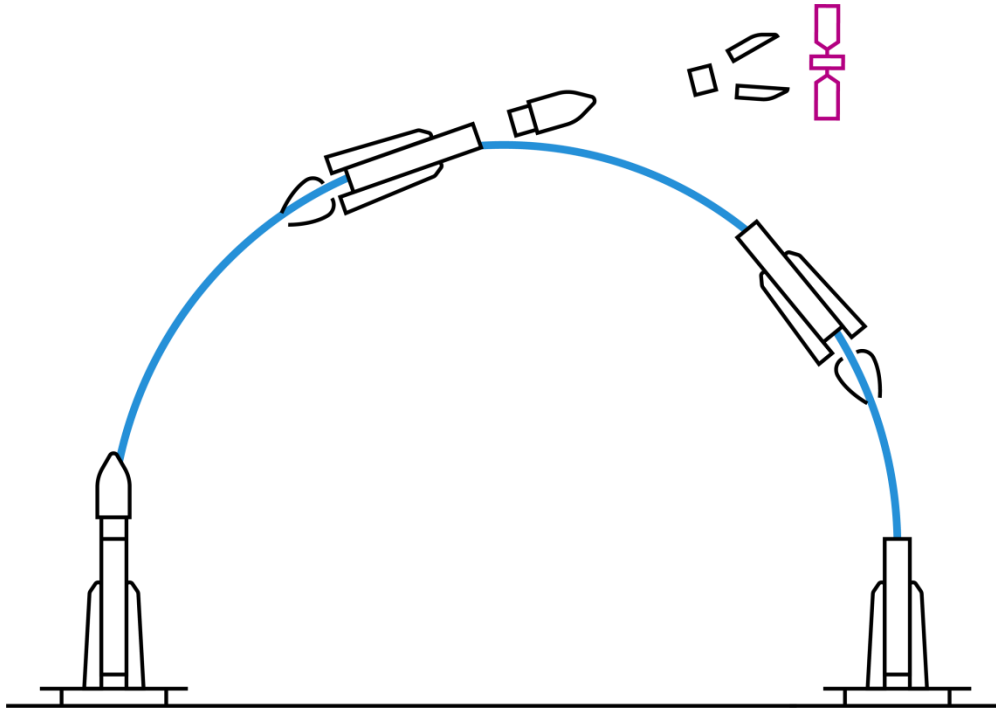




Space Ecosystem Innovation



Rocket reusability - success



- ▲ Rocket reusability expands access to space
- ▲ SES-8 was the first commercial satellite to launch on SpaceX's Falcon 9 in 2013
- ▲ In February 2017 we launched SES-10 on SpaceX's first-ever flight-proven rocket

Rocket reusability - success



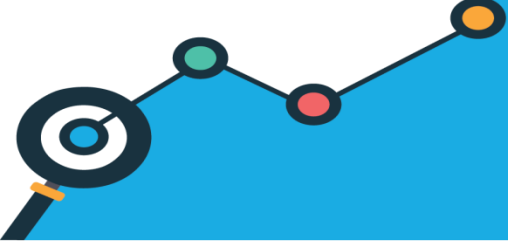




... To failure



This is the first time we've had a failure in seven years, so I think to some degree the company as a whole became maybe a little bit complacent over the course of seven years ... and I think this is simply an important lesson and something we'll need to take with us in the future



... and mitigation

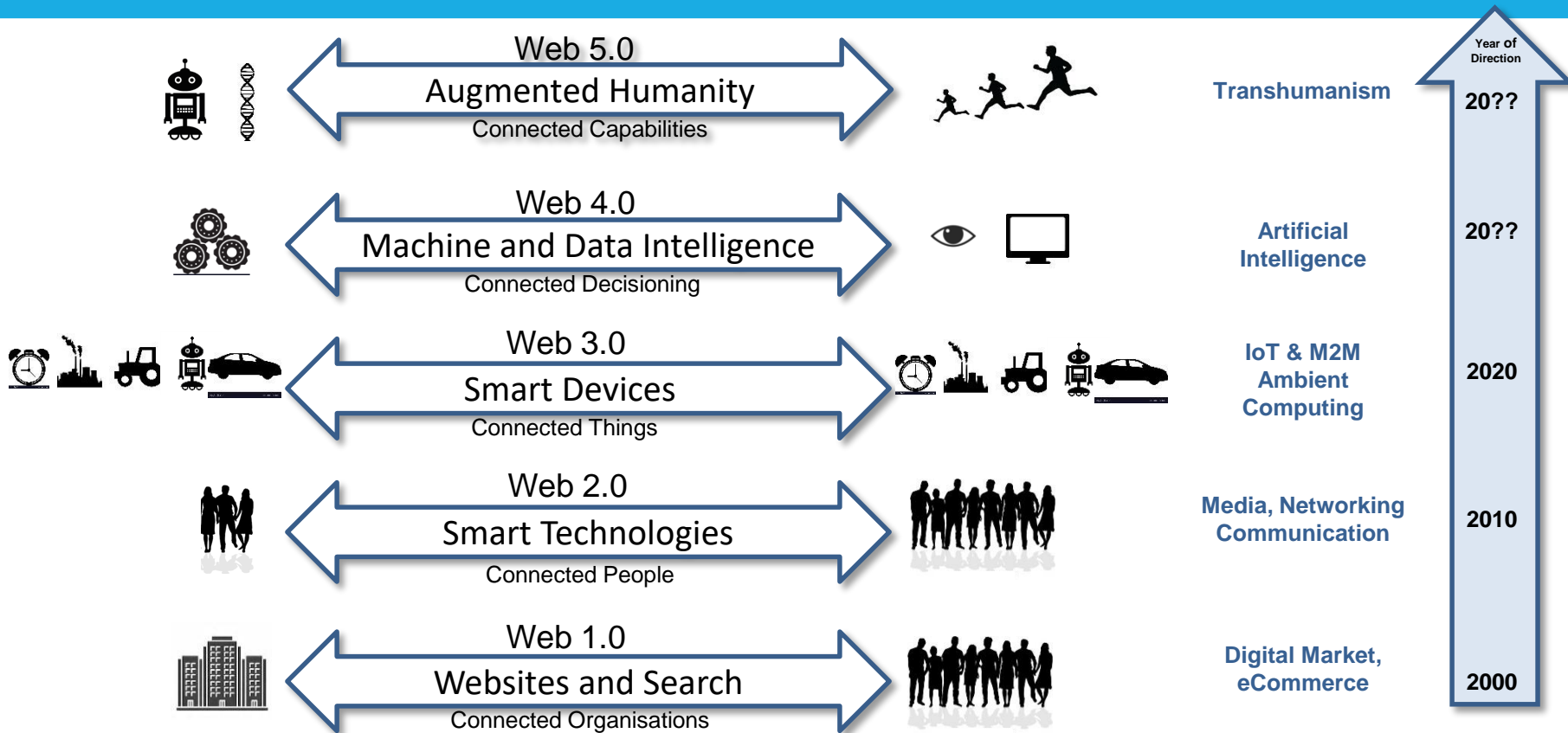
Before



After



The Transformation of Connection

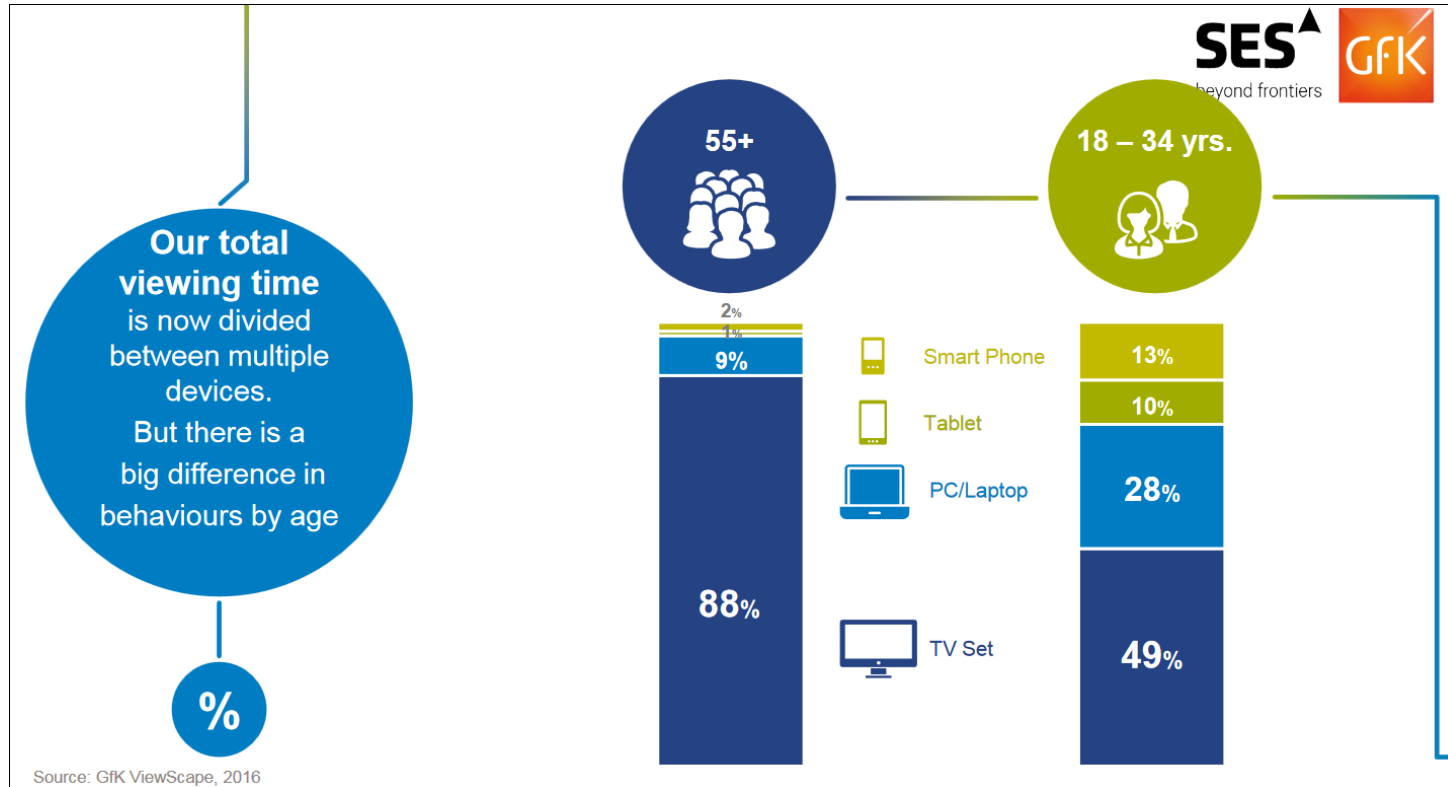


HUMAN NEEDS AND DESIRES

**WE EXPECT
TO BE CONNECTED!**



Evolution of viewing time per generation

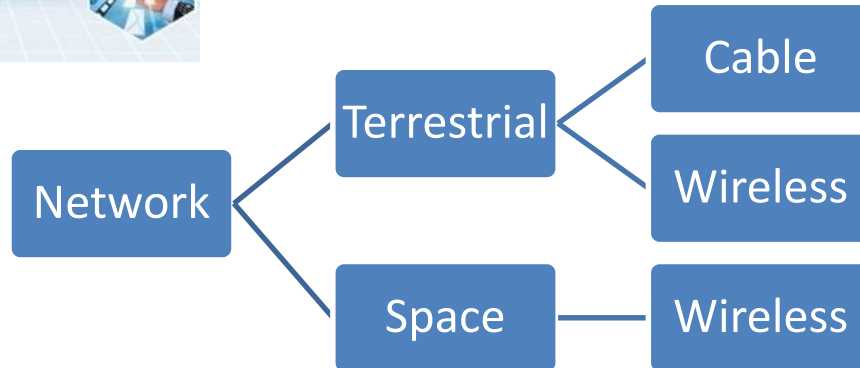




Connectivity refers broadly to **social** connections forged through **mediated communications systems**

The ability of a computer, program, device or system to connect with one or more others

It's about connecting people through networks

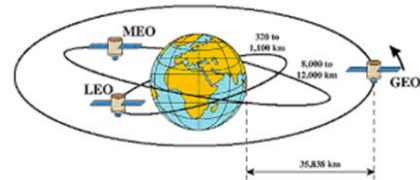
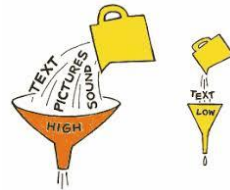
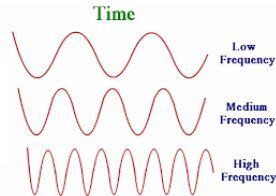
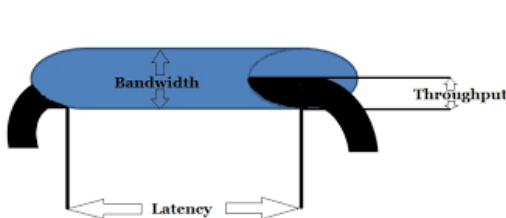


The 4 drivers of CONNECTIVITY

In today disruptive and digital world every actor is competing with each other to achieve the best effective and efficient use of CONNECTIVITY to optimize revenue at lower cost

CONNECTIVITY = f (Frequency x Bandwidth x Throughput x Latency)

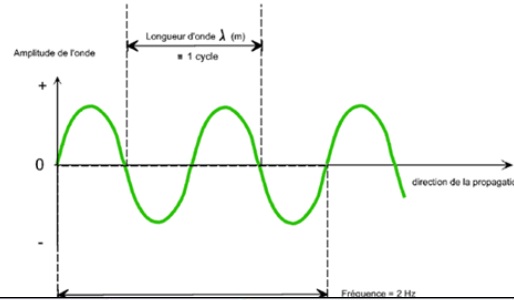
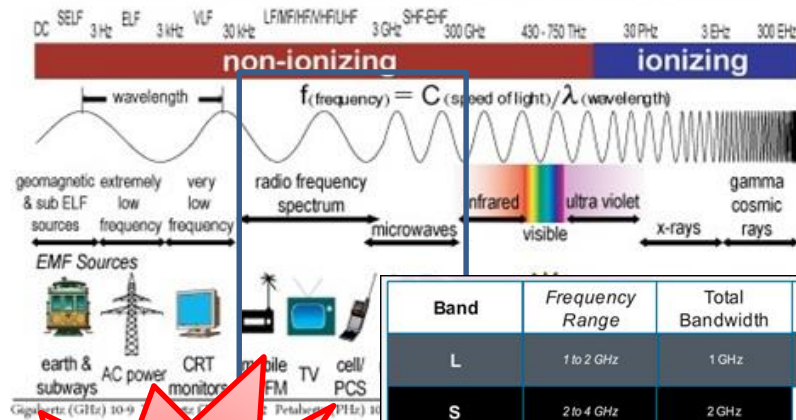
CONNECTIVITE = f (Fréquence x Bande passante x Débit x Latence)



A bit of physics... FREQUENCY

▲ Frequency is measurement of waves per second in HERTZ

THE ELECTROMAGNETIC SPECTRUM



Band	Frequency Range	Total Bandwidth	Rain impact (rain fade)	Throughput
L	1 to 2 GHz	1 GHz	Low	Low
S	2 to 4 GHz	2 GHz		
C	4 to 8 GHz	4 GHz		
X	8 to 12.5 GHz	4.5 GHz		
Ku	12.5 to 18 GHz	5.5 GHz		
K	18 to 26.5 GHz	8.5 GHz		
Ka	26.5 to 40 GHz	13.5 GHz	High	Very High

Satellite Frequencies

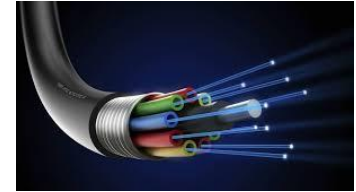
Gigahertz = 1000Megahertz

Frequency is a scarce resource

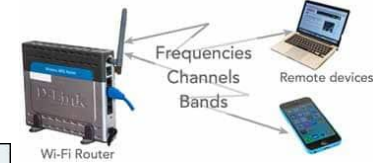
SES uses C, X, Ku & Ka

Throughput = volume of data transmitted per second

Gigabits per second



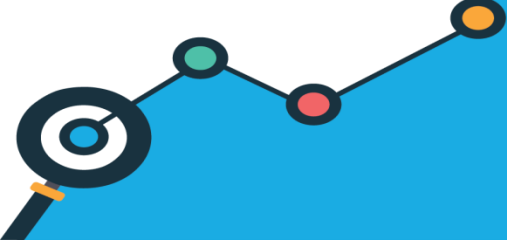
Optical fibre cable - infrared frequency (THz)



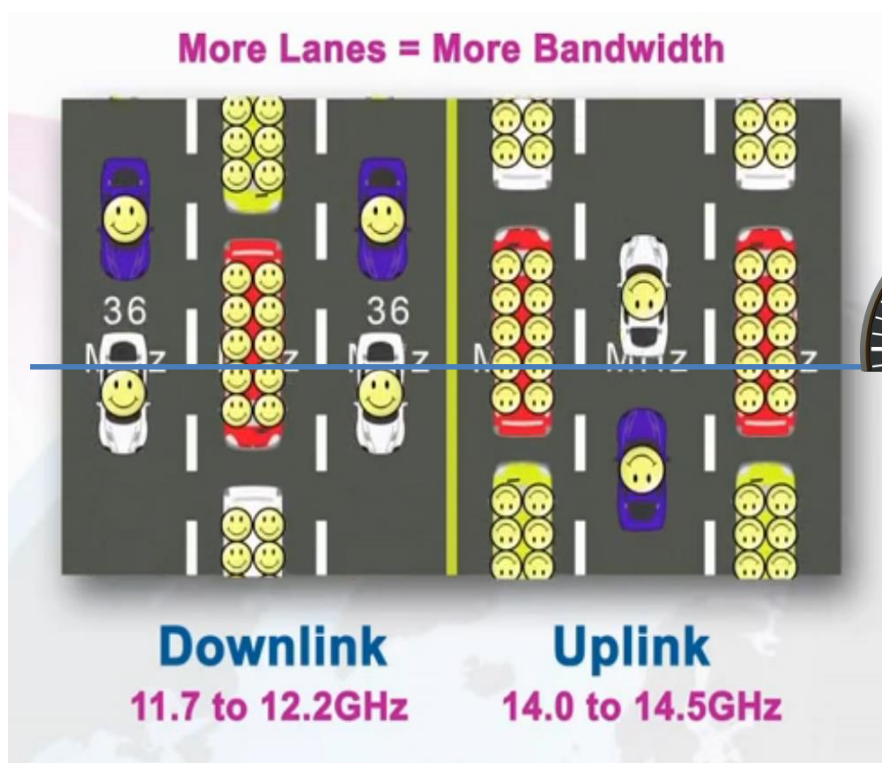
WiFi/WILAN 2,4 GHz / 5GHz & 5,8 GHz frequencies

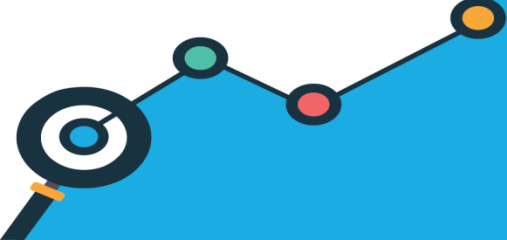


In US, fierce competition with MNO's in C-band (5G)



A bit of physics... BANDWIDTH & THROUGHPUT

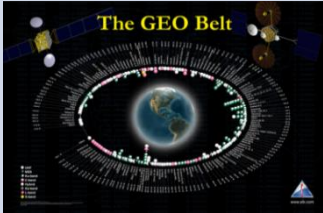
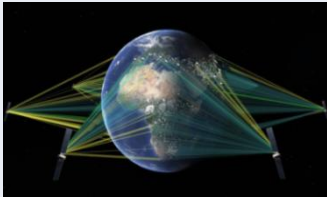
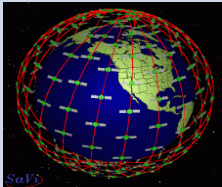


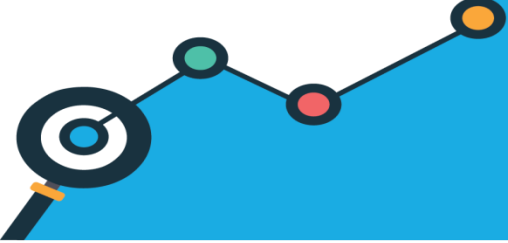


A bit of physics... LATENCY

Latency is the wait time introduced by the signal travelling the geographical distance as well as over the various pieces of communications equipment.

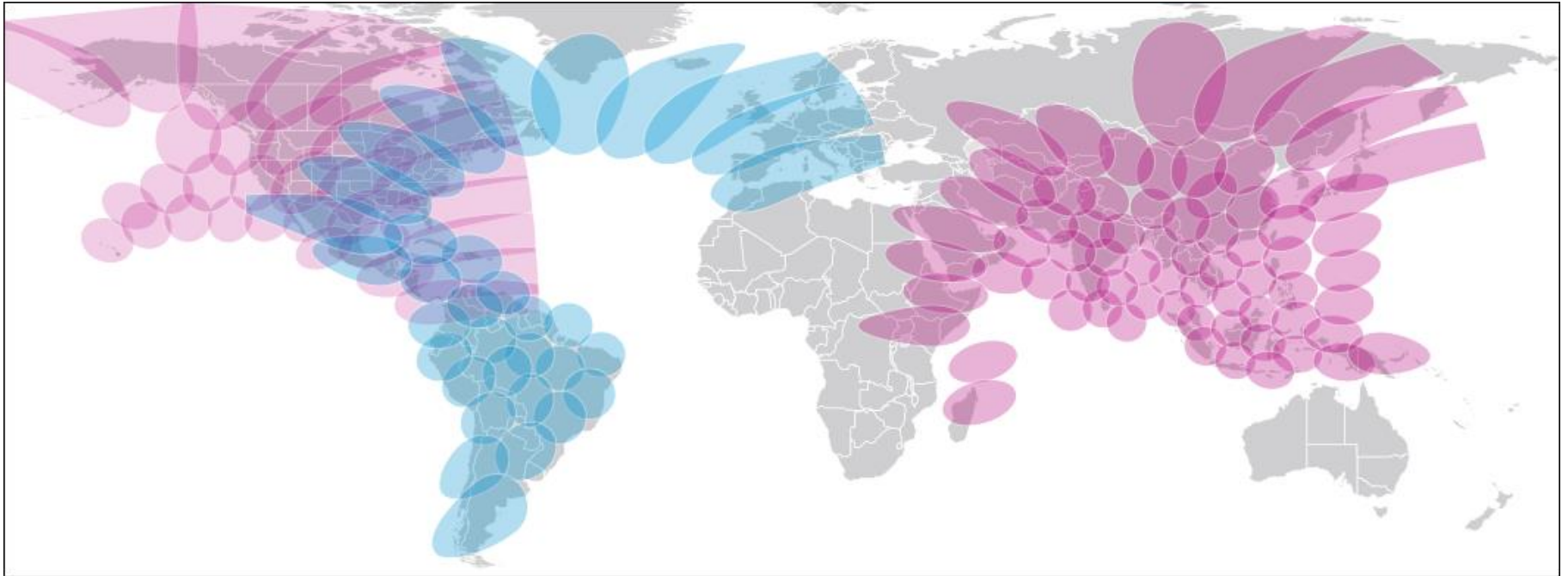


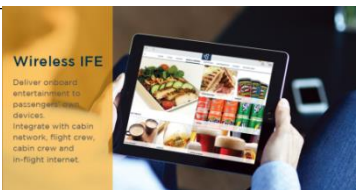
Orbital		Distance from earth	Latency
GEO		35.787 KMS in synchronisation with the terrestrial rotation / 1 orbital slot = 1 to 7 satellites SES, Intelsat, Eutelsat, telesat,...	250ms
MEO		8.062 KMS in a equatorial orbit O3B – 12 to 20 satellites / O3b mPower 7 sat	150ms (fiber in the space)
LEO		400 Kms to 2.000KMS Huge constellations (648 to > 4000 sat!) in several polar orbits Oneweb, Sapcex, Leosat	30ms (?)



Use Case: Aero Mobility

World aero routes - AN EXAMPLE OF GLOBAL SATELLITE SPOT BEAM COVERAGE





Integrate with cabin network, flight crew, cabin crew and in-flight internet.

Use Case: SATMED Providing eHealth Solutions



is a cloud-computing based eHealth platform that operates on a global scale



E-health applications (e-learning, e-care and e-hospital data management)



Satellite connectivity for areas in which mobile or terrestrial internet is lacking



Secure data storage and content management capacities



eMC
e-Medical Communication



GRAND-DUCHÉ DE LUXEMBOURG
Ministère des Affaires étrangères

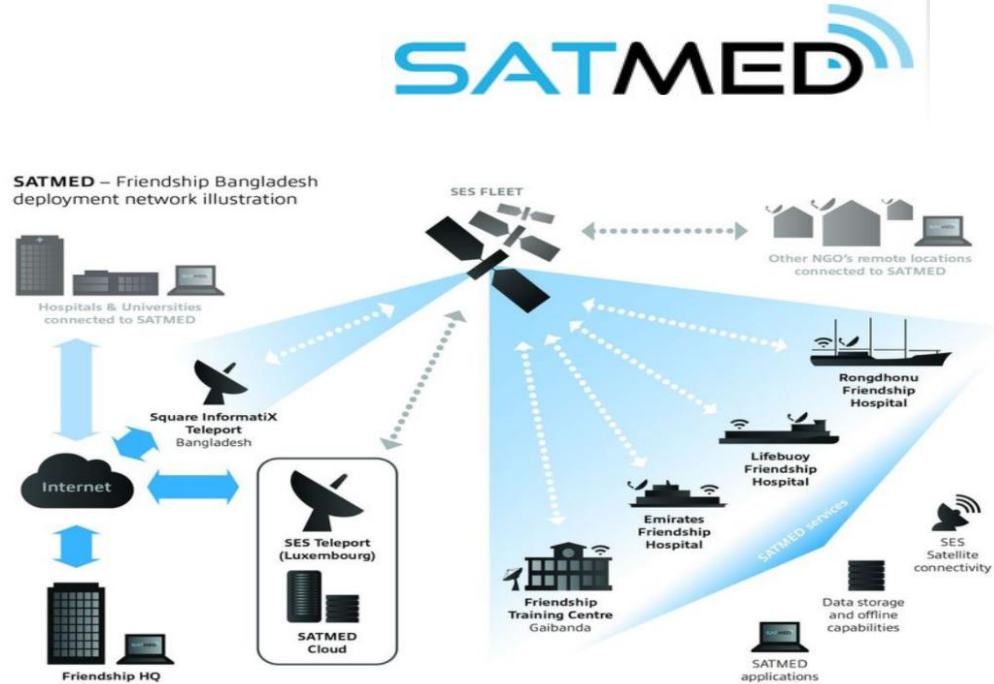
SES⁺
Techcom Services

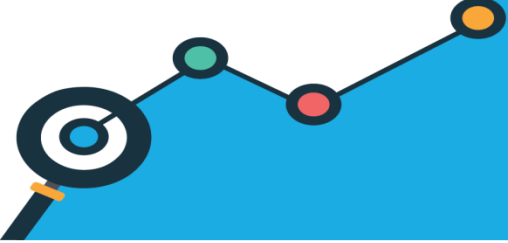
Initial roll-out of the platform in Sierra Leone in support of the fight against Ebola
Since then, deployed in Benin, Bangladesh, Niger, Philippines – and more

Use Case: SATMED Providing eHealth Solutions



SATMED – Friendship Bangladesh deployment network illustration





Digital Challenges & Risks

- Technology
- Security
- Regulatory
- Human / Ethics
- Environmental

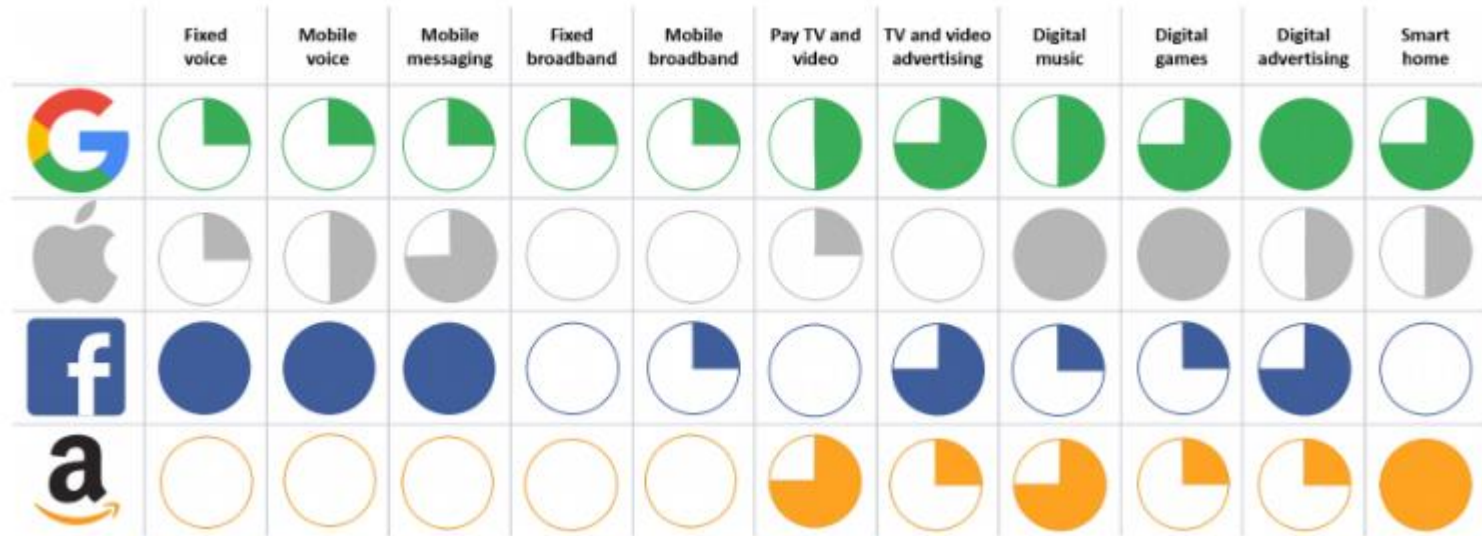


Celui qui a inventé le bateau a
aussi inventé le naufrage
(Lao Tseu)



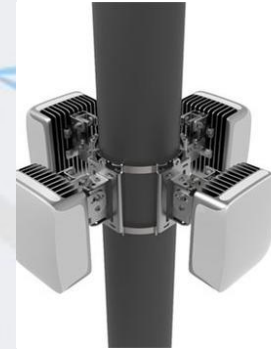
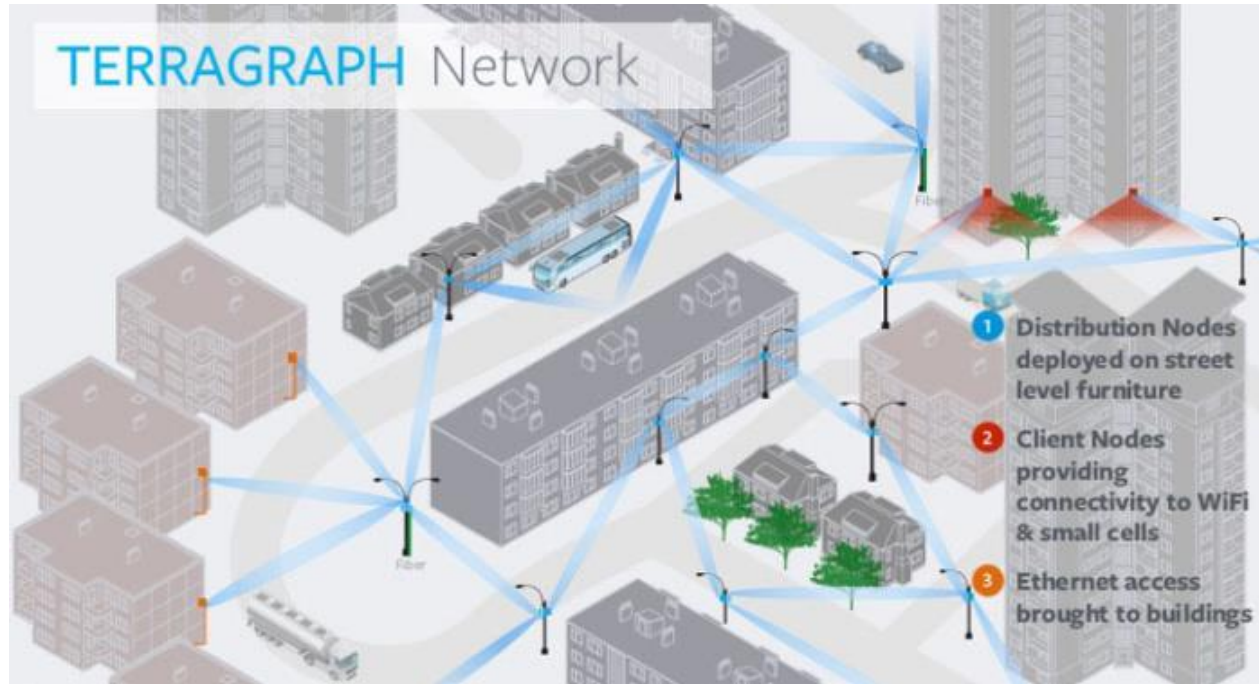
Will the GAFA giants rule the world?

Figure 1: Involvement of GAFA giants in core consumer TMT sectors



TMT : Abréviation désignant le secteur des Technologies, Médias et Télécommunications

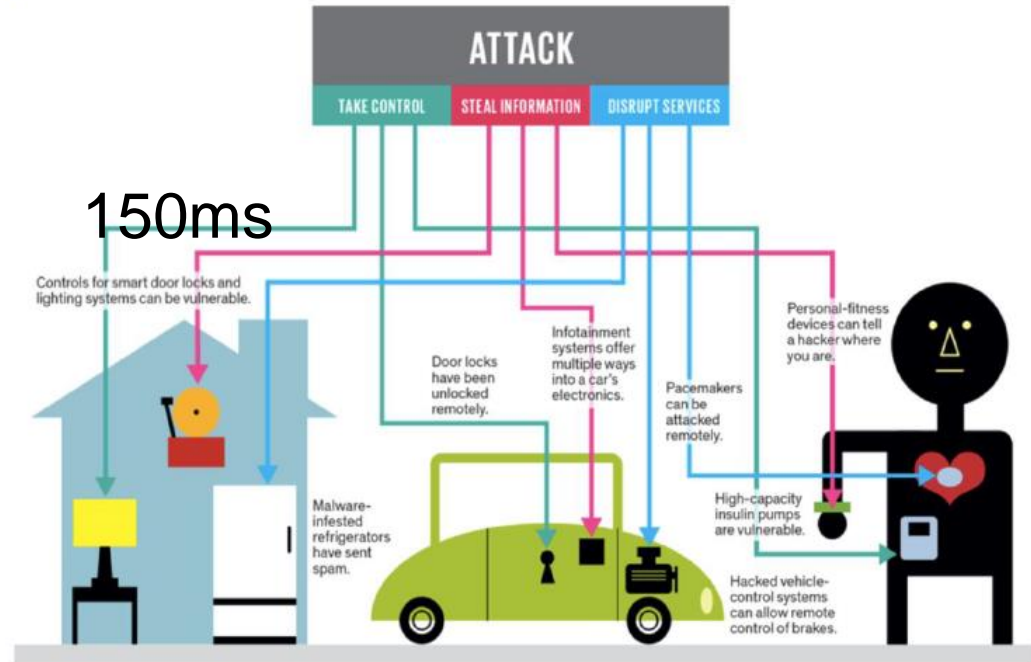
Facebook's Terragraph hopes to replace fiber broadband beginning with 2019 trials



Digital Challenges – Security Threats

- **Security Threats are exacerbated by:**

- Amount of connected devices
- Open digital environments



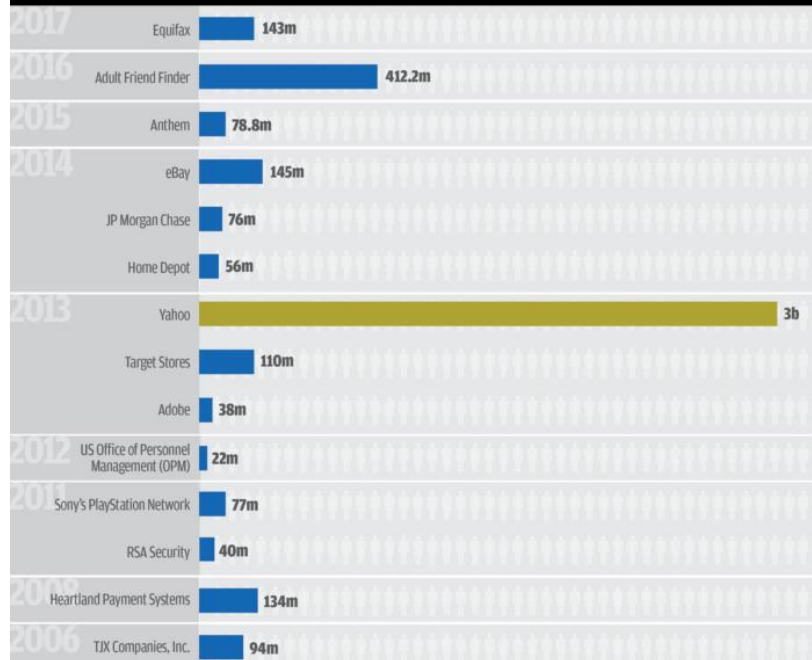
Digital Challenges – Security Threats

Biggest **DATA BREACHES** of the 21st century

Accounts
Compromised

by the millions

by the billions



SOURCE: CSO

Facebook faces \$1.63 billion in EU fine over fresh data breach

IANS | Oct 01, 2018, 11:10 AM IST



A+



Embroiled in another massive [data breach](#), Facebook may face \$1.63 billion in fine from the [European Union](#) (EU) privacy watchdog, the media reported.

According to a report in The Wall Street Journal on Sunday, Ireland's Data Protection Commission which is Facebook's lead privacy regulator in Europe, has asked Facebook to submit more details in the incident where data of over 50 million users were hacked via "Access Tokens" or digital keys.

Facebook also said it was taking precautionary step to reset access tokens for another 40 million accounts that have been subject to a "View As" look-up in the 2017.

The "privacy watchdog could fine Facebook as much as \$1.63 billion for the data breach", the report added.

Google annonce la fermeture de son réseau social Google+ après une faille de sécurité

Mis en ligne le 8/10/2018 à 20:15



PERSONAL INFORMATION

A close-up photograph of a person's hand holding a pen, poised to write on a form. The form contains several fields with labels: 'Phone No.', 'Phone No.', 'Where you go to school', 'What is the change and the reason for the change?', and 'What is the change and the reason for the change?'. The text is partially obscured by the hand and the pen.

General
Data
Protection
Regulation

- High Fines for Companies
High risk of Reputational damage !



Digital ID – unique and strong

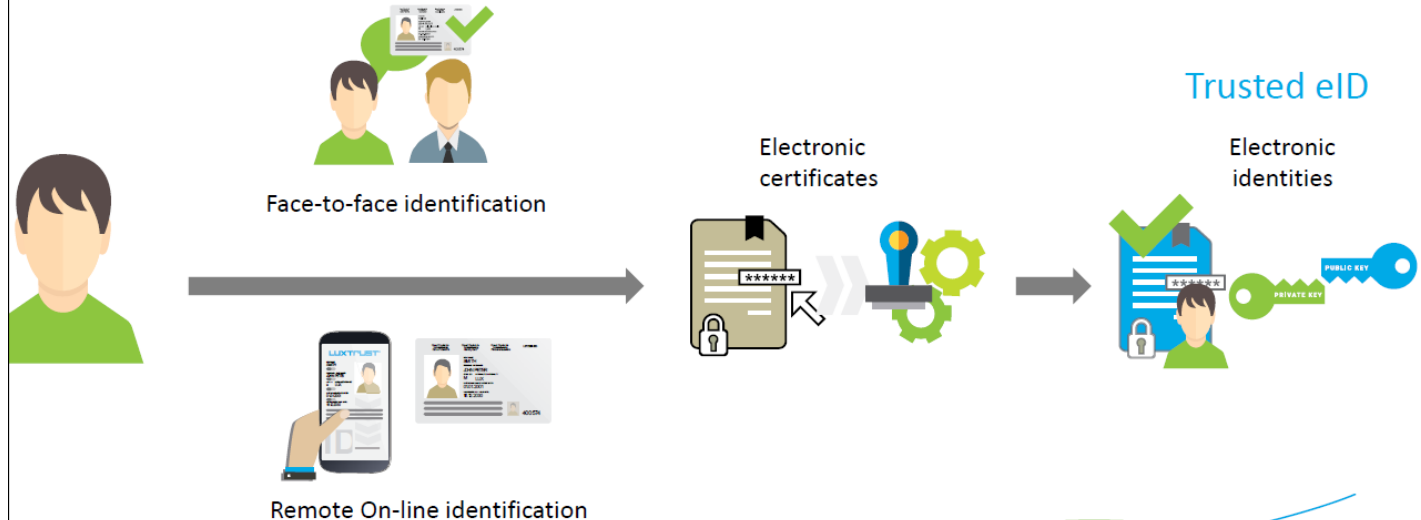


HOW IS A STRONG DIGITAL IDENTITY PRODUCED ?

LUXTRUST
Enabling a digital world

Under EU Regulation, a Strong Digital Identity can be assigned to People (Natural Person) and Organization (Moral Person), ... and extended to Things

(910/2014/EU : **E**lectronic **I**dentification and **A**uthentication **S**ervices - **eIDAS**)



New Fraud schemes



Amazon employees in China:

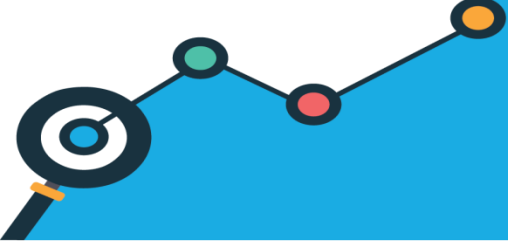
- Selling search key word used by customers to merchants using the platform to be better positioned in search engines
- Deleting bad comments on merchants for money
- Selling customers data (e-mail addresses)



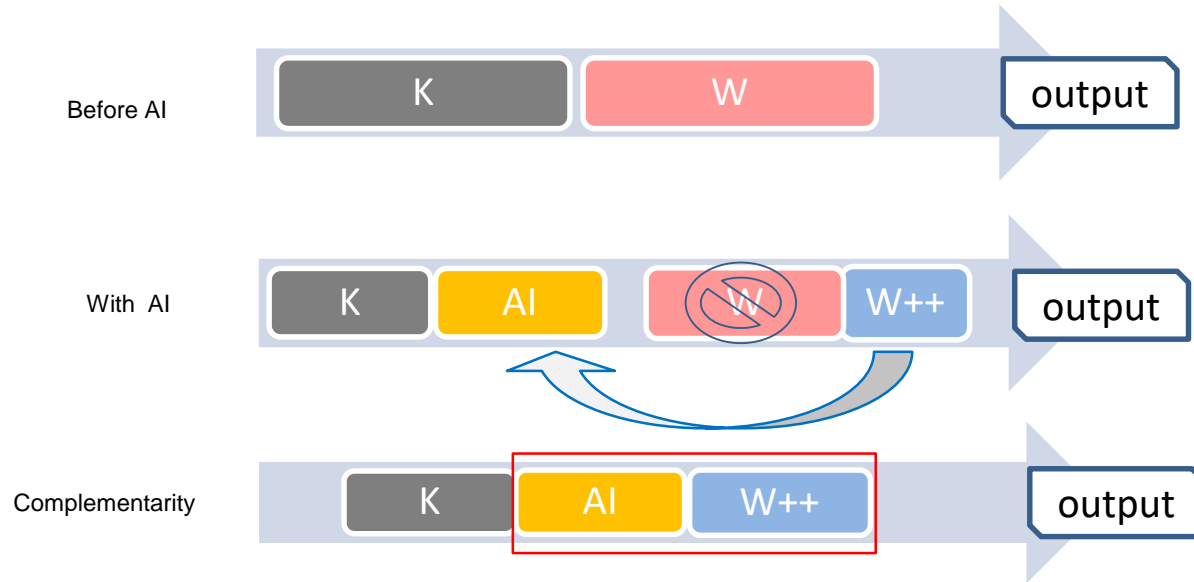
Artificial Intelligence Risks

HAL 9000





Complementarity of AI and jobs



Legend:

K – capital

W – workers

W++ – qualified workers

Environmental: Caring for future of our planet

▲ Earth Overshoot Day marks the date when we (all of humanity) have used more from nature than our planet can renew in the entire year

▲ EOD for Luxembourg: FEB 19!!!

▲ In 2018 as from 1 August our planet lived on credit





Questions & Answers?

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