

To 2030 and Beyond!

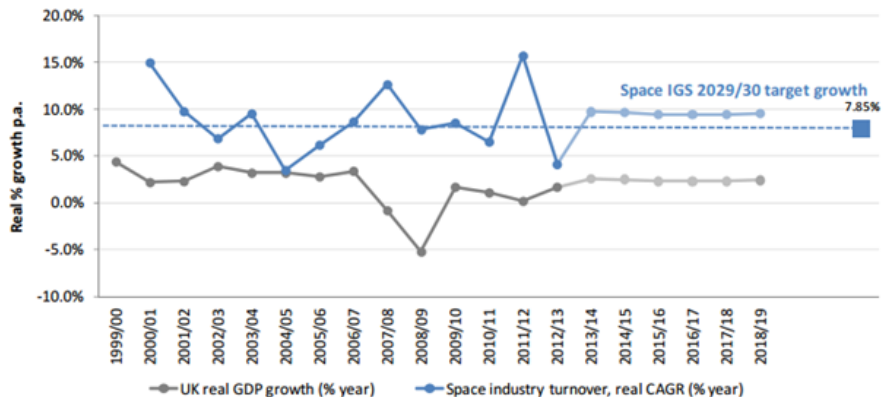
Stuart Martin
CEO
Satellite Applications Catapult

Fiji - Image taken by Spot 7 on 07/03/2014
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2030 – Our destination

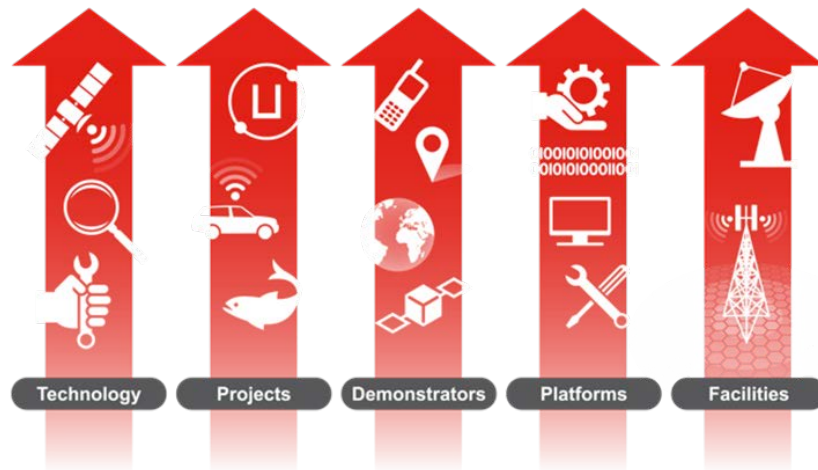
Figure 31 UK GDP compared with space turnover



Source: London Economics analysis of Size and Health data and OBR (March 2015), Economic and fiscal outlook.

- Currently, the UK space sector
 - Constitutes approx. 7% of the global space sector
 - Includes 11% of the global space operations market
 - Accounts for 10% of the global space applications market
- The UK generates over 30% of its turnover abroad

£40 billion



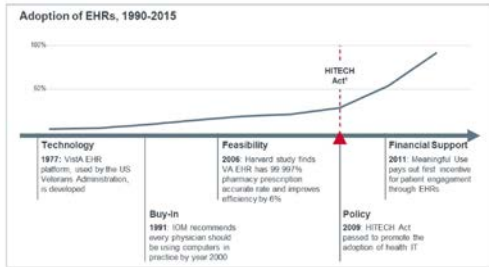
UK space – Are we at a Tipping Point?

“the moment of critical mass, the threshold, the boiling point” where a slow-moving trend suddenly becomes the status quo

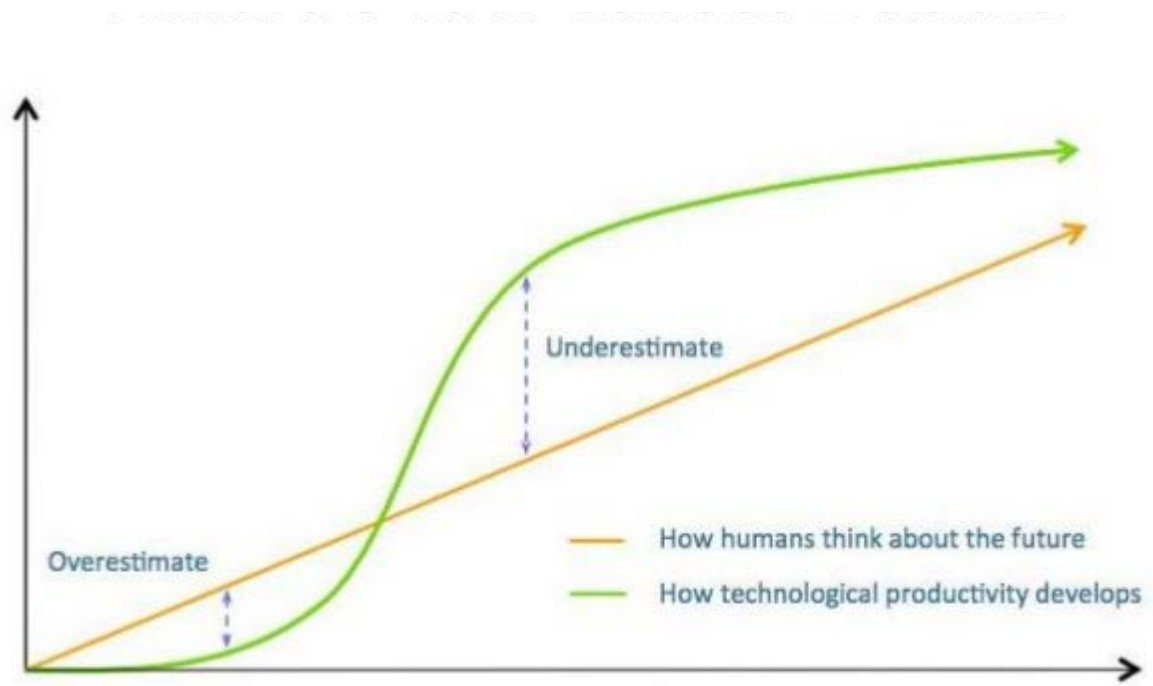
Malcolm Gladwell

Gladwell’s criteria for ‘tipping point’

- **1. Feasibility:** Is there evidence that proves that the trend is more effective, efficient, or preferable than the status quo?
- **2. Technology infrastructure:** Does the technology exist in a scalable fashion?
- **3. Industry buy-in:** Do users and providers acknowledge the benefits of the trend?
- **4. Financial support:** Is there capital behind the trend?
- **5. Policy:** Have legislatures or regulators come out with a position in favour of the trend?



Buy-In - Amara's Law – The Customer's Point of View



2030 - The Demand



2030 - The Opportunity





Mega-constellations

- Massive capacity & performance increase
- Low-cost mobile terminals
- Lower-latency ubiquitous services

Mega-constellations



GNSS augmentations

Enhanced positioning systems

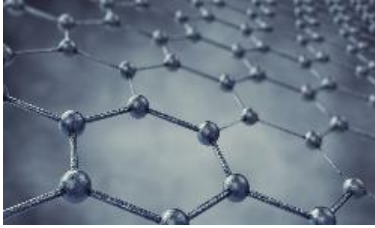
- 4 GNSS systems;
- Low power devices, integrated inertial measurement
- Ubiquitous sub-10cm accuracy positioning



Advent of near-real-time EO

Near-Real-time EO services

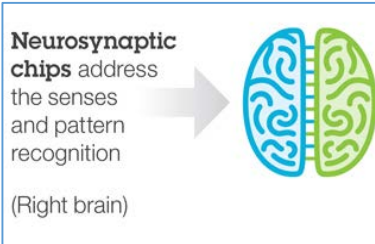
- Technology miniaturisation
- Reduced-cost access to space
- Commercial satellite-based relay systems



Graphene

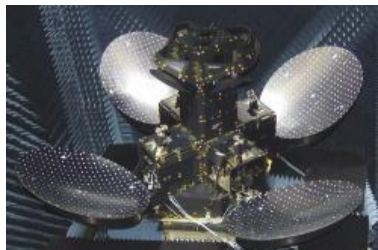


PV efficiency trends



Artificial intelligence

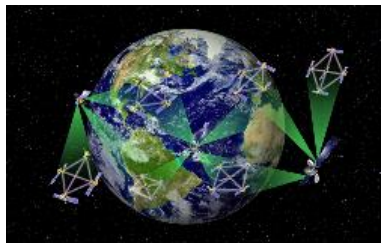
- **New Materials science**
 - The use of new material such as Carbon nanotubes & graphene radically change power electronics capability
 - Antenna embedded within structural materials
- **Energy generation and storage technologies**
 - Photovoltaic technology evolution → efficiency and lightweight
 - Energy harvesting (wearables) & storage evolution
 - Prevalence of contactless / induction charging systems
- **Artificial intelligence/ Neural processor technologies**
 - Advanced signal processing – image recognition
 - Advanced robotics become a reality



Deployable structures



HAPs



Fractionated Spacecraft

- **Hybridisation of robotics and new materials science**
 - Deployable and Reconfigurable structures
 - Repairable/ replenishable / upgradeable space-craft
 - Re-useable launch and orbit-transfer vehicles
- **Stratellites/ city-satellites High altitude pseudo-satellites**
 - Exceptional duration flight times, 20km altitude
 - Very stable observation and communications platforms
 - Optical communications
- **Fractionated and co-operative constellations**
 - Communications, distributed processing, precision positioning allow complex constellations of satellites to act in concert
 - Ubiquitous high-performance communications and imaging

Policy - are legislatures or regulators in favour of the trend?



Innovate UK



CATAPULT
Satellite Applications

"For us to succeed in the future we need to have the right infrastructure — roads, rail, broadband and mobile — that can connect businesses to their workforce. We need to have a rising generation of young people who are better educated than our competitors — and their predecessors — but also better trained. In the debate about education we must make sure that vocational education — especially in engineering and technology — plays a much more prominent role in our country than it has for many years now; and that employers have a decisive role in making sure that skills training is meeting the needs they have to fulfil their order books."

Greg Clark, Secretary of State for Business, Energy
and Industrial Strategy



Department for
Business, Energy
& Industrial Strategy

#IndustrialStrategy



“GPS... is one of the most widely used technologies by retailers today”

“LBS revenues are forecast to increase from €10.3 billion in 2014 at a compound annual growth rate (CAGR) of 22.5 percent to €34.8 billion in 2020”.



However ...

“The increase in usage of LBS has resulted in significant revenue growth, especially for **leading players like including Google, Facebook, Baidu, Tencent, Twitter and Yahoo!**”. Together, these companies accounted for an estimated 60 percent of global LBS revenues in 2014.



Thank you