

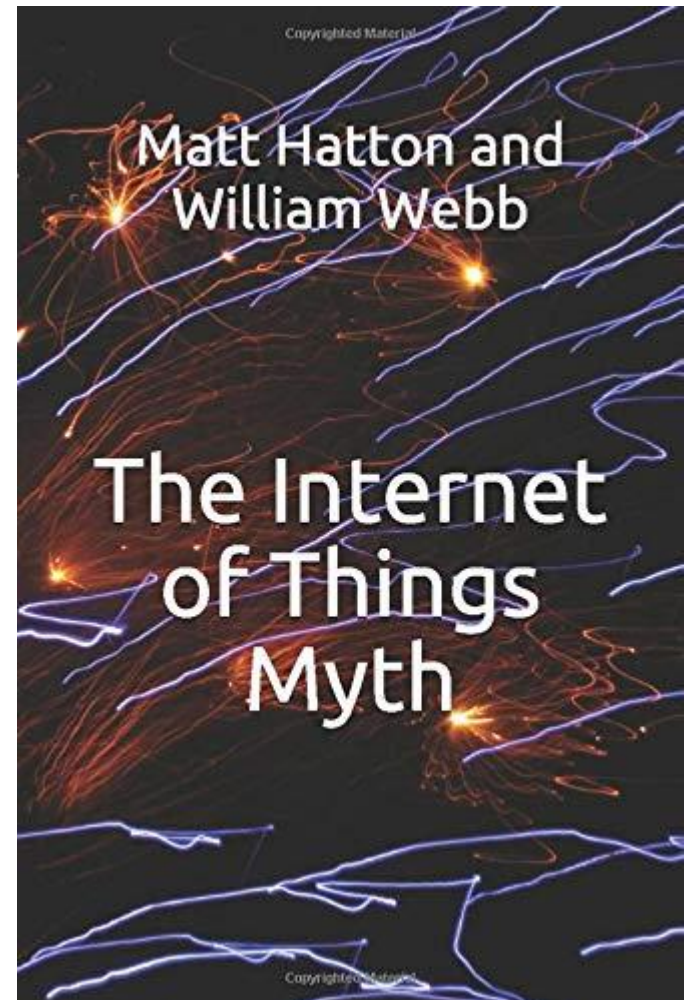


The IoT Myth

Professor William Webb

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2020



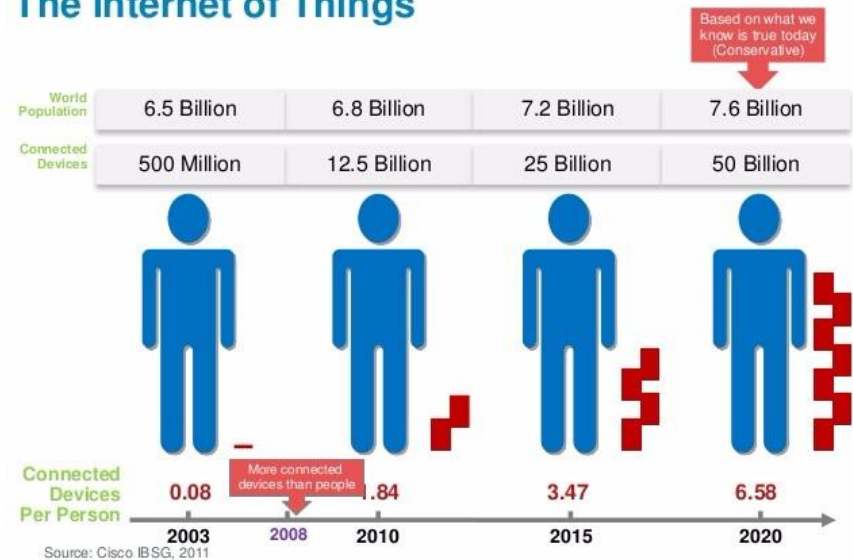
The story

- The vision
- The reality
- Future mistakes
- Lessons and thoughts

The vision

- “*The vision of more than **50 billion connected devices by 2020** may seem ambitious today, but with the right approach, it is within reach*”, Ericsson White Paper 2011
- *Refining these numbers further, Cisco estimates IoT was “born” sometime between 2008 and 2009. Today, IoT is well under way, as initiatives such as Cisco’s Planetary Skin, smart grid, and intelligent vehicles continue to progress. Looking to the future, Cisco predicts there will be 25 billion devices connected to the Internet by 2015 and **50 billion by 2020**, Cisco 2011*

The Internet of Things



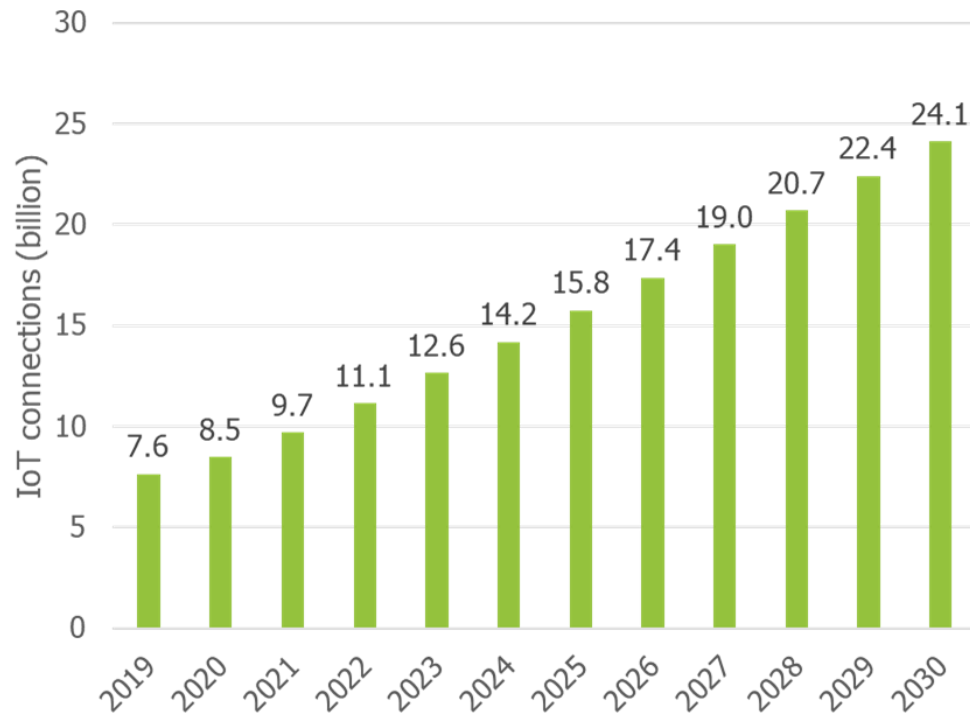
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The reality

IoT connections forecast 2019-2030

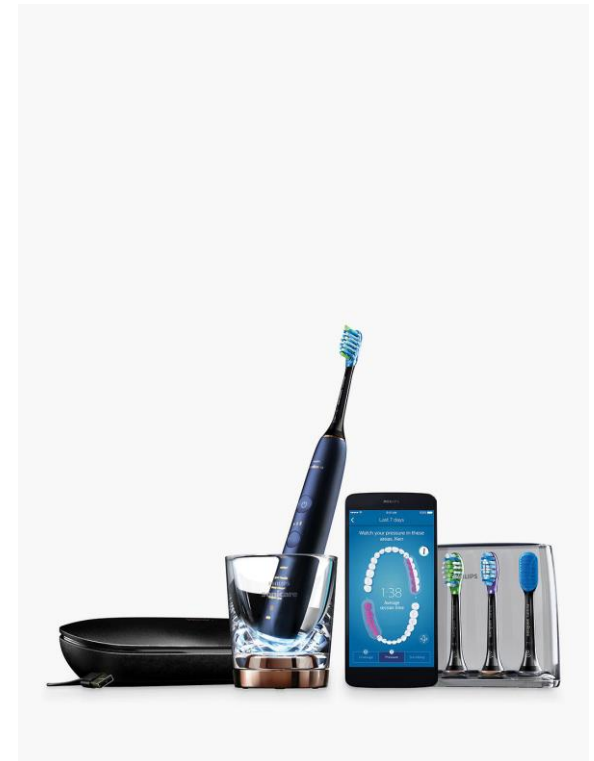
[Source: Transforma Insights TAM Forecasts, 2020]



- Latest Transforma Insights Forecasts (May 2020).
- 8.5bn devices in 2020 (<20% of predictions)
- Almost all devices in the home and office.
- What went wrong?

Most things shouldn't be connected

- Am I really going to use any of the functionality of a connected toothbrush?
- Why do I need to boil a smart kettle if I'm not stood immediately beside it?
- Would I really pay over \$1,000 for a Bluetooth connected iron?
- Connected dental floss, really?
- The legendary connected fridge. Does the user really want to track their egg consumption?
 - There may be some value in the manufacturer being able to monitor performance
- The Amazon Dash button, a small device with a single button that can be used to re-order frequently needed items, but likely adopters can just use their smartphone.
 - Dash was discontinued in March 2019.



It's easy to hypothesise in the lab, but the real world is messy

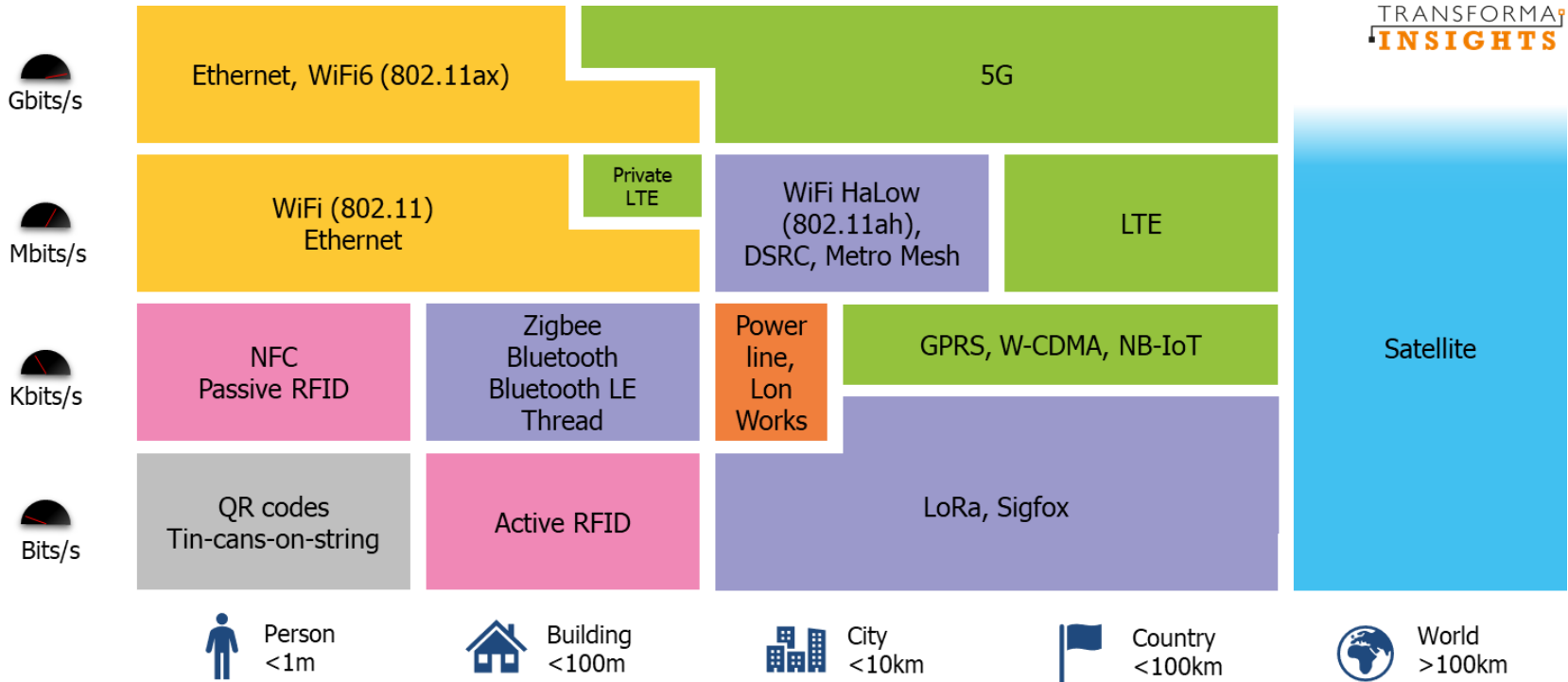
Webb

Search

- Take, for example, connected rubbish bins.
- The concept is sound that eliminating the emptying of bins that are only half full should make the collection activity significantly more efficient.
- However, the reality is much more complicated.
 - Organisations that are responsible for emptying bins have established routes, a number of collection vehicles and contracted employees.
 - The efficiency savings of redeploying them in a more reactive way is unlikely to deliver the hoped-for efficiency savings.
 - They cannot respond instantly to a full bin in the same way that, say, a fire engine would to a fire.
- Short of creating an Uber of Bins, with self-employed collectors using their own vehicles, it is very challenging to factor in the peaks and troughs of demand into an efficient asset utilisation model.
- The promise of constant monitoring has proven to be practically impossible to realise.



An overly complicated picture for connectivity



Which to pick? How to get comprehensive coverage?

The airport example (1)

- The aim – to track everything on the airport to ensure it arrives at the stand as needed
- The first problem for the airport is to select a wireless technology.
 - Airports generally prefer self-deployment of technologies and systems that are used for critical operational tasks. The only self-deployed LPWAN technology with any degree of scale is LoRa. However, trials of LoRa at airports such as Schipol have not gone well.
 - Alternatively, airports could use NB-IoT, with perhaps some “private network” guarantee from an operator to give the airport greater certainty that it will always have capacity and connectivity available.
 - NB-IoT modules are not available in all the various form-factors that would be required and battery life often appears to be much less than anticipated.
 - The airport is uncertain whether the MNO would provide NB-IoT coverage and service for the long term (10 years or more) and whether they will be able to procure suitable modules in the future.



Airport example (continued)

- The airport itself also has a standards problem. Some of the items needed at the stand will arrive from outside the airport. Some will be flown in on planes - for example cargo that needs to be transferred. But achieving international agreement is hard, especially when there is not clear and obvious solution to prefer.
- The first airport will need to be a pioneer. It will need to develop, or procure, connection management software, integrate it into its IT system, work out a way to effectively identify and address devices, build appropriate databases and more. Most of these are not skills that an airport possesses.
- Deploying a multi-environment, multi-tenanted, multi-technology, complex IoT system is a non-trivial task.

Many ecosystem mis-steps



Insecure

- Numerous examples
- Hacking of Chrysler Uconnect on Jeep Cherokee in 2015.
- Mirai virus (DDoS).
- Kayla doll



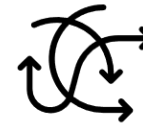
Immature market

- Applying old-style approaches (or wrong approaches) to a new market.
- E.g. US connected cars offline due to permanent roaming. See also 2G/3G switch off.



PoC hell

- Many companies are trapped in 'PoC hell', never quite getting to deploy.
- Too much focus on technology, not enough on operations and commercial factors.



Supplier hubris

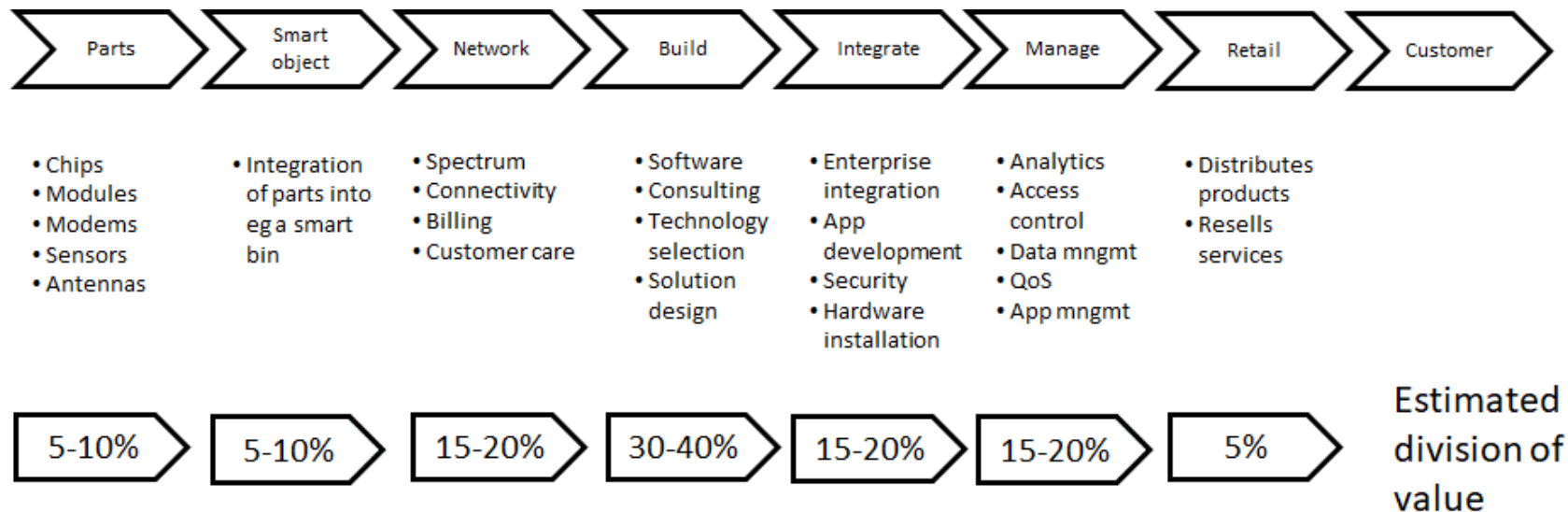
- Obsession with moving up value chain (and out of area of competence).
- Obsession with valuation.
- Too little focus on delivering real value.



	Internet	Things
Fault tolerance	High	Low
Testing	Beta test in field	Rigorous pre-release and field testing
Iteration	High	Low
Time to market	Fast	Slow
Compliance requirements	Low	High

Everyone move up the value chain

- An unhealthy obsession with moving up the value chain
- Software valuations are much higher than hardware
- End services is the holy grail, but with no specialism
- Many big industrial companies tried to sell internal capabilities



Embracing IoT requires digital transformation of the whole company

7 Areas of Disruption for IoT Adopters



Process

Unless you're doing something very wrong, IoT creates new processes of some sort. At the very least it creates a stream (or trickle) of data from remote assets that has to be gathered, stored and used in some way. At the most extreme it necessitates a complete overhaul of how an organisation operates.



Business Model

IoT use cases represent a spectrum of implications for organisations' business models. In some it's a simple streamlining of existing processes, e.g. a port which can make big savings by marginal individual gains in more efficient container handling. In others, it completely transforms the organisation and how it operates.



Finance

New business models often mean new payment formats. Connected car services, for instance, provide a new ongoing revenue stream for manufacturers. In as-a-service models finance is really disrupted, e.g. with implications for the amount of debt on the balance sheet, with the seller no longer receiving a chunk of cash up front.



People

With adoption of new technologies comes additional requirement for internal resources capable of managing them. Suppliers will help with implementation, but there is an underlying requirement for internal capability to be able to work with the new technology. Demand for in-house data scientists, for instance, is booming.



Partners

Most organisations are going through a process to become more IT-centric. "Software is eating the world". Every company is an IT company now. For most organisations this means working with a wide range of partners rather than, create every aspect of their new capabilities in-house. Managing those partners is challenging.



Systems

It almost goes without saying that new IoT capabilities introduce new systems, including device management, data analytics and much more. These new systems need to be implemented, run and integrated with existing systems such as enterprise resource planning (ERP) and customer relationship management (CRM).



Culture

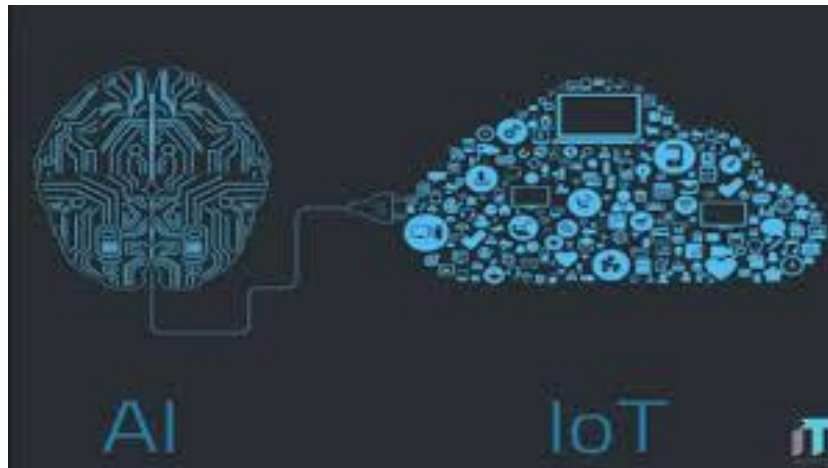
Notwithstanding the practical changes required of systems and skills, there is also the potential need for a change in culture within the organisation. Shifting from selling products to selling services, or harnessing a wide range of additional company data requires a culture shift to become more services- or IT-focused.

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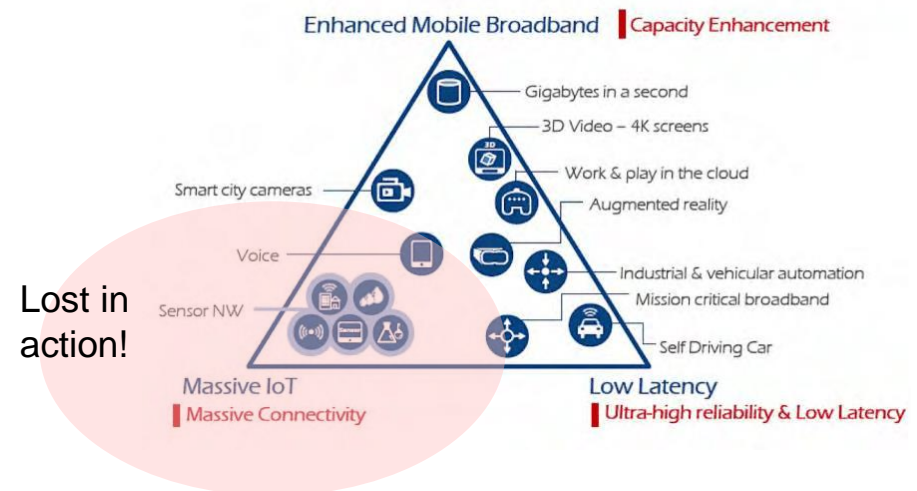
AI will save us

- The story runs something like this:
 - There will be billions of connected devices.
 - They will generate vast amounts of “big data”.
 - This in turn will feed AI systems leading to wondrous insights.
 - These insights will transform our world.
- Yes...but until we have the billions of devices and the data then the AI can't get to work
- AI will make IoT even better once IoT is already successful



5G will save us


- 5G is claimed to enable massive machine connectivity
- BUT
 - There is no new IoT element in 5G!!!
 - It just takes NB-IoT and calls it 5G
 - In the process it confuses many
- Ultra-fast and low latency might just have a niche role, but remote surgery is not going to transform the prospects for IoT
- Autonomous cars are...autonomous
- MNOs are distracted by 5G and less interested in IoT
- Customers are distracted by 5G
- 5G really doesn't help



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In summary – what went wrong



The view that everything should be connected. In practice the value of connecting most things is minimal and the downside of complexity, security and cost significant. There needs to be a clear benefit to connectivity and a relatively high threshold should be applied before deciding to make a device part of the IoT.

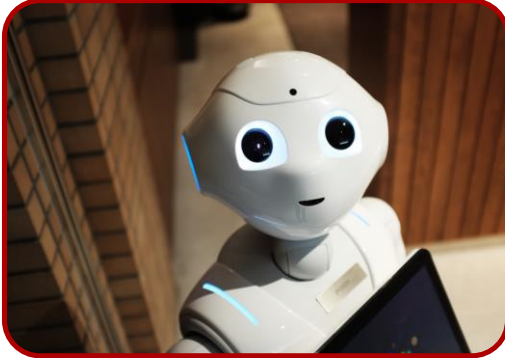
The assumption that just connecting a device is all that is needed. In practice, devices need management, the information they generate needs processing, users need support and complete solutions need to be delivered.

Too little focus by enterprise adopters on the non-technical implications of adopting IoT. Done right, IoT is transformational to how an organisation operates and offers a strong competitive differentiator. However, to gain the benefits can require an overhaul of existing business practices and a change in business models.

Insufficient focus on open standards. With the result that there are no standards in some areas, competing standards in others.

Lack of an industry value chain that generates sufficient profit for all the players. The distribution of value is not aligned with the expectation of the various players. This has led many to attempt to move across the value chain, with predictably poor results, further adding to the issues.

In summary - What will go wrong



The view that AI will transform IoT

AI is a useful tool, but it only works once there is substantial data - which only arrives in a mature IoT solution. IoT needs to be made to work well first, then AI can be applied to make it work better.



The thought that 5G will transform IoT

This is completely wrong. There is no IoT element within 5G. It changes nothing, other than further confuses users and operators as to the best form of connectivity. And it encourages the view that everything can and should be connected.



The hope that autonomous driving will be a huge marketplace for wireless connectivity

Autonomous cars are...autonomous. And in any case, they will not be in widespread use for many years, perhaps even decades.

How to avoid some of these mistakes

- Pick a segment, vertical or particular solution space where there is clear benefit from IoT, ideally in a way that can be quantified as a business case improvement.
- Make sure that a complete solution can be delivered to the end customer, even if that will come from myriad companies. Determine who will orchestrate this solution and work with them.
- Realistically model the profitability of each player in the value chain. Be willing to redistribute some of the profit if it is clear that certain players are not sufficient incentivised.
- Expect it to be a slow process. Implementing initial deployments will take time. Using these as case studies to encourage other customers will take time. Expanding nationally and internationally will take time. Structure and finance accordingly.



A message of hope

- We believe that IoT is of vital importance in a world of aging populations, climate change, growing congestion and increasing complexity.
- We believe that the original forecasts of 50 billion connected devices are plausible in their magnitude, just misjudged in their timespan.
- To achieve these forecasts requires that lessons be learnt from the past decade and applied to the next.
- We hope that key players can learn.

