TMT Predictions accuracy, 2008-2016

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

60% 68% 72% 82% 82% 85% 79% 86% 87%

Source: Deloitte, 2009-2017
Predictions 2017: the decade of invisible innovation

- Prints charming: biometric security reaches the billions
- DDoS attacks enter the terabit era
- Safety First: the road to self driving starts with a stop
- 5G: a revolution in evolution, even in 2017
- Brains at the edge: machine learning goes mobile
- The great indoors: the final frontier for digital navigation
- Have we reached peak tablet?
- Vinyl: the billion-dollar nostalgic niche
Prints Charming: Biometric security reaches the billion

The active base of fingerprint reader-equipped devices will top one billion for the first time in early 2017.

Each active sensor will be used an average of 30x per day, implying over 10 trillion aggregate presses globally over the year.

About 40% of all smartphones in developed countries will incorporate a fingerprint reader as of end-2017.

At least 80% of users with a fingerprint reader-equipped smartphone will use this sensor regularly.
Prints charming: biometric security reaches the billions

Deloitte Global predicts that the active base of fingerprint reader-equipped devices will top 1 billion for the first time in early 2017.

Each active sensor will be used an average of 30 times a day and over 10 trillion times a year.

Catalyst for the deployment of biometric sensors in other environments and across multiple industries including:

- retail
- financial institutions
- government
- schools
- media companies
- many more
There are concerns about the security of fingerprint readers, some of which may be based on untruths.

Your phone’s biggest vulnerability is your fingerprint

Can we still use fingerprint logins in the age of mass biometric databases?

by Russell Brandom | @russelbrandom | May 2, 2016, 8:00am EDT

Which country are the fingerprints captured by your phone stored?
The next step may be ultrasonic fingerprint readers that penetrate through liquid; so you can unlock your phone when your fingers are wet or greasy, should you need to. And after that, palm scanning.

Bath Air Pillow Smartphone Holder
About $40
DDoS attacks enter the terabit era

In 2017 Distributed Denial-of-Service (DDoS) attacks, a form of cyberattack, will become larger in scale, harder to mitigate, and more frequent. There will be on average a terabit/s (Tbit/s) attack per month, over 10 million attacks in total, and an average attack size of between 1.25 and 1.5 gigabits per second (Gbit/s) of junk data being sent.
A distributed denial of service attack floods a website, say for a retailer with fake data, akin to a shop being filled with false customers. The store cannot function as a result.
DDoS attacks enter the terabit era

Deloitte Global predicts one Terabit/s Distributed Denial of Service (DDoS) attack per month, and over 10 million attacks during the year.

The escalation of DDoS is due to:
- the growing base of insecure IoT devices
- online instructions for unskilled attackers
- rising uplink data speeds – each connection can effect more damage

Solutions to the problem include:
- decentralization
- dynamic defense
- geographic filtering
- certification marks for connected devices

Every year, the average size of attacks is getting larger:
The Mirai code which inflicted the first Terabit/s attack was made available online; it was then used in the second Tbit/s attack.
**AUTOMATIC BRAKING**

**Car Feature Interest**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Very interested</th>
<th>Somewhat interested</th>
<th>Not interested</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guidance Cameras</td>
<td>42%</td>
<td>40%</td>
<td>18%</td>
</tr>
<tr>
<td>Lane Departure Detection</td>
<td>39%</td>
<td>42%</td>
<td>19%</td>
</tr>
<tr>
<td>Automatic Braking</td>
<td>39%</td>
<td>39%</td>
<td>22%</td>
</tr>
<tr>
<td>Bad Driver Detection</td>
<td>22%</td>
<td>35%</td>
<td>42%</td>
</tr>
<tr>
<td><em>Fake feature</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self Driving Cars</td>
<td>19%</td>
<td>33%</td>
<td>48%</td>
</tr>
</tbody>
</table>

Base: Total (n=1,000)
Q2. How interested are you in having the following features in a vehicle that you were going to buy?
Risk of car driver fatality calculated using logistic regression

Risk of car driver fatality

Source: Transport Research Laboratory (extracted from the OTS and CCIS dataset), Department for Transport, 2010.
AUTONOMOUS EMERGENCY BRAKING

The Discovery Sport’s advanced Autonomous Emergency Braking system detects when a collision is imminent and intervenes by braking to avoid or mitigate the impact.
Safety first: the road to self-driving starts with a stop

By 2022, Deloitte Global estimates that a sixth of the US cars and light trucks will be equipped with automatic emergency braking (AEB).

Deloitte Global predicts AEB will contribute to a reduction of annual US motor vehicle deaths by 6,000, a 16% decline compared to 2017.

AEB technology can enable the vehicle to react to an obstacle in 1-2 milliseconds.
5G: a revolution in evolution, even in 2017

Significant tangible steps towards the launch of 5G will take place in 2017:

- >200 carriers are likely to be offering LTE-A across some of their network, and >20 should have LTE-A Pro networks by end of 2017
- Continual development of 5G standards will take place
- A few dozen of the 800 operators around the world are likely to be actively involved in trials or commercial deployment of services marketed as 5G
5G: A revolution in evolution, even in 2017

Deloitte Global predicts that over 200 mobile networks will include elements of 5G network architecture in 2017.

Advanced 4G networks introduce network components including:
- Carrier aggregation
- Licensed Assisted Access
- MIMO
- QAM
- Beamforming

These will be found among upgraded 4G (LTE-A and LTE-A Pro) networks, which will provide a steady progression to the full launch of 5G in 2020.
LTE-A is designed to offer maximum downlink speeds of up to 3 Gbit/s, while LTE-A Pro offers even faster maximum speeds of over 3 Gbit/s, and 5G should offer yet higher multi-gigabit speeds.

Which applications will these network speeds unlock?
Possible use cases of 5G and advanced 4G: will these enable the funding of the roll out of further network upgrades?

- **Ultra-reliable communication**
  - eHealth
  - Remote surgery/remote object control
  - Natural disaster

- **Massive IOT**
  - Sensor networks
  - Smart wearables (clothes)
  - Mobile video surveillance
  - Drones control
  - Critical control of remote devices

- **Broadcast-like services**
  - Live-TV at scale
  - Broadcast-like services-local, regional, national
  - On-demand anything

- **Ultra-low latency**
  - Automatic driving
  - Smart traffic control
  - Smart infrastructure
  - Tactile control

- **Broadband access everywhere**
  - 50+ Mbps everywhere
  - Dense urban society
  - HD video/photo sharing in stadium/open air gathering
  - Smart Office on-the-go

- **High User Mobility**
  - Moving hotspot
  - High speed train
  - Remote computing
  - Aircrafts

Source: Deloitte analysis
One core application of 5G may be home broadband; cost per GB and performance may be sufficient for a large proportion of broadband users.

Source: https://www1.relish.net/athome
In the 60s, we deployed the combination of cutting edge tech and telecoms to solve business problems and to enable epochal journeys.
The Apollo Guidance Computer, on board the Apollo 11 Command Module had 64 kilobytes of memory and operated at 0.043MHz.

In comparison, an iPhone 7, which you can easily fit into any pocket, has up to 256 GB, and a CPU running at speeds of up to 2.33 GHz, that is 4 million x and 54K x.

And what do we use this pocket supercomputer for?
The nexus of: 4G, digital mapping, GPS/GLONASS, colour displays, powerful and efficient processors, digital cameras, augmented reality, cloud computing, app stores, digital currency, external battery packs, accelerometers, gyroscopes and more.

Pokémon Go was one of the four highest grossing apps on Apple’s App Store in 2016.
Machine learning is going mobile
Brains at the edge: machine learning goes mobile

Deloitte Global predicts that in 2017 over 300 million smartphones (more than a fifth of units sold) will have on-board neural network machine-learning capabilities.

This will allow smartphones to perform machine-learning tasks even when not connected to a network.

This functionality will enhance applications including:

- indoor navigation
- augmented reality
- language translation
- image classification
- speech recognition
- and many more currently unknown applications.
The great indoors: the final frontier for digital navigation

As of 2022 at least a quarter of all human and machine uses of precision digital navigation will include an indoor leg or be for an entirely indoor journey.

This compares to less than 5% of all uses in 2017.
The great indoors: the final frontier for digital navigation

Deloitte Global predicts that by 2022, at least a quarter of human and machine uses of digital navigation will include or exclusively be indoors.

Enabled by growing availability of:
- Wi-Fi hotspots
- LED lighting
- dense cellular networks
- ultra-wideband (UWB)
- beacons
- magnetic positioning

It should have the same disruptive impact as outdoor navigation.

It will enable:
- new business models
- improved existing ones
- over the next decade
Indoor navigation is likely to require a combination of different signals and other inputs, each with its own set of pros and cons.
Have we reached peak tablet?

2017 sales of tablet computers will be fewer than 165m units, down by about 10% from the 182m units sold in 2016.

This compares to a peak of over 200 million units for several years, and a former expectation that tablets would cause the demise of the PC.
Have we reached peak tablet?

Deloitte Global predicts that 2017 sales of tablets will be fewer than 165 million units, 10% less than the 182 million units sold in 2016.

Their position as the device filling the gap between laptop/desktop computers and smartphones has been squeezed by smartphones getting bigger and laptops becoming lighter.
Tablets were the future once, when they bettered PCs on weight, screen quality and size, performance and looks.

Dell XPS 13
13 inch display
13 hours+ battery life
$800

New LG Gram 14
14 inch display
17-24 hours battery life
$850 for existing version

Vodafone Smart Ultra 7
5.5 inch display
Octa-core processor
£130

The PC has become lighter, has more stamina, has a touch screen, offers 360 hinges, includes fingerprint readers as options, has more power, switches on faster.

Smartphones have got bigger, lighter, cheaper, more powerful, are personal and portable.
Tablets are second best for all activities across all age groups; this makes it a nice to have, not a need to have.

Preferred device for a range of activities

Q. Which, if any, is your preferred device for each of the following activities?

<table>
<thead>
<tr>
<th>Activity</th>
<th>Total</th>
<th>Male</th>
<th>Female</th>
<th>18-24</th>
<th>25-34</th>
<th>35-44</th>
<th>45-54</th>
<th>55+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Watch live TV</td>
<td>TV</td>
<td>TV</td>
<td>TV</td>
<td>TV</td>
<td>TV</td>
<td>TV</td>
<td>TV</td>
<td>TV</td>
</tr>
<tr>
<td>Watch TV programmes via catch-up services</td>
<td>TV</td>
<td>TV</td>
<td>TV</td>
<td>Laptop</td>
<td>TV</td>
<td>TV</td>
<td>TV</td>
<td>TV</td>
</tr>
<tr>
<td>Stream films and/or TV series</td>
<td>TV</td>
<td>TV</td>
<td>TV</td>
<td>Laptop</td>
<td>TV</td>
<td>TV</td>
<td>TV</td>
<td>TV</td>
</tr>
<tr>
<td>Watch short videos</td>
<td>Laptop</td>
<td>Laptop</td>
<td>Laptop</td>
<td>Laptop</td>
<td>Laptop</td>
<td>Laptop</td>
<td>Laptop</td>
<td>Laptop</td>
</tr>
<tr>
<td>Video calls</td>
<td>Laptop</td>
<td>Laptop</td>
<td>Laptop</td>
<td>Laptop</td>
<td>Laptop</td>
<td>Laptop</td>
<td>Laptop</td>
<td>Laptop</td>
</tr>
<tr>
<td>Online search</td>
<td>Laptop</td>
<td>Laptop</td>
<td>Laptop</td>
<td>Laptop</td>
<td>Laptop</td>
<td>Laptop</td>
<td>Laptop</td>
<td>Laptop</td>
</tr>
<tr>
<td>Browse shopping websites</td>
<td>Laptop</td>
<td>Laptop</td>
<td>Laptop</td>
<td>Laptop</td>
<td>Laptop</td>
<td>Laptop</td>
<td>Laptop</td>
<td>Laptop</td>
</tr>
<tr>
<td>Make online purchases</td>
<td>Laptop</td>
<td>Laptop</td>
<td>Laptop</td>
<td>Laptop</td>
<td>Laptop</td>
<td>Laptop</td>
<td>Laptop</td>
<td>Laptop</td>
</tr>
<tr>
<td>Check bank balance</td>
<td>Laptop</td>
<td>Laptop</td>
<td>Laptop</td>
<td>Phone</td>
<td>Laptop</td>
<td>Phone</td>
<td>Laptop</td>
<td>Desktop</td>
</tr>
<tr>
<td>Read the news</td>
<td>Phone</td>
<td>Phone</td>
<td>Phone</td>
<td>Phone</td>
<td>Phone</td>
<td>Phone</td>
<td>Phone</td>
<td>Laptop</td>
</tr>
<tr>
<td>Check social networks</td>
<td>Phone</td>
<td>Phone</td>
<td>Phone</td>
<td>Phone</td>
<td>Phone</td>
<td>Phone</td>
<td>Phone</td>
<td>Laptop</td>
</tr>
<tr>
<td>Play games</td>
<td>Phone</td>
<td>Desktop</td>
<td>Phone</td>
<td>Phone</td>
<td>Phone</td>
<td>Phone</td>
<td>Phone</td>
<td>Laptop</td>
</tr>
<tr>
<td>Record videos</td>
<td>Phone</td>
<td>Phone</td>
<td>Phone</td>
<td>Phone</td>
<td>Phone</td>
<td>Phone</td>
<td>Phone</td>
<td>Phone</td>
</tr>
<tr>
<td>Take photos</td>
<td>Phone</td>
<td>Phone</td>
<td>Phone</td>
<td>Phone</td>
<td>Phone</td>
<td>Phone</td>
<td>Phone</td>
<td>Phone</td>
</tr>
<tr>
<td>Voice calls using Internet</td>
<td>Phone</td>
<td>Phone</td>
<td>Phone</td>
<td>Phone</td>
<td>Phone</td>
<td>Phone</td>
<td>Phone</td>
<td>Phone</td>
</tr>
</tbody>
</table>

Note: The survey was conducted online, and so likely biases the access to device numbers in favour of computers or tablets, since filling out the questionnaire on a smartphone would be possible but unlikely due to length.

Weighted base: All respondents (29,046): Australia (2,006), Belgium (2,000), Canada (2,010), Finland (1,000), France (2,003), Germany (2,006), Ireland (1,002), Italy (2,000), Japan (2,000), Luxembourg (1,000), Netherlands (3,000), Norway (1,009), Sweden (2,007), UK (4,003), US (2,000)

Source: Deloitte member firms’ Global Mobile Consumer Survey, developed countries, May-July 2016
Vinyl: the billion-dollar nostalgic niche

Vinyl should continue its remarkable resurgence in 2017, and that this audio format, whose peak sales in both units and dollars were in the late 1970s, may generate approaching $1 billion globally in revenues for the first time this millennium.

Deloitte Global expects that new and used discs will generate over 90% of revenues, with the remainder made up by turntables and accessories.
Vinyl: the billion-dollar nostalgic niche

Deloitte Global predicts that vinyl in 2017 will approach $1 billion in sales, mostly from new records, but also from used discs and record players.

Number of albums sold:

It will generate globally:

- 15% of all physical music sales
- 6% of all recorded music revenues
The sales trajectory looks fantastic, if data is selected selectively

But are we really approaching the final vinyl countdown?

![Revenues from vinyl record sales, US](image)

Source: RIAA, 2017
Contact

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To see the full TMT Predictions report, visit:
www.deloitte.com/au/tmtpredictions
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