IoT Wearable: Analytics, Security & Forensics

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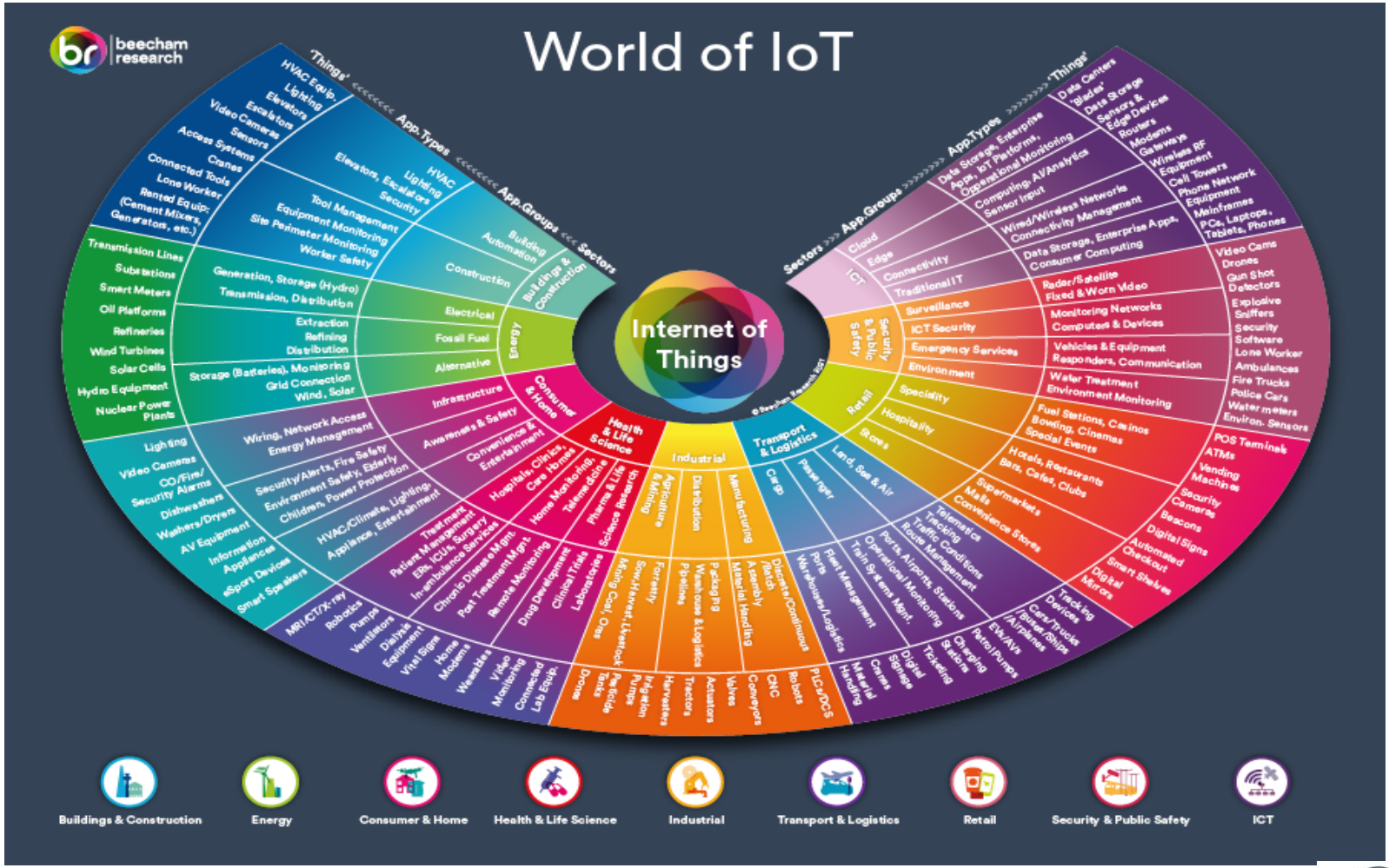
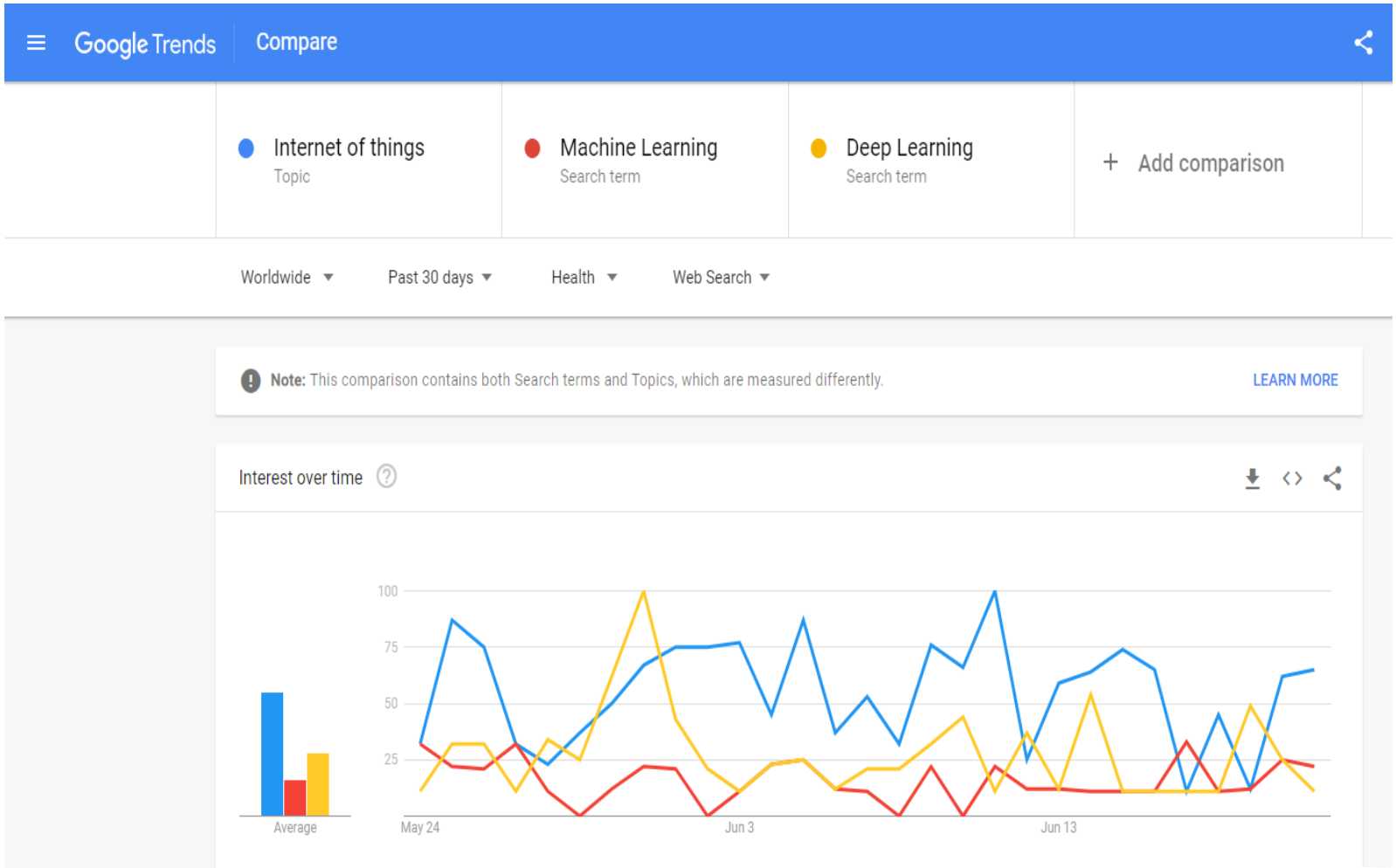
Outline...

IoT Sectors [1]



1. http://www.beechamresearch.com/article.aspx?id=42

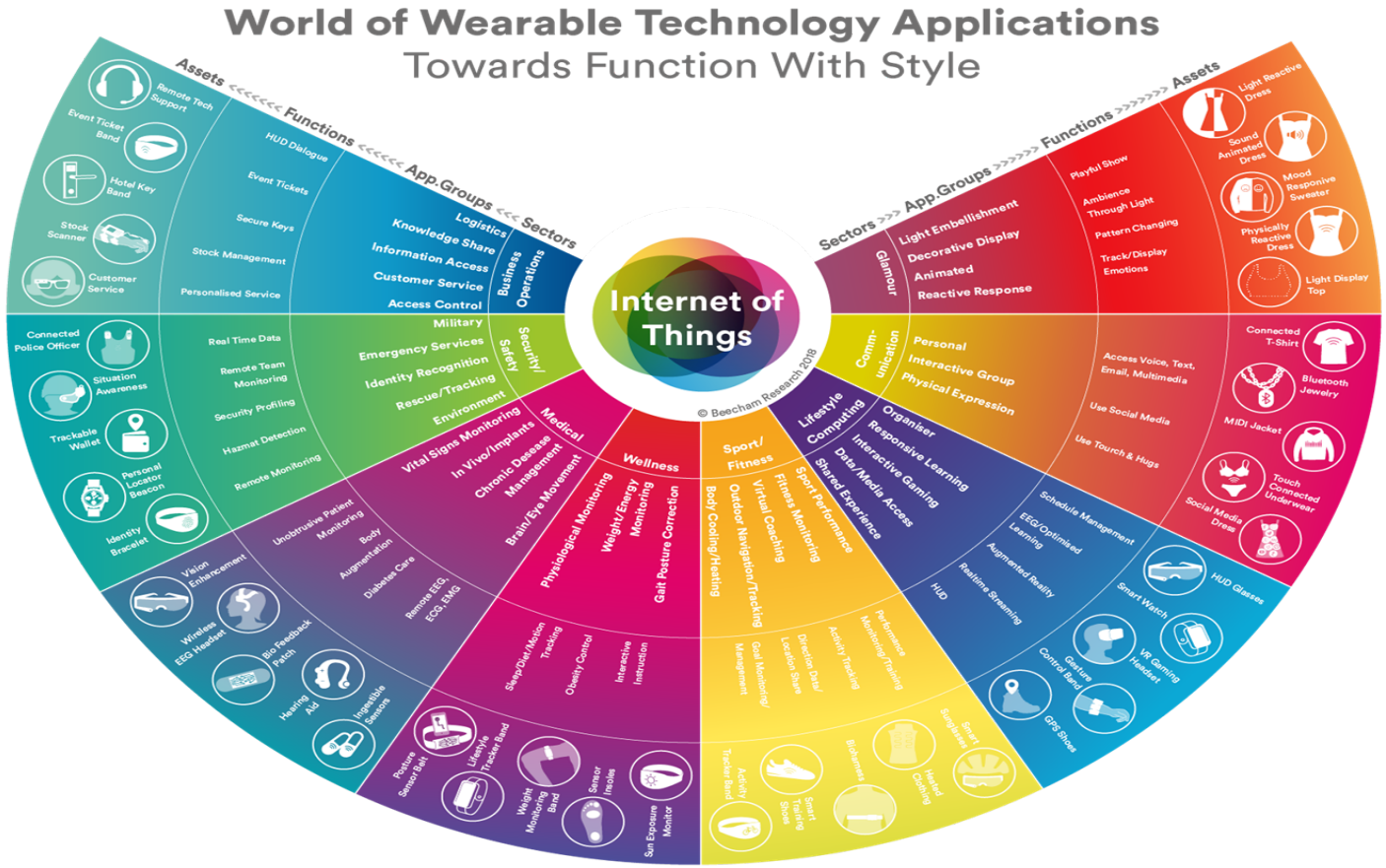
IoT Trend


Google Trends
Compare
Internet of things
Topic
Machine Learning
Search term
Deep Learning
Search term
Add comparison
Worldwide
Past 30 days
Health
Web Search
Note: This comparison contains both Search terms and Topics, which are measured differently.
LEARN MORE
Interest over time
100
75
50
25
Average
May 24
Jun 3
Jun 13

Wearable Devices

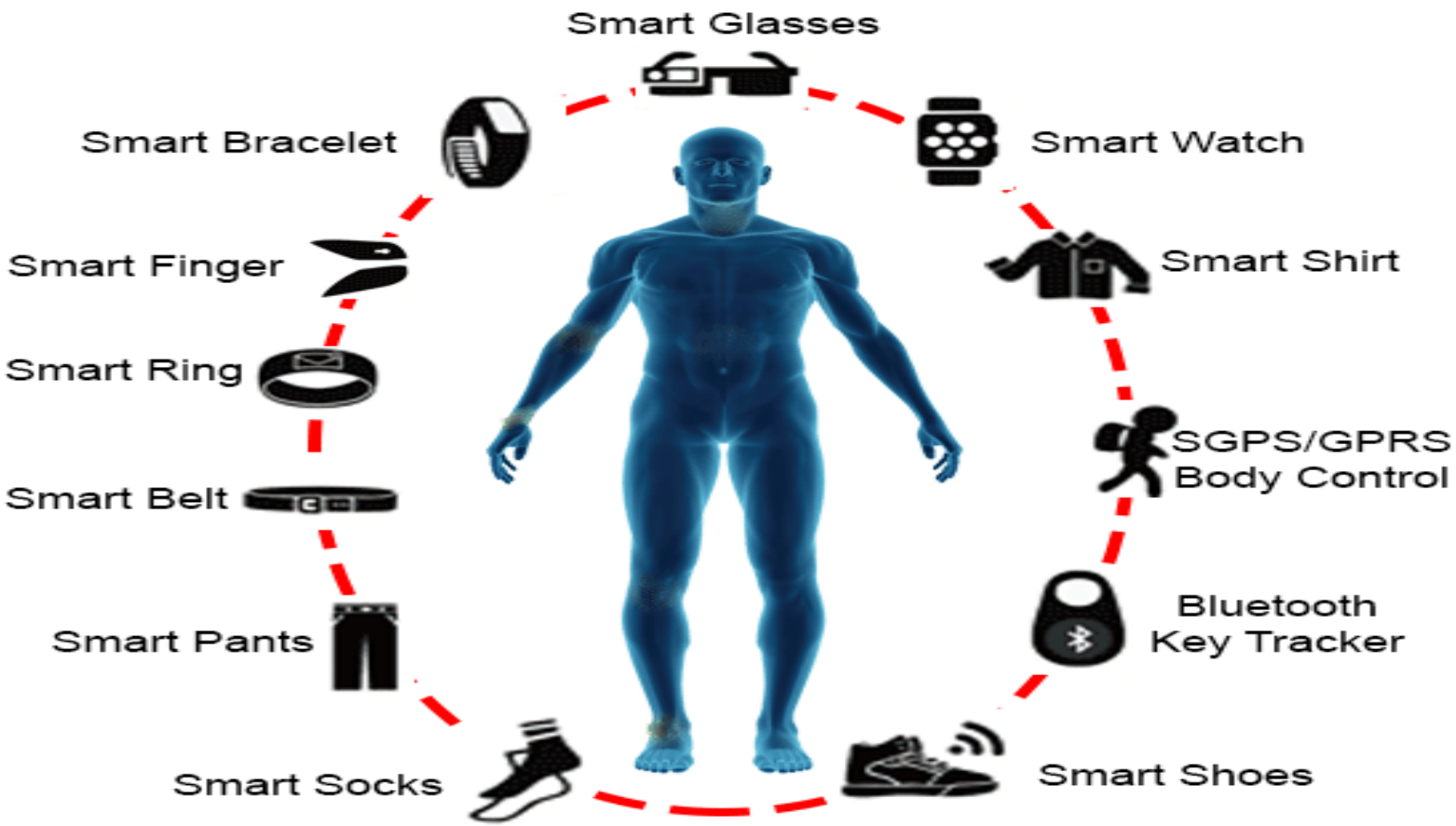
- A smart electronic device with microcontrollers.
- Worn on the body or as an accessory.
- Same computing tasks
- Can outperform

World of Wearable Technology [2]



2. http://www.beechamresearch.com/download.aspx?id=36

Wearable Devices



Wearable Devices

History : Wearable Devices

- 1961 – The first wearable computer
- 1975 – The Pulsar “Calculator”
- 1981 – Photographic Equipment
- 1994 - Wearable Wireless Webcam
- 2000 - Hands Free Bluetooth
- 2004 - CuteCircuit(HugShirt)
- 2006 - Nike+iPod sport bundle
- 2007 - Apple Iphone
- 2009 - Fitbit
- 2011 - Jawbone
- 2011 – Google Glass
- 2015 – Apple Watch

Latest Wearable Devices

- Mojo Lens
- Ōura Ring
- Norm Glasses
- Welt Smart Belt
- ECG Smartwatch

Wearable Devices : Examples [3]

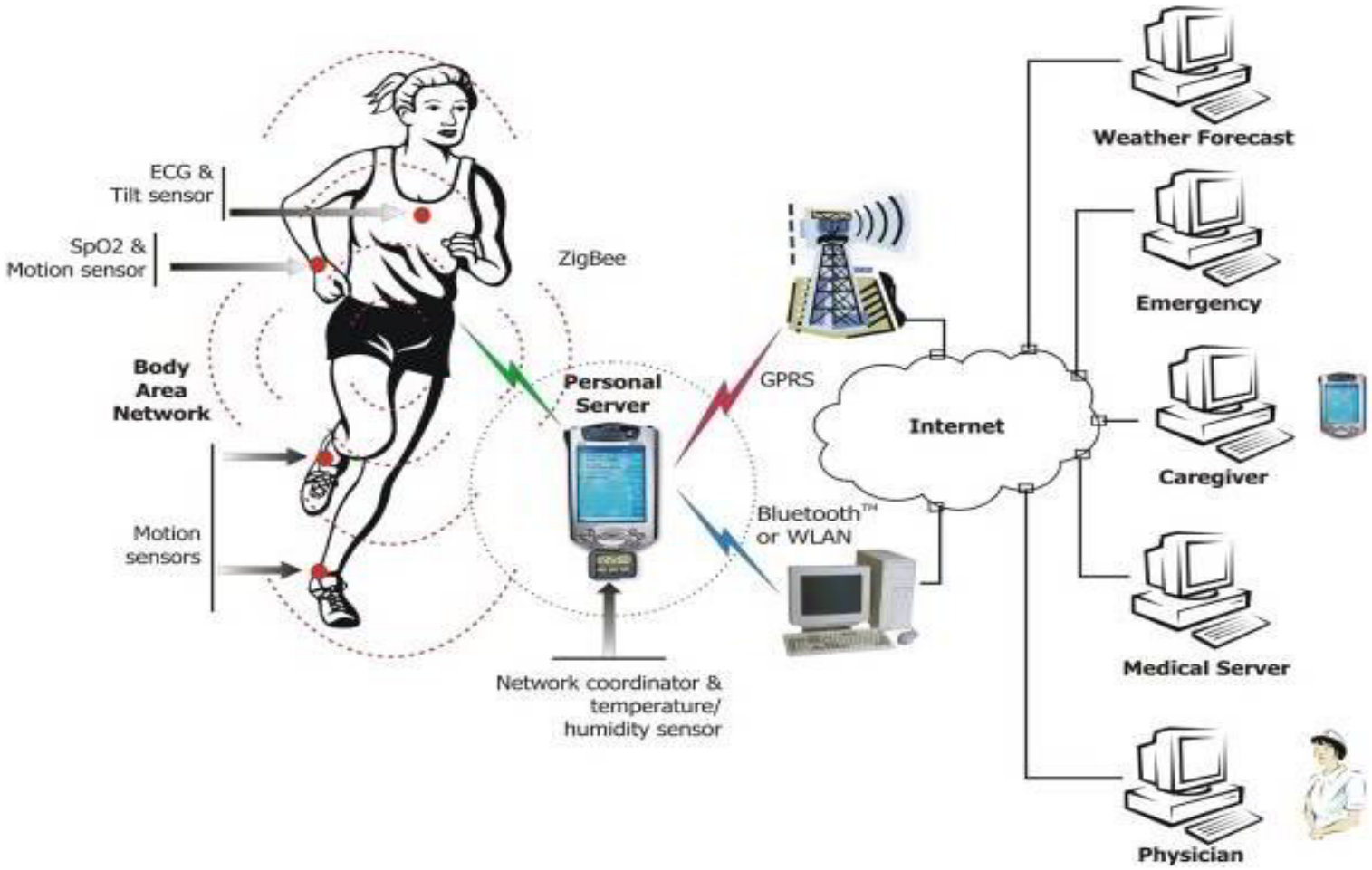
- Fitness Trackers
- SmartWatch
- GPS Tracker and Music System
- Remote Monitoring Systems
- Wearable Panic Buttons

3. https://www.wearable-technologies.com/

Connected Devices Vs. Years

YEAR	NUMBER OF CONNECTED DEVICES
1990	0.3 million
1999	90.0 million
2010	5.0 billion
2013	9.0 billion
2025	1.0 trillion

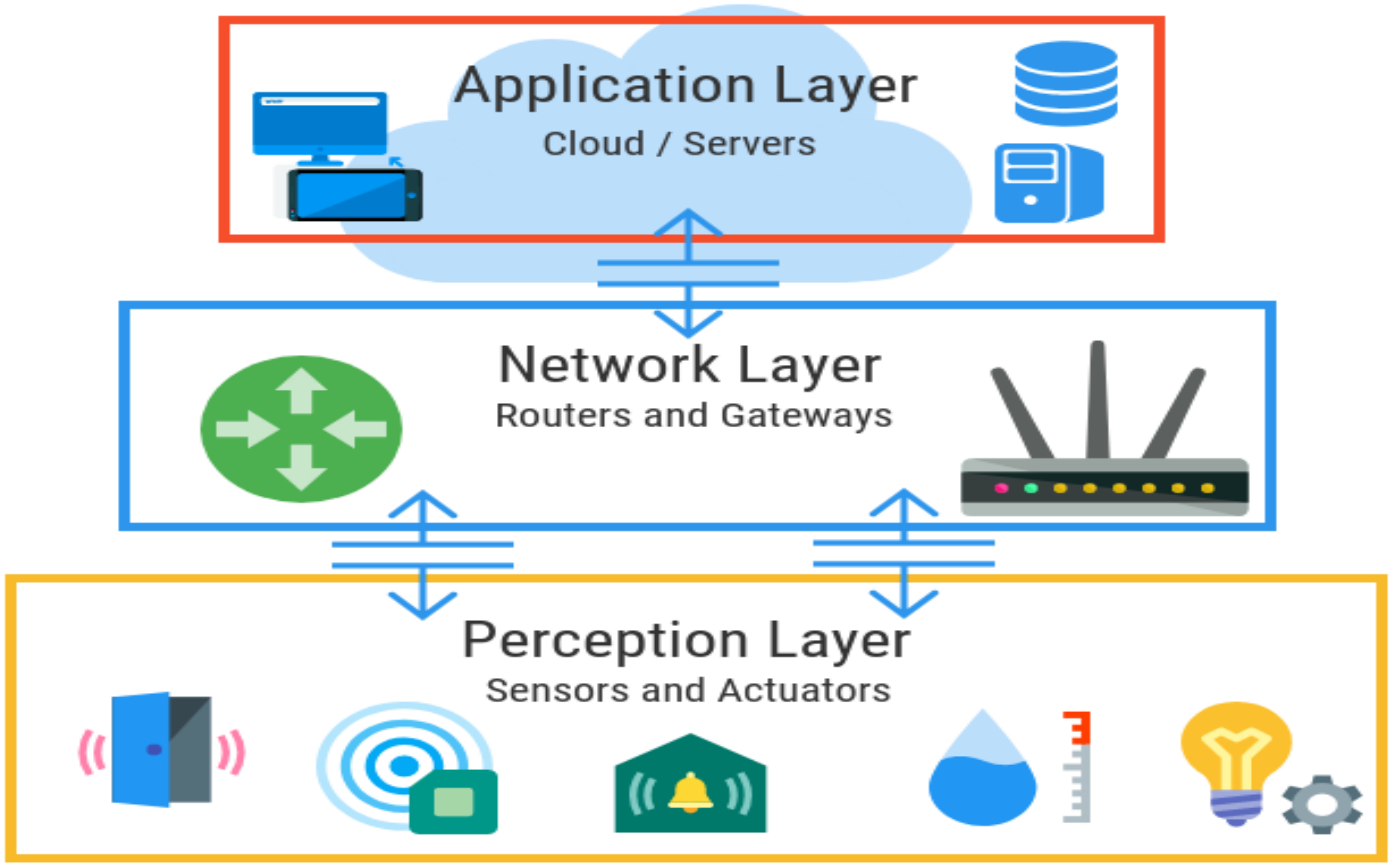
Wearable Technology : How it works



Driving Forces Of The IoT

- Wearable Technologies
- Smart Devices & Associated Technologies
- Device Miniaturization
- Cloud Computing & Big Data

IoT Architecture Overview



IoT Components

- Perception layer :
  Electronic sensors, Actuators, Devices
- Transport layer : networks and gateways :
- Processing layer : Cloud middleware or IoT platforms
  connectivity, device management, data management, data analysis, visualization, digital twin, IoT app development, edge / fog computing,
- Application layer : software solutions for users

Statistics : Connected Devices [4]

- The number of IoT devices is projected to grow from seven billion in 2018 to 22 billion by 2025.
- By 2020, there will be 26 times more connected things than people
- Every second, another 127 devices are connected to the internet.
- Download speeds up to 2.7 times faster than 4G, 5G can send data to and from as many as a million devices per square kilometer.

`https://www.altexsoft.com/blog/iot-platforms/`

4. https ://www.forbes.com/sites/forbestechcouncil/2019/11/18/the-5g-iot-revolution-is-coming-heres-what-to-expect/ ?sh=a5c2bf6abf67

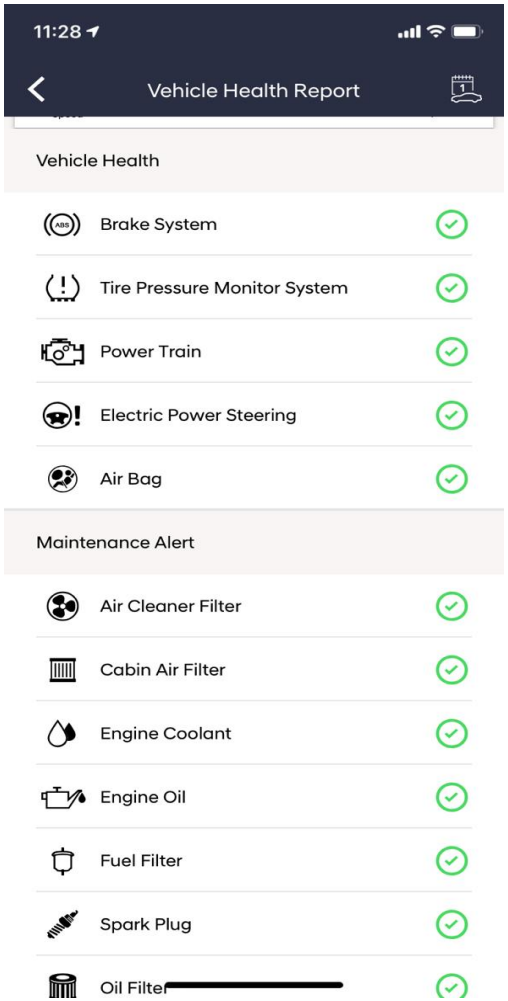
Wearable : Case Studies

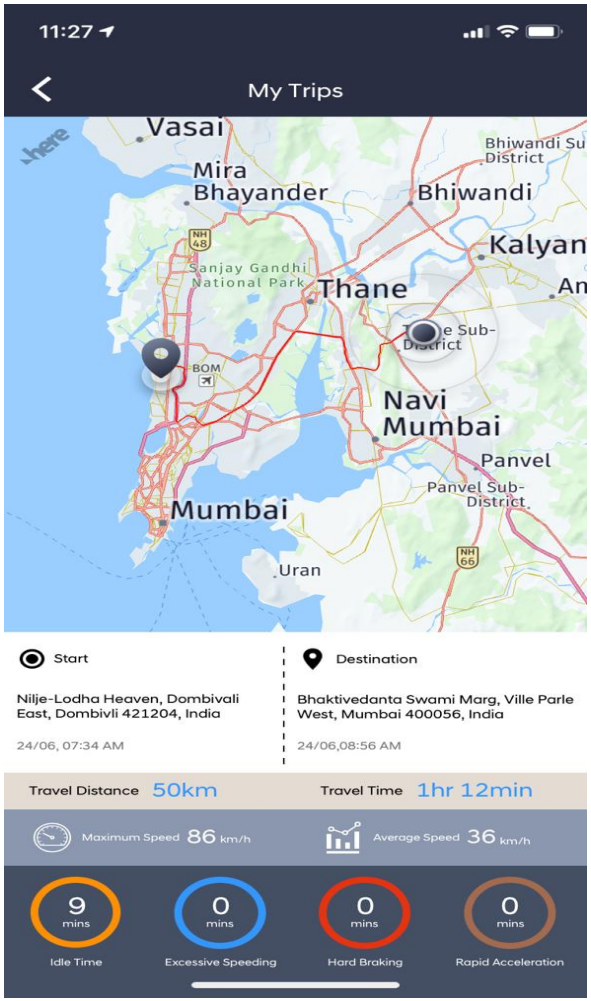
https://clutch.co/app-developers/resources/inside-look-wearables-case-studies

Wearable : Case Studies

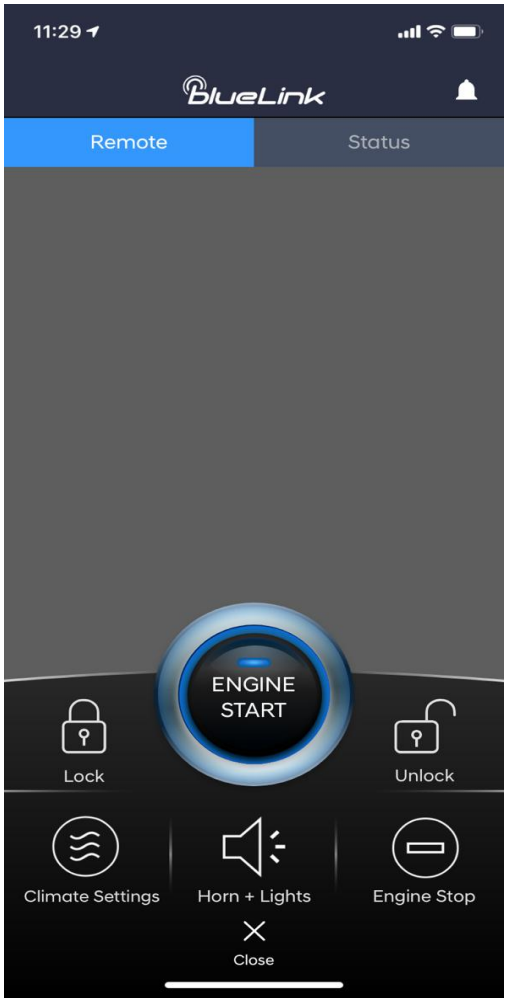
https://ezproxy.svkm.ac.in:
2220/content/pdf/10.1007/s10916-020-01697-1.pdf
https://ezproxy.svkm.ac.in:
2054/science/article/pii/S0140366419314343
https://ezproxy.svkm.ac.in:
2054/science/article/pii/S1877050921001149
https://ezproxy.svkm.ac.in:
2054/science/article/abs/pii/S2542660518300404

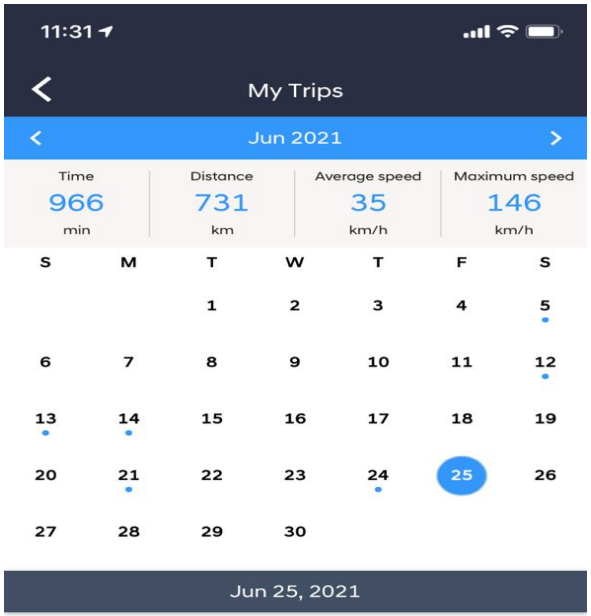
Case Study : Hyundai's Bluelink App



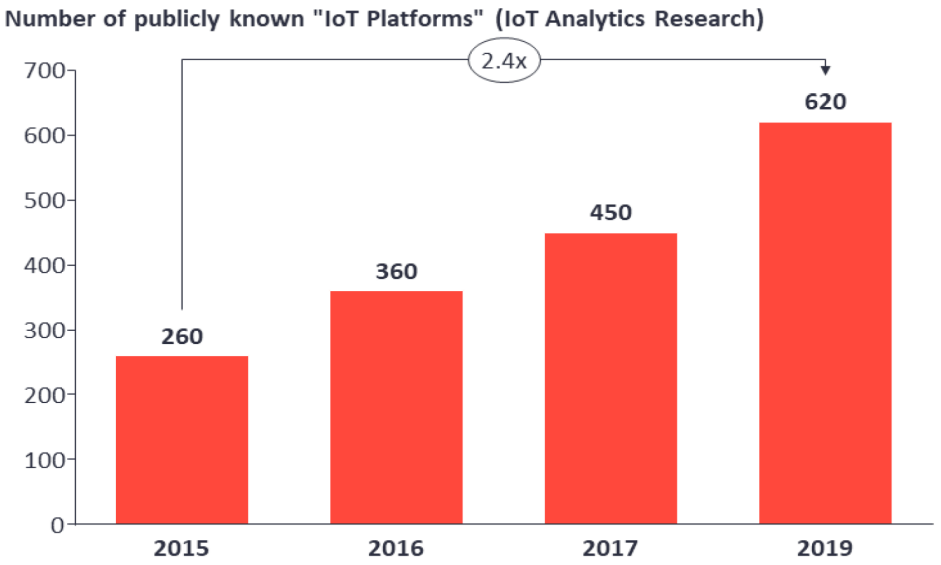


Case Study : Hyundai's Bluelink App





IoT Cloud Platforms [5]



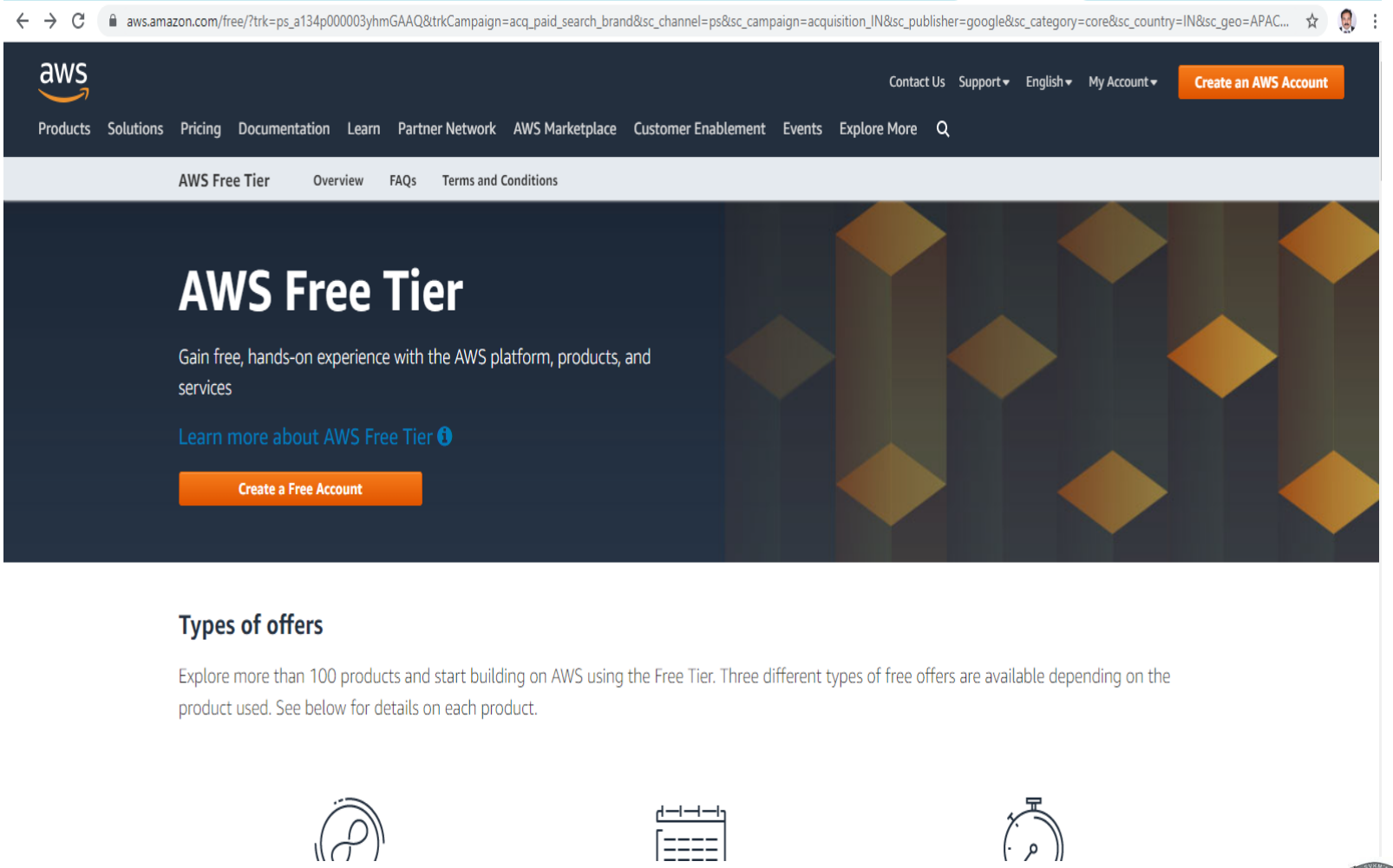
The competitive landscape of 620 IoT Platforms

5. https://iot-analytics.com/product/iot-platforms-market-report-2021-2026/

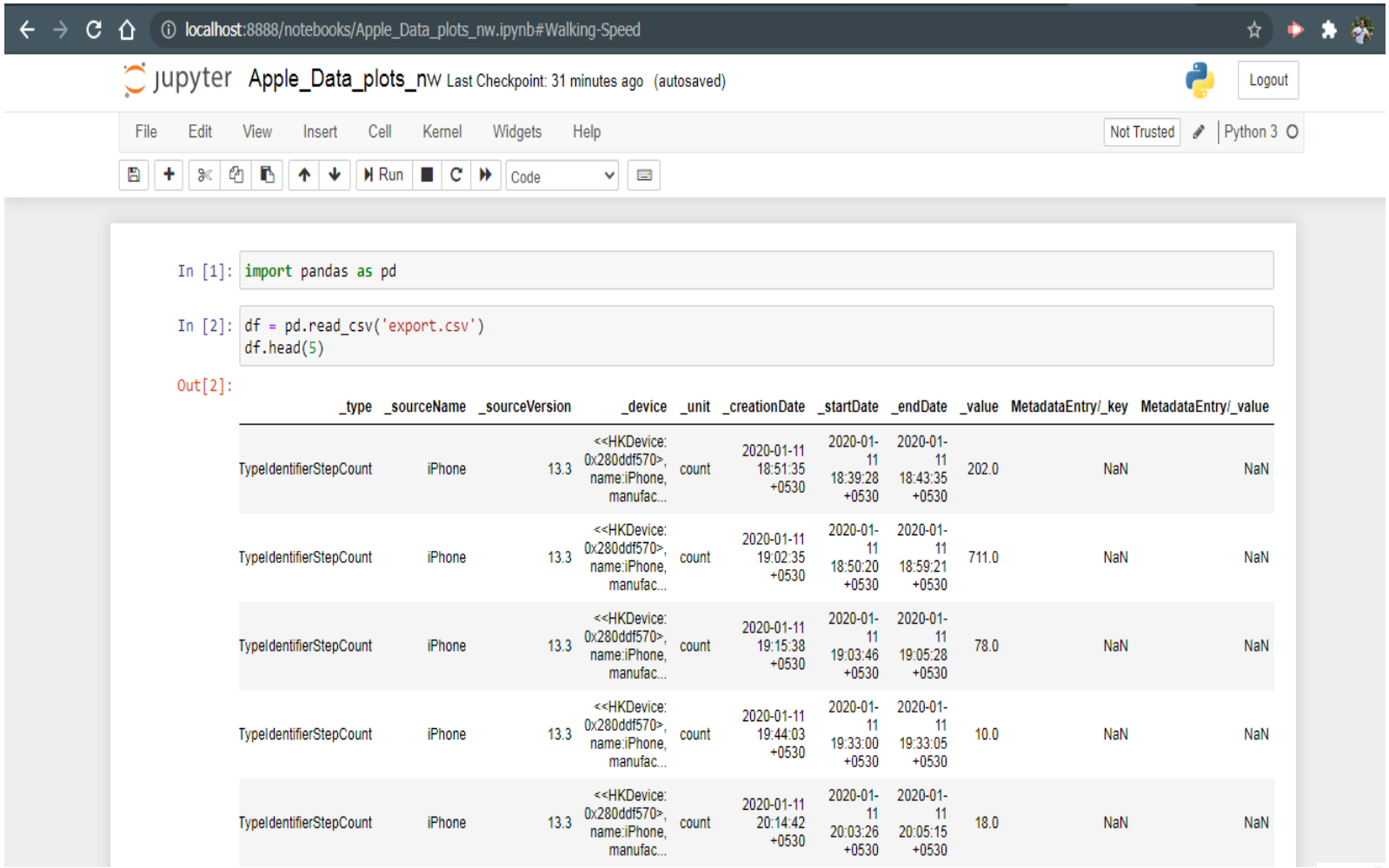
IoT Cloud Platforms

- Amazon Web Service (AWS) IoT platform
- Cisco IoT
- Google Cloud IoT
- IBM Watson IoT platform, and
- Microsoft Azure IoT

IoT Cloud Platforms : Demo



IoT Analytics : Case Study IPhone Health App



localhost:8888/notebooks/Apple_Data_plots_nw.ipynb#Walking-Speed

jupyter Apple_Data_plots_nw Last Checkpoint: 31 minutes ago (autosaved)

Logout

File Edit View Insert Cell Kernel Widgets Help

Not Trusted | Python 3

Run Code

In [1]:
```
import pandas as pd
```

In [2]:
```
df = pd.read_csv('export.csv')
df.head(5)
```

Out[2]:

	_type	_sourceName	_sourceVersion	_device	_unit	_creationDate	_startDate	_endDate	_value	MetadataEntry/_key	MetadataEntry/_value
0	TypeIdentifierStepCount	iPhone	13.3	<<HKDevice: 0x280ddf570>, name:iPhone, manufac...	count	2020-01-11 18:51:35 +0530	2020-01-11 18:39:28 +0530	2020-01-11 18:43:35 +0530	202.0	NaN	NaN
1	TypeIdentifierStepCount	iPhone	13.3	<<HKDevice: 0x280ddf570>, name:iPhone, manufac...	count	2020-01-11 19:02:35 +0530	2020-01-11 18:50:20 +0530	2020-01-11 18:59:21 +0530	711.0	NaN	NaN
2	TypeIdentifierStepCount	iPhone	13.3	<<HKDevice: 0x280ddf570>, name:iPhone, manufac...	count	2020-01-11 19:15:38 +0530	2020-01-11 19:03:46 +0530	2020-01-11 19:05:28 +0530	78.0	NaN	NaN
3	TypeIdentifierStepCount	iPhone	13.3	<<HKDevice: 0x280ddf570>, name:iPhone, manufac...	count	2020-01-11 19:44:03 +0530	2020-01-11 19:33:00 +0530	2020-01-11 19:33:05 +0530	10.0	NaN	NaN
4	TypeIdentifierStepCount	iPhone	13.3	<<HKDevice: 0x280ddf570>, name:iPhone, manufac...	count	2020-01-11 20:14:42 +0530	2020-01-11 20:03:26 +0530	2020-01-11 20:05:15 +0530	18.0	NaN	NaN

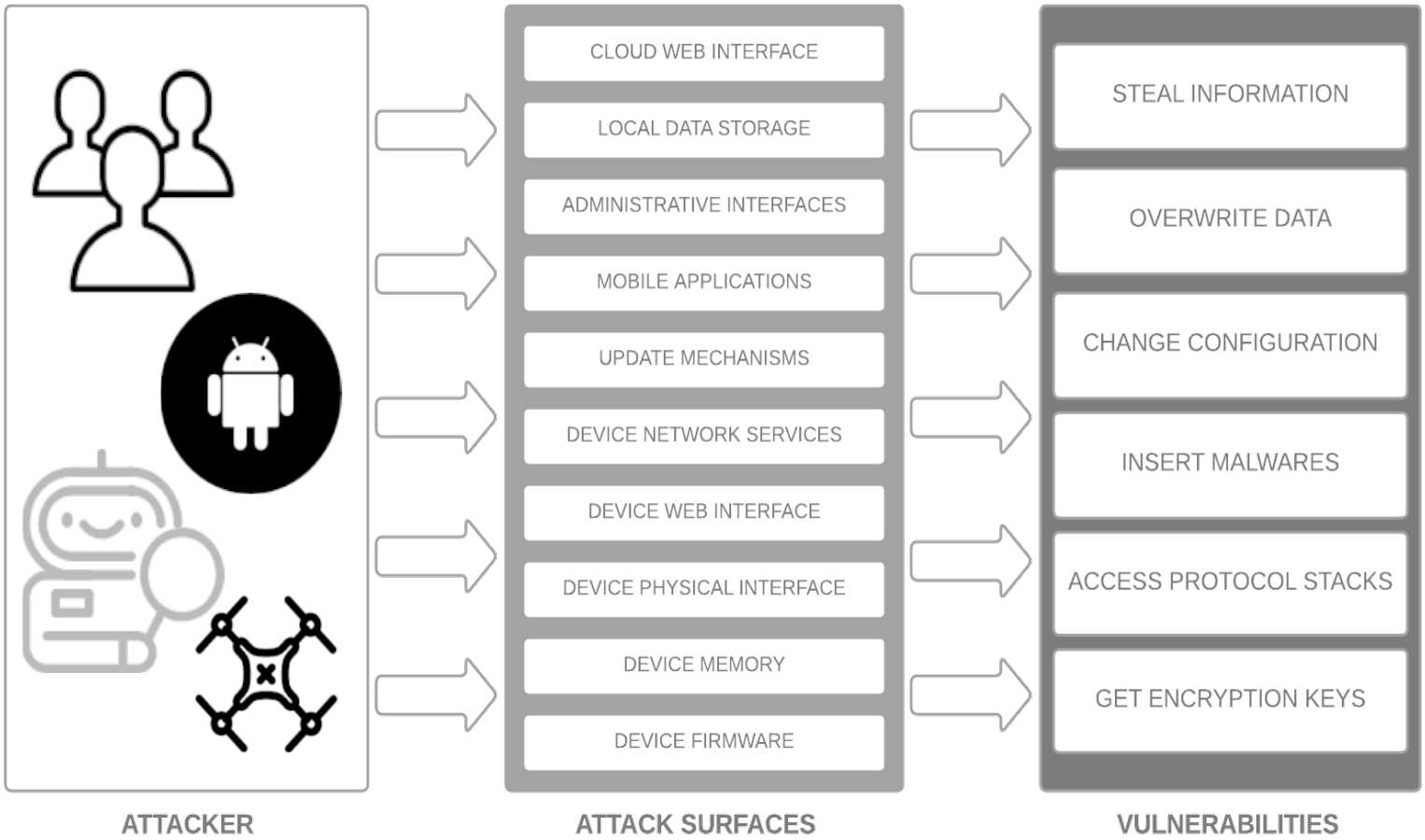
IoT Security

- Practice that keeps IoT systems safe.
- Protect from threats and breaches, identify and monitor risks and can help fix vulnerabilities.
- IoT security ensures the availability, integrity, and confidentiality of your IoT solution.

Need for IoT Forensics : Security Constraints

- devices, network and cloud
- prevents to adopt standard security mechanisms
- Shortcomings due to IoT Devices
- Shortcomings due to IoT Networking
- Shortcomings due to Cloud

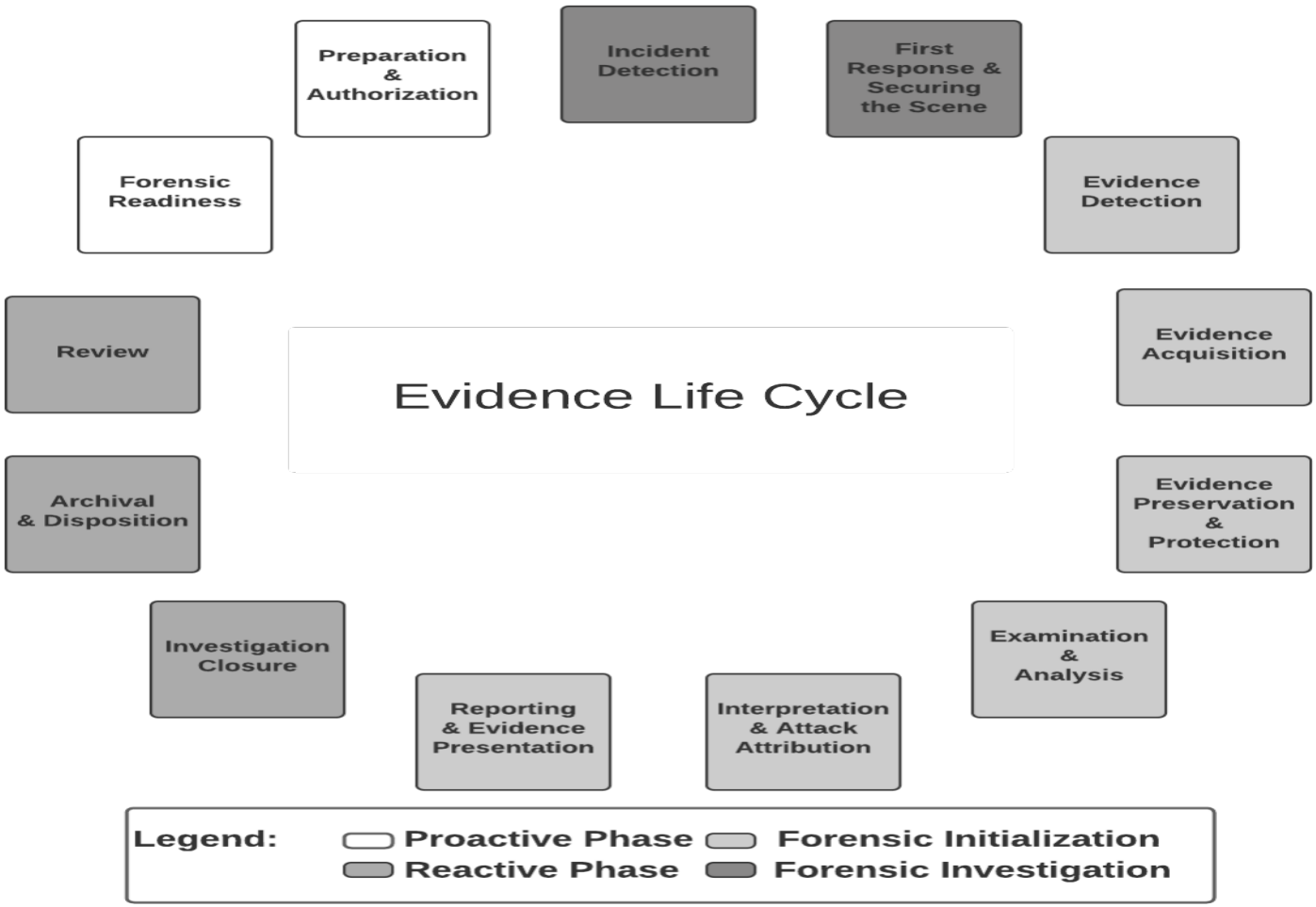
IoT Threat Model



IoT : Legal complexities

- Location of Evidence
- Need for new Laws
- Static, Elastic and Live forensics
- Digital Traces

IoT Forensics

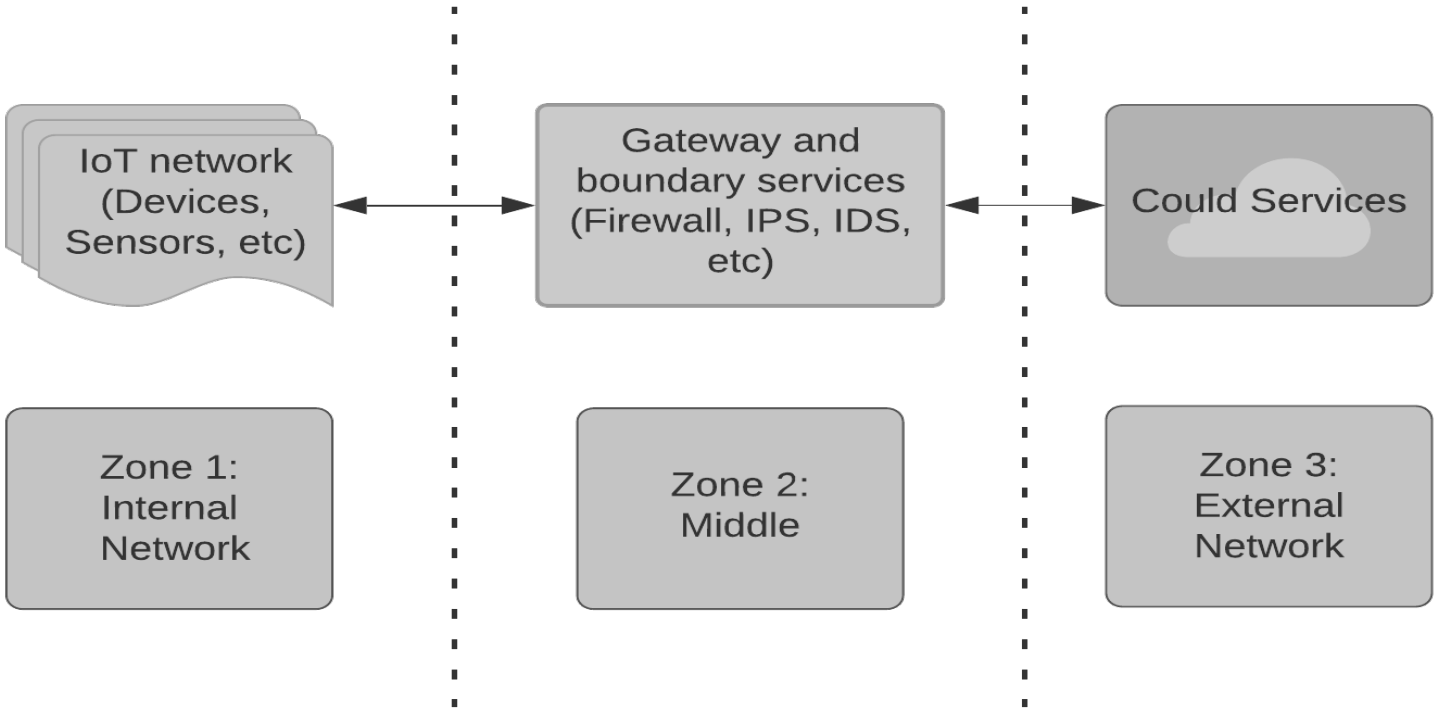


IoT Forensics Frameworks

- The Next Best Thing (NBT) model : The NBT model thus proposes to use the obtained traces of these device and to collect information from the corresponding networks that are connected to these devices and have less probability of being tampered with.

IoT Forensics Frameworks

- 1-2-3 Zones of Digital Forensics : Valuable time and effort is lost in finding information in the wrong places and hence a specific methodology



Thank you... !

Teaching is Simply a Continuous Learning... !

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"A Journey with Happiness..Not for Happiness "