

## Industrial & Agile Digital Transformation in Tomorrow's Factory

ABB, Siemens, Bosch and Honeywell are the names that come to mind when we think of industrial manufacturing traditionally. However, we live in a digital age and as these names try to reshape their business and technology strategy to compete, new partnerships are essential. Thus, leading manufacturers are competing or partnering with Big Tech enterprises like Google, Microsoft and IBM.

Digital transformation in the industry has gone from being an option that could give companies a competitive advantage to being a necessity for surviving in the current context of industry 4.0. Industry 5.0 is just around the corner, and without the digital skills and technologies involved in transformation, companies won't be able to keep up with emerging demands or compete against the rest of the industry.

Besides advanced analytics, industrial IoT and cloud computing are high on the agenda for investors. Manufacturers want to be able to make proactive decisions to maximize their performance, respond to demand fluctuations and make sure they're flexible in their everyday operations. Furthermore, could IoT and cloud computing help manufacturers become more resilient to future "black swan" events and a future pandemic?

Is this why we are seeing Big Tech emerge as serious players within these focused Industrial Automation technologies? The reliance and requirements for high level AI, analytics and cloud solutions have exponentially increased and is where Big Tech has years of knowledge and application.

**In this article we will dive into innovations and new innovators, and probe into why Big Tech is driving digital transformation in the modern factory, in the three following technology areas:**

**Visualisation & Analytics:** Visualisation of data and processes in an industrial environment through graphical user interfaces and human machine interfaces. Graphical and analytical demonstrations of diagnostics, processes, digital factory floor maps and controls.

**Asset Tracking & Inventory:** Asset tracking refers to the method of tracking physical assets, either by scanning barcode labels attached to the assets or by using tags using GPS, BLE or RFID which broadcast their location. Inventory control systems are technology solutions that integrate all aspects of an organization's inventory tasks. Includes shipping, purchasing, receiving, warehouse storage, turnover, tracking, and reordering.

**Predictive Maintenance:** Predictive Maintenance of machinery and systems in an industrial manufacturing environment. Includes condition monitoring, analysis of plant equipment and communication links. Protocols to a maintenance database and responsible plant personnel are also considered.

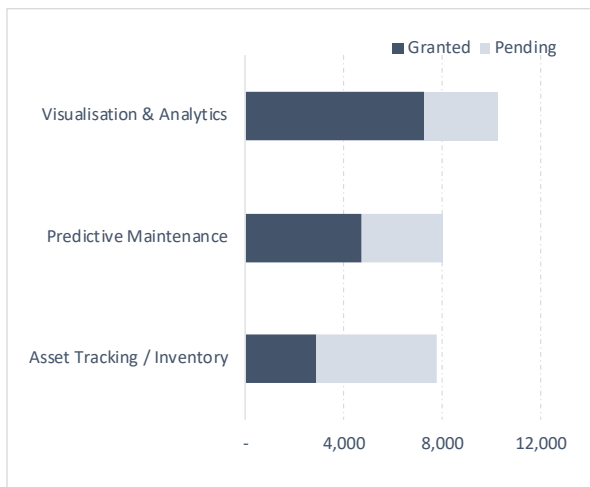
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## Advancements in tech over the last ten years has sparked an arms race to become leaner and more efficient

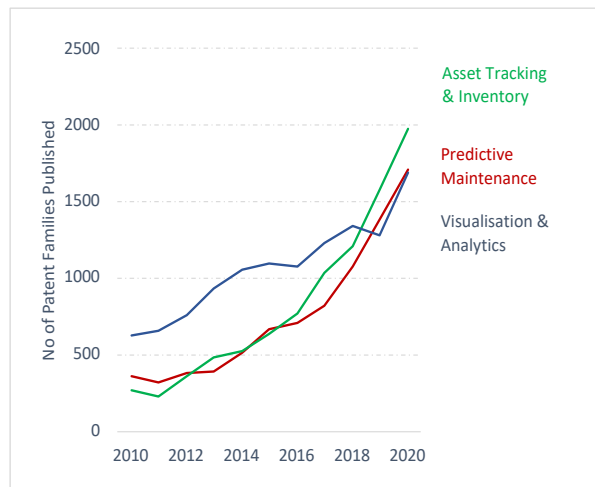
There is no secret that these technologies have been around for a long time. It has always been a manufacturer's ambition to have visibility of all processes, to know when the next shutdown will happen and to have autonomy over their supply chain.

But the annual pace of innovation is so high that it doesn't look like stopping. In a key growth market attracting billions in R&D and new start-up ventures, why would innovation slow down?

**Number of Inventions: Global**



**Pace of Invention: Publications - Global**



*As measured by patent families either granted or pending globally*

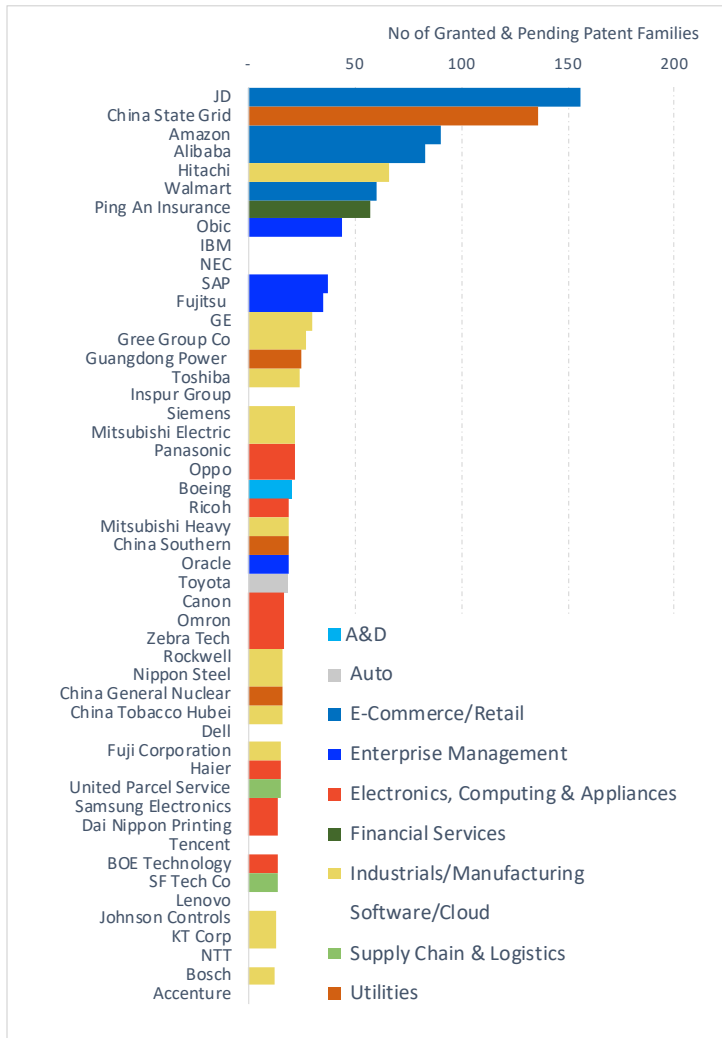
Google & Siemens partnered to combine deep domain expertise in manufacturing with AI. Allowing AI to be integrated in industrial use cases is game changing in the manufacturing industry, especially with the future look at scaling into global operations.

These global operations expand into Asset Tracking/Inventory systems. An area that doesn't hold the largest share of patents but is increasing rapidly in comparison to the leading digital technologies. This field could be renamed Blockchain – Industrial Automation in the years to come as more manufacturers are investing millions to enhance their supply chain visibility on a distributed ledger.

We will dive deeper into this technology space to see many of the same names but focus on the emergence of Big Tech.

## Big Tech is asserting operational technology leadership and innovation across the manufacturing landscape

**The Companies:** *Number of Inventions Owned*  
*Asset Tracking & Inventory*



The global asset tracking market will reach USD 36 billion by 2025 with IOT asset tracking and blockchain solutions set to be the driving technologies for the foreseeable future.

It is no surprise that we are seeing 50% of leaders in the landscape as traditional tech organisations.

### The Amazon effect

The industrial market is hotter than ever since the pandemic led a surge in e-commerce and increased consumer demand to receive products at Amazon – like speeds.

Amazon’s Asset Inventory & Tracking patent portfolio is not one that has seen mass growth in the last few years despite them being third in the landscape for size. Yet they have reinvented “The Last Mile” enabling them as a leader in supply chain management.

Manufacturers have now chosen to give attention to the “First Mile” of automation which starts in the factory within the supply chain.

The APAC region contains the largest manufacturers of electronics and consumer goods. Therefore, asset tracking solutions are being adopted at pace to improve production/assembly efficiency and product quality to meet consumer demand globally.

SAP, Walmart, Amazon, Alibaba are already leaders in the global enterprise supply chain space having led innovation for years. They are now tapping into new innovative technologies to boost their strength amongst this diverse set of players. We are also seeing increased partnerships with SAP and Oracle. Leading Enterprise Resource Planning (ERP) solution providers are partnering with major manufacturers to optimize the asset tracking process holistically.

Schneider Electric partnered with T-Mobile in 2018 to develop their “EcoStruxure” platform. An IOT system architecture connecting anything in an enterprise, from shop floor to delivery line, to deliver

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enhanced safety, reliability and efficiency. That wasn't enough for Schneider. They decided to partner with metals and mining multinational, Rio Tinto. Rio Tinto's blockchain technology will be deployed across the entire supply chain, on which Schneider has visibility, supporting customers, suppliers and partners.

Traditional ERP vendors are clearly leading this space with the heritage technologies that are being enhanced in collaboration with manufacturers. Manufacturers understand that they do not have the in-house expertise to innovate and are increasingly looking at partnerships to stay competitive or risk staying behind the pack.

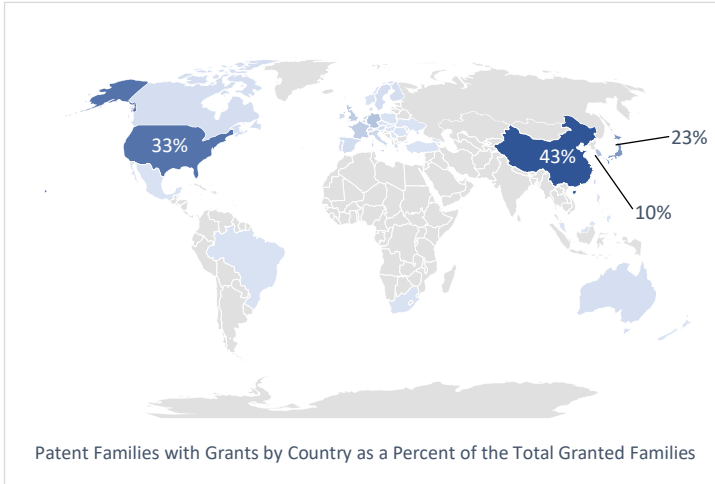
## For reference & attached: Innovation Lens Snapshots

- *Technology Screening: Visualisation & Analytics, Predictive Maintenance & Asset Inventory & Tracking*
- *Company Screening: Asset Inventory & Tracking*
- *Company Snapshot: Amazon*

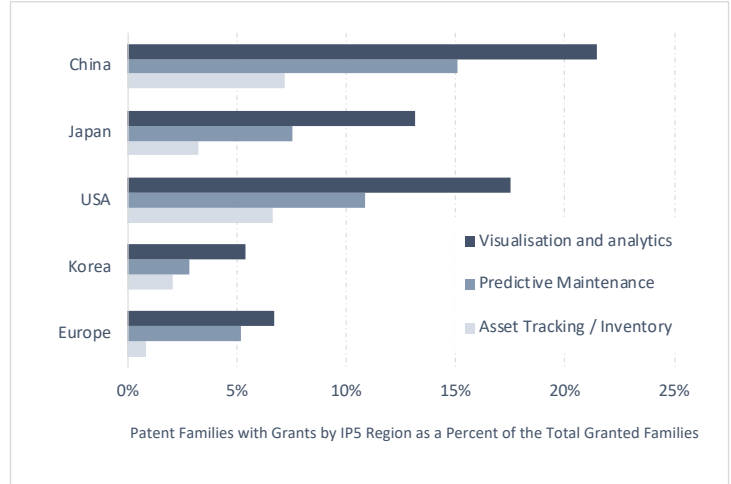
# Technology Screening: Industrial Control Systems & Connectivity

**Technology Areas:** Visualisation & Analytics  
 Predictive Maintenance  
 Asset Tracking/Inventory

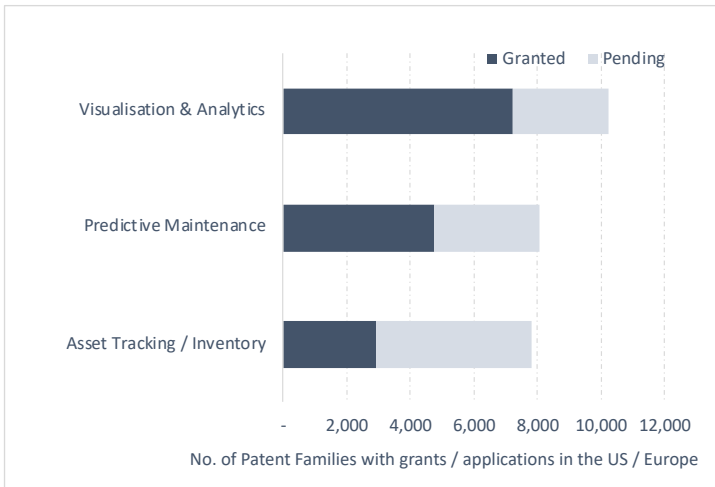
**Geographies Protected:** *By Country across all 3 Tech Areas*



**Geographies Protected:** *By Key Region / Countries*



**Number of Inventions:** *(Global)*

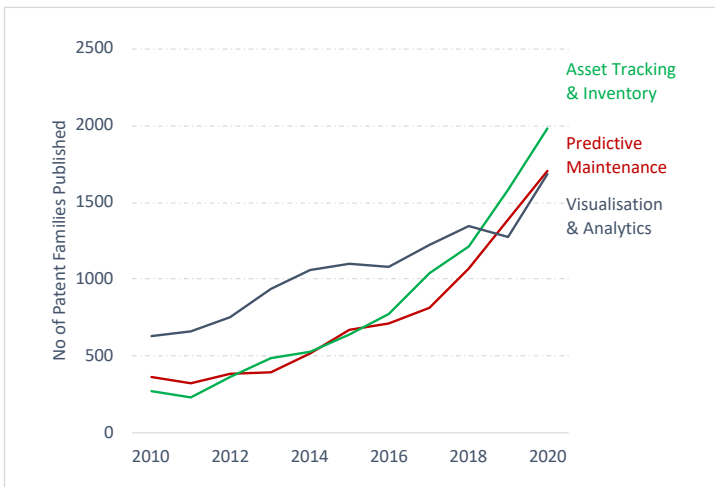


**Companies:** *Top ranked by Inventions owned, Global*

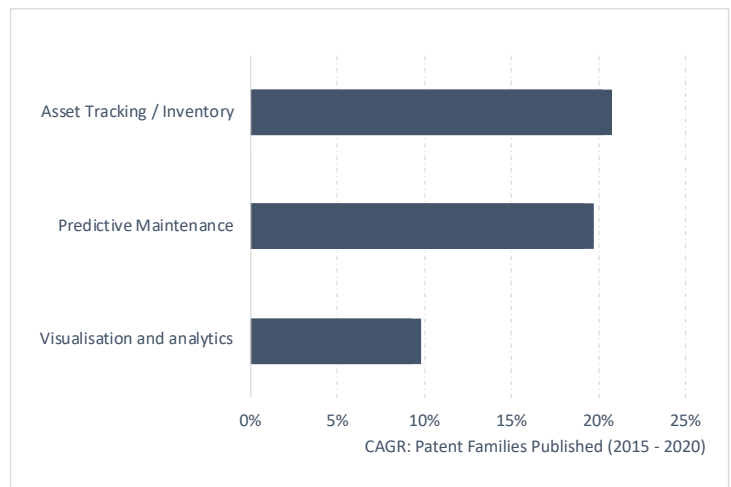
Rank	Visualisation and analytics	Predictive Maintenance	Asset Tracking / Inventory
1	Rockwell	Hitachi	JD.com
2	Emerson	Fanuc	State Grid China
3	Samsung Electronics	Siemens	Amazon
4	Siemens	GE	Alibaba
5	Mitsubishi Electric	State Grid China	Hitachi
6	LG Elec	ABB	Walmart
7	Canon Inc	Mitsubishi Electric	Ping An
8	Honeywell	Emerson	Obic Co
9	Toshiba	Toshiba	IBM
10	ABB	Honeywell	NEC
11	Kyocera	Mitsubishi Heavy	SAP
12	Sharp	Omron	Fujitsu
13	Oppo	Univ Zhejiang	GE
14	Yokogawa	XI'AN Jiaotong Uni	Gree Group
15	Hitachi	Rockwell	Guangdong Power Grid

Top Owners of Patent Families with grants / applications in the US / Europe

**Pace of Invention:** *Trendlines, Global*



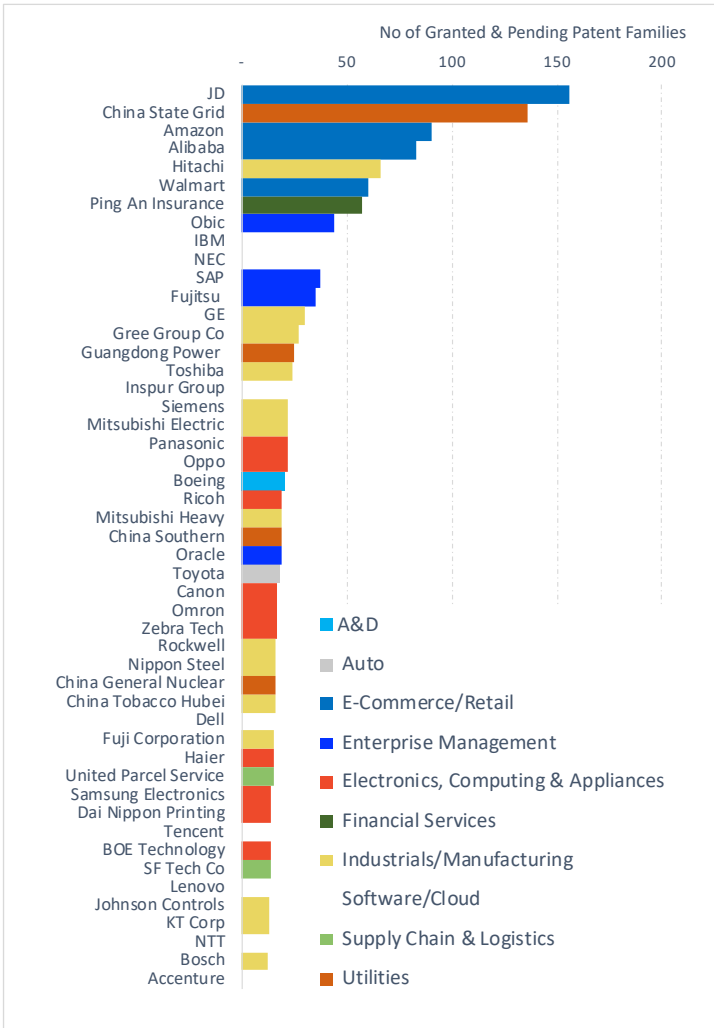
**Pace of Invention:** *CAGR 2015-2020, Global*



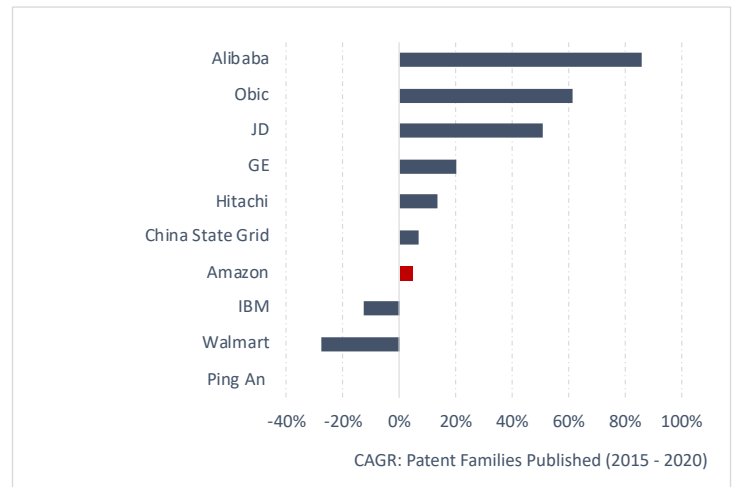
# Company Screening: Asset Tracking & Inventory

**Technology Area:** Asset Tracking & Inventory  
**Region:** Global *granted/pending patent families (inventions)*

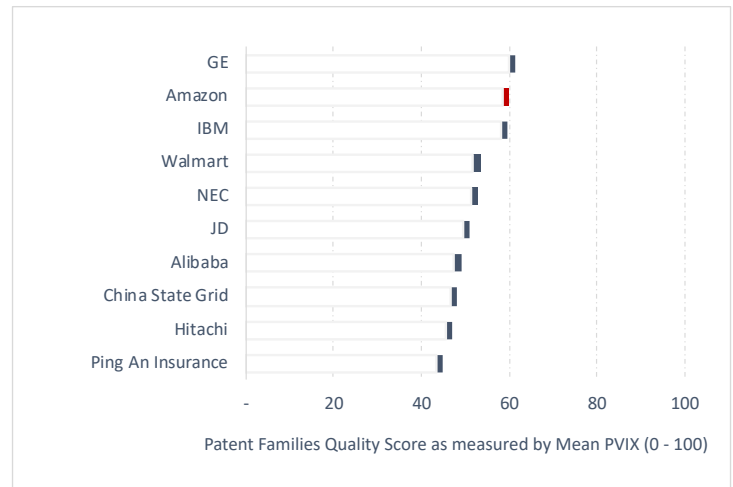
**Companies:** No of Inventions Owned, AT&I



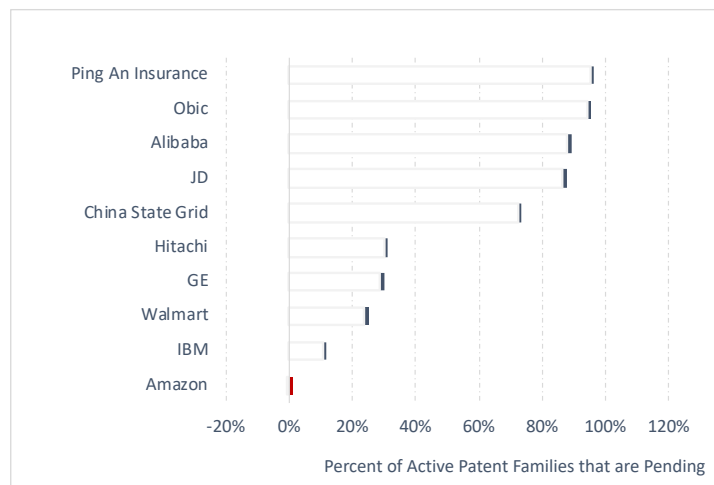
**Pace of Invention:** Top Owners, CAGR 2015-2020



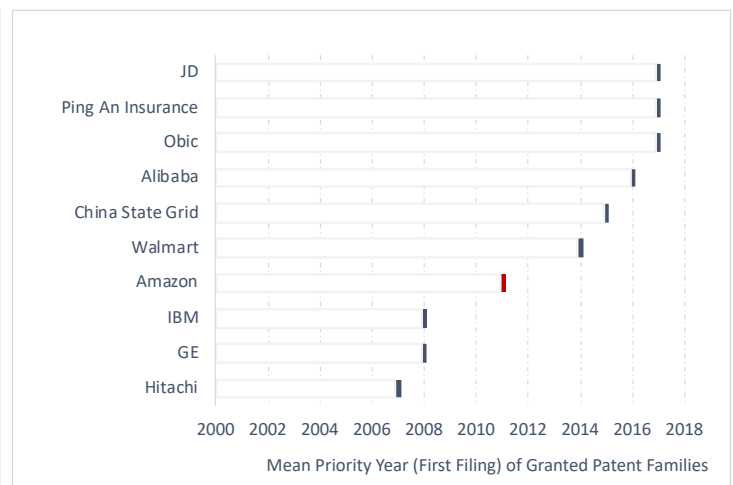
**Quality of Invention:** Top Owners, AT&I



**Invention Pipeline:** Top Owners, AT&I



**Invention Age:** Top Owners, AT&I (First Filing Date)

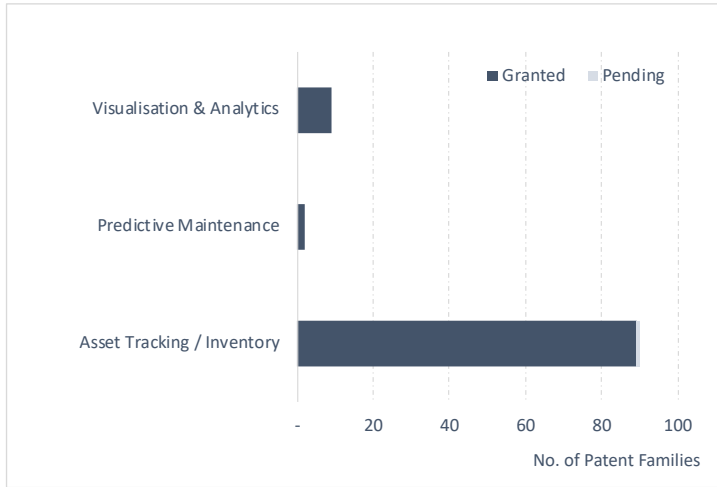


# Company Snapshot: Amazon

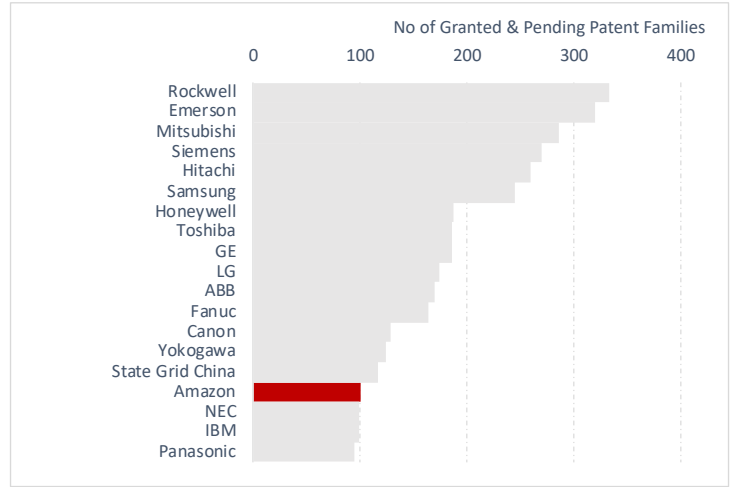
**Technology Areas:** Visualisation & Analytics  
 Predictive Maintenance  
 Asset Tracking/Inventory

**Region:** Global *all granted/pending patent families (inventions)*

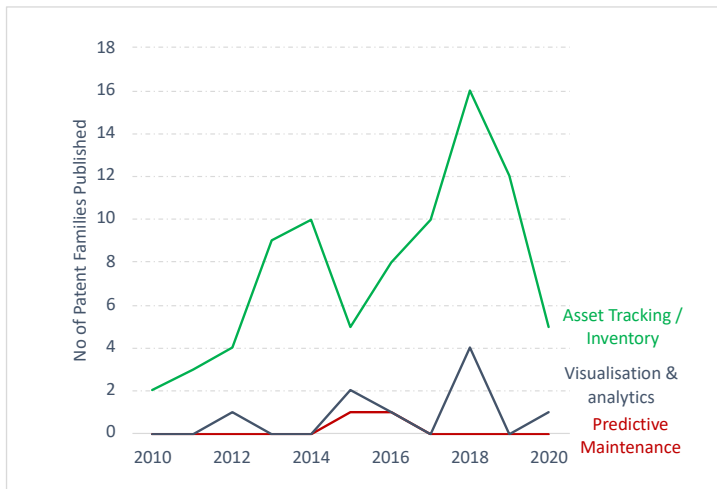
**Number of Inventions:** Amazon



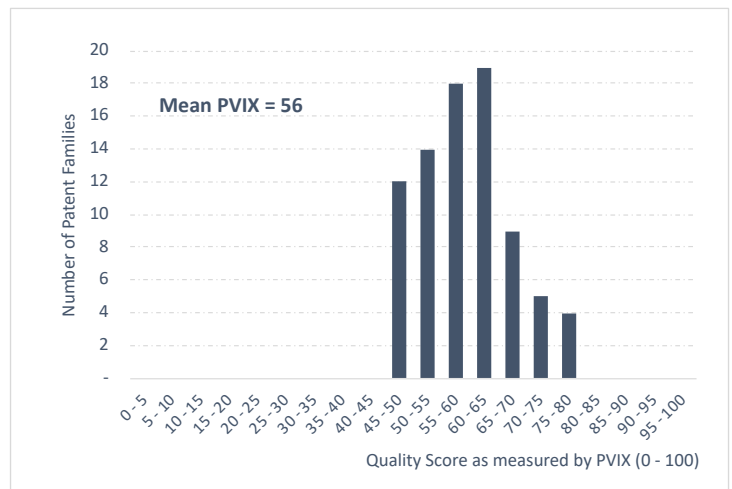
**Companies: Number of Inventions Owned**



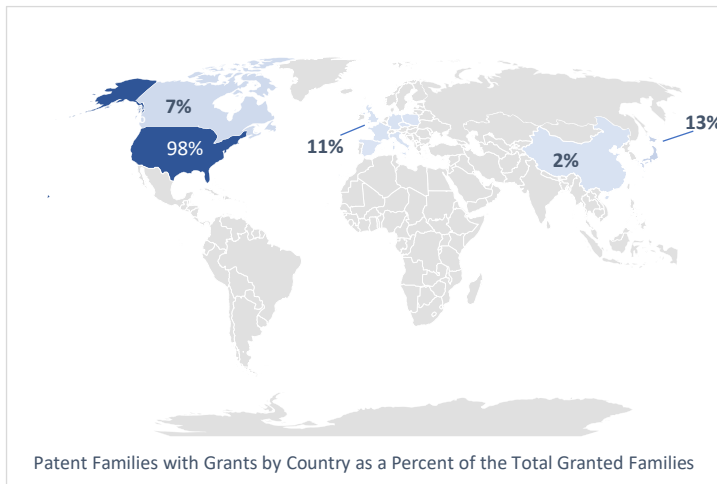
**Pace of Invention:** Amazon



**Quality of the Inventions:** Amazon



**Geographies Protected:** Amazon



**Invention Age:** Amazon (Expiry Date)

