Decoding Gartner Hype Cycles of Emerging Technologies

Yogesh Kulkarni

December 12, 2020

Introduction

Attribution

Primarily based on:

- Gartner Hype Cycle Report 2018

  https://www.gartner.com/en/documents/3883863/hype-cycle-for-artificial-intelligence-2018

- Gartner Hype Cycle Report 2019

  https://www.gartner.com/smarterwithgartner/top-trends-on-the-gartner-hype-cycle-for-artificial-intelligence-2019/

- Gartner Hype Cycle Report 2020

  https://www.gartner.com/en/documents/3988006/hype-cycle-for-artificial-intelligence-2020

Why Track Technologies?

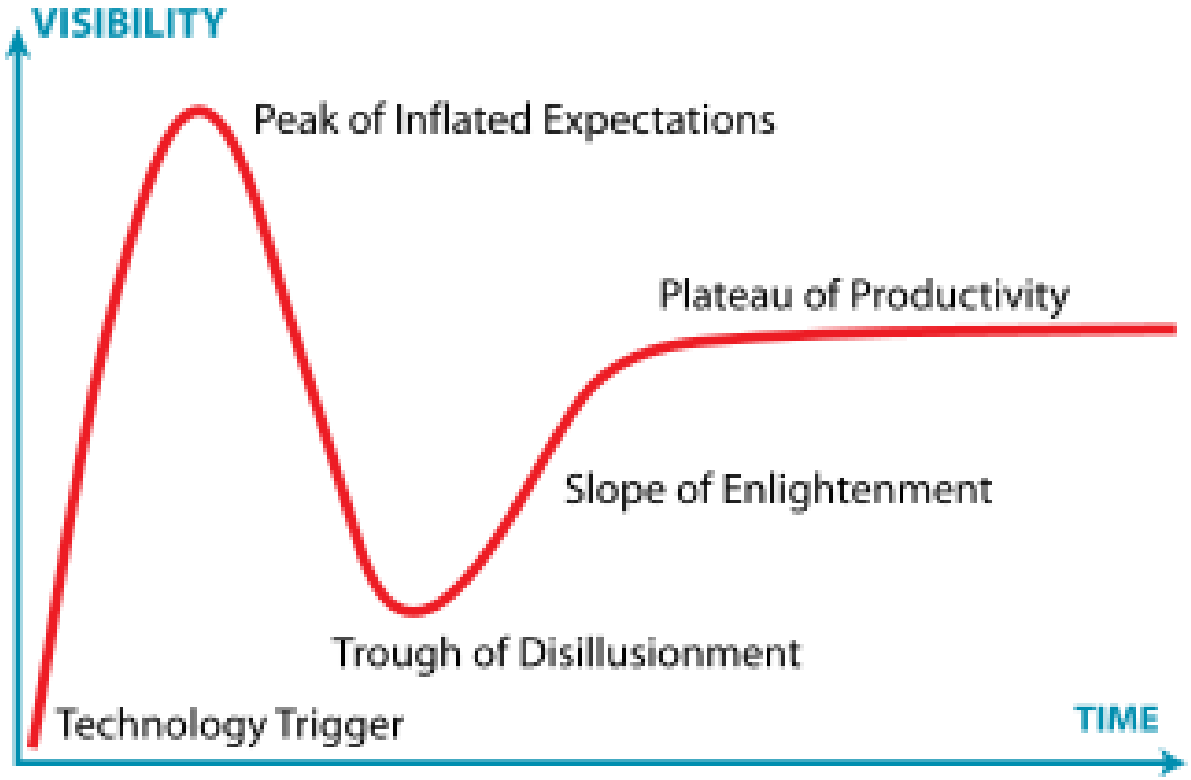
- Emerging Technologies take civilizations forward (most of the times).
- Effects can be positive or negative.
- Anxiety when it gets introduced.
- Shortcomings are highlighted disproportionately: even if there are 40k accidental deaths by normal cars, 1 or 2 by autonomous vehicle gets the front-page.
- Important to be informed about whats coming!!
- Planning, budgeting, hedging . . .

What it is for?

"Clients use Hype Cycles to get educated about the promise of an emerging technology within the context of their industry and individual appetite for risk."
- Gartner

What is a Hype Cycle?

" The Gartner Hype Cycle is a device that lays out the path that technologies generally take, from their initial introduction into the market until their eventual maturation into useful components of broader solutions "

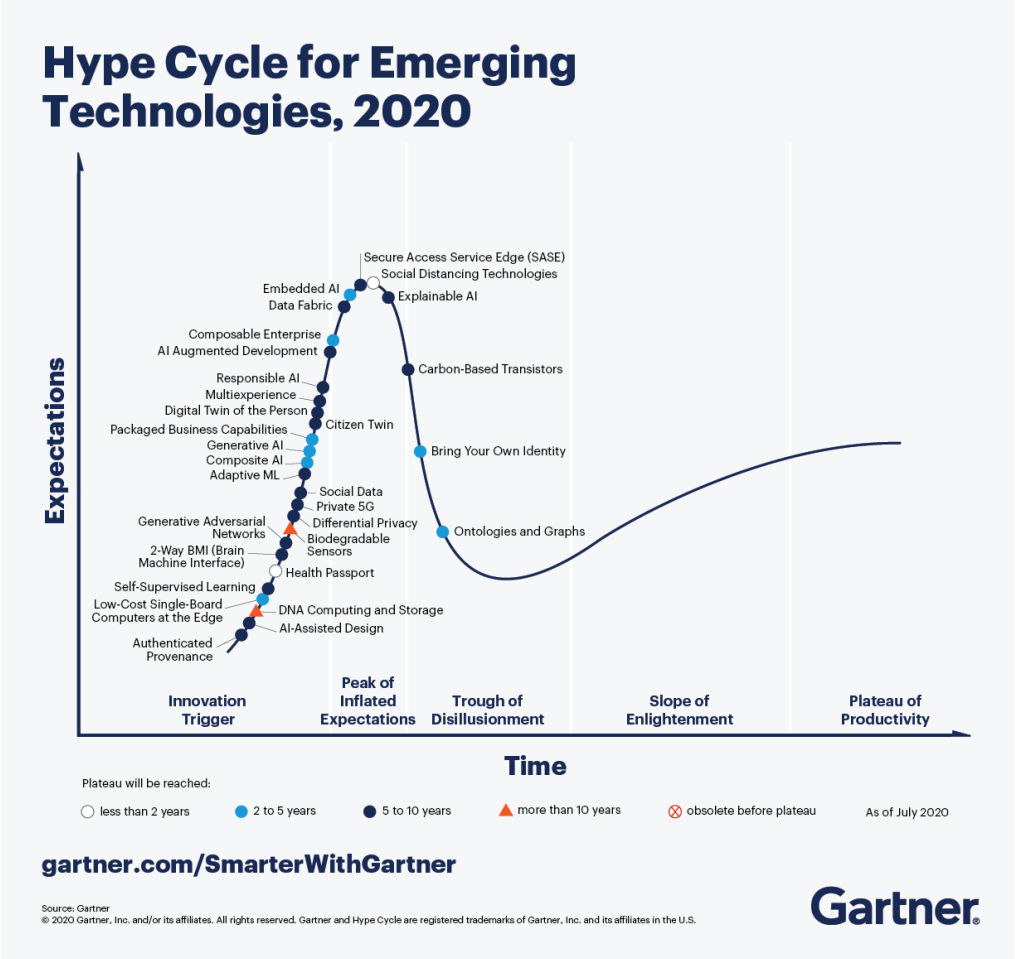


- Offers a snapshot and a trend of relative maturity of the technology.
- Assessment of Hype and Maturity

(Ref:By Jeremykemp at English Wikipedia, CC BY-SA 3.0, https://commons.wikimedia.org/w/index.php?curid=10547051)

Speed of Technologies

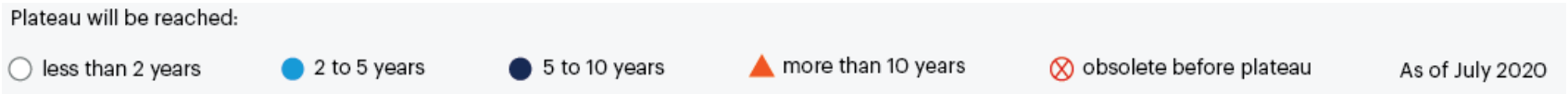
Technologies do not move at an uniform speed on Hype Cycle.



Thats captured by color and shape of the dot.

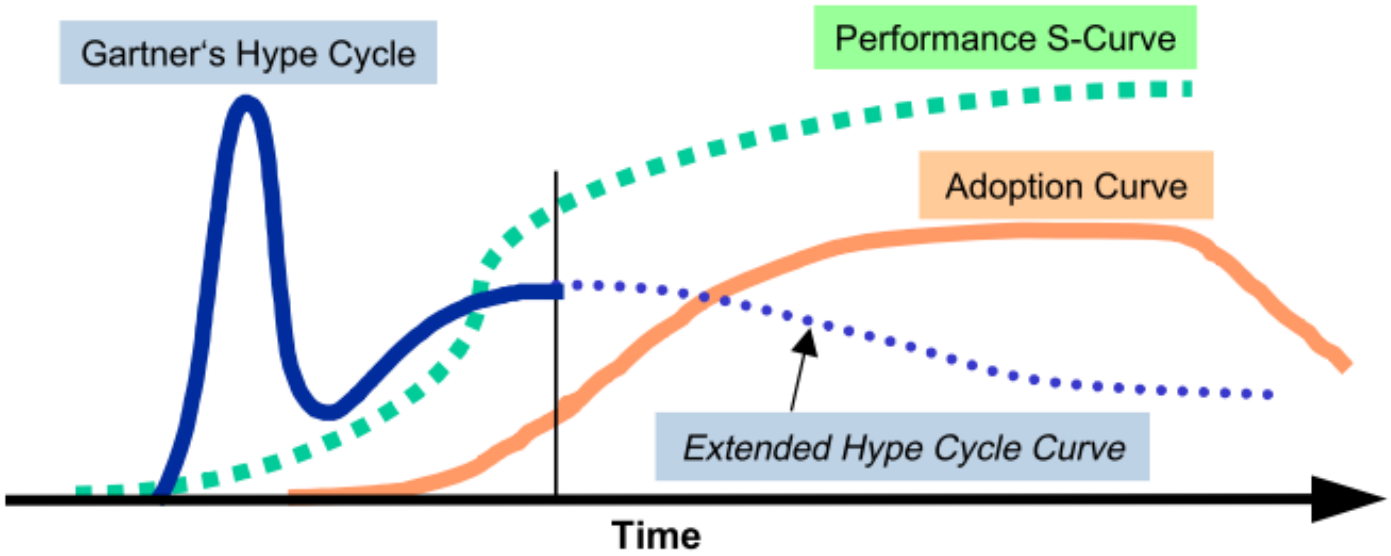
Time to mature

Dot shape decides time to reach Plateau of Productivity or maturity of market adoption (ie the last stage, and not the time to reach PEAK).



- Ultra Fast : less than 2 years (empty circle)
- Fast track : 2 - 5 years (light blue circle)
- Normal : 5 - 10 years (dark blue circle)
- Long Fuse : more than 10 years (triangle)

Comparison with Other Curves



Source: Gartner Research (May 2003)

- Performance S-curve: technology's performance
- Adoption curve: Market adoption over time
- Gartner's Hype Cycle: occurs early in the technology's life cycle.
- Adoption peaks when Hype cycle stabilizes.

(Ref: Understanding Gartner's Hype Cycles - A. Linden, J. Fenn)

Phases of Hype Cycle

Think of any Technology in the mind and see if it has gone through similar phases!!

Phase 1: Technology Trigger

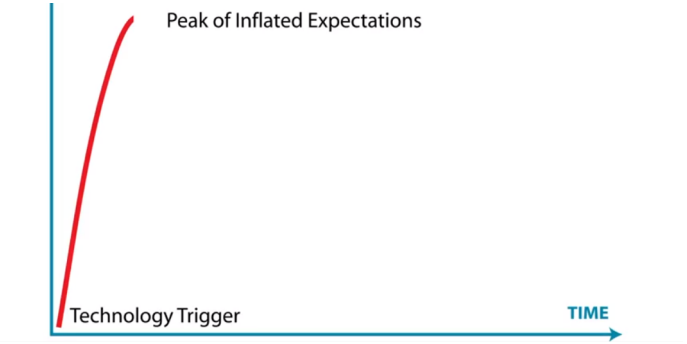
Emergence

- When a new technology is discovered!!
- Gets mentioned in the research conferences
- Enthusiasm

Phase 2: Peak of Inflated Expectations

Excessive enthusiasm

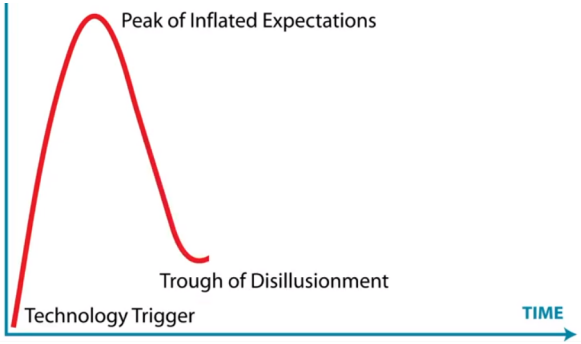
- Gets mentioned even in non-technical forums
- Seen as solution for ALL problems.
- E.g. 3D printing my dinner!!



Phase 3: Trough of Disillusionment

Excessive disappointment

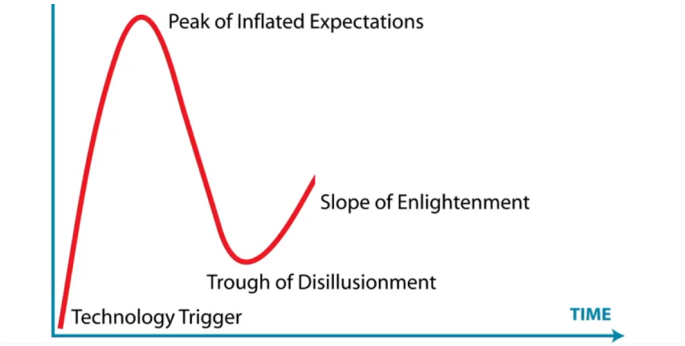
- Does not live up to ALL expectations
- Disillusionment
- Some die here!!



Phase 4: Scope of Enlightenment

Gradual adoption

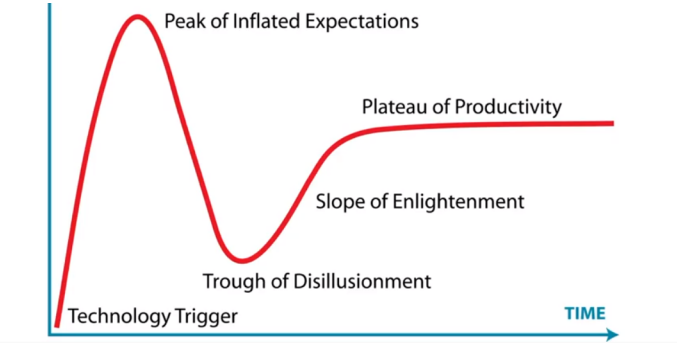
- Those who survive the trough
- May not solve ALL the problems but some specific ones.
- Focused development



Phase 5: Plateau of Productivity

Practical adoption

- Good, mature products
- Survives longer

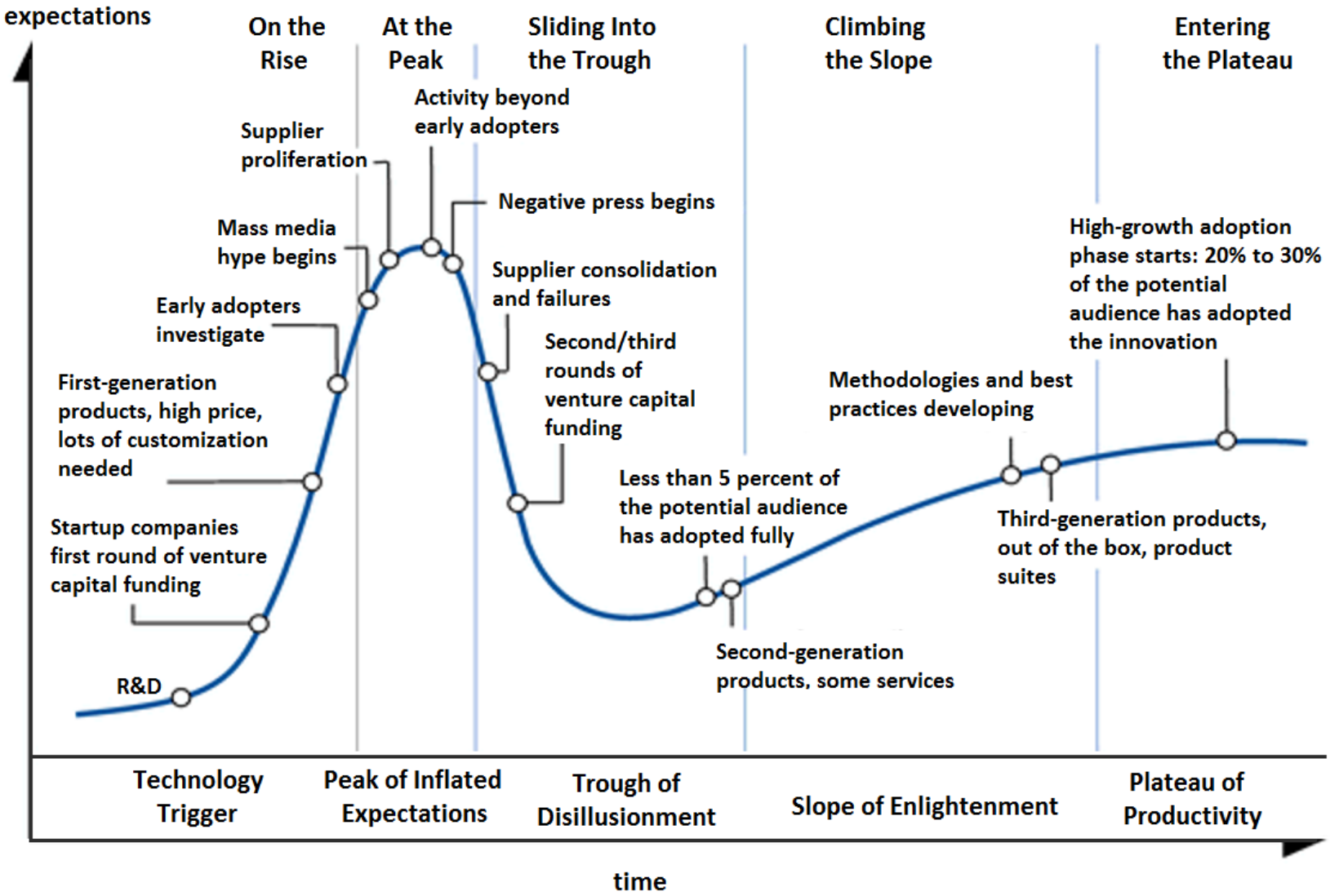


Summary : Learnings

Source: Gartner Research (May 2003)

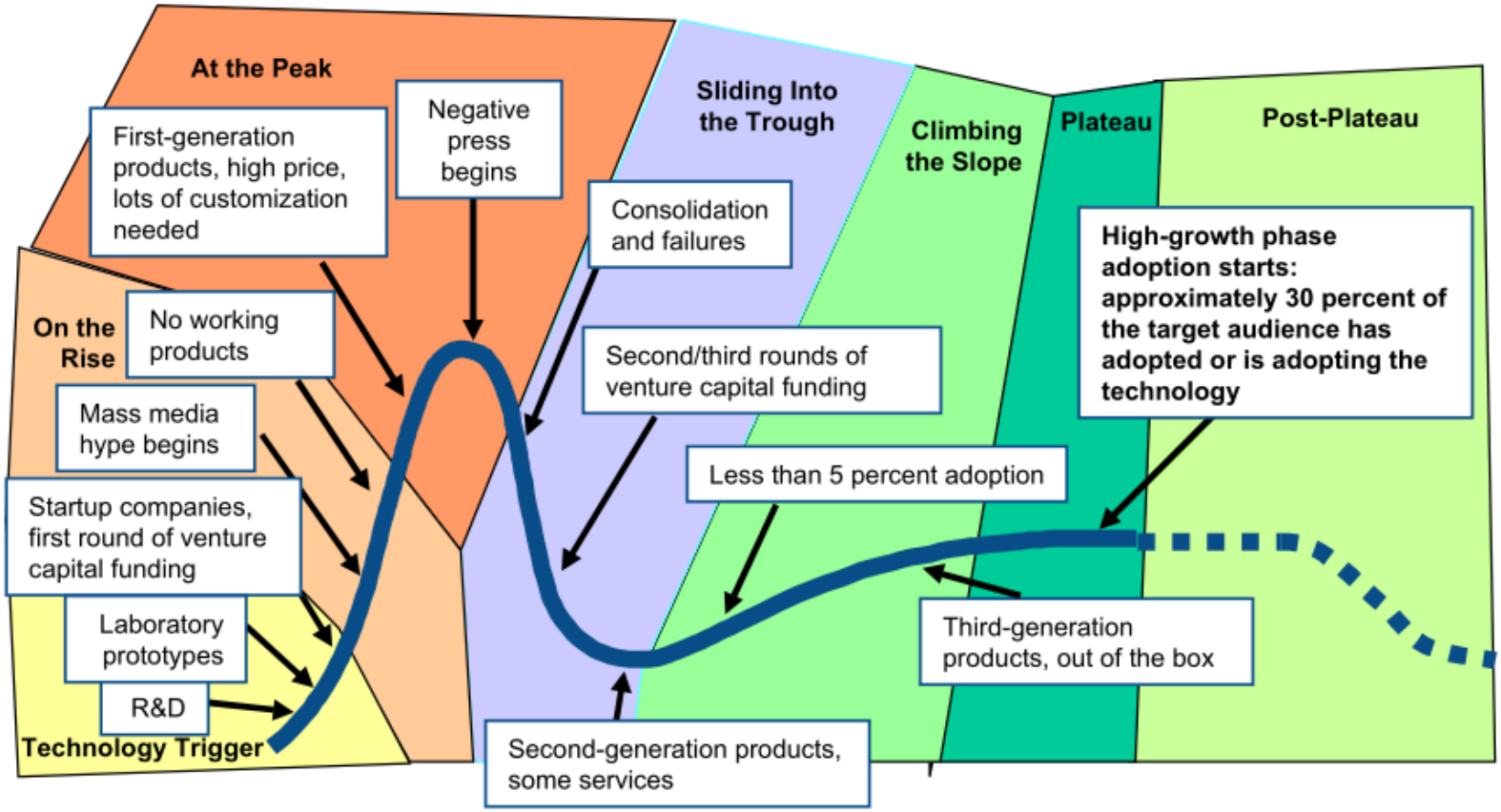
(Ref: Understanding Gartner's Hype Cycles - A. Linden, J. Fenn)

Summary : Phases



(Ref: By NeedCokeNow - Own work, CC BY-SA 3.0, https://commons.wikimedia.org/w/index.php?curid=27546041)

Summary : Phases

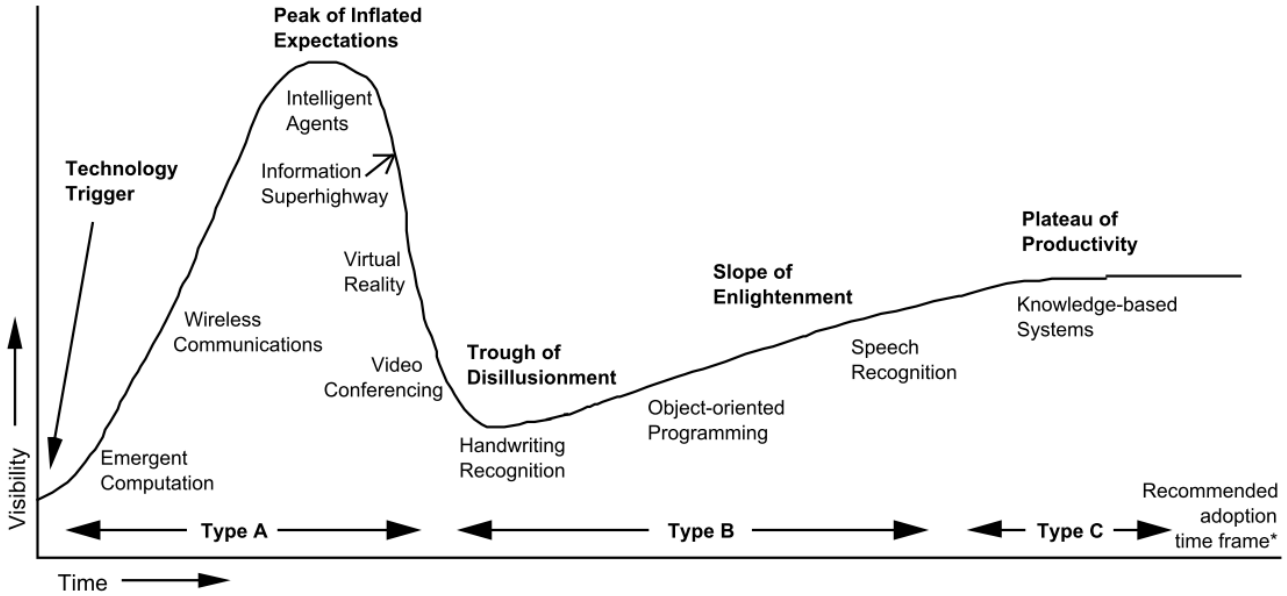


(Ref: Understanding Gartner's Hype Cycles - A. Linden, J. Fenn)

History

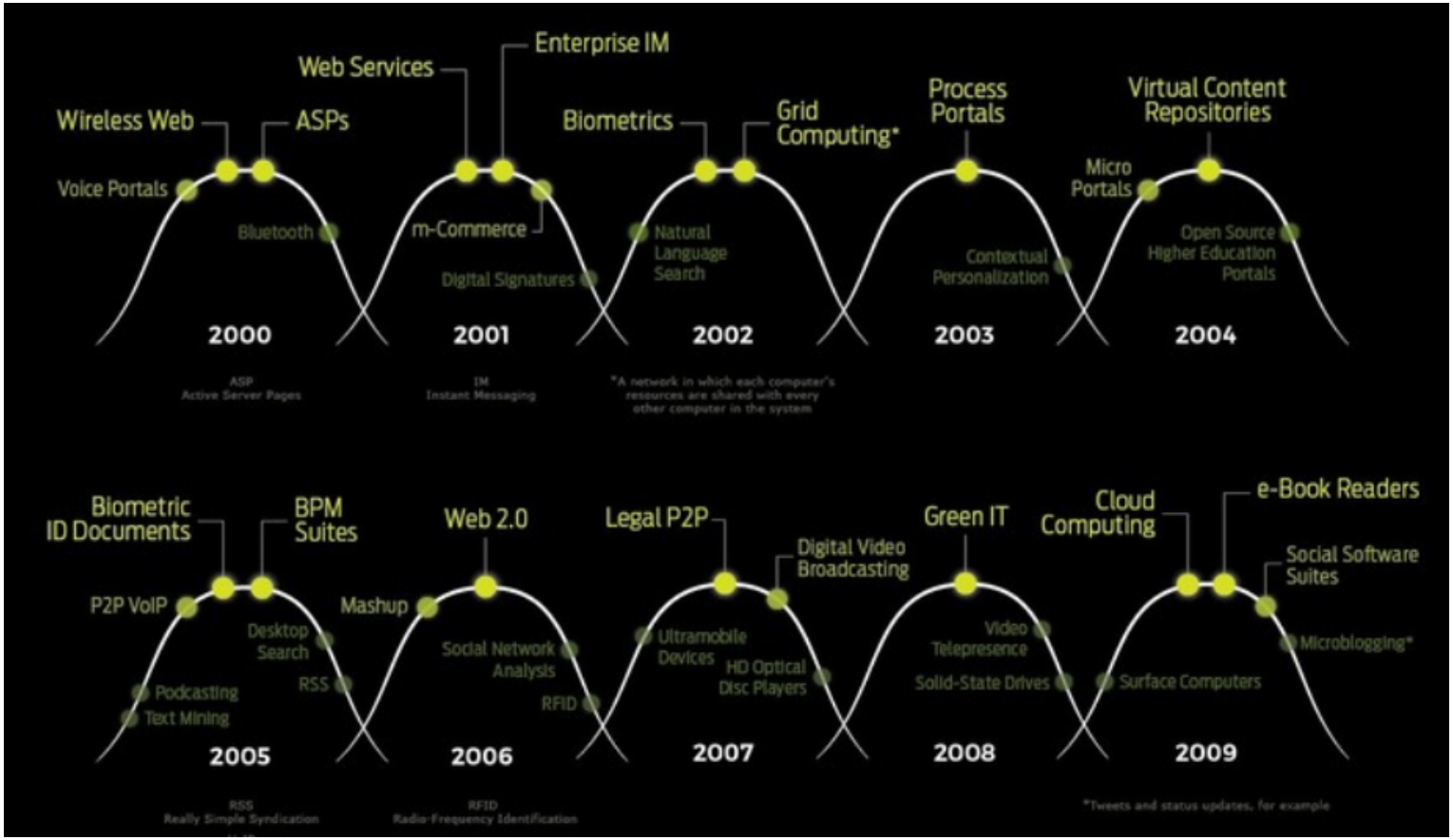
Inception

- Publishing these annually for more than 2 decades, actually since 1995
- Inventor: Jackie Fenn
- About 40 Hype cycles per year, by team of Jackie Fenn and Alex Linden with 100+ analysts, plotting 500+ technologies.



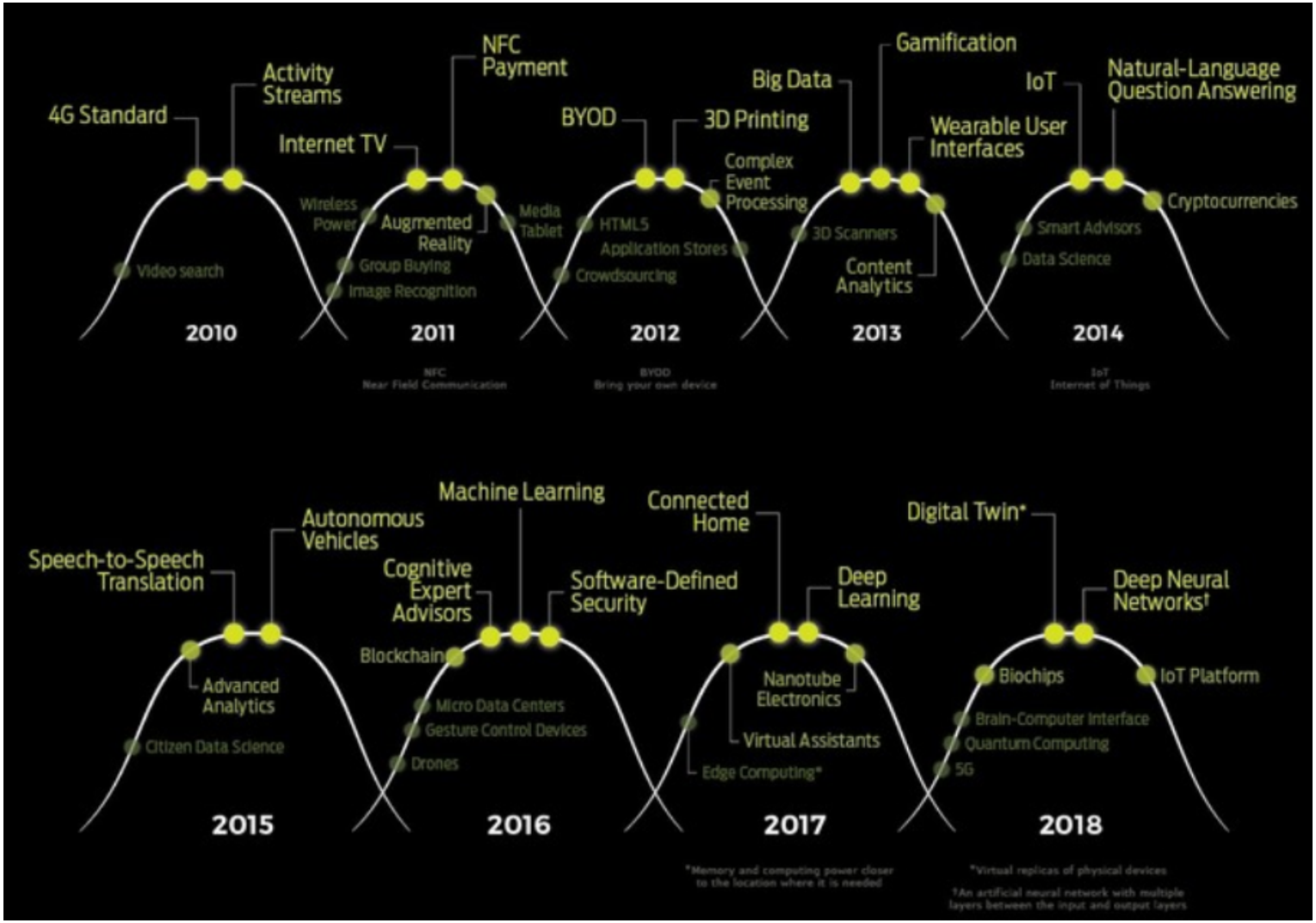
A technology Hype cycle of 1995

Over the Years by Duncan Stewart



(Ref: The Gartner Hype Cycle over the years - Duncan Stewart)

Over the Years by Duncan Stewart



(Ref: The Gartner Hype Cycle over the years - Duncan Stewart)

Over the Years by Duncan Stewart

- Some technologies surpass the hype. 4G wireless networks (2010) and cloud computing (2009) are both trillion-dollar industries today. Neither really went through the classic Gartner "trough of disillusionment" and have been consistently hot trends for a decade now.
- Some technologies follow the classic Hype Cycle almost perfectly. 3D printing (2012) was definitely over-hyped. But although the "factory in every home" hype did not ever happen enterprise 3D printing came out of the trough quite nicely, and will soon be a $3 billion industry, growing at 12-13% per year

(Ref: The Gartner Hype Cycle over the years - Duncan Stewart)

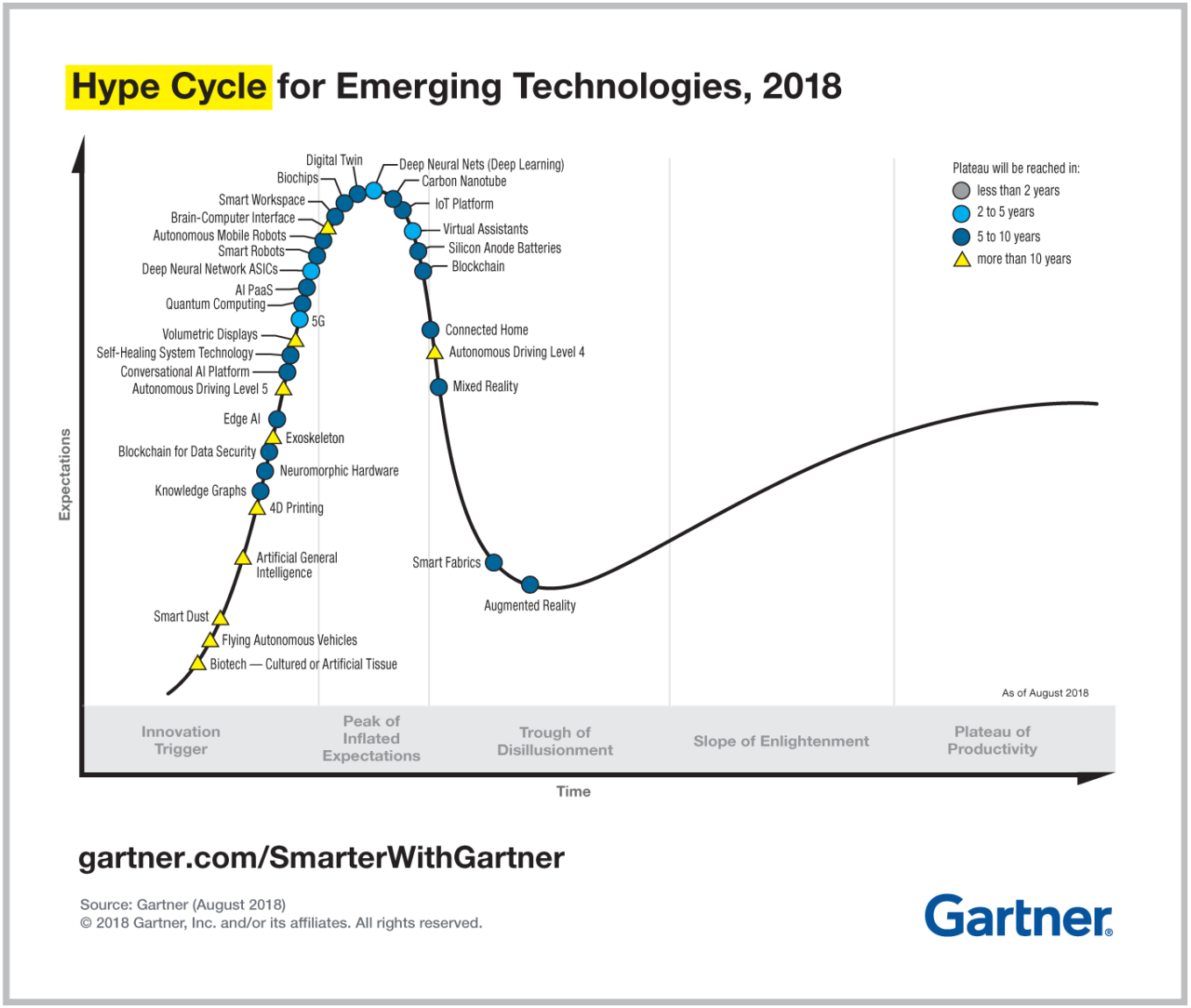
Over the Years by Duncan Stewart

- Some technologies are overhyped, and never fulfill their promise. E-book readers (2009) and BYOD (Bring Your Own Device, 2012)
- Some technologies may do well one day. . . but it can take an awfully long time. Podcasting was shown ascending the hype curve in the 2005 edition, and many expected it to be the Next Big Thing soon. Did not happen, but may happen. Same with Autonomous vehicles (2015).
- Many technologies never come out of the trough. Augmented reality glasses (2011). Yes, Google Glass.

(Ref: The Gartner Hype Cycle over the years - Duncan Stewart)

Trends over last 3 years

Trends in 2018

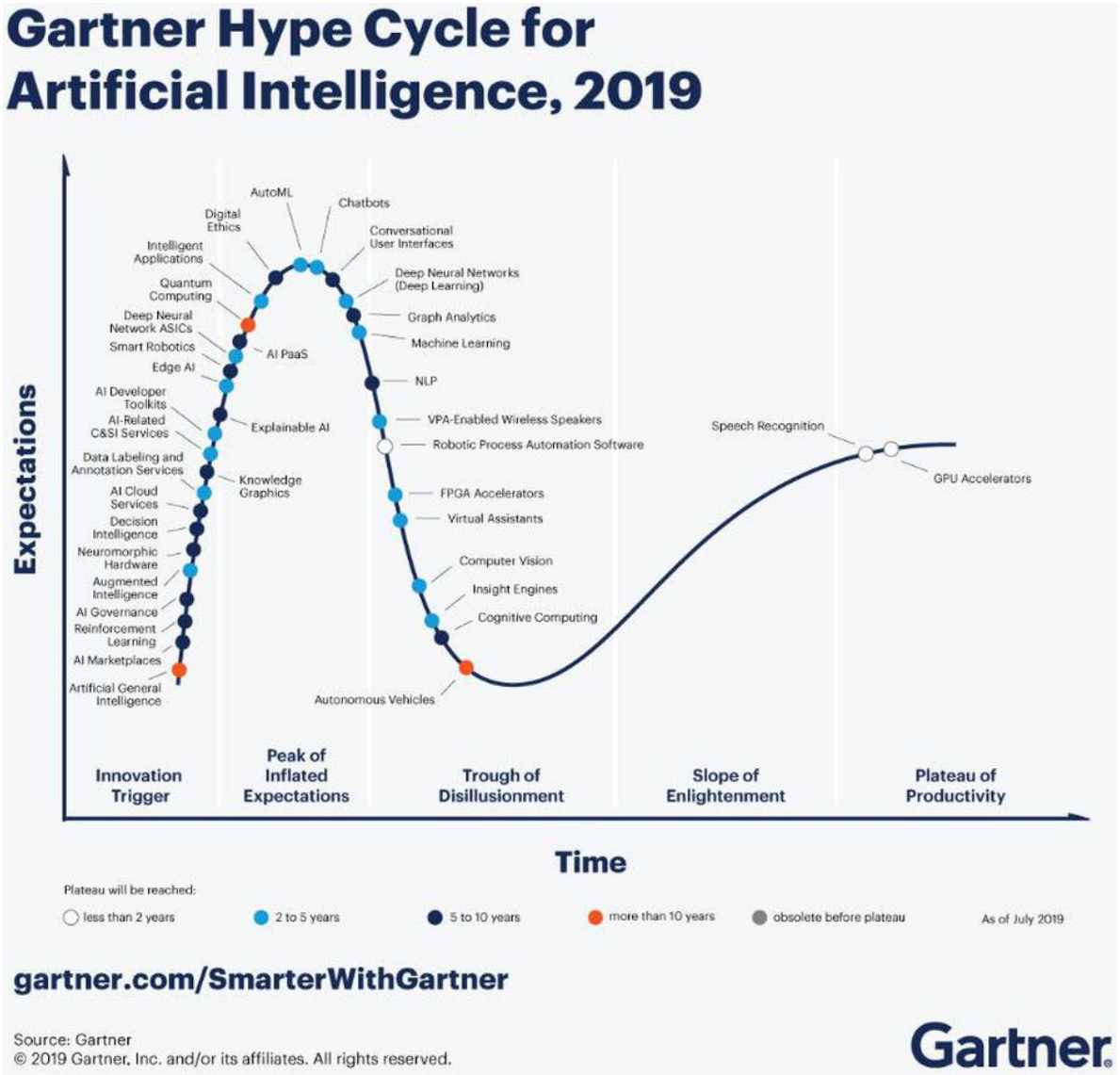


Trends in 2018: Emerging Technologies

- Democratized AI, as cloud computing, open source and the "maker" community open AI to the masses.
- Digitalized ecosystems, as companies shift from compartmentalized infrastructure to platforms that create broader ecosystems to connect humans and tech.
- Ubiquitous infrastructure, as limitless, always available infrastructure expands business opportunity.
- Transparently immerse spaces, as technology becomes more human-centric and creates smarter spaces.
- Do-it-yourself biohacking, as line between what is technology and what is human blurs.

(Ref:Gartner serves up 2018 Hype Cycle with a heavy side of AI - Alex Hickey)

Trends in 2019

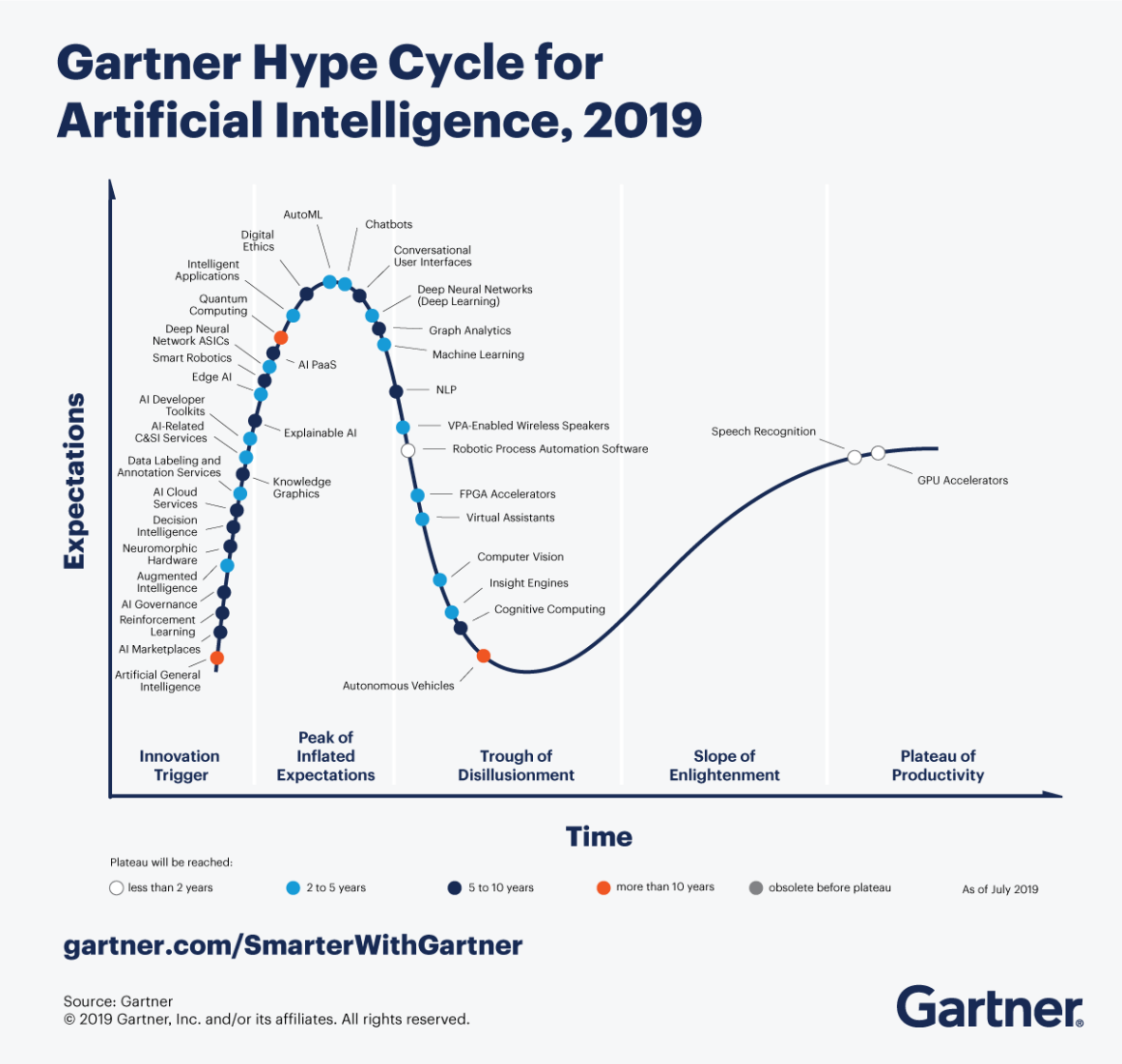


Trends in 2019: Emerging Technologies

- Sensing and mobility: light cargo delivery drones, IoT, autonomous driving levels 4 and 5
- Augmented human: a prosthetic arm that exceeds the strength of a human arm, robotic skin that is as sensitive to touch as human skin
- Postclassical compute and comms: 5G, low-earth-orbit (LEO) satellites
- Digital ecosystems: Knowledge graphs, synthetic data
- Advanced AI and analytics: Edge AI, Generative Adversarial Networks

(Ref: 5 Trends Appear on the Gartner Hype Cycle for Emerging Technologies, 2019 - Kasey Panetta)

Trends in 2019: AI

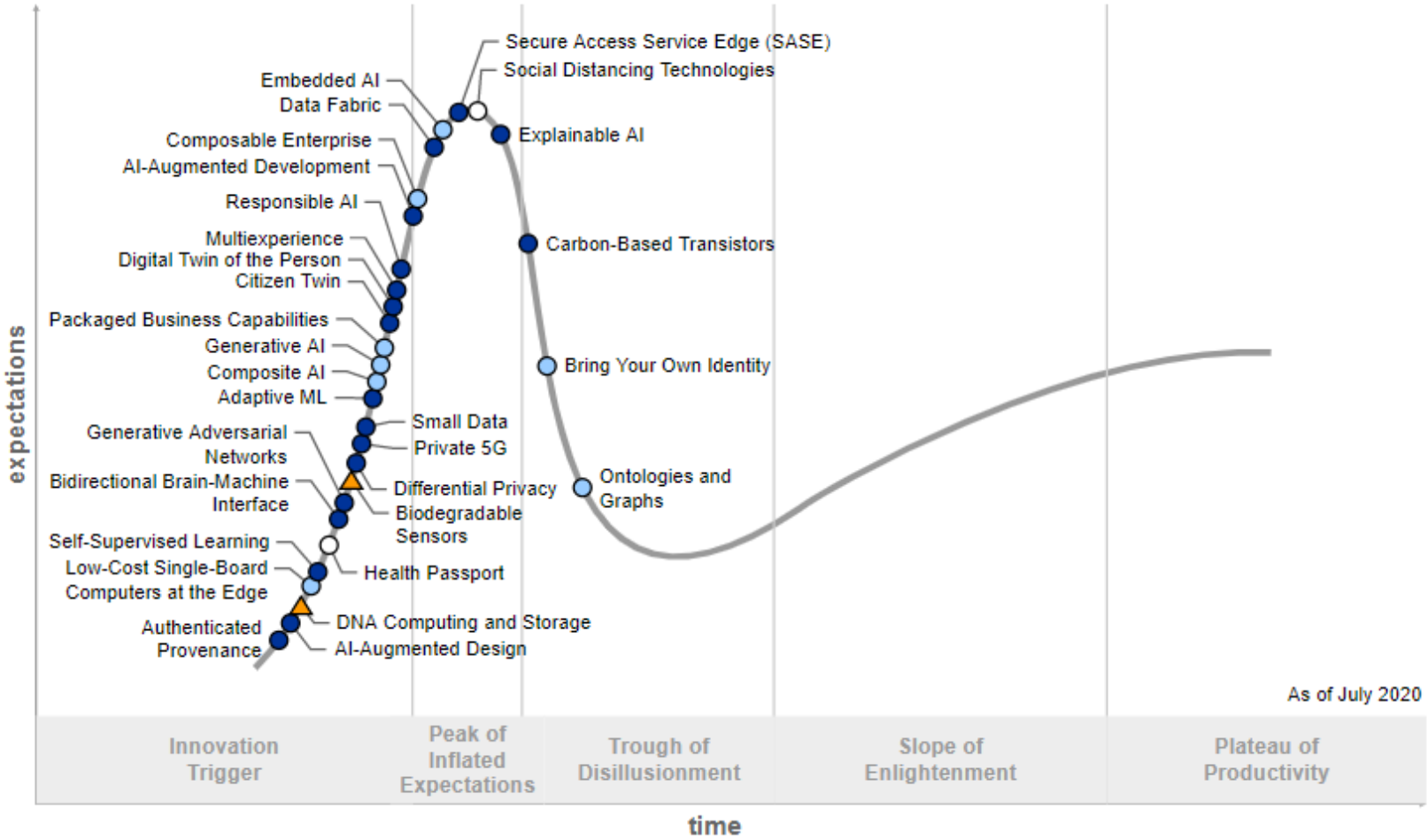


Trends in 2019: AI

- Augmented intelligence: to be more efficient with automation, reduce mistakes.
- Chatbots: The change from "the user learns the interface" to "the chatbot is learning what the user wants"
- Machine learning: can solve business problems, due to big data and compute
- AI governance: creating policies to fight AI-related biases, discrimination and other negative implications of AI
- Intelligent applications: to support or replace human-based activities via intelligent automation, data-driven insights, and guided recommendations to improve productivity and decision making.

(Ref:Top Trends on the Gartner Hype Cycle for Artificial Intelligence, 2019 - Laurence Goasduff)

Trends in 2020: Emerging Technologies



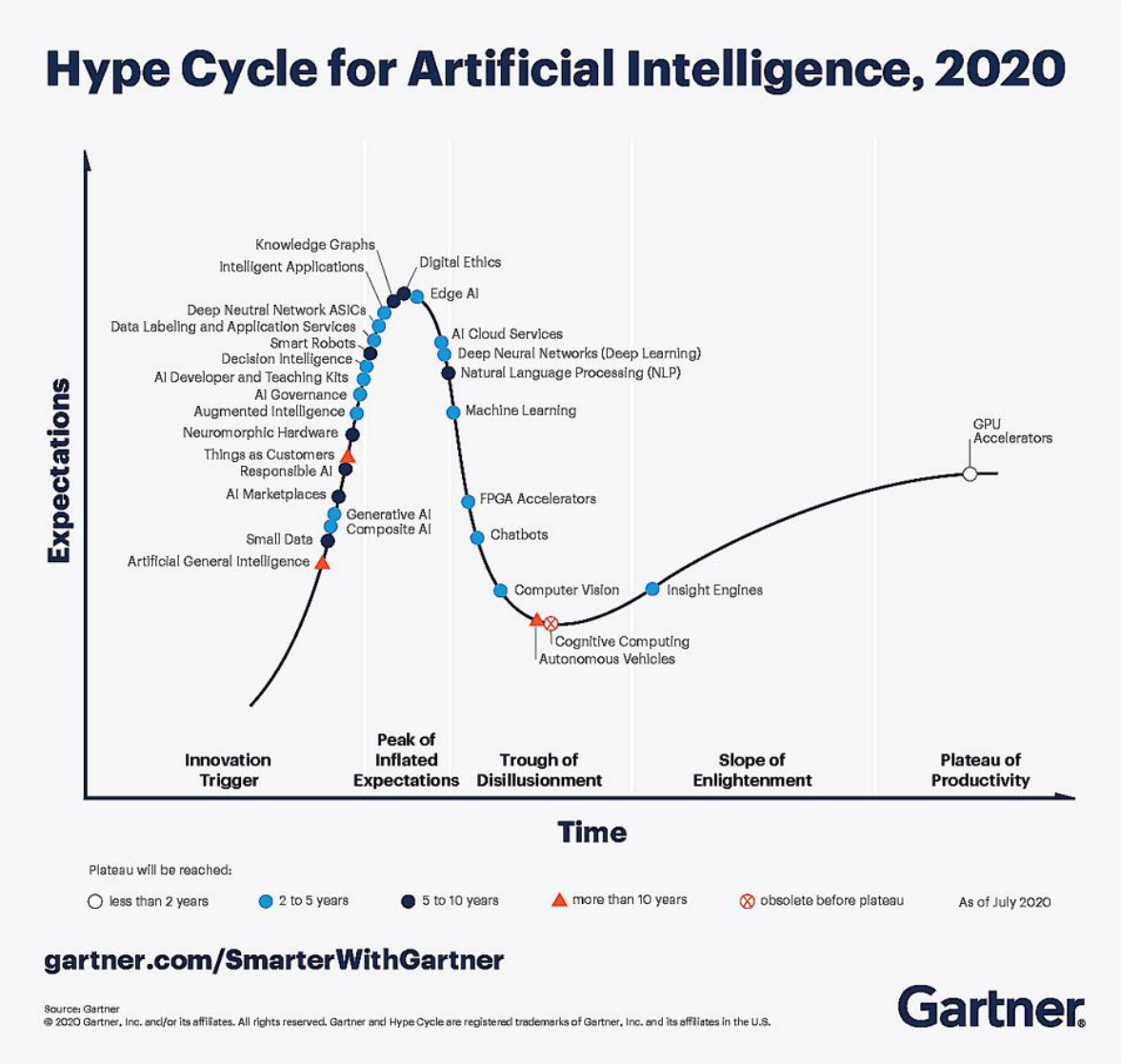
Trends in 2020: Emerging Technologies

Unique trends:

- Composite architectures: plug-and-play like Lego blocks, packaged business capabilities built on a flexible data fabric, to respond to rapidly changing business needs.
- Algorithmic trust: to shift from trusting central authorities to trusting algorithms, Block-chain
- Beyond silicon: Use synthetic DNA in place of silicon or quantum architectures to perform computation or store data. (still rudimentary)
- Formative AI: adaptive ML, generative AI to create new novel content (images, video etc.) or alter existing content
- Digital me: digital versions of ourselves, health digital twins, authentication, access and payment.

(Ref: 5 Trends Drive the Gartner Hype Cycle for Emerging Technologies, 2020 - Laurence Goasduff)

Trends in 2020: AI



(Ref:2 Megatrends Dominate the Gartner Hype Cycle for Artificial Intelligence, 2020 - Laurence Goasduff)

Trends in 2020: AI

- In spite of COVID, nearly half of AI investments intact. About a third are planning to increase. 16% suspended and 7% decreased the investments.
- AI is starting to deliver
- Five new entrants — small data, generative AI, composite AI, responsible AI and things as customers
- Two mega trends: Democratization, Industrialization

(Ref:2 Megatrends Dominate the Gartner Hype Cycle for Artificial Intelligence, 2020 - Laurence Goasduff)

Trends in 2020: Democratization of Artificial Intelligence

- " Gartner foresees developers being the major force in AI"
- Along with data scientists and data engineers, developers would be key.
- Engineering complements data science to deliver AI at scale

(Ref:2 Megatrends Dominate the Gartner Hype Cycle for Artificial Intelligence, 2020 - Laurence Goasduff)

Trends in 2020: Industrialization of AI platforms

- " Responsible AI and AI governance also become a priority for AI on an industrial scale"
- Enables the reusability, scalability and safety of AI, which accelerates its adoption and growth.

(Ref:2 Megatrends Dominate the Gartner Hype Cycle for Artificial Intelligence, 2020 - Laurence Goasduff)

Trends in 2020: AI

- Chatbots: 100% increase in adoption rates in 2-5 years
- GPU Accelerators are the nearest-term technology to mainstream adoption
- AI-based minimum viable products replacing pilot projects
- To focus on narrow AI than the General AI, as it is not commercially viable.
- Small data, Generative AI enter Hype Cycle.
- Responsible AI: Concentrating on the ethical and social aspects of AI
- Things as Customers: a smart device or machine or that obtains goods or services in exchange for payment

(Ref:What's New In Gartner's Hype Cycle For AI, 2020 - Louis Columbus)

Trends in 2020: Embedded AI

- Stage: Peak of inflated expectations
- Time required to plateau: 2 to 5 years
- Supercomputers in the pockets, Edge computing systems
- Era of IoT, 5G and portable medical devices
- Applications for manufacturing, retail, smart cities, and more

(Ref:AI Technologies That Featured In Latest Gartner Hype Cycle - Ram Sagar)

Trends in 2020: Generative AI

- Stage: Innovation Trigger
- Time required to plateau: 2 to 5 years
- Paint auction-worthy art, generate songs and even create faces of people who never existed.
- Disadvantage: Malicious online players can now generate disinformation in the form of images and videos that can fool many.

(Ref:AI Technologies That Featured In Latest Gartner Hype Cycle - Ram Sagar)

Trends in 2020: Responsible And Explainable AI

- Stage: Innovation Trigger & Peak of inflated expectations resp.
- Time required to plateau: 5 to 10 years
- Machine learning algorithms are infamous for their black-box nature
- Growing demand for explain-ability
- Medical diagnosis or credit card risk estimation

(Ref:AI Technologies That Featured In Latest Gartner Hype Cycle - Ram Sagar)

Trends in 2020: Self Supervised Learning

- Stage: Innovation Trigger
- Time required to plateau: 5 to 10 years
- Availability of pre-trained models are almost negligible due to less data, needing more accurate results

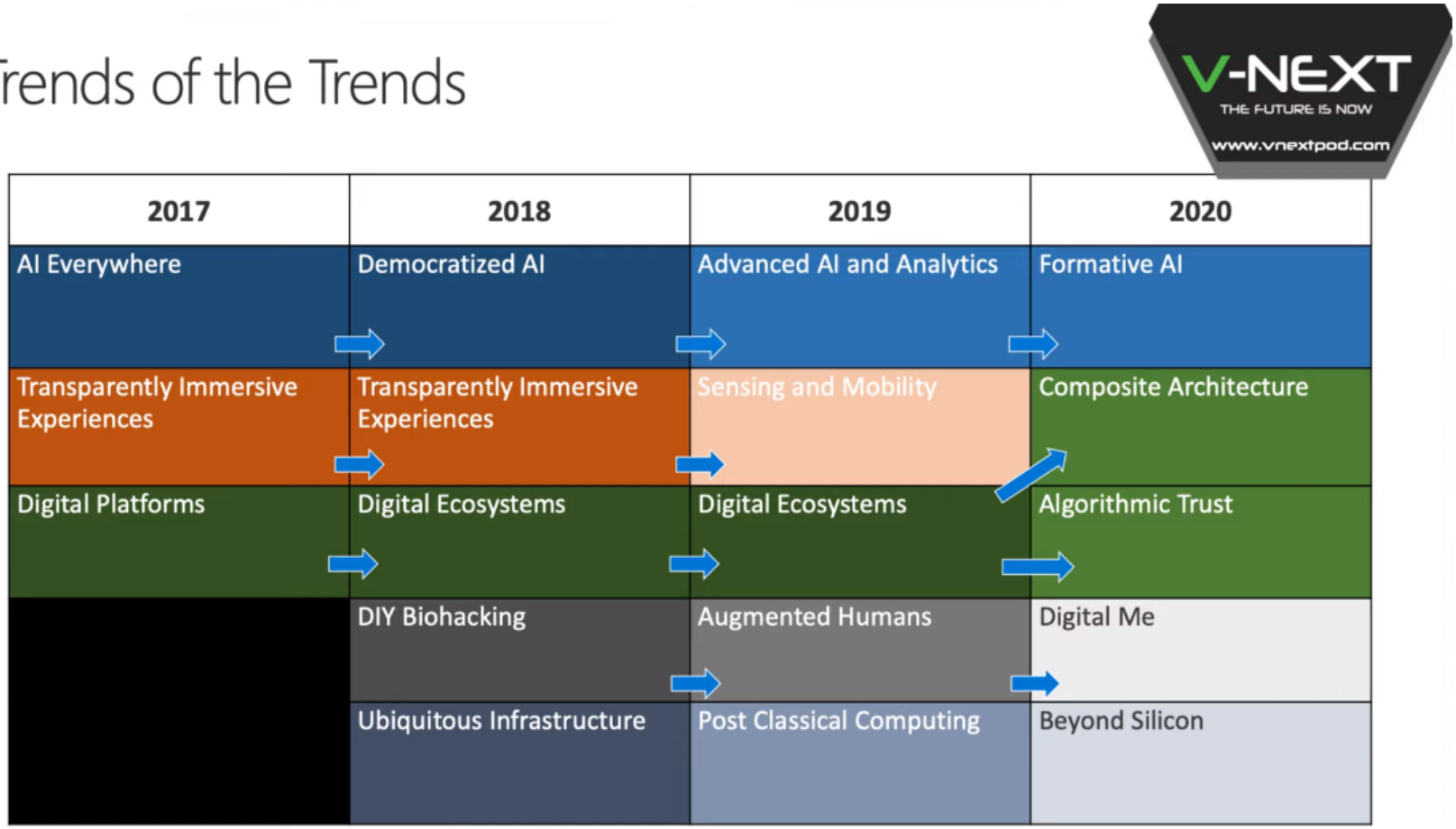
(Ref:AI Technologies That Featured In Latest Gartner Hype Cycle - Ram Sagar)

Trends in 2020: AI Augmented Development

- Stage: Peak of inflated expectations
- Time required to plateau: 5 to 10 years
- AI assisting organizations in design, development and deployment of their software products
- To take care of the mundane debugging tasks through automation.

(Ref:AI Technologies That Featured In Latest Gartner Hype Cycle - Ram Sagar)

Transitions



(Ref: Episode 41: Demystifying the Gartner 2020 Emerging Technologies Hype Cycle - V-Next)

Transitions

- Thirteen technologies have either been removed, re-classified, or moved to other Hype Cycles compared to last year.
- Robotic process automation software is now removed
- Graph analytics and Reinforcement Learning to the Hype Cycle for Data Science and Machine Learning, 2020

Limitations

Criticism By Patrick Crouch

- Personally, couldn't find a single example of tech-oriented company using the Hype Cycle to determine spending or strategy.
- So who's using it? Answer: Marketers.
- Most technological advances come from the combination or misuse of a variety of technologies, not from one technology being researched
- The Gartner Hype Cycle is more of a scapegoat for failing/unrealized technical promise than a useful tool

(Ref: The Gartner Hype Cycle - Does the Gartner Hype Cycle Invalidate Itself? - By: Patrick Crouch)

Criticism By Shaun Snapp

- Abysmal history of technology predictions: Windows phone would become 2nd most popular smart phone platform with 19.5% share. Its not even 3%.
- Getting the predictions right, is not Gartner's primary concern.

(Ref: Disregarding Gartner's Deeper Technology Insights and Predictions - By: Shaun Snapp)

Conclusion

Suggestions by Duncan Stewart

- You have to do your own work.
- The Hype Cycle is a great graphic, and a useful visualization.
- But it is a lousy predictor.
- Being at the hype peak doesn't guarantee that a given technology will succeed massively

(Ref: The Gartner Hype Cycle over the years - Duncan Stewart)

Lessons by Mullany

- We're terrible at making predictions. Especially about the future.
- Out of 200 unique technologies that have ever appeared on a Gartner Hype Cycle for Emerging Technology, just a handful of technologies have been identified early and traveled even somewhat predictably through a Hype Cycle.
- An alarming number of technology trends are flashes in the pan.
- Just over 50 individual technologies appear for just a single year on the Hype Cycle - never to reappear again.

(Ref: 8 Lessons from 20 Years of Hype Cycles - Michael Mullany)

Lessons

- Lots of technologies just die. Period.
- The technical insight is often correct, but the implementation isn't there.
- We've been working on a few core technical problems for decades: Speech recognition, Internet micropayments.
- Some technologies keep receding into the future: Quantum Computing, Brain/Computer Interfaces.

(Ref: 8 Lessons from 20 Years of Hype Cycles - Michael Mullany)

Lessons

- Lots of technologies make progress when no-one is looking: Head Mounted Displays ie VR AR, Speech Generation.
- Many major technologies flew under the Hype Cycle radar: Virtualization, No-SQL, Open Source.

(Ref: 8 Lessons from 20 Years of Hype Cycles - Michael Mullany)

What Next for Data Science, AI, ML?

AI is here to STAY!!
Suggestions:

- Build Solid foundation in Data Sciences, Machine Learning, Deep Learning, etc.
- Don't ignore seemingly mundane, Data Engineering and Results Interpretation.
- Build specific domain expertise and projects therein.
- Github, Kaggle, Meetups ...

Additional References

- What's New In Gartner's Hype Cycle For AI, 2019 - Louis Columbus
- Gartner Hype Cycle - J Scott Christianson
- Gartner Hype Curves - Joining Dots dot com
- Pitfalls in Technological Predictions - Xiaoliang Wang
- Riding the Hypecycle to Infinity and Beyond - Sam Adams, RTI International
- Episode 41: Demystifying the Gartner 2020 Emerging Technologies Hype Cycle - V-next
- Episode 42: The 2020 Emerging Technologies Hype Cycle with Brian Burke - V-next
- Top Strategic Technology Trends for 2021: An Interview with Mary Mesaglio and Brian Burke
- 5 Key Trends from the Gartner Emerging Technologies Hype Cycle, 2020

Thanks ... yogeshkulkarni@yahoo.com