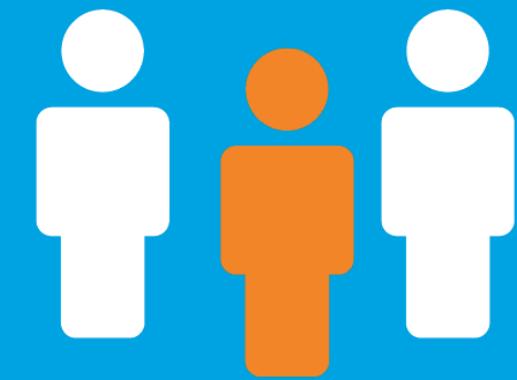


# Future of Software Engineering

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# Keep Brunel Safe



As many as one in three people who have Coronavirus show no symptoms but could be spreading the virus in the community without knowing

## GET TESTED

If you are on campus or living in halls you must get tested twice a week



If you have symptoms of Covid-19 you should book an NHS test



Don't get tested if you have had a positive Covid-19 test in the last 90 days



You will need to self-isolate for ten days if you get a positive result

Book your two tests at [brunel.ac.uk/testing](http://brunel.ac.uk/testing)

FUTURE TRENDS

# Will Programmers Have a Job in the Future?

Or will AI take them too?



May 15, 2019, Bruno Jacobson

<https://www.futuresplatform.com/blog/will-programmers-have-job-future>

“I think there is a world market for maybe five computers” – Thomas Watson, IBM, 1943

“There is no reason anyone would want a computer in their home” – Ken Olson, Digital Education, 1977

“640K ought to be enough memory for anybody” – Bill Gates, Microsoft, 1981

Pressman – future of software engineering

## Story so far....

The Jacquard machin, Plankalkül,.....

Fortran, LISP, COBOL, Pascal, .....

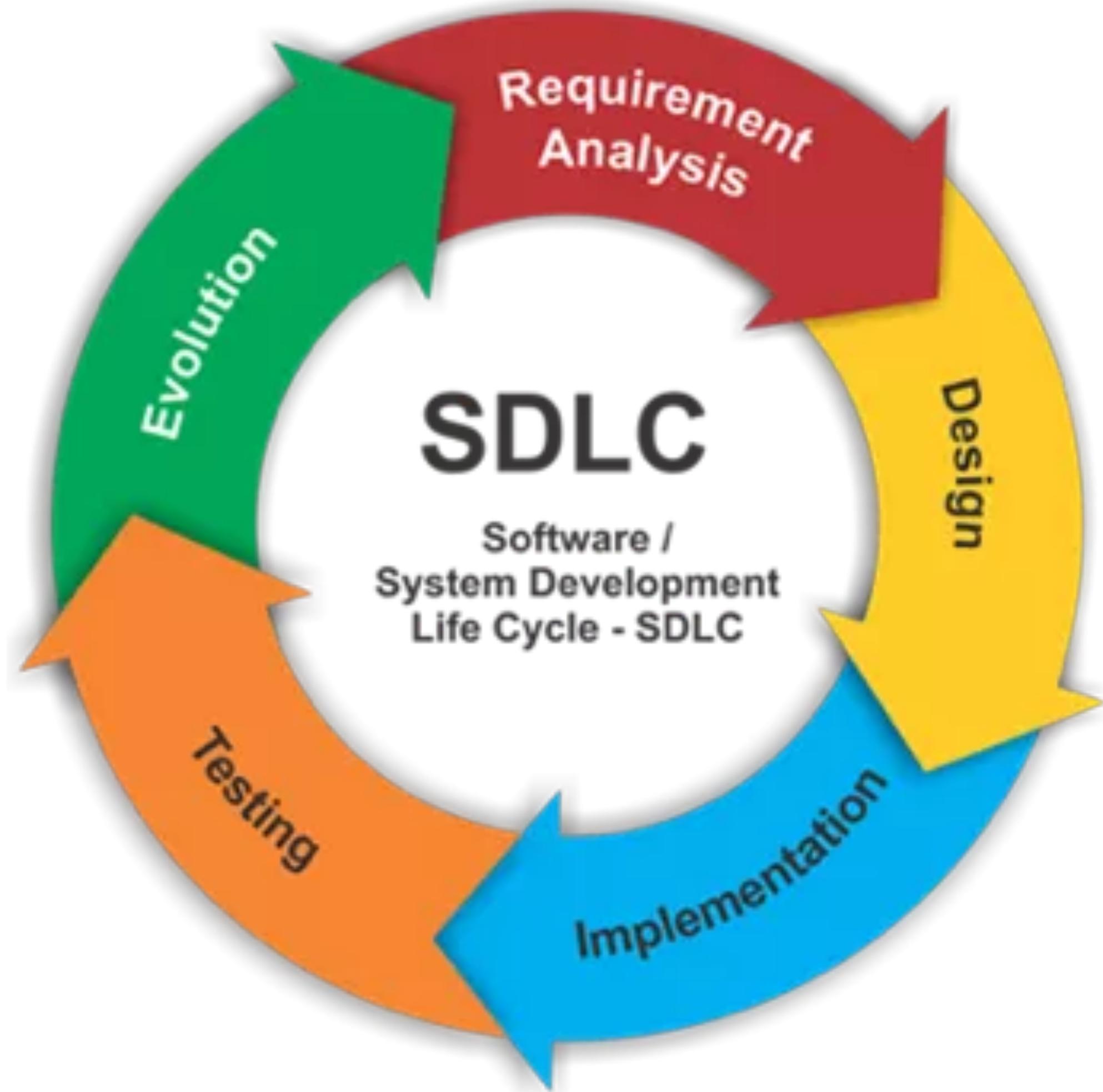
C, Prolog, S, C++, JAVA, python, R, C#, ....

Go, Hack, SWIFT.....

**600+**

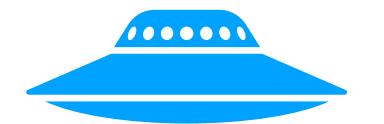
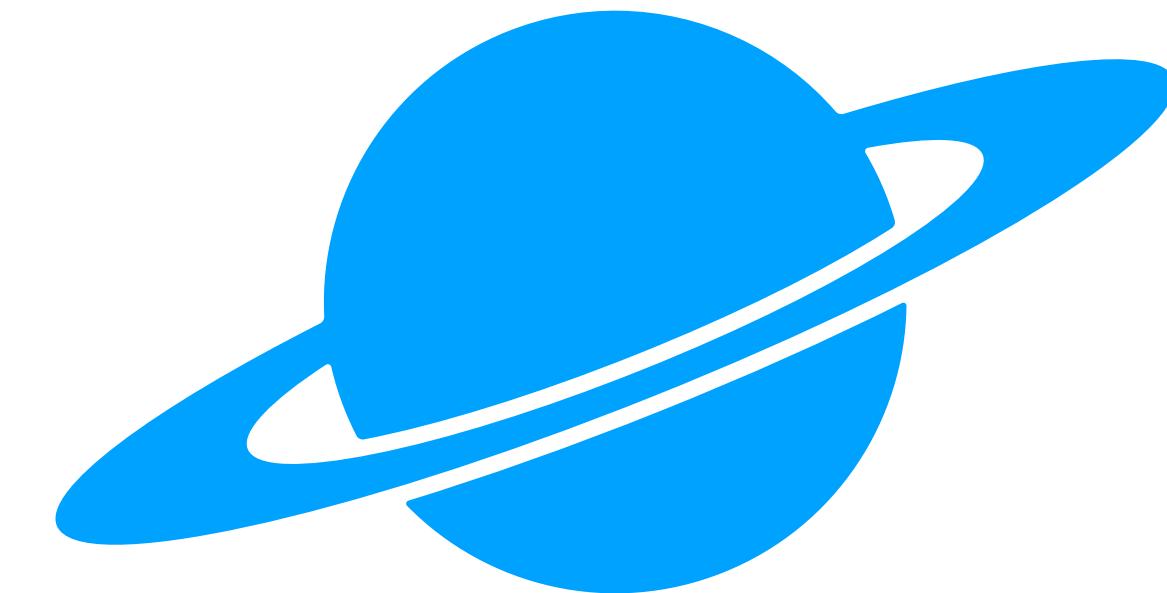
<https://www.techrepublic.com/article/the-future-of-programming-languages-what-to-expect-in-this-new-infrastructure-as-code-world/>

# Software life cycle

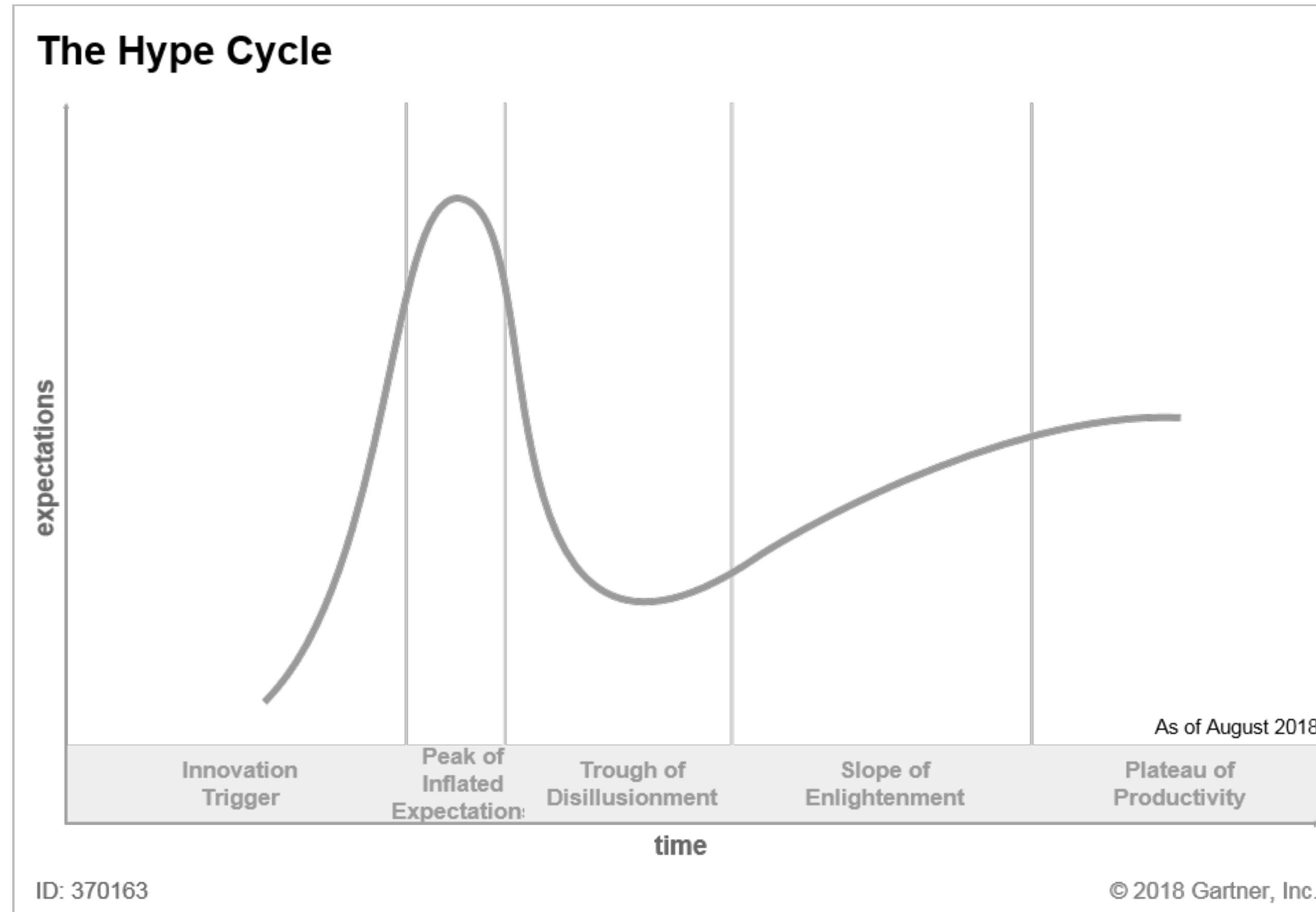


<https://melsatar.blog/2012/03/15/software-development-life-cycle-models-and-methodologies/>

# What will determine our future?



# “Hype cycle”



Innovation trigger → “the idea”

Inflated expectations → “the buzz”

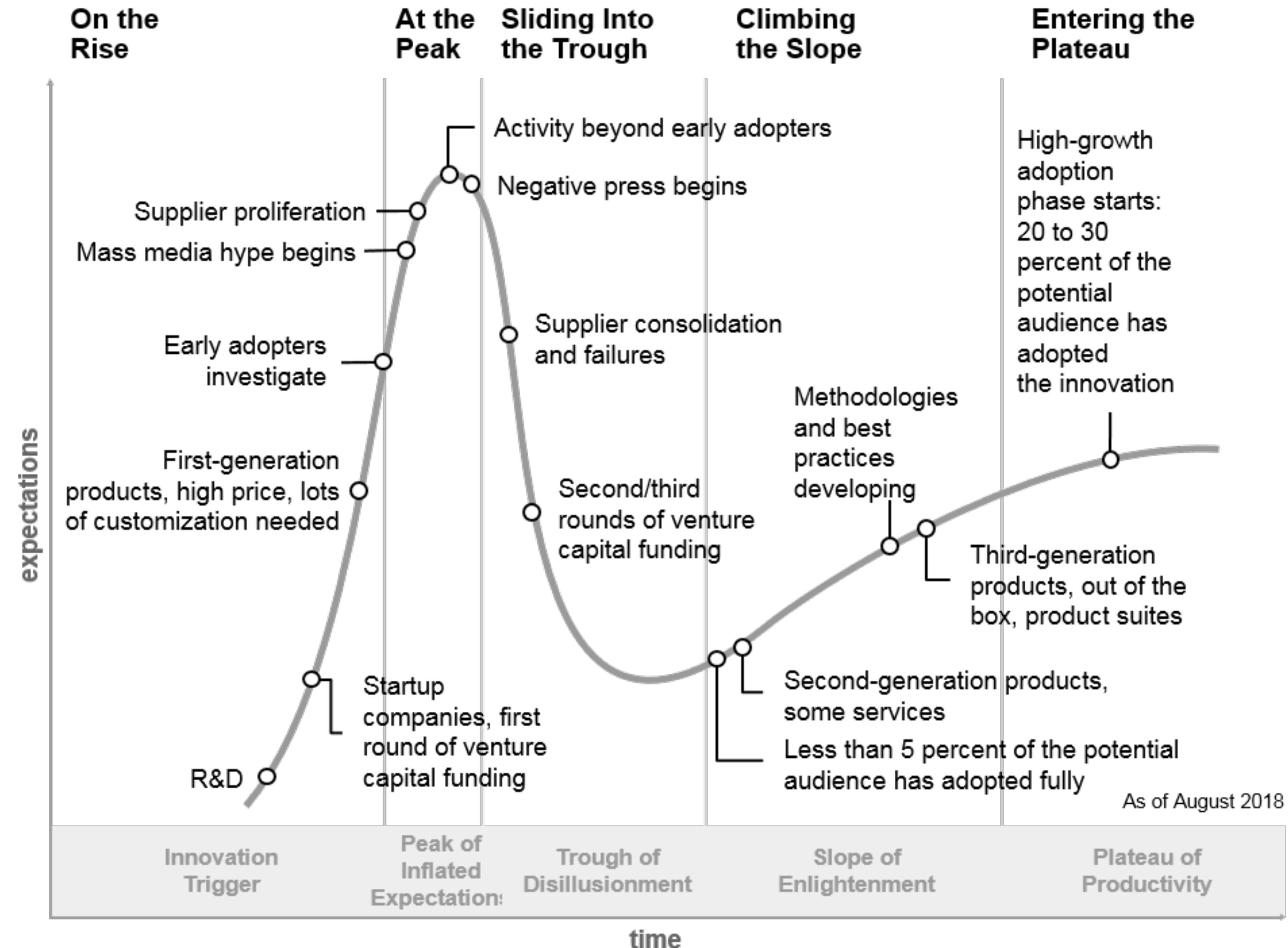
Plateau of productivity → “the usefulness”

Trough of Disillusionment → “the disappointment”

Slope of enlightenment → “the reality”

# “Hype cycle”

## Phases of the Hype Cycle



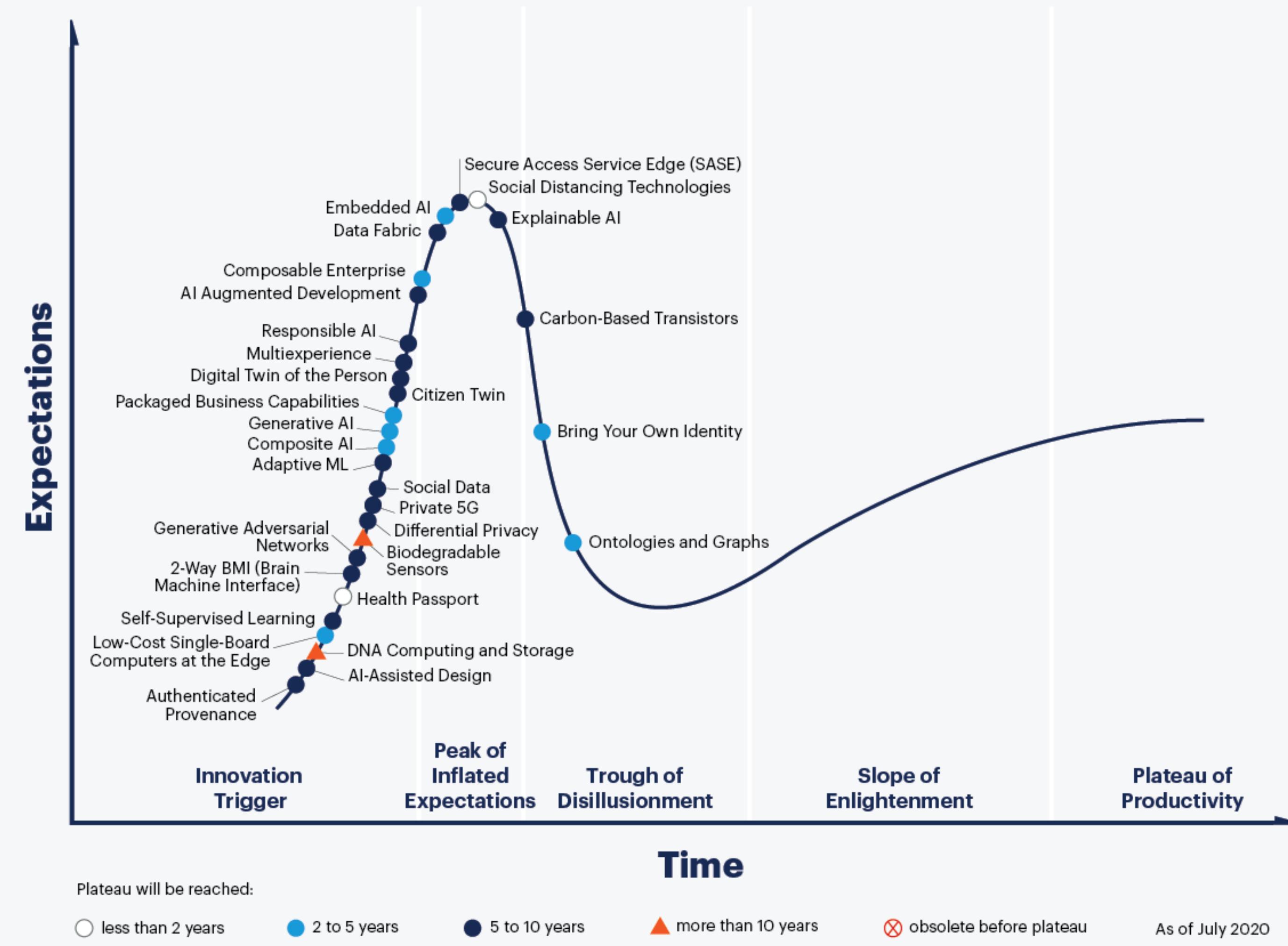
ID: 370163

© 2018 Gartner, Inc.

<https://www.gartner.com/en/documents/3887767/understanding-gartner-s-hype-cycles>

“Hype cycle”

# Hype Cycle for Emerging Technologies, 2020



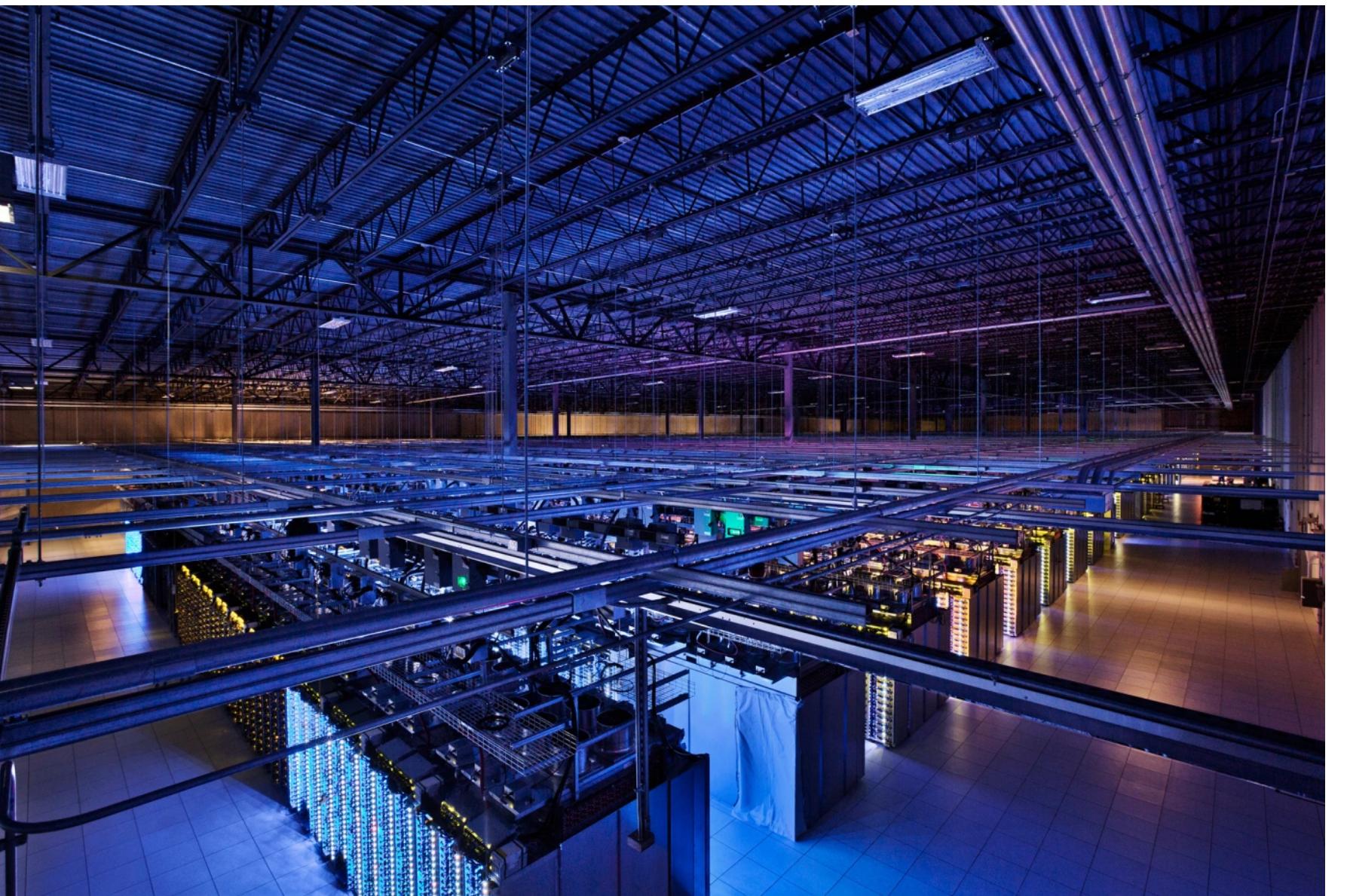
<https://www.gartner.com/smarterwithgartner/5-trends-drive-the-gartner-hype-cycle-for-emerging-technologies-2020/>

## Big Data problem (Zettabyte era)

$40 \times 10^{21}$  bytes i.e. 40 Zettabyte or 40,000,000 Petabyte

175ZB by 2025 --> 90ZB coming from IoT devices (too many cat pictures?)

Challenges: Storage, Analysis, Capture, Search, Transfer,  
Querying, **Ethics**



[Google](#)



[Blizzard](#)

# AlphaStar: Grandmaster level in StarCraft II using multi-agent reinforcement learning

30 OCT 2019

[DeepMind: AlphaStar](#)



BLOG POST

# MuZero: Mastering Go, chess, shogi and Atari without rules

23 DEC 2020

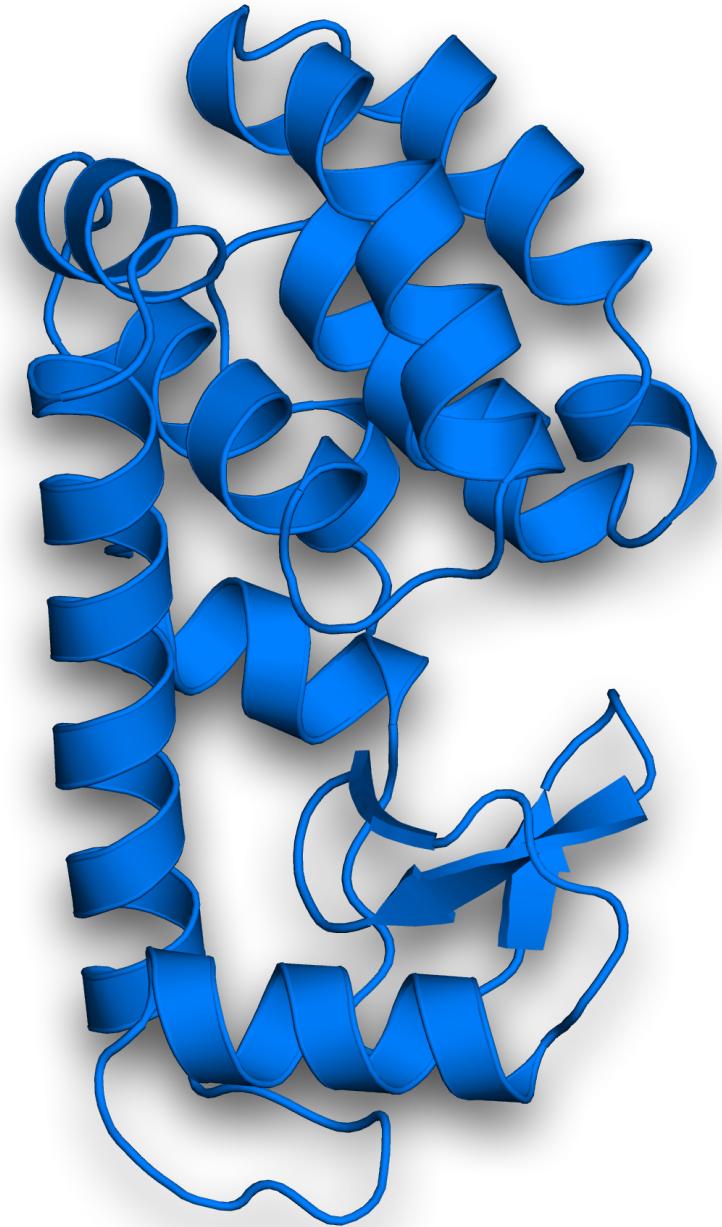
[DeepMind: MuZero](#)



BLOG POST  
RESEARCH

30 NOV 2020

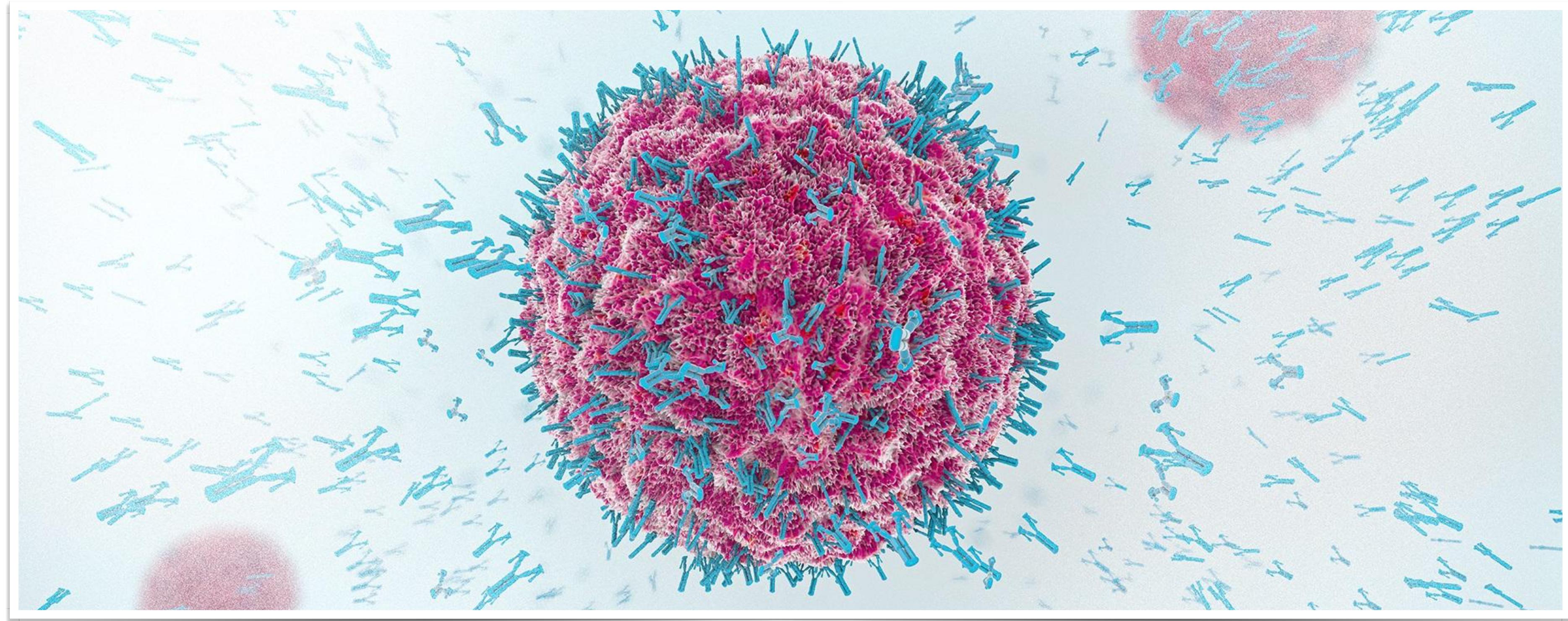
# AlphaFold: a solution to a 50-year-old grand challenge in biology



Structure x 10<sup>y</sup>

CRYST1	1.	0.000	1.	0.000	1.	0.000	90.00	90.00	90.00	P	1	1
ORIGX1		1.000000		0.000000		0.000000				0.00000		
ORIGX2		0.000000		1.000000		0.000000				0.00000		
ORIGX3		0.000000		0.000000		1.000000				0.00000		
SCALE1		1.000000		0.000000		0.000000				0.00000		
SCALE2		0.000000		1.000000		0.000000				0.00000		
SCALE3		0.000000		0.000000		1.000000				0.00000		
MODEL		1					x	y	z			
ATOM	1	N	MET	A	1		43.920	-2.831	8.924	1.00	0.00	N
ATOM	2	CA	MET	A	1		43.195	-1.525	8.828	1.00	0.00	C
ATOM	3	C	MET	A	1		41.775	-1.681	9.370	1.00	0.00	C
ATOM	4	O	MET	A	1		41.177	-2.754	9.270	1.00	0.00	O
ATOM	5	CB	MET	A	1		43.188	-1.046	7.372	1.00	0.00	C
ATOM	6	CG	MET	A	1		42.798	0.407	7.142	1.00	0.00	C
ATOM	7	SD	MET	A	1		43.854	1.632	7.912	1.00	0.00	S
ATOM	8	CE	MET	A	1		45.427	1.292	7.158	1.00	0.00	C
ATOM	9	H1	MET	A	1		44.273	-3.269	8.097	1.00	0.00	H
ATOM	10	H2	MET	A	1		44.756	-2.900	9.469	1.00	0.00	H
ATOM	11	H3	MET	A	1		43.458	-3.633	9.302	1.00	0.00	H
ATOM	12	HA	MET	A	1		43.700	-0.774	9.435	1.00	0.00	H
ATOM	13	HB2	MET	A	1		44.194	-1.201	6.983	1.00	0.00	H
ATOM	14	HB3	MET	A	1		42.487	-1.682	6.831	1.00	0.00	H
ATOM	15	HG2	MET	A	1		42.805	0.595	6.069	1.00	0.00	H
ATOM	16	HG3	MET	A	1		41.790	0.553	7.530	1.00	0.00	H
ATOM	17	HE1	MET	A	1		45.347	1.416	6.078	1.00	0.00	H
ATOM	18	HE2	MET	A	1		46.175	1.983	7.548	1.00	0.00	H
ATOM	19	HE3	MET	A	1		45.725	0.267	7.384	1.00	0.00	H
ATOM	20	N	ASN	A	2		41.257	-0.603	9.959	1.00	0.00	N

## The challenge



$10^{16}$ - $10^{18}$  unique antibodies per human ([Nature: 2019, 566; 393-397](#))

## Working in a team

