Digital Factory

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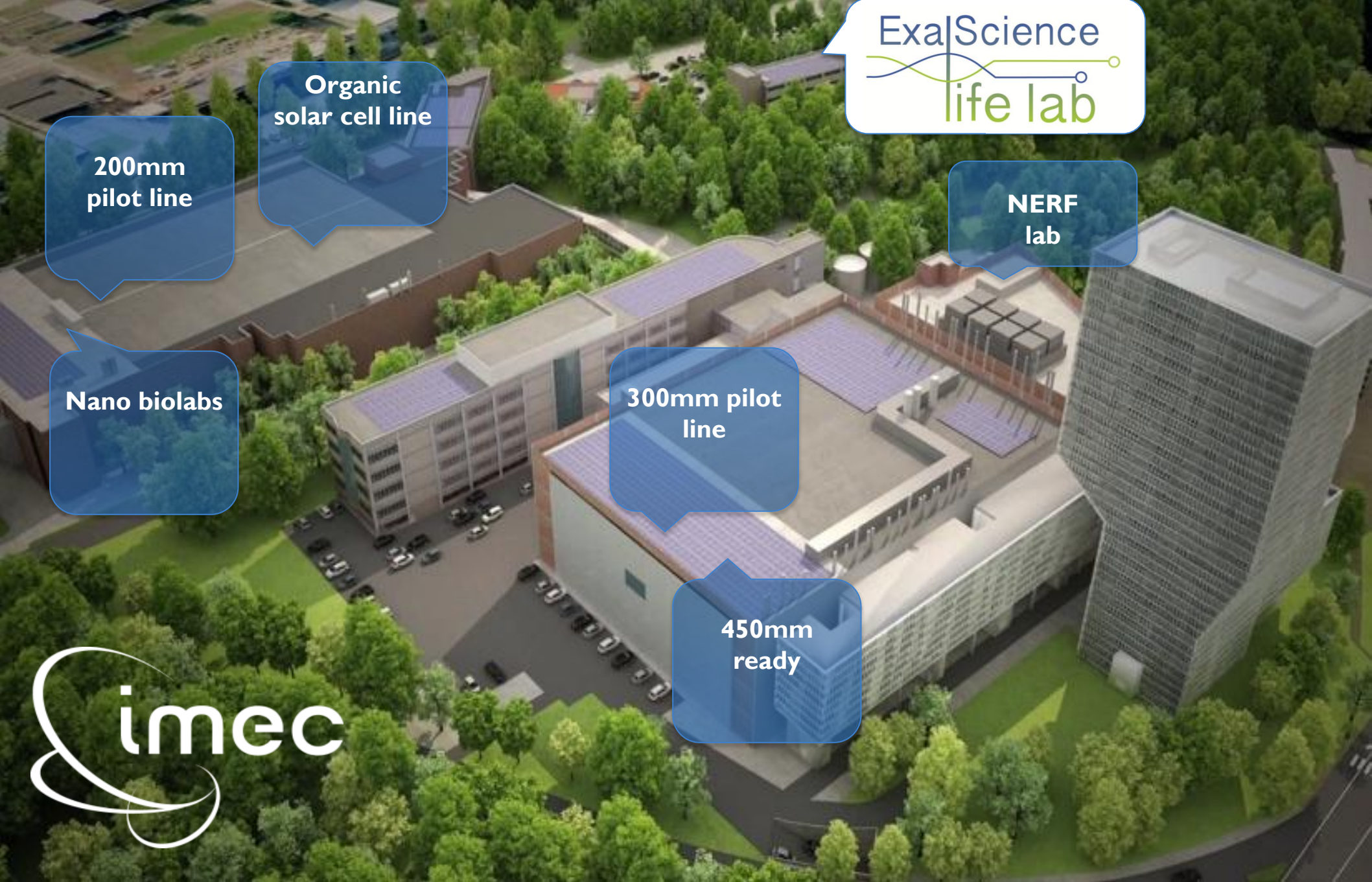
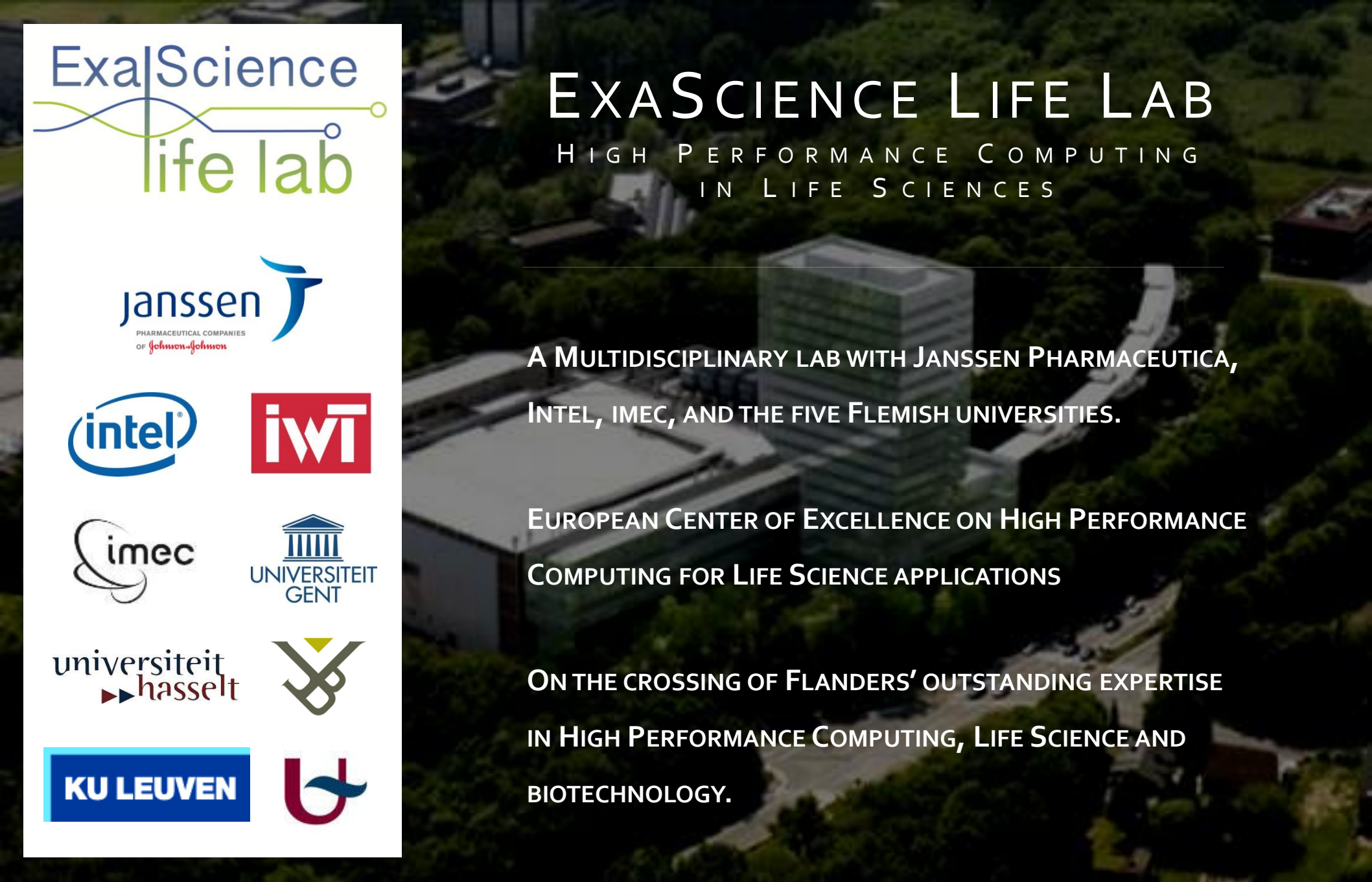
INTERUNIVERSITY MICROELECTRONICS CENTRE

FACTS & FIGURES

- Total revenue in 2011 of 300M€, a growth of 5%
- 1,773 publications R&D related in 2011
- 132 patents awarded & 133 patents submitted in 2011
- Collaboration with 600 companies & 208 universities
- About 2000 people, including 600 residents

CORE CMOS PARTNERS


ExaScience
life lab
200mm
pilot line
Organic
solar cell line
NERF
lab
Nano biolabs
300mm pilot
line
450mm
ready
imec



ExaScience Life Lab

High Performance Computing in Life Sciences

A Multidisciplinary lab with Janssen Pharmaceutica, Intel, imec, and the five Flemish universities.

European Center of Excellence on High Performance Computing for Life Science applications

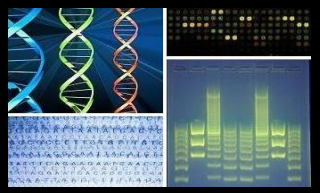
On the crossing of Flanders' outstanding expertise in High Performance Computing, Life Science and biotechnology.

Tianhe-2

33.86 PFlops
17.6 MW
(24 MW with cooling)
390 million USD

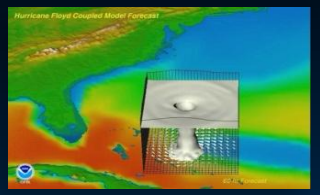
3.120.000 processors with 12 cores

FSI

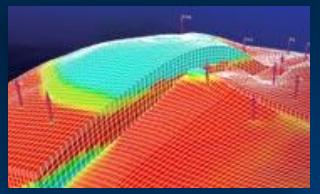


Life Science

Manufacturing



Weather

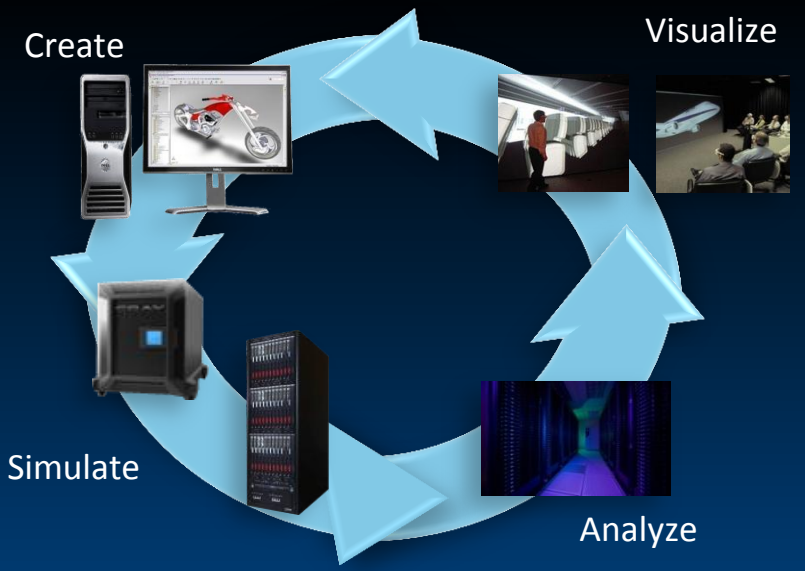


Energy

High Performance Computing – Exascale

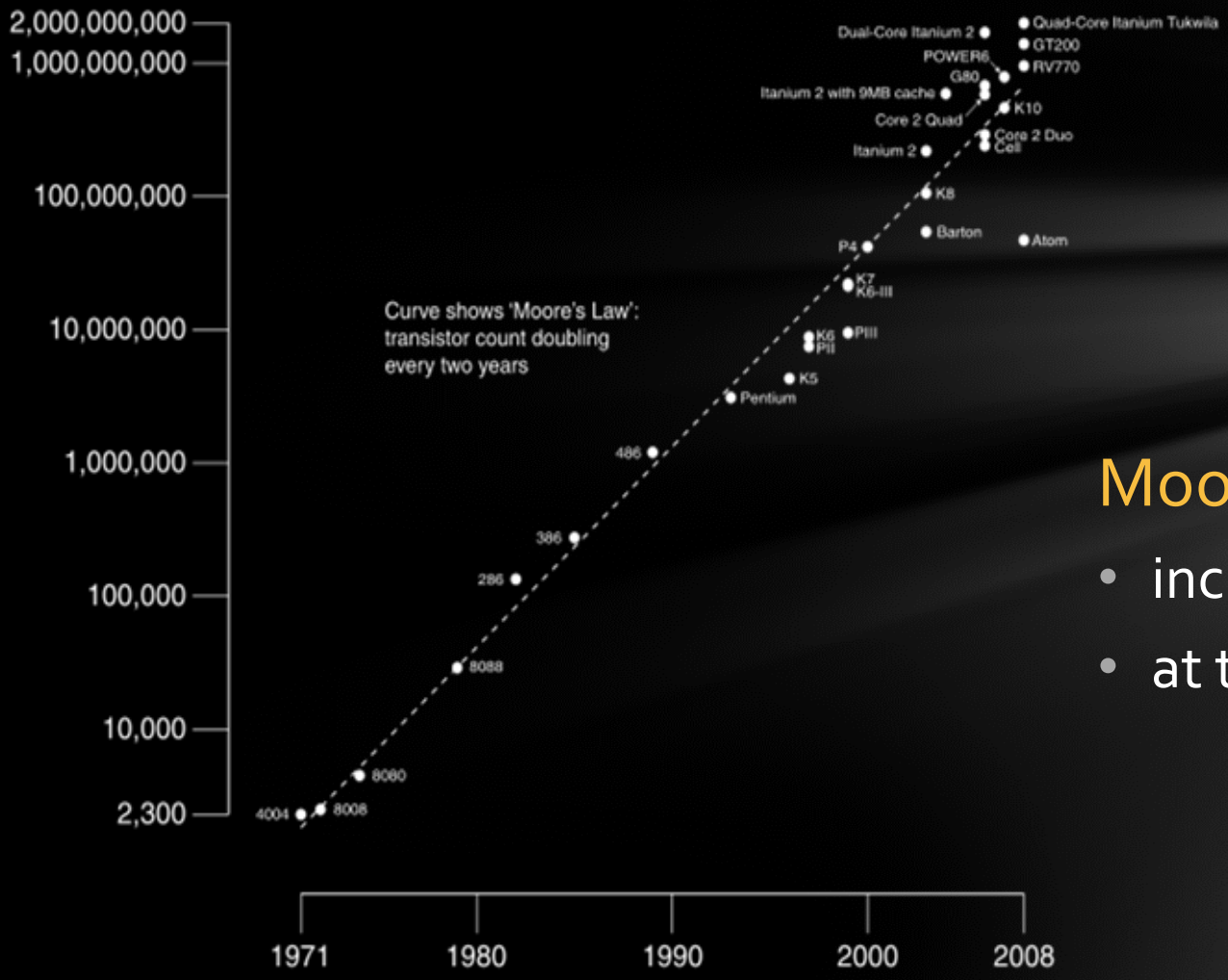
Large scale applications with insatiable appetite for performance

accelerated cycle of
innovation & discovery



Technology Outlook

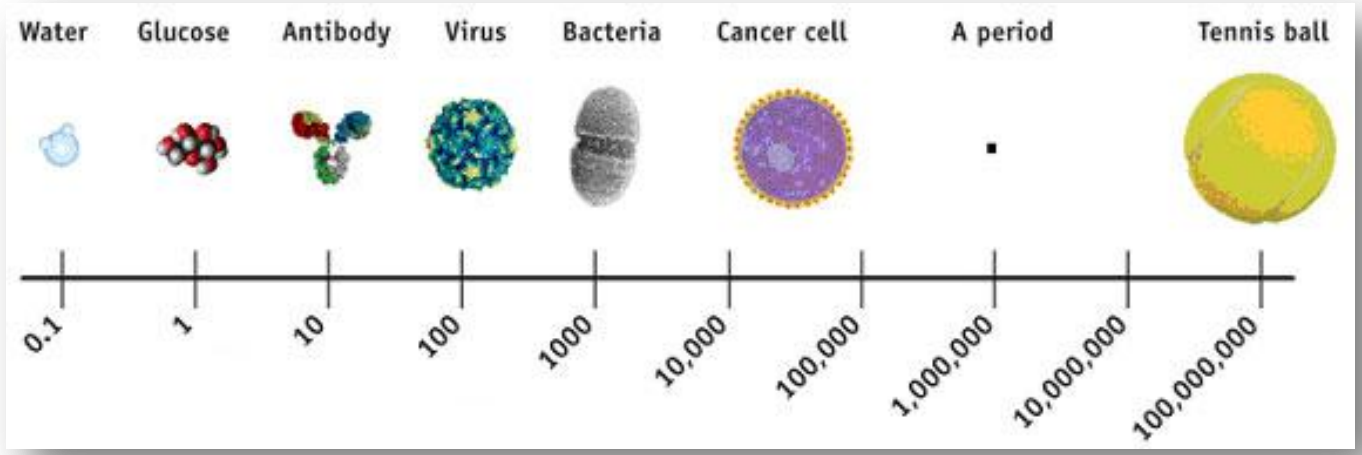
Performance

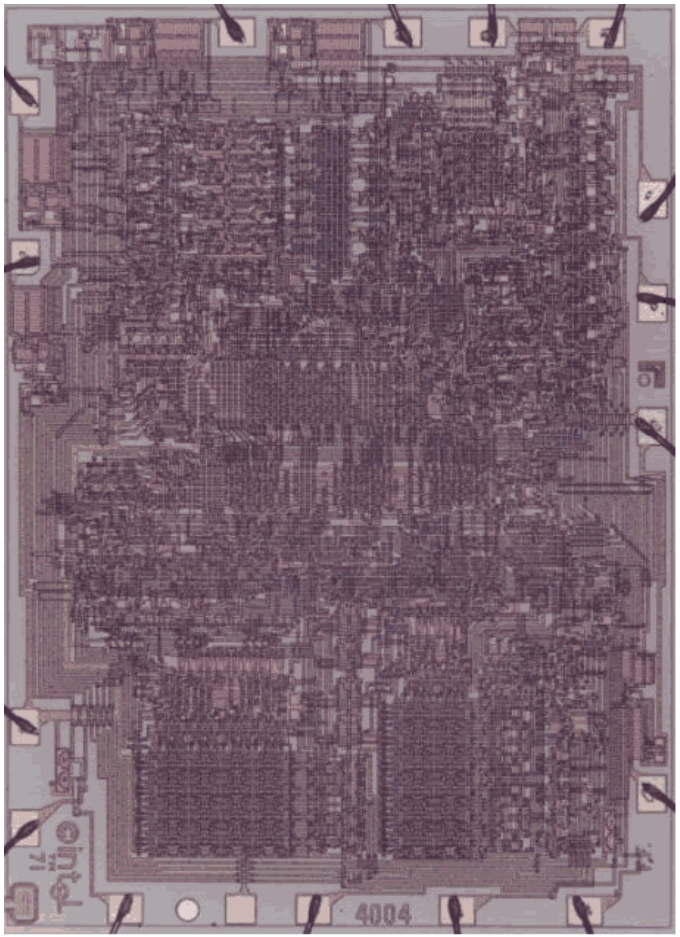


Moore's Law still applies

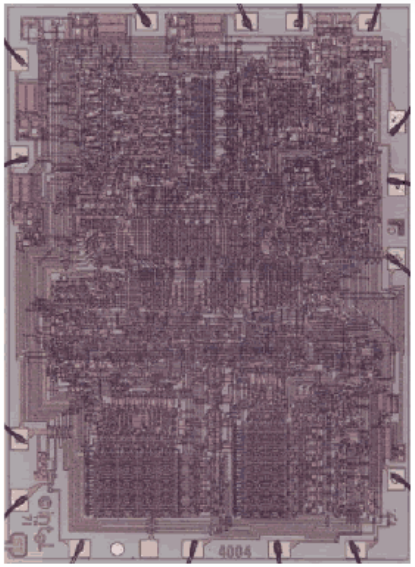
- increase of performance
- at the same price

Moore's Law

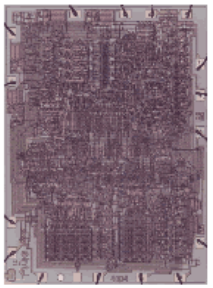




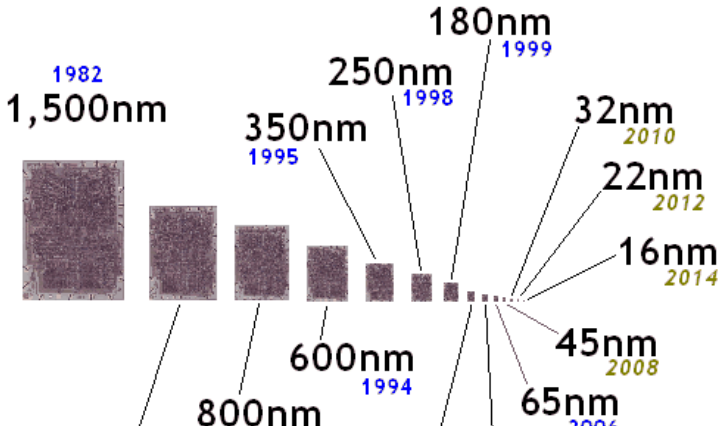
10,000nm
1971



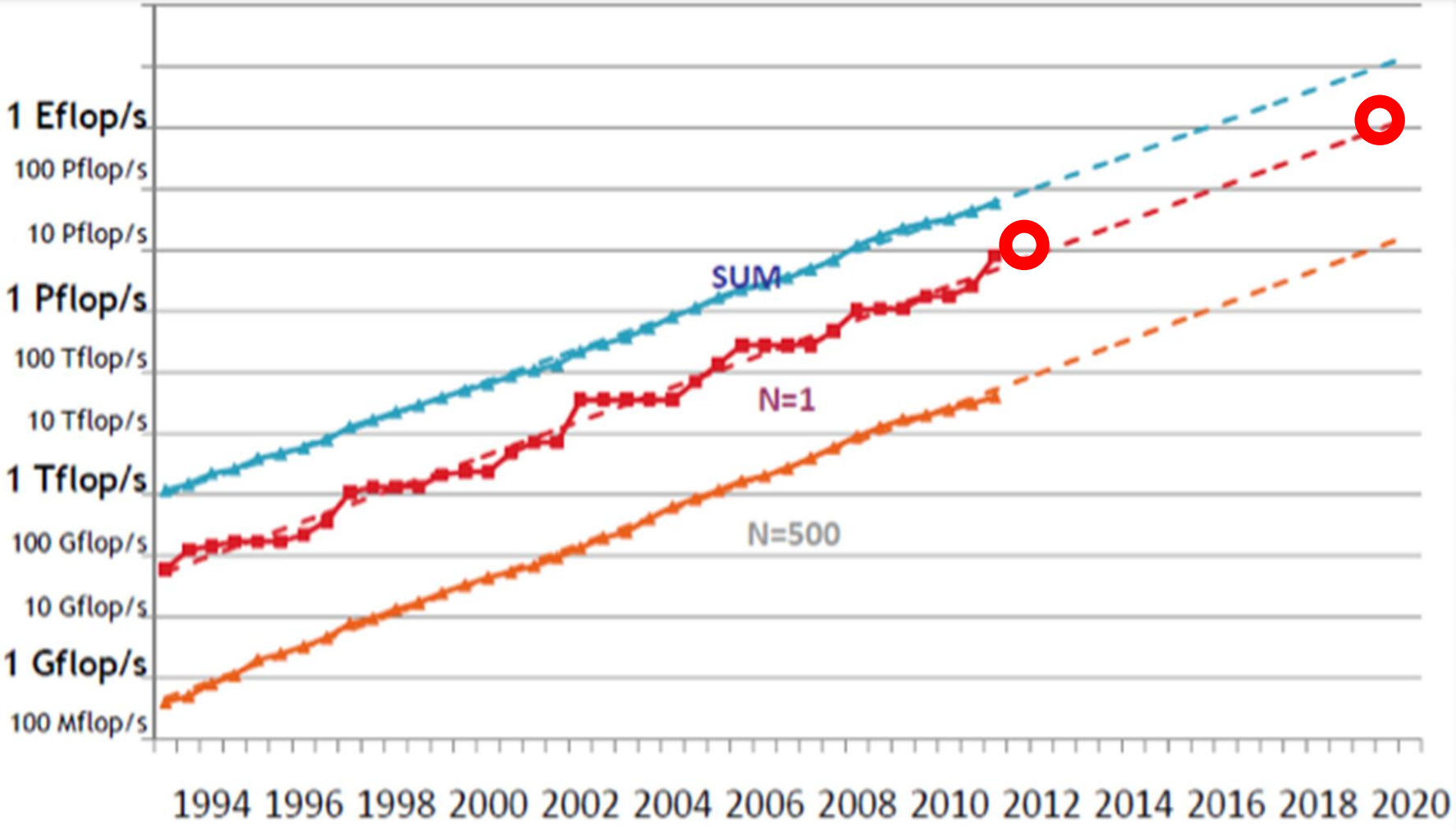
6,000nm
1974



3,000nm
1976

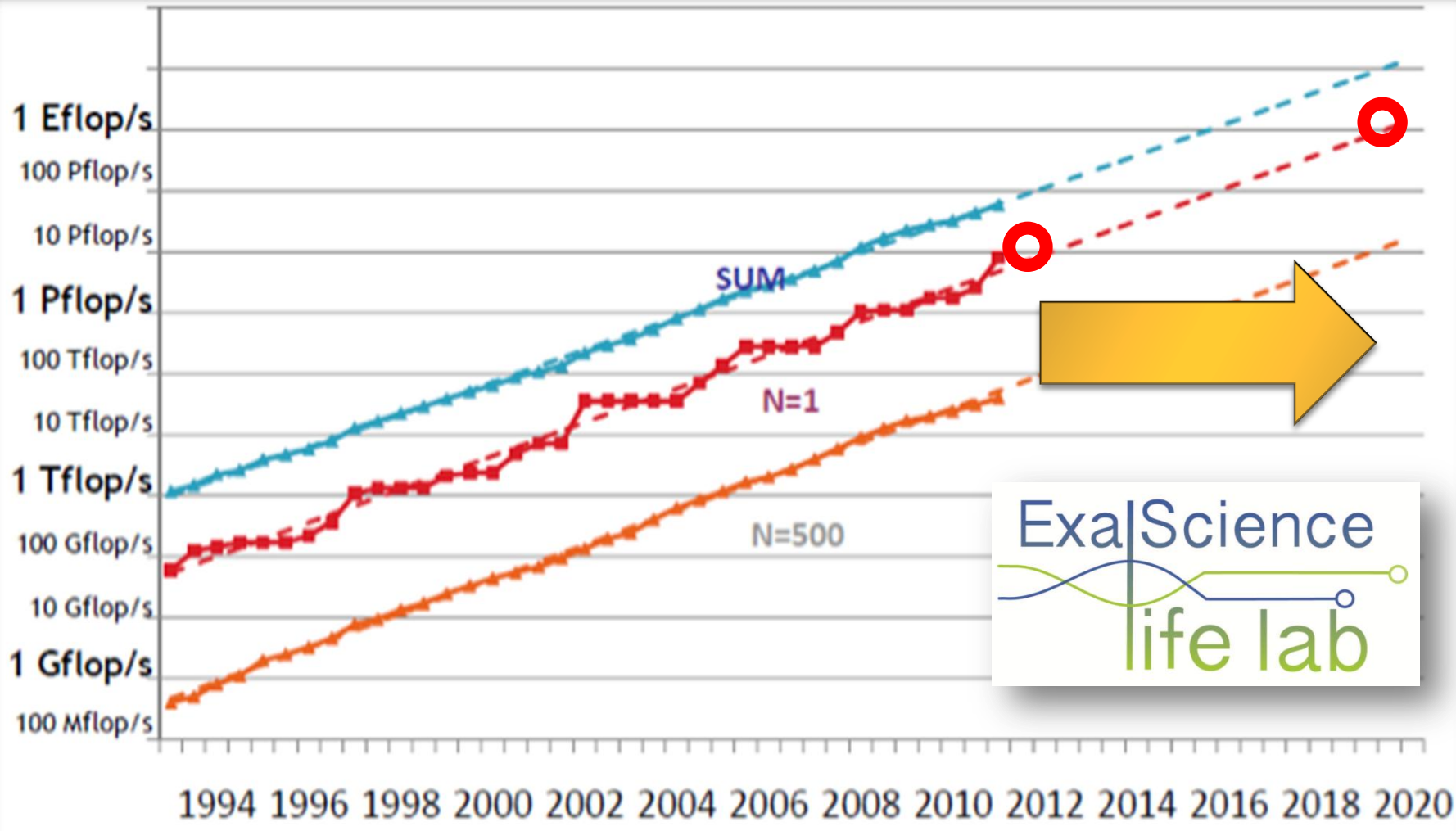


Projected Performance



TOP500 SUPERCOMPUTER SITES

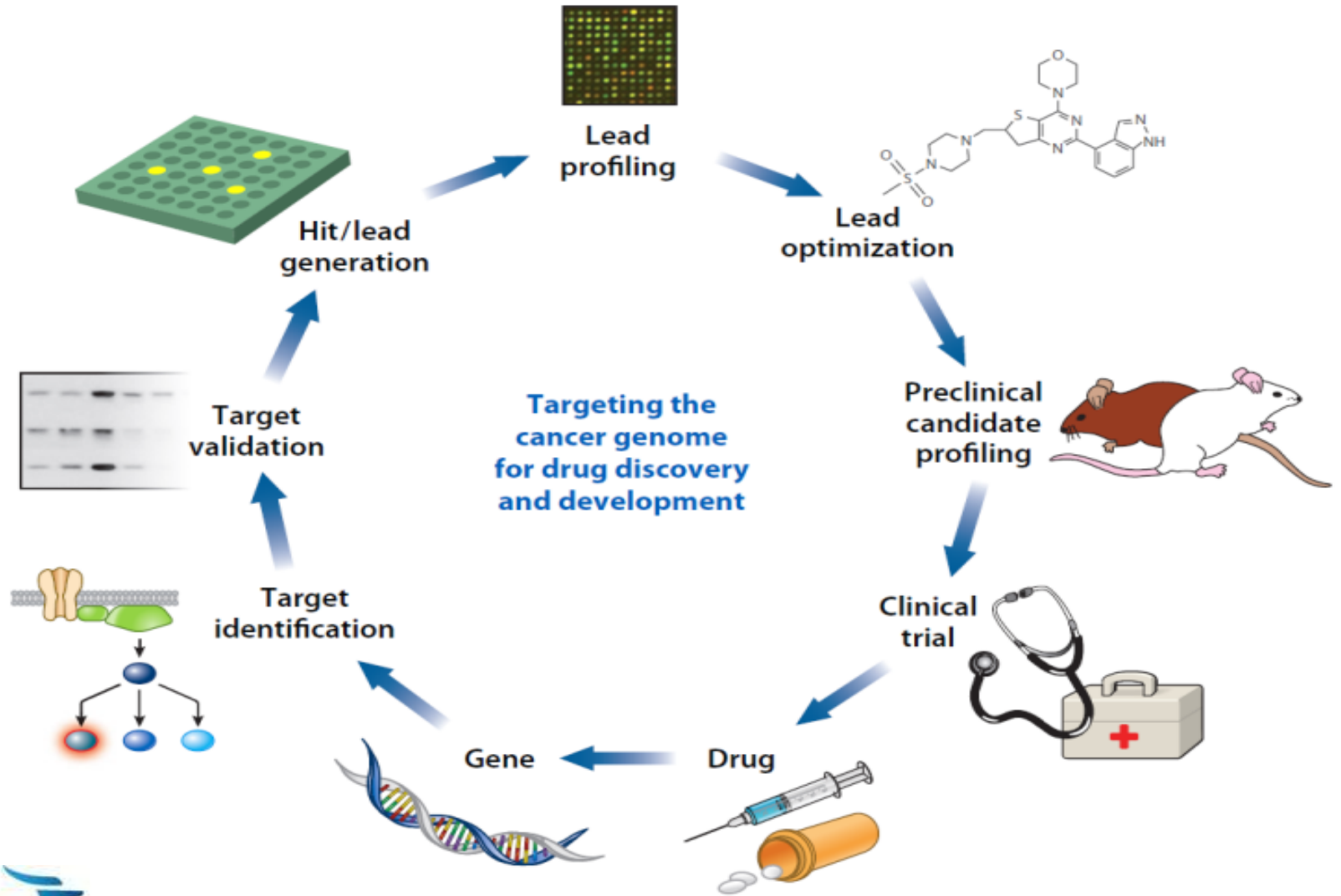
Projected Performance



ExaScience life lab

TOP500 SUPERCOMPUTER SITES

Targeting the Genome for Drug Discovery

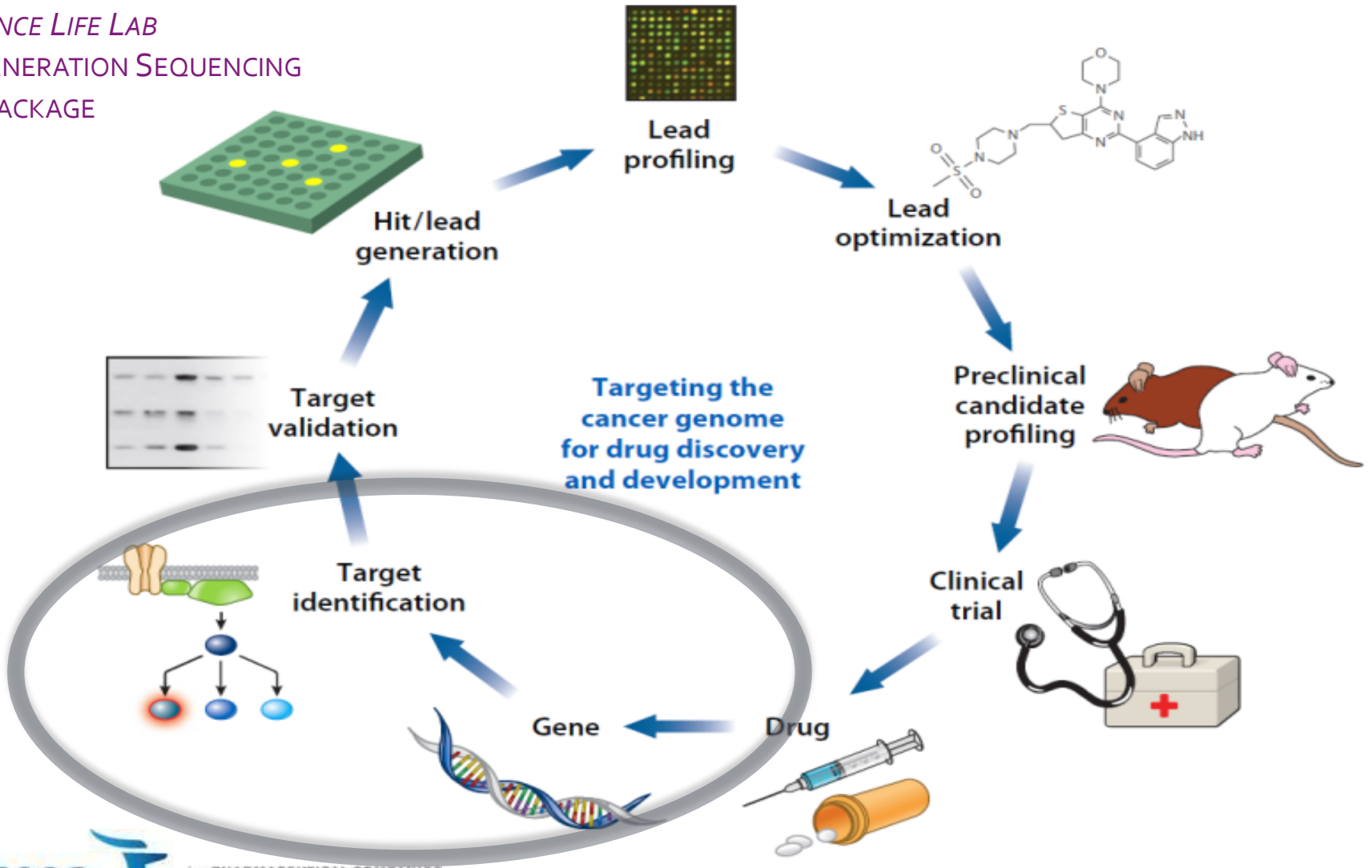


janssen | PHARMACEUTICAL COMPANIES OF Johnson & Johnson

Yap & Wolkman, Annu. Rev. Pharmacol. Toxicol. 2012

Targeting the Genome for Drug Discovery

ExaScience Life Lab
Next Generation Sequencing
Work Package



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Targeting the Genome for Drug Discovery

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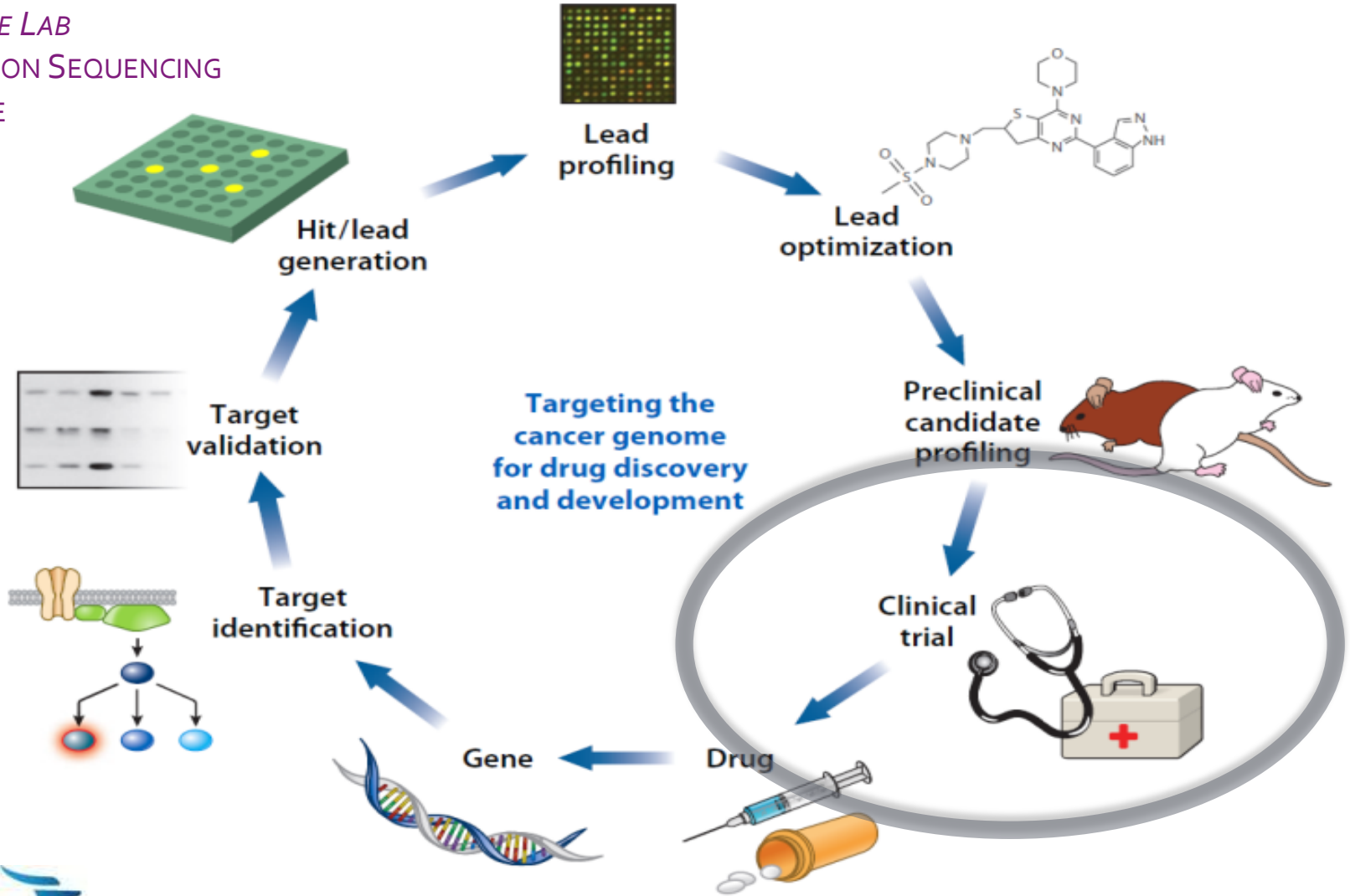
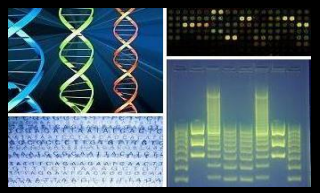


janssen | Pharmaceutical Companies of Johnson & Johnson

Yap & Wolkman, Annu. Rev. Pharmacol. Toxicol. 2012

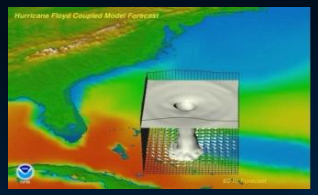
The ‘Missing Middle’

FSI

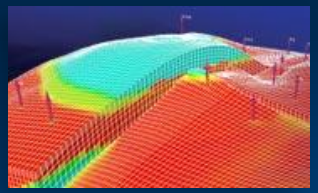


Life Science

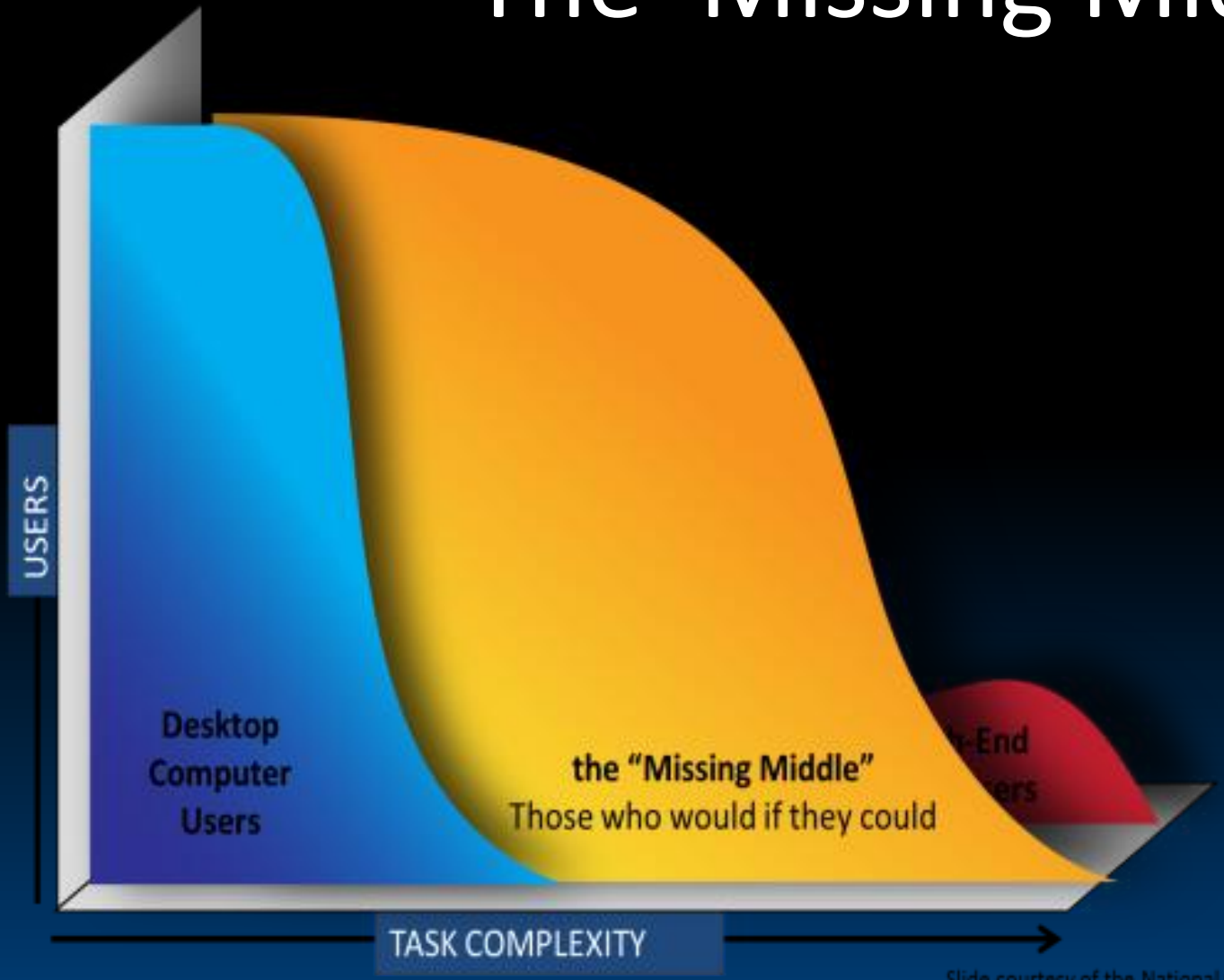
Manufacturing



Weather



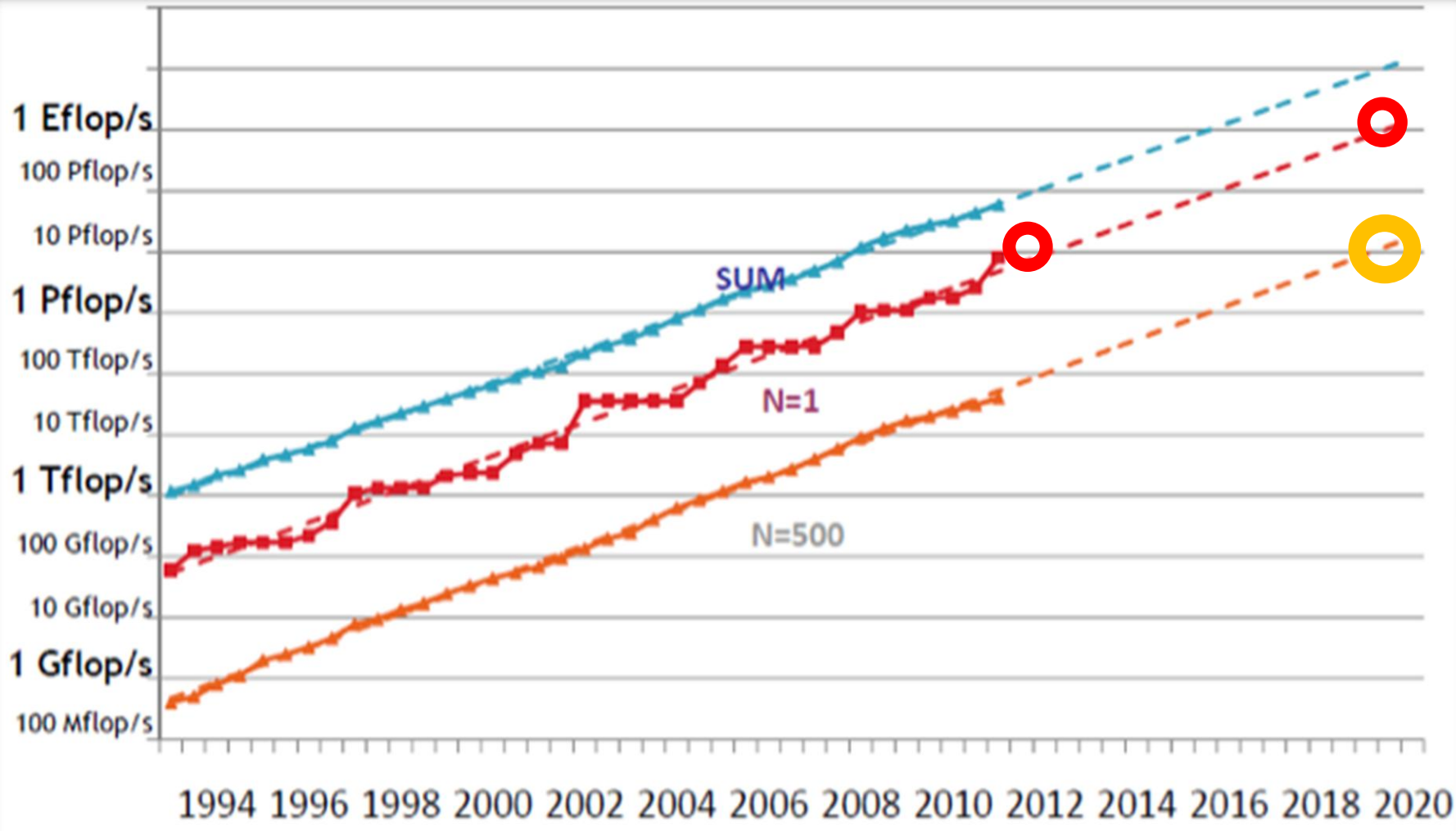
Energy



Slide courtesy of the National Center for Manufacturing Sciences

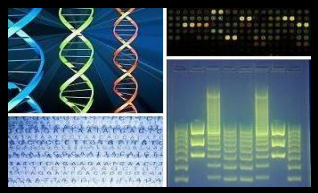
intel

Projected Performance



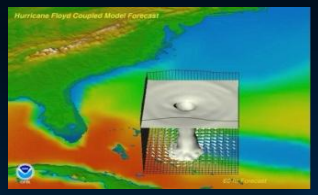
TOP500 SUPERCOMPUTER SITES

FSI

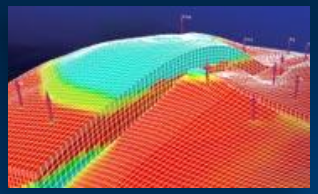


Life Science

Manufacturing



Weather



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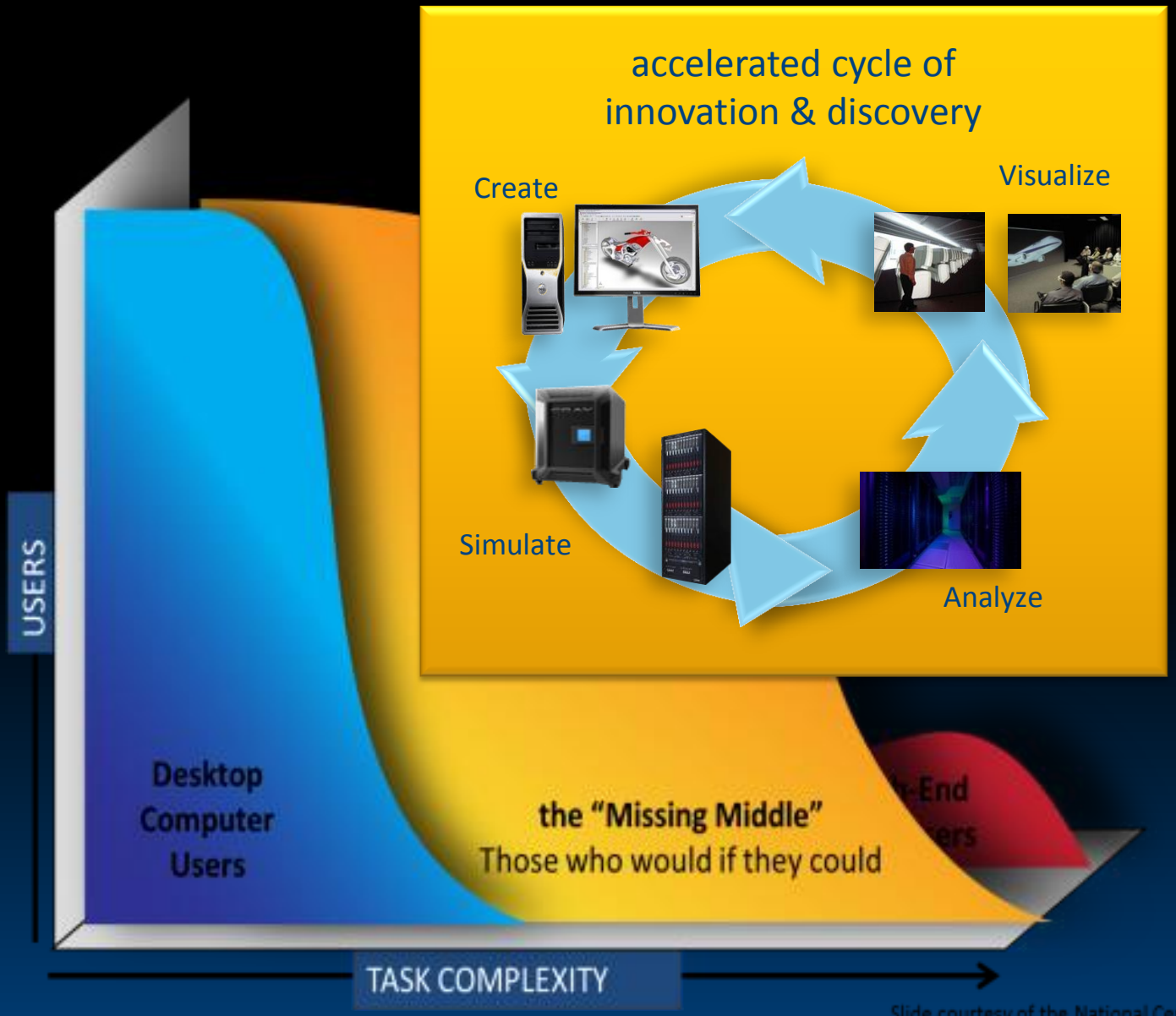


Slide courtesy of the National Center for Manufacturing Sciences

intel

Technology Outlook

Performance

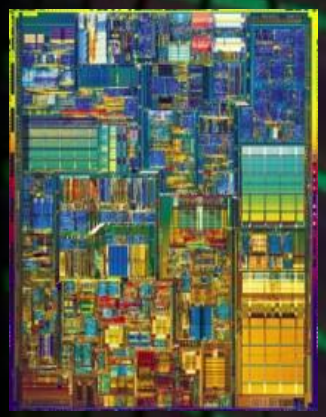
What's in it for ICT people ?

Moore's Law still applies, but …

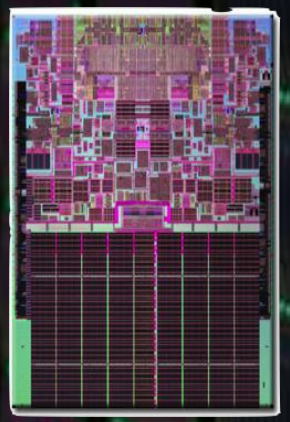
- CPU speed does not increase
- instead CPU speed decreases

Moore's Law is used to

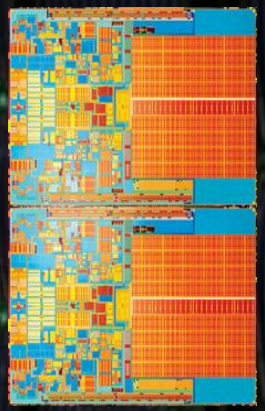
- add more cores into each chip
- cfr. dual core, quad core, …
- ex. Intel Xeon Phi : 240 threads



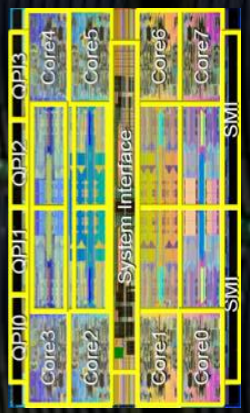
1 *core*
Pentium 3 Xeon
1999



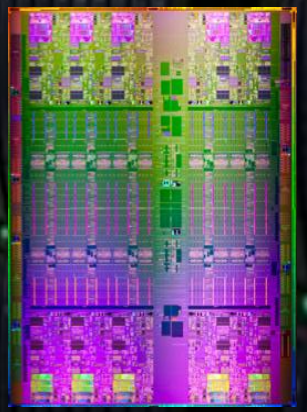
2 *core*
Xeon
2006



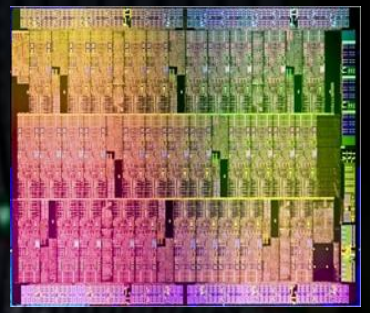
4 *core*
Xeon 52xx
2008



8 *core*
Xeon 52xx
2010



10 *core*
Xeon E7
2011



50+ *core*
Xeon Phi
2013

Technology Outlook

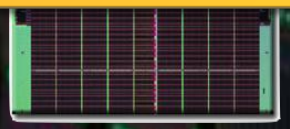
Performance

What's in it for ICT people ?

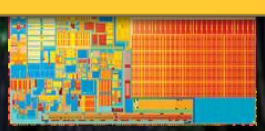
We will need to write

- Massively Parallel Programs
- Massively Distributed Programs

1 *core*
Pentium 3
Xeon
1999



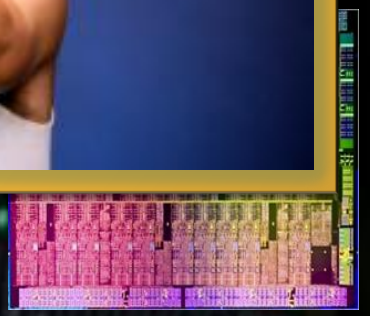
2 *core*
Xeon
2006



4 *core*
Xeon 52xx
2008

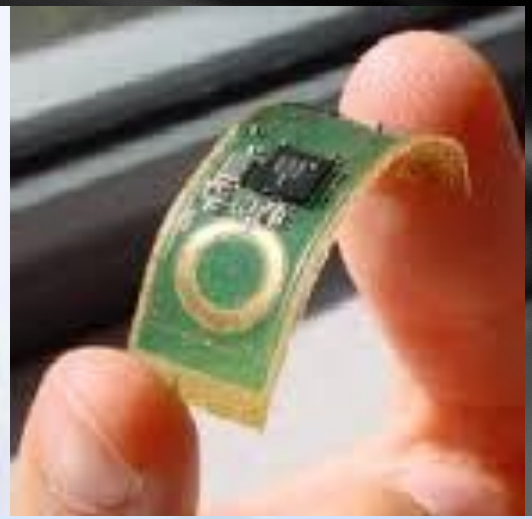
8 *core*
Xeon 52xx
2010

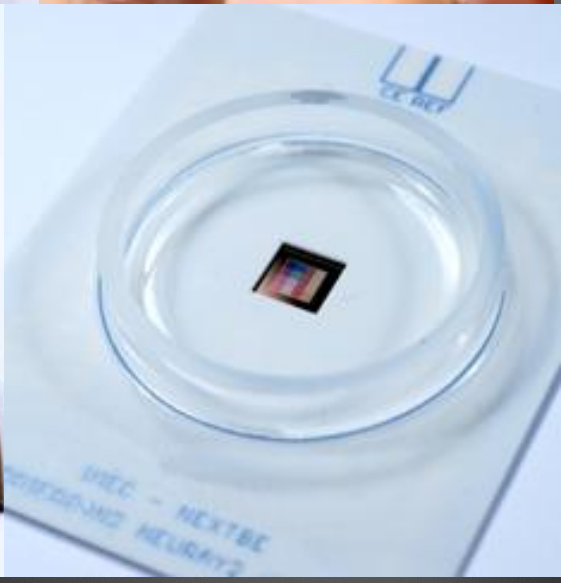
10 *core*
Xeon E7
2011



50+ *core*
Xeon Phi
2013

CMOS is also used to create new kinds of devices

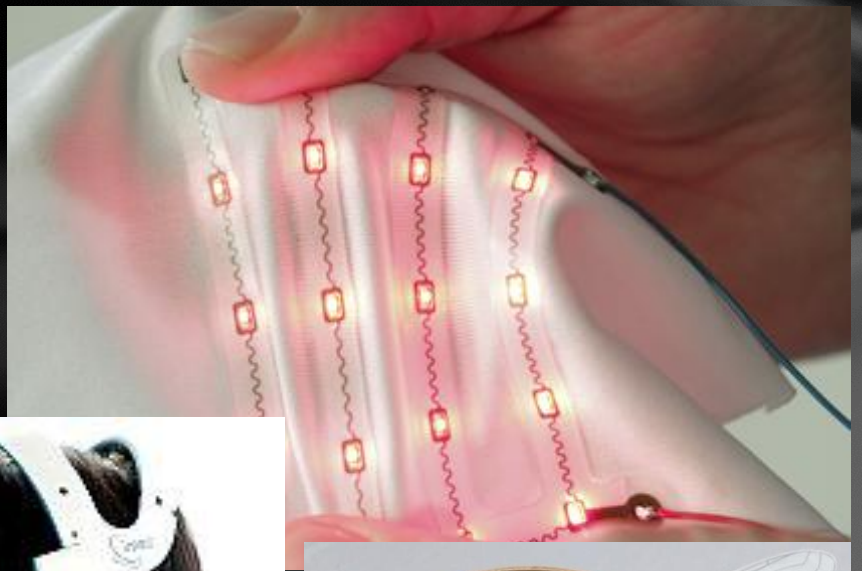




Technology Outlook

Smart Devices

What can we expect ?



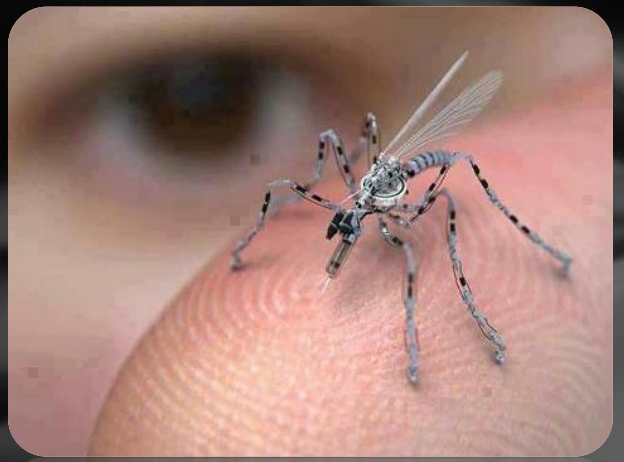
Technology Outlook

Smart Devices

What can we expect ?

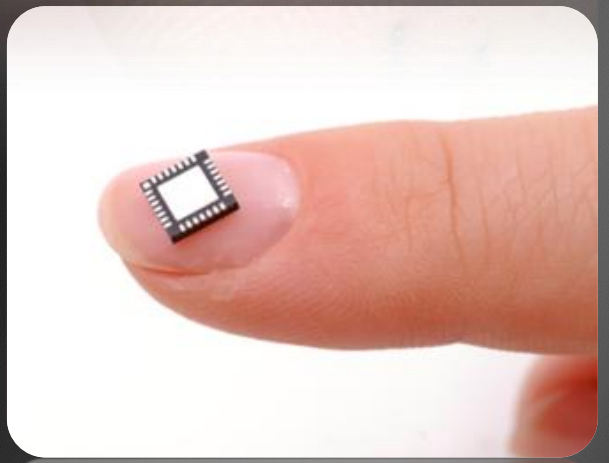
Smart Digital Devices become

- Small
- Cheap
- Printable
- …



Digital Devices will be everywhere

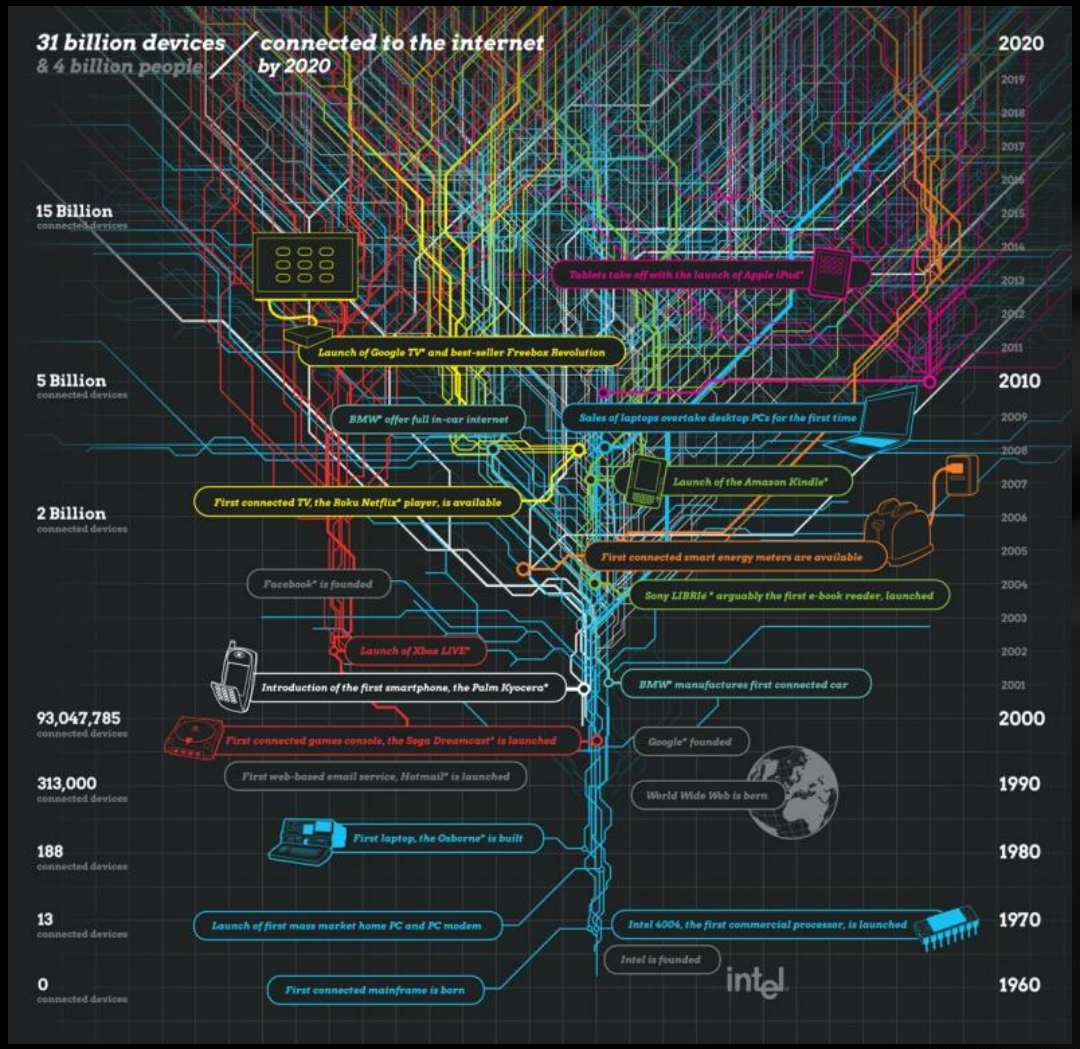
- in our house, car, bike, clothes, food, body, hair, …
- in new products
- in your products

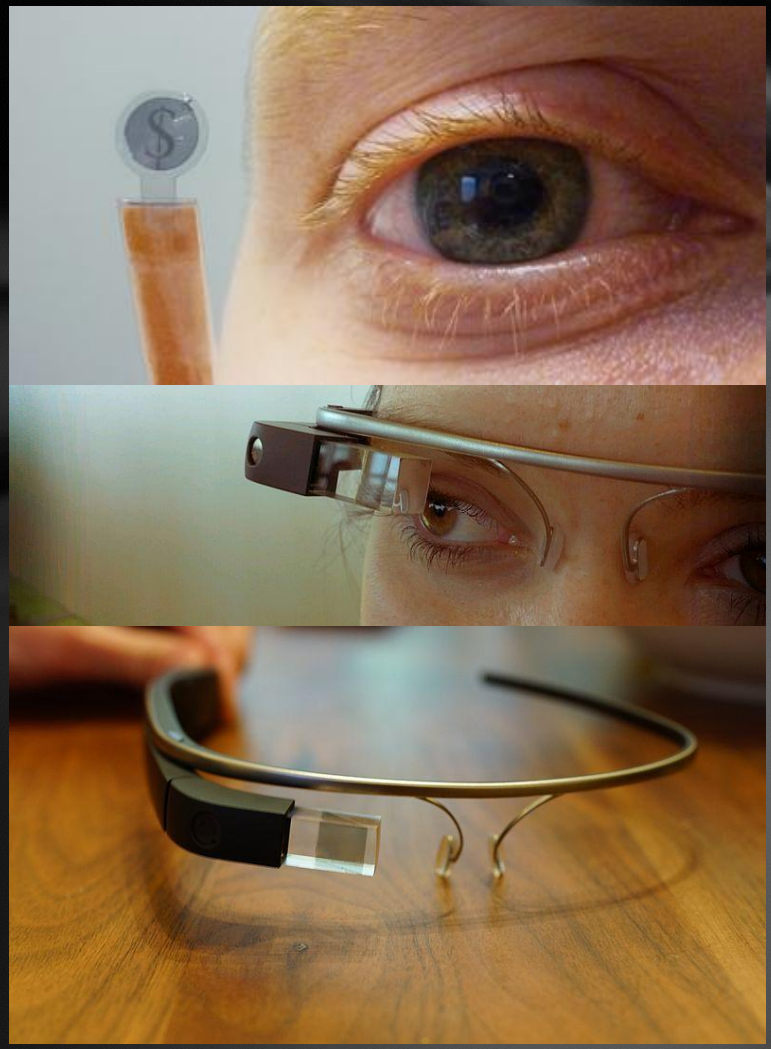


Technology Outlook

Smart Devices are online

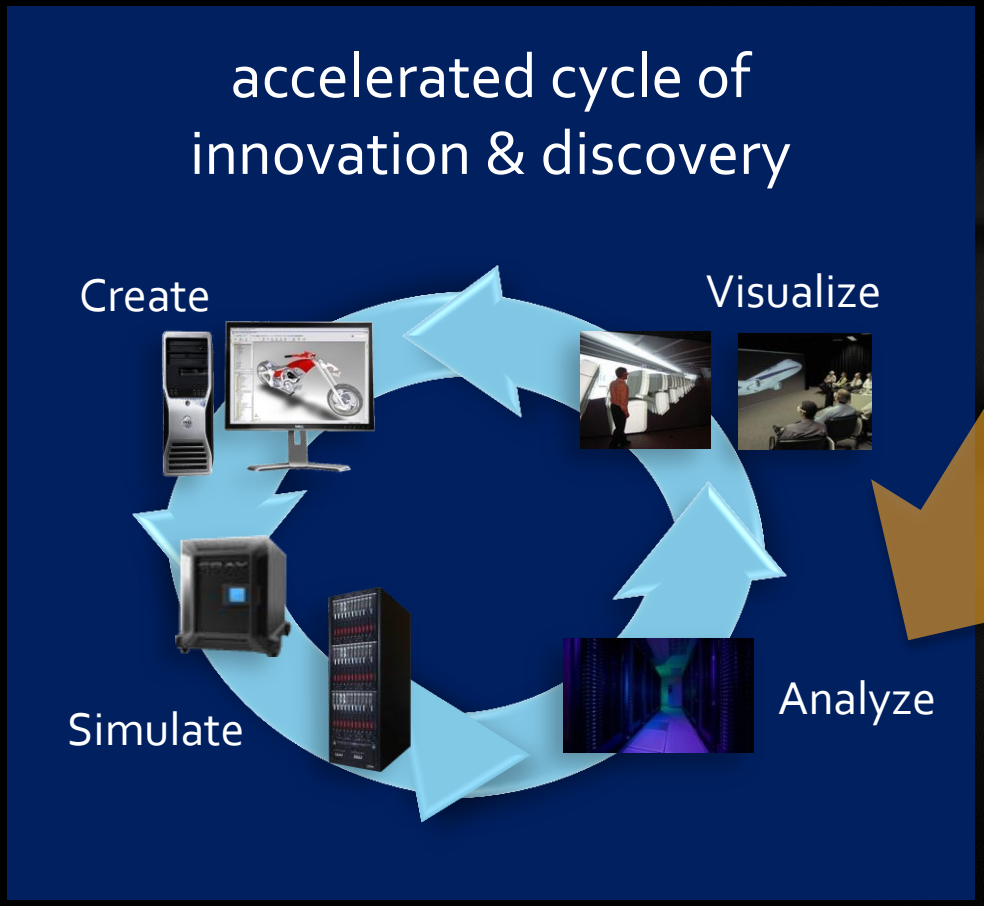
What can we expect ?





Technology Outlook

Smart Devices & High Performance Computing



Lots of Smart Devices will create a massive amounts of real-time *Big Data.*

High Performance Computing will help *Data Analytics* to do something with that data.

Digital Factory

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Technology Outlook

Smart Connected Devices

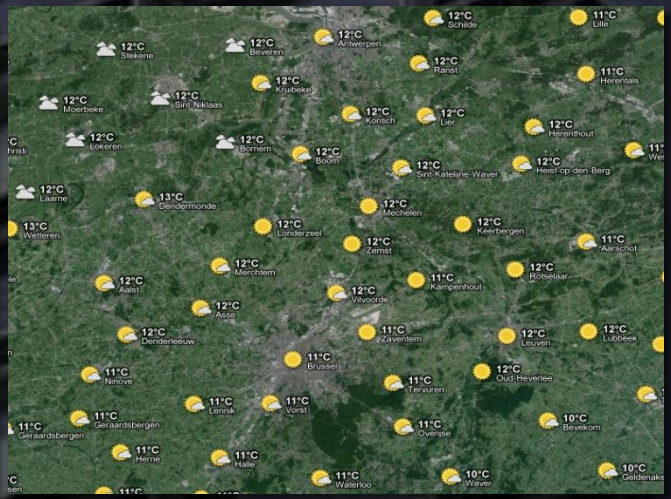
What does it mean for business ?

We will have an enormous amount of real time data / information about the usage our products.

We will have the ability to adjust/steer our products.

Will we move from products towards services ?

How can/will smaller companies benefit from technology ?



How to move forward ?

Hybrid Teams

an example

EXASCIENCE LIFE LAB

a multi-disciplinary team

Technology Outlook

supercomputers

How to get access to high performance computing today ?

Supercomputers become accessible for everyone

- VSC - *Vlaams Supercomputer Center*

Digital Factory

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