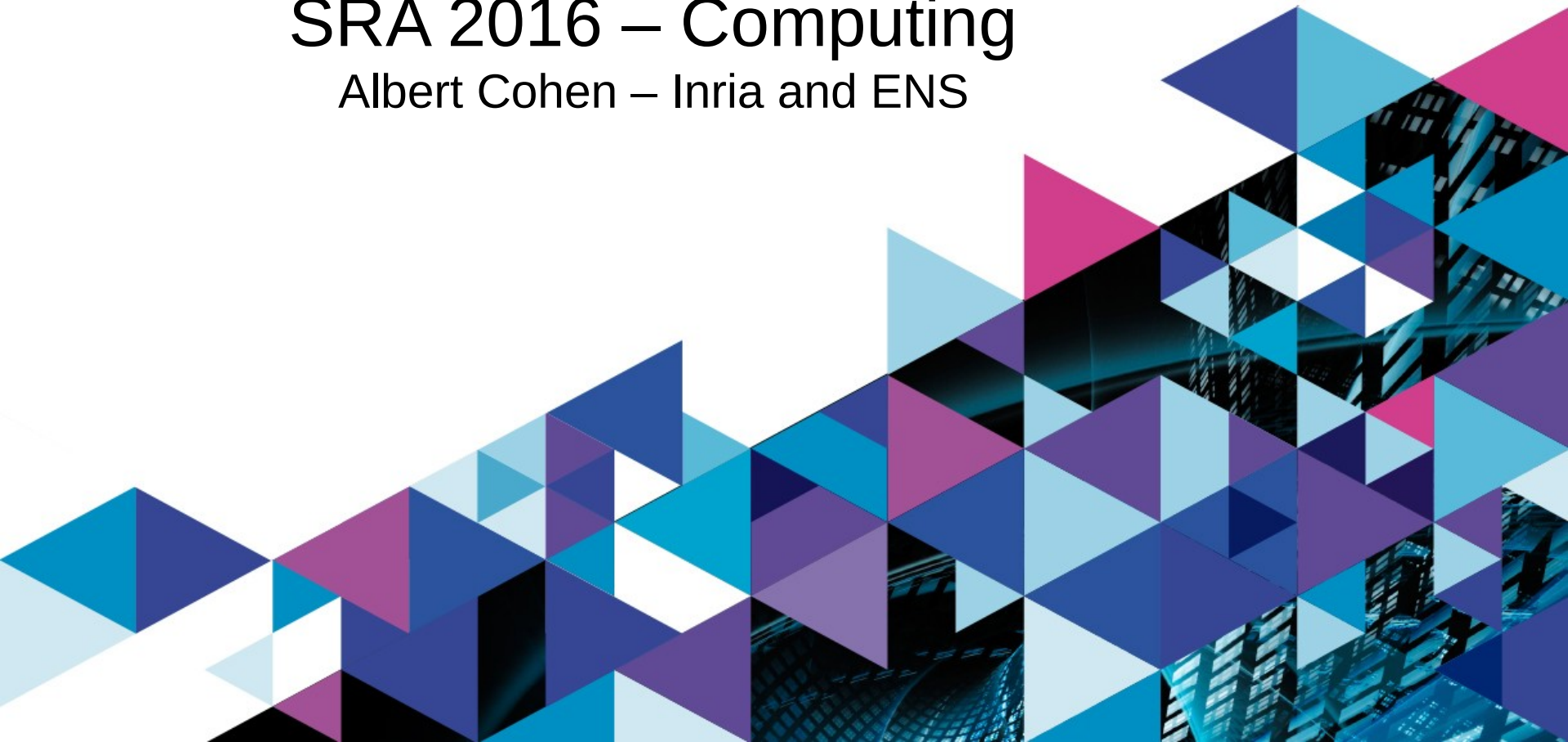




SRA 2016 – Computing

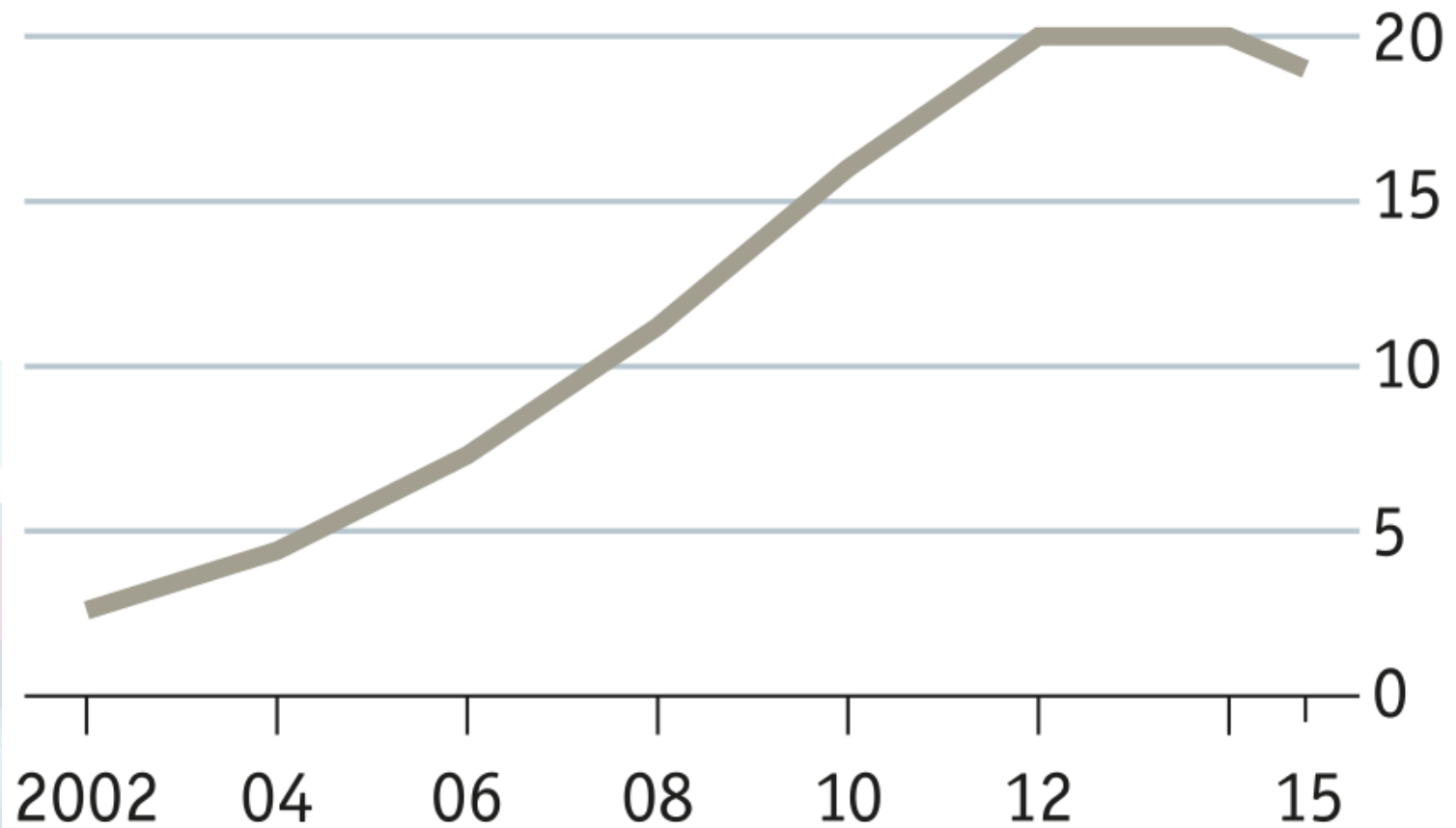
Albert Cohen – Inria and ENS



More than Moore



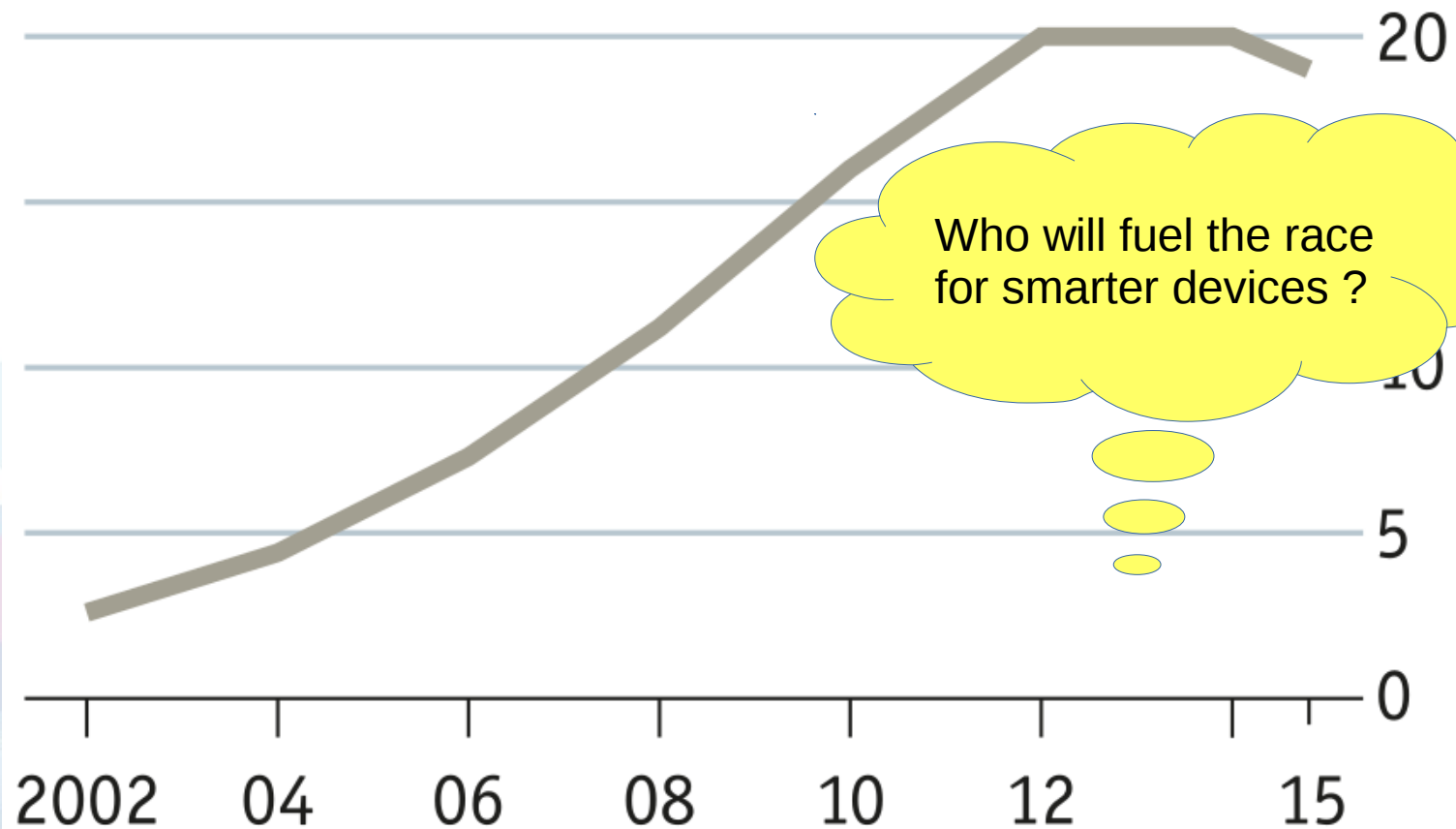
Transistors bought per \$, m



More than Moore - More Opportunities!



Transistors bought per \$, m

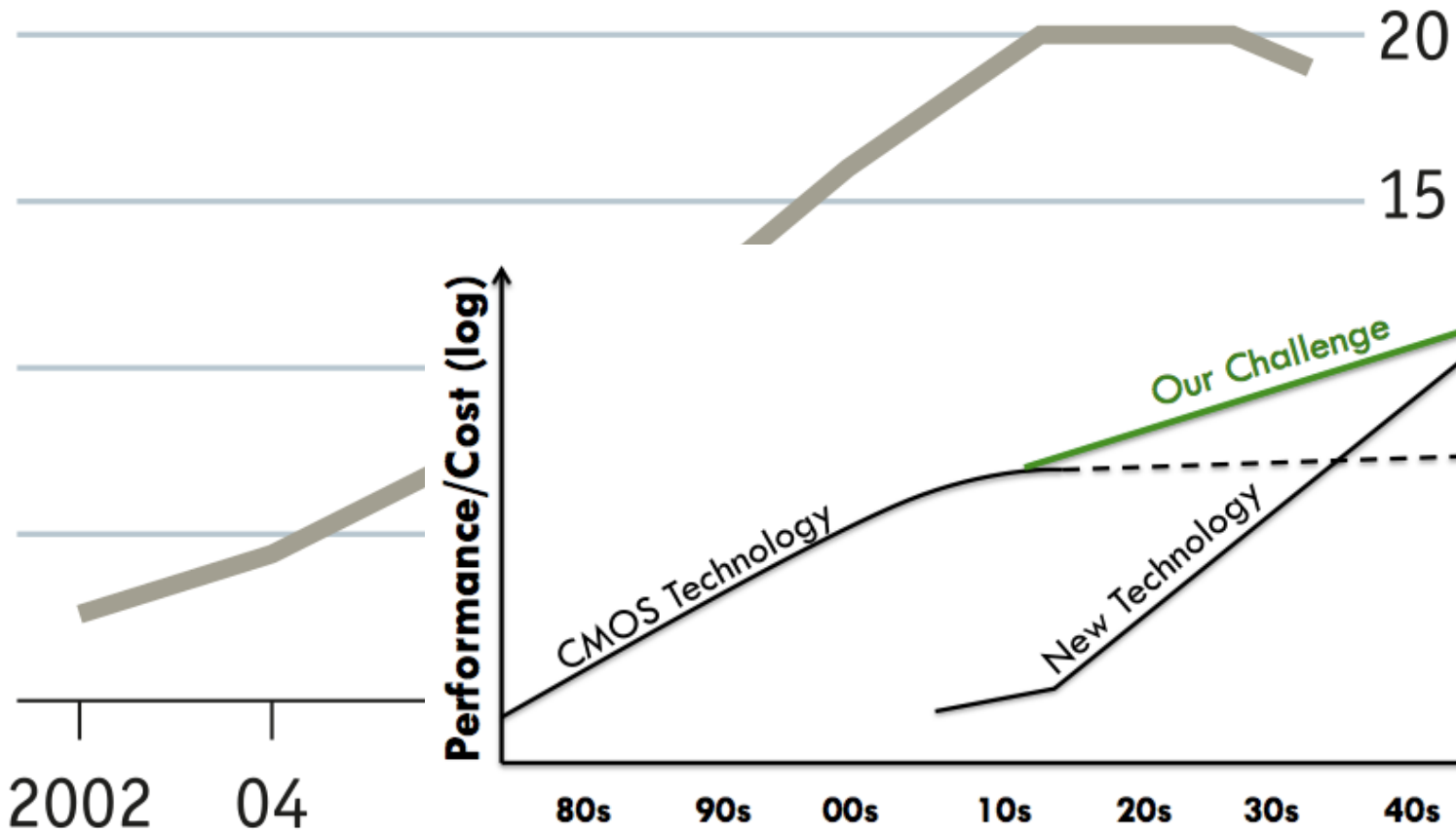


Who will fuel the race for smarter devices ?

More than Moore - More Opportunities!

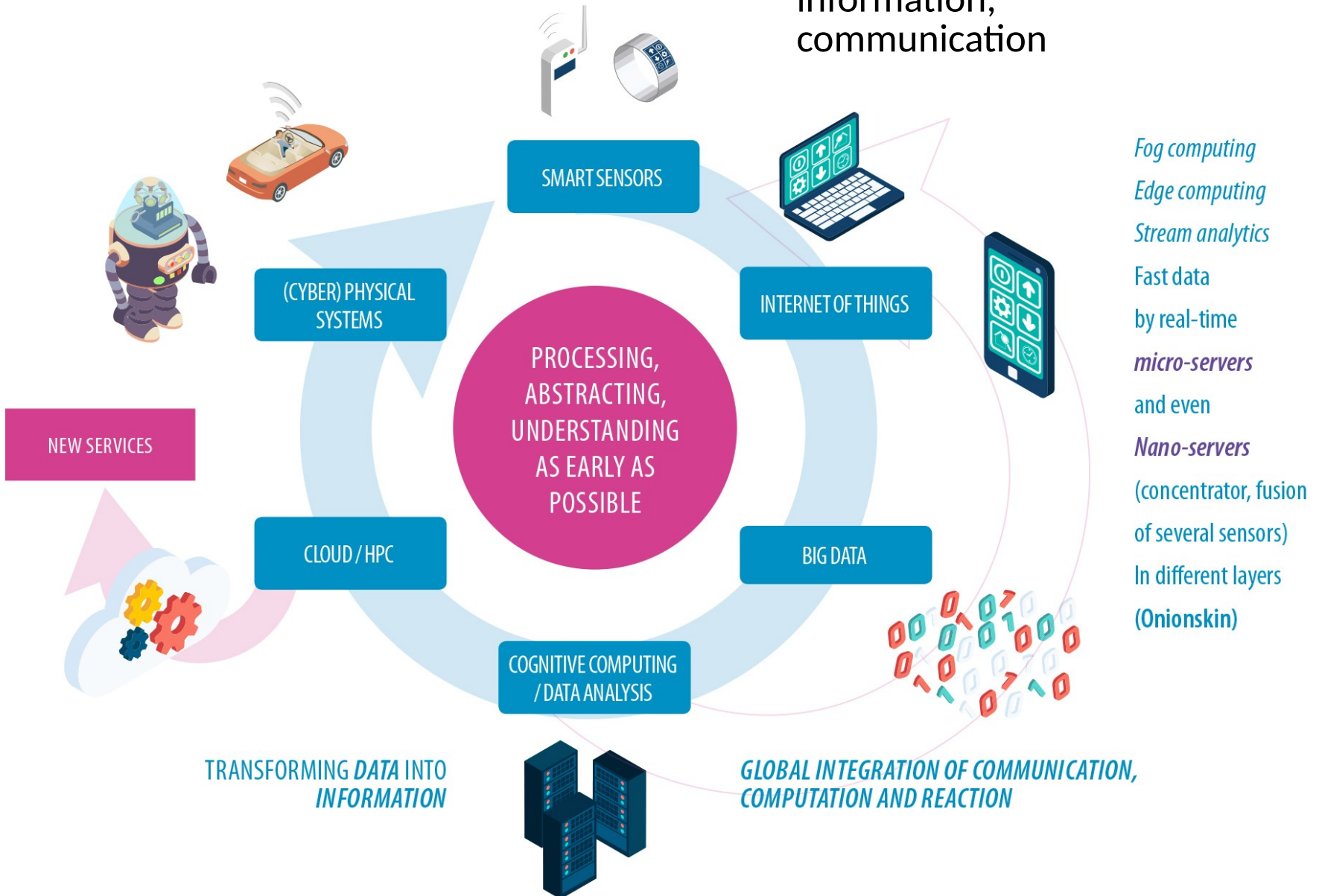


Transistors bought per \$, m



Smarter Devices?

convergence of reactive control, computation, information, communication



Smarter Devices?

convergence of reactive control,
computation,
information,
communication



Fog computing
Edge computing
Stream analytics
Fast data
by real-time
micro-servers
and even
Nano-servers
(concentrator, fusion
of several sensors)
In different layers
(Onionskin)

TRANSFORMING DATA INTO
INFORMATION

GLOBAL INTEGRATION OF COMMUNICATION,
COMPUTATION AND REACTION

Software Crisis



FACING A NEW SOFTWARE CRISIS AND ITS COURSE OF ACTION

- ‘ The major cause of the software crisis is that the machines have become several orders of magnitude more powerful! To put it quite bluntly: as long as there were no machines, programming was no problem at all; when we had a few weak computers, programming became a mild problem, and now that we have gigantic computers, programming has become an equally gigantic problem. ’

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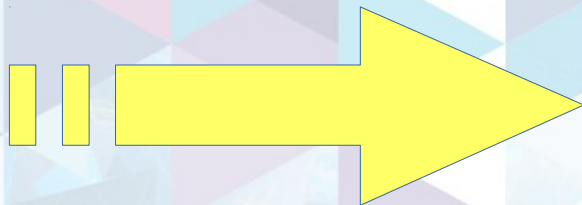
— *Edsger Dijkstra, The Humble Programmer [Dijkstra 72],*

The New Software Crisis

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Correctness challenge
Performance challenge
Data challenge
Holistic and interoperability challenge

Software Crisis – Opportunities



European
Excellence
in Cyber-
Physical
Software

Focus on high-productivity, high value software

- › Higher level, reactive programming languages
- › Correct-by-construction approaches
- › Ubiquitous parallelism
- › Ubiquitous distribution: elasticity, heterogeneity (edge/fog)
- › ‘Non-functional programming’: time, resources, faults...

Invest in tools and reference platforms:

larger businesses, virtually vertical organizations, and funding agencies need to understand the urge and value in supporting a sound ecosystem of tools and platforms

Develop new computing modalities in HW and SW:

dynamicity, adaptation, learning and reasoning, accuracy, trust, predictability, agile development... without throwing validation, verification, certification, quality away

And... engage into standards committees