



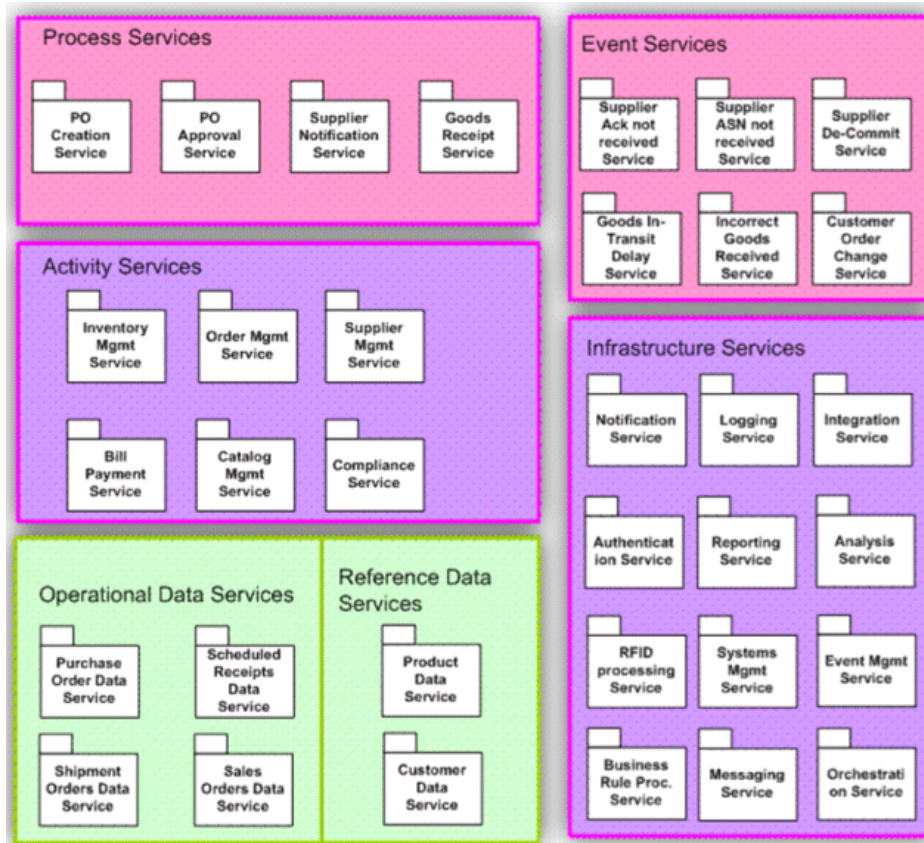
Systems Analysis and Specification

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**Hello
World!?**



Real-world software



not monolithic

possibly (likely?) distributed

continuously evolving

developed by a team

... And subject to many challenges!

Latency costs money



Every 100 ms of latency costs 1 % in sales



400 ms of additional latency to show 30 instead of 10 results decreases searches/user by 0.76 %

A lot of money...



in high-frequency trading, each ms is worth \$ 100 million per year

a technology firm spent \$ 300 million to realize
a straight line and shave 3 ms of the
communication time with the NASDAQ server

engineers add extra lengths of cables of a few feet
to equalize the runs among all algo-computers
inside the room with the central NYSE server

Go viral... not down



Realo.com

Wie de **site** zelf eens wil uitproberen, kan daarbij moeilijkheden ondervinden. Coppens benadrukt dat de site niet offline is gehaald, maar net problemen ondervindt door alle media-aandacht. De site zit namelijk nog in een testfase. "Maar we proberen de problemen zo snel mogelijk op te lossen."



Eiffel Tower's website crashed on March 31 when featured in a Google Doodle

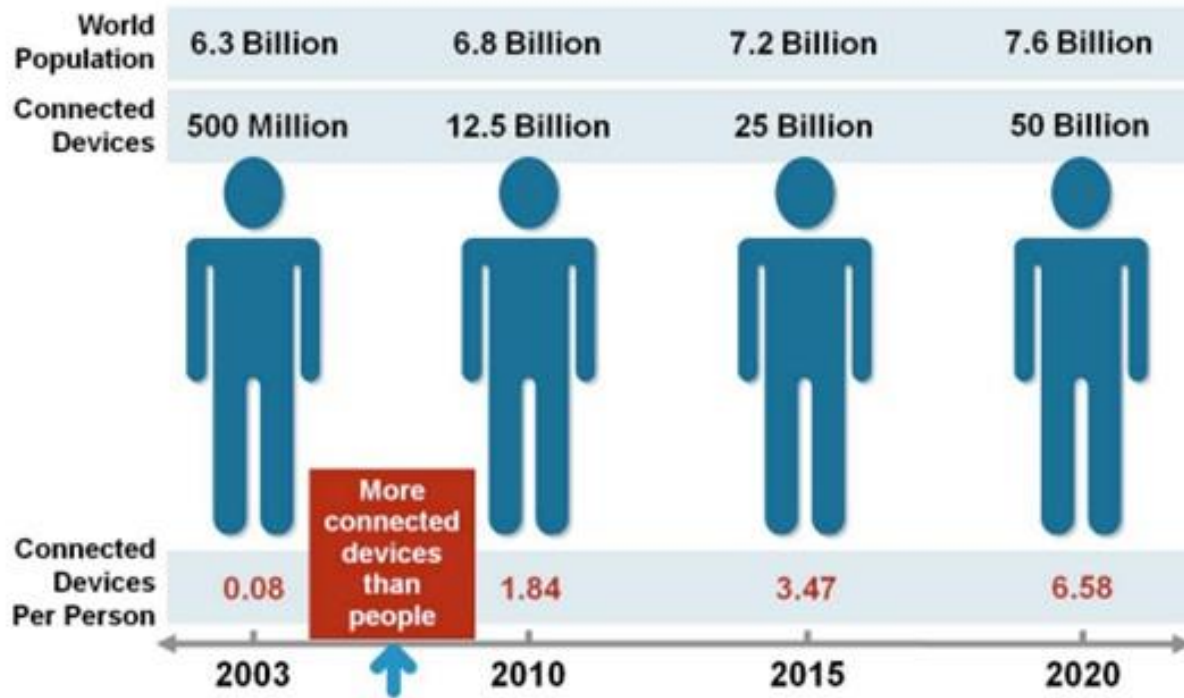
Undisciplined DevOps



Knight Capital Group stock

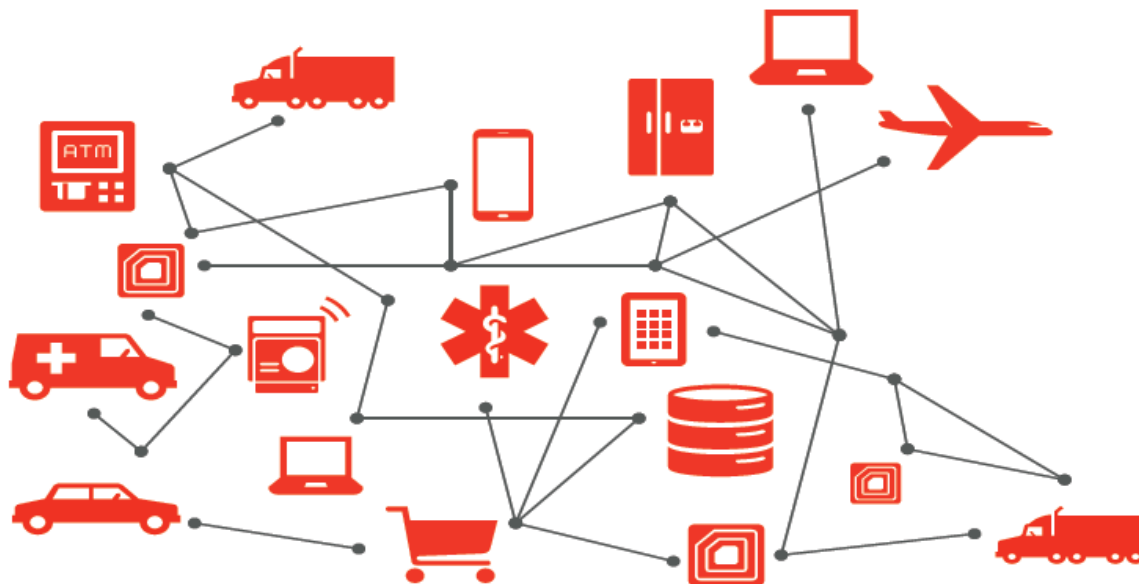


- Deploy new code in algorithmic router that sends orders into the stock market
- Update was intended to replace unused code in the order router
- Knight stopped using the old code in 2003
- Repurposed a flag formerly used to active the unused code
- New code was only copied to 7 of the eight servers, so one server executed the old code (flag repurposing!)



Connecting people and things has enabled new types of applications

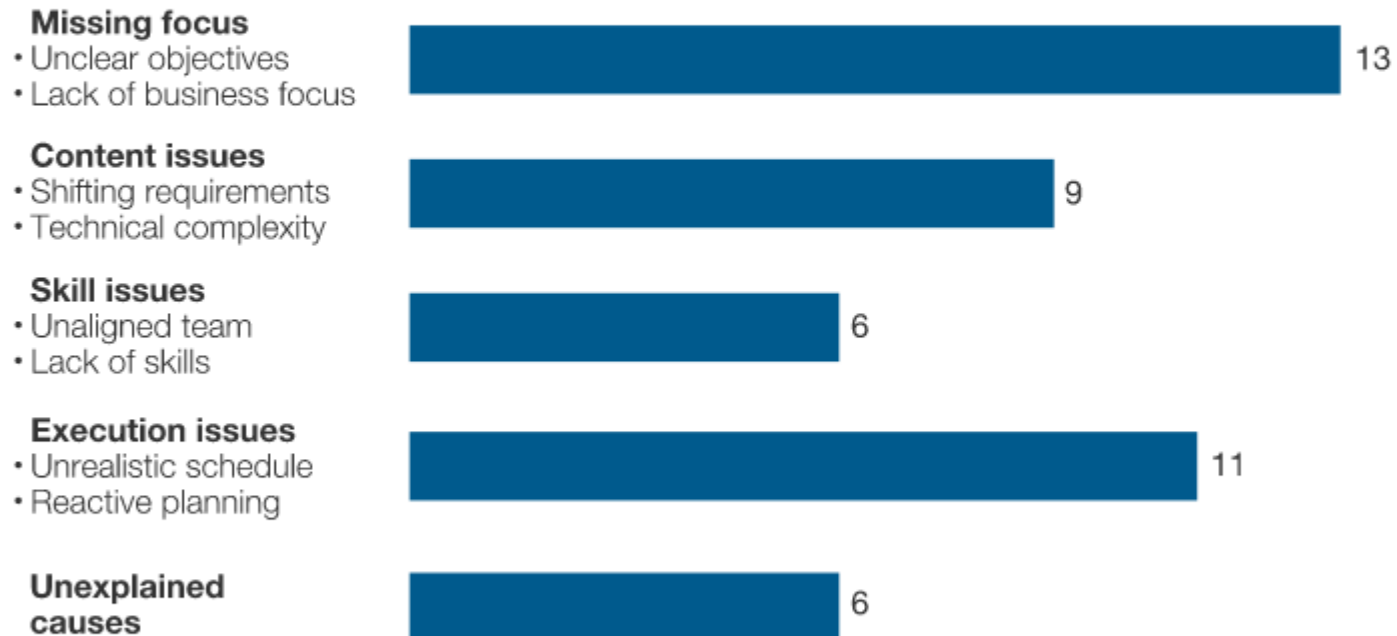
Big Data, IoT, mobile...



Deliver on time, on budget, on value

IT executives identify 4 groups of issues that cause most project failures.

Rough distribution by cause of the 45% of IT projects that experience cost overruns
(for those with budgets >\$15 million in 2010 dollars), %



IT projects with budgets >\$15 million

Cost overrun, 45%

Schedule overrun, 7%

Benefits shortfall, -56%

The programmer today...



business requirements
(latency, stability, world-scale problem)

skilled individual



Pick the appropriate tools:

- * cloud computing
- * big data processing and storage
- * ...



... in an organized team



Organize the work:

- DevOps
- Project Management
- ...

Systemanalyse en -specificatie

- Course content:
 - Central question: how to develop complex software?
 - Topics:
 - fundamentals of parallel and distributed computing
 - big data processing and storage
 - cloud computing
 - project management and software development
- Weekly, 15:45 – 17:45 @ B2.018
 - mixture of ex cathedra, lab sessions and guest lectures
- Exam
 - written