26th annual INCOSE international symposium

Edinburgh, UK

July 18 - 21, 2016

Faster is Better and Cheaper

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CGI

Introduction

- Theoretical Nuclear Physics (PhD)
- Systems Engineering in Storm Surge Barriers
- Software Reliability: TOPAAS
- Software Development Quality

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Versnellertunnel HERA
Boven de protonenversneller met supergeleidende magneten (rond), onder de eletronenversneller (rechthoekig)

Introduction

CGI: 5th largest independent IT and business process services firm in the world

65,000 professionals	**75%** shareholders	**95%** on-time, within budget delivery
400 locations	**9/10** client satisfaction score	**150+** mission-critical IP-based solutions
40 countries	**$10.3B** annual revenue	**$21.5B** backlog

Statistics verified as of January 27, 2016.

CGI

A strong local presence around the world

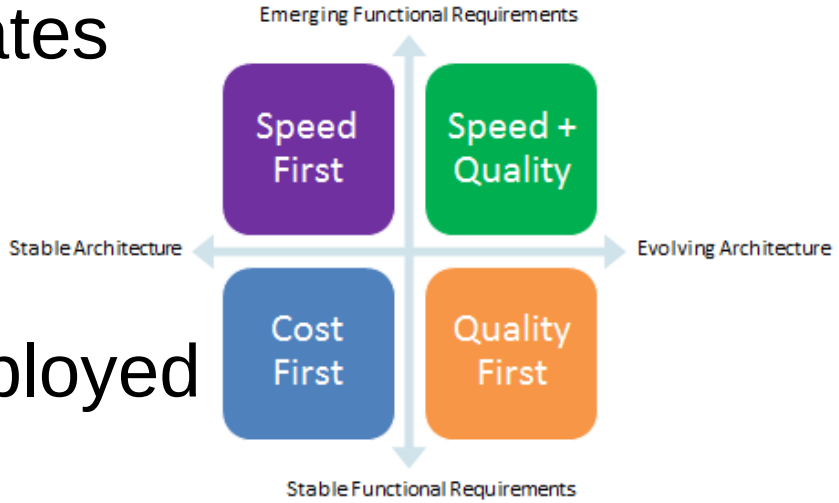
CGI

Agenda

- Need for Speed
- The nature of Software
- Enablers of speed/ Sources of Waste
- A management view
- A (systems) engineering view

Need for Speed

- Requirements
  - Competition is faster
  - End users demand updates
- Software
  - provides changeability
  - provides value when deployed



The Nature of Software

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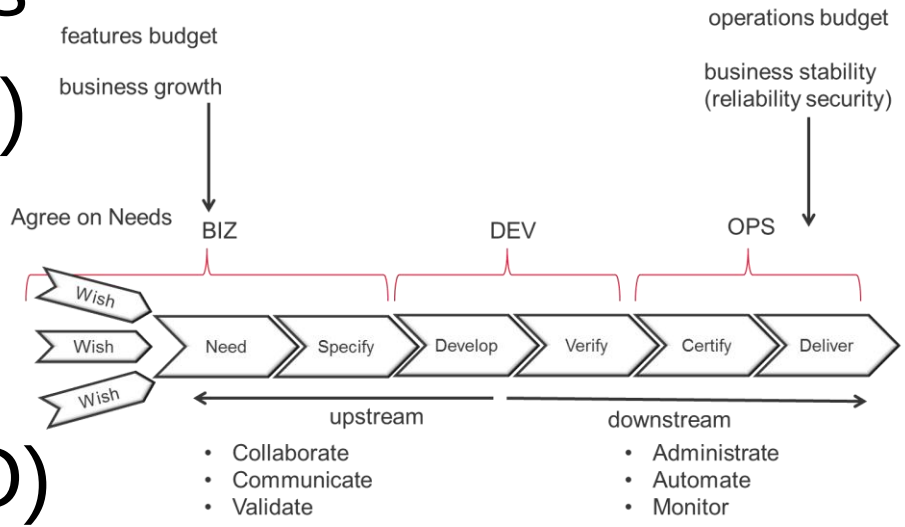
- Software itself is Worthless
  - functionality provide by platform + software
  - adaptability provided by platform, development process, software structure, team, tools
- Software Production Factory?
- Software Production Art?

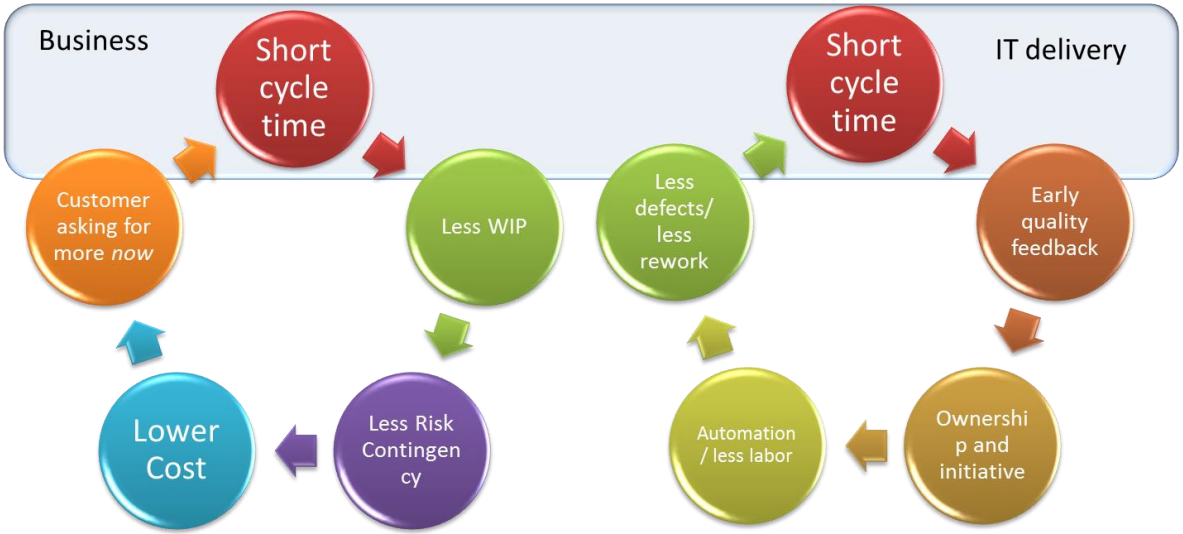
Enablers for speed

- Frequent integration
- Build in small pieces
- Collaboration (Agile)
- Automation (Tools)
- Apps/Services
- Full Life Cycle (TCO)



A management view

- Focus on Speed is sustainable
- monitor:
  - ownership
  - quality
  - cost



An Engineering View

- Innovate (if you do what you did ....)
  - balance proven methods with experiments
- Think ahead: how far? (You ain't gonna need it...)
  - reversible decisions
  - focus on structure and guidelines
  - architecture runway, just enough anticipation
- Gates: Impediments or Safety measures
  - judged by deep software craftmanship

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Software Craftman-mindset

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- Software Engineer 3.0:
  - Software has effect on world via hardware (embedded sw and websites alike!)
  - Works mainly in problem domain
  - Aware of two levels
    - design of work process
    - adhere to work process

Agile/ DevOps: Practices

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SE (handbook) describes processes.

Processes have implicit knowledge

Hard to extract, translate to other context

Practice = general solution to general problem, contains more explicit knowledge.

DevOps and SE: Practices

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Technical Process	**Success Factor**	**Agile/DevOps Practice**
Business or Mission analysis	Business Goals are clear and understandable	*Business and development work together* in clarifying goals
Stakeholder needs & requirements definition	Stakeholder needs and requirements are clear and understandable	*Face to face communication* combined with *full responsibility* delivers strong focus on real needs (as opposed to wishes that may not be used)
System requirements definition	System Requirements are unambiguous.	*Test driven development* ensures testable system requirements.
Architecture definition	Frame stakeholder concerns with solution options to guide the delivery	Implementation of the *just enough anticipation* principle provides the vehicle for architecture decision making.

Closing Remarks

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- Business Agility asks for flexible organisation and less process rigidity
- Upfront design and quality gates need their equivalent in the fast changing world
- Store Crucial knowledge in practices for use by the next generation of engineers