Aalto University
School of Science

Service Engineering Analytics in Hybrid Computing Systems of IoT, Big Data and Clouds

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Real applications and systems

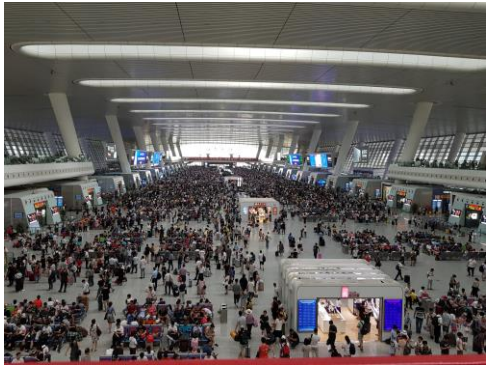
Realtime sport analytics

Geo Sports: Picture courtesy Future Position X, Sweden

Traffic monitoring & management

Source: http://english.vietnamnet.vn/fms/society/149411/transport-minister-vows-to-wipe-out-traffic-congestion-in-vietnam.html

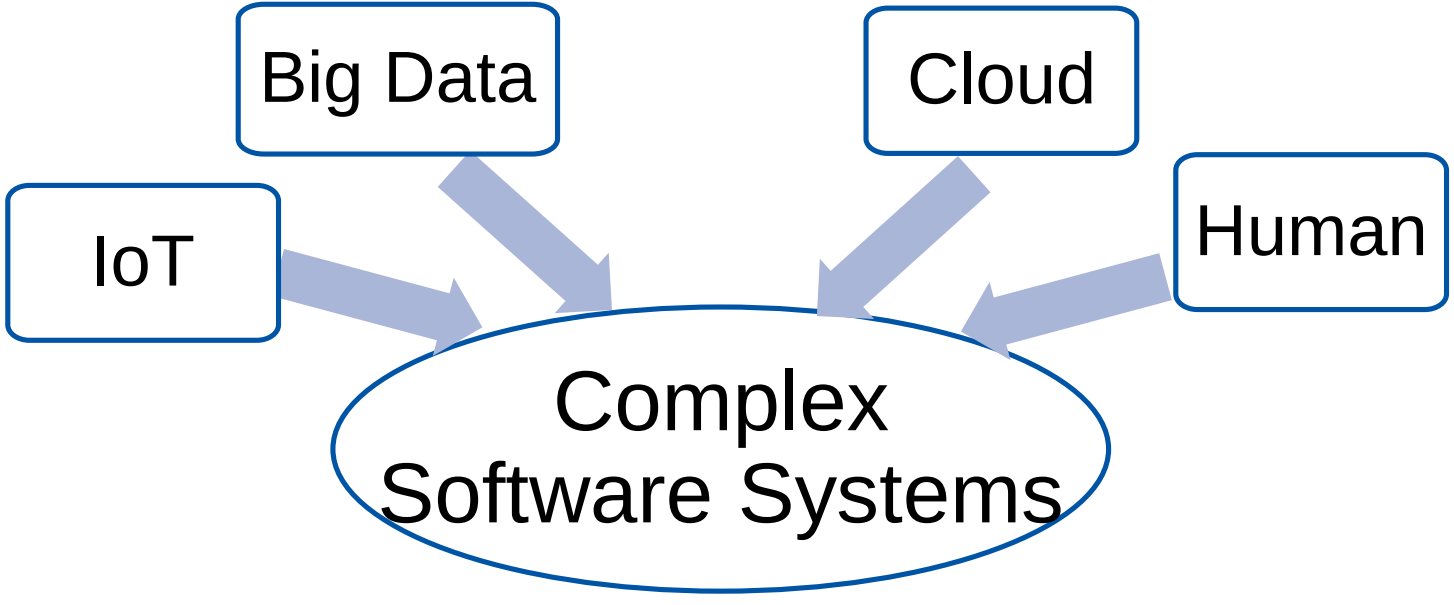
Enterprise services & digitalization



Customers waiting for boarding trains in Hangzhou

Challenging to develop and operate them

Solving complex problems with hybrid and diverse capabilities

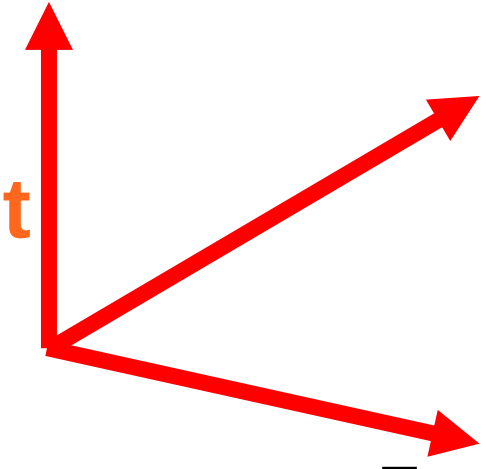


How to optimize the development and operation of such software systems?

Hybrid Computing Systems

- **Abstract computing, sensing, data, network and analysis *capabilities as services***
  - Utilize constrained-to-powerful machine and human capabilities
- **Design and build software systems with hybrid computing service units**
  - Hide low-level details and enable dynamic software systems

Application requirements



Services, systems & infrastructures

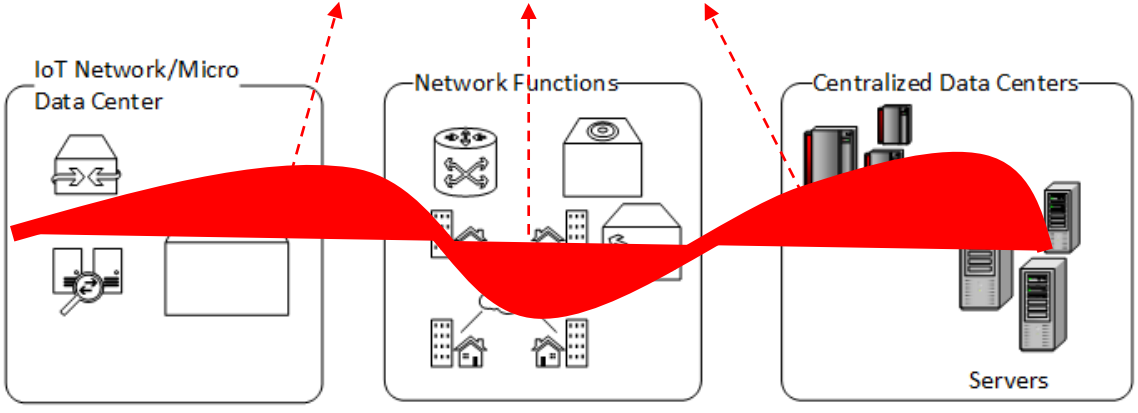
Engineering methodologies

Responsive, Elastic & Resilient HCS need novel Service Engineering Analytics

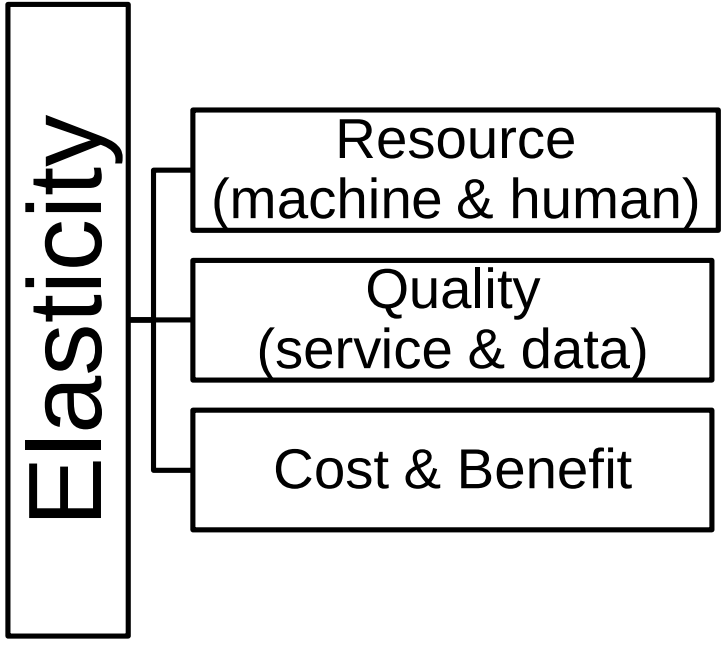
Resource ensembles from hybrid capabilities

Ensemble ={Resource slice, Requirements, Metrics, Policies, ...}

Resource slice of services



Multi-dimenstional elasticity brings many applications



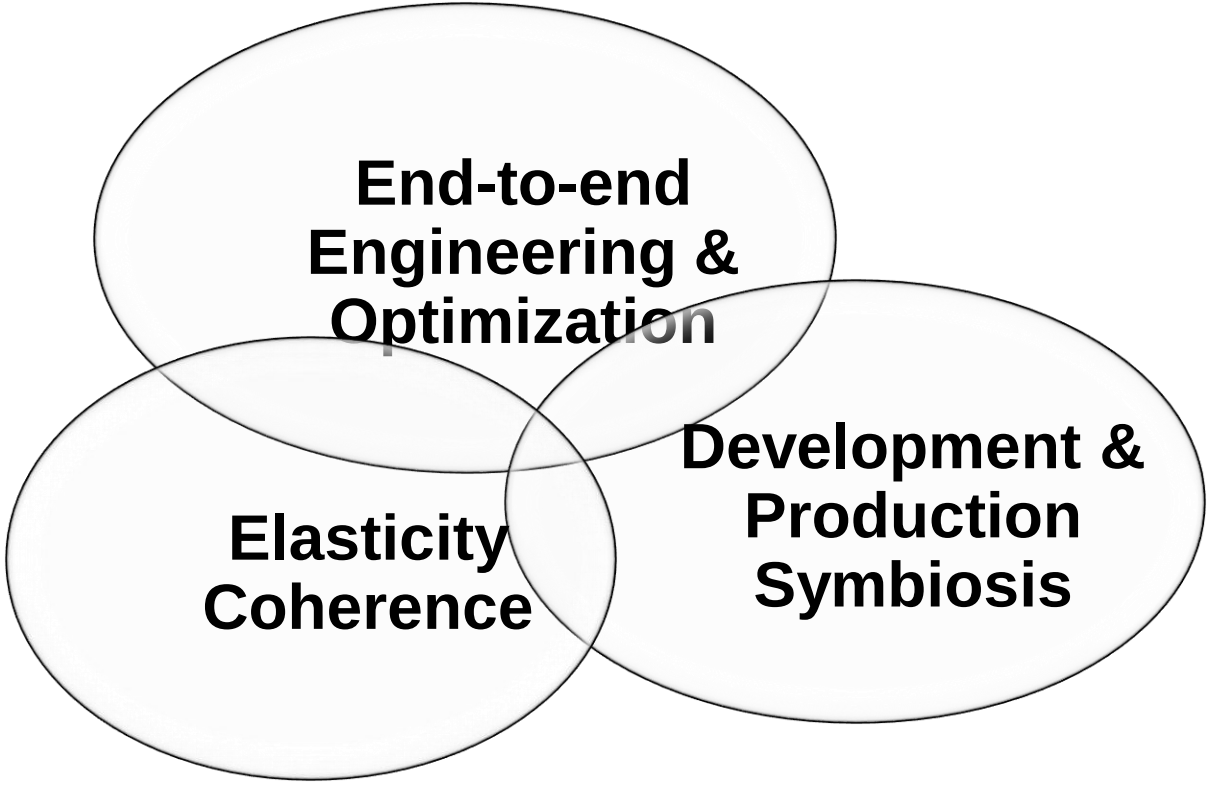
empower

- **Quality of analytics**
- **Software-defined capabilities**
- **Application-specific resource ensembles**

Understand uncertainty and incidents

- **A W3H deep analytics model becomes crucial**
- What, When, Where and How for uncertainty & incidents in big systems
- End-to-end integrated with software engineering processes

New engineering principles



Service Engineering Analytics outlook on Hybrid Computing Systems

- **Characterization & service models of hybrid software systems**
- **Instrumentation, monitoring, measurement & benchmarking**
- **Analytics models, techniques & algorithms**
- **Ensemble as a Service**

Thanks for your attentions!

Acknowledgment: my many collaborators and students for contributing to the research mentioned in this talk