Adaptive 2020 Track

ESES: Evolving Software Ecosystems and Services

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Related background

- Head of research group: Software Engineering & Formal Methods
- Vice-head of research group: Security & Privacy
- Research areas:
  - Formal Methods in Software Engineering
  - Artificial Intelligence in Software Engineering
  - Reliable and Secure Data Ecosystems
  - Decentralized Systems Technology
  - Supply chains, Logistics, and FinTech

Sebastian Lawrenz, M.Sc.

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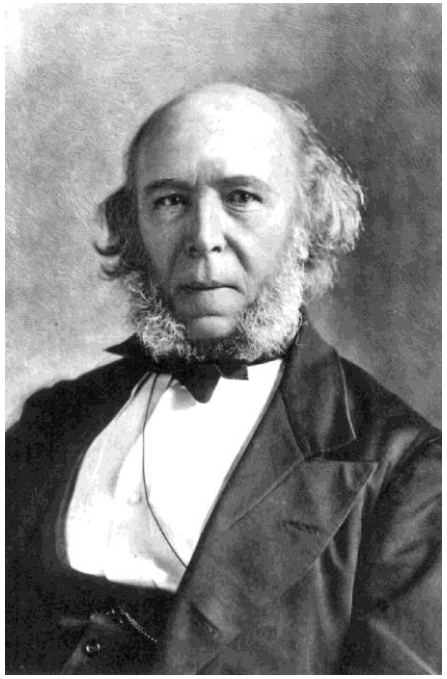
Related background

- Research group: Sustainable Ecosystems Engineering
  https://www.isse.tu-clausthal.de/en/research/research-groups/sustainable-ecosystems-engineering
- Co-Founder: Sense4Future
- Freelance lecturer: Software Engineering & IT Security
- Research areas:
  - Data- and Information Quality
  - Data- and Information Marketplaces
  - Circular Economy and Sustainability
  - Community Driven Ecosystems

Institute for Software and Systems Engineering

Evolving Software Ecosystems and Services

- Everything is evolving, such as our society and software systems
- On the one hand, new requirements create the need for new technologies such IoT, Blockchain, AI, AR/VR, 3D Printing
- on the other hand new technologies create new requirements
- An ecosystem is a heterogeneous, cooperative group of entities that are not just technical entities but also people and their relation



Survival of the fittest – Herbert Spencer, 1864

Kinds of Ecosystems

- Business ecosystems: centers on a firm and its environment
- Innovation ecosystem: focused on a central innovation and a set of components which support it
- Platform Ecosystems: here, all the actors are organized around a platform
- Software Ecosystems: Defined as the interaction of a set of actors on top of a common technological platform that results in a number of software solutions or services
- Digital Ecosystems: an open community-driven, loosely coupled union working towards a common goal.

Towards data vs service vs software SCM

Data/service/software supply chain management (SCM)

Interconnected, interrelated or interlinked networks, channels and node businesses combine in provision of products and services

Challenges:

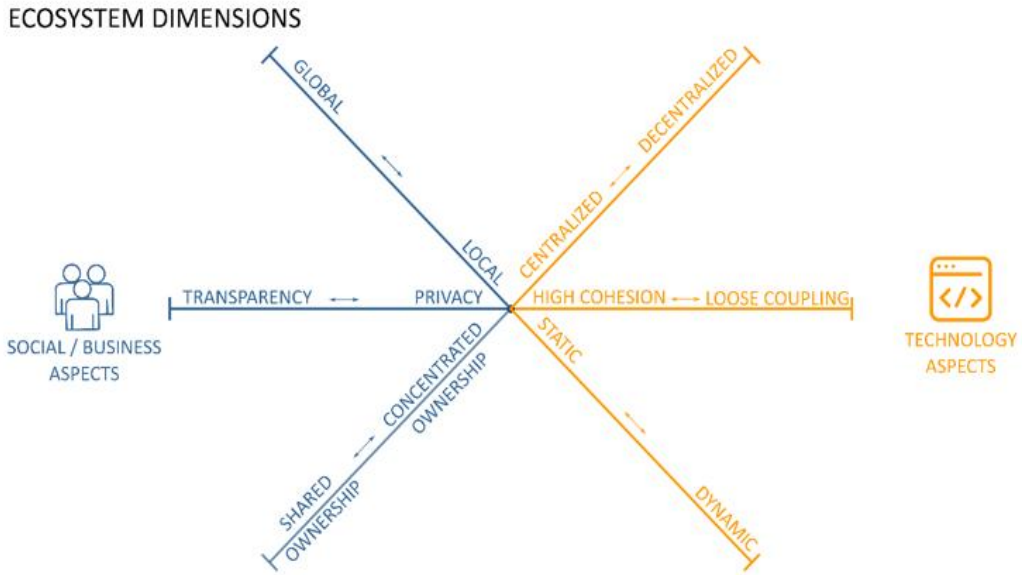
- Uncertainty in demand and/or supply
- Changing customer requirements
- Decreasing product life cycles
- Fragmentation of supply chain ownership
- Conflicting objectives in the supply chain
- Conflicting objectives even within a single company

Governing the dynamic evolution of software ecosystems

- Interdisciplinary, systemic model for control for sustainable ecosystems
- Governance and policy, i.e., automated or manual
- Incentive models for participating and sharing resources
- Fairness, dependability, and trust in ecosystems
- Tension of openness in value creation and control of value capture
- Ecosystem properties, i.e., guarantees and emergent properties
- Technical and organizational decentralization

Future Challenges

- Finding the right balances
- Building new Business Models
- Legal and organizational challenges
- Semantic interoperability
- Governance and provenance models
- Building sustainable Ecosystems
- Balancing between technical progress and sustainability



Presentations

- Business Ecosystems:
  - Development of a digital ecosystem using the example of Amazon
  - Analysing the Impact of the Implementation of a Blockchain in an Existing Business Model
  - Anonymization of Transactions in Distributed Ledger Technologies
- Innovation Ecosystems:
  - Robot Cognition in Disassembly - Advanced Information Processing for an Adaptive Dismantling Ecosystem
  - Towards an Evolving Software Ecosystem in the Mining Industry
  - A Catalog-based Platform for Integrated Development of Simulation Models
- Software Ecosystems
  - Towards Improving Software Architecture Degradation Mitigation by Machine Learning
  - Automated Configuration in Adaptive IoT Software Ecosystems to Reduce Manual Device Integration Effort: Application and Evaluation of a Novel Engineering Method
  - Dynamic Adaptive System Composition Driven By Emergence in an IoT BasedEnvironment: Architecture and Challenges