TECHNISCHE UNIVERSITÄT MÜNCHEN

Software Engineering in der industriellen Praxis (SEIP)

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Sustainability



Minimize Minimize Minimize Ξ **DESIGN Excessiveness HARDWARE Idleness HUMAN Effort** Minimize the idleness and maximize the Minimize the excessiveness and Minimize the efforts of humans and utilization of existing hardware maximize the adequacy of solution maximize the efforts of machines in all resources. designs. production and operation processes. Rationale: Unused or under-utilized Rationale: Non-adequate designs cause Rationale: Delegating tasks to machines hardware are an unnecessary waste of unnecessary complexity and waste gives humans the possibility to already available resources. resources. concentrate on more important tasks. Keywords: Virtualization, Utilization. Keywords: Reduced Libraries, Immutability. Keywords: Computer, Robot, Automation. Minimize Minimize Minimize **SOFTWARE Inefficiency SOLUTION Ephemerality ENERGY** Consumption Minimize the inefficiency and maximize Minimize the ephemerality and Minimize the consumption and the efficiency of software applications maximize the life-span of any type of maximize the saving of energy in all and their development processes. solutions. production and operation processes. Rationale: Efficient software and Rationale: Short life-spans of solutions Rationale: Electric energy still has to be cause unnecessary short renewals and partially generated from non-renewable development processes consume less this way wastes resources. resources. resources. Keywords: High Quality, Best Practice. Keywords: Caching, Monolith. Keywords: Eco Mode, Reduced CI/CD. Minimize Minimize Minimize A **INFORMATION Amount ECOSYSTEM Exploitation CARBON Emission** Minimize the total amount of gathered, Minimize the exploitation and maximize Minimize the carbon emission and transmitted, stored and spreaded the back-contribution in any type of hence the footprint during any type of information. ecosystems. production and operation processes. Rationale: Reduced amount of Rationale: The consumer and provider Rationale: Climate change and global information means less data transmission. behaviour have to be in balance for every warming is partially caused or at least less data storage, less GDPR issues, etc. long-lasting ecosystem.

Keywords: Open Source Software.

Keywords: Compression, No Big Data.



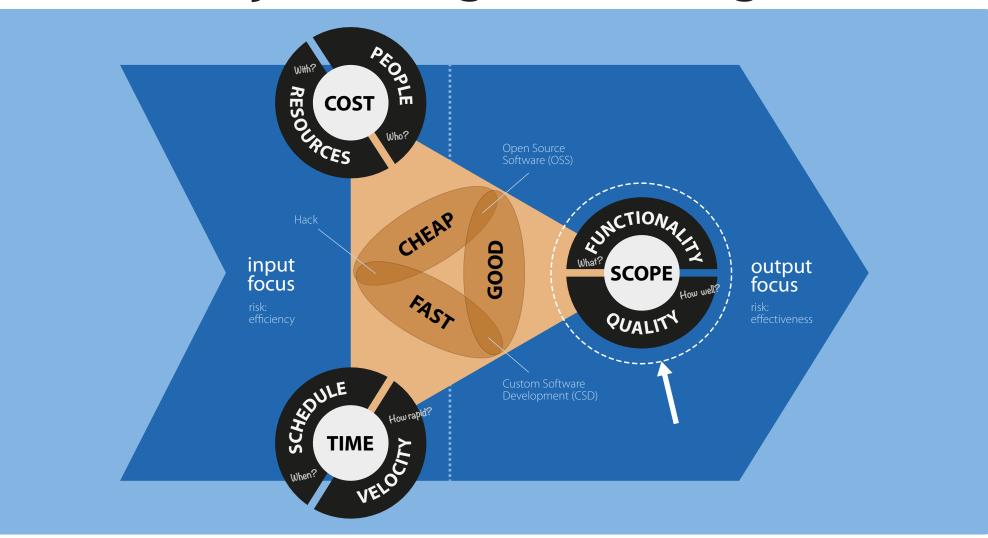
Keywords: Reduced CO2 Footprint.

accelerated by carbon emissions.





Project Management Triangle



Definition of a *Project*:

"Temporary endeavor undertaken to create a unique product, service or result." **Temporary** in that it has a defined beginning and end in time, and a defined scope and cost. **Unique** in that it is not a routine operation, but a one-time, single-goal, and risk-containing operation.

Project Management *Iron Triangle*:

A project is constrained by **time**, **cost** and **scope**. No constraint in this triangle can be changed without affecting the others. Time splits into **schedule** and **velocity**. Cost splits into **people** and **resources**. Scope splits into **functionality** and result **quality**.

Project Management Trilemma:

"Fast. Cheap. Good. Pick two!" Each project optimization effort has the choice among **three** favourable options — only **two** of them are possible at the same time. EF 04.1