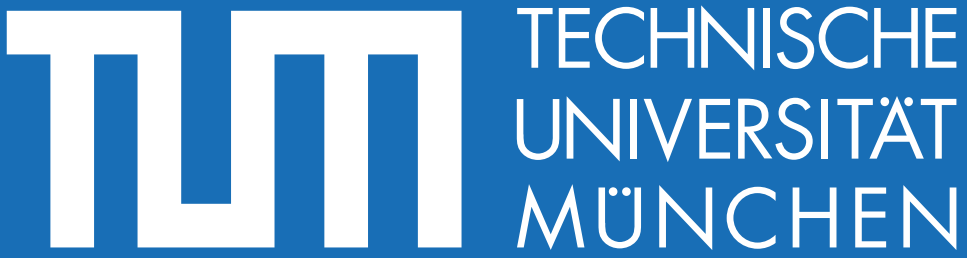


Software Engineering in der industriellen Praxis (SEIP)

Dr. Ralf S. Engelschall

ENGINEERING FUNDAMENTALS

Sustainability

TECHNISCHE UNIVERSITÄT MÜNCHEN

EF 01.7

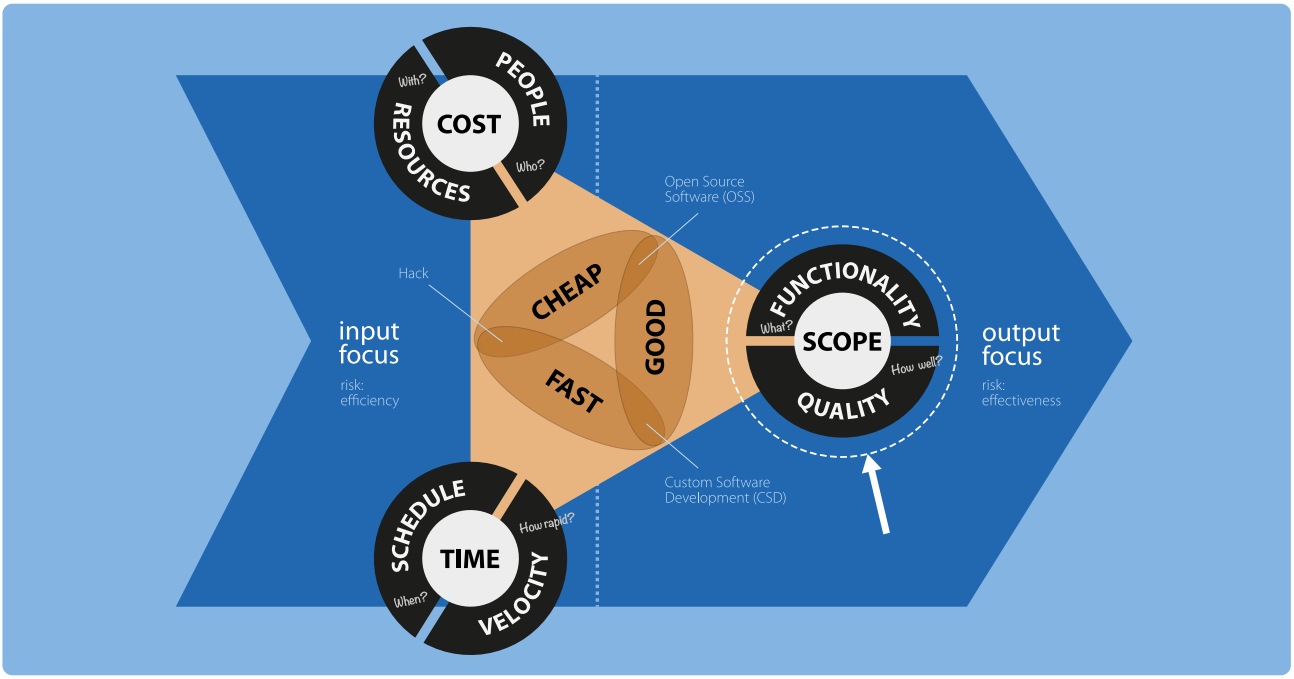
Sustainable action should be a matter of course, since there will always be others coming after us. In Software Engineering, the following minimization principles lend themselves to acting sustainably:

Minimize the idleness and maximize the utilization of existing hardware resources; Minimize the inefficiency and maximize the efficiency of software applications and their development processes; Minimize the total amount of gathered, transmitted, stored and spreaded information; Minimize the excessiveness and maximize the adequacy of solution designs; Minimize the ephemerality and maximize the life-span of any type of solutions; Minimize the exploitation and maximize the back-contribution in any type of ecosystems; Minimize the efforts of humans and maximize the efforts of machines in all production and operation processes; Minimize the consumption and maximize the saving of energy in all production and operation processes; and: Minimize the carbon emission and hence the footprint during any type of production and operation processes.

Questions

- Is the Best Practice of Continuous Integration (CI) a sustainable way of acting?

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.

project & constraints

Project Management, alongside **Software Architecture**, is the second important Discipline in the field of **Software Engineering**. Therefore everyone should have at least a basic understanding of the essential task of Project Management: continuously finding the balance from the "Iron Triangle" of **Time**, **Cost** and **Scope**.

The adjusting screw **Time** is divided into the two aspects **Schedule** (When?) and **Velocity** (How rapid?). The adjusting screw **Cost** is divided into the two aspects **People** (Who?) and **Resources**. (With?). The adjusting screw **Scope** is divided into the two aspects **Functionality** (What?) and **Quality** (How well?).

If a change is made to one of the three adjusting screws or one of the six aspects, the "Iron Triangle" will be unbalanced, and one must inevitably change one or more of the other screws or aspects to restore the balance.

Also worthy of mention is the **Trilemma**, which says that one can usually have only two out of three things at a time: either cheap and good (Open Source Software), but not fast; or good and fast (Custom Software Development), but then not cheap; or fast and cheap (the "Quick Hack"), but then not good.

In practice, the non-Project-Managers are co-responsible, especially in the area **Scope**, since here a change in the project usually requires a deeper technical understanding of the Application.

Questions

? At which adjusting skew of **Project Management** in practice are the non-Project-Managers co-responsible?