

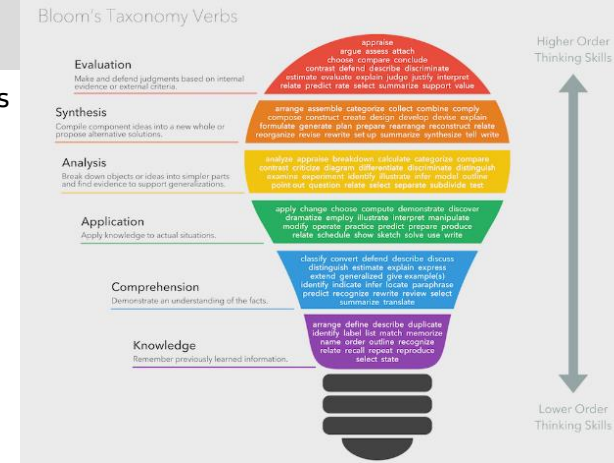
„Software Project Management 2“

[10] Project Portfolio Management

Learning Goals

- ✓ Understand the scope and aims of project portfolio management
- ✓ Understand complexity of project portfolio planning and potential tool support

Bloom's Taxonomy Verbs
by [Fractus Learning](#),
Lizenz: CC-BY-SA 4.0



Agenda

- Terminology
 - Program
 - Project Portfolio
 - Project Portfolio Management
- Planning Portfolios
 - Case Study Primary Sector

[10.1] Terminology

Program & Project Portfolio

Program

- Group of projects related by jointly delivered results

Project Portfolio

- Group of projects or programs in a business aiming at strategic objectives, sharing resources and competing for funding. Any organization that allocates, funds and manages resources to more than one project has a portfolio. (Nicolas/Styne, Project Management for Business,

Prof. Dr. Gero Luckemeyer | Software Project Management 2 | Folie 5

Project Portfolio Management

- Project portfolio management is a centralized management of one or more portfolios, which includes identifying, prioritizing, authorizing, managing, and controlling projects, programs, and other related work, to achieve specific strategic business objectives. (PMBOK)

[10.2] Portfolio Management

– Planning Case Study

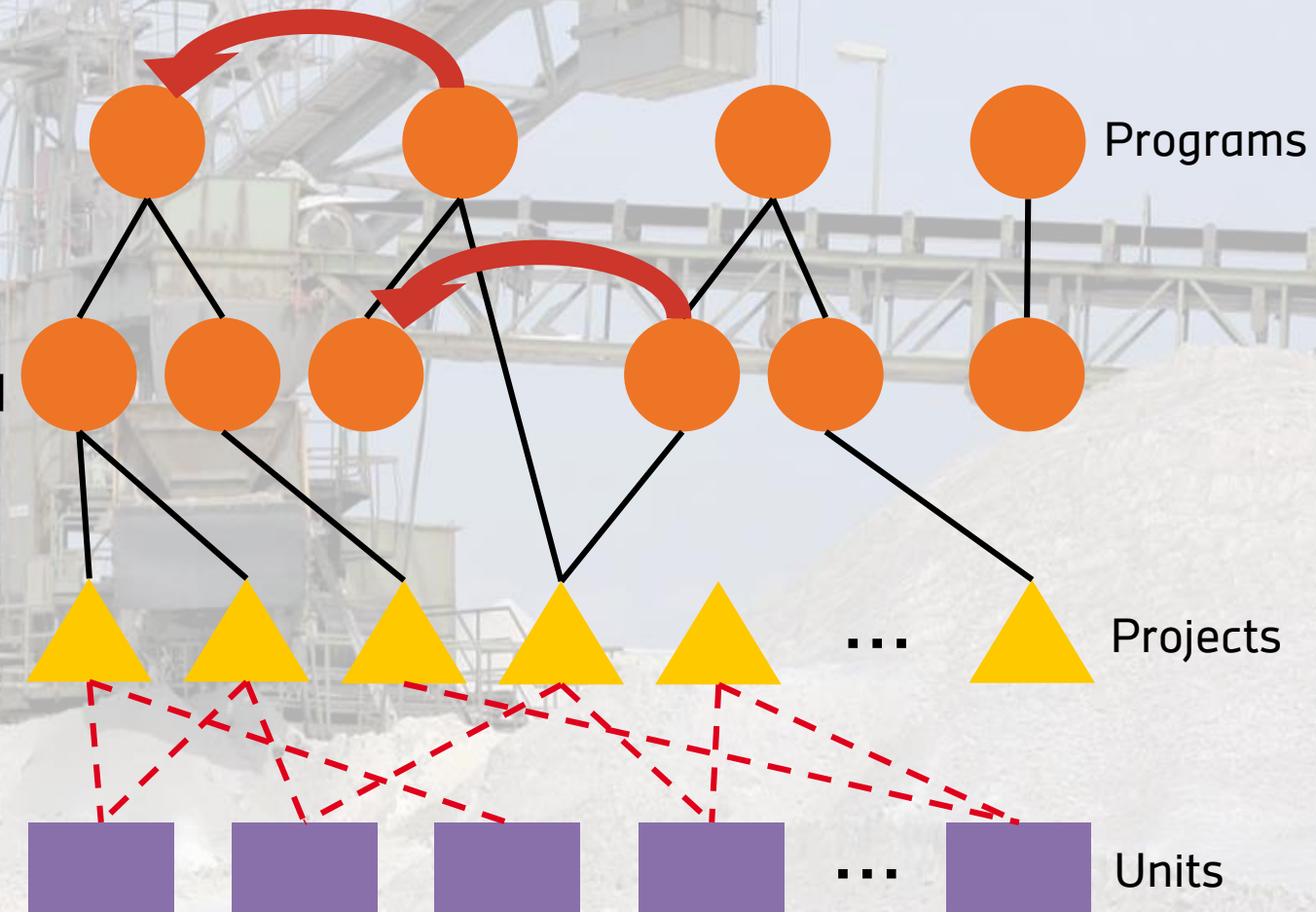
Project portfolio optimisation in the primary sector: planning problem

Find utility maximizing portfolio

- ~500 concurrently planned projects in the ~3 year funnel
 - Capacity demands on the ~50 business units worldwide
 - Partly grouped in hierarchically structured programs with begin/end-dependencies
 - Partly belonging to an orthogonal, prioritized restructuring program
- Technical environment
 - SAP data source, restricted access
 - Existing notebooks with Microsoft Excel or Matlab

Project portfolio optimisation: Analysis

- Multidimensional Knapsack-Problem under constraints
 - Units are knapsacks with limited capacity
 - Programs and the restructuring add further constraints
- NP complete
- Standard implementation not available
- Heuristics necessary
- Very long calculation times expected



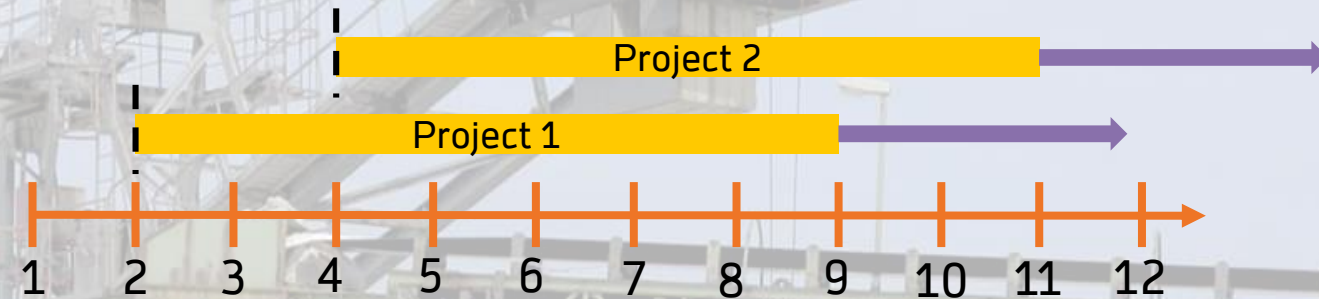
Project portfolio optimisation: factual calrifications (1)

■ Timeline

- Planning horizon 1 year
- Projects cannot start earlier than planned, but can be postponed; Start date is an earliest start
- Assumption: capacity demands in projects lasting longer than the planning horizon equally distributed; just divide by runtime to obtain partial demand

■ M:n-relationship project:program

- Further priority classes below the restructuring, also orthogonal to the program(dependencie)s



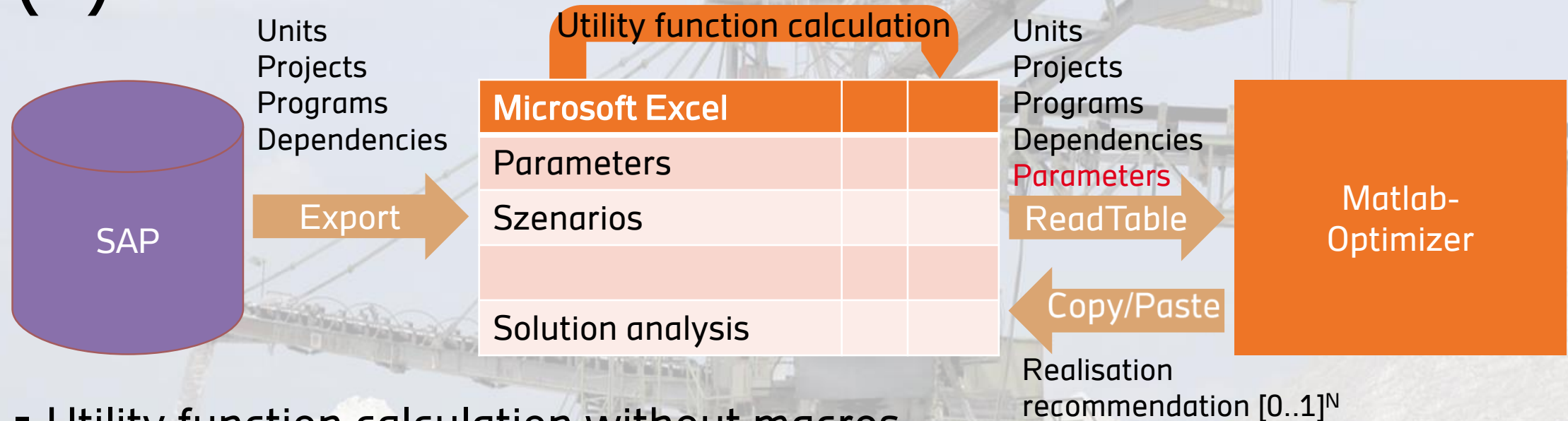
Project portfolio optimisation: Quantity structure and data

- Quantity structure
 - ~300 projects, ~50 outside planning horizon
 - ~30 units relevant
- Programs
 - ~40 projects in programs
 - ~10 relevant program-induced project dependencies
- Utility function
 - Calculation at project start not agreed upon internally at the customer
 - Range [0-10]

Project portfolio optimisation: factual clarifications (2)

- Solution serves as decision support for the management
 - Factual What-if-Analysis preferred
 - Business wants to force projects into being drawn
- Utility function
 - Calculation (Score) agreed
 - Projects with score 0 receive a minimal „rememberance value“

Project portfolio optimisation: Solution (1)



- Utility function calculation without macros
 - Factor priority classes into disjoint scores by score exponentials
- Factual view on the solver part in Microsoft Excel
 - Easy adaptation
 - Central control without code change
 - Known UI

Project portfolio optimisation: Matlab-Optimizer

- Preprocessing
 - Eliminate all projects outside planning horizon
 - Bootstrap program hierarchies
 - Create direct project dependencies
 - Partial transformation into constraints: dependent project can be part of solution at most as much as lowest predecessor
- Optimization via integrated Simplex-Algorithm „Linprog“
- Output of potentially violated dependencies for factual analysis
- Runtime: < 10 Seconds!
- Delivered in one week!

Project portfolio optimisation: further steps

- Enhance temporal resolution: split planning horizon into multiple time intervals
 - Fine-grain input: capacities and demands on finer scale
 - Assumption: capacity demands unaltered by postponement
- Solution
 - Synthetically generated delayed clones of early projects for each period of delay
 - Limit share of all alternatives of one project to at most 1
 - Current factual clarification: dependencies fulfillable over
 - A: horizon (add projects to existing dependency columns)
 - B: each period (create copied columns and add them there)

Project portfolio optimisation: further steps (2)

- Near blind management trust in system output
- Business demand for project rejection transparency
 - For rejected projects (all projects drawn <1), output rejection reason
 - A: start after planning period
 - B: score too low
 - C: dependencies unfulfilled
 - D: capacities used up
- Into production May 2020

Summary

- ✓ **Portfolio Management takes a much broader scope**
 - ✓ Understanding important for project managers
- ✓ Planning tool successfully introduced
 - ✓ Near blind management trust into output
 - ✓ Scoring transparency
 - ✓ Business needs rejection reasons
 - ✓ Multi-period-planning introduces many new aspects and conditions
- ✓ Business analysis and agile minimum viable product approach saved months and 1,000s €!

Vielen Dank

Für Ihre Aufmerksamkeit!