

Areas of investigation:

1. Lean construction
2. Building Information Modelling

General information:

Name: David Leicht

Profession: Architect and Construction Engineer

Department of Research and Development at RIB IT AG; Germany

PhD-Program: Civil Engineering at EDUC Santander

Supervisor: Daniel Castro Fresno

Co-Supervisor: Joaquín Díaz

Tutor: Jorge Rodríguez Hernández

Research Topics: BIM and Lean Construction

Start: 2014-2015 (PARCIAL DEDICATION since December 2014)

Thesis defence: before October 2019

International conferences:

1. EGLC conference; Copenhagen; Denmark; 2015
Lean construction: What are the main efficiency killers in a construction project life cycle? A partial solution approach.
2. BIM - Research & Development; Guangzhou; China; 2017
How to implement supply-chain-management to the construction industry?

Courses and workshops:

1. Courses according to DAD:
 - Curso Básico (UNICAN) - 2015
 - Curso Avanzado (UNICAN) - 2017
 - Course BIM-5D (RIB IT AG) - 2017
2. Workshops according to EIDEIC:
 - Study activities till 2014/2015
 - Past and current activities 2014 - 2017
2. Extra Course:
 - Green Belt - Lean; Six Sigma; Capstone

Journal papers and PhD-Thesis:

1. Journal paper - *under revision*:
Bridging the gap between planned and built deviations -
an on-site solution approach.
2. Journal paper - *currently under development*:
Project execution schedule according to Lean
Construction Management (LCM) requirements.



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Journal paper:

Information feedback tool to improve planning accuracy

**BRIDGING THE GAP BETWEEN
PLANNED AND BUILT DEVIATIONS
- AN ON-SITE SOLUTION APPROACH -**

* iTWO-OnSite is a program to take-off construction performances of subcontractor activities on site



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Problem statement:

- lack of information-feedback between site management and design team
- insufficient prediction accuracies about actual required
 - material quantities
 - cost-values
 - execution times





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Research methodology:

- analysis about significant reasons (case study / workflow assessment)
- suggestions for improvements (OnSite feedback-loop features)
- OnSite implementation to project workflow
 - UI for actual used material quantity take-off
 - UI for actual used cost and time values
- evaluation of OnSite application



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Research methodology:

- real project case study



Figure 1: Case study project: View from west



Figure 2: Case study project: Floor plan

Project location:

- Kirchheim / Germany

Owner:

- German real estate development company

Tasks:

- proving the usability of iTWO-OnSite features to improve planning accuracy in real construction projects



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Investigation:

- current workflow assessment

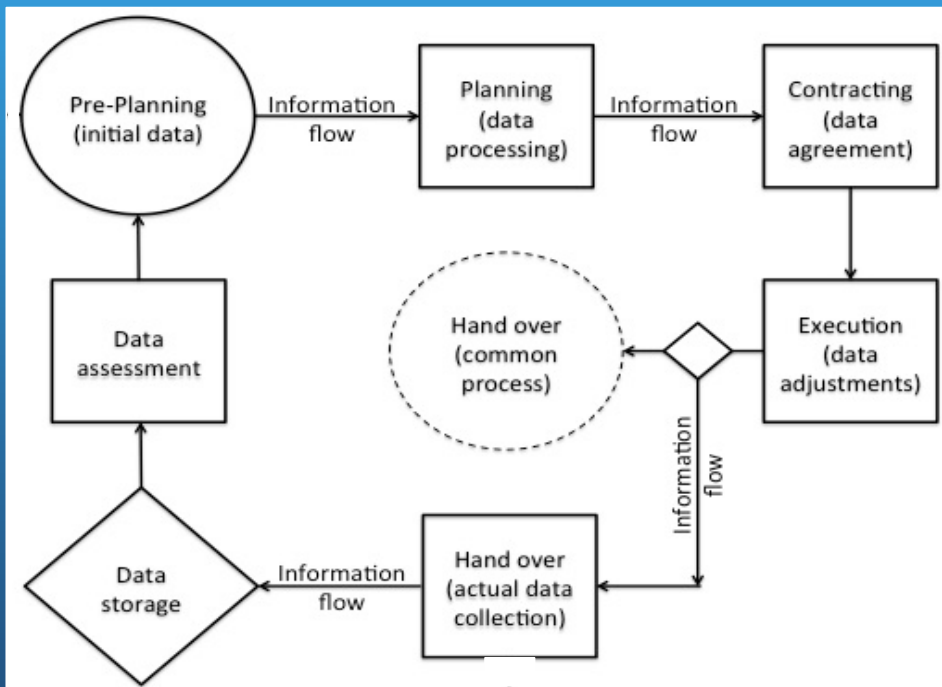


Figure 3: Information assessment and implementation of a continuous improvement process: planned and actual required values of construction products, material, time and costs will be assessed, discrepancies will be fed back to the pre-planning/planning phase



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Investigation:

- development of OnSite quantity take-off features

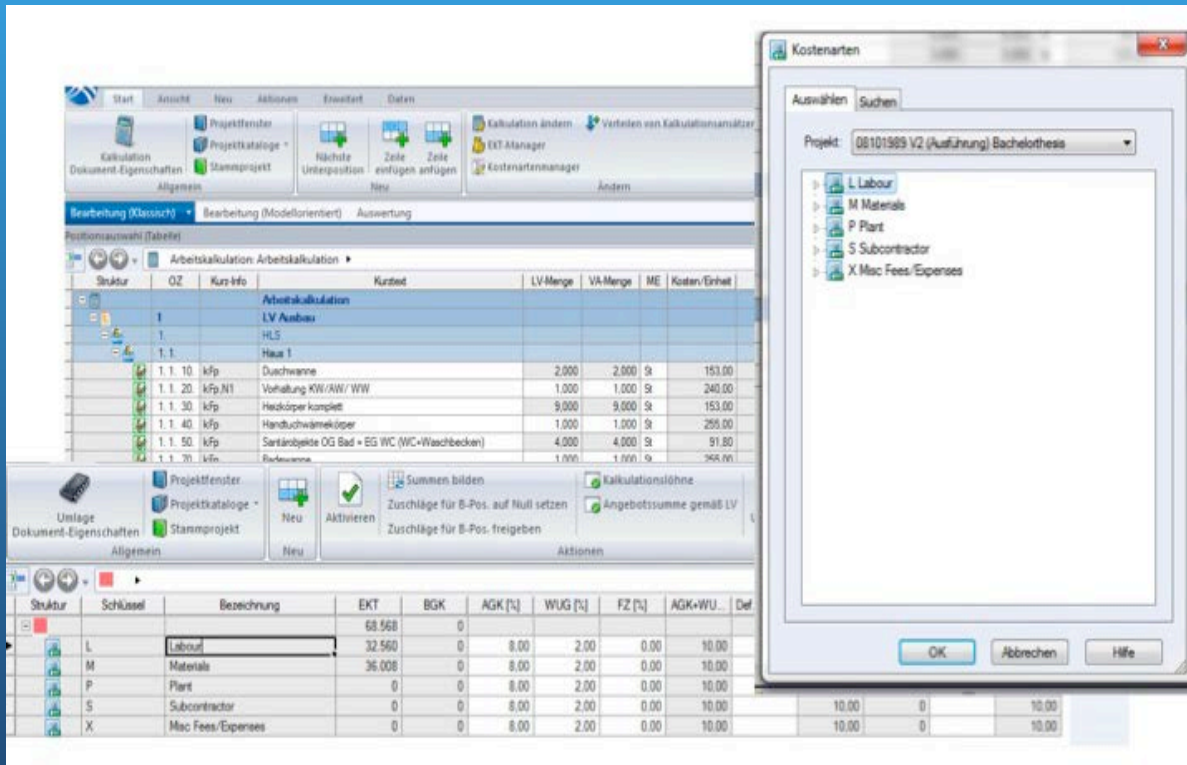


Figure 4: OnSite modification



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Investigation:

- OnSite implementation to project execution workflow

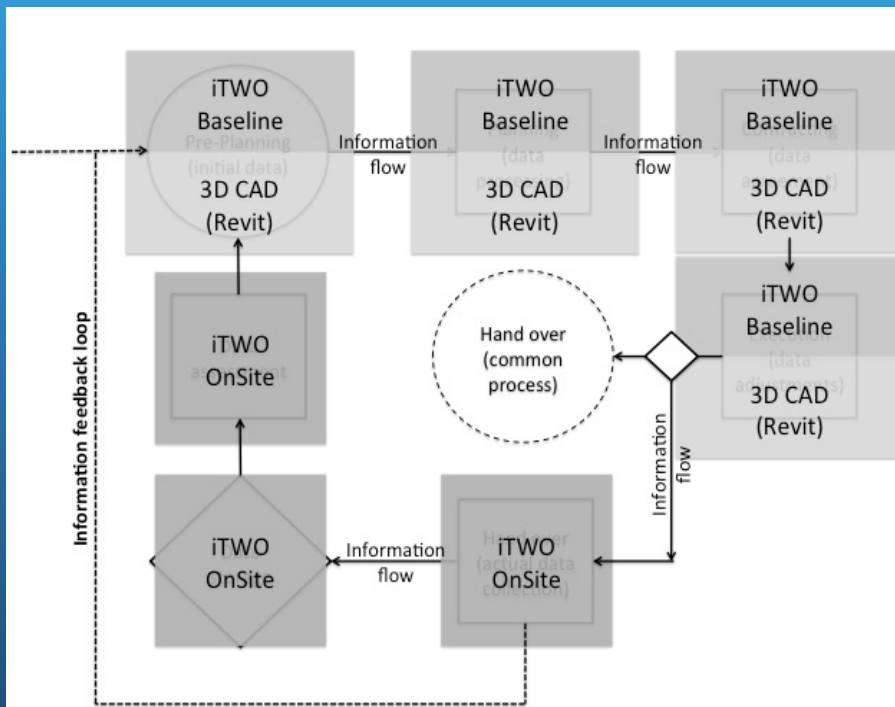


Figure 5: OnSite implementation to project execution workflow



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Investigation:

- take-off material quantities; time and cost values

The screenshot displays the RIB software interface for a construction project. The main window is divided into several panes:

- Left Pane (Structure):** A tree view showing the project hierarchy. It includes levels (LV) and objects (OZ) such as 'Haus 1', 'Haus 2', 'Haus 3', 'Haus 4', 'Flur KG Haus 1', 'Flur EG Haus 1', 'WC EG Haus 1', 'WC EG Haus 1', 'Küche DKW1', 'Bad 1 OG Haus 1', and 'Bad'. A 3D model of a house is visible at the bottom left.
- Top Pane (Menu/Toolbar):** Contains various toolbars for navigation and editing, including 'Start', 'Ansicht', 'Neu', 'Aktionen', 'Erweitert', and 'Daten'.
- Right Pane (Material Take-off):** A detailed table of material quantities and costs. The table has columns for 'Struktur', 'OZ', 'Kurztext', and 'Menge'. It lists items like 'Duschwanne', 'Vorfallung KW/AW/ WW', 'Heizkörper komplett', 'Handbuchwärmekörper', 'Sanitärobjekte OG Bad + EG WC (WC+Waschbecken)', 'Badewanne', 'WC Betätigungspolster', 'Wandverankerung', 'Armaturen', 'Flachinstallation ohne Material', and 'Erdinstallation ohne Material'. A 3D model of a wall section is shown in the center, with a red line indicating the take-off path.

Figure 6: Case study execution



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Results:

- the new OnSite features are applicable for taking off actual used material quantities; time and cost values
- with this “single source” software the implementation of the common Lean method - CIP (continuous improvement process) - has become possible
- improvements in planning accuracy has been achieved
- precise result values have not be achieved by this investigation → further research is required

Current paper preparation

Project execution schedule according to Lean Construction Management (LCM) requirements:

- State of the art:
 - LEAN principles
 - Improvement of productivity performance
 - Incensement in process efficiency
 - Building Information Modelling
 - Project execution scheduling (Gant / Line of balance)
 - Last planner System
 - Lean construction management schedule
- Problem formulation
- ...

Thank you for your attention!