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**Warsaw University
of Technology**

LEAN CONSTRUCTION





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5. Integration to the Construction Industry

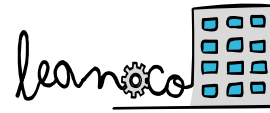
This construction process system is divided into three planes:

OBJECTIVES

PROCESSES

METHODS &
PRINCIPLES

1. Systemic plane of objectives



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At the core of the system of objectives is the client and the issue of compliance with their needs and expectations. This basic objective serves as a basis for introducing the following partial objectives:

Effectiveness

- Increased effectiveness of processes to reduce the construction costs

Clarity

- To warrant the overall, systematic action, it is necessary to define the construction processes clearly

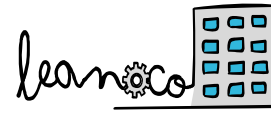
Flexibility

- Construction organisations are sociotechnical systems which allow for implementation of complex and dynamic process structures. Thus, cooperation requires high flexibility of the project participants to make sure that the necessary means of control of specific processes are implemented on time

Stability

- Processes in construction projects should be implemented stably. Such factors as weather conditions, the right of the ordering party to make changes in the scope of works, unexpected soil conditions or withdrawal of subcontractors require the tools and methods for standardisation of the process implementation

Clarity:



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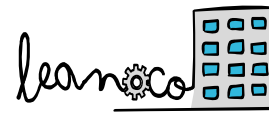
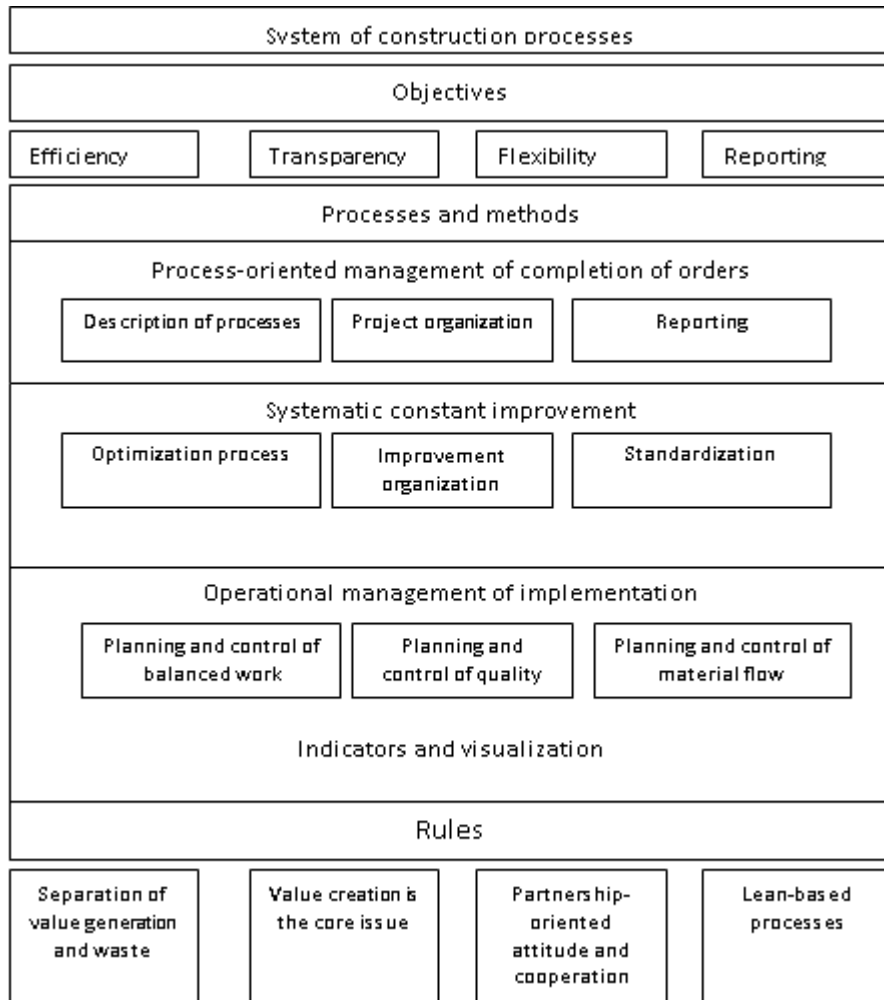
The following components are necessary to achieve this objective:

Precise
definition of the
position and
competences
of the
employee in
the project
organisation

Devising the proper
monitoring tools to
obtain an image of
the status of
implementation of
processes, e.g.
through specification
of the appropriate
process indicators

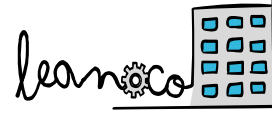
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Structure of the construction process system in accordance with the lean methodology

2. The systemic plane of principles.



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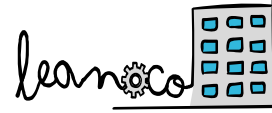
The systemic plane of principles along with its components reflects the lean management perspective, thus:

Separation of
value generation
from waste

Centralisation of
value generation

Partnership-
based
cooperation

Organisation of
processes
according to
lean methods



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3. The systemic plane of processes and methods.

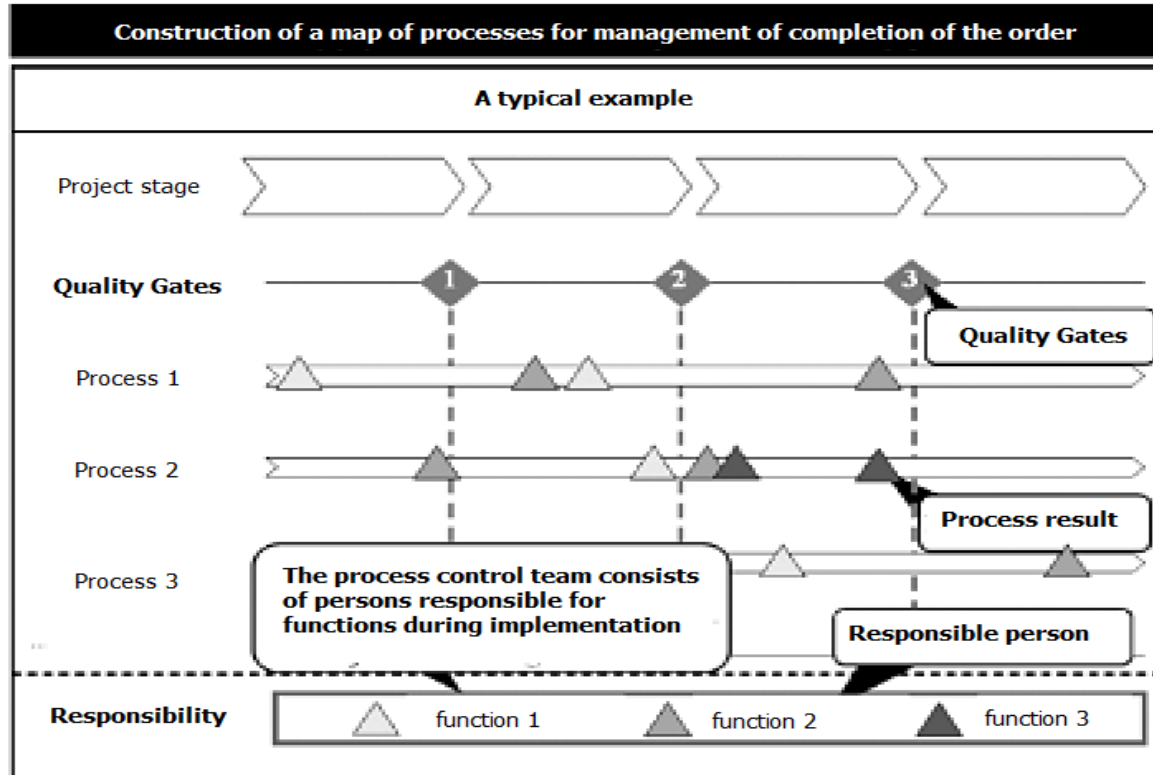
Objectives and principles are implemented on the plane of processes and methods. This is a dynamic structure, within which there is interaction between operational management of performance of works, which is process-oriented, and management of the order completion. This interaction is regulated by systematic improvement of the flow and organisation of construction works in accordance with the principle of Continuous Improvement Process **CIP** (KVP Kontinuierlicher Verbesserungsprozess).

The components of this system plane are:

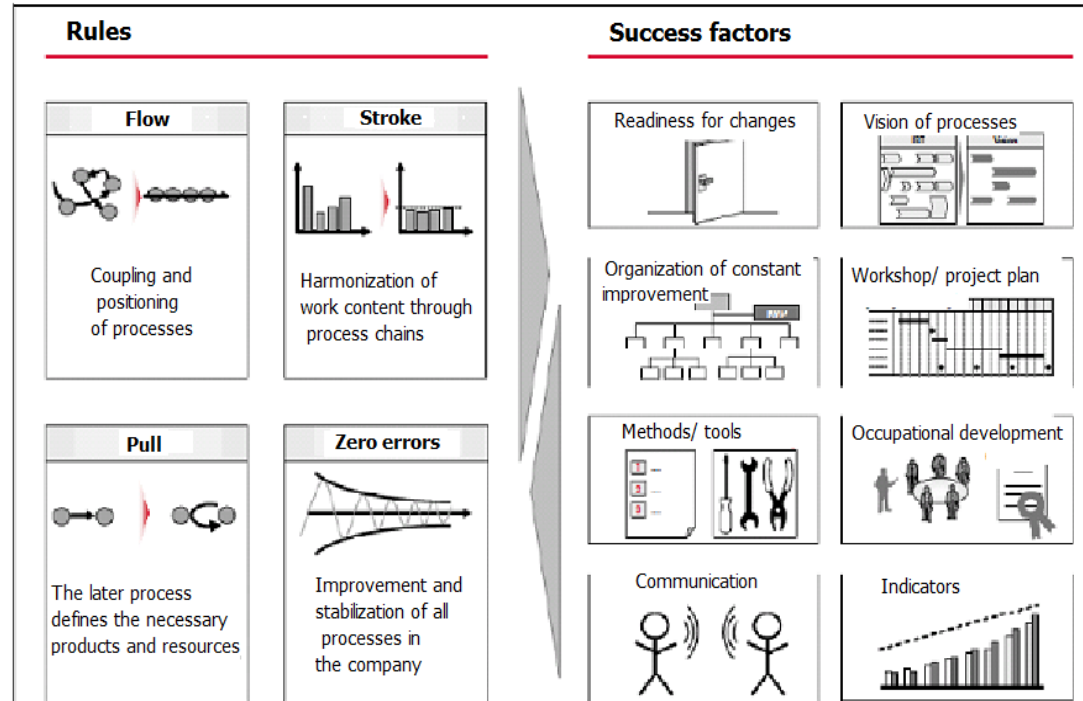
Process-
oriented
management of
order
completion

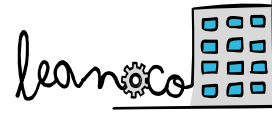
Operational
management of
implementation

Example of a process map:



Application of rules and factors that are decisive for successful implementation of lean construction





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How Lean Design & Construction differs from other forms of project management:

Control is redefined from “monitoring results” to “making things happen,” with a measured and improved planning process to assure reliable workflow and predictable project outcomes.

Maximizing value and minimizing waste at the project level is the goal, versus the traditional practice of attempting to optimize each individual activity.

Value to the customer is defined, created and delivered throughout the life of the project, while traditional practice calls for defining requirements at the outset for delivery at the end, despite changing markets, technology and business practices.

Coordinating action through pulling and continuous flow, as opposed to the traditional, schedule-driven push which places an over-reliance on central authority and project schedules to manage resources and coordinate work.

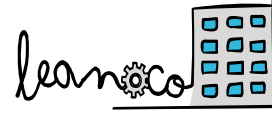
Decentralized decision-making through transparency and empowerment provides project participants with information on the state of the production systems and empowering them to take action.

Some of the varied principles underpinning lean construction include:

- Improving communication.
- Eliminating waste and errors.
- Direct intervention to drive immediate and apparent change.
- Improving work planning and forward scheduling.
- Specifying value from the perspective of the customer.
- Identifying the processes that deliver customer value (the value stream).
- Eliminating activities that do not add value.
- Ensuring the working environment is clean, safe, and efficient.
- Continuous improvement.



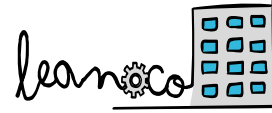
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Some of the techniques that can be adopted include:

- Using modelling and visualisation techniques to improve planning and communication.
- Early planning, to improve workflow, focussing on defining achievable tasks and avoiding mistakes, duplicated effort, out of sequence working and activity that does not add customer value. The objective is the maximisation of workflow and the minimisation of performance variation rather than point speed.
- Look-ahead scheduling.
- Pre-fabrication and modular building to reduce activity on site and better distribute the workload.
- Just-in-time deliveries.



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...continued:

- Value management techniques.
- Integrating the supply chain through partnering and collaborative practices.
- Benchmarking techniques and the use of key performance indicators.
- Last Planner System
- Critical path analysis and management.
- Risk management techniques.
- Continuous improvement from one project to another.