Embracing change: the road to improvement?
A study into if and how a combination of Lean and Agile could help coping with complexity and uncertainty in the front-end development of an infrastructure project.

Introduction
Cost overruns and delays form a big problem in the infrastructure sector. Pinpointing a main cause for cost overruns and delays is not easy. Several differencing reasons can be found in literature, with one being that most projects are not managed in a proper manner. Project management methods and tools are described in many well-established guidelines and several have become the standard in the field of project management. Yet, despite those guidelines projects still fail.

Problem definition
One could thus say that current project management methods and tools are not adequate anymore. This inadequacy of conventional project management is due to the fact that projects are becoming more complex and uncertain for which conventional project management does not provide sufficient tools to cope with. Conventional project management is aimed at reaching predefined goals. Yet, the complexity and uncertainty of many projects makes that this preplanning becomes less appropriate. For this a new approach is needed which recognizes and provides tools to cope with the complexity and uncertainty of a project, an approach that is aimed at increasing the flexibility.

Research
In order to solve this problem already existing tools part of Lean and Agile, two approaches receiving increasing attention due to the rethink of project management, are tested on their ability to handle complexity and uncertainty. For this the following research question was formed: could, and how could, a combination of Lean and Agile help coping with complexity and uncertainty in the front-end development of an infrastructure project? In order to form an answer to this research question the following steps were taken:
1. A literature study on complexity and uncertainty in order to assess what is needed to effectively manage both.
2. A literature study on Lean and Agile in order to assess whether they provide practical tools for effectively managing complexity and uncertainty.
3. Conducting a mixed research to assess the true helpfulness of Lean and Agile methods and tools.

Results
1. Resulting from the literature studies was a list of criteria for effectively managing complexity and uncertainty, and Lean and Agile ideas, methods and tools linked to those criteria in order to assess the Lean and Agile approach for handling complexity and uncertainty.
2. Resulting from the research was the definition of three perspectives regarding the applicability of Lean and Agile and a categorization regarding the way Lean and Agile elements helped with reducing the complexity and uncertainty of the studied projects.
3. Combining the results formed a categorization of Lean and Agile elements as showed in figure 1. In this figure ‘convincing’ stands for elements which are convincingly helpful.

Conclusions and recommendations
Based on the conclusion, keeping the scope and limitations of this research in mind, it was concluded that the answer to the research question is yes. The ideal behind both Lean and Agile is value maximization for the client. For complex and uncertain projects the client's definition of value at the beginning of the process differentiates for the client's definition of value at the end of the process. This requires a project that is flexible and adaptive to changes instead of a project that rebels against changes. Both Lean and Agile embrace change instead of rebel against it. Thus implementing the Lean and Agile ideal in project management would help coping with complexity and uncertainty.

Student: J.A. Blom
Committee: Prof. dr. ir. J.W.F. Wamelink, ir. Y.J. Cuperus, ir. A. Jalali Sohi, ir. S.H. van der Togt (Antea group)

For more information you can contact the section Construction Management and Engineering, tel. +31 (0)15 2784774
convincing

- involve all stakeholders in decision making
- cross functional teams
- product & process: considering subsequent phases, preassembly, prefabricatable elements, small batches
- share incomplete information
- design-work approaches: lean, agile

technologies that facilitate lean design

problem solving
- stop to fix problems
- solve root causes

figure 1: conclusion

dependent convincing

- standardization product standardization process
- continuous learning
- daily Scrum meetings daily impediment report
- early delivery
- continuous intermediate delivery
- early and recurrent feedback

Scrum

not convincing

- many alternatives
- late decision
- monotonous iterations
- share incomplete information
- set based strategy
- self-organizing teams
- cross-functional teams

Scrum

- prioritized sprint backlog
- daily meeting and tasks assignment
- daily visual progress

Scrum

- responding to change over following a plan
- see change as added value
- no complete and definite definition of scope needed
- pre-active organization

Agile project management

minimize negative iteration

- Full planning
- DSM
- lookahead planning
- weekly work plans
- percentage plan complete
- Agile project management