Reflection

In this part the scientific relevance and the societal relevance will be discussed including the related literature. This paragraph will address the added value of this research as well as the intended or potential effects of this research and the relationship with the lab theme.

Scientific relevance

A lot of research has been done into the causes of cost and time overruns. One of the main researchers into the cause of these overruns is Flyvbjerg (2003, 2011); he however focuses mainly on infrastructural projects. The same is the case in the graduation research of Cantarelli (2010). Other researchers of cost and time overruns are Assaf (2006), Hamzah (2011), Love (2012) and Morris (1990).

Scientific research on indicators, for these causes of cost and time overruns which can be recognised early one in the process, is missing. Van Notten stated in her master thesis, “Kosten- en tijdoverschrijding in bouwprojecten; een vroegtijdige herkenning door indicatoren” (van Notten, 2013), a list of indicators for recognizing cost and time overruns. She got these indicators by doing interviews with different anonymous companies. The groundwork is laid by her, but the research needs further empirical foundation and methodological back-up (D&CM Lab, 2013). Van Notten (2013) did recommendations on further research that can be done. One of these recommendations was to research different collaboration models. Interviewees stated that to recognize indicators and to act on them, an early collaboration could be the key. Therefore the focus of this research was on contract models.

The indicators presented by van Notten (2013) are also tested statistical to determine if the occurrence of these indicators, which are obtained by doing interviews, actually lead to cost and time overruns. Research also focused on the management tools within contract models to see if this minimises cost and time overruns.

Research done in recent years about minimising cost and time overruns using contract models are from Straub (2012) and graduation projects of Nielen (2010), Vasters (2012) and Van der Spek (2012). These graduation projects however focus mainly on one contract model and not on a comparison. Furthermore they do not go into detail about management tools within these contract models to minimise cost and time overruns.

By using statistics, this research concludes that the consequent and adequate tools of management tools can lead to less cost and time overruns. The same conclusion has been made with the indicators. If the indicators occur in a construction project, the chance this will lead to overruns is larger than when none of the indicators occur. The use of tools within the Traditional contract model and within the Design & Build contract model, do not differ significantly. There is however a trend that most of the tools are used more consequentially and adequately within Design & Build contract models. Indicators also occur less within Design & Build projects. Final conclusion is that the assumption that integrated construction projects lead to less overruns, is true.
Societal relevance
While it looks like cost and time overruns are considered to be normal, while it occurs a lot in construction projects, it does have consequences. The clients suffer from these cost and time overruns and because cost and time are heavily linked, when a construction time overruns it will probably cost more and the other way around (Jackson, 2002). End-users also suffer, mainly from the time overruns, because they have delays in the time of operation of the building. Furthermore in recent years the construction industry has suffered from an image decline, especially when they are public construction works. With this graduation project an attempt is done to minimise this negative image. By giving parties an idea to minimise cost and time overruns, they will try to prevent them. This will lead to more projects without cost and time overruns thus leading to a less negative image. Furthermore when more parties use a Design & Build or other integrated contract model, cost and time overruns can be prevented or minimised.

Utilisation potential
First of all researching the cost and time overruns and the underlying causes and indicators, a first solution to minimise cost and time overruns can be found. With the use of the indicators presented, parties can steer or intervene in the process before it leads to (severe) overruns. By looking at the management tools within the PRINCE2, PMBoK and ISO21500 methods, prove can be found that using these tools, or a combination of these tools will result in a minimising of overruns. Finally this research focused on contract models. Most of the management tools are used more consequently and adequately within Design & Build contract models. Indicators also occur less within Design & Build projects. Final conclusion is that the assumption that integrated construction projects lead to less overruns, is true.

The result of this research on management tools and contract models can be used by many parties within the building process. However this research is mainly focused on project managers while they are mostly responsible on controlling the budget and schedule and when needed can steer or when needed intervene. The outcome of this research however is beneficial for mostly the clients and the end-users while they are the most affected by overruns.

While the management tools are used during the entire building process, a result of this research can be used during the entire process. However since the choice for contract model is concentrated in the early phase of the project, this part is most important. The indicators presented can be found during the entire process and can be used to steer or intervene.

By using the result of this research, parties get the most potential from their project with the least amount of cost and time overruns. Not only will the clients benefit from less cost and time overruns and end-user from less time overruns, also the entire building industry will benefit from this while the negative image of the building industry will reduce.
**Relationship with lab theme**

This research is a Design & Construction Management focused thesis. The reason for this is that Design & Construction Management focuses mainly on the design and construction phases of the building life cycle of buildings or built objects (D&CM Lab, 2013). The general theme of the Design & Construction Management lab is “Integration and Collaboration” which is subdivided into four different themes: Integrating Procurement, Empowering AEC Organizations, The Project Design School and Transformation. This research fits best in the theme of The Project Design School. The main goal of this theme is: “To establish the Project Design School of design and construction management research developing and exploring the fundamental and conceptual premises behind terms like integration, innovation, sustainability and value added, by developing theories, methods techniques and tools within the context of the AEC domain as application domain.” (D&CM Lab, 2013). This thesis is focused on developing a theory behind cost and time overruns by exploring conceptual premises of management tools and contract models.