Executive Summary

The principles of Lean and SixSigma are regularly used in many industries to achieve significant performance improvements in their operations, maintenance, engineering and business processes. However, the use of these principles in the software products and services industry is rather limited. Often the ideas of Lean and SixSigma are applied in isolation. The purpose of this research is to propose and implement an integrated Lean SixSigma methodology for process improvement during software development thereby reducing cost and improving profitability. The thesis discusses the motivation, relevance and need for this research.

The thesis begins with a review of literature on Lean, SixSigma and integration of Lean SixSigma principles. The research relies on a case study approach as it is found to be more suitable for this research. The empirical results from the two case studies illustrate the effectiveness of this approach. The case studies focus on integrated Lean SixSigma programs in practice, rather than dwell on the theoretical basis or a motivationally based argument. It is hoped that the adoption of methodologies outlined here would enable software companies to realize improvements in terms of cost, schedule and quality. It is also hoped that this approach can provide insights to extend the integrated Lean SixSigma approach beyond the software industry to other industries in the service sector. In this research, two independent cases have been analyzed quantitatively, one case is on software application development and the other case is on an application support setting. Both cases have been identified and analyzed for two real life customer facing projects.

In the first case study, the integration of Lean SixSigma for continuous improvement in an application software development field is discussed, followed by a demonstration of the outcomes from an empirical study of Lean SixSigma for software development. The research also finds that continuity and change are twin characteristics of any software development process as it evolves from the traditional life cycle approach to incorporating and managing flexibility from an end-user perspective. Viewed from this perspective, the idea of Lean, as borrowed from the Lean manufacturing context, is an agile methodology for managing change while the SixSigma approach emphasizes continuous improvement as part of a defect reduction strategy. Managing the continuity-change dichotomy requires a deeper understanding of the underlying context of the software development process. The thesis proposes a software development approach that
holds together the aspects of both continuity and changes under a flexible management system and illustrates the application of the continuity - change framework using an integrated Lean SixSigma framework for software development in a practical context.

In the second case study, a Lean SixSigma implementation for continuous improvement is discussed using an Information Technology Infrastructure Library (ITIL) process extending the applicability of the integration in an application software support domain. This case is chosen to analyze and demonstrate its applicability in yet another scenario in IT services.

The research work reflects the application of Lean SixSigma in the software industry, using the commonly used statistical tools and other quantitative techniques, software engineering processes and methodologies and other practices used within software industry. The research also examines some of the factors which are essential and critical for a successful Lean SixSigma initiative in the Information Technology services and software industry. The research brings out that Lean SixSigma, when used for achieving operational excellence can, as it turns out, do more than simply improve processes. The results indicate that Lean SixSigma can help discover innovation opportunities far beyond operations and ultimately enhance financial performance.