3. RESEARCH DESIGN AND METHODOLOGY

The objective of the current research is to implement an integrated Lean Six Sigma methodology for software development, maintenance and testing. This involves understanding the existing process implementation, if any, in a software project in an IT Services organization, identify gaps, collect the baseline data and implement the methodology under study, collect the data again and evaluate the improvement and verify the research questions are achieved. It is also essential to continue the data collection and analysis to ensure the consistency and reliability, replicability and validity of the study. The current study pertains to a single event, that is Lean Six Sigma implementation and analysis, which entails detailed and intensive analysis. The current study involves a qualitative and quantitative research combined this being a quality management scenario. The study is also extended to various scenarios in a software development life cycle. Typically, in an SDLC, there are different scenarios such as software development, maintenance, technical support and software testing. The replicability and validity of the current study can be attempted in these scenarios.

A case study approach is found to be ideal for the current research study since each case can be treated as a single event and extensive qualitative and quantitative analysis can be done on each case. Knights and McCabe (1997) suggests that the case study provides a vehicle through which several methods (qualitative and quantitative) can be combined, thereby avoiding too great a reliance on one single approach. In their study of quality management in a UK retail bank, they were able to combine participant observation with semi-structured interviewing and documentary data collection of company reports, TQM management guides, and newsletters. The case study method involves detailed, holistic investigation (for example, all aspects of a company) and can utilize a range of different measurement techniques (the case study researcher is not limited to any one methodological tool) (Bryman and Bell, 2009).

Quantitative research under a case study design is being taken up to evaluate the implementation of Integrated Lean Six Sigma for software development. The case studies where live implementation is attempted will be a validation of the effectiveness of Lean Six Sigma in IT
services scenario. As discussed in the literature survey, software development life cycles are of varied nature based on the project. Software product and application development, maintenance, testing, support etc. are can be implemented using various life cycles. It is important to capture sufficient data for supporting the authenticity of the case studies.

The steps intended to follow in the present study is:

1. Determine and define the research questions
2. Select the cases and determine data gathering and analysis techniques
3. Measure and baseline the available data
4. Analyze baseline data using quantitative techniques
5. Evaluate the gaps in terms of addressing the research questions
6. Implement the methodology (here Lean SixSigma)
7. Collect data in the field
8. Evaluate and analyze the data using quantitative techniques
9. Compare the results and measure the effectiveness
10. Prepare the report

As part of this research two empirical cases have been attempted, one for a full life cycle of software development and the other for an application technical support. The cases undertaken are real time cases on software projects undertaken by Marlabs Inc. for its customers, in their India development centers. The customer information is kept confidential due to contractual obligations. The cases were attempted on real time ongoing projects. The cases focus on implementation of integrated Lean SixSigma for continuous improvement. The cases are chosen in such a way that there is adequate data for bench marking the project as-is and then Lean SixSigma is implemented for continuous improvement. Moreover, case study approach helps the researcher in evaluating the validity and the effectiveness of the implementations in different scenarios for future research as well.

In the first case study, a full life cycle software development is undertaken. In this case, the software development project had effort overrun and schedule overrun which was impacting
overall cost of the project and hence the business. The data analysis indicated that a Lean implementation can reduce cycle time by eliminating the wastes involved in the existing process thereby ensuring meeting the project deadline. However, the Lean implementation will not yield reduction of the defects in the product. Through an integrated Lean SixSigma, we will be able to reap the benefits of reducing process variation through SixSigma. After the implementation, the financial benefits are assessed.

In the second case study, an application support setting is attempted in a SAP implementation of a large catering application. In this ongoing support project, though ticket handling has been brought under ITIL implementation. In the IT software management, “continuous improvement” is the final phase of ITIL implementation. Lean and SixSigma are two continuous improvement philosophies are successfully attempted in different industries. In the present case, an integrated Lean SixSigma is implemented to improve the ticket handling process which in turn reduces the team size and overall effort aiding cost reduction.