Conclusions

In the end I would like to summarize the works presented till chapter 5 followed by a brief discussion on the impact of this research towards enriching the state of the art review as well as setting the foundation for further exploration in this field. The scope of this research on "A Study on Data and Process Modeling for Distributed Systems Using High Level Nets", begins with lessons on complexity of transaction management system and information flow in large distributed systems. The critical issues of transaction management in a distributed environment have been studied by revisiting the complexities of two-phase commit protocol (2PC) over a distributed database management system. Chapter III of my work is confined with modeling of the 2PC protocol logic using PN.

Subsequently, I have explored some of the real life applications from the business process reengineering (BPR) domain to model and analyze in order to improve the business process with a clear objective. A case study on a global product ordering system for modelling the distributed transaction management issues are described in chapter IV. The PN model describes its various properties with the introduction of an agent based computing and decision making. Besides, the state transition matrix generated out of the system can be used to monitor the different transaction states. Out of nine states of the global purchase order model, if any of the state vector stands one then the task assigned to that state is complete otherwise not and this can be used as a monitoring scale to the ordering system. Next I chose to model another real life application from the garment manufacturing domain and exploit the decision making functions of a virtual data warehouse. A sales person can use this model in a location independent manner and can communicate about the stock status of an item to his/her customer along with the expected delivery time. At the same time it can send the intimation to its production department about the new order procured, such that the stock can be produced on time along with the dyeing and cutting instructions. This is a complete model tailored for any garment industry having multiple functions.

Originally, health service modeling was not within my scope of work plan. However, access to real-life data and the growing need of the application domain motivated me to switch to health service modeling. I modeled telemedicine support services over hybrid networks to improve health services using mobile phones. The study includes survey of primary field data from the hospitals, collection of secondary data from other sources, and models a remote Tele Health

Support service. A distributed framework for Tele Health Monitoring System has been designed, developed, and examined various activities. It is primarily modeled for android callers. However, it it is not limited to them only. Distressed callers can make calls to particular predefined phone numbers. System finds the location and the ambulance along with paramedics who will move to the spot for treatment or relocation to nearby hospitals, where, the desired service can be extended. In order to tune-up the emergency service, a model on ambulance availability along with finding of exact service location is modeled to reduce the service time and increase the survival rate of victims [BBS-12]. Subsequently, a model on personal health record generation is designed for on demand treatments in a location independent manner [BBS-11].

In order to address couple of open issues to formalize the uncertainties and timing of events, few more case studies have been modeled using generalized stochastic Petri net (GSPN) in the Supply Chain Management (SCM) domain. I mapped every formalism which is used in the hybrid model into an appropriate GSPN. I started with modeling the Beer Game phenomena. This is a teaching and learning model taught at MIT to describe SCM operations. The role player, who finishes the game at the least cost wins the game. This game actually teaches the criticalities in the SCM operations in terms of block stock, sort stock, collaboration, concurrency and parallelism in a Supply Chain. Subsequently, another application domain was selected with a data warehouse of a multi stage, multi-tier SCM, where non linearity in stock, order, and cost is modeled to control the Bull Whip Effect (BWE). Last but not the least, a demand forecast variance analysis is modeled with some numerical self narrated citations to supplement the controlling issues of BWE It is worth noting that if GSPN is regard as implementations of concurrent systems then such a modelling technique automatically guarantees that the implementation obtained for a given concurrent system is correct, i.e. consistent with the specification of the system itself.

It is true that modelling activities are necessary to increase operational efficiency at a lower cost. I have chosen the case studies from different application domains to improve efficiency in operation. This entire operational exercise may provide some miss conception before the examiner and the reviewer that in each occasion the modeling exercise sketched a base model followed by a revised model. However, in reality the truth is that in my research endeavor only

the success stories have been recorded chronologically. Some empirical observations and simulations have been performed with changes in parametric values.

It has been a pleasure to find that some of the works published in the last few years are being cited by other researchers across the geographical borders. The total number of citations for 3 of my papers [BBS-2, BBS-3, BBS-8, and BBS-9] is 42. Few such citations are mentioned in the concluding remarks at the end of each chapter. These papers are listed in “List of significant citations from CT1 to CT5”. I expect that the algorithmic approaches proposed in this dissertation will be recommended as state of the art learning methods.