PREFACE

This volume of the *CiTR Technical Journal* reports the result of CiTR's research programme in 1997. It contains all the technical papers written and published by CiTR staff during the last twelve months in some leading international conferences, forums and journals.

In the past decade or two, two significant trends have influenced the direction of the telecommunications industry. First, the global deregulation and competition has intensified the quest for new, innovative and integrated solutions to manage more and more complex telecommunication businesses. Second, the use of mainstream computer and IT technology in the telecommunication management domain has created serious impact on the ways that management solutions are developed and deployed.

With this business background, the management of global telecommunication infrastructure is faced with the new challenges. Last year's CiTR Advanced Technology Development Programme has reflected our strategy of offering some answers to these challenges.

First, we focus on integrated management solutions. We are faced with the management of different network technologies (switching and transmission); different management functions (fault, configuration, accounting, performance and security); different management domains (elements, networks, services and business) and finally, different management technologies and tools. The value of any management solution is seriously limited without a sound integration strategy. We focused on integrated broadband management solutions which bridge the network and service management boundary.

Second, we focus on multiple technology solutions. The so-called software technology wars have in some areas negatively impacted software development for the telecommunication industry. In this volume, we offer our experience in developing management software where different technologies are used to address different problem domains in an integrated manner. Further, we share our development experiences in managing the solution development life-cycle to maximise the benefit of different software technologies and tools, yet at the same time to minimise the negative impact of the technology wars.

Third, we take a problem oriented software development approach to telecommunications management. The solutions are customer focused, service oriented rather than network oriented. We took steps to model telecommunications networks from a service management perspective: the customer's and the operator's view point. This generic network model provided us with a better environment to support application development and to manage the solution development life-cycle.

In this volume, we share with our readers the results and experiences we gained from these research and development activities.

This journal consists of the following papers.

The article *War and Peace—how to avoid technology wars?* serves as an introduction to this journal. It summarises CiTR's view on the management of solution software life-cycle in telecommunications management industry. Versions of this paper were presented as a panel presentation at the Network Operations and Management Symposium in New Orleans (NOMS 1998) and as a keynote presentation at the International Conference on Information Infrastructure in Beijing. It will appear in the *Thresholds* column of the Journal of Network and Systems Management by Plenum Press.

The paper *Integrated TMN Service Management* reports our integrated service management architecture and experiences in building solutions according to this architecture. The paper has been accepted and is to appear in the Journal of Network and Systems Management, Plenum Press.

The Business Process and Object Modelling for Service Ordering is a condensed version of CiTR's early contribution to the Network Management Forum's SMART Ordering team. It covers detailed object modelling and associated technical issues on service ordering. It has been presented to the 8th International Workshop on Distributed Systems: Operation and Management (DSOM 1997).

Integrating CORBA and Java for ATM Connection Management reports our experience of integrating CORBA and Java in ATM management applications. It was presented to the 8th International Workshop on

Distributed Systems: Operation and Management (DSOM 1997) in Sydney, Australia and appeared in its proceedings.

The paper *Distributed Architecture for Cross-domain Network Management* reports our experience in building path management functions for SDH and ATM networks. The paper was presented to the 6th IFIP/IEEE International Symposium on Network Operations and Management (NOMS 1998) in New Orleans and appeared in its proceedings.

A Management Framework for Internet Services discusses applying TMN architecture and management principles to Internet Service Management. The paper was presented to the 6th IFIP/IEEE International Symposium on Network Operations and Management (NOMS 1998) in New Orleans and appeared in its proceedings.

The paper *Multi-Operator Access to a Network Management System* reports our experience of building a Java/CORBA-based network management system which allows multiple operators to access the path management functions. The paper was presented to the 6th IFIP/IEEE International Symposium on Network Operations and Management (NOMS 1998) in New Orleans and appeared in its proceedings.

SP-to-SP Service Ordering Specification and its Implementation reports our implementation experience of the NMF service ordering object model. The paper was presented to the NOMS 1998.

The paper *Calculating Optimal Flit Size and Upper Limit on the Performance of Wormhole Routing* presents a model for wormhole routing. This model has its application in the routing of ATM cells. The paper was presented to the ICA3PP-97 conference, Melbourne, December 1997 and appeared in its proceedings.

Finally, the paper *Controller Development with a Rapid Prototyping Shell* reports the authors' research experience in fuzzy control systems. It was published in the Australian Journal of Intelligent Information Processing Systems, Vol. 4, No. 2 Winter 1997.

Some papers involve co-authors from other organisations. I would like to thank them for agreeing to include their joint work in this journal.

I would like to thank all the authors for contributing their work to this journal. CiTR's Advanced Technology Development group has continued to produce most of the work for this edition. I would like to thank the full team for their consistent quality work. I would also like to thank CiTR's Technical Communication Group for their continued quality service in editing the manuscripts and the design of the art work.

Dr. Graham Chen
Chief Technology Officer
g.chen@citr.com.au

June 1998, Brisbane, Australia