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A UNIFIED APPROACH TO ENTERPRISE ARCHITECTURE MODELLING

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To my lovely wife Isabelle, who has provided me with unwavering support throughout my research program.

And to my dear Mother and Father, for encouraging a love of learning.

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ABBREVIATIONS

CG	Conceptual Graph
CRM	Customer Relationship Management
DTH	Dynamic Type Hierarchy
EA	Enterprise Architecture or Enterprise Architect
EA's	Enterprise Architectures or Enterprise Architects
EM	Elastic Metaphor
ERM	Enterprise Resource Management
HCI	Human Computer Interaction
HTML	Hypertext Mark-up Language
ICT	Information and Communications Technology
IS	Information System
IT	Information Technology
ITA	Information Technology Architecture
ITD	Information Technology Department of UTS
LEAN	Lightweight Enterprise Architecture Notation
MCS	Minimal Common Supertype
ODBC	Open Data-Base Connectivity
UML	Unified Modeling Language
USDoS	United States, Department of State
UTS	University of Technology, Sydney
VE	Virtual Environment
VR	Virtual Reality
WIMP	Windows, Icons, Mice, Pull-down menus

ABSTRACT

As IT environments grow in complexity and diversity, their strategic management becomes a critical business issue. Enterprise architectures (EA's) provide support by ensuring that there is alignment between an enterprise's business objectives and the IT systems that it deploys to achieve these objectives. While EA is a relatively new discipline, it has already found widespread commercial application. It is likely that EA will receive even more focus as IT environments continue to grow in complexity and heterogeneity.

Despite this widespread acceptance of EA as a valuable IT discipline, there are several serious challenges that contemporary EA approaches are yet to overcome. These arise from the fact that currently, there is no *unified* EA modelling language that is also *easy to use*. A unified EA modelling language is one that is able to describe a wide range of IT domains using a single modelling notation. Without a unified, easy to use EA modelling language, it is impossible to create integrated models of the enterprise. Instead, a variety of modelling languages must be used to create an EA, leading to enterprise models that are inconsistent, incomplete and difficult to understand. The need to use multiple modelling languages also places a high cognitive load on modellers and excludes non-IT specialists from developing or using these models, even though such people may be the most important stakeholders in an EA program.

The research presented in this thesis tackles these problems by developing a metaphor-based approach to the construction of unified EA modelling languages. Contemporary approaches to the understanding of metaphor are surveyed, and it is noted that one way to understand metaphor is to view it as part of a dynamic type hierarchy. This understanding of metaphor is related to the development of enterprise models and it is shown that highly abstract metaphors can be used to provide conceptually unified models of a range of enterprises and their component structures.

This approach is operationalised as methodology that can be used to generate any number of unified EA modelling languages. This methodology is then applied to generate a new, unified EA modelling language called 'LEAN' (Lightweight Enterprise Architecture Notation).

LEAN is evaluated using a mixed-methods research approach. This evaluation demonstrates that LEAN *can* be used to model a wide range of domains and that it is easy to learn and simple to understand.

The application of the theoretical principles and methodology presented in this thesis can be expected to improve the understandability and consistency of EA's significantly. This, in turn, can be expected to deliver significant tangible business benefits through improved strategic change management that more closely aligns the delivery of IT services with business drivers.

The findings in this research also provide fertile ground for further research. This includes the development and comparative evaluation of alternative unified languages, further research into the use of the methodology presented to align architectures at various levels of abstraction, and the investigation of the applicability of this theoretical approach to other, non-IT disciplines.