



Joseph Goguen

## Preface

Joseph Goguen is one of the most prominent computer scientists worldwide. His numerous research contributions span many topics and have changed the way we think about many concepts. Our views about data types, programming languages, software specification and verification, computational behavior, logics in computer science, semiotics, interface design, multimedia, and consciousness, to mention just some of the areas, have all been enriched in fundamental ways by his ideas.

Considering just one strand of his work, namely, the area of algebraic specifications, his ideas have been enormously influential. The concept of initiality (or co-initiality) that he introduced is now a fundamental concept in theoretical computer science applied in many subfields. The Clear formal specification language was the first language with general theory composition operations based on categorical algebra. Such generality inspired Goguen and Burstall to propose institutions as a meta-logical theory of logics, so that Clear-like languages could be defined for many logics. The OBJ language, one of the earliest and most influential executable algebraic specification languages, also incorporated the Clear ideas. Categorically based module composition operations had an enormous influence not only in formal specification, but also in software methodology: his parameterized programming methodology predates by about two decades more recent work on generic programming. These ideas, and many others that he has pioneered, reverberate through the pages of this volume, in which entire chapters are devoted to some of them. Furthermore, there are several regular scientific meetings of an international scope, including the CALCO and AMAST conferences and the WADT Workshop, dedicated to ideas either initiated or directly influenced by Joseph Goguen. There are also a number of important languages that have been influenced by his CLEAR and OBJ algebraic specification languages, including: ACT1, ML, CASL, Maude, CafeOBJ, and ELAN.

A common thread in his work is the use of abstract algebra, particularly of categorical algebra, to get at the core of each problem and formulate concepts in the most general and useful way possible. Algebraic and logical methods are then deployed to provide a rigorous account of meaning, both in computational systems and in semiotic systems. Furthermore, in areas in which social aspects are involved, a humanistic perspective is combined with mathematical and computational perspectives to do justice in a non-reductionist and critical way to a wide range of human phenomena, including phenomena arising from the use or misuse of computer systems in concrete social situations.

This Festschrift volume, published to honor Joseph Goguen on his 65th birthday, includes refereed papers by leading researchers in the different areas spanned by Joseph Goguen's work. These papers were presented at a symposium in San Diego, California, June 27-29, 2006 to honor Joseph Goguen's 65th birthday on June 28, 2006. Both the Festschrift volume and the symposium will allow the

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articulation of a retrospective and prospective view of a range of related research topics by key members of the research community in computer science and other fields connected with Joseph Goguen's work. We think that the papers speak for themselves and provide a wonderful overview of Joseph Goguen's enormously influential ideas in one of the best ways possible, namely, by reflecting on how they have become and are part of a vast scientific dialogue.

We feel privileged to edit this volume. For us it is a way of expressing our admiration, our gratitude, and our friendship to Joseph Goguen. The four of us worked closely together at SRI's Computer Science Laboratory designing and implementing the OBJ2 language during the 1983-4 academic year. The scientific enthusiasm, camaraderie, and friendship of that relatively short but very influential period have grown over the years and have had a great impact on our lives. We are most grateful to all the authors who responded enthusiastically to our project and have contributed an excellent collection of papers for this volume. We are also very thankful to all those, both authors and nonauthors, who have helped us in the refereeing process to achieve a well-finished scholarly volume, and to Alfred Hofmann at Springer who has encouraged our project from its early stages and has provided valuable advice. Keith Marzullo and Briana Ronhaar at UCSD deserve very special thanks as, respectively, Local Chair of the Symposium and Main Local Coordinator. Funding from the US Office of Naval Research to partially support both this Festschrift volume and the symposium through ONR Grant N00014-06-1-0280 is also gratefully acknowledged. We are particularly grateful to Ralph Wachter at ONR, who early on encouraged our project for the Festschrift volume and the symposium. Last but not least, we warmly thank Joseph Hendrix at UIUC for his invaluable and untiring help in preparing this volume.

April 2006

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Algebra, Meaning, and Computation

Essays dedicated to Joseph A. Goguen on the Occasion  
of His 65th Birthday

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2006, XXXVIII, 650 p., Softcover

ISBN: 978-3-540-35462-8