The **Chapter Proposal Submission Deadline** has been **extended** to the **28th of January 2010**.

We are pleased to invite you to submit your proposals for the contribution of chapters to the **"Handbook of Research on Computational Science and Engineering: Theory and Practice"**. The following outline identifies objectives for this manuscript collection, as well as suggestion of some possible topics on which you may wish to contribute. You are, however, not limited to these topics. Please feel free to propose any topics that you think are critical issues in the theme.

Please forward this call to colleagues and those with an interest in CSE.

--------------- INTRODUCTION:

CSE is an emerging, rapidly developing, and potentially very significant force in changing scientific practice by offering a 'third way' of carrying out research in addition to, or indeed, instead of, theory and experiment.

This handbook will provide a basic reference text for the fundamental elements making up CSE and showing their interdependence in a way that (a) reviews state of the art and current achievements; (b) explores imminent developments that will advance the state of play; and (c) presents these in a form accessible to as wide an audience of interested parties as possible.

Since this handbook is produced in a time of transition, it will invite key figures to evaluate the state of play in their specialist areas and to identify main lines of future development, attempting to survey the critical elements in CSE, ranging from fundamental technological developments, through pioneering applications of computational sciences to the impact on the organisational infrastructure of scientific research, particularly with respect to the level and integration of the multiple resources and competences involved in a way that alerts readers to the hurdles facing further development of computational science in their discipline, as well its advantages.

Over time the techniques used in CSE have broadened as more academic disciplines use computers as research tools. While social scientists are still not great users of academic HPC services or CSE, there is an adoption pathway from the natural sciences through the humanities to the social sciences and arts in the western world via central government's funding for the development of eScience. Equally, there is an adoption pathway from the developed world to the developing world. In a world of globalised Internet access amongst researchers, CSE is, from the beginning, a means of inter- and multi-national research collaboration. Equally, by its very nature, CSE involves interdisciplinary collaboration in order to produce meaningful results, often between computational specialists and different scientific disciplines.

--------------- OBJECTIVES OF THE BOOK:

This handbook is timely, since the development of computing and its application in the sciences are undergoing paradigm shifts and CSE is achieving takeoff. Until the present, however, much of the discussion about and understanding of CSE has been confined to high performance computing (HPC) and its concern with disseminating the use of the latest developments in computer hardware; but the situation is changing and there is a need to familiarise a much wider audience with a much wider range of issues in CSE which can be done through the handbook's twinned emphasis on theory and practice.

The handbook aims at a comprehensive and organised survey of the state of research in CSE. The chapters should be designed to report on advanced developments, but, as this is such a cross-disciplinary field, the contributors are not expected to be writing exclusively to people within their own specialisms, so whilst one reader can usefully consult the book for up-to-date work in their own

specialism, it is important that readers outside that specialism can also access its contents as a means of understanding the topography of computational science and guiding the reader to sources of more advanced understandings. Each chapter should clearly focus on the research role of computational science, but be framed into the context of the book, which is meant to capture the architecture of computational science. In this way, the handbook will discuss the field of computational science rather than the research outputs of the various disciplines that currently use the methodology which are diffuse, reported separately, and largely not read by those interested in the general field.

--------------- TARGET AUDIENCE:
This handbook is designed to act as an information source for those largely unfamiliar with the nature and potential of computational science or those involved in the low-end who wish to up their game. It aims to be of use to research decision makers as well as to scientific researchers, making them aware of the nature and range of developments now under way, allowing the reader to understand long term implications of early technology choices that may later create problems that will be difficult to rectify. It will also act to familiarise those in computational disciplines with the ways in which their skills and interests interface with scientific work, enabling research beginners to understand what computational resources and technologies can be applied in their field, and how these are currently being exploited in cutting edge work. Equally, it alerts research scientists to the priorities and concerns of computational specialists. Although many key developments are now concentrated in the most advanced industrial economies such as the U.S. and Europe, the handbook will reflect the extent to which CSE and eScience are an increasingly globalised and globalising activity.

--------------- RECOMMENDED TOPICS:
Contributions are invited from experts in CSE who have specialist knowledge of numerical methods, high performance computing, visualization, developing/using domain specific applications, project management, policy making, security, education and the sociological issues to do with its adoption, organisation, collaboration, and cross-disciplinary nature.

Topics may include, but are not limited to, the following:

  -- **Hardware trends:** trends in computer architecture, trends in chip architecture, chip architecture and the suitability for particular problem types, IO trends and the affect on the IO bottleneck, optimisation of architecture for particular problem types

  -- **Numerical methods:** the use and development of numerical methods for particular applications, optimisation for interactivity (levels of detail), evaluation of numerically based software, porting numerical software

  -- **Programming paradigms:** new languages, changing demands for languages

  -- **Visualization:** review the state of the art of well known application areas, new applications to visualization, design and development, user assessment, collaborative environments, computational steering, visualization in interactive physics (simulation as a part of virtual reality and games)

  -- **Software development tools and practices:** review of the tools available for parallel code development and optimisation (challenges and open-source options) , review of CASE tools for serial code development (challenges and open-source options), "best practice," the importance of standards and accreditation

-- **Case studies:** state of the art applications, new applications to CSE, moving from serial to parallel, evaluation including comparing real results to computational results, computation in design, prototype engineering, the use of visualization, the use of collaborative working environments, eScience (CSE delivered through the GRID and/or Web)

  -- **Organisational and sociological issues:** communicating science to the public, security (both computer based and socially based), multi-disciplinary and/or international practices in collaborative code development , multi-disciplinary and/or international issues in the evaluation of results and allocation of success to each party, exploration of the sociological factors affecting multi-disciplinary collaboration, technology transfer of the CSE method, technology transfer of computational (numerical) methods across disciplines that use CSE, technology transfer of visualization across disciplines that use CSE, opportunities for training and skill development

The book is directed at both the academic and non-academic audience including researchers, users, organisations, policy initiators, students and practitioners in the field, meaning that chapters should address advanced issues, but should attempt to do this in a manner accessible to non-specialists.

--------------- SUBMISSION PROCEDURE:
Researchers and practitioners are invited to submit on or before **January 28, 2010,** a 2-3 page chapter proposal clearly explaining the mission and concerns of his or her proposed chapter. The web site **http://www.cse-book.com/** is dedicated to the development of this handbook and submissions will be received through this site. Authors of accepted proposals will be notified by **February 7, 2010** about the status of their proposals and sent chapter guidelines. Full chapters are expected to be submitted by **August 15, 2010**. All submitted chapters will be reviewed on a double-blind review basis. Contributors may also be requested to serve as reviewers for this project.

Should you have any questions or concerns, please do not hesitate to contact us at editor@cse-book.com.

--------------- PUBLISHER:
This book is scheduled to be published by IGI Global (formerly Idea Group Inc.), publisher of the "Information Science Reference" (formerly Idea Group Reference), "Medical Information Science Reference," "Business Science Reference," and "Engineering Science Reference" imprints. For additional information regarding the publisher, please visit http://www.igi-global.com. This publication is anticipated to be released in 2010.

--------------- IMPORTANT DATES:
January 7, 2010:   Proposal Submission Deadline
January 28, 2010:   Extended Proposal Submission Deadline
February 7, 2010:   Notification of Acceptance
April 30, 2010:   Full Chapter Submission
July 15, 2010:   Review Result Returned
August 15, 2010:   Final Chapter Submission
September 15, 2010:   Final deadline