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PREFACE: ENHANCING INNOVATION AND COMPETITIVENESS THROUGH SIMULATION

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If the state-of-the-art, in any field, is satisfactory, it may be worthwhile to preserve it. But, no advancement is ever possible by preserving the status quo. Furthermore, for a creative mind, the world view pertaining to a topic cannot be limited by the current state-of-the-art.

Generation of new ideas which might lead to a worthwhile change, i.e., innovation, requires a rare ability to conceive and perceive reality from radically different perspective(s). Modes and characteristics of innovation are summarized in Table 1 where the possibilities range from innovate to oppose, passing through support, pseudo-support, and ignore.

There is no substitute to the intellectual disposition to innovate. Furthermore, to increase the value of innovative thinking, the ideas have to be transformed into wealth production through generation, promotion, and distribution of appreciated products and/or services in a timely and competitive way. To be able to achieve these goals, the philosophies of institutions (academic, commercial, and governmental) as well as countries need to be nurtured to promote both innovative thinking and the transformation of ideas into wealth production. In doing so, the agencies should also realize that innovation is a highly non-linear phenomenon.

Competition based on rivalry is not sufficient for long-term success. Competition is the essence of progress and necessitates the ability, willingness and drive to surpass oneself. Those –be it an individual, an institution, or a country– unable to surpass themselves cannot exceed others. Therefore, in achieving progress, what is difficult is to supersede oneself; then outdoing and even eclipsing others may become possible.

Simulation, that is goal-directed experimentation with dynamic models, can play a key role in testing innovative ideas in a gamut of application areas. In the call for papers of the SCSC'95, for example, we listed almost thirty application areas for simulation. This list (see Table 2) is not meant to be exhaustive. Furthermore, some listed application areas, such as engineering applications, may themselves encompass hundreds of distinct applications.

Table 1.
Modes and Characteristics of Innovative Thinking

Modes	Characteristics
Innovate	- Intellectual disposition to perceive and conceive reality from radically different perspective(s)
Support	- Intellectual disposition - Commercial or other benefit(s)
Pseudo-support	- Support or follow anything fashionable
Ignore	- Uninformed - Not realizing consequences - Unrelated field
Oppose	Due to: - Mental inertia - Commercial or other interests (NIH: Not Invented Here) - Opposite views

The theme of SCSC'95 is "Enhancing innovation and competitiveness through simulation." Indeed, simulation is essential in enhancing innovation and competitiveness in all

types of system problems, e.g., in design, analysis, and control.

Table 2
Some Application Areas of Simulation

Aerospace applications
Automotive and land vehicles
Autonomous intelligent systems and robotics
Business re-engineering
Computer architecture
Computer systems and networks
Defense systems
Distributed interactive simulation (DIS)
Distributed simulation
Embedded systems
Energy systems
Engineering applications
Environmental simulations
Government applications
Health care and health sciences
Intelligent vehicle highway systems
Management information systems
Manufacturing/CAD/CAM/CAE/CIM
Marine and undersea applications
Mission Earth
Natural sciences applications
Performance evaluation of parallel and distributed systems
Process control
Real-time systems
Simulation in education
Simulators for training
Telecommunications
Transportation systems
V/V for nuclear fuel waste management systems

In any *design* problem, a model has to precede its realization, namely, reality. In such problems, designers are free from the limitations of existing reality. Once a parametric design (or model) is created, an analyst can test it under several conceivable experimental conditions. As it is well known to simulationists, "reality is a special case of simulation." In *analysis* problems, simulation allows testing a multitude of hypotheses about reality as represented by models. In *control* problems, simulation allows testing of the behavior of a model under feasible, rare, and extreme conditions.

A word of caution is in order: The precision of a measurement is irrelevant when the metric is wrong. Therefore, if the outcome of a measurement of a complex phenomenon is not satisfactory, before focusing on the calibration of the instruments of measure, one has to verify the appropriateness of the metric. Similarly, if simulation is not enhancing innovation and competitiveness, one has to focus on the goal of the study and the way we perceive the problem and its environment. After all, the way we perceive and conceive reality can either limit or enhance our abilities to handle it.

The Society for Computer Simulation International has a well established tradition of sponsoring high caliber conferences and publications. Along this line, the articles in the SCSC'95 proceedings are contributing to and advancing the state-of-the-art of both methodological aspects and applications of simulation in diverse fields.

As organizers of the SCSC'95 and co-editors of the proceedings, my colleague Dr. L.G. Birta and myself, have taken particular care to ensure the prevailing high standards. The contributions of the Group and Session Organizers and Chairs as well as the care and dedication of the authors are gratefully acknowledged while we pass the flag to other colleagues in the continuing challenge of enhancing the power as well as reliability, usability and usefulness of simulation in a wealth of application areas.