Simulation and Promising Future

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To organizers
&
To students
Experiments and experience are the essence of modeling & simulation (M&S).

• Simulation is performing goal-directed experiments using a model of a dynamic system.

• Simulation is gaining experience, by use of a representation of a system,
  • to enhance any one of three types of skills:
    - motor skills (by virtual simulation, or simulators),
    - decision making and communication skills
      (by constructive simulation, gaming simulation),
    - operational skills (by live simulation); or
  • for entertainment (simulation games)

Another meaning of “experience” is also used in everyday parlance:
“Experience is the name every one gives to their mistakes.”

(Oscar Wilde)

It takes wisdom to learn from experience (+ | -) of others.
What They Didn't Teach You in Graduate School: 199 Helpful Hints for Success in Your Academic Career
Paul Gray, David E. Drew
Illustrated by Matthew Henry Hall
Foreword by Laurie Richlin, Steadman Upham
Publisher: Stylus Publishing

“* 199 tips for getting your PhD and surviving and thriving in your first years of teaching”
CHAPTER THREE: JOB HUNTING

17) Job hunting is a research project; 18) Go where you and your family want to live; 19) Build a reference pool; 20) References are important; 21) Interview your potential boss; 22) If You produced more research than they did; 23) Find the best possible school; 24) Get the PhD before you start the tenure track; 25) Non-university research organizations; 26) Don’t take the 1st job at your PhD school; 27) The Assistant Dean strategy; 28) Effect of Supply and demand; 29) Determine the culture; 30) Need for Salary and tenure information; 31) Getting tenure data; 32) The Post Doc option; 33) Change your career every seven years; 34) Ask about retirement system; 35) Coping with parking; 36) Real pay; 37) Get offer in writing; 38) Potential of other employment"
What They Didn't Teach You in Graduate School: 199 Helpful Hints for Success in Your Academic Career
Paul Gray, David E. Drew

Chapters
1. BASIC CONCEPTS
2. THE PHD
3. JOB HUNTING
4. TEACHING AND SERVICE
5. RESEARCH
6. TENURE
7. ACADEMIC RANK
8. SALARY
9. LIFE AS AN ACADEMIC
10. DIVERSITY
11. ON WRITING
12. ON PUBLISHING
13. PERSONAL ITEMS
14. FINAL THOUGHTS

Appendices:
A. THE DISSERTATION
B. OUTSIDE INCOME
C. WRITING HINTS
D. OUR HEALTH

Three Aspects of **Professionalism** in M&S*  
(1: activities, 2: knowledge, 3: conduct and monitoring)

| 1.1 Generation of products and/or services to solve problems (Industry) | 3.1 Professional and ethical conduct  
(Both voluntary and required) |
|---|---|
| 2.1 M&S BoK  
(Body of Knowledge) | 2.2 Science |
| 2.3 Engineering & Technology | 2.4 Application area(s) |
| 2.5 Code of professional ethics | 3.2 Certification of:  
- *Individuals* as M&S professionals  
- *Companies* for their maturity levels |
| 1.2 Generation & dissemination of knowledge  
(Academia, R&D) | 1.3 Funding  
(Governmental agencies, users, interest groups) |

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SimEthics - A Code of Professional Ethics for Simulationists
(Please note that the official site of SimEthics is at: http://www.scs.org/ethics/)

The Code has been adopted by (In order of adoption)
SCS - Society for Modeling and Simulation International (Resolution)
MISS - Mcleod Institute of Simulation Sciences (Resolution) (To see: MISS Centers)
M&SNet - McLeod Modeling and Simulation Network (Resolution) (To see: Member Organizations)
SISO - Simulation Interoperability Standards Organization (Resolution)
SISO Canada (Resolution)
AMSC - Alabama Modeling and Simulation Council (Resolution)
Student Chapters of SCS
NMSG - NATO Modeling and Simulation Group (Resolution)
DLM - (Resolution) (Members)
CMSP - Certification of Modeling and Simulation Professionals.
By the M&SPCC (Modeling and Simulation Professional Certification Commission) (Requirement)
METU Student Chapter of the SCS
Meteksan - Meteksan Defense Industry Inc. (Meteksan Savunma Sanayii A.Ş. - in Turkish)
(Resolution - in English, in Turkish,
in Turkish at MSI (Military Science & Intelligence) April 2009, p. 34)
Some reasons why you are lucky to have chosen M&S as your profession:

“Preaching the convert?”

Modeling and simulation is very important and its importance has been recognized at several levels:
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1. “In The Coming of Post-Industrial Society (1973), American sociologist Daniel Bell (1919–) outlined a new kind of society with the following characteristics:
   • a shift from manufacturing to services
   • the centrality of the new science-based industries
   • the rise of new technical elites and the advent of a new principle of stratification.”

   Among other things, Bell pointed out the importance of simulation as follows: In Post-industrial industries,

   Strategic resource – Knowledge
   Methodology – Abstract theory: models, simulations, decision theory, systems analysis.

Models have data generation abilities! (Superiority of model bases over databases)
Simulation models can generate trajectory and structural behavior

Tuncer Ören
Modeling and simulation is very important and its importance has been recognized at several levels:

2. Some developments:

- 150 Modeling and simulation associations and groups.

- Tuncer Ören’s share of contributions to advance M&S and Normative Views.

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Modeling and simulation is very important and its importance has been **recognized** at several levels:

3. In USA:

- **High Level Recognition of M&S:**
  US Congressional Modeling and Simulation **Caucus** *(News)* (Congressman J. Randy **Forbes**)

- **As a testimony of high level recognition of M&S see:**
  USA - **House Resolution 487** (2007 July 16)
  USA - Enhancing SIMULATION
    *(Safety In Medicine Utilizing Leading Advanced Simulation Technologies to Improve Outcomes Now)*
  USA - A companion bill - S. 616 (2009 March 17)
Modeling and simulation is very important and its importance has been recognized at several levels:

4. In China:

• Since 1985, most universities in China have master and Ph.D programs on the direction of modeling and simulation technology under related discipline such as computer science, mathematics, mechanical engineering, and automation.

• According to the investigation of CASS (China Association for System Simulation), during the last decade, there are 85,964 master students and 19,657 Ph.D students graduated from system modeling and simulation technology in the top 100 universities in China.

• Modeling and simulation technology is being considered to be established as a first class discipline by the Ministry of Education of China under the proposal of most Chinese universities and CASS [1].

Bo Hu Li, From 2010-01 January issue of SCS M&S Newsletter
Modeling and simulation is very important and its importance has been recognized at several levels:

5. In other countries and regions:

THE NATIONAL INTELLIGENCE COUNCIL'S 2025 PROJECT: Global Trends 2025: A Transformed World

NIC 2008-003, November 2008

Chapter 3: The New Players
Rising Heavyweights: China and India
Other Key Players: Russia, European Union (EU), Brazil

Especially at the beginning, it may be expected that EU would realize importance of modeling and simulation and declare it & act accordingly.
Some (technological and scientific) reasons why you are lucky to have chosen M&S as your profession:

- As of 2009 November, **1.75 petaflops** (peta FLoating point Operations Per Second) is possible. (peta = million * billion)

For comparison: “pre-1960 to 1971 average speed rating of computers was based on calculations for a mix of instructions with the result given in Kilo Instructions Per Second (KIPS).”

“Given the current speed of progress, Supercomputers are projected to reach 1 exaflops in 2019. [22] Cray, Inc. announced in December 2009 a plan to build a 1 exaflops supercomputer by the end of the 2010s. [23] Erik P. DeBenedictis of Sandia National Laboratories theorizes that a Zettaflops computer is required to accomplish full weather modeling, which could cover a two week time span accurately. [24] Such systems might be built around 2030. [25]”

peta = 10^{15}, exa = 10^{18}, zetta = 10^{21}. Be ready for the opportunities!
Some \textit{(technological and scientific)} reasons why you are lucky to have chosen M\&S as your \textit{profession}:

- Already, it is well accepted that simulation modeling has to be based on \textit{mathematical system theories}.

For a \textit{rationale}, consider the case of a \textit{carpenter} to build a \textit{cottage} and an \textit{engineer} to build a \textit{skyscraper}.

\textbf{Also consider:}

\textbf{Ability} to \textit{build} and \textbf{requirements} from \textit{users}.
An example:


Rankings are based on citations to articles on SIMULATION journal site from articles in HighWire-hosted journals. (abstract)

*The Editor-in-Chief –at the time– took almost a year and several strong complaints from the authors, to accept the article.
Two personal views to share on this occasion:
No progress is ever possible by keeping the status quo!

Emulate nature; keep blooming!
• 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.

A few wishes for our profession:
On **Professionalism** in Modeling and Simulation:

► Some professions require **certified professionals** such as:
  • Professional engineers
  • Professional dentists

► Simulation studies, regardless how important they are, do not require –yet– certified simulationists.

► Certification of individual simulationists are possible: M&SPCC (Modeling and Simulation Professional Certification Commission) ([Requirement](#))
  but they are not required –yet–
  to perform important simulation studies.
Hope that certified professional simulationists will be required for important simulation studies.

Software engineering has capability maturity model.

Hope that:
1. similar capability maturity model will be developed for M&S;
2. simulation companies will be certified about their maturity levels; and
3. simulation studies will be allocated according the required maturity levels of the studies.
“Would you tell me, please, which way I ought to go from here?”
“That depends a good deal on where you want to get to,” said the Cat.
“I don’t much care where –” said Alice.
“Then it doesn’t matter which way you go,” said the Cat.
"– so long as I get somewhere,“ Alice added as an explanation.
"Oh, you're sure to do that," said the Cat, "if you only walk long enough."

Alice’s Adventures in Wonderland (1865)

Lewis Caroll (Pen name of Charles Lutwidge Dodgson (1832-1898)
English author, mathematician, logician, Anglican deacon and photographer.)
(from Wikipedia)
To my future colleagues:

Good luck*
in your careers!

*“Luck is what happens when preparation meets opportunity.”

Seneca – Roman philosopher, mid-1st century AD