

Modeling, Simulation & Visualization  
Student Capstone Conference  
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# Simulation and Promising Future

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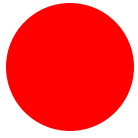




To organizers

&

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](#)

March 2008 , 128 pp.

“\* 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:

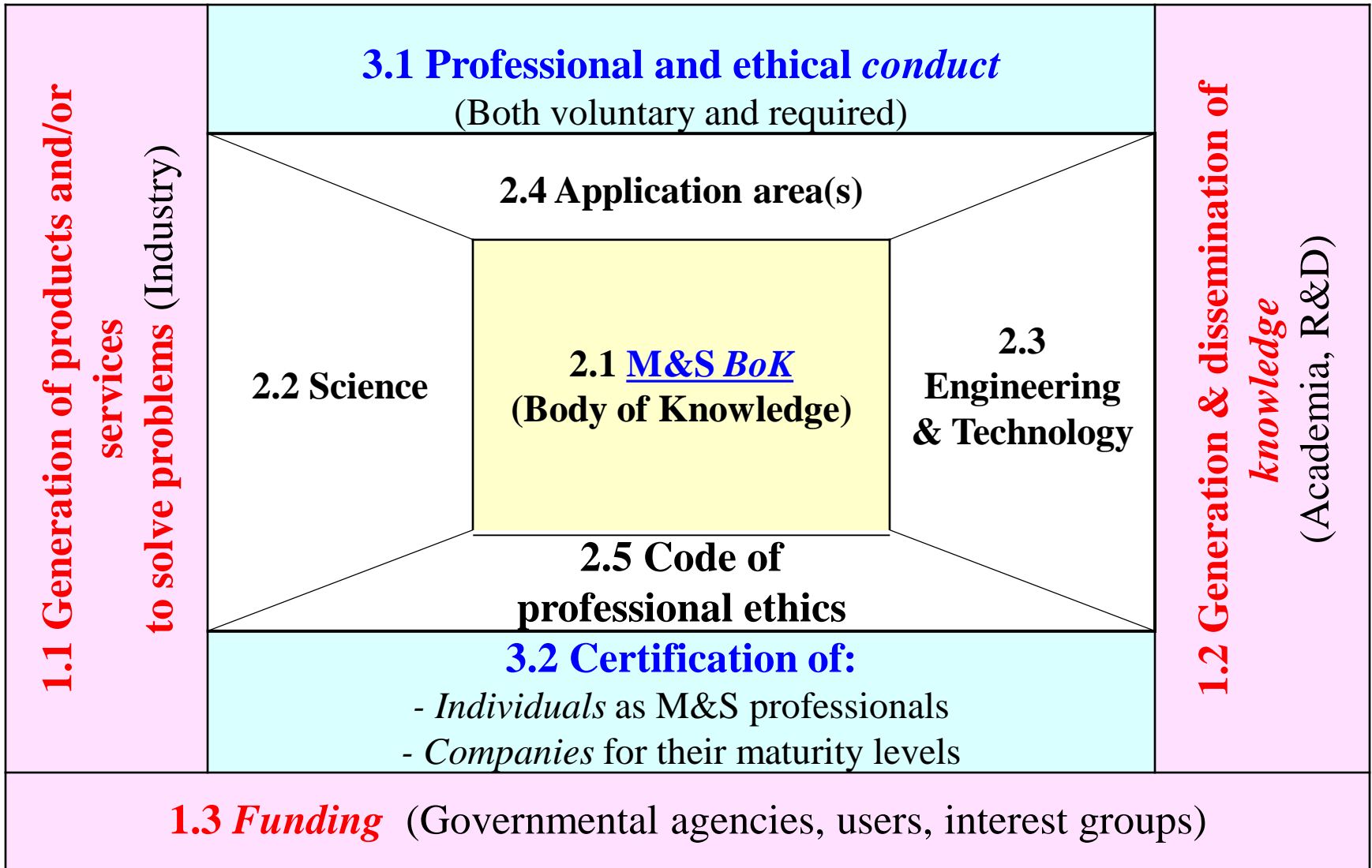
- A. *THE DISSERTATION*
- B. *OUTSIDE INCOME*
- C. *WRITING HINTS*
- D. *OUR HEALTH*

<http://stylus.styluspub.com/Books/BookDetail.aspx?productID=171247>



# Three Aspects of **Professionalism** in M&S\*

(1: **activites**, 2: knowledge, 3: **conduct and monitoring**)



\* Ören, T.I. (2010–In Press). Simulation and Reality: The Big Picture. (Invited paper) International Journal of Modeling, Simulation, and Scientific Computing (of the Chinese Association for System Simulation - CASS), the World Scientific Publishing Co. China, 1:1, 1-25.



# **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.

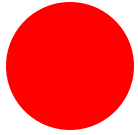
By the [M&SPCC](#) (Modeling and Simulation Professional Certification Commission) ([Requirement](#))

**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:

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

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.

	1970s	1980s	1990s	2000s	2010s	total
Publications	14	28	16	51	1	110
Presentations & other activities	8	28	13	13		62
total	22	56	29	63	1	172



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

(**S**afety **I**n **M**edicine **U**tilizing **L**eading **A**dvanced  
Simulation **T**echnologies to **I**mprove **O**utcomes **N**ow)

Act of 2009 – [H.R. 855/S. 616](#) (2009 February 4)

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 <sup>[1]</sup>.

*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](#)

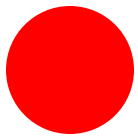
*NIC 2008-003, November 2008*

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 **F**loating point **O**perations **P**er **S**econd) 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.<sup>[22]</sup> Cray, Inc. announced in December 2009 a plan to build a 1 exaflops supercomputer by the end of the 2010s.<sup>[23]</sup> 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.<sup>[24]</sup> Such systems might be built around 2030.<sup>[25]</sup>”

**peta =  $10^{15}$ , exa =  $10^{18}$ , zetta =  $10^{21}$ . Be ready for the opportunities!** 16



Some (*technological and scientific*) reasons why **you are lucky** to have chosen **M&S** as your **profession**:

- Already, it is well accepted that simulation modeling has to be based on *mathematical system theories*.

For a **rationale**, consider the case of a *carpenter* to build a *cottage* and an *engineer* to build a *skyscraper*.

Also consider:  
*Ability* to build and  
*requirements* from *users*.

An example:

Ören, T.I., Zeigler, B.P. (1979\*). **Concepts for Advanced Simulation Methodologies**. *Simulation*, 32:3, 69-82. [SAGE Journals Online](#).

([One of the 50 Most-Frequently Cited Articles in SIMULATION](#) (6/50) as of March 1, 2010 -- updated monthly.)

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.

# AGENT-DIRECTED SIMULATION AND SYSTEMS ENGINEERING

Edited by  
LEVENT YILMAZ AND TUNCER OREN



 WILEY

At [Wiley](http://www.wiley.com)





Two personal views to share on this occasion:



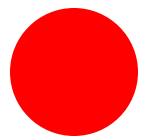
**No progress is ever possible  
by keeping the status quo!**



**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.

Ören, T.I. (1995). [Enhancing Innovation and Competitiveness Through Simulation](#). Preface of the Proceedings of 1995 Summer Computer Simulation Conf., Ottawa, Ont., July 24-26, SCS, San Diego, CA., pp. vi-vii.



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 Carroll (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