

SIMULTECH'15, Colmar, France  
July 21, 2015

**Plenary Panel** (organized by Prof. Mohammad Obaidat):

**“Advances in Modeling and Simulation of  
Computer Networks and Systems”**

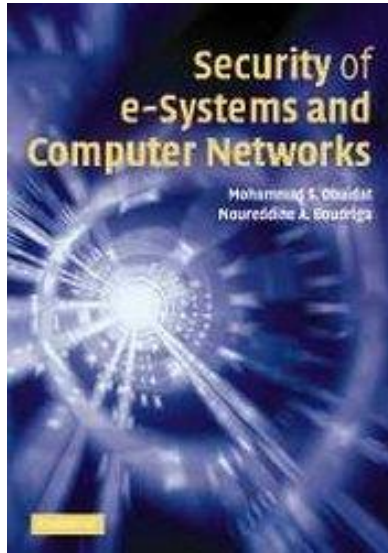
*"I shall either find a way or make one."  
“Inveniam viam aut faciam”*

Hannibal Barca (c. 247 BCE – c. 183 BCE),  
Carthaginian general

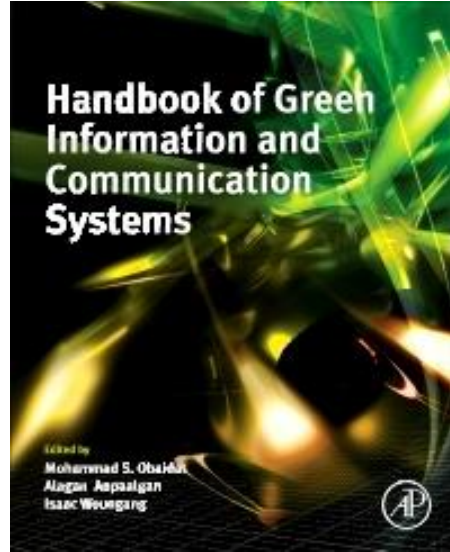
© **Tuncer Ören**, Ph.D.  
Professor Emeritus of Computer Science  
School of Electrical Engineering & Computer Science  
University of Ottawa Ottawa, ON, Canada  
[oren@eecs.uOttawa.ca](mailto:oren@eecs.uOttawa.ca)

[http://www.site.uottawa.ca/~oren/y/2015/07-21-p\\_advances.pdf](http://www.site.uottawa.ca/~oren/y/2015/07-21-p_advances.pdf)

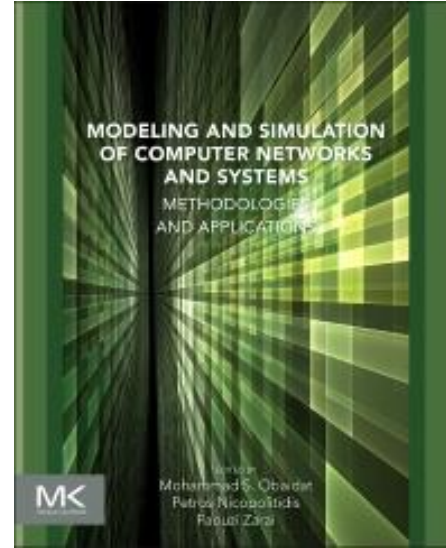
## Some excellent sources (for information and/or inspiration):



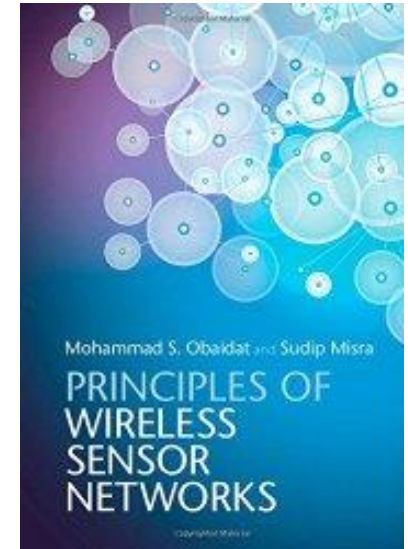
2007



2012



2015



2015

## Some ongoing development areas:

[SoftCom 2015](#): **23<sup>rd</sup>** International Conference on Software, **Telecommunications** and **Computer Networks**, Sept. 16 - 18, 2015, Split-Bol, Croatia

[INNOV 2015](#), The Fourth International Conference on **Communications, Computation, Networks** and Technologies, November 15 - 20, 2015 - Barcelona, Spain.

[SENSORNETS 2016](#): 5<sup>th</sup> International Conference on **Sensor Networks**, February 19-21, 2016, Rome, Italy

[IPDPS 2016](#): IEEE International **Parallel and Distributed Processing** Symposium, May 23-27, 2016, Chicago, IL

[Recent Advances in Green Industrial Networking](#), Special Issue of IEEE Communications Magazine, October 2016

[IEEE Optical Communications Series](#) (bi-annually)

## Some development areas:

- [Programmable wireless networks](#) (Journal)
- [Software Defined Wireless Networks](#) (SDWN), Special Issue
- [Bio-inspired Cyber Security for Communications and Networking](#)
- Virtualization
  - [Virtualized networks](#)
  - [Virtualization of wireless sensor networks](#)
  - [Virtual private servers, Virtual hosting](#)
  - [Virtualization of 5G Servers](#)
  - [Cellular networks on the cloud](#)
  - [ViNOrg'15](#): Fourth International Conference on Virtual and Networked Organizations Emergent Technologies and Tools, Nov. 18-20, 2015. Póvoa de Varzim, Portugal

*Pushing* the boundaries (or *back to the roots*):

“Computer” (etymology):

computer (n.)

- **1640s**, “one who calculates,”
- agent noun from compute (v.). Meaning “calculating machine” (of any type) is from 1897;
- in modern use, “programmable digital electronic computer” (1945 under this name; theoretical from 1937, as *Turing machine*).

.

## Some advancement areas:

**Networked & Social Systems Engineering** (NETS): *“the study of today's networked world of systems and people interconnected by communications networks”*

“**Advances in Social Network Analysis and Mining** (ASONAM)”  
Paris, France, August 25-28, 2015

“**EAI International Conference on Smart Sustainable City Technologies**” (S2CT) Oct. 13-16, 2015, Toronto, ON, Canada  
- Open access network in future sustainable cities

“**IEEE/WIC/ACM International Conference on Web Intelligence 2015**” (WI-IAT 2015). Theme: “Big Data in **Global Brain** and **Social Networks**,” Dec. 6-9, 2015, Singapore

“**IEEE/IFIP Network Operations and Management Symposium**:  
Managing Everything toward a Secure, Smart,  
**Hyperconnected** World,” April 25-29, 2016, Istanbul, Turkey

## Some advancement areas:

“Mayada Omer (2013) [The Resilience of Networked Infrastructure Systems](#), World Scientific

“Saurabh Mittal and José Luis Risco Martin (2013). [Netcentric System of Systems Engineering with DEVS Unified Process](#). CRC Press, Taylor & Francis Group.

(Upcoming Chinese Edition in 2016).

“[Software tool to analyze cities as spatial networks](#)” MIT School of Architecture and Planning, June 2015

“[Internet of Things/M2M from Research to Standards: The Next Steps](#)” Special Issue of IEEE Communications Magazine, August 2015

# Simulation as a powerful infrastructure

To perform **experiments** for all 3 types of system problems for *decision support*, *understanding*, and for *education*

analysis

design

control

To provide **experience** for

**Training** (gaining/enhancing **skills**)

**Motor** skills

*Virtual simulation*

**Decision & communication** skills

*Constructive sim (serious game)*

**Operational** skills

*Live simulation*

**Entertainment**

*Gaming simulation*

**Enjoyable collective experience**


in non-game contexts to solve problems, learning

Gamification



# Simulation as a powerful infrastructure

Type of connectivity		Type of simulation
Operations of the simulation and the real system are	not connected	<i>Standalone simulation</i>
	interwoven (integrated simulation)	To <i>enrich</i> real system's operation <ul style="list-style-type: none"> <li>- online diagnostics (or <b>simulation-based diagnostics</b>)</li> <li>- <b>simulation-based augmented/enhanced reality operation</b> (for training to gain/enhance motor skills and related decision making skills)</li> </ul>
		To <i>support</i> real system's operation <ul style="list-style-type: none"> <li>- parallel experiments while system is running</li> </ul>

A photograph of a bright blue sky filled with large, white, fluffy cumulus clouds. The clouds are scattered across the frame, with some appearing more prominent than others. The overall scene is bright and clear.

Thanks for your attention!