Teaching Performance Modeling 50 Years Later: Where Are We Going?

Vittoria De Nitto Personè
University of Rome Tor Vergata, IT

T e a P A C S, November 12th 2021, Milano, Italy

Outline

The History

A *Performance Teaching* snapshot

Where are We Going?

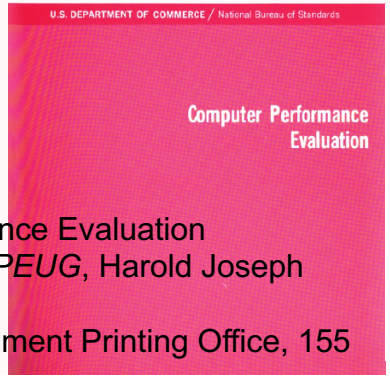
The History

1971

Federal Information Processing Standards (FIPS) Task Group 10 – Computer Component and Systems Performance Evaluation:

> "a self-governing ***Computer Performance Evaluation User's Group (CPUEG)*** whose purpose is to disseminate improved techniques in performance" [1]

The CPEUG collected people "from many United States Governmental agencies involved in various phases of this field a number of academicians as well as analysts from business and industry working in this area, and **this gave rise to the formation within the ACM of SIGME** [Special Interest Group in Measurement and Evaluation] which is currently known as SIGMETRICS" [1]



[1] Ruth M. Davis, 1974. Computer Performance Evaluation In Proceedings of *The Eighth Meeting of CPEUG*, Harold Joseph Highland (Ed.), Vol. Spec. Publ. 401. National Bureau of Standards, U.S. Government Printing Office, 155

2021

To some, computer performance, evaluation and measurement is a tool, a marriage of abstract thought and logic combined with the techniques of statistical and quantitative methods. To others, it is a technique with very heavy reliance on modeling and simulation and simultaneously involves features of both classical experimentation and formal analysis.

The problem of exact specification is made the more difficult by the **recent birth and development of** computer performance, evaluation and measurement as a discipline within computer science

PREFACE

• the emphasis on massive data bases for

for Computing Machinery of SIGME [Special

Evaluation is defined as a "determination or the fixing of a value, to estimate or appraise, to state an approximate cost."

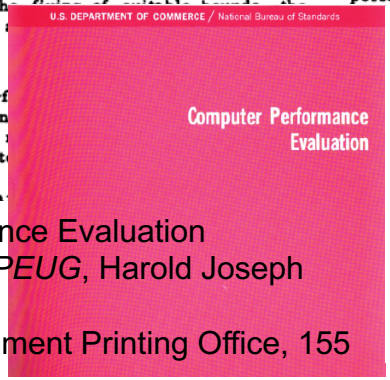
Measurement is defined as a "process of measuring, th regulation by

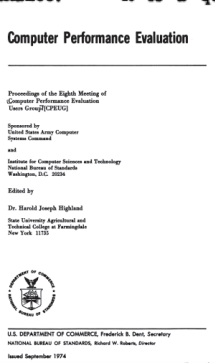
detailed information about a system that he has created, or about which his knowledge is limited. On the other hand, the analyst has used simulation to test various hypotheses about the system in an effort to improve its performance. It is a quixotic hope that as

come more inter-
rk not only of
ticians, but also
analysts and

Computer perf
surement is n
user and the
computer syst
performance,
a tool, a ma

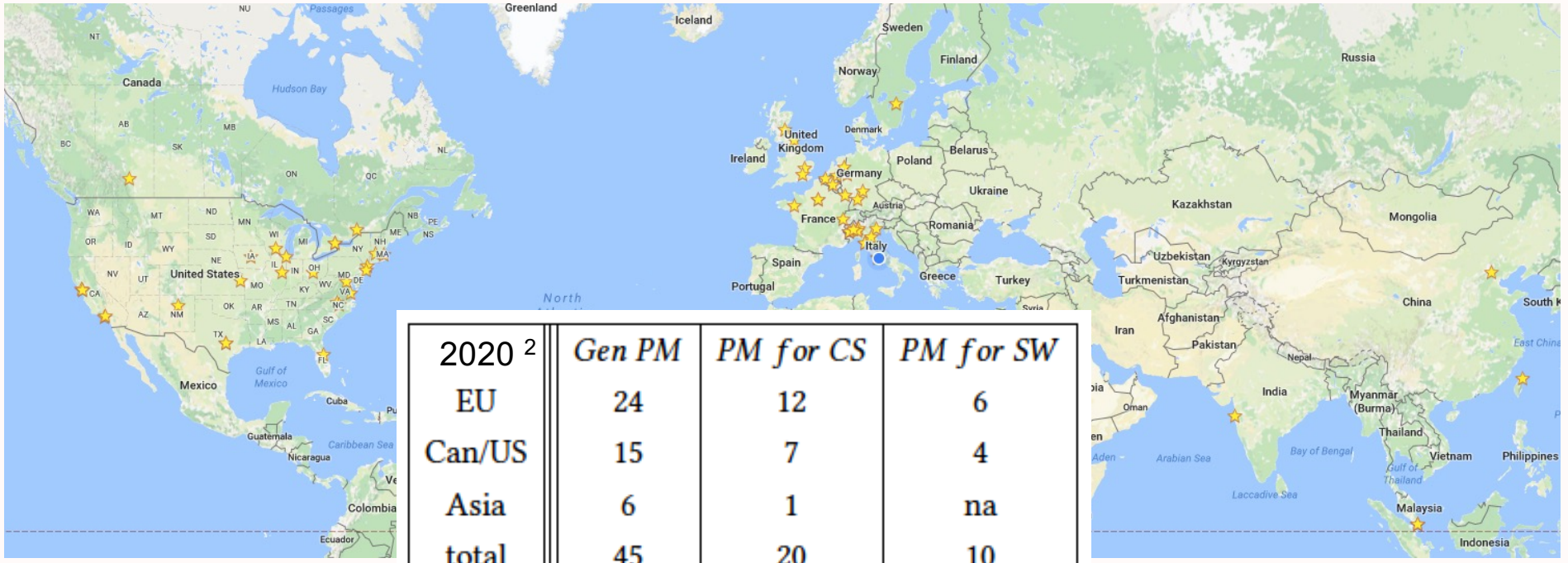
n and measure-
r the computer
of modern elec-
e user of that
ger responsible
well as the
It is cap-
needed answers





[1] Ruth M. Davis, 1974. Computer Performance Evaluation
In Proceedings of *The Eighth Meeting of CPEUG*, Harold Joseph Highland (Ed.), Vol. Spec. Publ. 401.
National Bureau of Standards, U.S. Government Printing Office, 155

A *Performance Teaching* snapshot, 2017 [1]



2020 [2]	*Gen PM*	*PM for CS*	*PM for SW*
EU	24	12	6
Can/US	15	7	4
Asia	6	1	na
total	45	20	10

[1] Vittoria de Nitto Personè, 2017. Teaching Performance Modeling in the Era of 140characters. In ICPE'17 Companion: Proceedings of *The 8th ACM/SPEC on International Conference on Performance Engineering*. ACM, 183–184.

[2] Vittoria de Nitto Personè, 2020. Teaching Performance Modeling in the Era of Millennials. arXiv:2001.08949v1 [cs.CY], https://arxiv.org/pdf/2001.08949.pdf

Performance Teaching evolution

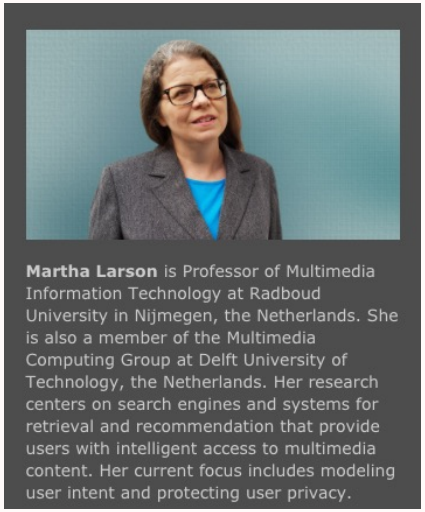
1970s → 1980s → 2010s →

new needs

specialization trend

Chapter 1 Basic Knowledge vs Specialization

- **CS teaching faces with the challenge of preparing students for a future that nobody can anticipate**



Martha Larson is Professor of Multimedia Information Technology at Radboud University in Nijmegen, the Netherlands. She is also a member of the Multimedia Computing Group at Delft University of Technology, the Netherlands. Her research centers on search engines and systems for retrieval and recommendation that provide users with intelligent access to multimedia content. Her current focus includes modeling user intent and protecting user privacy.

«My advice is to enrich your education by diving into subjects that enjoy invariance (persist) over generations.» [1]

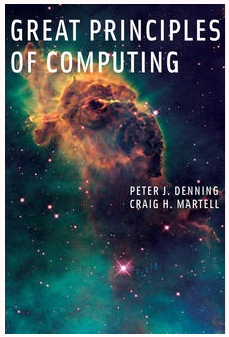
[1] Martha Larson. 2019. People of ACM. https://www.acm.org/articles/people-of-acm/2019/martha-larson

Chapter 1 Basic Knowledge vs Specialization

A short wide-ranging analysis of computing:

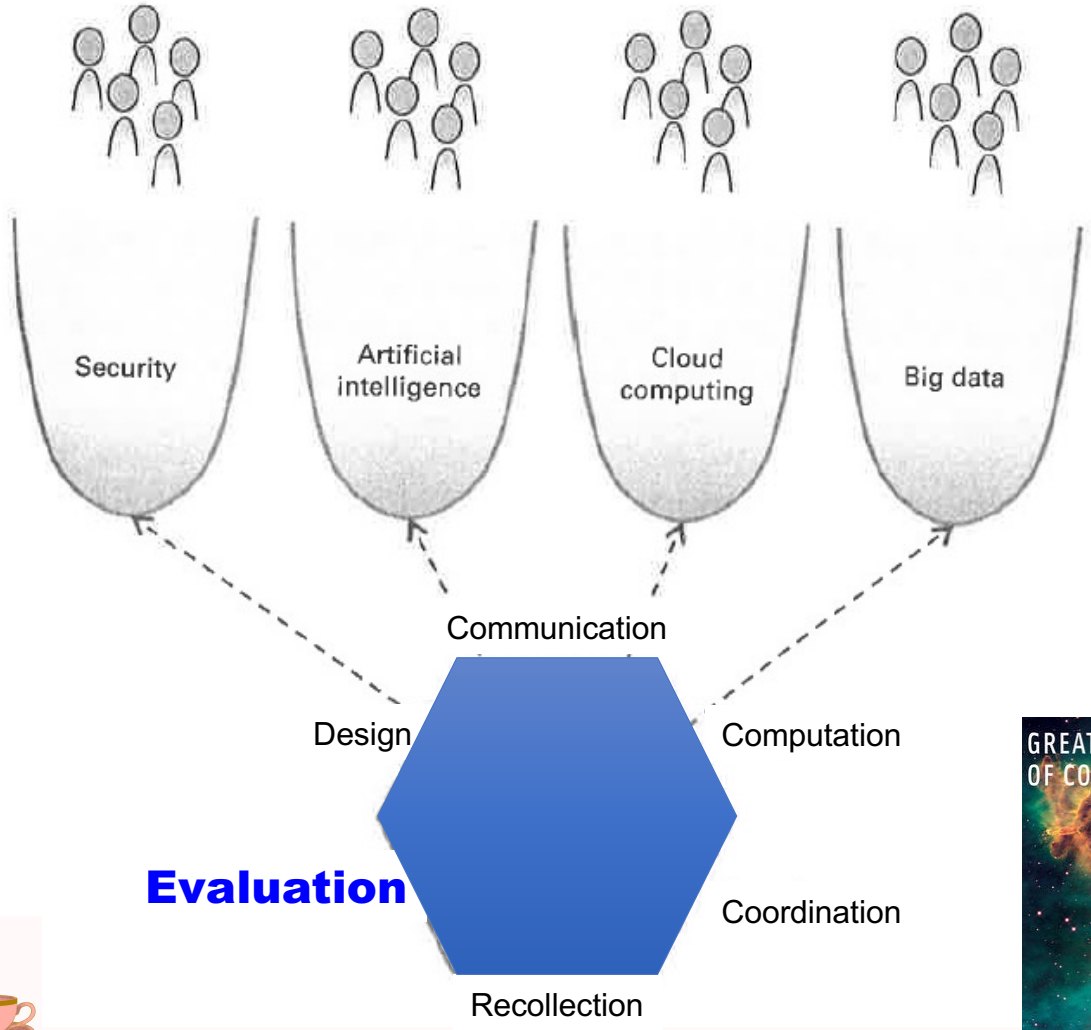
history, evolution, domains…

Identify the principles behind computing



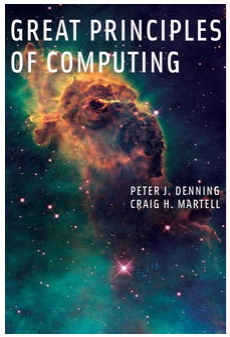
Peter J. Denning and Craig H. Martell, 2015
Great Principles of Computing
https://denninginstitute.com/pjd/GP/GP-site/welcome.html

Chapter 1 Basic Knowledge vs Specialization



"I have strongly advocated that performance modeling and engineering are fundamental parts of computer science"
P. Denning

"The six categories do not divide the computing knowledge space into separate slices. They are like windows of a hexagonal kiosk. Each windows see the inside space in a distinctive way; but the same thing can be seen in more than one window."



Peter J. Denning and Craig H. Martell, 2015
Great Principles of Computing
https://denninginstitute.com/pjd/GP/GP-site/welcome.html

Chapter 2 The Role of University

- **a continuous monitoring activity to identify courses that appear not *productive***

[1] Five Global Challenges and the Role of University
Berkman Faculty Associate, Juan Carlos De Martin
with Berkman Klein founder, Charlie Nesson
The Berkman Klein Center for Internet & Society
https://www.youtube.com/watch?v=DpDei1batXE

Chapter 2 The Role of University

"The aim of higher education is not merely to prepare students for jobs. It is to prepare them to lead, innovate, and contribute meaningfully to the world around them"
SATISH K. TRIPATHI [1]

"Higher learning can offer individuals and societies a depth and breadth of vision absent from the inevitably myopic present. Human beings need meaning, understanding and perspective as well as jobs.
The question should not be whether we can afford to believe in such purposes in these times, but whether we can afford not to."
DREW FAUST

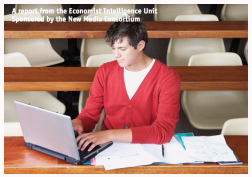
[1] Speaking of Higher Education
University of Buffalo, 2015
http://www.buffalo.edu/president/from-the-president/speaking-of-higher-ed/higher-ed-opportunity.html

[2] The University Crisis of Purpose
The New York Times, Crossroads, 2009
https://www.nytimes.com/2009/09/06/books/review/Faust-t.html

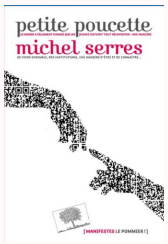
Chapter 3 The New Generation

- **grown up in close contact with digital devices in a world that is always connected**

«note a rise in student plagiarism, cheating and distractability, which they attribute to easy and ready access to mobile technologies.»



The Future of Higher Education: How Technology Will Shape Learning, 2008
The Economist Intelligence Unit
https://files.eric.ed.gov/fulltext/ED505103.pdf



Michel Serres, 2014
Thumbelina: the culture and technology of millennials
Rowman & Littlefield International, 2014.

Moore, K., Jones, C., Frazier, R.S., 2017
Engineering education For Generation Z
Am. J. Eng. Educ. 8, 111–126

Hernandez-de-Menendez M., Escobar Díaz C. A., Morales-Menendez R., 2020
Educational experiences with Generation Z
International Journal on Interactive Design and Manufacturing (IJIDeM) (2020) 14:847–859
https://doi.org/10.1007/s12008-020-00674-9

the excess of Information need to be transformed in Knowledge

Virtual and augmented reality
3D printing
Holograms
Wearable devices
Virtual laboratories
Blockchain

Chapter 3 The New Generation

PRINCETON PRE-READ

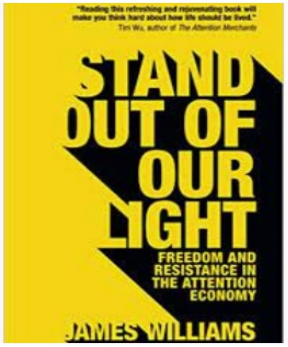
The Princeton Pre-read Tradition

The Pre-read program, initiated by President Christopher L. Eisgruber in 2013, introduces incoming freshmen to Princeton's intellectual life.

Members of the incoming class join together to read and discuss a book that President Eisgruber selects and sends to freshmen prior to their arrival on campus. Freshmen then participate in Pre-read discussions with student leaders during Orientation Week and with President Eisgruber over the course of the academic year. Other University community members also are encouraged to read and discuss the Pre-read selection.

«digital communications technology is one source of the problem» [1]

«...A culture of distraction also threatens the educational project of universities. Teaching is all about getting students to focus and concentrate. ...digital media are making it harder to exert the attention that scholarly projects require.» [1]



[1] C. L. Eisgruber. April 2019
What is digital communication doing to civic discourse?
https://paw.princeton.edu/article/pre-read-2019-what-digital-communication-doing-civic-discourse

J. Williams. 2018
Stand out of our light: Freedom and Resistance in the Attention Economy.
Cambridge University Press.
http://www.crassh.cam.ac.uk/blog/post/oxford-student-and-former-google-employee-wins-inaugural-100000-nine-dots-p

Chapter 1 Basic Knowledge vs Specialization

Chapter 2 The Role of University

Chapter 3 The New Generation

Chapter 4 …

⋮