ER at 33 : A Luncheon Debate

Grand Challenges for ER:
Then and Now

Sandeep Purao, Ph.D.
Professor of IST, Penn State

We are 33

- By this age
  - We have <u>lost our innocence and naïveté</u> but
  - Our <u>sense of reality is mixed with a sense of hope</u> ..
  - We <u>still have a 'can do' spirit</u>
  - and <u>a healthy belief in our own talents and abilities</u>.
  - We have <u>yet to develop cynicism and world-weariness</u>

- **So - are we ready to craft new "Grand Challenges"?**

What is a Grand Challenge?

- Grand Challenges are ambitious but achievable goals that harness science, technology, and innovation to solve important national or global problems and that have the potential to capture the public's imagination.

From the White House
http://www.whitehouse.gov/administration/eop/ostp/grand-challenges

What is a good Grand Challenge?

- A grand challenge has these characteristics:

  - Clear and compelling solution (demonstrable solution)

  - Clear and simple measurement (success is well-defined)

  - Decomposable and diagnostic (partial results, failure points)

  - Ambitious, visionary, not unrealistic (faith in success 10+ years)

  - Compelling to the general public

  - Motivating for the research community

ER Grand Challenges

- **Circa 1979**

  - Move computing beyond bits and bytes to a Conceptual Foundation

- Have we met this?

  - An established industry,

  - Ongoing use in practice,

  - Applied in many domains

- **Circa 2014**

  - <u>Observation 1</u>: I see a Big Data phenomenon !

  - <u>Observation 2</u>: The focus on Conceptual Modeling is fading ?

  - What are our New Grand Challenges ?

Our Debaters

Stu Madnick

Eph McLean

Peter Chen

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Format

- Opening Positions (5 minutes each = 15 minutes)

- Contributions from the Audience (5 minutes)

- Open Debate

- Summary

Ephraim R. McLean

Regents' Professor
G.E. Smith Eminent Scholar's Chair
in Information Systems
Director, Center for Health IT

Computer Information Systems Department
Robinson College of Business
Georgia State University

Atlanta, GA

EMcLean@GSU.edu

Some background . . .

- **M.I.T. (1969)**
  - Stu Madnick
  - Eph McLean
  - Peter Chen
- **UCLA (1979)**
  - Eph McLean
  - Peter Chen
  - First ER Conference

- What was the problem that ER was supposed to solve?
  - A notational scheme?
  - A database schema?
  - Conceptual modeling of systems?
  - A new worldview of software development?
  - Other goals?
- What was the state of software development?
  - COBOL
  - Codd's Data Model, and
  - ER modeling

Where are we now?

- Other conceptual models . . .
  - Semantic Web
  - Process Modeling
  - Enterprise Architectures
  - Competing or complementary?
- What is the next "big thing"?
  - BIG DATA
  - Hadoop
  - HANA
  - Machine learning
  - ?????

ER Grand Challenges: Reflect on 33 years backward and forward
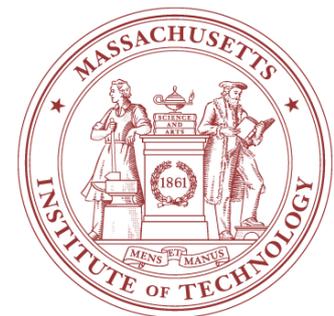
28 October 2014

Stuart Madnick

John N. Maguire Professor of Information Technology, Sloan School of Management
& Professor of Engineering Systems, School of Engineering
Massachusetts Institute of Technology
smadnick@mit.edu

Ephraim McLean and Peter Chen also came from this place.

#1 - The Grand Challenge in 1979 was to move computing beyond bits and bytes to a Conceptual Foundation

- Agree and Disagree.

- Agree: Although not solely by efforts of the ER community, much of that has largely happened.

- There are probably > billion "computer users" (including smart phones) in the world
  - **Most do not know the difference between "bit" and "byte."**
  - Remember Octal and Hexadecimal numbers? What is 2A5EFD?

- Disagree: Conceptual Foundation not well established yet
  - more on that issue shortly

# # 2 - The ER community has met this Grand Challenge - there is a database industry, ongoing use in practice, and application in many domains

- Agree & Disagree.
- <u>Agree</u>: There is a thriving "database industry"
- <u>Disagree</u>: That is not the same as the "Grand Challenge #1" above.
  - For many, database = SQL, etc.; not necessarily conceptual modelling.

3 - As of 2014, the Big Data phenomenon is driving the train and focus on Meta-Data (Conceptual Modeling) is fading

- Agree & Disagree.

- <u>Agree</u>: "Big Data" is clearly BIG.
  - It even make the cover of Harvard Business Review

- <u>Disagree</u>: "Conceptual Modeling" is dead (extreme view)
  - How many know: Semantic Web? RDF? OWL?
  - N**ew Grand Challenge** t̶o̶ ̶e̶s̶t̶a̶b̶l̶i̶s̶h̶ ̶c̶o̶n̶n̶e̶c̶t̶i̶o̶n̶s̶
    between the three <u>larg̶e̶s̶t̶</u>
    - **Big Data**
    - **Semantic Web**
    - **Conceptual Modelli**
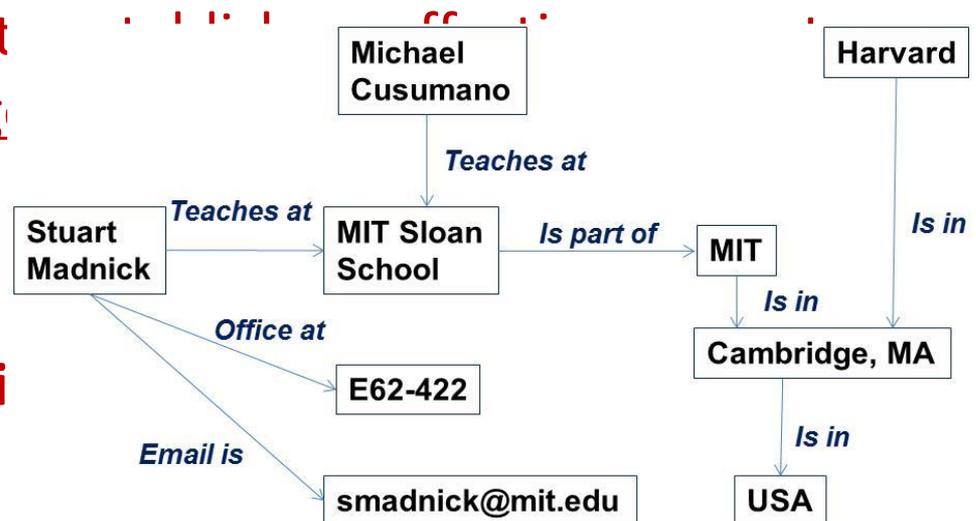
ER Grand Challenges: Reflect on 33 years backward and forward

28 October 2014

Peter Chen

Distinguished Career Scientist, Software Engineering Institute, & Faculty Member, Carnegie Mellon University

PeterChen@cmu.edu

Career Path:

Harvard (Ph.D.), MIT (Madnick was the mentor),
UCLA (McLean was the mentor and 1st ER Conference Chair)
LSU, Now CMU

#1 - The Grand Challenge in 1979 was to move computing beyond bits and bytes to a Conceptual Foundation

- "Moving beyond bits and bytes?" Yes,

- But "To a Conceptual Foundation?" Partially successful.

- Some large software companies still preach "cut and paste" type of programming techniques.

2 - The ER community has met this Grand Challenge - there is a database industry, ongoing use in practice, and application in many domains

- In general, "Yes," but ER is much broader
- Successful as analysis and design methodology
- Attempts on languages/user-interfaces?
  - EAS-E, ERLANG (H. Markowitz, Nobel Prize winner, A. Malhotra, IBM)
  - Entity Framework of Microsoft ADO.NET – good directions
- Links with other domains (Simulation, language technology,, Accounting etc.)?

3 - **As of 2014, the Big Data phenomenon is driving the train and focus on Meta-Data (Conceptual Modeling) is fading**

- "Big" data, per se, is nothing new. The first ER paper was presented at the first VLDB Conference. What does "VLDB" stand for?

- The **new Grand Challenge** is to enhance ER to:
  - A higher level of user interface than SQL and C++
  - A theoretical foundation for integration of multiple domains: DB, Software/knowledge Engineering, Simulation, Accounting, etc.
  - A solution for handling the mess created by incorrect applications of "Big Data" and "Semantic Web".