Artificial Intelligence and Life in 2030

100 Year Study on AI: 1ˢᵗ Study Panel Report

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One Hundred Year Study
Goals of the Endowment

"To support a longitudinal study of influences of AI advances on people and society,

centering on periodic studies of developments, trends, futures, and potential disruptions associated with the developments in machine intelligence, and

on formulating assessments, recommendations, and guidance

on proactive efforts."   (July 2014)
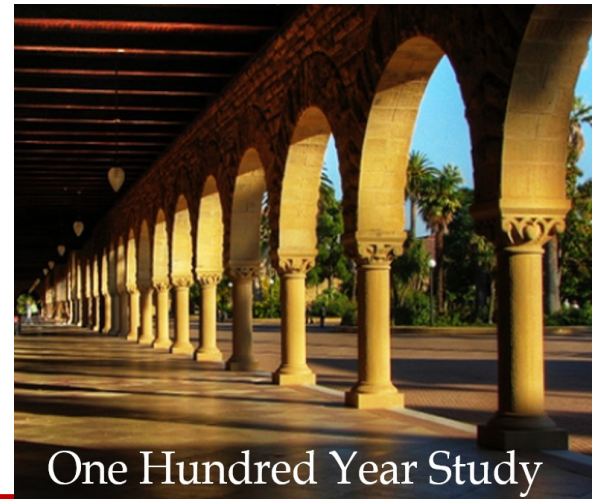
One Hundred Year Study

Roots: AAAI Presidential Panel on Long-term AI Futures (Asilomar 2008-09)

Commissioned by AAAI President, Eric Horvitz

Co-chaired by Eric Horvitz & Bart Selman

Charge: Explore potential long-term societal influences of AI advances.

Subgroups focused on

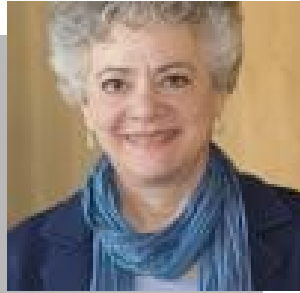
Potential Disruptive Advances Over the Short-term

Longer-term Pace, Concerns, Control

Ethical and Legal Challenges

http://www.aaai.org/Organization/presidential-panel.php

Standing Committee

Barbara Grosz, Chair

Russ Altman

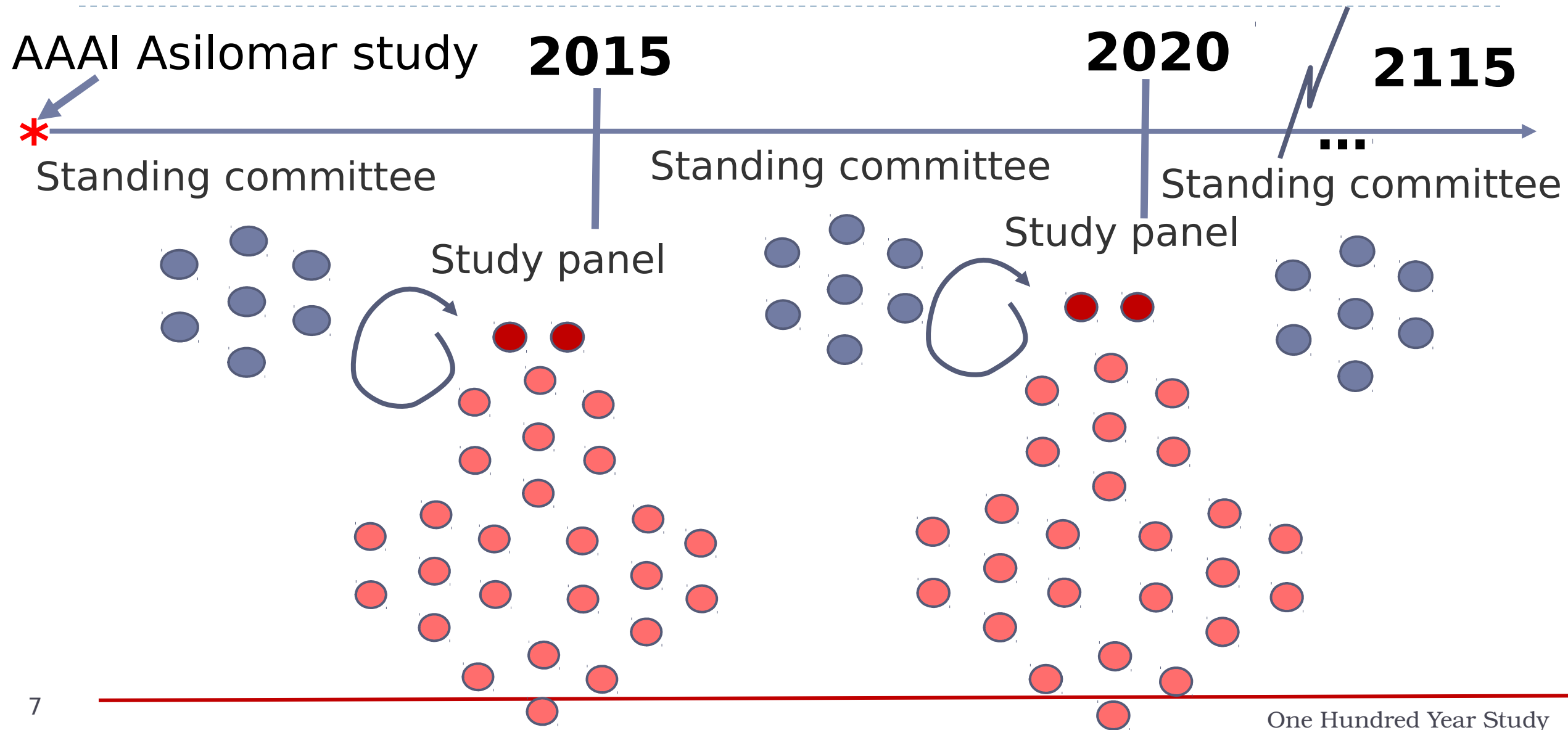Eric Horvitz

Alan Mackworth

Tom Mitchell

Deirdre Mulligan

Yoav Shoham

One Hundred Year Study:
Timeline of Studies

One Hundred Year Study: Intended Audiences

Stanford Digital Archive

Stanford University

2015

Standing committee

Study panel

Convey results to multiple audiences

AI researchers

General public

Industry

Policy makers

Charge to the Inaugural Study Panel:
Artificial Intelligence and Life in 2030

Identify possible *advances* in AI over next 15 years and *their potential influences on daily life.*

Specify *scientific, engineering, and legal efforts* needed to realize these developments.

Consider actions needed to shape outcomes for *societal good*, deliberating *design, ethical and policy challenges.*

Focus: *large urban regions* (typical North American city), grounding the examination of AI technologies in a context that highlights

- ▸ *potential influences on a wide variety of activities*
- ▸ *interdependencies and interactions among AI technologies*

An Opportunity and a Challenge

- ## Carte Blanche with respect to format

  - Even flexibility on topic

- ## Should be topical now at a time of great interest in AI

  - Industry progress, white house studies, press, fear-mongering
  - Balanced view, taking into account possibilities, barriers, and **realistic** risks

- ## Also should be relevant over time

- ## Set a precedent for future studies

- ## First task: invite panelists

  - Balance of AI areas, seniority, gender, geography (to some extent)

Members of the Inaugural Study Panel
Artificial Intelligence and Life in 2030

Chair: Peter Stone, UT Austin

- Rodney Brooks, Rethink Robotics
- Erik Brynjolfsson, MIT
- Ryan Calo, University of Washington
- Oren Etzioni, Allen Institute for AI
- Greg Hager, Johns Hopkins
- Julia Hirschberg, Columbia
- Shivaram Kalyanakrishnan, IIT Bombay

- Ece Kamar, Microsoft
- Sarit Kraus, Bar Ilan
- Kevin Leyton-Brown, UBC
- David Parkes, Harvard
- William Press, UT Austin
- Julie Shah, MIT
- Astro Teller, X
- Milind Tambe, USC
- AnnaLee Saxenian, Berkeley

Process

- What should the output be?
  - Report? Webpages? Youtube videos? Multimedia?
- What topics?
- Monthly phone calls: outline for a background doc
  - The parts with **real** impact would come later

- In-person meeting in February: intensive draft writing
- Months of back and forth with a professional writer
  - Became clear the document was going to be our sole output
- Final in-person meeting (callouts)
- Lots of feedback and polishing

Structure

- Preface for context
- Executive Summary (1 page)
- Overview (5 pages)
- Introduction
  - Defining AI; Current research trends
- AI by domain
  - 8 areas with likely urban impact by 2030
  - Look backwards 15 years and forward 15 years
  - Opportunities, barriers, and realistic risks
- Policy and legal issues
  - Current status; Recommendations
- Lots of callouts in the margins

Areas of Focus in the Study Panel Report

Transportation

Home-Service Robots

⟵ **hardware**

Healthcare

Education

⟵ **partnering with people**

Public Safety and Security

Low-resource communities

⟵ **building trust**

Employment and Workplace

⟵ **societal futures**

Entertainment
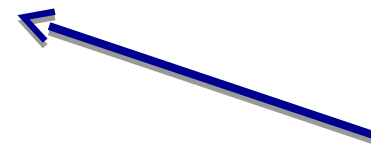
⟵ **interpersonal interaction**

Areas of Focus in the Study Panel Report

→ Transportation: Short term

Public Safety and Security: Medium term

Meeting needs of low-resource communities: Longer term

Data → Predictive models → Decision models

Transportation: Prediction and Intervention
First domain where public asked to trust AI on a large scale

Problem: Sense surroundings, car state, lane change, parking, route plan..

AI Technologies: Advanced sensors, computer vision, machine learning, ...

Surprising progress in academia and industry:
  ➢ Autonomous vehicles (Google, Tesla, Uber, etc)
  ➢ Not just cars but drones

But now, must grapple with world full of people

In 15 years, autonomous pickup and delivery of people and packages

Areas of Focus in the Study Panel Report

Transportation: Short term

Public Safety and Security: Medium term

Meeting needs of low-resource communities: Longer term

Data $\longrightarrow$ Predictive models $\longrightarrow$ Decision models

Public Safety and Security: Prediction & Intervention
Fraud Detection

Problem: How do we tell which transactions are fraudulent?
Credit cards, compromised accounts, etc.

AI Technology: Classification via machine learning

How:

Data: Records of fraudulent and legitimate transactions
Predictive Model: Identify features of fraudulent transactions
Decisions: Autonomous termination of transaction when fraud

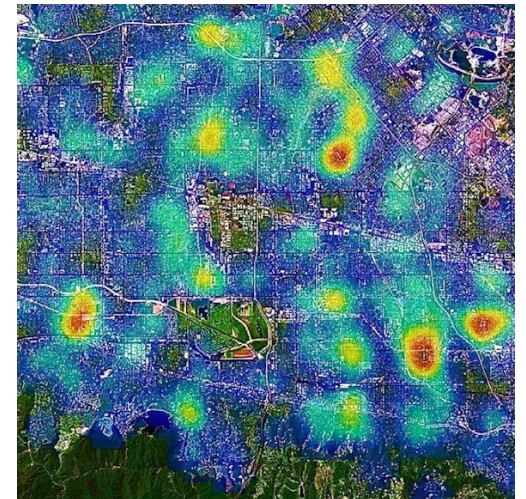**Risk: encoding, even magnifying, human biases**

Problem: Crime analysis or predict crimes for effective police allocation

Crime locations, times of higher risk of crime

AI technology: Predictive modeling via machine learning.

How:

Data: Crime data
Predictive model: Probability of high-crime areas

Areas of Focus in the Study Panel Report

Transportation: Short term

Public Safety and Security: Medium term

➤ Meeting needs of low-resource communities: Longer term

Data ⟶ Predictive models ⟶ Decision models

Low Resource Communities: Prediction
Machine Learning for Preventing Lead Poisoning in Children

Problem:

Lead: Severe motor skill/brain impairment in children
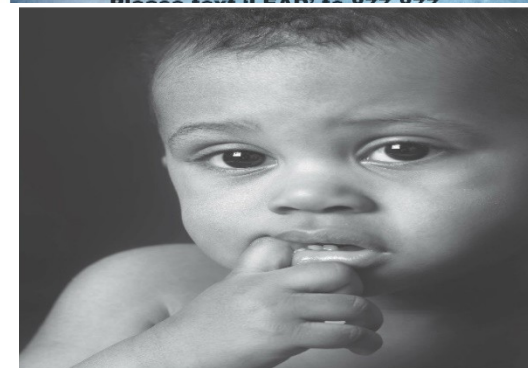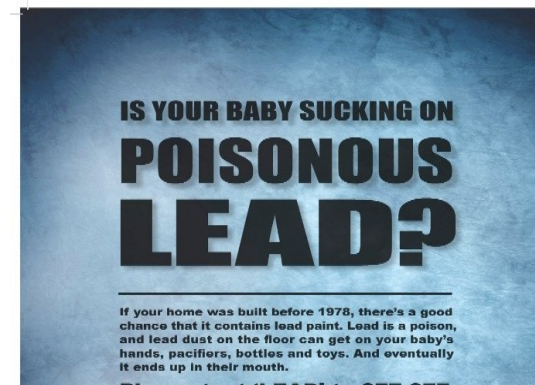
Lead found in many homes in paint

> ▶ Which houses to inspect for lead

AI technology: Machine learning predictive models

How:

Data: 20 year data on children's blood tests & house inspections

*Predictive model*: Pre-birth prediction if house needs lead inspections

Low Resource Communities: Prediction & Intervention
Social Networks for Raising HIV awareness in homeless youth

Problem:

Homeless youth HIV: 10x infection rate of general population

Distrust authority; peer interventions to spread HIV information

▸ Social network: Uncertain and dynamic
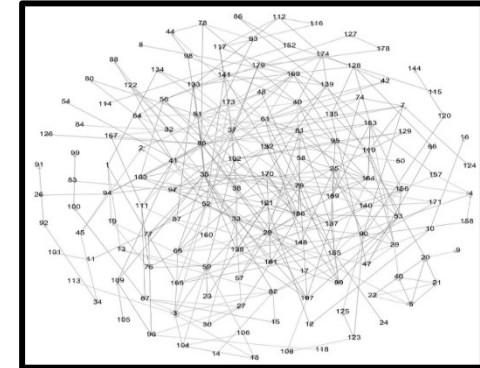
AI technology: Influence maximizing peer leaders
How:

Data: Network information

Decision making: Most influential peer leaders in network

Gather more information about network, reduce uncertainty

Decision aid piloted in Los Angeles showing increase in HIV testing

Areas of Focus in the Study Panel Report

Transportation

Service Robots

Healthcare

Public Safety and Security

Education

Meeting needs of low-resource communities

Entertainment

Employment and Workplace

Summarizing callouts in the report

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