



Comp Sci 288: AI for Social Impact

MILIND TAMBE



Welcome!

Comp Sci 288:AI for Social Impact

Recent years have seen AI successfully applied to societal challenge problems; indeed, it has a great potential to provide tremendous social good in the future. In this course, we will discuss the potential use of AI in various topics that are essential for social good, including but not limited to health, environmental sustainability, public safety and public welfare.

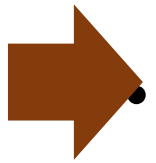
Special focus:

- Multiagent systems
- "AI for Social Good": public health, conservation, public safety
- Ethical challenges faced in applications

Tuesday, Thursday

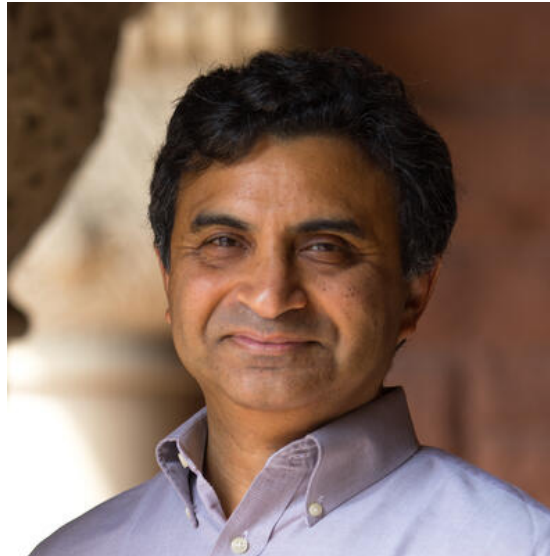
10:30am to 11:45am

Outline



- Introductions: Instructors and TFs
 - Brief overview of what we will cover in this course
 - Break
 - AI for Social Good

Instructor & TFs



Milind Tambe
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Key points

- AI for social good: Emerging as a new field
- Trying to figure out foundations:
Have to rely on case studies
- No textbook: Must read latest papers
- Need your help in figuring out this field
- Course project is a key component of this course

Comp Sci 288: Lecture Plan

Lecture #	Date	Topic	Purpose	Lecturer
1	Jan 26	Course intro, syllabus, goals, key concepts	<i>Introduction</i>	<i>Tambe</i>
2	Jan 28	AI for social impact case studies & discussion	<i>Case studies</i>	<i>Tambe</i>
3	Feb 2	AI for social impact case studies & discussion	<i>Case studies</i>	<i>Tambe</i>
4	Feb 4	AI for Substance Abuse prevention	<i>Case study</i>	<i>Yadav</i>
5	Feb 9	Embedded ethics module	<i>Ethics</i>	<i>Dishaw</i>

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5	Feb 9	Embedded ethics module	<i>Ethics</i>	<i>Dishaw</i>
6	Feb 11	Public health & conservation	<i>Define project</i>	<i>Golden</i>
7	Feb 16	World Wildlife Fund	<i>Define project</i>	<i>Singh</i>
8	Feb 18	AI & Covid	<i>Define project</i>	<i>Mina</i>

Also, trying to set up conversations with local area non-profits

Comp Sci 288: Lecture Plan

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9	Feb 23	Restless bandits, example paper presentation	<i>Example</i>	<i>Tambe/Biswas</i>
10	Feb 25	Paper presentation		<i>Students</i>
11	Mar 2	Paper presentation		<i>Students</i>
12	Mar 4	Paper presentation		<i>Students</i>
13	Mar 9	Paper presentation		<i>Students</i>
14	Mar 11	Project definition	<i>Define project</i>	<i>Students</i>
15	Mar 18	AI & Sustainability	<i>Interdisciplinary</i>	<i>Davies</i>
16	Mar 23	Implementation science & AI4SG	<i>AI4SG meta</i>	

Comp Sci 288: Lecture Plan

Lecture #	Date	Topic	Purpose	Lecturer
17	Mar 25	AI4SG & Implementation science	<i>AI4SG meta</i>	<i>Tambe/?</i>
18	Mar 30	Handling data limitations	<i>AI4SG meta</i>	<i>Tambe</i>
19	Apr 1	HCI & AI4SG	<i>AI4SG meta</i>	
20	Apr 6	Late-breaking news		<i>Tambe</i>

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18	Mar 30	Handling data limitations	<i>AI4SG meta</i>	<i>Tambe</i>
19	Apr 1	HCI & AI4SG	<i>AI4SG meta</i>	
20	Apr 6	Late-breaking news		<i>Tambe</i>
21	Apr 8	Fairness	<i>F, A, T</i>	<i>Tambe</i>
22	Apr 13	Interpretability in ML	<i>F, A, T</i>	<i>Lakkaraju</i>
23	Apr 20	Is AI4SG often bad?	<i>Discussion</i>	<i>Tambe</i>
24,25	Apr 22 Apr 27	Final project presentations		<i>Students</i>

Questions?

Grading

- Homework 1: Select papers and presentation partner (due Feb 10): 5%
- Paper presentation, discussion I (Per sign up date):(15%)
- Project proposal (March 1) and midterm discussion (March 11): (10%)
- Attendance and comments on assigned readings: (15%)
- Homework 2: Select papers and presentation partner (March 23): 5%
- Paper presentation, discussion II (Apr 1): (15%)
- Project presentation (Apr end): (30%)
- Ethics and broader impact in project: (5%)

Selecting papers for paper presentation

- Pick a paper on AI for Social Impact
- From calendar years 2020/2021.
- Paper should have appeared at a top AI conference: AAAI, IJCAI, AAMAS, NeurIPS, ICML, UAI, etc,
- Other venues ok: but must be rigorously reviewed not preprints
- Send the paper to us for approval
- Generally stick to topics of public health, environment (climate change, conservation, agriculture), disaster response/public safety.
- “Meta papers” also ok, but must have appeared in a rigorously reviewed setting, not just pre-print

Paper presentation

- This should be done in pairs.
- Presenters will be asked to present not only a summary, but also some evaluation of the paper.
- For evaluation, presenters should use “AAAI rubric”

[Appended to the syllabus on canvas, also available from AAAI web site in “AI for Social Impact”]

- Roughly 20 minutes per presentation
- Paper presentation 1: Done in class (sign up for dates by Feb 10)
- Paper presentation 2: will request you to send us a video (Apr 1)

Paper reading

- During weeks without paper presentation, read papers
- First week (Feb 4 reading): individually
- Beyond that, read in pairs
- One or max 2 papers per week (but exclude some weeks), provide a short summary

Projects: Main part of the course

Selecting projects:

- Will provide many expert lectures to select project topics
- Will try to connect with local non-profits as well
- Group of 2-3 students per project
- Should use cutting edge AI technique

Projects: Main part of the course

- Mid-term project presentation
- Final project presentation
- Project writeup
- Ethical component (broader impacts)

Expectations

- Attendance:
 - Class is based on discussions and presentations
 - Participation is crucial
 - Strongly encourage: keep your video on
- Encourage you to ask questions
- Remarks by TFs

5 min break for short questions

Outline

- Introductions: Instructors and TFs
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Breakout rooms

How it all started (in my view)

the WHITE HOUSE PRESIDENT BARACK OBAMA



BRIEFING ROOM

ISSUES

THE ADMINISTRATION

Preparing for the Future of Artificial Intelligence

MAY 3, 2016 AT 3:01 PM ET BY ED FELTEN



[ABOUT](#)

[VISIONING](#)

[LEADERSHIP DEVELOPMENT](#)

[TASK FORCES](#)

[RESOURCES](#)

[EVENTS](#)

[BLOG](#)

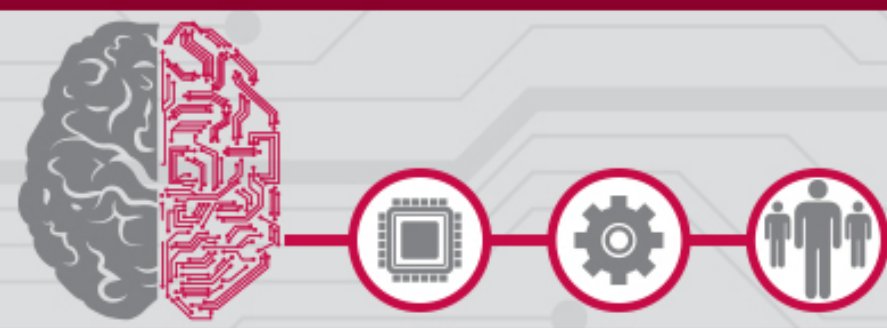


Artificial Intelligence



For Social Good

Artificial Intelligence For Social Good



ARTIFICIAL INTELLIGENCE

FOR SOCIAL GOOD



IJCAI 2016 panel

Panel on **White House OSTP Workshops** on Preparing for the Future of Artificial Intelligence

July 14th Thursday 3:10pm

Room: Ballroom East

Panelists:



**Kate
Crawford**



**Milind
Tambe**



**William
Scherlis**



**Meredith
Whitaker**

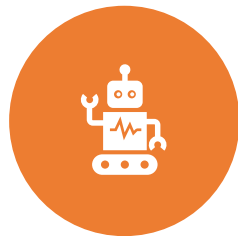
Questions Discussed in this Course



WHAT IS AI
FOR SOCIAL
IMPACT/AI
FOR SOCIAL
GOOD?



WHAT IS THE
OVERALL
PROCESS IN
ACHIEVING AI
FOR SOCIAL
IMPACT?



WHAT AI
TOOLS DO WE
USE, AND
WHAT
HAPPENS
WHEN THE
TOOLS FALL
SHORT OF
GOALS?



HOW DO WE
MEASURE
SOCIAL
IMPACT?



HOW DO WE
SUSTAIN
SOCIAL
IMPACT OVER
TIME?



HOW DO WE
ADDRESS
ETHICAL
CHALLENGES
THAT COME
ALONG THE
WAY?

What is AI for Social Good (from the reading)

- AI4SG =def. the design, development, and deployment of AI systems in ways that:
- (i) prevent, mitigate or resolve problems adversely affecting human life and/or the wellbeing of the natural world, and/or
- (ii) enable socially preferable and/or environmentally sustainable developments.

AI for Social Good (our view)

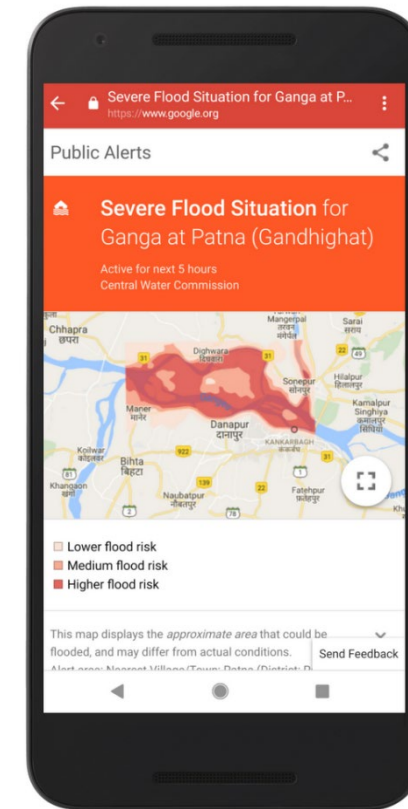
- AI4SG =
- (i) Social impact is a first class objective: not enough to be motivated by social impact; must have social impact
- (ii) Work for the benefit of vulnerable or endangered groups (or benefiting the natural world)
- (iii) Groups that have not benefited from AI in the past

Examples of AI for Social Good

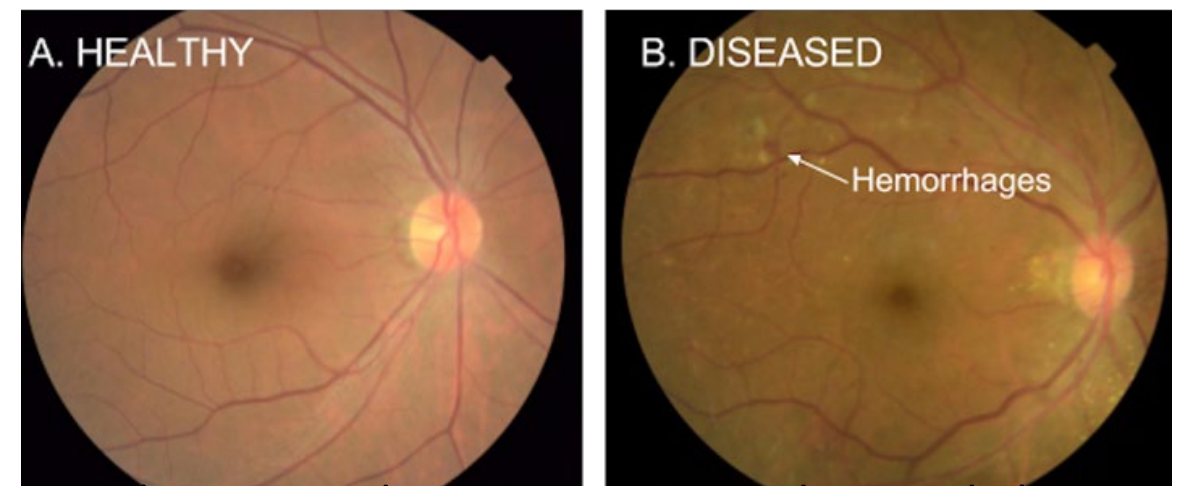
Forbes Top 10 AI for Social Good (June 2020, B. Marr)

- Medical imaging: cancer screening (94% accuracy), radiology assistant
- Fighting world hunger: Determine the perfect crop, maximize output
- Tools for people with disabilities: Identify visual disorders before causing blindness
- Climate change: Study the impact of rising sea levels
-

Examples from Google Research



Google Flood forecasting



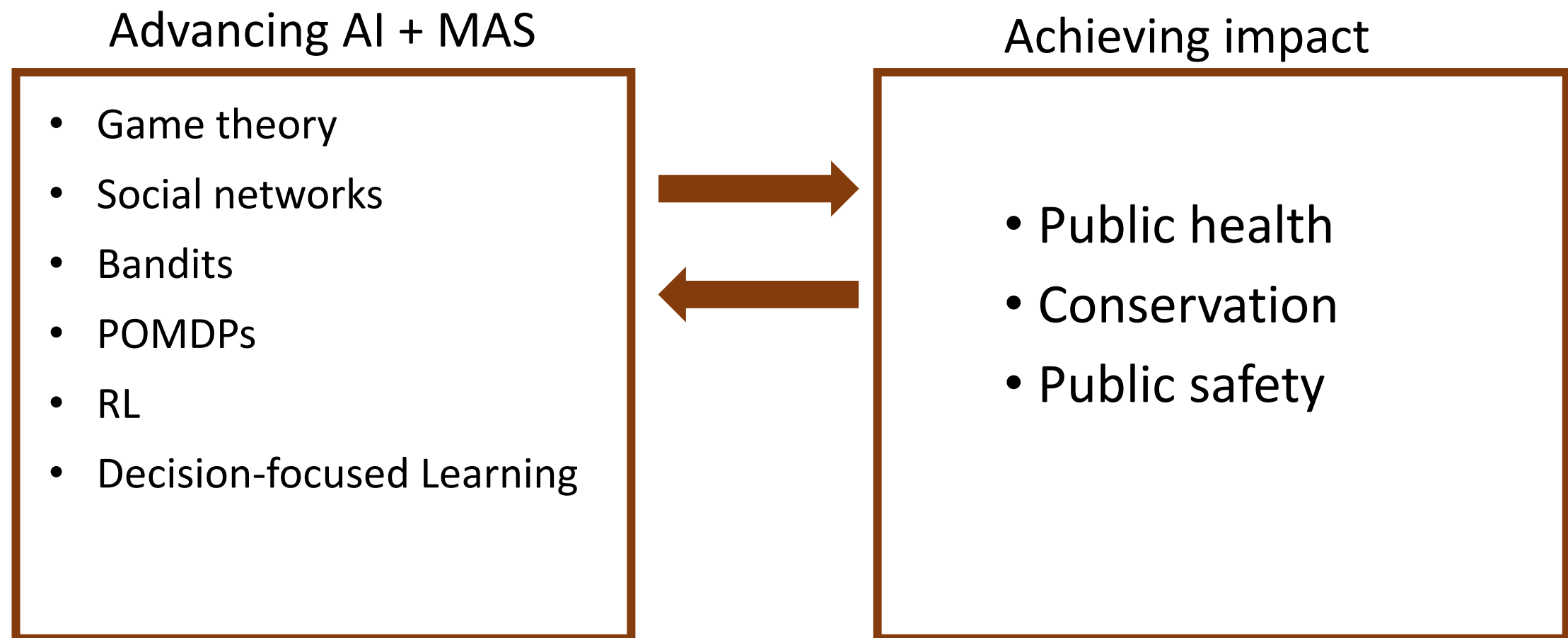
Google researchers use deep learning to detect diabetic retinopathy with upwards of 90 percent accuracy

More Traditional View vs AI4SI view

- Mostly we work on research ideas to provide methodological advances in the lab, providing new papers; the idea is that such models might eventually influence products and policy, but that is to be taken up by someone else
- We wish to provide methodological advance, but actually show actual impact on society.

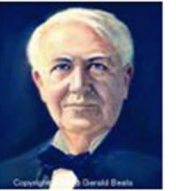
“Social Impact Driven” Approach to AI Research

- *AI research & Social Impact go hand-in-hand*



Pasteur's Quadrant *"Social Impact Driven"* *Approach to AI Research*

Donald E. Stokes Pasteur Quadrant

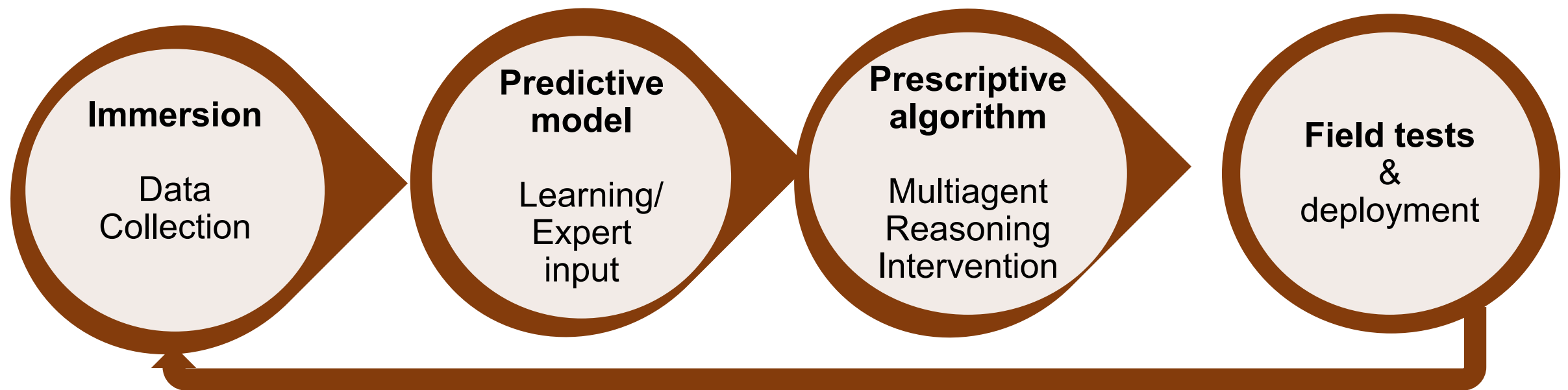
		Considerations of use?	
		x	✓
Quest for fundamental understanding?	✓	Niels Bohr 	Louis Pasteur 
	x		Thomas Edison 

Source: Donald E. Stokes, *Pasteur's Quadrant*, p. 73

The Entire Pipeline is part of AI for social impact

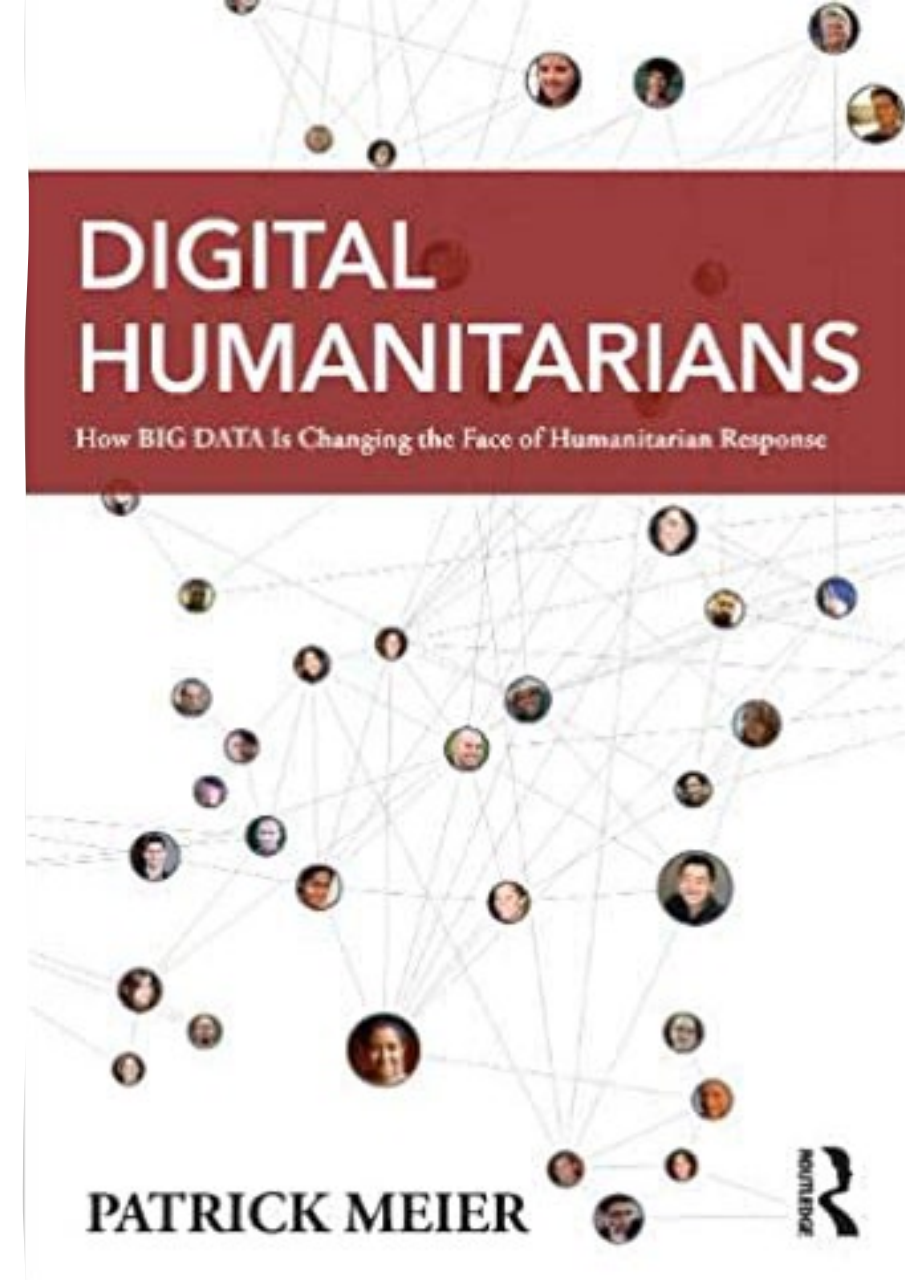
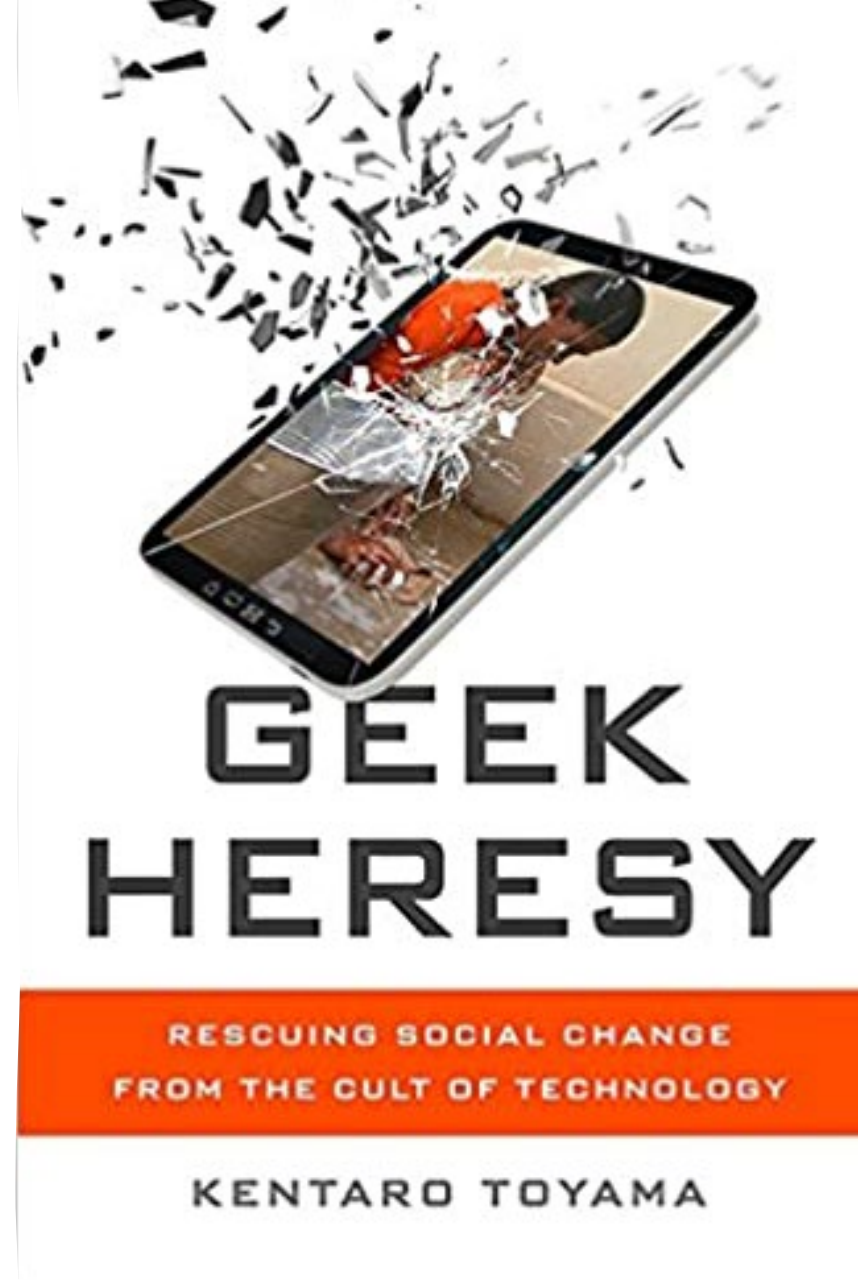
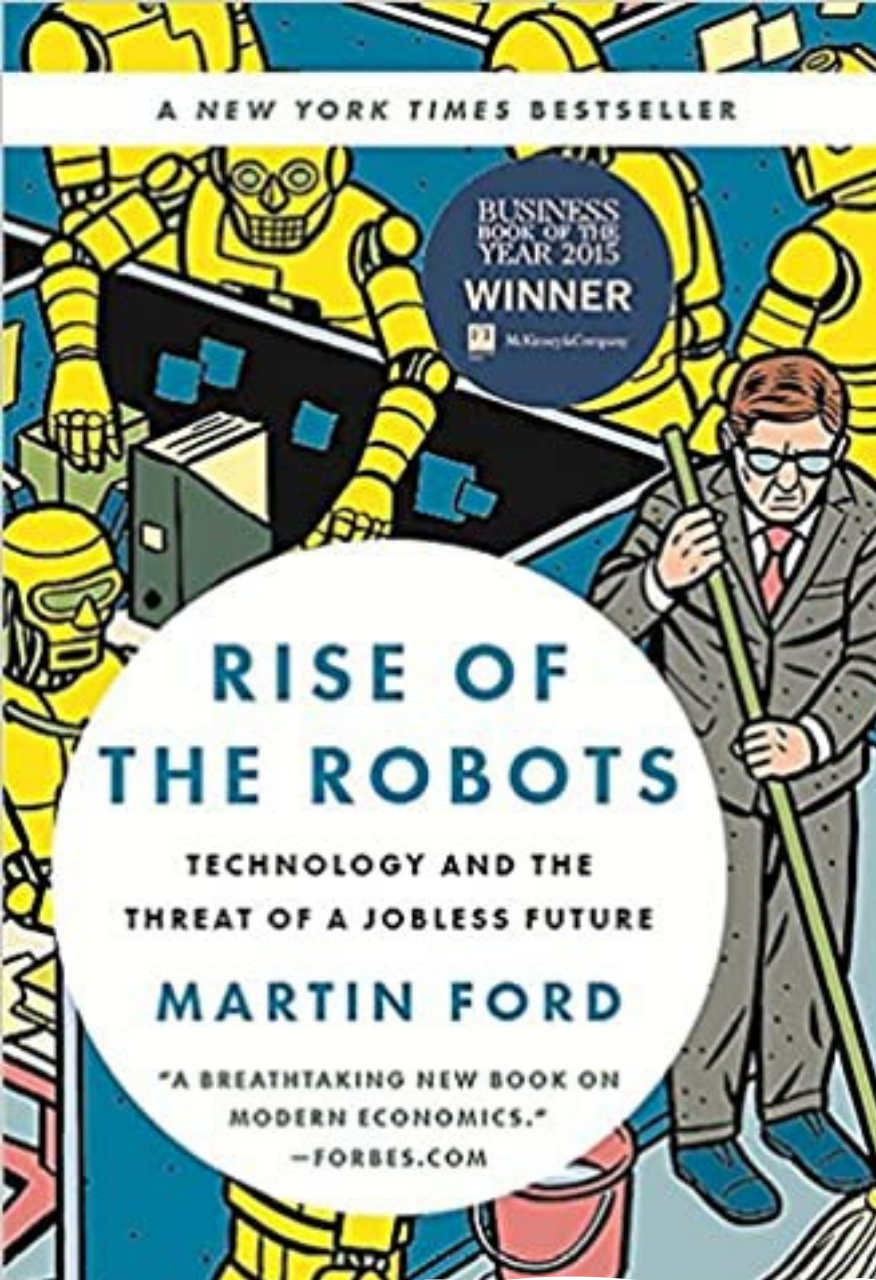
Field test & deployment: Social impact is a key objective

In this view, AI for social impact as a field actually includes the entire pipeline shown below. It is not just the algorithmic portion, but also includes the HCI component of “immersion” all the way to field testing and deployment (see below).



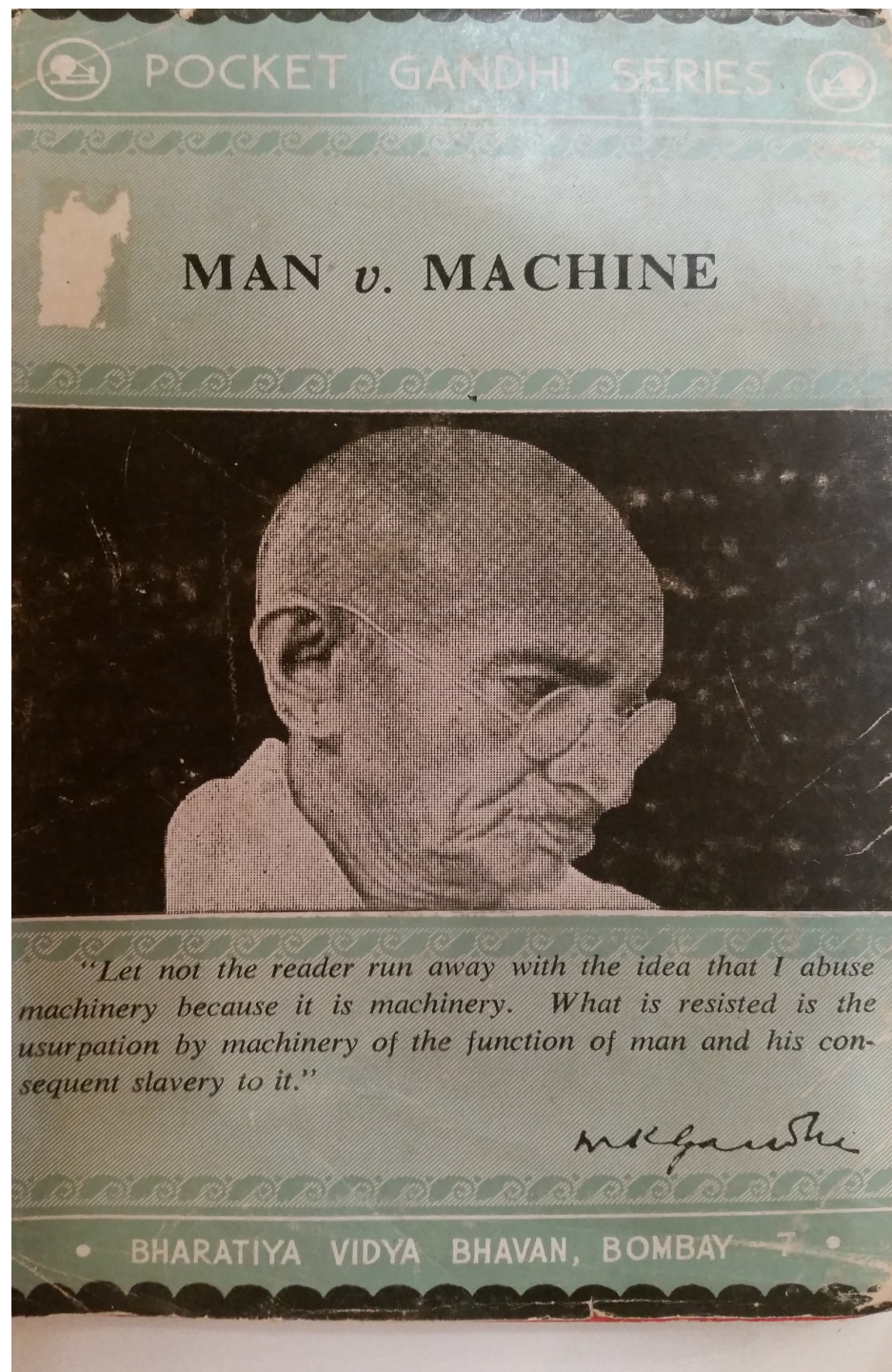
Implementation Science

- *Mark S. Bauer, Laura Damschroder, Hildi Hagedorn, Jeffrey Smith & Amy M. Kilbourne "An introduction to implementation science for the non-specialist" BMC Psychology volume 3, Article number: 32 (2015)*
- Historically, this research-to-practice gap has not been the concern of academic clinical researchers. The traditional academic business case for career success has primarily supported conducting descriptive or mechanism-oriented studies and intervention studies on highly selected, typically academic medical center-based populations, and publishing in—ideally—top quality academic journals. Whether these findings translate into public health impact has typically not been the concern of traditional healthcare researchers.



Some things
to keep in
mind....

...And the Past



“...prize every invention of science made for the benefit of all”

AI and Multiagent Systems Research for Social Impact



Public Health



Conservation



**Public Safety
and Security**

Viewing Social Problems as Multiagent Systems

Key research challenge across problem areas:

**Optimize Our Limited Intervention Resources
when
Interacting with Other Agents**

Interdisciplinary Partnerships



Empower non-profits to use AI tools; avoid being gatekeepers to AI4SI technology



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