Only Humans Need Apply: Winners and Losers in the Age of Smart Machines

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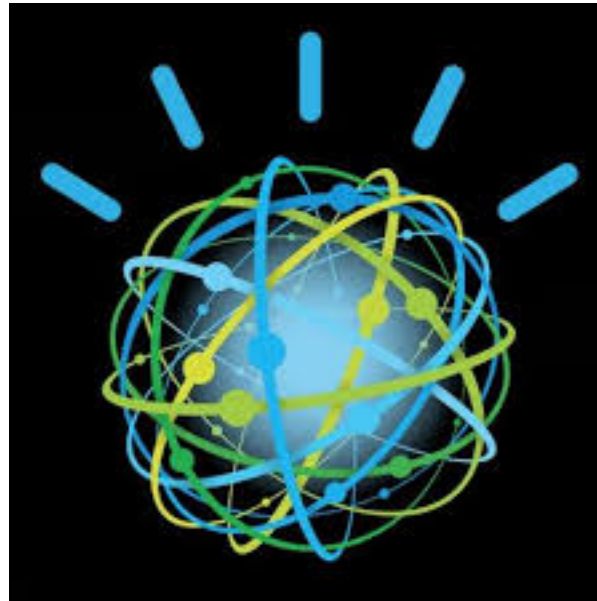
Leaders Excellence

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Many Roads Lead to Automation

Too much data

Expensive labor

Need for accurate decisions

Tedious work

Powerful technologies

Smart People Are Concerned About AI

▶ "I am in the camp that is concerned about super intelligence…I don't understand why some people are not concerned." (Bill Gates)

▶ "The development of full artificial intelligence could spell the end of the human race." (Stephen Hawking)

▶ "Advancing machine intelligence is the most important problem facing the world today." (Nobel economist Robert Schiller)

▶ "We will soon be looking at hordes of citizens of zero economic value…[It is] the greatest challenge facing free market economies in this century." (Michael Malone, Bill Davidow)

Why Should We Care?

Ned Ludd

► Work matters to human meaning and happiness

► The technology is getting more capable by the day, and we aren't

► Previous technological revolutions have created substantial dislocations, and the middle class is already threatened

► Our society is already highly unequal, and becoming more so

► Unless we determine the appropriate role for humans in this revolution, there may be substantial resistance to a technology that could provide substantial value

And Automation Is a Pain

► At a minimum, substantial displacement of human workers in the short run

► In many cases, humans prefer to be served by humans

► Automation is often a race to the bottom

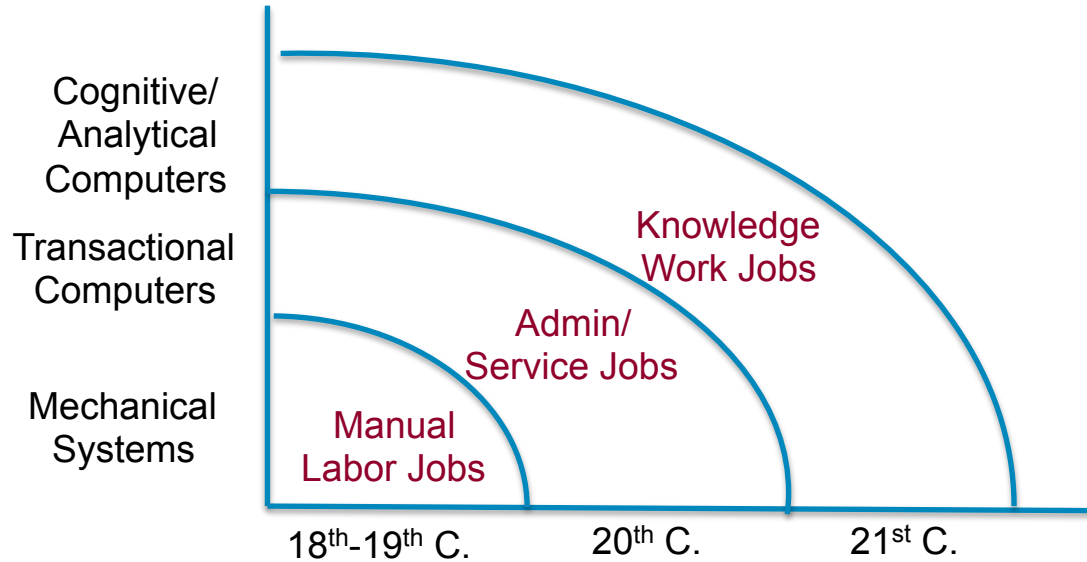► Difficult to combine automation with creativity and frequent innovation

Yet Service Automation Is Proceeding Apace

Service jobs with substantially automated components:

1. Secretary—appointment scheduling
2. Landscaper—lawn mowing
3. Hamburger chef
4. Taxi driver
5. Long-distance truck driver
6. Farm equipment driver
7. Longshoreman—loading ships
8. Hotel clerk/concierge—checking in, providing advice
9. Call center representative—solving customer problems
10. IT technician—fixing servers and networks

Is Knowledge Work Next to Go?

My Answer Is…Yes…and No

► Many knowledge work job *tasks* are at risk of being automated

► Some knowledge workers will lose their jobs, but it will be on the margins

    ► We'll need 8 lawyers instead of 10

► There are going to be a lot (no one knows how many) of jobs working alongside smart machines

► We'll have plenty of productivity gains, so we can afford to retrain and redeploy people if we want to

► But there is no room for complacency!

Ten Automatable Knowledge Work Jobs

1. Teacher/Professor—online content, adaptive learning

2. Lawyer—e-discovery, predictive coding, etc.

3. Accountant—automated audits and tax

4. Radiologist—automated cancer detection

5. Reporter—automated story-writing

6. Marketer—programmatic buying, focus groups, personalized e-mails, etc.

7. Financial advisor—"robo-advisors"

8. Architect—automated drafting, design

9. Financial asset manager—index funds, trading

10. Pharmaceutical scientist—cognitive creation of new drugs

Technologies Driving Knowledge Work Automation

► Analytics and big data

► Machine learning

► Neural networks/deep learning

► Rule engines

► Event stream/complex event processing

► Natural language processing

► Robotic process automation

► Custom integrations and combinations of these in a "cognitive cloud"

Just How Smart Are Smart Machines?

Level of Intelligence Task Type	Human Support	Repetitive Task Automation	Context Awareness and Learning	Self-Aware intelligence	The Great Conver-gence
Analyze Numbers	BI, Data visualization, hypothesis driven analytics	Operational analytics, scoring, model management	Machine learning, neural nets	Not yet	
Digest Words, Images	Character and speech recognition	Image recognition, machine vision	Q&A, natural language processing	Not yet	
Perform Digital Tasks (Admin and Decisions)	Business process management	Rules engines, Robotic process automation	Not yet	Not yet	
Perform Physical Tasks	Remote operation	Industrial robotics, collaborative Robotics	Fully autonomous robots, vehicles	Not yet	

The Technology Is Great—But How About People and Processes?

► People

  ► We need an alternative to automation

  ► We need to begin preparing people for the impacts of these technologies

► Processes

  ► Identify those in need of more and better cognition

  ► Measure them, implement quickly, achieve value quickly

  ► Design what people and cognitive technologies do in them

(Pages and pages of similar graphics on Google Image, so all three must be necessary!)

People: Automation or Augmentation?

► Augmentation—smart humans helping smart machines, and vice-versa

► People do this by aiding automated systems that are better than humans at their particular tasks, or by focusing those tasks at which humans are still better

► The classic example: freestyle chess

    ► Better than humans or automated chess systems acting alone

    ► Humans can choose among multiple computer-recommended moves

    ► Humans know strengths and weaknesses of different programs

► We've seen this before: textile machinery, spreadsheets

Five Ways of Stepping

► *Step in*—humans master the details of the system, know its strengths and weaknesses, and when it needs to be modified

► *Step up*—humans take a big-picture view of computer-driven tasks and decide whether to automate new domains

► *Step aside*—humans focus on areas they do better than computers, at least for now

► *Step narrowly*—humans focus on knowledge domains that are too narrow to be worth automating

► *Step forward*—humans build the automated systems

The Five Augmentation Steps for Financial Advisors

► *Step in*—advisors become experts in online advice, and assist clients to use it to their best advantage

► *Step up*—advisors identify the domains most in need of automation, or those already automated needing improvement

► *Step aside*—advisors primarily communicate with clients, but don't make decisions for them—or work outside investments

► *Step narrowly*—advisors identify a narrow client segment or investment type

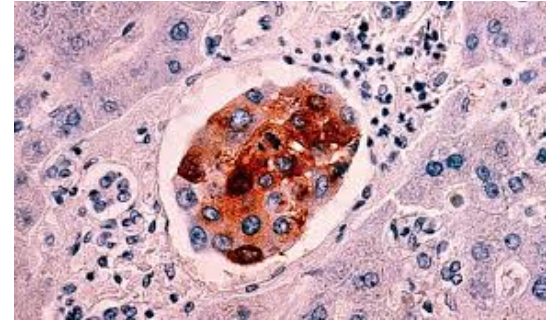► *Step forward*—advisors use their expertise to build and support robo-advisor systems

Cognitive Processes—Criteria and Examples

► Knowledge bottleneck

   ► Veterinary diagnosis and treatment

► Need for decision quality and consistency

   ► Insurance policy, credit underwriting

► Too much data or content for humans to digest/analyze

   ► Oncology, digital marketing

► Cognition currently too expensive for broad application
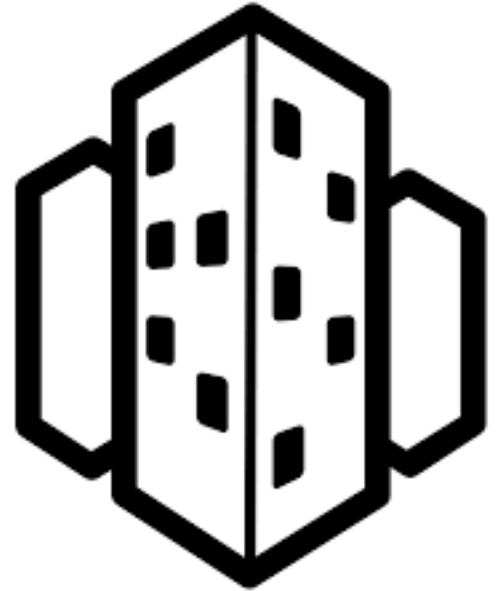
   ► Investment advice, college education

Oncology Treatment, For Example

► Over 400 types of cancer

► Hundreds of oncogenes and tumor suppressor genes

► Biome probably implicated in cancer too

► Oncology information needs to be integrated with EMR data

► Over 75 different drugs for breast cancer alone

► Treatment options changing very quickly

► In short, too hard for humans, but machines don't find it easy either—yet

Implications for Organizations

► Take an augmentation perspective from the beginning

► Pick the right cognitive technology for your problem

► Get good at work design for smart humans and smart machines

► Give your people the options and the time to transition to them

► Put someone in charge of thinking about this

Implications for Government and Education

Government
- Start a public dialogue on automation and augmentation
- If necessary, guarantee jobs, not incomes
- Encourage augmentation with tax and licensing policies
- Engage with NGOs and private sector organizations for planning and policy

Education
- STEM and computer science for step in, step forward roles
- Arts, social/emotional intelligence for step aside roles
- Let students follow their passions for step narrowly roles

What Are You Waiting For?

► The technology is good, and getting better rapidly

► Knowledge workers are ready to have their work augmented and to augment smart machines

► Cognitive processes need improvement and innovation

► Start your machines!