Making **AI** a reality for the enterprise and the physical world

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Why are we doing this

- Provide motivation for application of AI to a broader set of real world problems
- Maximize AI’s potential impact by application of a systematic methodology
A snapshot of AI

North American working population
100M

Data scientists
8,900

Wild life biologists
17,900

Overstated?

SOURCE: LinkedIn
Machine Learning Based Study

Largest 500,000 companies

350 TB unstructured business data
10 Million business relationships
100 Million People Behavioral Data
15 Billion Page Views

Classified companies into levels of AI Maturity…
Even where AI capability exists, maturity is low

Companies employing AI at scale

- Strategic direction for business: 87
- Building applications: 494
- Lab projects / proof of concept: 967
Application of AI concentrated in digital and data based business

Companies investing in AI by industry
Analyzed by spiderbook

- **32%** SOFTWARE INFORMATION TECHNOLOGY SERVICES
- **2.66%** RETAIL
- **3.37%** RESEARCH
- **4.19%** TELECOMMUNICATIONS
- **8.78%** INTERNET
- **2.55%** MARKETING AND ADVERTISING
- **2.35%** FINANCIAL SERVICE
- **2.15%** AUTOMOTIVE
- **2.04%** GOVERNMENT ADMINISTRATION
- **1.94%** SEMICONDUCTORS
- **1.84%** MANAGEMENT CONSULTING
- **1.74%** BANKING
- **1.63%** FINANCIAL SERVICE
- **1.63%** MARKETING AND ADVERTISING
- **1.53%** RETAIL
- **1.33%** RESEARCH
- **1.33%** TELECOMMUNICATIONS
- **1.33%** INTERNET
- **1.33%** INTERNET
- **1.33%** INTERNET
- **0.92%** INTERNET

60% in digital and data based businesses
Inevitably, AI talent intensity highest in a few (predictable) companies

Rank by per capita spend on AI

1. Google
2. Facebook
3. Rocketfuel
4. IBM
5. Amazon.com
6. Yahoo!
7. Intel
8. Microsoft
9. Deloitte
10. MITRE
11. Baidu
12. LinkedIn
13. Apple
14. Lockheed Martin
15. NASA
16. Sentient
17. EA
## IoT enables AI for the physical world

<table>
<thead>
<tr>
<th>Software &amp; data analytics</th>
<th>Connectivity to ‘things’</th>
<th>New value from “Internet of Things”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cloud / AWS</td>
<td>Cars</td>
<td>Additional revenue generation</td>
</tr>
<tr>
<td>Mobile apps</td>
<td>Lights</td>
<td>• Allow new customer interactions</td>
</tr>
<tr>
<td>Analytics engines</td>
<td>Machinery</td>
<td>• Create new service models and business models</td>
</tr>
<tr>
<td>Data visualization</td>
<td>Electrical equipment</td>
<td>• Enable new products/services and pricing models</td>
</tr>
<tr>
<td>Predictive algorithms</td>
<td>Wearables</td>
<td><strong>Better products, cheaper</strong></td>
</tr>
</tbody>
</table>

- **Additional revenue generation**
  - Allow new customer interactions
  - Create new service models and business models
  - Enable new products/services and pricing models

- **Better products, cheaper**
  - Improve existing products and services
  - Increase efficiency and optimize resources
  - Improve safety
99% of IoT data goes unused today

Oil & Gas Case Example ~30,000 tags measured

Data capture: 100%
Infrastructure: 40%
Data Management: 1%
Analytics: 1%
Deployment: >1%
People & processes: 0%
Two dimensions for the applicability of AI in the physical world

Eliminate waste

Create surplus opportunity
Eliminate waste examples

Material waste
• Yield loss
• Planning and forecasting inaccuracy

Asset underutilization
• Vehicle and equipment underutilization
• Building utilization

Imperfect process outcomes
• Drug discovery
• Negotiation of contracts
Create surplus opportunity examples

**Accident avoidance**

![Car collision diagram]

**Risk management**

![Industrial construction diagram]

**Improved outcomes**

![Medical equipment setup]

**Educational outcomes**

![Educational building]

- Improved outcomes
- Educational outcomes
Our framework to evaluate opportunities

Total Value From AI in "REAL WORLD"

- Physical world (things)
- Applicability of AI
- Availability of data
- Eliminate waste
- Create surplus
- Accessibility
- Quality

- Human activity (people)
## Results: Top use cases

### Physical world (things)
- Monitoring and treating illness
- Predictive maintenance
- Improving wellness
- Centralized and adaptive traffic control
- Increasing agriculture yield
- Autonomous Vehicles
- Real time personalized promotions
- Inventory optimization in manufacturing
- Chore automation in homes
- Video crime monitoring

### Human activity (people)
- Personalized Education
- Business Concierge (sales & marketing)
- Nurses
- Autonomous Vehicles inc. commercial
- Retail Shopping
- Financial Advisors
- Customer service
- Legal/Contract Negotiations
- Government
Example: Supply chain planning and forecasting

Need for faster, granular and precise supply chains

- 100s–1000s internal and external demand variables

Bullwhip effect: translation of variability throughout the supply chain

- Inventories
  - -35+%

- Lost sales
  - -35 - 65%

- Automated/closed loop planning
- Demand sensing
- Profit-optimized production planning
Example: Business Concierge

ALEXA for B2B:
Personalized sales, success & service person

- Manages entire relationship
- How product can help their business + ROI calculation
- Answers pricing, billing, upgrades questions
- Logs tickets and reports on status

Sales
Service
Success
How to build a solution: Government

**PROBLEM**
Most citizens do not know what/how state or local bills impact their lives

**PROBLEM**
Direct Democracy doesn’t work because it requires citizens to have in-depth knowledge of issues and policy

**PROBLEM**
Representative Democracy suffers from The Principal-Agent Problem

This is too hard? Too futuristic?
Wait a second...Is it really that far out?

The Training Data

- A Bill is just complicated text
- Thousands of +/- feedback from Special-Interest (SIG), Non-profits, Citizens...
- All publically available

The Algorithm

- Probability-of-Vote (Citizen, Bill)
- Citizen likes a dozen SIGs as preferences
- NLP + Netflix-style Matrix Factorization on SIG/Citizen feedback to derive $p(\text{citizen}, \text{bill})$

AI Representative Democracy

- Machinery knows how every citizen will vote on every bill
- Allocates taxes optimizing preferences across all citizens
Challenges in reaching outcomes

- Technology building blocks
- Open Source “Real-world Data”
- Coordination between technical solutions (Interoperability)
- Business model, incentives and alignment of stakeholders
Technology building blocks

- Natural language generation/processing
- Deep learning (text, speech, vision)
- Evolutionary systems
- Access to, and accelerated processing of, training data
Open source ‘real world’ data: No Data ➔ No AI

Dirty Data
Most public/academic datasets limited and pure. Real world data is dirty. Thus, academic results aren’t dependable.

Silo’d
Data use limited to specific scope or domain: single-thread use cases or historic analysis

Proprietary
6 Orgs manage most of the world’s data (Google, Facebook, Amazon, Microsoft, Government, AT&T)
### Business model disruption

- **Value realized on** reduction of waste or creation of surplus
- Customers value transparency

### Incentives redefined

- Intermediate players in value chain must enable data, promote transparency

### New stakeholders vs incumbents

- Value created by entrants that provide value from data
- Incumbents threatened
Thank you