

Industrial AI

ee392b Seminar Overview

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Class Topic: Industrial AI Big Picture

- What do companies mean when they hire AI engineers?
- Why are companies compelled to do AI?
- What is the outcome they expect?
- What are the real issues there?

DIGITAL TRANSFORMATION

Digital Transformation

- Digital Transformation
- Software is eating the world
- Digital technology transforms all areas of economy
 - Internet of People (IoP)
 - Internet of Things (IoT)
 - Business Processes

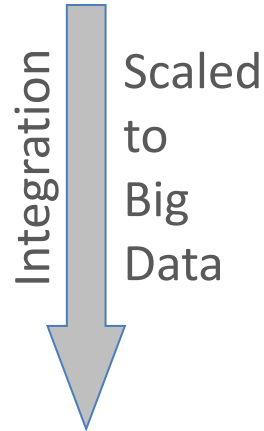
Analytics Applications

- Much of software business is in data management platforms
- Added value comes from business process changes driven by applications



Analytics in Industry

- Business Intelligence (BI)
 - Spreadsheets
- Data Science
 - Exploratory analysis services
- AI
 - Automated applications

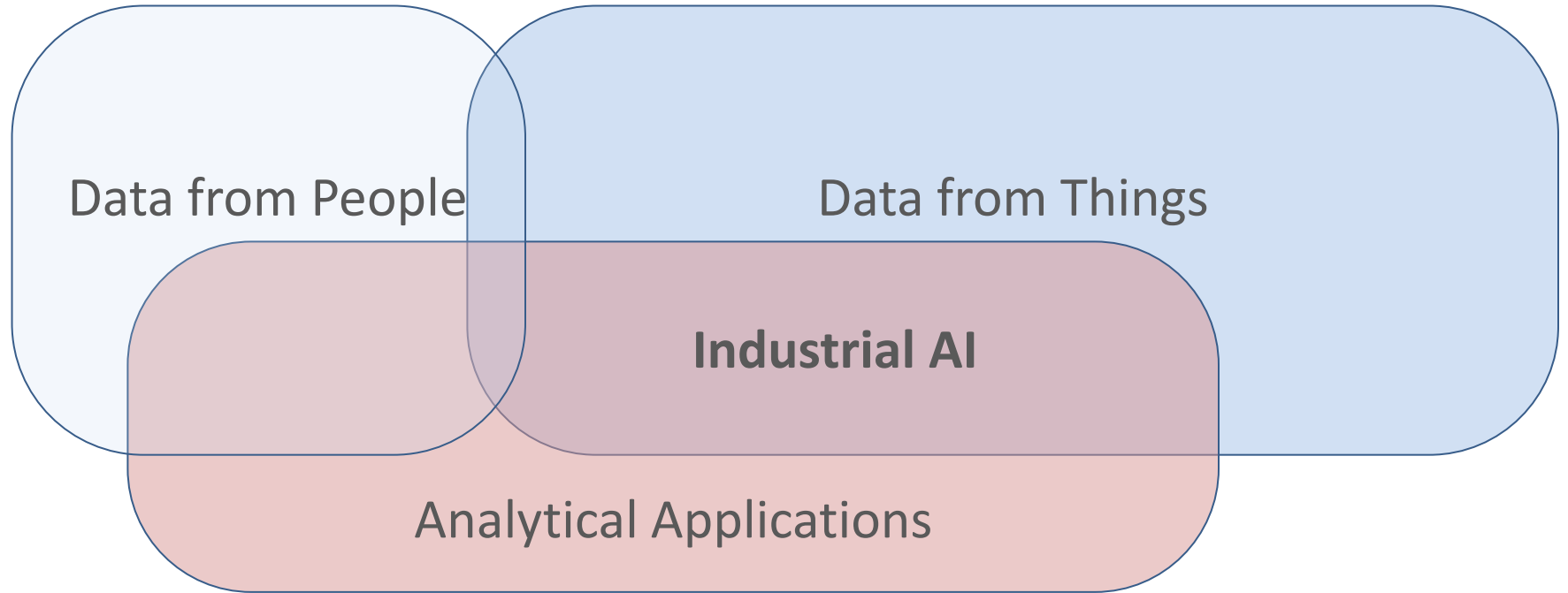


Descriptive analytics

Predictive analytics

Prescriptive analytics

Industrial AI in Digital Transformation



Digital Transformation and Industrial Revolution

- Industry 4.0
 - 4th Industrial Revolution
 - Manufacturing: Data from Machines and Processes

1. The First Industrial Revolution
2. The Second Industrial Revolution
 - Mass production; power integration
3. Internet Revolution
 - Automation; electronics, information technology
4. Industrial IoT, the 4th Industrial Revolution
 - Digital Transformation



Digital Transformation with Data From Things

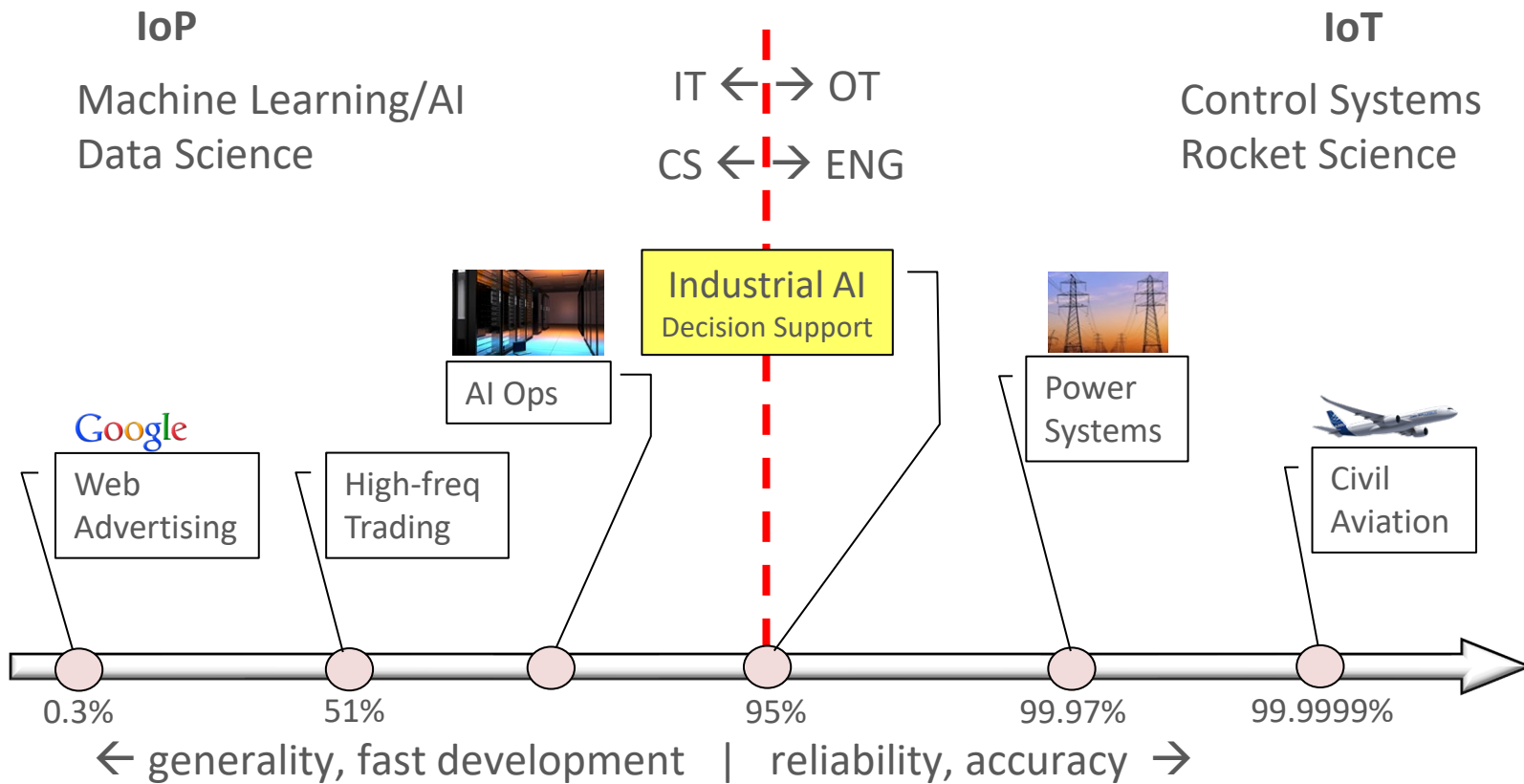
- Smart Cities, Smart Buildings, Smart Homes
- Industrial IoT (includes Industry 4.0, Smart Cities, and more)
 - Smart Grid
 - Supply Chains
 - Transportation (Cars, Planes, Trains)
- More...
 - Insurance
- Data Centers and IT Systems (AI Ops)

INDUSTRIAL AI APPLICATIONS

What is Special about Industrial AI?

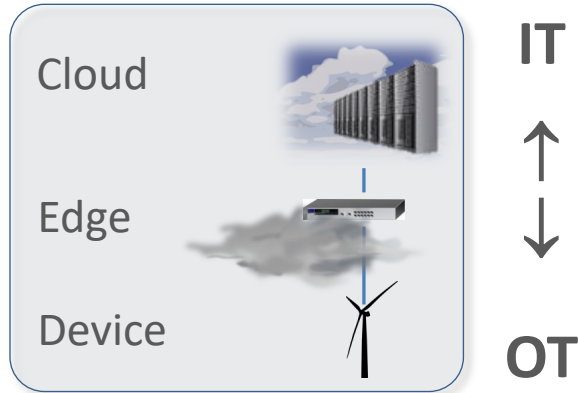
- Mission Critical Analytics
 - Explainable AI
 - Digital Twins models
 - Verification and validation processes, engineering rigor
 - E.g., Tesla, Waymo
- Automated Data-driven Apps
 - Scalable, reduced deployment effort
 - Broaden access to the benefits of advanced analytics

Mission Critical Analytics



Computing Platform: IT/OT Convergence

Information Technology



Operational Technology

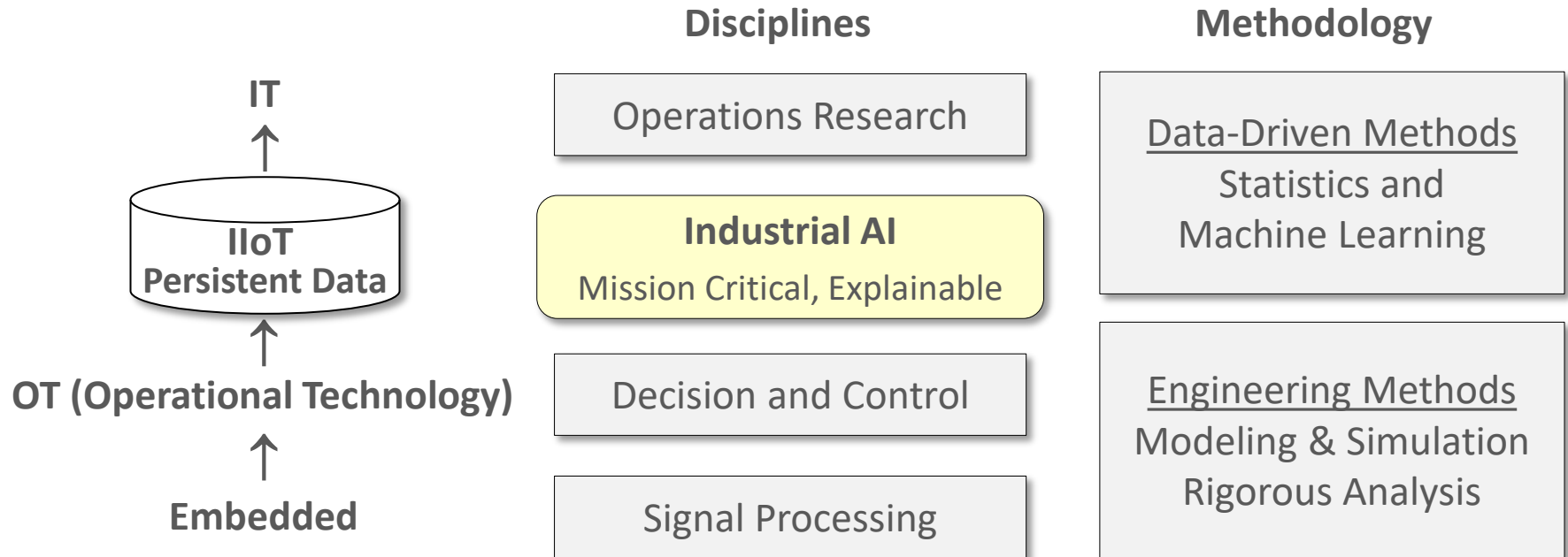
- IT: Enterprise computing. Cloud.

Edge computing. Fog.

- OT: Industrial systems.
Secure, closed networks.

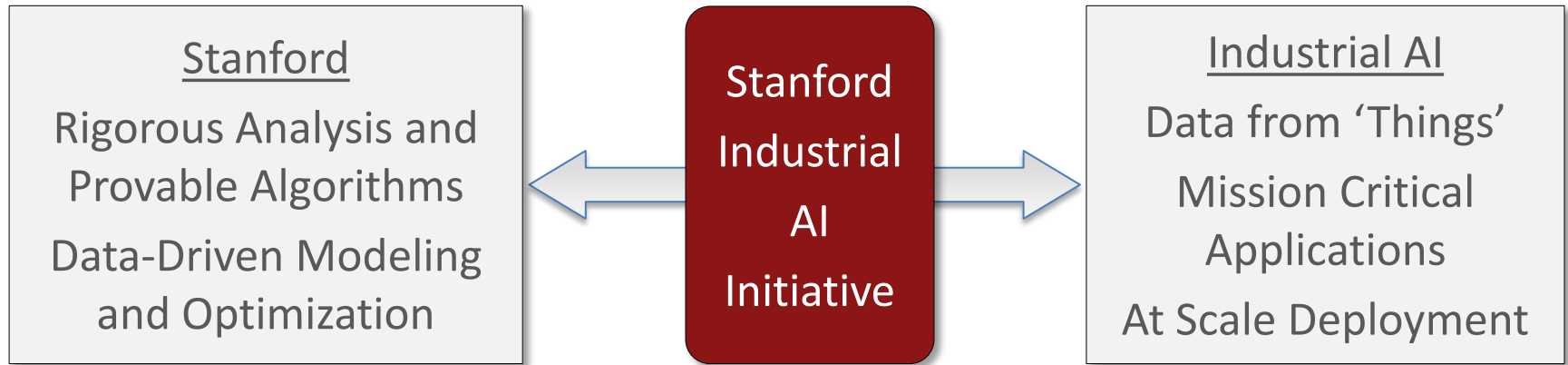
INDUSTRIAL AI AT STANFORD

Analytics Domains



Industrial AI Initiative

<https://iai.stanford.edu>

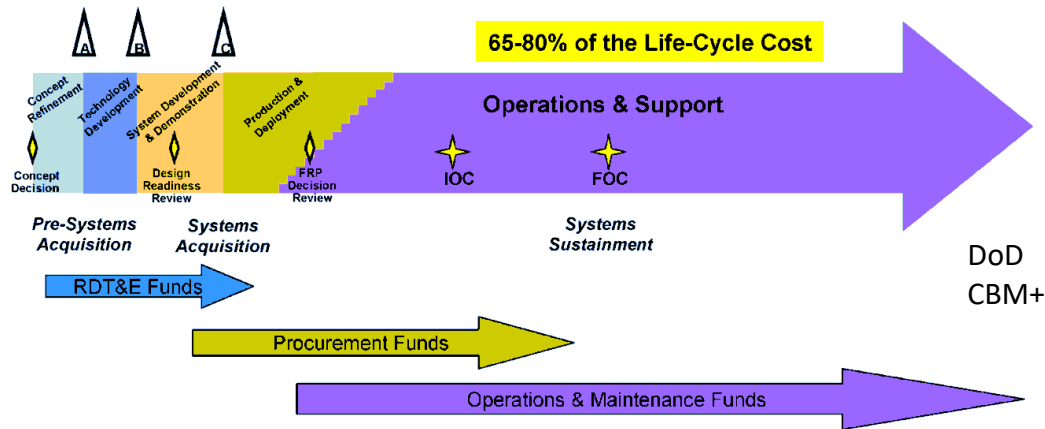


Rigorous Algorithms \leftarrow **Industrial** \rightarrow Mission Critical Applications
Data Driven Modeling \leftarrow **AI** \rightarrow At Scale Deployment

IMPORTANT USE CASES

Digital Transformation of Operations and Support

- Engineering and manufacturing
 - 10-15% of the lifecycle cost
- Operations and supply chains
 - 65-80% of the lifecycle cost



AI Ops

- AI for IT Operations
- Computing center as an industrial plant
- Control plane provides 'OT'
- Tech Industry
 - Much more dynamic than traditional industries

SYLLABUS

Planned Lectures

March 31, Introductory Lecture

April 7, Industrial Enterprise, **Hitachi**

April 14, AIOps, **Alibaba**

April 21, VC, **Greylock**

April 28, Consulting, **Accenture** (panel)

May 5, VC, **The Robotics Hub**

May 12, AIOps, **Google**

May 19, AIOps, **Microsoft**

May 26, AI Technology, **Aspen**

June 2, Consulting, **Deloitte** (panel)

I-AI Lecture Map

