

Artificial Intelligence in the Water Industry: Myth or Reality?

Mo Chalabi & Andrew Duffy

Introduction



Elon Musk ✓
@elonmusk

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If you're not concerned about AI safety, you should be. Vastly more risk than North Korea.

12:29 PM - Aug 12, 2017

2,434 13,752 37,939

Introduction

Technology

Stephen Hawking warns artificial intelligence could end mankind

By Rory Cellan-Jones
Technology correspondent

🕒 2 December 2014 | Technology | 🗨️

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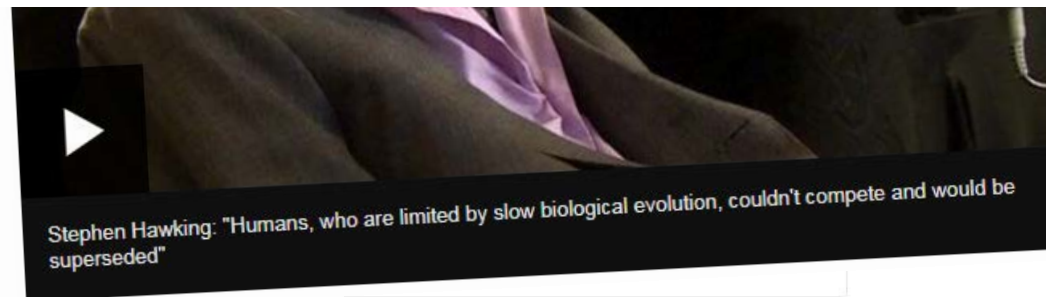


Stephen Hawking: "Humans, who are limited by slow biological evolution, couldn't compete and would be superseded"

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Stephen Hawking warns artificial
Steve Wozniak: The Future of AI Is 'Scary and Very Bad for People'



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**Intel Capital has invested over \$1 billion in companies
focused on AI**

Posted 1 hour ago by [Darrell Etherington \(@etherington\)](#)

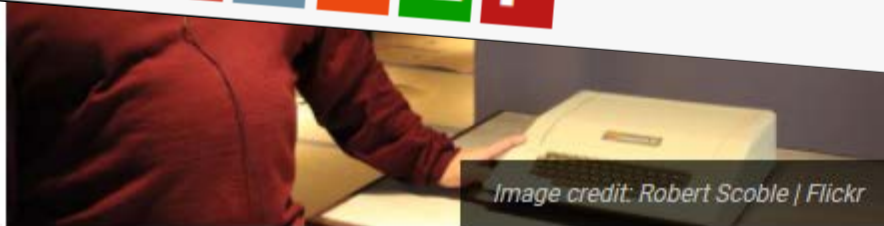
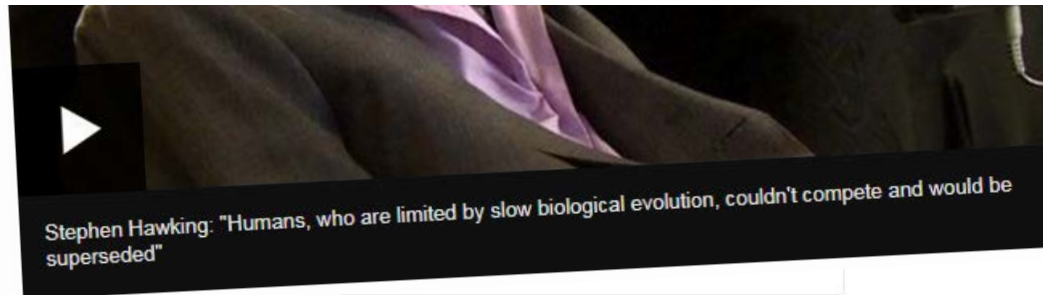


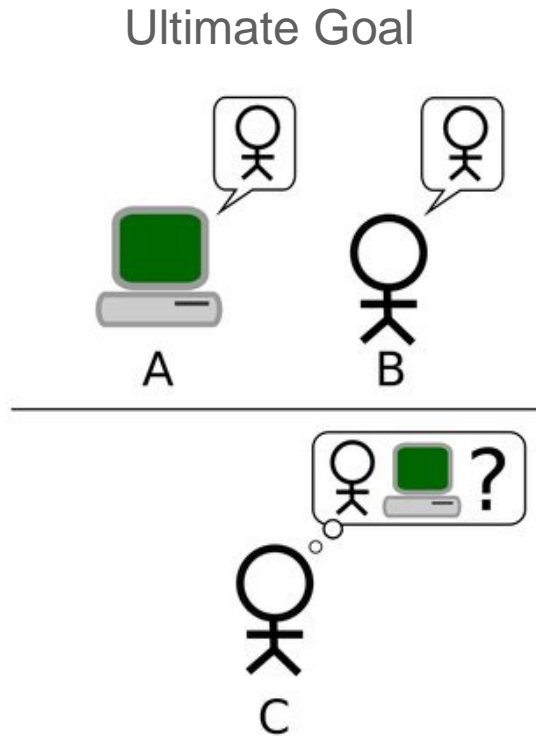
Image credit: Robert Scoble | Flickr



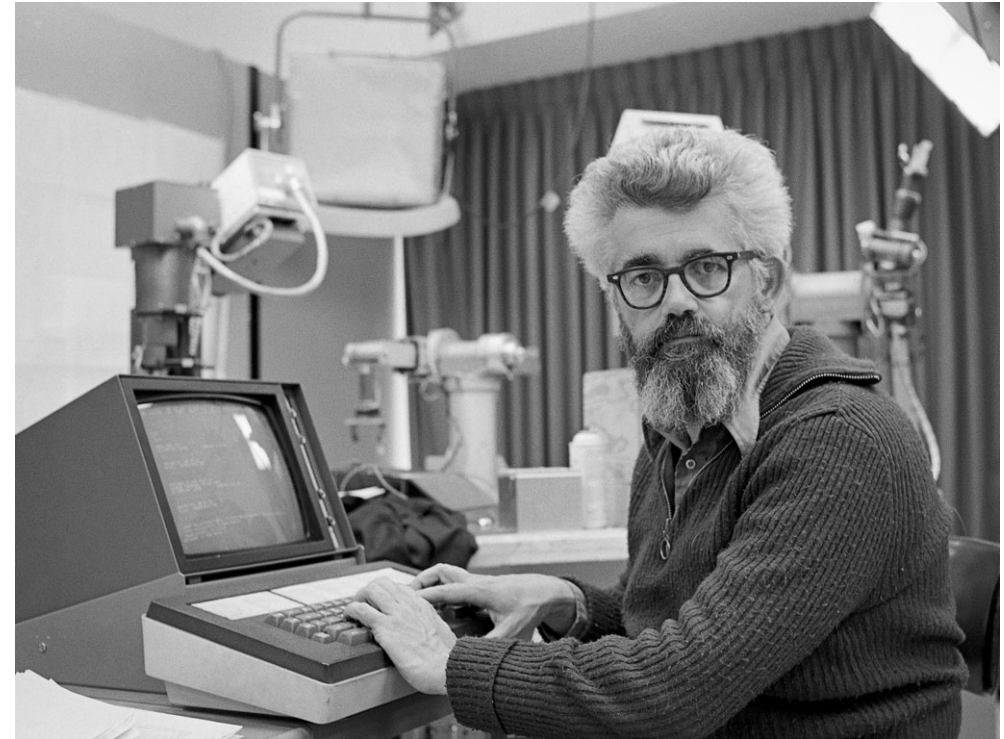
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What is Artificial Intelligence?

The science of making computers perform tasks that require intelligence.



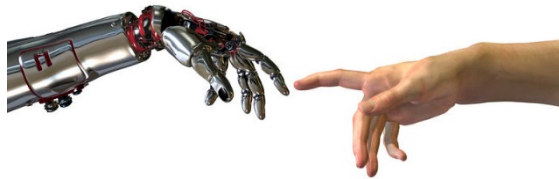
John McCarthy (Father of AI, 1950's)



Types of AI

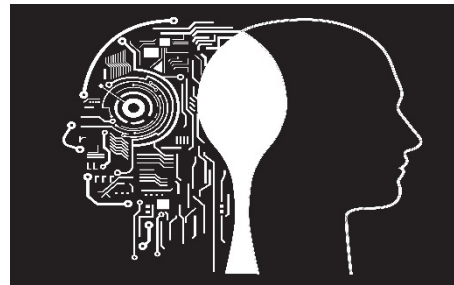
Narrow Intelligence

Artificial Narrow Intelligence (ANI) is AI that specialises in one area. It is machine intelligence that equals or exceeds human intelligence or efficiency, but in one specific area. Smartphone apps, spam filters, Google translation are all examples of ANI.



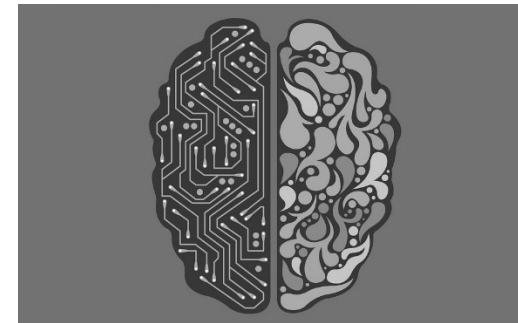
General Intelligence

Artificial General Intelligence (AGI) refers to a computer that is as smart as a human, can understand and that can perform any intellectual task that a human being can.



Super Intelligence

Artificial Super Intelligence (ASI) is an intellect that far surpasses the best human intellect in virtually every field, including scientific, general wisdom, and social skills.



Similar Scenarios?

Self-driving Car



Water Treatment Plant



Situation

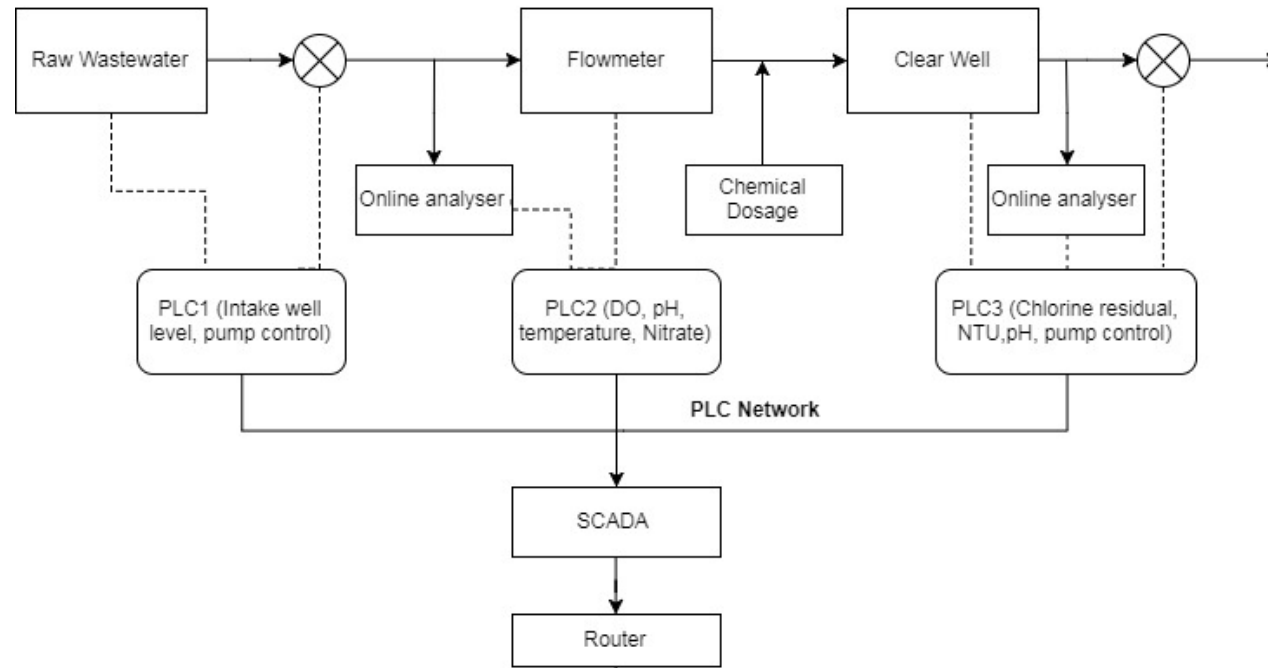
Sensing of surroundings

Dealing with unexpected encounters

Understanding and acting upon human intervention

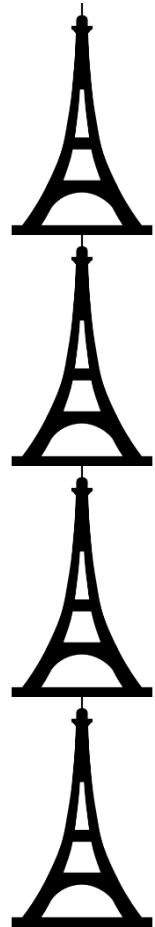
Offering reliability and security

Where does AI Fit?

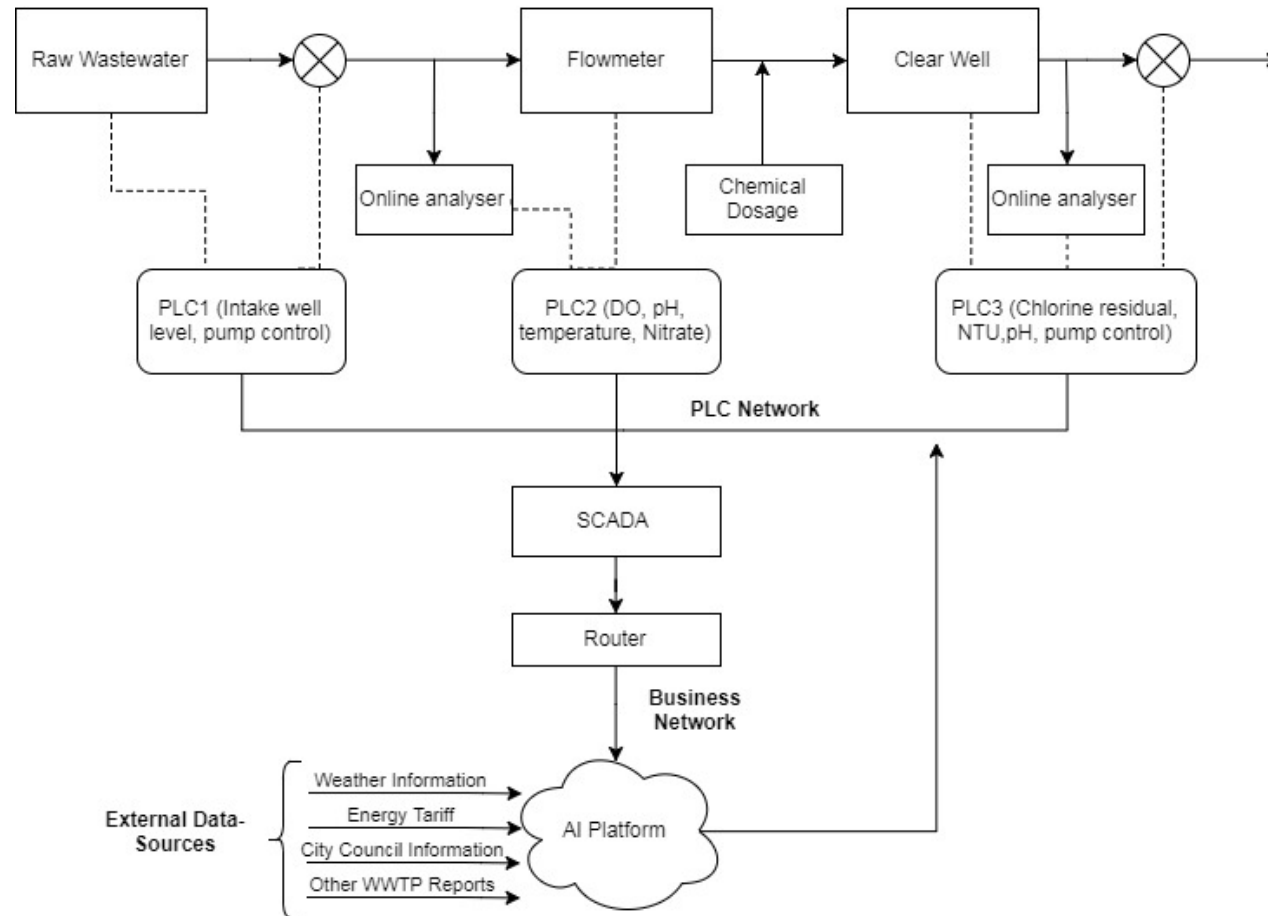


Where does AI Fit?

2,500,000,000,000,000,000 per day

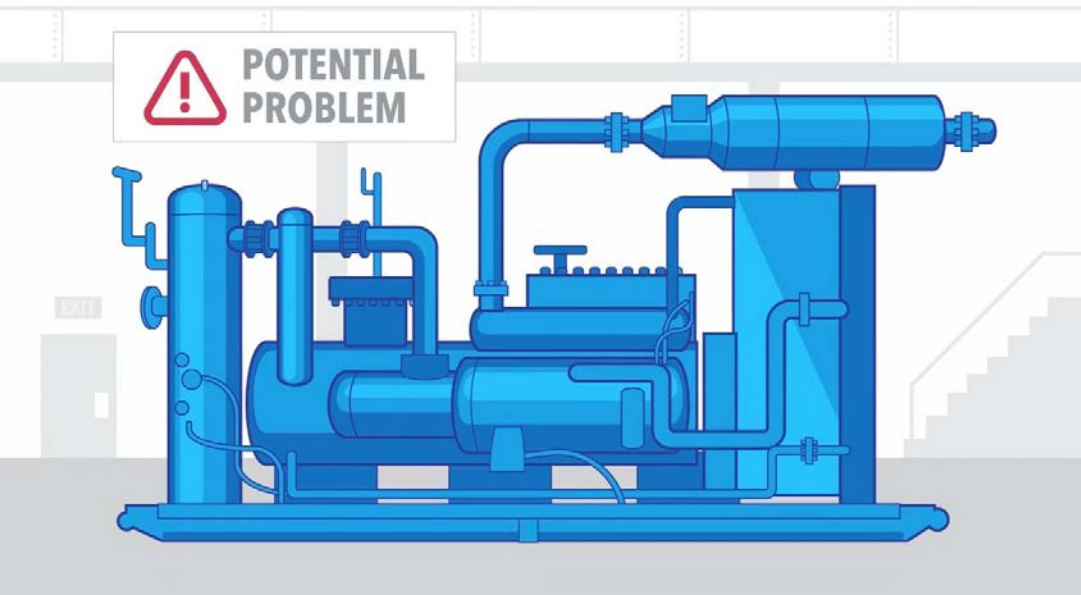


Where does AI Fit?

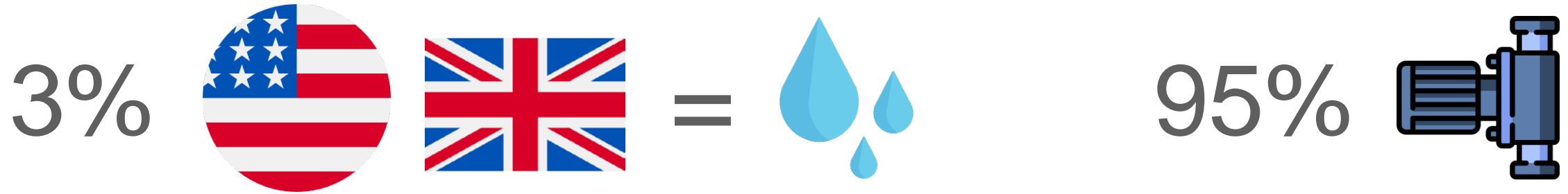


Optimising Operations (Low-hanging Fruit)

- Power consumption
- Predictive maintenance
- Alarm analysis



Reducing Power Consumption



- Pump reconditioning
- Pump scheduling ← Complex process and dynamic system
- Time-of-use tariff/Maximum demand
- Shift pumping to off-peak hours
- Reducing pump start-stop frequency



Reducing Power Consumption

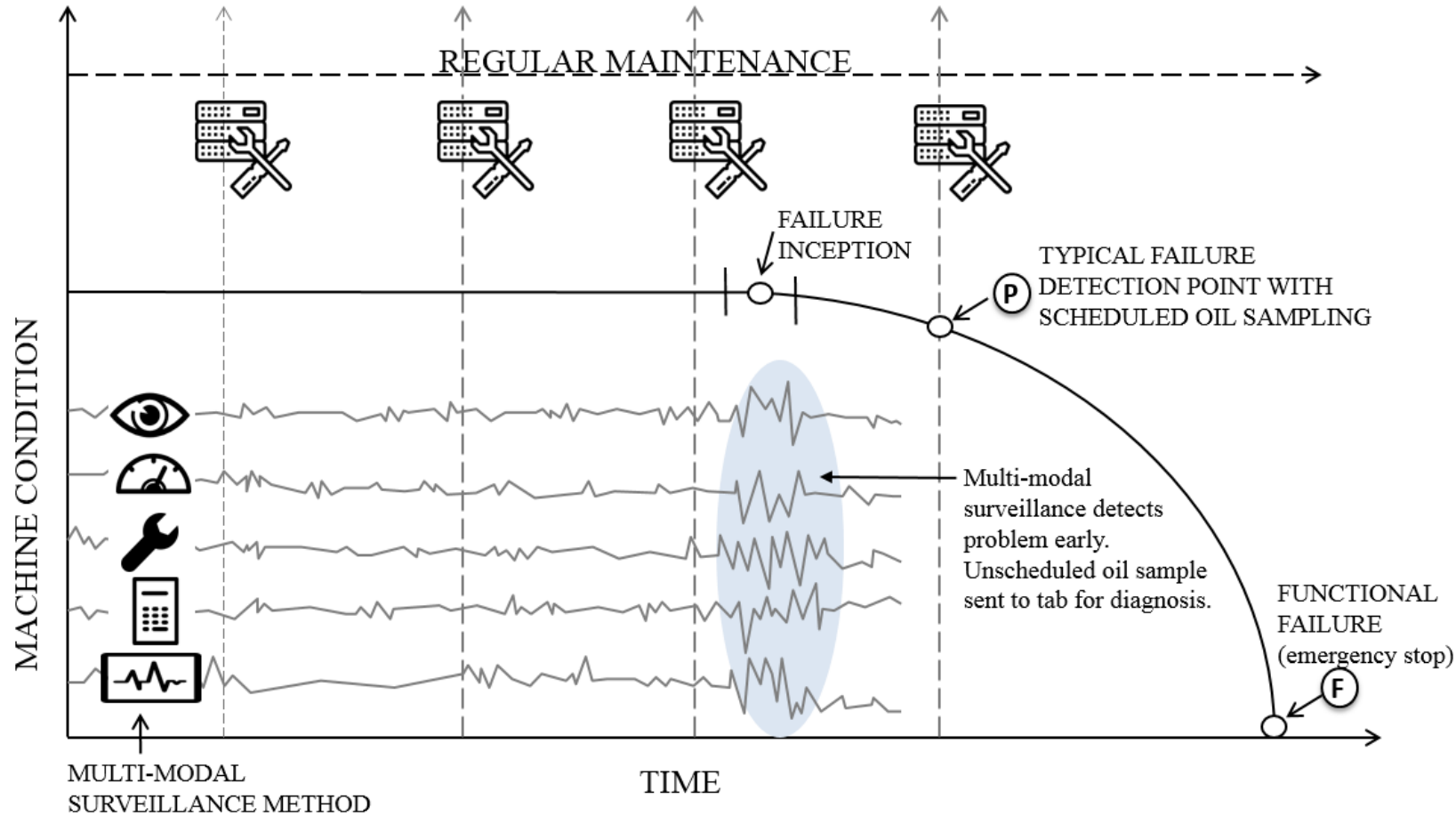


- Pump Scheduler to minimise energy costs
 - Most suitable pumps to operate
 - Time of day
 - Predicted load & weather data

10-20%



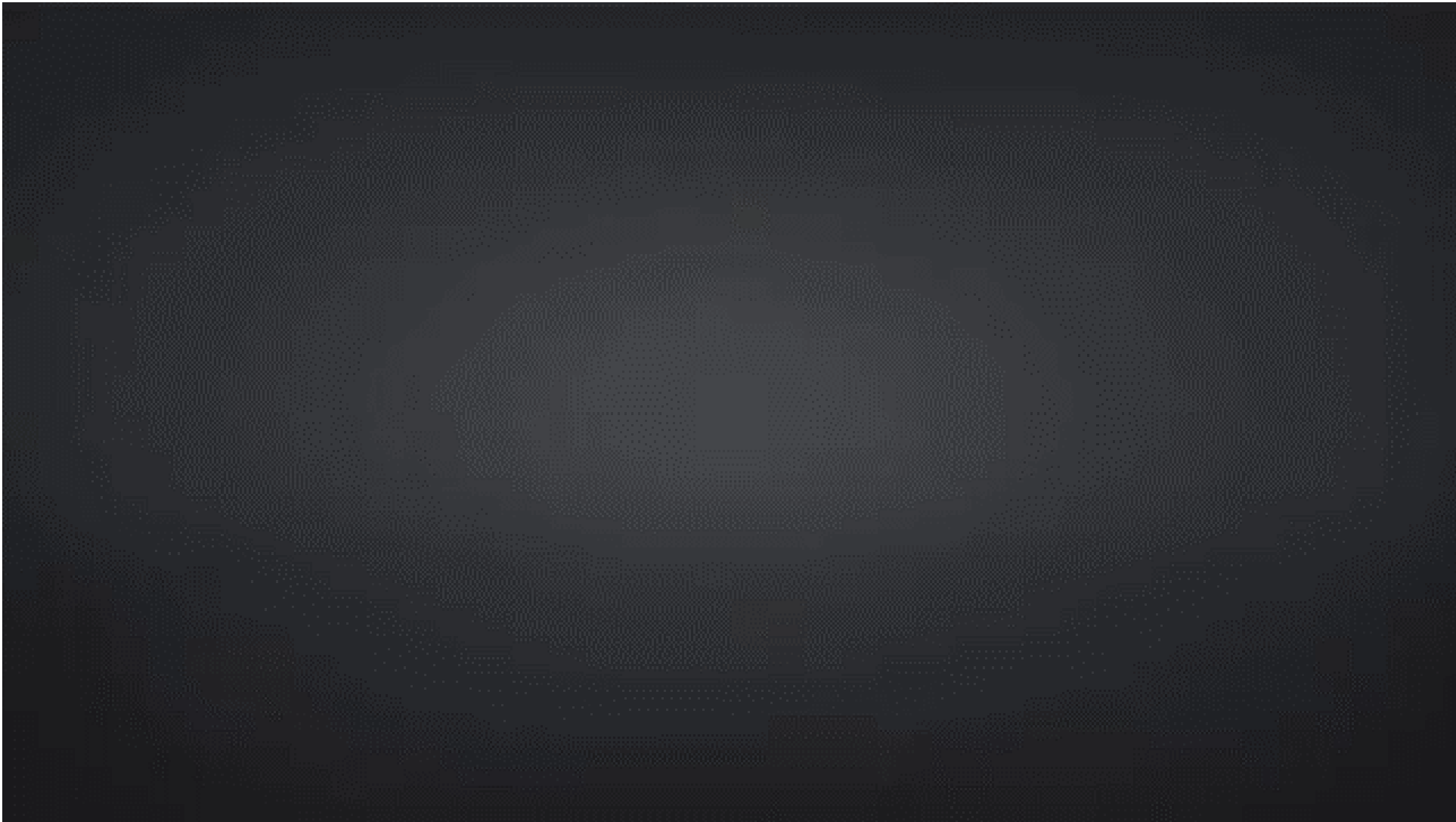
Predictive Maintenance



- Combine preventive & reactive
- Less down-time
- Reduced operational costs



Predictive Maintenance



Predictive Maintenance



STEP #1: KICK OFF MEETING

We identify scope (challenges and goals) and explore historical data, plant specifications and scope of the project.



STEP #2: HARVI LEARNING

We use historical data to train HARVI to site-specific data. Once HARVI's internal models are built, they are diligently validated.

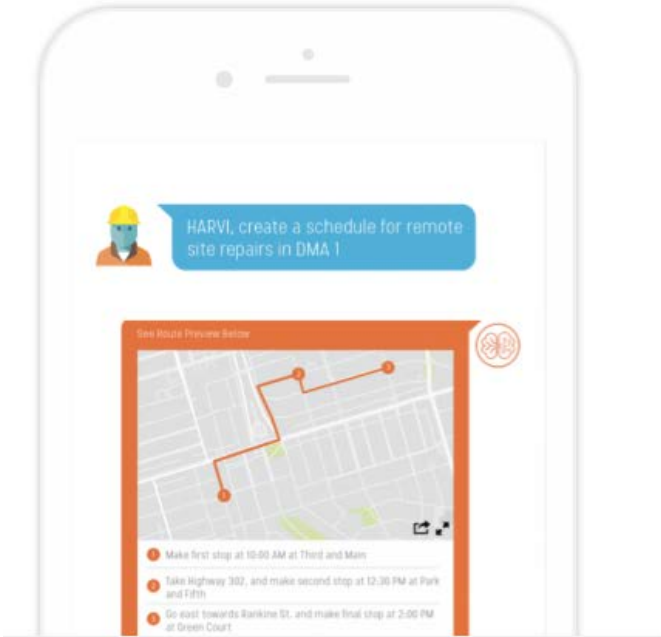


STEP #3: INTEGRATION

HARVI is then integrated with your SCADA system and your staff are provided with administrative access to the platform.



Chatbots (Powered by AI)

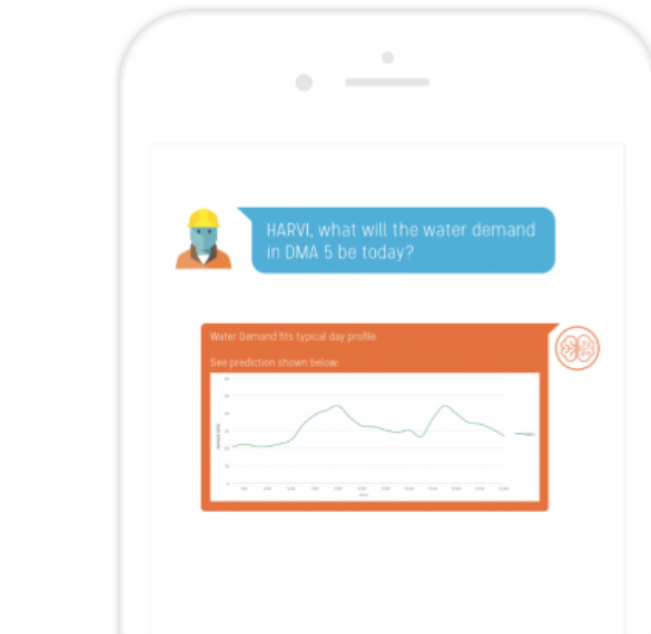


OPTIMIZE MAINTENANCE DOWNTIME

HARVI is capable of optimizing your maintenance crews' schedules in order to ensure system downtime is minimal.

PREDICT KEY PERFORMANCE DRIVERS

Track with ease how your infrastructure will perform based on varying parameters just by asking HARVI.



Who is offering this?



Who is offering this?

AI Application	Platforms
Predictive Maintenance	IBM PMQ, SAP, Cisco, Intel, Siemens, Microsoft, GE, ABB, Huawei
Reducing Energy Costs & Consumption	Aquadapt Derceto, Pluto AI
Forecasting Intake, finding leaks underground	Pluto AI, H2O

How can you start using AI?

49% Moderate Impact

20% Little to No Impact

- AI used to be costly
- Viable business case for large-scale adoption is challenging
- Lack of AI standards

The
Economist

How can you start using AI?

To achieve a successful outcome when implementing AI into your plant:

- Identify an area within that requires optimisation
- No optimisation can be done without monitoring
- Set reasonable ROI & KPIs
- Perform a technology assessment to identify the suited platform. (This could be done through partnership with vendor agnostic consultants)
- Run a free trial on an AI platform (small scale pilot study)
- If successful, consider expanding the same platform to service other areas within your plant
- Explore the use of Internet of Things (IoT) sensors in providing more data into the system

Questions?



Mo Chalabi

Emerging Technologies Engineer



Andrew Duffy

Associate – Electrical, Instrumentation &
Controls Engineer