How To Manage AI Projects

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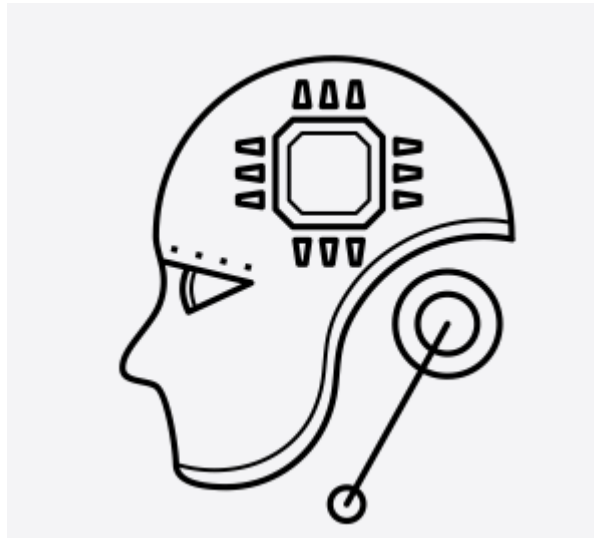
Agenda

- Artificial Intelligence (AI) Definition
- Brief History of AI
- Potential of AI
- A Tutorial on Managing AI Projects

What is Artificial Intelligence

- **Artificial Intelligence** is a term first used by Stanford Professor John McCarthy in 1955. McCarthy used the following definition, 'the science and engineering of making intelligent machines'.

One of the most prominent textbooks on artificial intelligence provides us with a framework to better understand its potential capabilities: *Artificial Intelligence: A Modern Approach* published by Stuart Russell and Peter Norvig.

- Four potential goals of AI:

THINKING LIKE HUMANS	THINKING RATIONALLY
Introspection, observation, anything that replicates human cognition	Basic logic, probability-based reasoning
ACTING LIKE HUMANS	ACTING RATIONALLY
Natural language processing, drawing conclusions, and passing the Turing test	Achieve the best (expected) outcome, doing the "right" thing

Excerpt from HHS CIO Briefing July 13, 2013

Types of AI

Machine Learning: Artificial intelligence includes machine learning as a component. It is described as the algorithms that scan data sets and then learn from them to make educated judgments. In the case of **machine learning**, the computer software learns from experience by executing various tasks and seeing how the performance of those tasks improves over time.

Deep Learning: Deep learning may also be considered a subset of machine learning. **Deep learning** aims to increase power by teaching students how to represent the world in a hierarchy of concepts. It demonstrates how the notion is connected to more easy concepts and how fewer abstract representations can exist for more complex ones.

Natural language Processing (NLP): Natural Language Processing (NLP) is an artificial intelligence that combines AI and linguistics to allow humans to communicate with robots using natural language. Google natural language processing utilizing Google Voice search is a simple example of **NLP**.

Computer Vision: Computer vision is used in organizations to improve the user experience while cutting costs and enhancing security. The market for computer vision is growing at the same rate as its capabilities and is expected to reach $26.2 billion by 2025. This is an almost 30% annual growth.

Explainable AI(XAI): Explainable artificial intelligence is a collection of strategies and approaches that enable human users to comprehend and trust machine learning algorithms' discoveries and output. Explainable AI refers to the ability to explain an AI model, its projected impact, and any biases. It contributes to the definition of model correctness, fairness, and transparency and results in AI-powered decision-making.

History of AI, Conceptual Years

1936-1956 Theoretical Years

1936 Alan Turing describes theory of computation

1943 McCullough and Pitts publish Logical Calculus of Ideas, (first description of neural network

1950 Alan Turing publishes Computer Machinery and Thinking, asking the question can computers think?

1956 Dartmouth Conference which is what is regarded as the birthplace of AI

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20 years

AI History Continues
AI Development, Early Models

1959-1999 Early Systems and Enhanced Development

1959 Arthur Samuels created a program to play checkers that beat a human

1971 Arthur Feigenbaum begins research on Expert Systems

1979 Stanford CART is first autonomous vehicle

1993 web protocol available to public at no charge, advent of big data

1997 IBM Deep Blue beats Gary Kasparov in Chess

1999 Web crawlers become ubiquitous

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History of AI
Contemporary Systems

2000-Today Commercial Applications

2009 Google builds autonomous car

2011 Apple releases SIRI

2014 Microsoft releases Cortana, virtual assistant available in 8 languages

2022 Open AI releases Chat GPT

2023 Open AI releases GPT-4 multi modal very high scores on SAT & LSAT

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Potential of AI

- Healthcare
- Business Intelligence
- Machine/System Design (Digital Engineering)
- Education
- Climate Change

Potential Pitfalls of AI

- Paperclip maximizer problem
- Enhanced tool set for criminals
- Challenges for educators to validate student work vs AI
- Eliminate skilled jobs
- Hallucinations
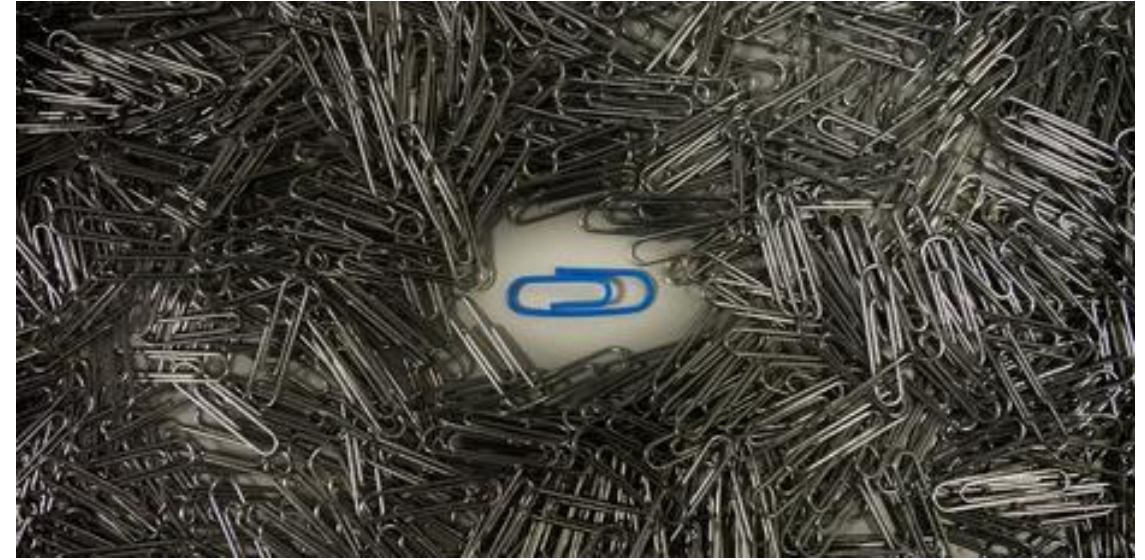
Background

- Tech Startup founded in late 2019 by two engineers from DeepMind and an engineer from Trane.

- Developed an AI Agent that optimized industrial chiller plants.

- Purpose – To bring this technology to mission critical facilities to save energy and provide stability.
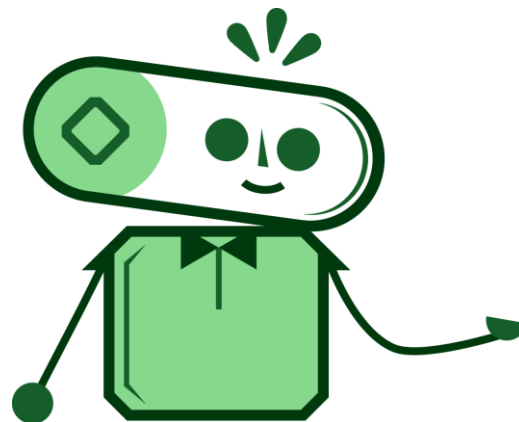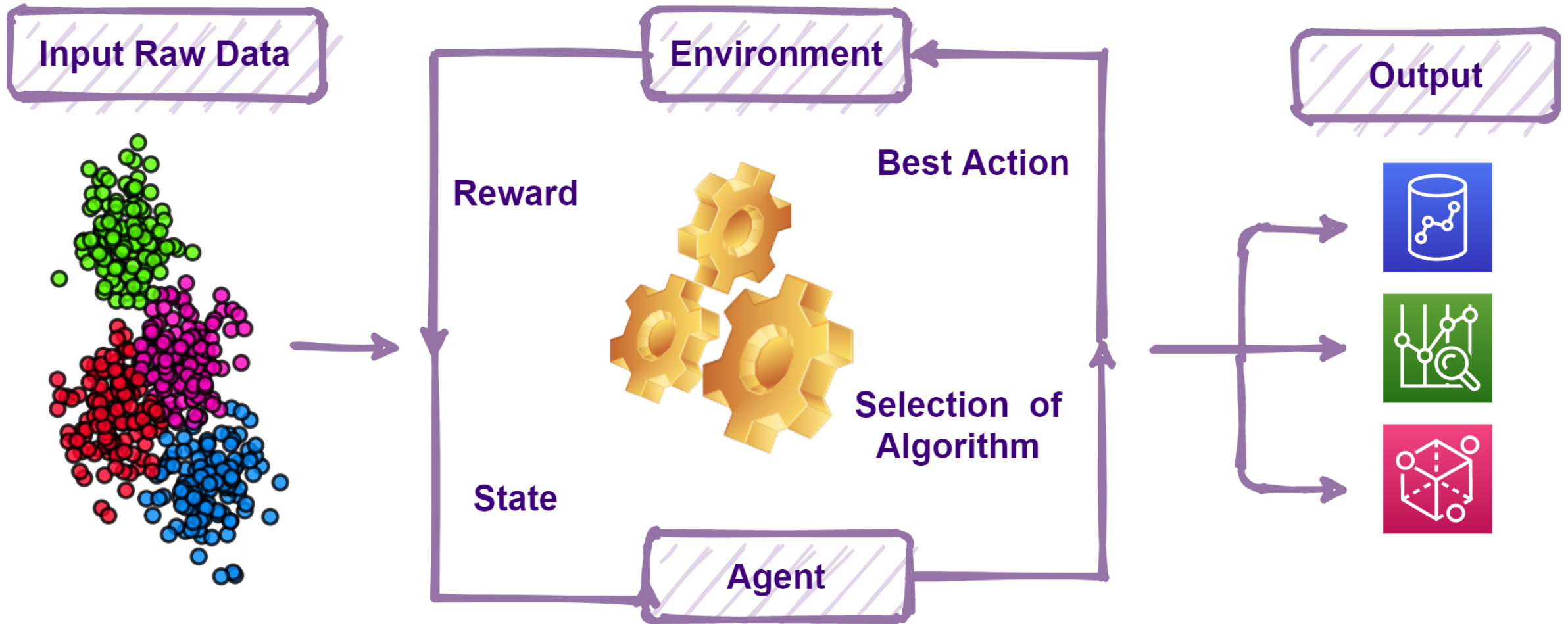
What is a chiller plant?
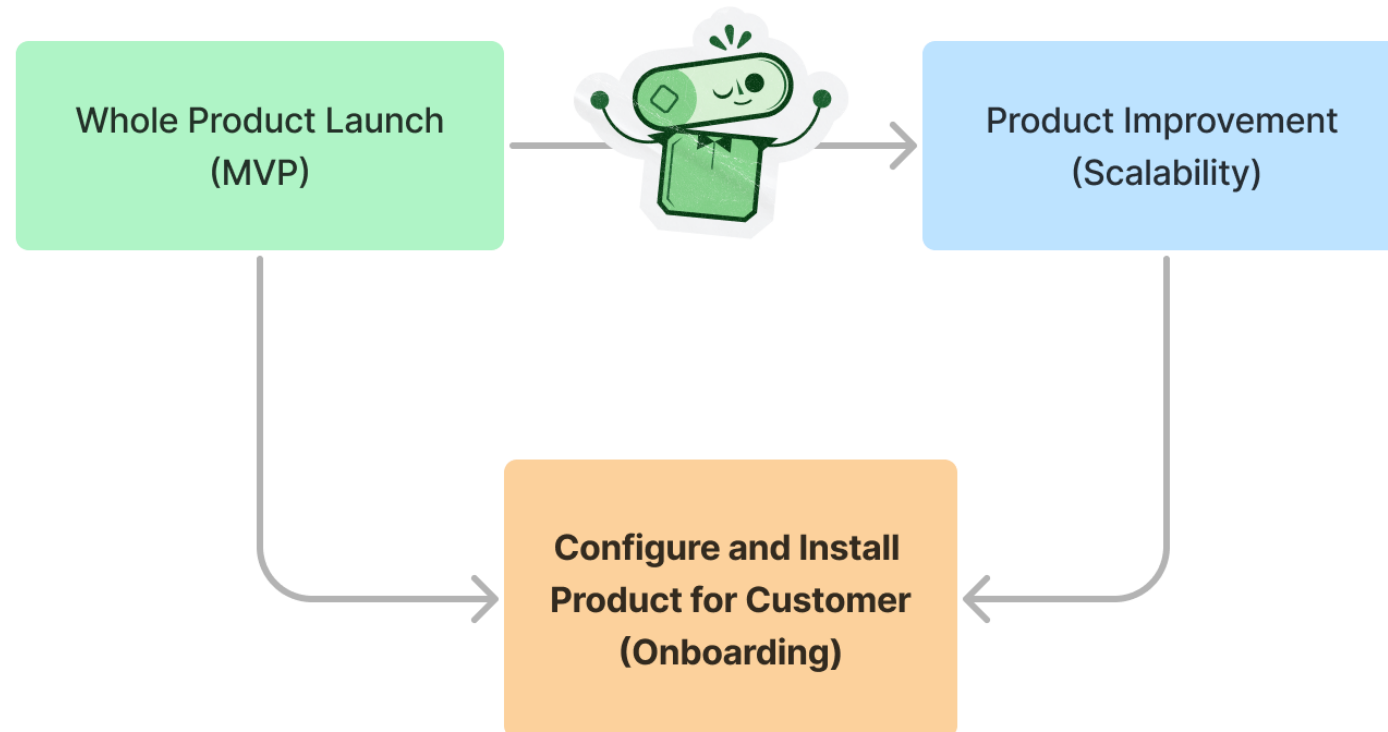
What is a Chiller Plant?

Meet Alfred…

- Alfred is a cloud-based AI Agent that provides supervisory control of the chiller plant.

- It uses Reinforcement Learning to recommend setpoints.

- These setpoints are communicated through a live data stream to the building level controller to optimize the plant and provide stability.

Reinforcement Learning

Input Raw Data

Environment

Output

Reward

Best Action

Selection of Algorithm

State

Agent

Image courtesy of https://www.analytixlabs.co.in/blog/top-data-science-interview-questions-and-answers/

What projects do we encounter?

Challenge #1: Each step is dependent on another

Solution: Use a good waterfall scheduling tool

- How do I define "good"?
  - Relate tasks to show the dependencies.
  - Built in formulas to automatically adjust.
- Tools I have used…
  - Microsoft Project
  - Smartsheet
  - **Inspire Planner (Salesforce native)**

Challenge #2: We don't have a whole product…yet!

Solution: Be flexible, discuss scope and schedule often, adjust as necessary.

- Our Research team is heavily involved in customer onboarding.
- Have Research communicate status…often.
- Adjust scope to deliver an AI Agent on schedule. OR
- Adjust schedule to delay the deployment.

Challenge #3: The customer does not understand AI. And we need their help.

Solution: Educate. Listen. Learn. Iterate.

- **Educate** – Our sales team tries to explain our product and our process during the sales process.

- **Listen** – The project team listens carefully to red flags that they do not understand.

- **Learn** – We conduct retrospectives to learn how to better educate and update our documentation and processes.

- **Iterate** – We're not done yet…

Challenge #4: AI Agents are a challenge to test

Solution: Soft-live is your friend…

- Our design includes the customer programming an Operator Override button into their control system.

- "Soft-Live" is a fully operational AI Agent with Operator Override in "Override".

- We observe the recommendations and make sure it is operating as designed.

Summary

- Start with a good waterfall scheduling tool.
- Be flexible. This is new technology!
- Good communication - with co-workers and with customers.
- Be innovative.

Artificial Intelligence Engines

- Copy AI, [Copy AI](#)

- Chat GPT, [Chat GPT](#)

Additional Resources

- Virginia Tech IT Bootcamp VT AI Bootcamp
- Harvard Medical AI Bootcamp, Harvard Medical AI Bootcamp
- MIT AI Bootcamp, MIT AI Bootcamp
- Coursera AI courses, Coursera AI Courses