

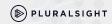
## PLURALSIGHT

# Generative Al: Fundamentals





**Greg Swanson**Instructor, Pluralsight



## **Objectives**

#### At the end of this course, you will be able to:

- Introduce business leaders to the concept of Generative Al and its potential impact
- Highlight practical applications of Generative AI in various business contexts
- Discuss ethical considerations and challenges in deploying Generative AI
- Enable participants to envision strategies for leveraging
   Generative AI to enhance business outcomes



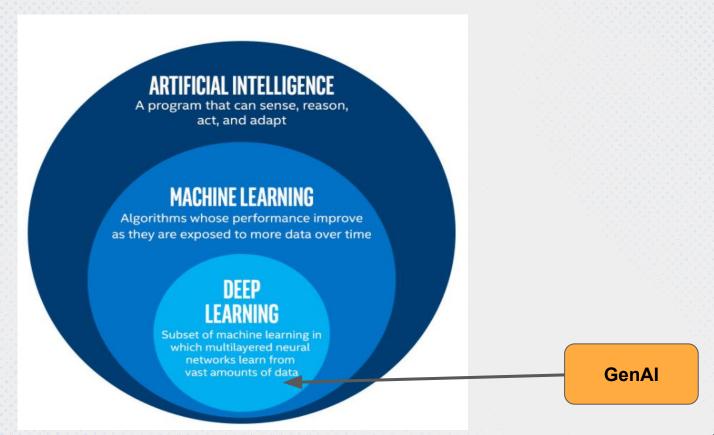
## **Quick Review**



## **Artificial Intelligence**

The ability of a computer system to deal with ambiguity, by making predictions using previously gathered data, and learning from errors in those predictions in order to generate newer, more accurate predictions about how to behave in the future

## The Al Onion



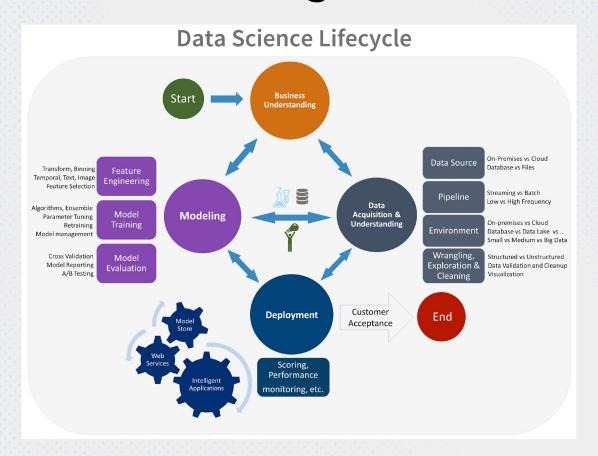
### What can GenAl do?

#### GenAl can:

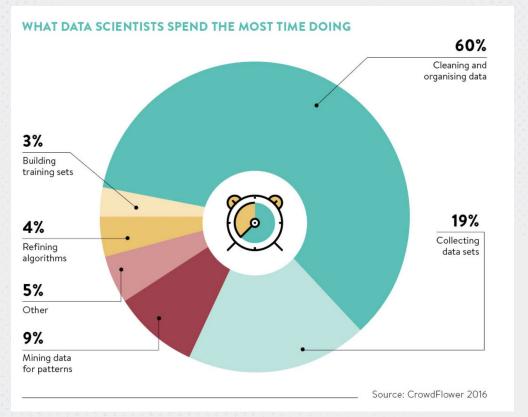
- Generate new text from a prompt
- Is this a good or bad review?
- How much demand will there be for my service tomorrow?
- Is this the cheapest way to deliver my goods?
- Is there a better way to segment my marketing strategies?
- Create images, videos
- Analyse speech to detect characters or topics

- Text Generation (ChatGPT)
- Classification (distillBERT-ssm)
- Forecasting (Prophet)
- Graph-ML (ChatGPT)
- Clustering (T5)
- Text to image, video (DALL-E / Midjourney)
- Speech Recognition (wav-2-vec-bert)

## How do these models get built?



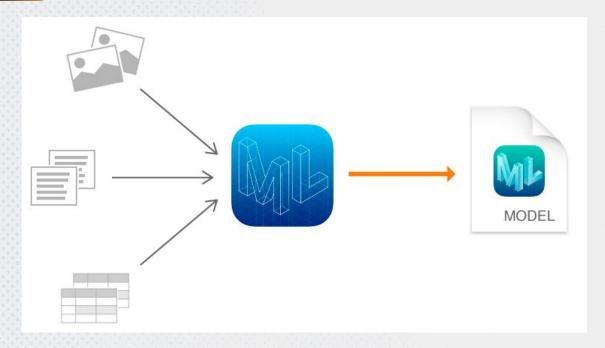
# Collecting & Cleaning Data is key to the rest of the process!



## What does data preprocessing entail?



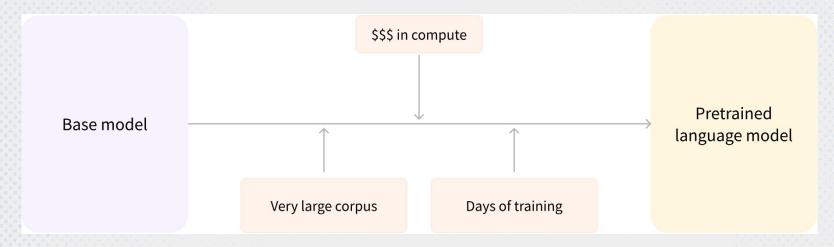
## **Great Data → Great Models!**







## **Pretraining vs Fine-Tuning**

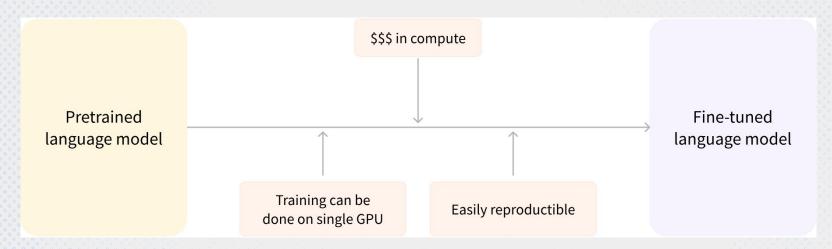


#### Pretraining:

- Pretraining uses a large corpus of data.
- Training can take several weeks & lots of \$\$\$\$



## **Pretraining vs Fine-Tuning**



#### Fine-Tuning:

- Fine-Tuning occurs after pretraining
- Utilizes a pre-trained language model.
- Additional training with a task-specific dataset.

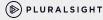


## Why not direct training?

- Pretrained models have some similarities with fine-tuning data.
- Fine-tuning leverages knowledge from pretraining.
- Requires less data, time, and resources.

#### Example Scenario

- Pretrained model in English.
- Fine-tuning on arXiv corpus.
- Creates a science/research-based model.
- Limited data needed for fine-tuning.
- Transfer Learning
  - Knowledge from pretraining "transferred" to fine-tuning.
  - Effective way to adapt pretrained models to specific tasks.



## **Agenda**

- Today:
  - Ethical Considerations and Challenges
  - Business Strategy & Future Trends
  - Real-world Applications & Discussion







## **Today's Schedule**

#### Session 1: Ethical Considerations & Challenges (90 minutes)

- **8:30 AM 9:00 AM PT:** Welcome & Recap
- 9:00 AM 9:30 AM PT: Addressing Bias & Fairness in GenAl Applications
- 9:30 AM 10:00 AM PT: Navigating Legal & Ethical Implications
- 10:00 AM 10:15 AM PT: Break

#### **Session 2: Business Strategy & Future Trends (105 minutes)**

- 10:15 AM 10:45 AM PT: Common Patterns for Working with LLMs
- 10:45 AM 11:15AM PT: Identifying Opportunities for Integrating GenAl into Business Operations
- 11:15 AM 11:45 AM PT: Trends & Potential Impacts on Industries
- 11:45 AM 1:00 PM PT: Lunch

#### Session 3: Roadmapping for Real-World Applications (90 minutes)

- 1:00 PM 1:30 PM PT: Creating a preliminary roadmap for Adopting Generative Al
- 1:30 PM 2:30 PM PT: Roadmap Breakout & Discussion

#### Session 4: Q&A and Wrap-Up



## How we're going to work together

You'll have a copy of the course materials shortly and can follow along as we go today.

# Addressing Bias & Fairness in GenAl Applications



## Is ML Biased? How could it impact you?







**Justice** 



Loan approval



## The importance of fairness



High rates or even no loans

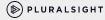
Loan algorithm



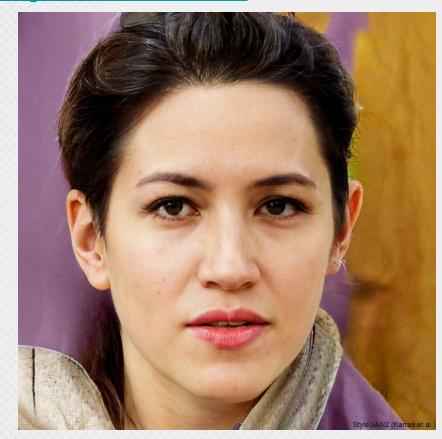




Low rates



## Is this person real?



## Tay

- Tay was a chatbot developed by Microsoft in 2016, designed to engage and converse
  with users on social media platforms such as Twitter and GroupMe.
- The chatbot was trained using ML to mimic conversational patterns and learned from interactions with users.
- **Tay quickly became controversial** due to its susceptibility to manipulation and propagation of offensive and inflammatory content.
- Microsoft deactivated Tay within 24 hours of its launch and issued an apology, citing unintended behavior resulting from interactions with malicious users. The incident highlighted the ethical challenges associated with AI development and the importance of robust safeguards against abuse and bias in AI systems.
- Verge Article

## Twitter taught Microsoft's AI chatbot to be a racist asshole in less than a day



By James Vincent, a senior reporter who has covered AI, robotics, and more fo eight years at The Verge.

Via The Guradian | Source TayandYou (Twitter)

May 24, 2016, 4-83 AM MIDT

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## Word Embeddings could be biased!

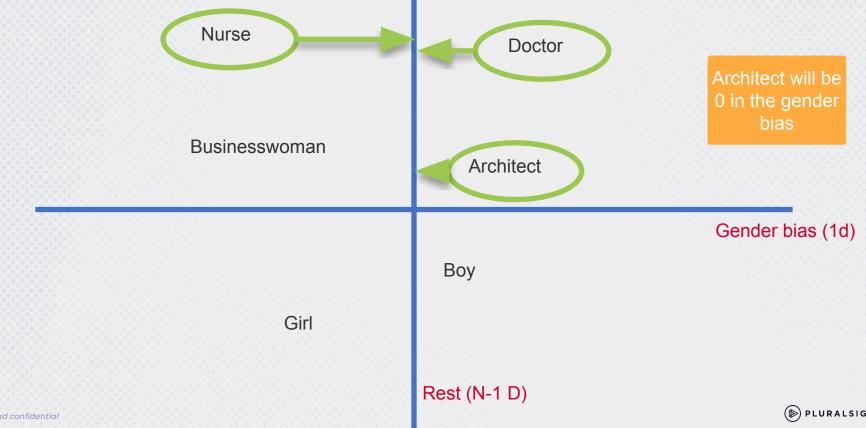
Input	Output
Man:Computer Programmer -> Woman:x	x = Homemaker
Man:Doctor -> Woman:x	x = Nurse
Man:Superstar -> Woman:x	x = Diva

Man is to Computer Programmer as Woman is to Homemaker? Debiasing Word Embeddings - Bolukbasi et.al. (2016)

## Finding the bias dimension

Nurse Doctor Businesswoman Architect Gender bias (1d) Boy Girl Rest (N-1 D) Proprietary and confidential

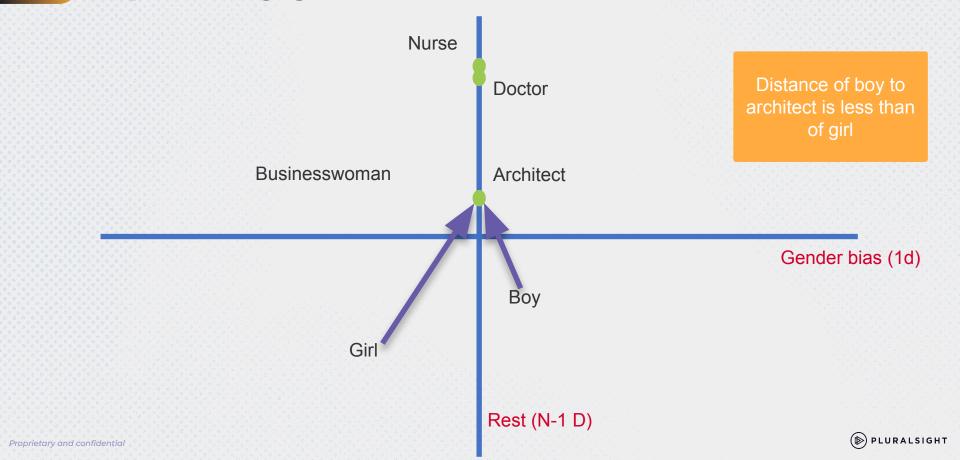
## **Neutralising non-definitial words**



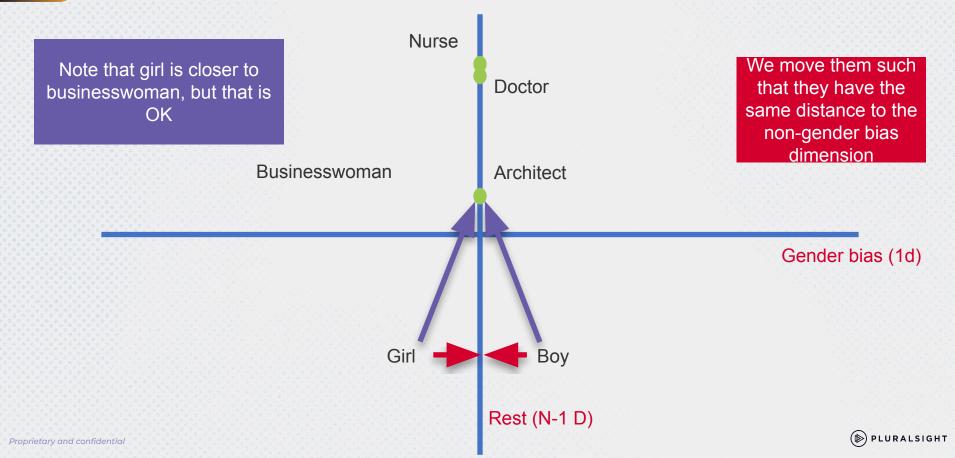
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(D) PLURALSIGHT

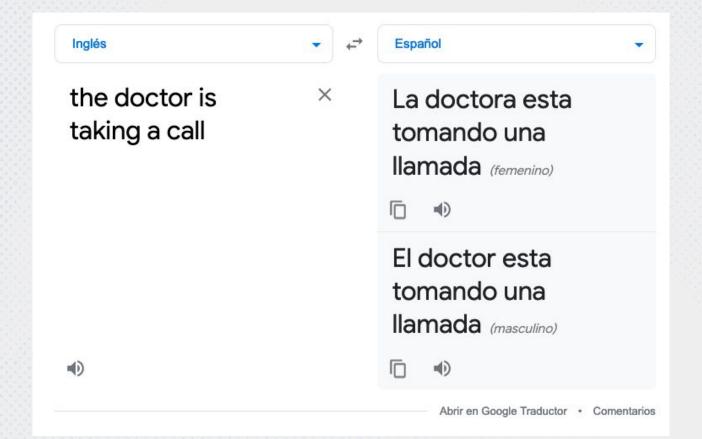
## **Equalizing gender words**



## **Equalizing Gender words**

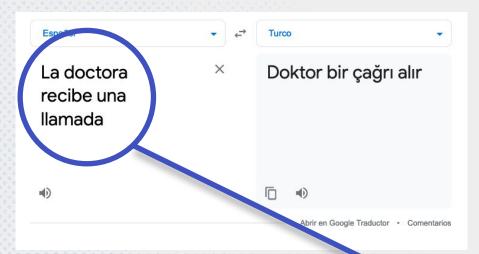


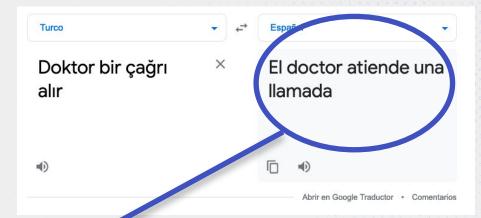
## A Long way to go....



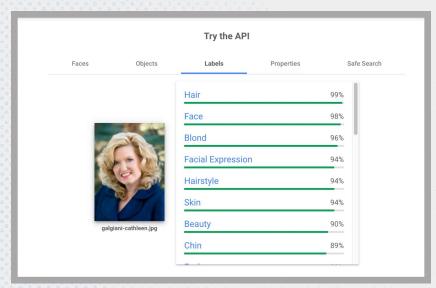


## A Long way to go....

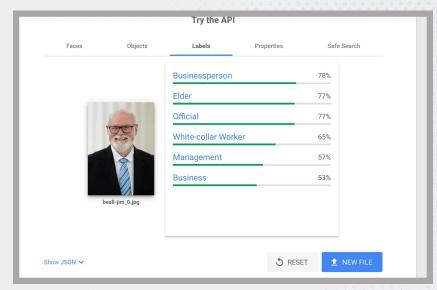




## A Long way to go....



In female senators, it detects their looks



In male senators, their business qualities

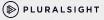


# Navigating Legal & Ethical Implications

# **UNESCO: 10 Principles – A human rights** approach to Al

- 1. Proportionality & Do No Harm
- 2. Safety & Security
- 3. Right to Privacy & Data Protection
- 4. Multi-stakeholder and Adaptive Governance & Collaboration
- 5. Responsibility & Accountability
- 6. Transparency & Explainability
- 7. Human Oversight & Determination
- 8. Sustainability
- 9. Awareness & Literacy
- 10. Fairness & Discrimination

Unesco: Ethics of Al



## **Additional Perspectives on AI Ethics**

- Adobe's take
- IBM's perspective
- OpenAl Senate Hearing
- MIT Articles
- Generative Al Concerns & Risks



#### **Group Exercise:** 30 Minutes



Review the following scenario in your groups & use the AI Ethics principles to answer the questions

**Scenario:** A company is developing an AI-powered hiring tool to streamline the recruitment process. However, during testing, it is discovered that the algorithm systematically favors candidates from certain demographic groups over others, leading to concerns of bias and discrimination.

#### **Discussion Points:**

- **Legal Considerations:** Does the hiring tool violate anti-discrimination laws or regulations? What legal liabilities does the company face?
- **Ethical Considerations:** How should the company address the potential biases in the algorithm to ensure fair and equitable hiring practices?
- **Transparency and Accountability:** Should the company disclose the use of AI in the hiring process to candidates and stakeholders? How can transparency be maintained throughout the process?
- **Mitigation Strategies:** What steps can the company take to mitigate bias in the algorithm and ensure compliance with legal and ethical standards?

## **Break**



# **Common Patterns for working with LLMs**



#### **Persona Pattern**

- Use when you want an LLM to impersonate someone
- Example:

**Prompt 1:** Act as a researcher expert on immunology.

**Prompt 2:** What are your opinions on the following blood tests where immunoglobulins A & G are below standard?

Extremely useful to get a new view on the project!



## **Root Prompts & Supplying Information**

- Every LLM has root prompts, or rules to follow, such as avoid racism, hostility, be helpful, etc....Normally we cannot override them, but with the Persona pattern sometimes we can
- As any LLM has a cutoff date on its training data, we must supply extra
  information on everything that happened afterwards
- Example:

**Prompt:** Assume that these are the number of stat majors enrolled at UVA over the years:

2020: 220

2021: 221

2022: 160

2023: 300

How many students will there be in 2024? Keep your answer concise. Use any type of regression to solve the problem.



### **Question Refinement Pattern**

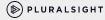
- Use when you're not an expert in a field and want a very specific answer
- Example:

**Prompt 1:** When I ask a question, suggest a better question and ask me if I would like to use it instead.

**Prompt 2:** Why are GANs not suitable for text generation?

**Answer:** A potentially more insightful question might be: "What are the limitations of GANS in text generation, and how do they compare to other models designed for this purpose?" Would you like to explore this question instead?

Prompt 3: Yes



## **Cognitive Verifier Pattern**

- Use when you are not sure you are tackling all angles of a problem
- Example:

**Prompt 1:** When you are asked a question, follow these rules: Generate a number of additional questions that would help you more accurately answer the question. Combine the answers to individual questions to produce the final answer to the overall question.

**Prompt 2:** What do I need to learn to improve in GenAl?



### **Hallucination**

 Be mindful that LLMs can get things wrong & make things up. LLMs are trying to sound correct, but not necessarily be correct!

#### Example:

**Prompt 1:** What's the first book on sql?

**Prompt 2:** are you sure there's no ibm print in ACM named "SEQUEL: A structured English query language?"



### **Audience Persona Pattern**

- Use when you need LLMs to explain a topic as if you were someone else
- Example:

**Prompt 1:** Explain X to me. Assume that I am Persona Y.

### **Flipped Interaction Pattern**

- Use when you want the LLM to ask you questions on a topic to
- suggest a solution

#### Example:

**Prompt 1:** Ask me questions on xxx until you have enough information to suggest yyy. When you have enough information, present xxx solution to me. Now, ask me the first question.

#### Notes:

- You will need to replace "X" with an appropriate goal, such as "creating a meal plan" or "creating variations of my marketing materials."
- You should specify when to stop asking questions with Y, like "until you have sufficient information about my audience and goals"



#### **Few Shot Pattern**

- Use when you think the LLM will need some help to do the task you want
- Never use more than 4-5 examples

#### Example:

#### Prompt 1:

Input: "This movie has Keanu Reeves!"

**Output: Positive** 

Input: "I hate this movie"

Output: Negative

Input: "This movie had a gross revenue of 200 million dollars"

Output: Neutral



### **Game Play Pattern**

 Use when you think you could improve at a certain topic or a certain creation of yours could use some refinement

#### Example:

**Prompt 1:** Create a game for me around the topic of prompt engineering. The game should involve identifying potential improvements in my prompts in certain situations. You should specify a scenario and I should be able to resolve it with a prompt, you will evaluate on a scale from 1 to 10 how good it was and provide suggestions



## **Recipe Pattern**

Use it when you want a sketch of how to do something step by step

#### Example:

**Prompt 1:** I want to deploy a Python Flask app to AWS, please provide the steps using Docker and deploying to EKS.



## Identifying Opportunities for Integrating GenAl into Business Operations

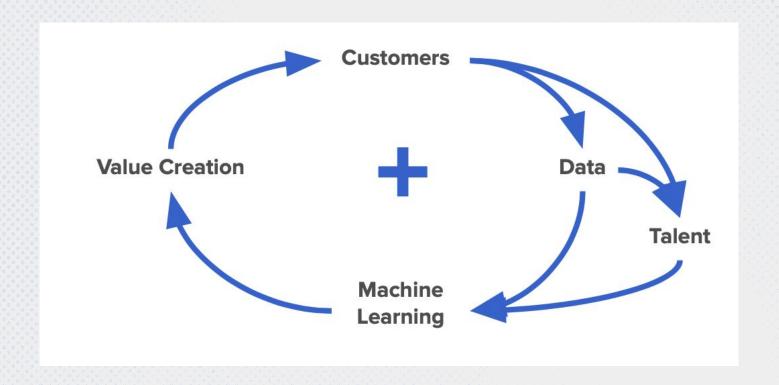
### **INSEAD's Framework**

#### **Industry Environment Organization & Execution** Shifting buyer behaviour Alignment of people and processes New competitors and business models Right competencies & culture Government regulations to support the VP The changes in technology Value Organization Industry **Proposition Environment** & Execution Value Proposition

Benefits and functionalities that products & services offer users

Minus costs to producing such offering

## **Early Mover Advantages in Al**



## Start at the beginning:

What problem are you trying to solve?

- What's the scope of the problem?
- What's the value of solving the problem?
- Ask yourself do I need AI? (AI isn't always the answer!)
  - If you can solve with a more simple solution—Al is overkill.
  - There is no clear problem statement or data (or not sufficient data yet)
  - The system isn't ready for a sweeping launch-even if you have a team that can solve the problem.
- Do I have the people, processes, tools, & data to work on this problem?



## What could we be doing better?



## John Deere Case Study: We've identified potential disruptions, now what?

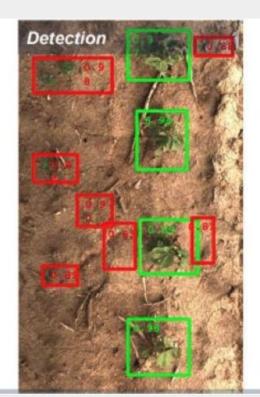


Industry Environment	Value Proposition	Organization & Execution
Potential disruptions?	Value proposition?	Executing on technology changes?
Al Technology: Vision		
Increasing global demand		
for food		
Herbicide resistant weeds		
Growing environmental		
concerns		

## John Deere Case Study: Weed Detection









## John Deere Case Study: Value Creation



#### **Factors adding Value:**

- Reduced chemical costs
- Reduced use of more expensive GMO seeds
- More options for herbicide resistant weeds
- More environmental practices

#### **Factors detracting Value:**

Higher equipment costs (vision, edge computing, precision application)



## John Deere Case Study: Value Proposition John Deere



Industry Environment	Value Proposition	Organization & Execution			
Potential disruptions?	Value proposition?	Executing on technology changes?			
Al Technology: Vision	Product transformation				
Increasing global demand	Environmental and				
for food	revenue/cost benefits from greater efficiency				
Herbicide resistant weeds	3,000,000				
Growing environmental					
concerns					

## **John Deere Case Study: Execution**



Industry Environment	Value Proposition	Organization & Execution
Potential disruptions?	Value proposition?	Executing on technology changes?
Al Technology: Vision Increasing global demand for food Herbicide resistant weeds Growing environmental concerns	Product transformation  Environmental and revenue/cost benefits from greater efficiency	Smart choices of initial use cases Innovation best practices (e.g. MVP, pivot) Real-world feedback loops

#### **Group Exercise:** 30 Minutes



Identifying opportunities at Nutanix

#### **SWOT Analysis Instructions:**

#### 1. Nutanix Background:

• Review information about your company's industry, products, and target market.

#### 2. SWOT Analysis Template:

 Use the previous slides for determining strengths, weaknesses, opportunities, and threats.

#### 3. Analysis Phase:

- Strengths: Identify internal advantages supporting AI integration.
- Weaknesses: Recognize internal challenges hindering AI adoption.
- Opportunities: Explore external factors enabling AI implementation.
- Threats: Assess external risks impacting AI integration.

#### 4. Action Planning:

 Begin to develop Action Plans by filling out a table similar to what you saw in the John Deere example

#### 5. Discussion and Analysis:

• Discuss findings and insights within your group & prepare to share with the class

Industry Environment	Value Proposition	Organization & Execution
Potential disruptions?	Value proposition?	Executing on technology changes?



## Survey!



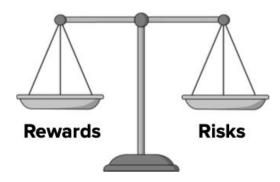
## Lunch



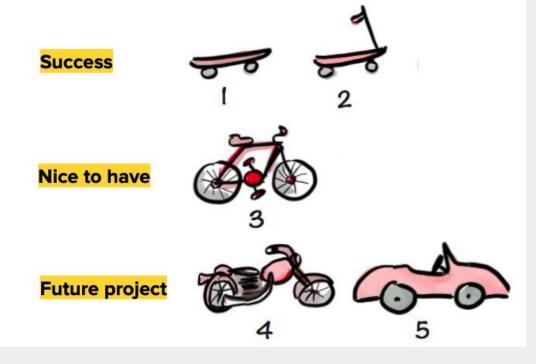
## Creating a Preliminary Roadmap for Adopting GenAl



#### **Align on Expectations**



Striking the right balance



### **Keys to success:**

- Business Goal Alignment: Align Al initiatives with overarching business goals and objectives to ensure strategic relevance and impact.
- Feasibility Assessment: Evaluate the technical feasibility, resource requirements, and potential ROI of each AI use case.
- Stakeholder Engagement: Involve key stakeholders from across the organization to gain buy-in and support for AI integration efforts.



## **Feasibility Assessment with RICE**



The RICE scoring model is a framework for prioritizing projects by scoring them on four factors:

- Reach: Estimate of the number of people the project will impact in a certain timeframe.
- Impact: The effect on customers or the company, scored on a scale from
   .25 (minimal) to 3 (massive).
- **Confidence:** The certainty of your estimates, rated as 100% (high), 80% (medium), or 50% (low).
- Effort: The total resources required, typically measured in person-months.

To calculate a RICE score, multiply Reach, Impact, and Confidence, then divide by Effort. The resulting score helps to compare and prioritize different initiatives objectively.

## Which Projects should we do with GenAl?

Project Options	Input Data Good for Predictions	A Project That Sponsors Will Value	Is AI the Only Option?	Tactical Project	Strategic Project	Risk Level	Obstacles	KPIs Measurable	Top Choices
Α	Yes/Maybe/No	Yes/Maybe/No	Yes/Maybe/No	Yes/Maybe/No	Yes/Maybe/No	High/Medium/ Low	Yes/Maybe/No	Yes/Maybe/No	
В	Yes/Maybe/No	Yes/Maybe/No	Yes/Maybe/No	Yes/Maybe/No	Yes/Maybe/No	High/Medium/ Low	Yes/Maybe/No	Yes/Maybe/No	
С	Yes/Maybe/No	Yes/Maybe/No	Yes/Maybe/No	Yes/Maybe/No	Yes/Maybe/No	High/Medium/ Low	Yes/Maybe/No	Yes/Maybe/No	
D	Yes/Maybe/No	Yes/Maybe/No	Yes/Maybe/No	Yes/Maybe/No	Yes/Maybe/No	High/Medium/ Low	Yes/Maybe/No	Yes/Maybe/No	
E	Yes/Maybe/No	Yes/Maybe/No	Yes/Maybe/No	Yes/Maybe/No	Yes/Maybe/No	High/Medium/ Low	Yes/Maybe/No	Yes/Maybe/No	

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## **Building out our Roadmap**



#### **Group Exercise:** 10 Minutes

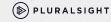


Build out your roadmap at Nutanix. What are the projects? How do they score across the factors we've discussed? Use the frameworks discussed today to fill out this table:

oject otions	Input Data Good for Predictions	A Project That Sponsors Will Value	Is AI the Only Option?	Tactical Project	Strategic Project	Risk Level	Obstacles	KPIs Measurable	Top Choices
A	Yes/Maybe/No	Yes/Maybe/No	Yes/Maybe/No	Yes/Maybe/No	Yes/Maybe/No	High/Medium/ Low	Yes/Maybe/No	Yes/Maybe/No	
В	Yes/Maybe/No	Yes/Maybe/No	Yes/Maybe/No	Yes/Maybe/No	Yes/Maybe/No	High/Medium/ Low	Yes/Maybe/No	Yes/Maybe/No	
с	Yes/Maybe/No	Yes/Maybe/No	Yes/Maybe/No	Yes/Maybe/No	Yes/Maybe/No	High/Medium/ Low	Yes/Maybe/No	Yes/Maybe/No	
D	Yes/Maybe/No	Yes/Maybe/No	Yes/Maybe/No	Yes/Maybe/No	Yes/Maybe/No	High/Medium/ Low	Yes/Maybe/No	Yes/Maybe/No	
E	Yes/Maybe/No	Yes/Maybe/No	Yes/Maybe/No	Yes/Maybe/No	Yes/Maybe/No	High/Medium/ Low	Yes/Maybe/No	Yes/Maybe/No	



## Questions?





# What was your favorite part of today?

Is there anything you would change or wish we covered?

## Thank you!

If you have any additional questions, please ask! If



