

# Artificial Intelligence:

## *A Briefing For SMACNA Members*

*October 22<sup>nd</sup>, 2025*

# What is Artificial Intelligence?



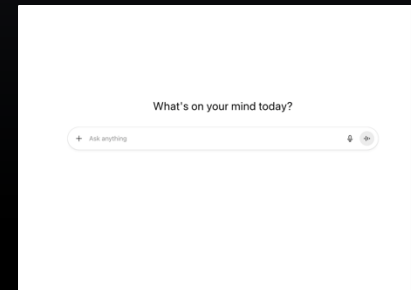
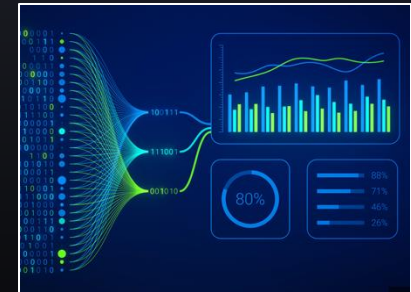
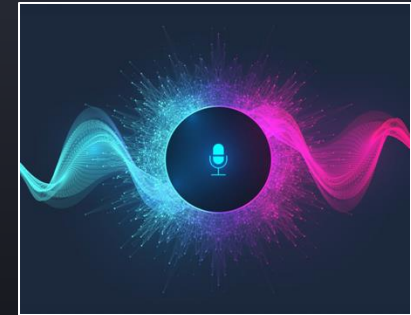
**Not This**

# A Definition

Artificial Intelligence is software  
That can do unique things

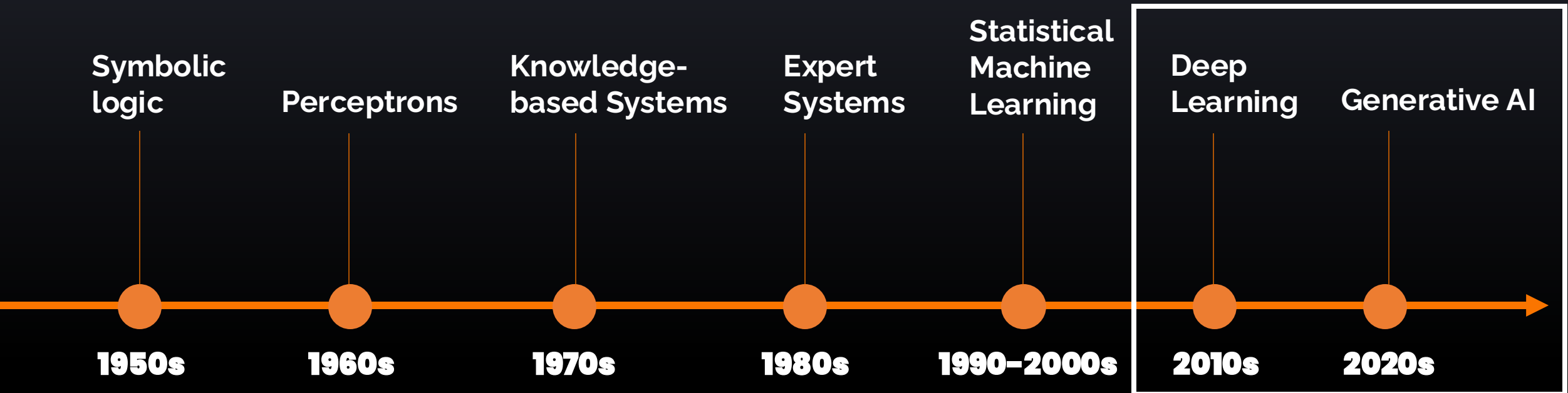
Because it is based on data &  
training

Unlike traditional software that  
relies on hard instructions



# AI is a Goal, Not a Technology

Artificial Intelligence aspires to make  
**machines that can think**



# Two Types of AI Out There Now

## Deep Learning

Can recognize, or **classify** things in the real world

- Natural Language Recognition
- Machine Vision
- Predictive Analytics

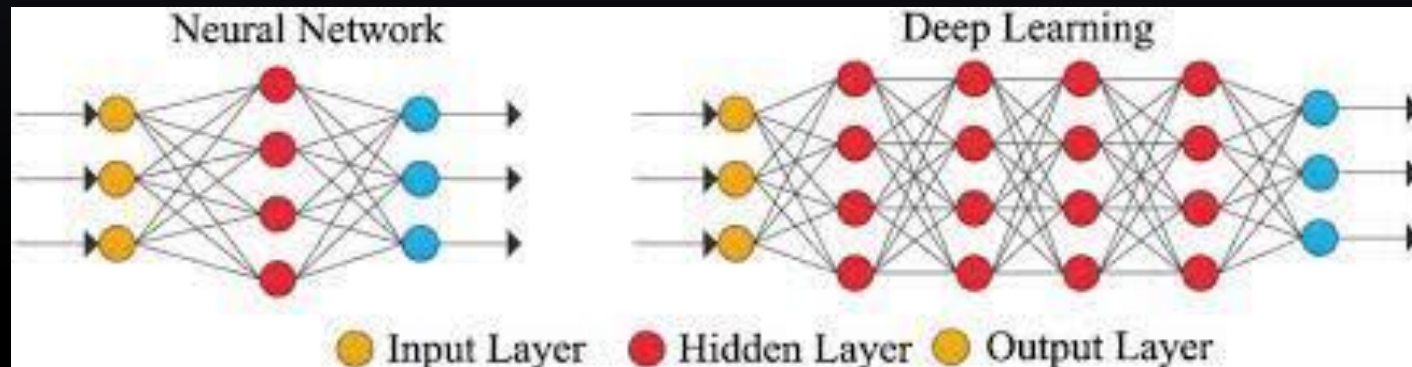
## Generative AI

Understands and works with content humans can understand

- Chatbots
- Agents

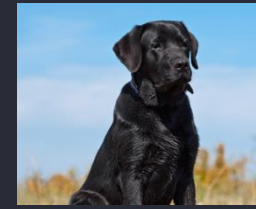
# How Deep Learning Works

- Machine Learning is the creation of an equation that allows us to classify something based on lots of data
- Deep Learning goes further. It creates many of these equations, and organizes them in layers
- This is based on how the brain works



# Deep Learning Requires Tons of Labelled Data

- Example: Model to recognize dog breeds
- Thousands of images label by dog type
- The system tries to classify dog breeds
- Each failure teaches the system to improve
- Eventually it learns if there is enough data



Black Labrador



Black Labrador



Black Labrador



Basset Hound

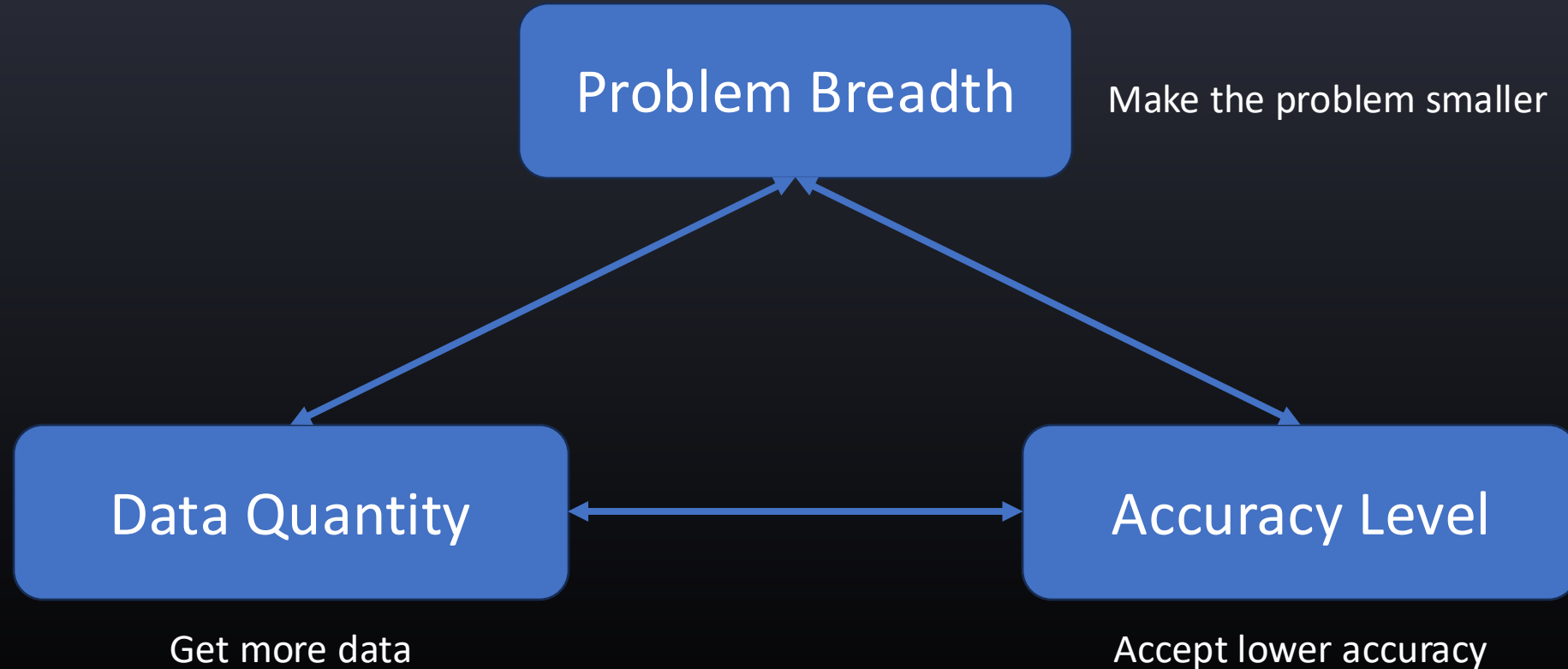


Basset Hound



Basset Hound

# AI Tradeoffs: Usually You Make The Problem Smaller



Deep Learning **Classifies** or  
Predicts Single Items

# Generative AI

- Generative AI is trained to predict the highest likelihood content for a 'gap' in content
- This starts with masking content and running the training many times until the system can fill in the blanks

# How Masking Works

Trained over and over again, until the system can predict the missing information

|     |                                                                                       |                                                                                     |                                                                                     |     |                                                                                     |
|-----|---------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-----|-------------------------------------------------------------------------------------|
| She | Sells                                                                                 | Seashells                                                                           | by                                                                                  | the |  |
| She | Sells                                                                                 | Seashells                                                                           |  | the | seashore                                                                            |
| She | Sells                                                                                 |  | by                                                                                  | the | seashore                                                                            |
| She |  | Seashells                                                                           | by                                                                                  | the | seashore                                                                            |

# Now We Do This With Millions of Sentences

- Modern models, like GPT-5, are trained on most of the internet's content
- This gives the model enormous power to predict what's most likely the best answer
- At its heart, Generative AI is built to find the highest probability, best content to complete, or answer, a question or prompt
- It is built to give you answers, whether it knows the answer or not

# Hallucinations

- Generative AI, like LLMs, are **answer-giving machines**
- Powerful enough to create something from its memory if it does not have the answer
- It is not built to tell you it doesn't know – so it makes it up
- We can manage this, but it is always a risk

# Hallucination "Levels"

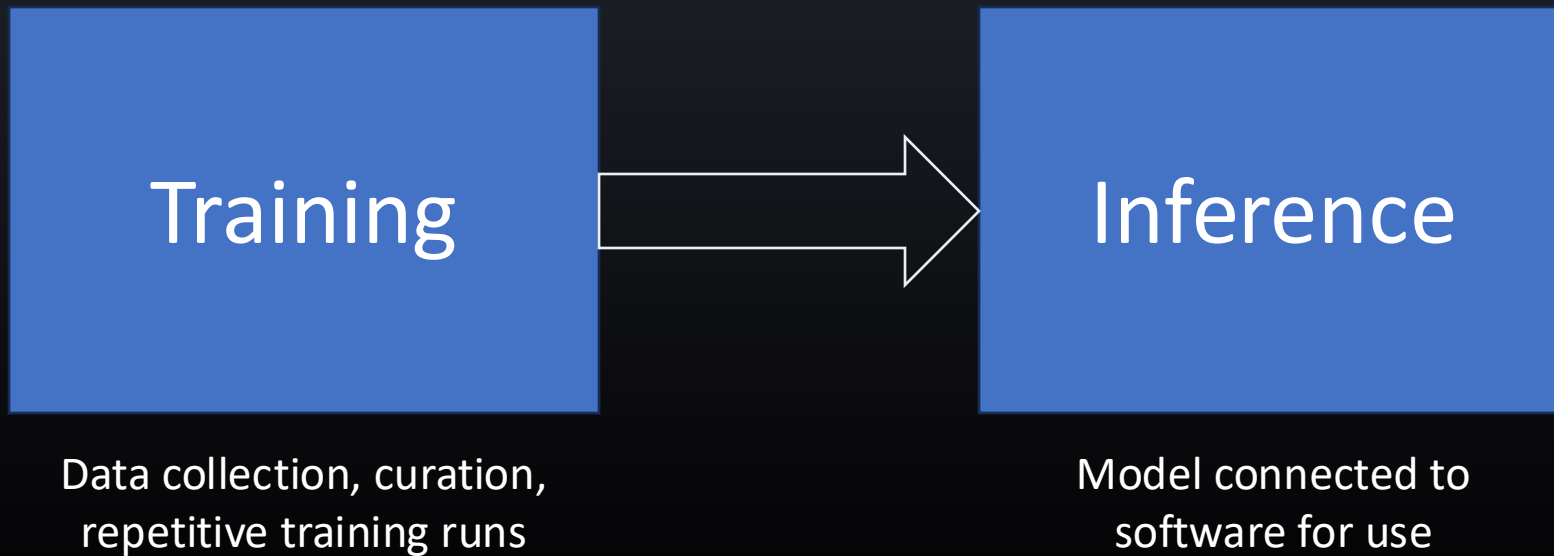
- Factual hallucinations are becoming rare
- But you're often asking for conclusions, insights, summaries
- This is harder to train and control
- Sometimes the insights are disappointingly shallow, or go in an unhelpful direction

# Generative AI Recognizes **Patterns** and Creates Content

Critical Point:  
**AI Does Not “Learn By  
Doing”**

# All AI has at least two phases:

These are separate – to learn over time, we need to *separately* collect usage data and then train the model again



# Implications of *Not* Learning by Doing

- Current AI does not **automatically get better the more you use it.**
- Current AI does **not remember what you've done with it**
- This is also why your **data is not as at risk** as most people think

# AI is Narrowly Superhuman

- Calculators are superhuman at math, *transformed business*
- Excel is superhuman at numbers at scale, *transformed business*
- AI applications are super human at
  - Reading
  - Summarizing
  - Planning
  - Classifying
  - ...*Is transforming business and culture*

# Limits of AI

- Traditional software is always better when we need the **same thing every time**
- Often AI is good for **inputs and outputs**, and traditional software in the 'middle'
- AI does not:
  - Handle complexity – when things interact and there are implications
  - Know the job, or the bigger context
  - Know the verbal and personal communications that drive decisions
  - Have intuition or judgment like a human would

# AI Thinks From the Bottom Up

- In 2017 researchers built an image recognizer
- It confused huskies with wolves
- A human would assume because they look alike



# AI vs. Humans

- Lots of hype
- AI is a powerful tool, but it cannot make real decisions
- AI does not understand a project, or the reality of audiences or members
- AI cannot apply judgment about a social media post, or member communication
- AI is there to make you do your work better, faster, more confidently

# Chatbots

# ChatBots are Not AI, They are a User Interface

- Important distinction between the interface and the model it's using
  - Example – (paid) ChatGPT in early 2025 allowed for up to *eight* different GPT models
- Think of chatbots as a place to communicate with the AI model of your choice, and connect it to tools and data.

# ChatBots and Tools

What's on your mind today?

+ Ask anything



 Add photos & files

 Add from Google Drive

 Deep research

 Create image

 Agent mode

 Add sources

... More >

# Working with Your Information: **Retrieval Augmented Generation (RAG)**

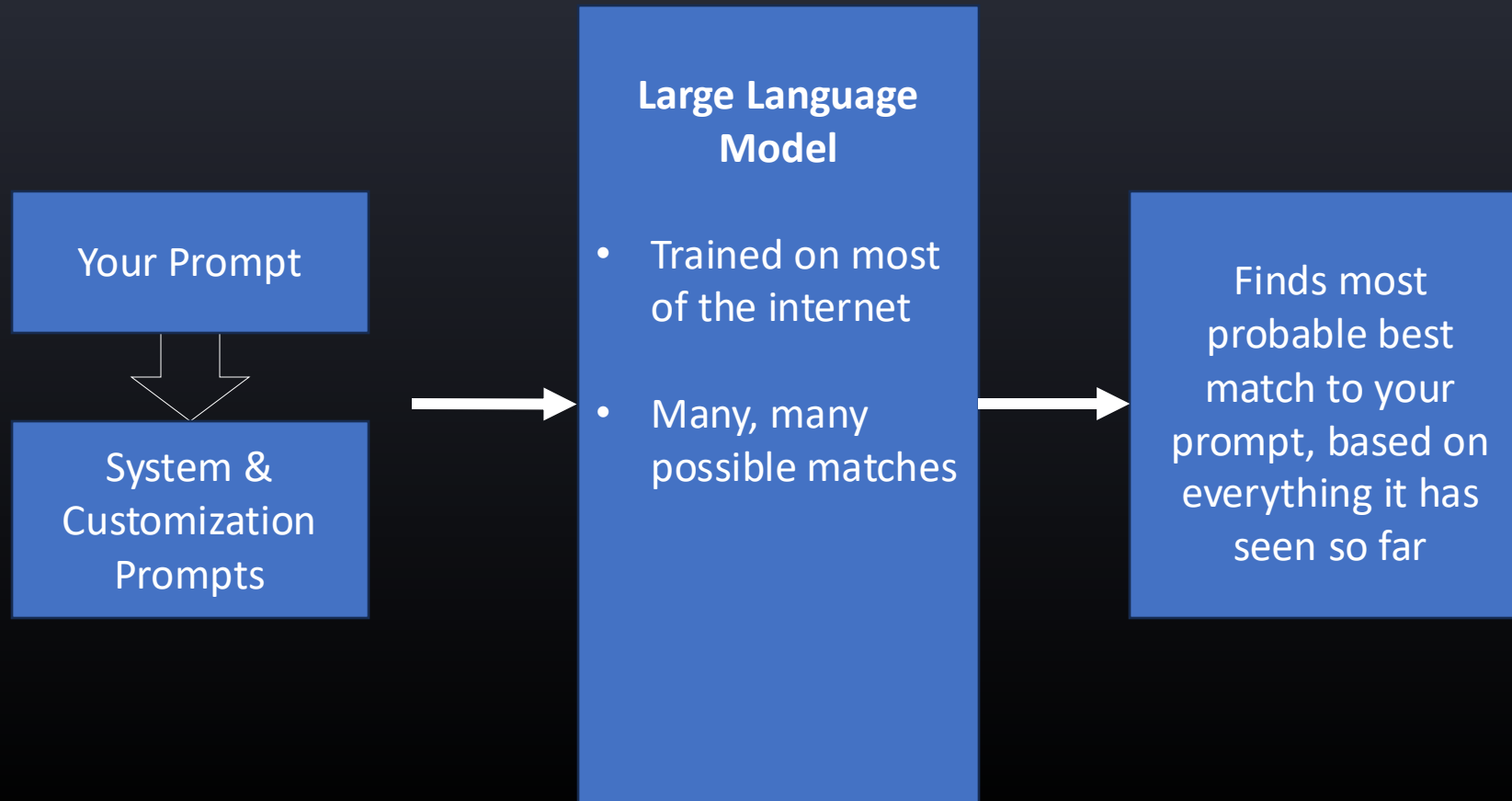
- GenAI is built to generate the highest probability answer for a question
- If it does not have the right answer, it will synthesize one that looks right but is not correct
- To avoid this, you can upload or otherwise supply your data. The system will retrieve the data and it will get a higher probability than made up data.
- This addresses the hallucinations problem when combined with a well written prompt

# Prompting

# What's a "Prompt"

- A prompt is a question or instruction to GenAI to produce something.
  - You are supplying the context a human would
  - Or that Google/Facebook would from your profile and tracking

# What Prompting Does



# How to Think about Prompting

Your job in prompting is three parts:

1. Narrow down the list of things the LLM will look for when it matches your prompt to its memory
2. Clearly state your task, including as much detail as possible
3. Define how you want the task completed

# Part Three: Define Task Execution

- Provide constraints, like geography, industry, style, etc.
- Provide examples.
- Tell the LLM not to fabricate information, that it is ok to tell you it does not know
- Anchor in the current date if relevant

# Prompt Template

|                    |                                                                                 |
|--------------------|---------------------------------------------------------------------------------|
| <b>Role</b>        | You are a world class HVAC technician                                           |
| <b>Context</b>     | You are working on a project summary                                            |
| <b>Instruction</b> | Please search the attached documents and summarize the relevant specifications. |
| <b>Constraints</b> | Only look at the attached documents                                             |
| <b>Examples</b>    | Here is a past summary example                                                  |
| <b>Delivery</b>    | Give me 4 paragraphs. Provide a source for all facts cited.                     |
| <b>Defensive</b>   | Do not fabricate information.                                                   |

# Is AI Coming for Your Job?

# AI as Economic Input

## Economics of Inputs is Not New

- When AI is a tool that does what you do – you **lose value**
- When AI is a tool you use, you **gain value**

# What That Means

- AI Cannot Understand a Project
- AI Cannot Find a New Solution
- AI Doesn't Know How HVAC affects mechanical, or Façade, or electrical
- AI Doesn't Know...*endless* facts, details & patterns

AI will become your personal assistant, making you fuss with paperwork less, hunt for information less

**AI will complement SMACNA members, potentially *increasing your value***

Within the next 5 years:

Skilled Trades Expertise Is Not Being Automated

Judgement Is Not Being Automated

Experience Is Not Being Automated

# Bad Prompts

GenAI doesn't have *any* context that you don't give it

**“What’s wrong with this drawing?”**

- open question without a definition of what “wrong” means

**“Show me everywhere there is flatwork?”**

- What is ‘flatwork?’ industry jargon GenAI wouldn’t know

**“What temperature can we pour cement?”**

- “cement or concrete?”

# What AI *Can* Help With

- Meeting Agendas
- Presentation Outlines
- Employee Reviews
- Job Descriptions
- Software help, excel formulas, etc.

# Key Takeaways

- Give AI the same context you might either give an intern, or assume that intern would know
- Get the AI to write a prompt for you – it takes 5 extra minutes and can produce much better outcomes



# Questions?

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