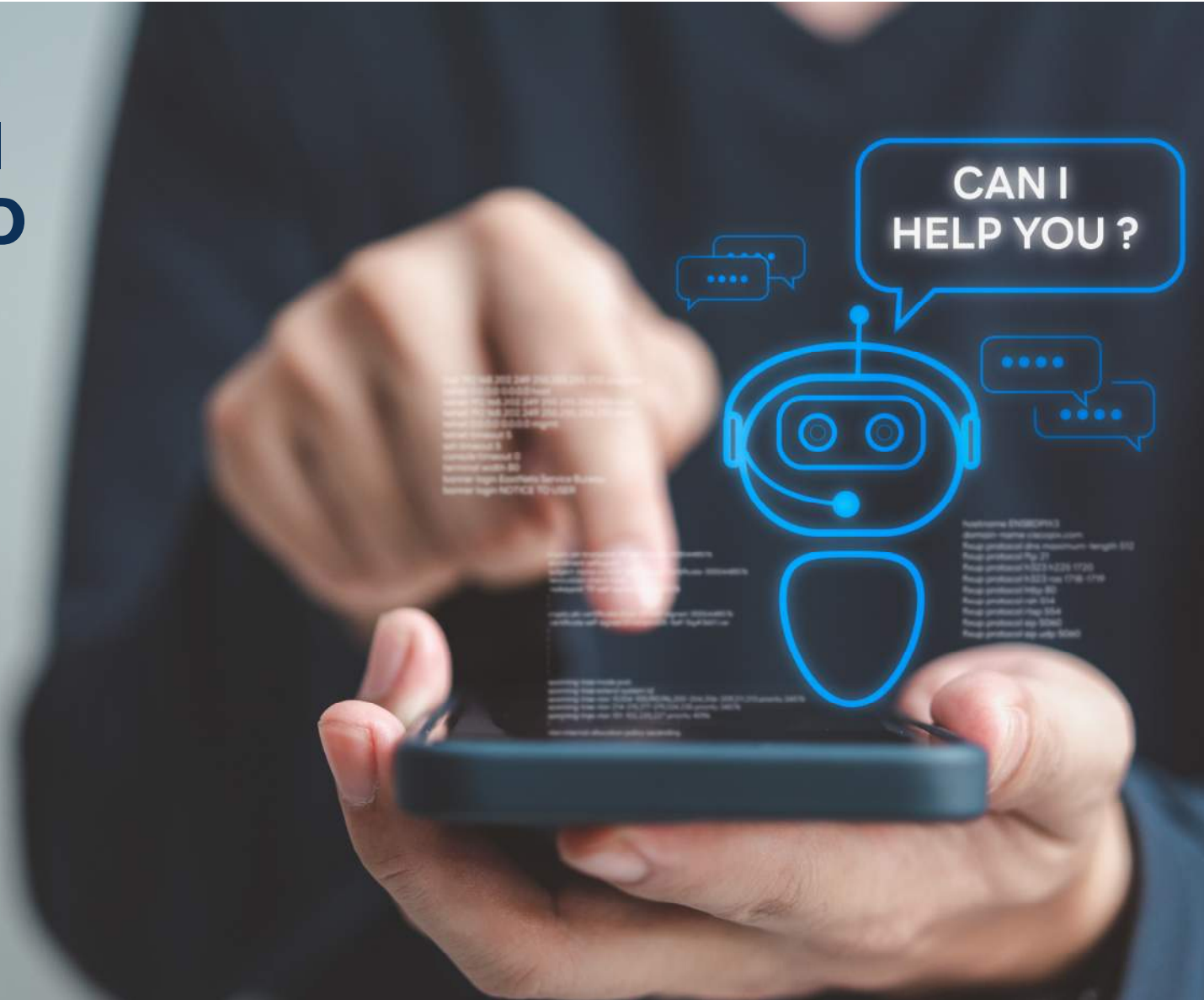


OVERVIEW OF AI ASSISTANTS AND APPLICATIONS

Parametrix



AGENDA

01 Overview of Applications

02 Prompting

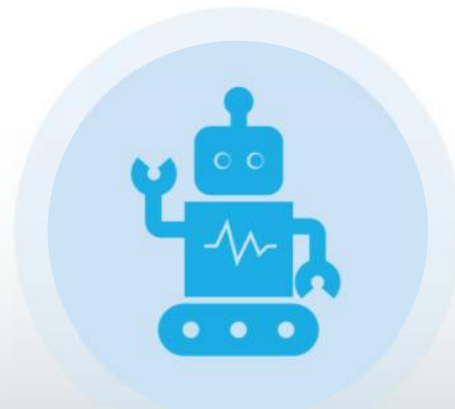
03 ChatGPT Overview

04 Copilot Overview

AI APPLICATIONS IN CIVIL ENGINEERING



WHERE TO PLUG AI TOOLS
INTO YOUR WORKFLOW



WHAT AI CAN DO FOR PLANNING,
DESIGN, AND CONSTRUCTION

- Springer.com – AI in Civil Engineering (AICE) ([Springer](#))
- ASCE
 - [AI for Detecting Structural Problems | ASCE](#)
 - [People-Centric AI for Resilient, Sustainable, Safe and Healthy Built Environments | ASCE](#)
- WRF
 - [The Role of Generative AI \(GenAI\) for the Global Water Sector](#)
- [WEF AI](#)

The map shows the location of the study area within the Democratic Republic of Congo. The study area is highlighted in yellow. The map includes a legend with the following categories: Urban (red), Suburban (orange), Rural (green), and Forest (blue). The map also shows the distribution of the study area within the region, with labels for various districts and towns. The map is oriented with North at the top.

The flowchart illustrates the proposed algorithm for the multi-objective problem. It begins with an initialization step, followed by a loop that iterates through various steps including 'Generate Initial Population', 'Evaluate Fitness', 'Select Parents', 'Generate Offspring', and 'Update Pareto Front'. The process continues until a termination condition is met, leading to the final output.



EVERYDAY PRODUCTIVITY

- Summarize Meetings, Emails Threads, Documents, Developing Drafts - Microsoft 365 Copilot/LLMs
- Assess large amounts of data - ChatGPT Enterprise or Business, secure “data not used for training”
- Cited standards, codes, reference research - Perplexity/ChatGPT/LLMs
- Project management, risk assessment and planning, WBS development, critical path considerations - LLMs



DESIGN, CAD/BIM

- Autodesk AI / Autodesk Assistant across Autodesk Construction Cloud and Forma for querying RFIs/submittals, accelerating takeoffs, and geometry-aware help. ([Autodesk News](#))
- Bluebeam (Revu/Cloud) early AI features for OCR, visual search, and automation experiments via Bluebeam Labs. ([Bluebeam Global Newsroom](#))
- Bentley MicroStation 2025 Python Assistant to auto-generate CAD automation scripts with a generative AI helper. ([blog.bentley.com](#))



CONSTRUCTION MANAGEMENT

- Procore AI (“Assist” / Agents) to summarize docs, answer project questions, and automate workflows inside Procore. ([Procore](#))
- OpenSpace + Disperse for 360° site capture with hybrid AI progress tracking. ([openspace.ai](#))
- DroneDeploy for unified drone/360 capture and AI analytics on quality, hazards, and trade-level progress. ([dronedeploy.com](#))
- Buildots to compare as-built 360 video with BIM and flag deviations automatically. ([Buildots](#))



GEOGRAPHIC INFORMATION SYSTEM (GIS)

- Esri GeoAI (ArcGIS Pro) toolbox for deep-learning object detection, feature extraction, clustering, and spatiotemporal forecasting directly in GIS. ([ArcGIS Pro](#))
- Bentley iTwin Capture AI Detectors to auto-classify features in reality meshes and point clouds. ([blog.bentley.com](#))



TRANSPORTATION OPERATIONS AND MOBILITY

- Traffic Engineering

- Miovision for AI-assisted traffic counts, adaptive signal control, and an emerging AI agent for traffic engineering. ([Miovision](#))
- Rekor video-based roadway intelligence and traffic analytics (TrafficSight/Discover). ([rekor.ai](#))

- Transportation Systems Condition Assessment

- Pavemetrics railway laser inspection with AI to detect defects ([Pavemetrics](#))
- *Vialytics advanced AI algorithm to analyze and categorize defects* ([Vialytics](#))



WATER/WASTEWATER PLANNING AND ASSET MANAGEMENT

- Preliminary Treatment Facility Design - Transcend Design Generator to auto-produce preliminary WWTP concepts, BIM, and equipment lists; Autodesk partnership for early-stage generative design. (dg.transcendh2o.com)
- Pipe Assessment and Failure Prediction – Sewer AI, Arcadis Gen WAIPP pipe failure prediction for risk-based renewal planning. ([Sewer AI, arcadisgen.com](https://SewerAI.arcadisgen.com))



DIGITAL TWINS

- Autodesk Tandem for operations-focused building twins with evolving predictive insights. ([Autodesk Tandem](#))
- Autodesk InfoWorks ICM for cloud-accelerated hydraulic simulations, with sessions exploring AI/ML verification workflows. ([Autodesk](#))
- Bentley iTwin IoT for sensor fusion, anomaly detection dashboards, and event alerts on dams, bridges, and embankments. ([Bentley Systems](#))

ETHICAL, SECURE, AND COMPLIANT USE OF AI



Validation Check



Augment Data



Confidentiality



Ethical Use



Validation Strategies

RESPONSIBLE AI ADOPTION



Strategy



Readiness



Mindset



Governance



Ethics

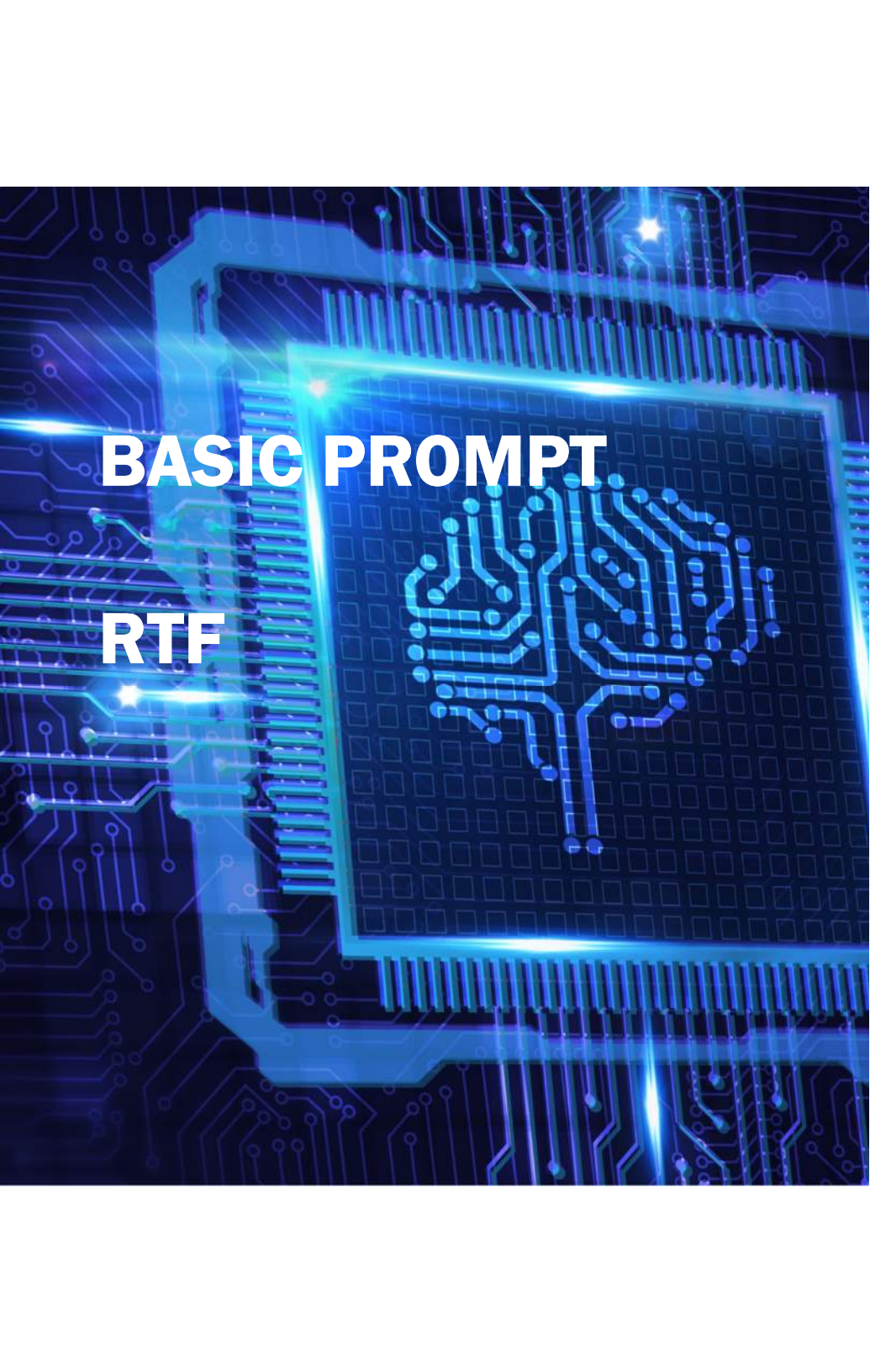


PROMPT ENGINEERING

**KEY SKILL – TO DRIVE
LLMS TO USEFUL
OUTPUTS**

ITERATIVE PROCESS

- Specificity
- Context
- Tone
- Examples
- Experimentation and Refinement
- Clarity
- Audience Awareness



BASIC PROMPT

RTF

- **ROLE**

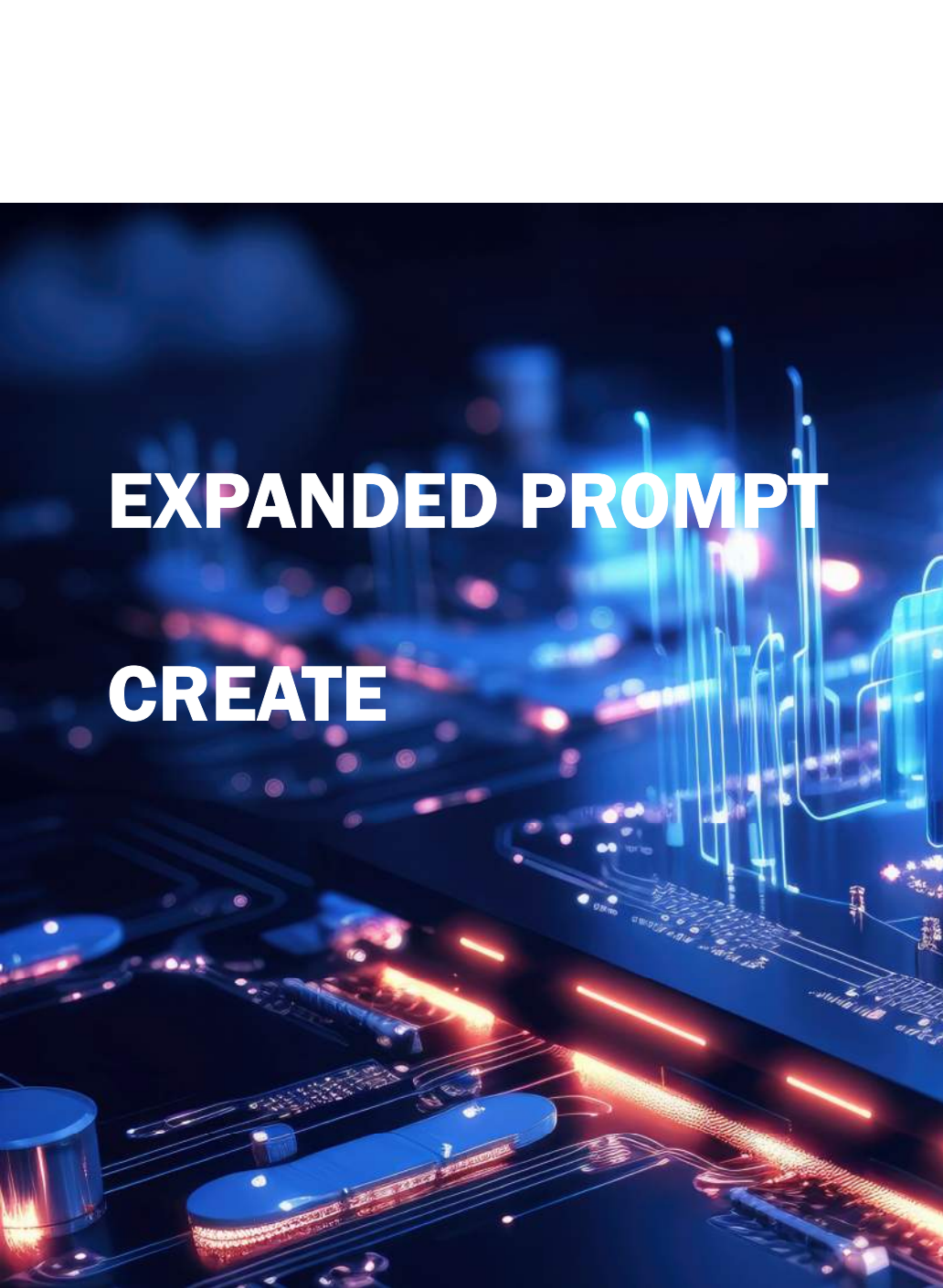
Defining the role – You are an experienced municipal engineer that specializes in potable water supply planning, design and construction.

- **TASK**

Your task is identify potential risks with a booster pump station replacement, that requires limited shut down windows, and impacts to critical facilities.

- **FORMAT**

Create a risk register with the project's potential risks in table format, that can be exported in Excel.



EXPANDED PROMPT

CREATE

- **CONTEXT**

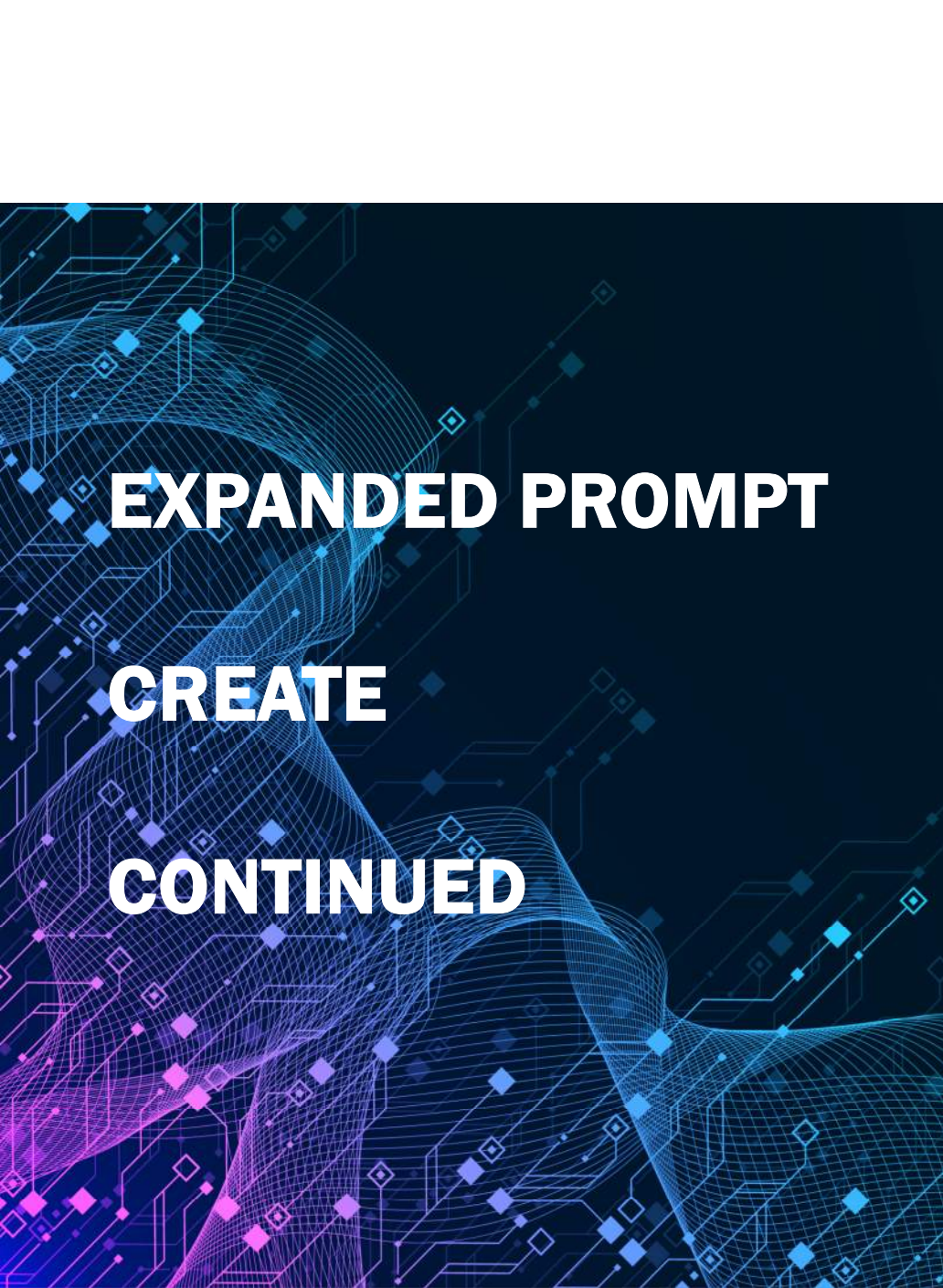
Establish perspective & background (role, tone, scenario).

- **ROLE**

Defining the role the LLM should take.

- **EXPLICIT INSTRUCTIONS**

Show or provide an example of structure or example to aid guiding the LLM in the requested task.



EXPANDED PROMPT

CREATE

CONTINUED

- **ACTION**

Define the task that needs to be performed.

- **TARGET OUTPUT**

Outline the format or structure of the requested output (list, report, table, etc.).

- **EVALUATE / ENHANCE**

Ask the LLM to review, refine, or improve its own output.

OTHER PROMPTS

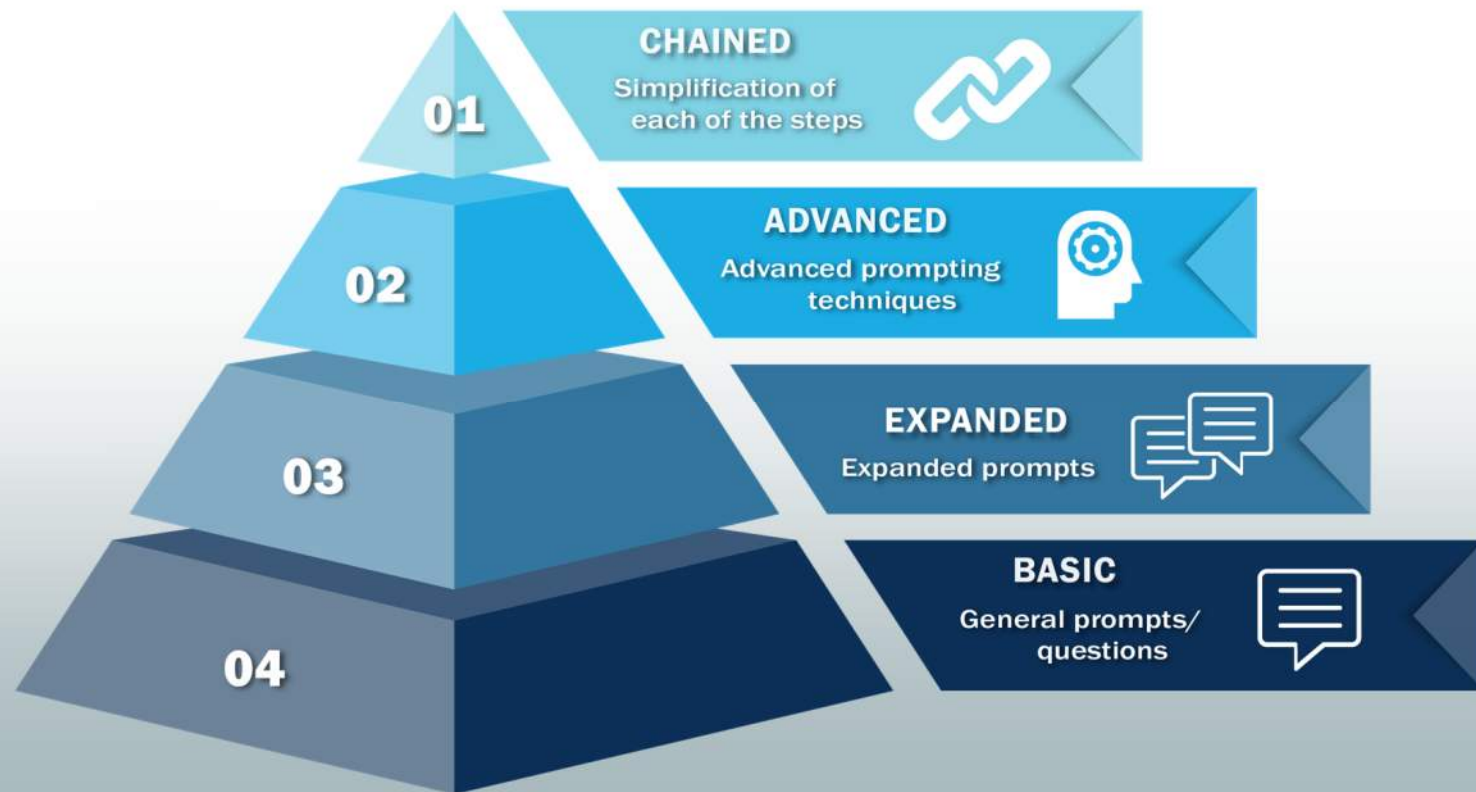
TITLE	DESCRIPTION	ELEMENTS
SMART	Goal Based	S – Specific M – Measurable A – Achievable R – Relevant T – Time-bound
STAR	Narrative/Case Studies	S – Situation T – Task A – Action R – Result
ABCD	Learning/Instructional	A – Audience B – Behavior C – Condition D – Degree
PEAR	Analytical/Reflective	P – Point E – Evidence A – Analysis R – Reflection
SCARF	Human-Centered/Communication	S – Status C – Certainty A – Autonomy R – Relatedness F – Fairness



ADVANCED PROMPTING

Chain-of-Thought	Simplifies more complex prompts by breaking them into smaller more manageable tasks.
Persona	Aids in aligning AI responses to a specific stakeholder group style or expertise.
Flipped Interaction	Supports gathering information in developing project or proposal documents.
ReAct	Explores hypothetical scenarios to anticipate and prepare for potential project challenges and mitigation strategies.
Risk Assessment Matrix	Helps to identify, assess, and prioritize project risks.

PROMPT EVOLUTION PYRAMID



CHAT GPT DEMONSTRATION



GENERAL SETUP/
OVERVIEW



TASKS



CUSTOM GPTS

AND IF EVERYTHING WORKS RIGHT...



404 Not Found

In the heat of day,
The path dissolves to nothing—
An empty mirage.

*ChatGPT response to link
shared for a custom GPT*

At least it is creative...



COPILOT TIPS

- Teams
- Outlook
- Search
- Notebooks



PATH FORWARD

- Remember Limitations
 - No/Limited Emotional Intelligence
 - Human Oversight
 - Probabilistic Responses
 - Hallucinations
- These are the worst AI tools that you will use...

QUESTIONS?

Thank you!

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509-381-6177

Parametrix

