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Designing Systems that use AI

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In this module, you learn to ...

01 Break complex processes into discrete tasks

02 Determine if and how AI can be used to help humans perform their tasks

03 Architect AI solutions that leverage Google Cloud tools

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Topics

01	Automating Business Processes with AI
02	Product Catalog Management Case Study
03	Architecting the Catalog Management Solution

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For each task where you are considering AI, consider how you would approach it both with and without AI to weigh cost & performance.

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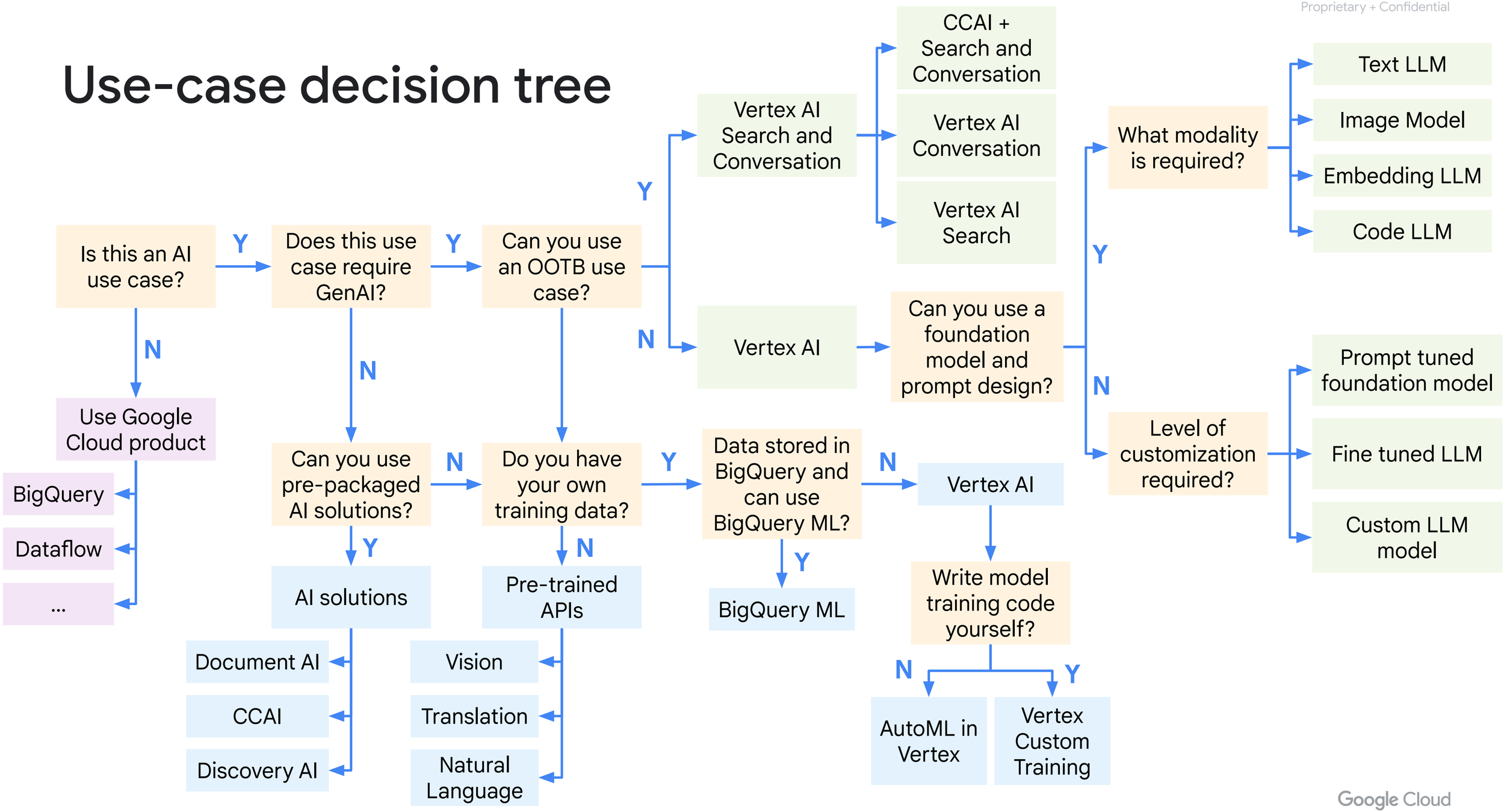
Use-case decision tree



Google Cloud

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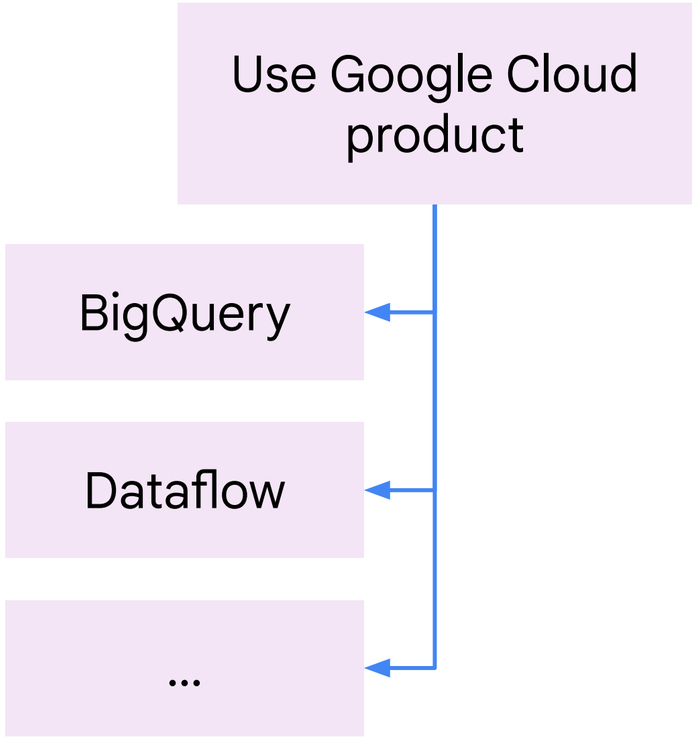
Not all automation problems are AI problems

- Sometimes there are traditional programming solutions to automating tasks
- Find the right Google product
- Use the simplest way that works



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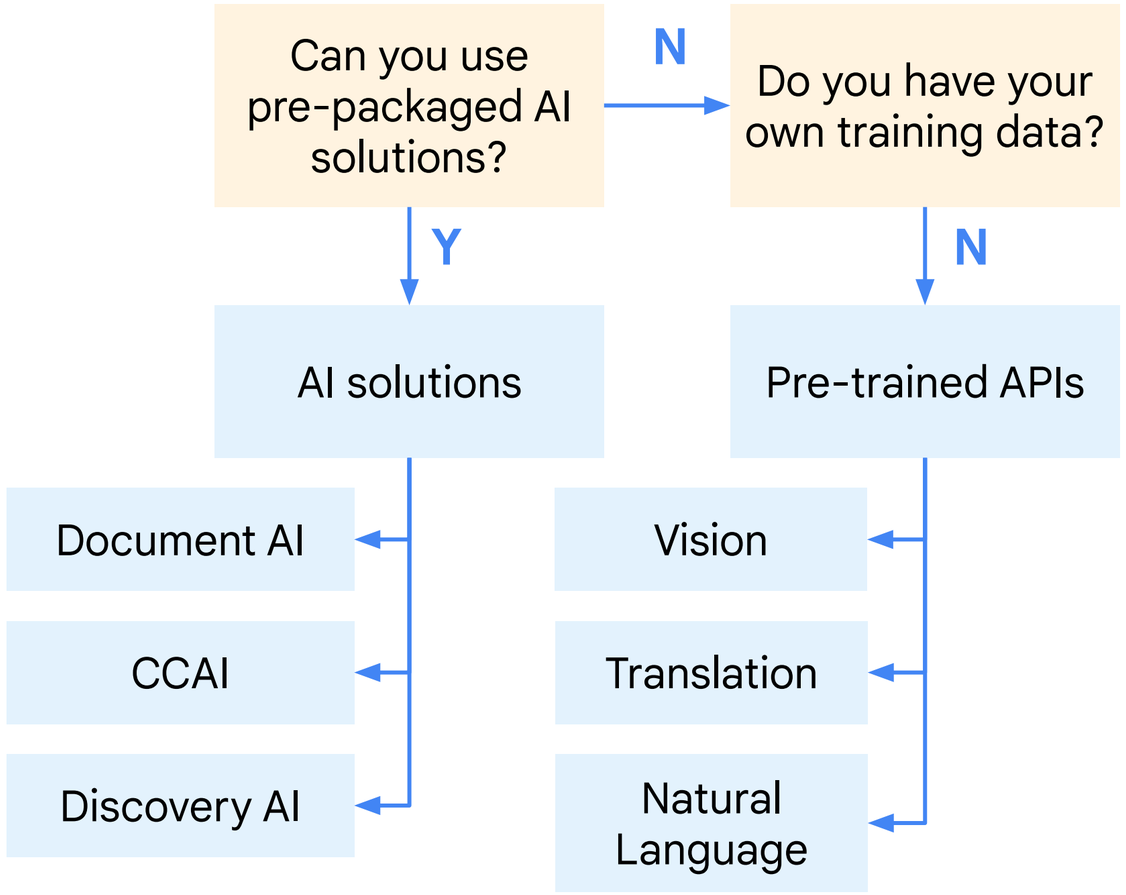
Not all AI problems are generative AI problems

- Smaller ML models will often perform an AI task as well as a foundational model
- Smaller models are cheaper and will likely provide better performance
  - Translate API for translation
  - Vision API for object detection, classification, and labels
  - Natural Language API for sentiment analysis
  - Etc.
- Google has out of the box solutions for common AI problems
  - Document AI
  - CCAI



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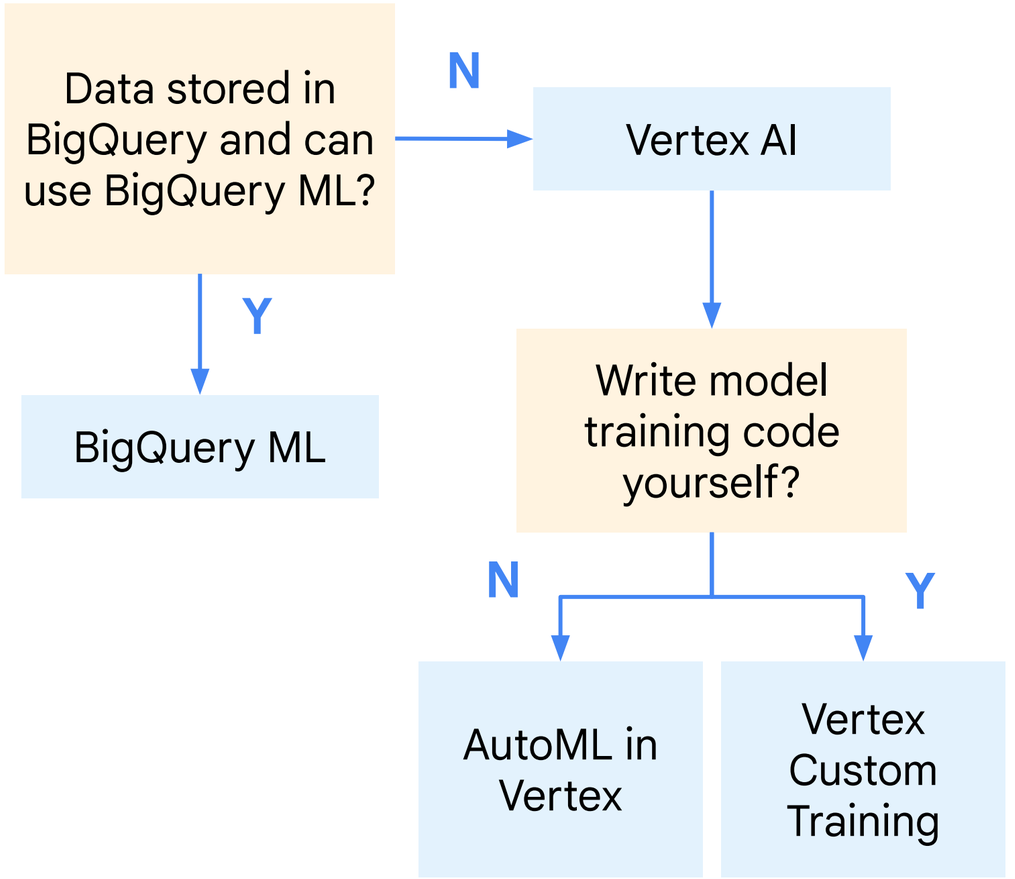
You can use BigQuery ML, Auto ML, or Vertex AI training to create your own ML models

- Requires your own training data
- Requires machine learning expertise



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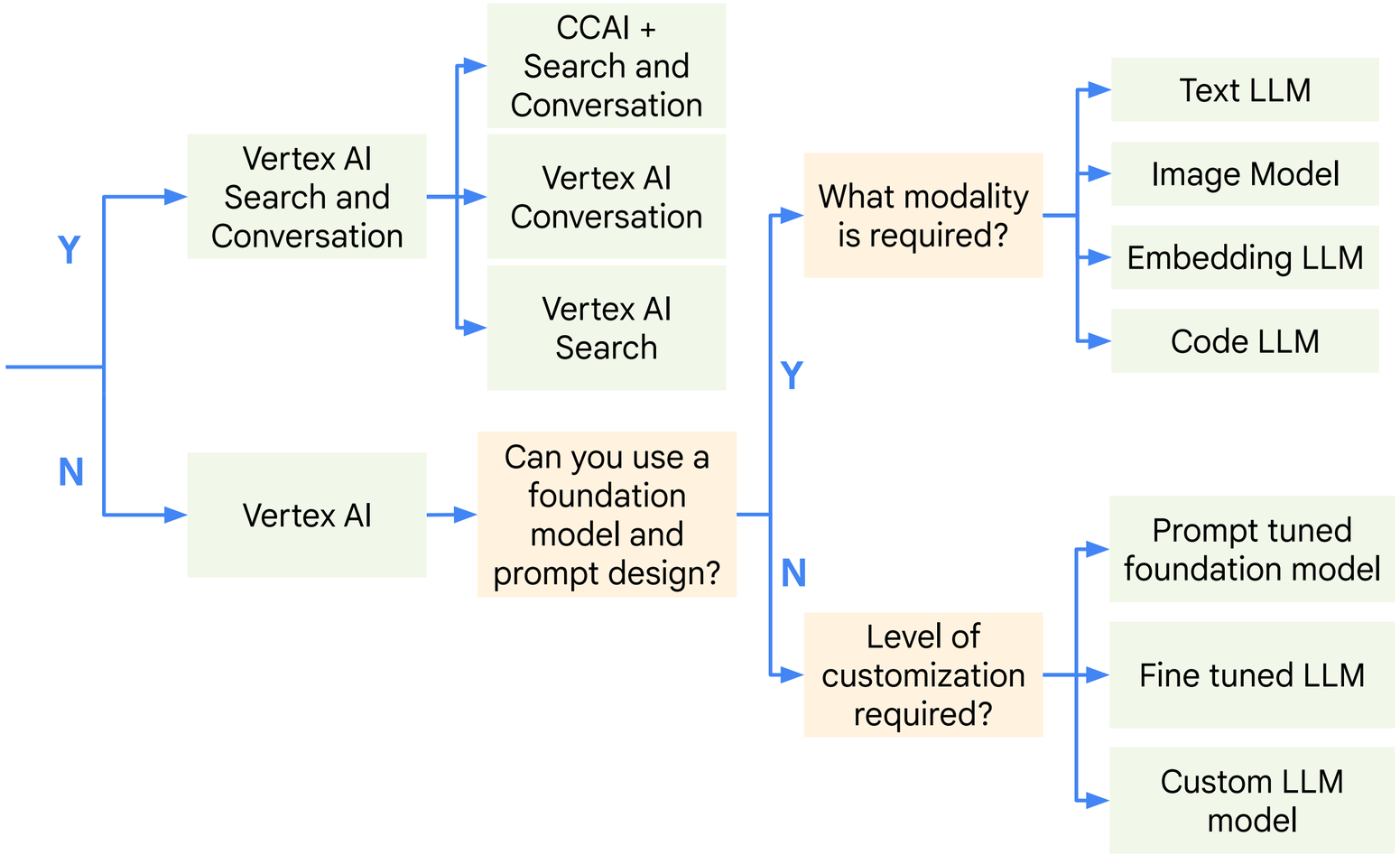
For GenAI problems, use the right generative AI model

- Gemini
- PaLM
- Chat PaLM
- Codey
- Embeddings
- Imagen
- Etc.



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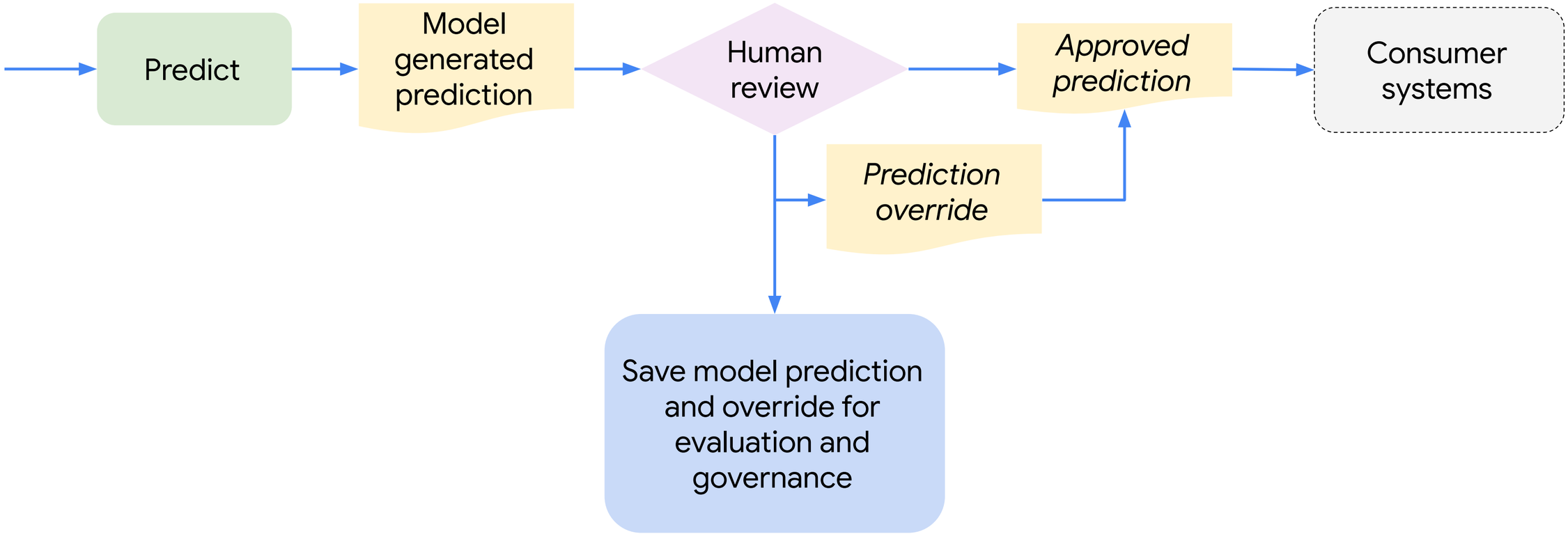
Do you need a human in the loop?



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If you can improve prediction quality, then the need for humans in the loop becomes less critical

Prompt Engineering

- Relatively simple
- Inexpensive
- Effective for most use cases

Fine tuning

- Requires training data
- More expensive
- Time consuming
- Effective, assuming the training data is high quality

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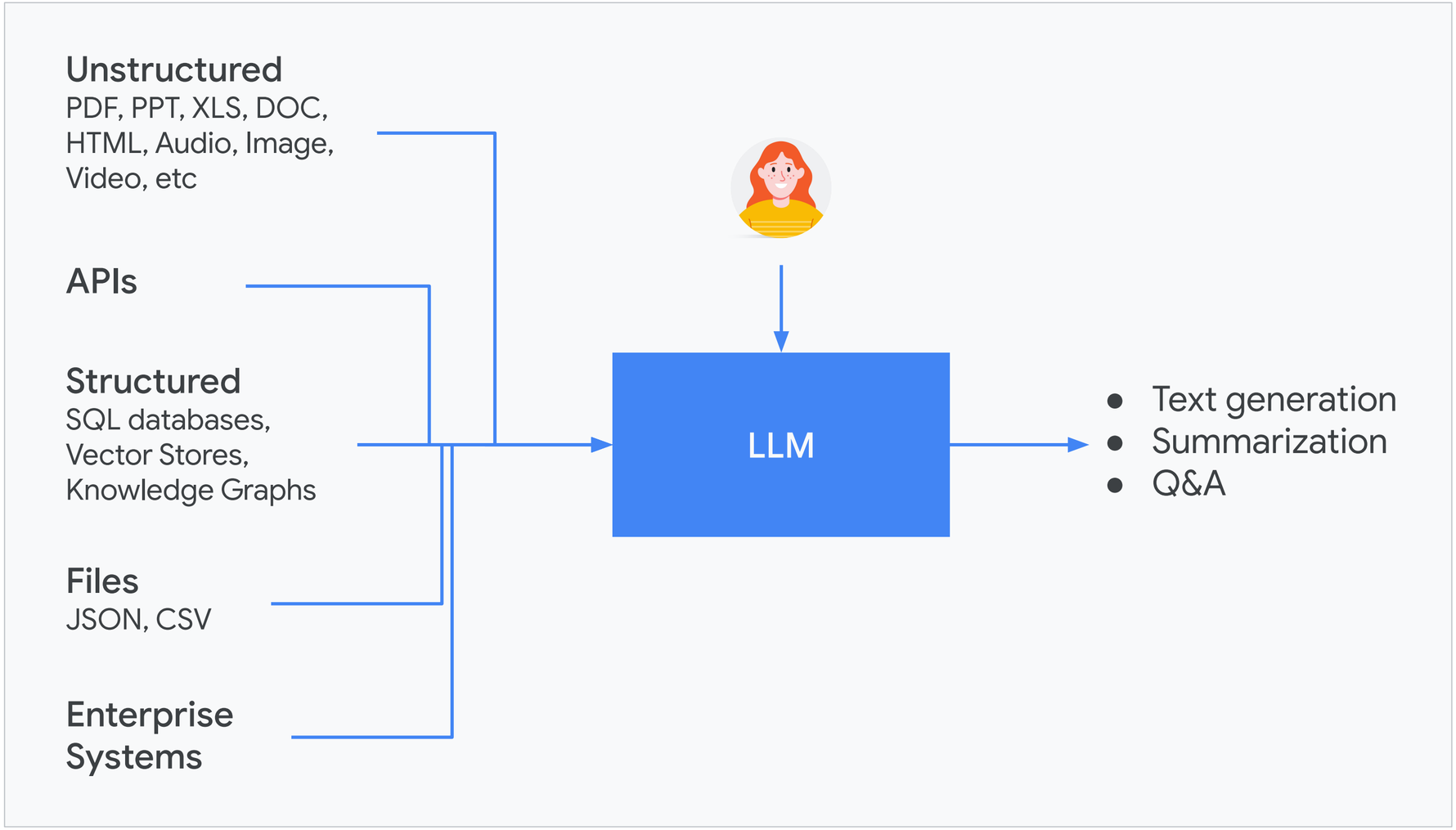
How can you provide the model with external data?

- Add data to the prompt
- Make an API call or database lookup
- Use embeddings and Vector Search



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Topics

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03	Architecting the Catalog Management Solution

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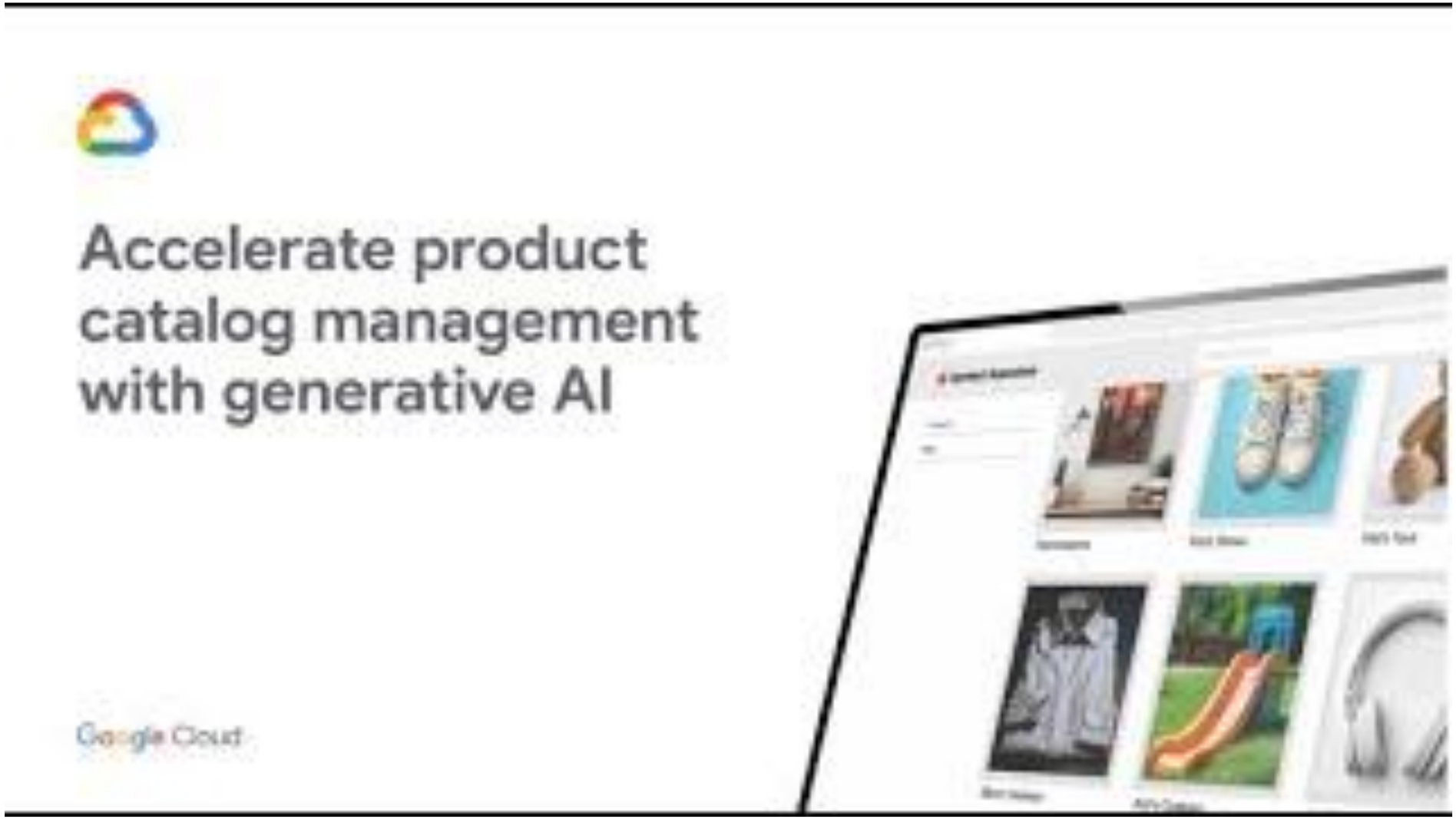
Product Catalog management with Generative AI



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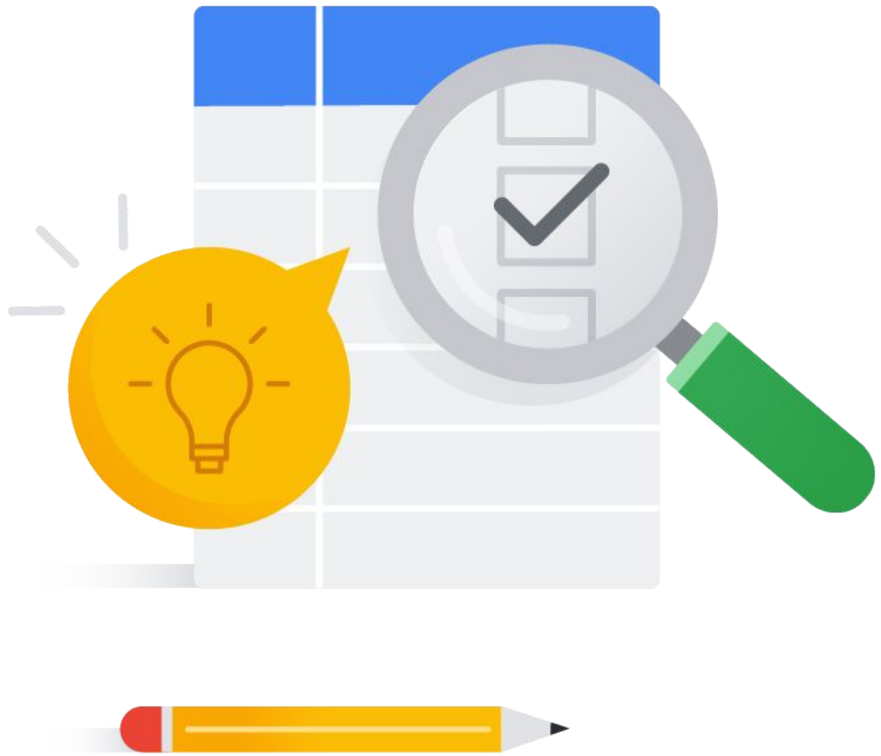
Discussion: Based on the video, What are the tasks required for adding a product to the online catalog?

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____



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Task 1

Upload the product photo & link it to text by SKU

Can AI help with this task?

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Task 1

Upload the product photo & link it to text by SKU

Can AI help with this task?

No, this is not a task for AI.

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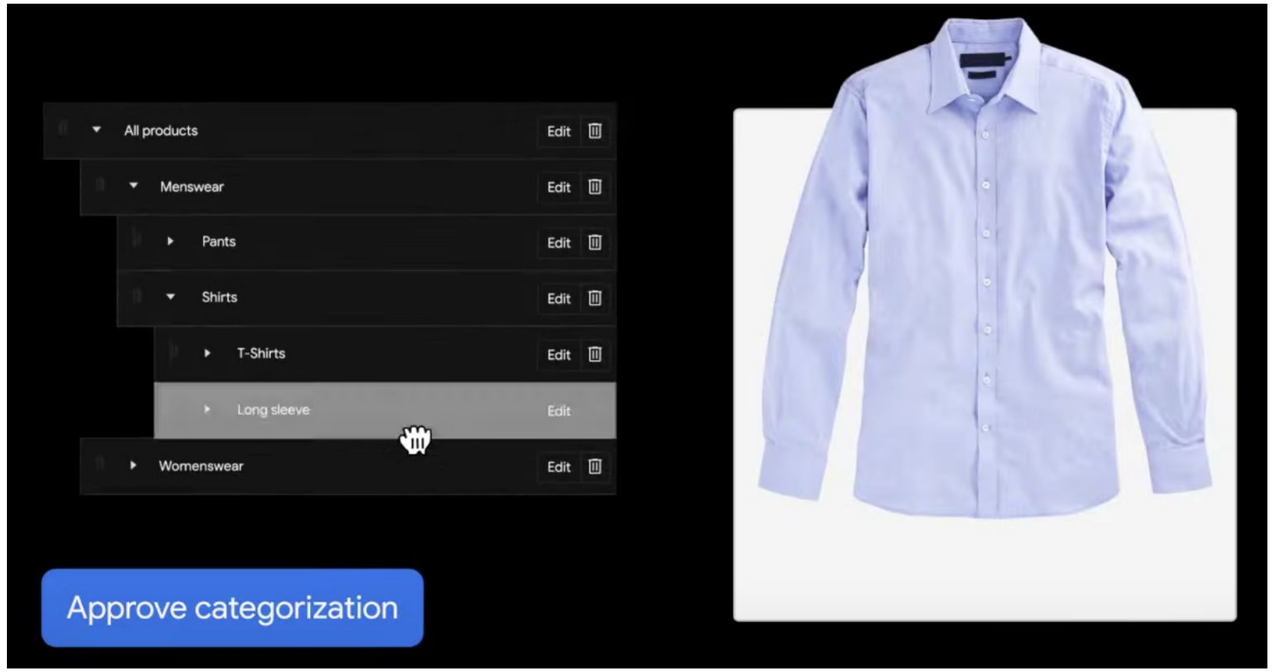
Task 2

Categorize the product

Can AI help with this task?
If so, how would we use it?



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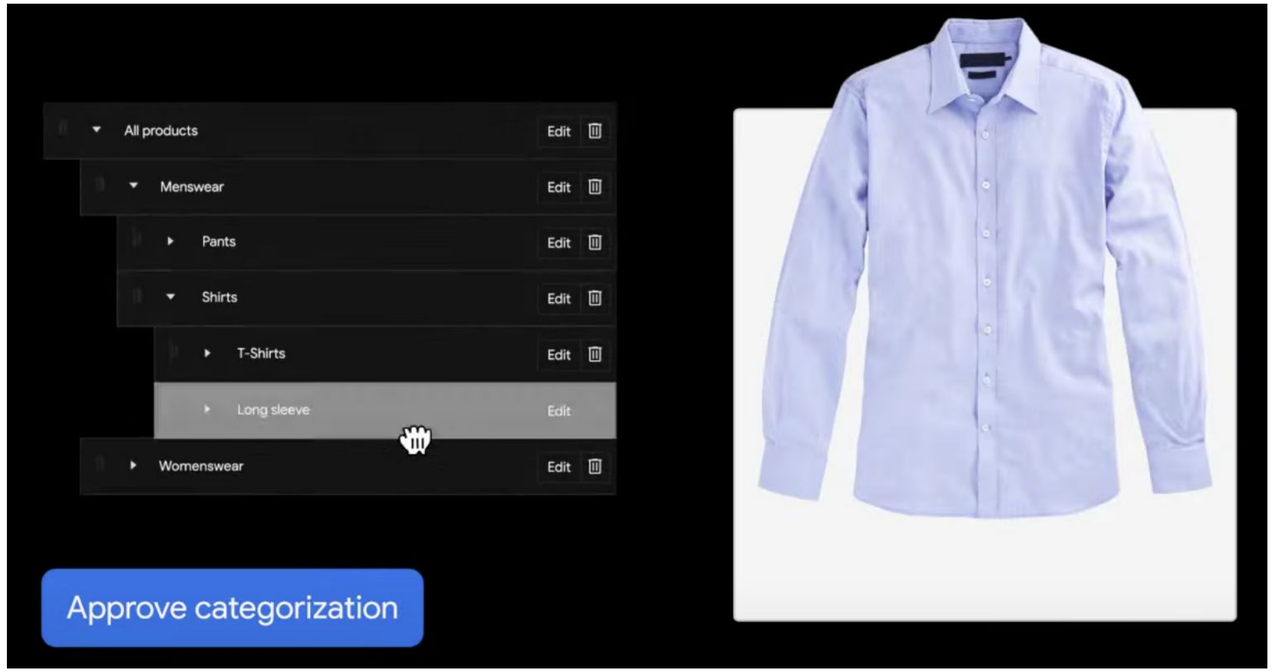
Task 2

Categorize the product

Can AI help with this task?
If so, how would we use it?

Possibly. Some options include:

- Get embeddings of the image and find the nearest product cluster
- Visual QA to ask, “Is this a men’s shirt?” etc.



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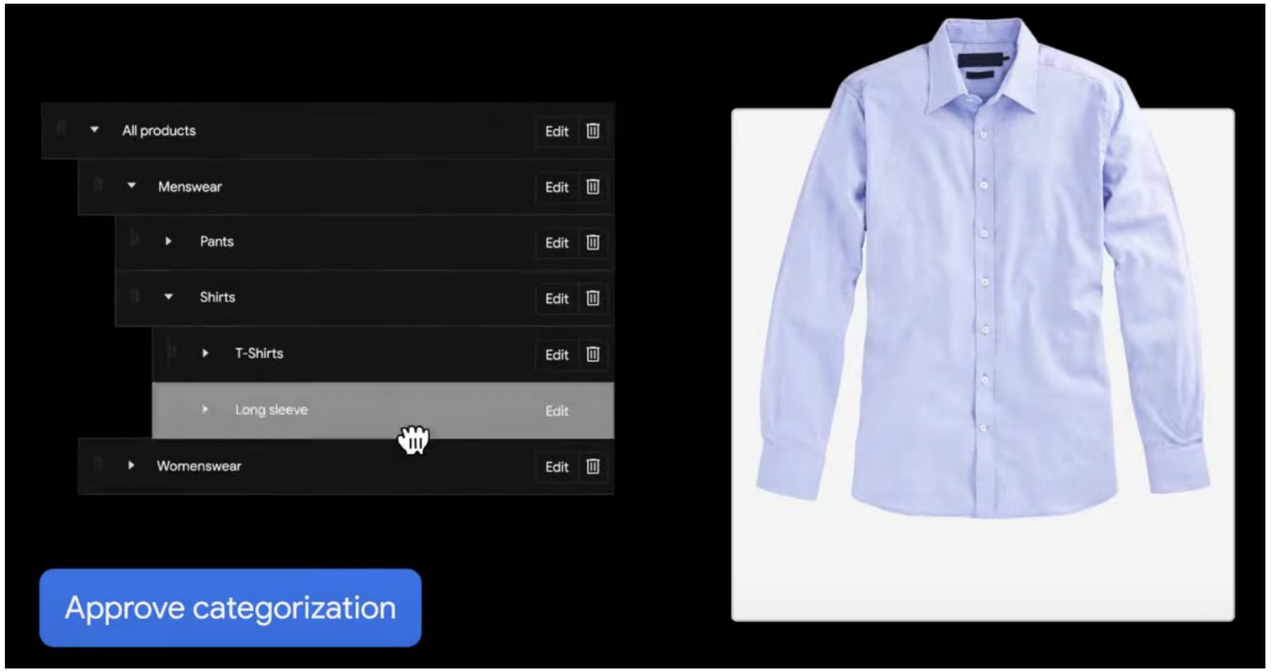
Task 2

Categorize the product

If we didn’t use GenAI, how would we approach this?



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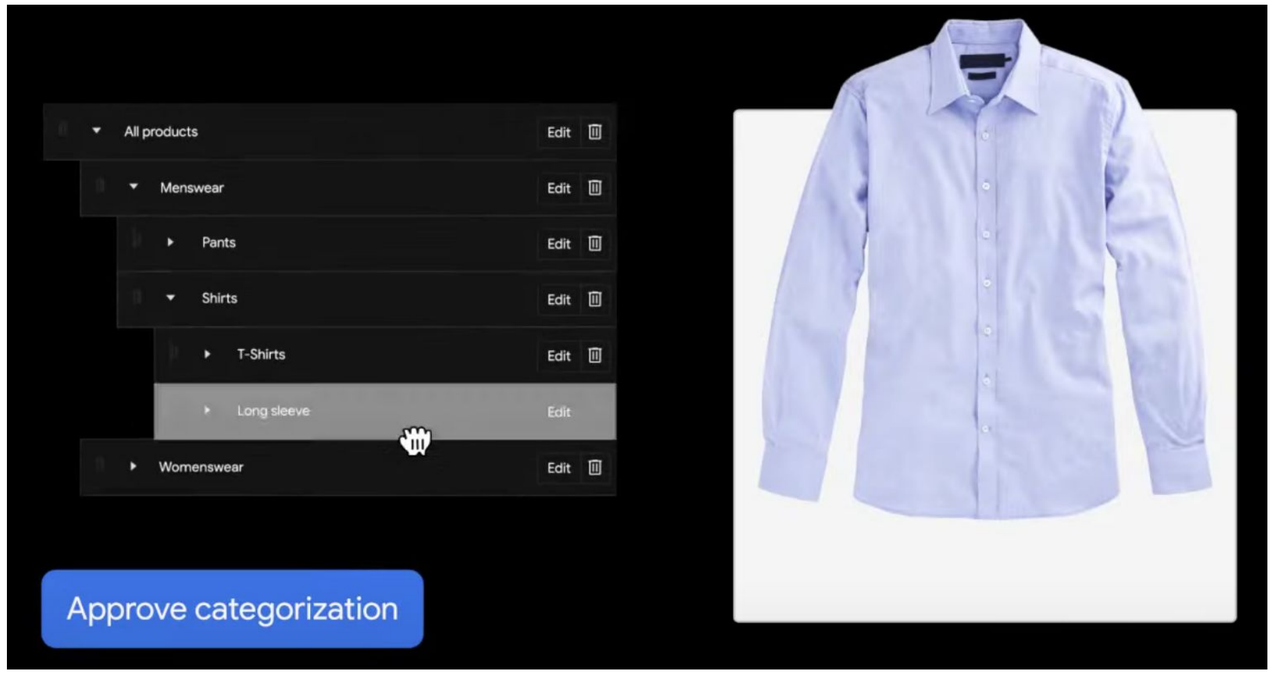
Task 2

Categorize the product

If we didn’t use generative AI, how would we approach this?

Some options include:

- Human labelers
- AutoML multiclass & multi-label image classification



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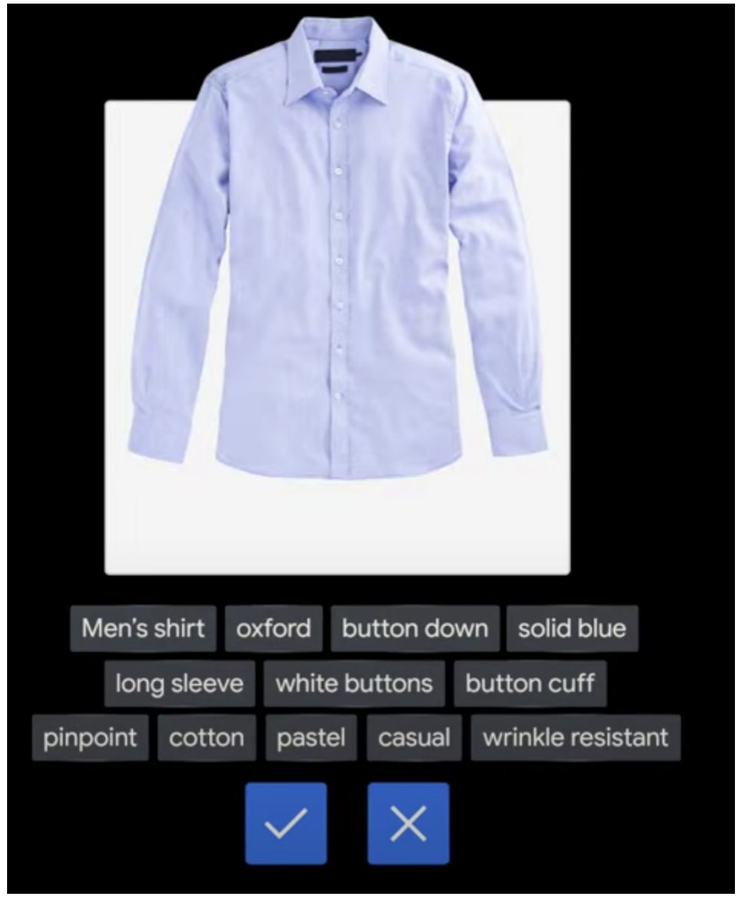
Task 3

Create tags (labels) for the product

Can AI help with this task?
If so, how would we use it?



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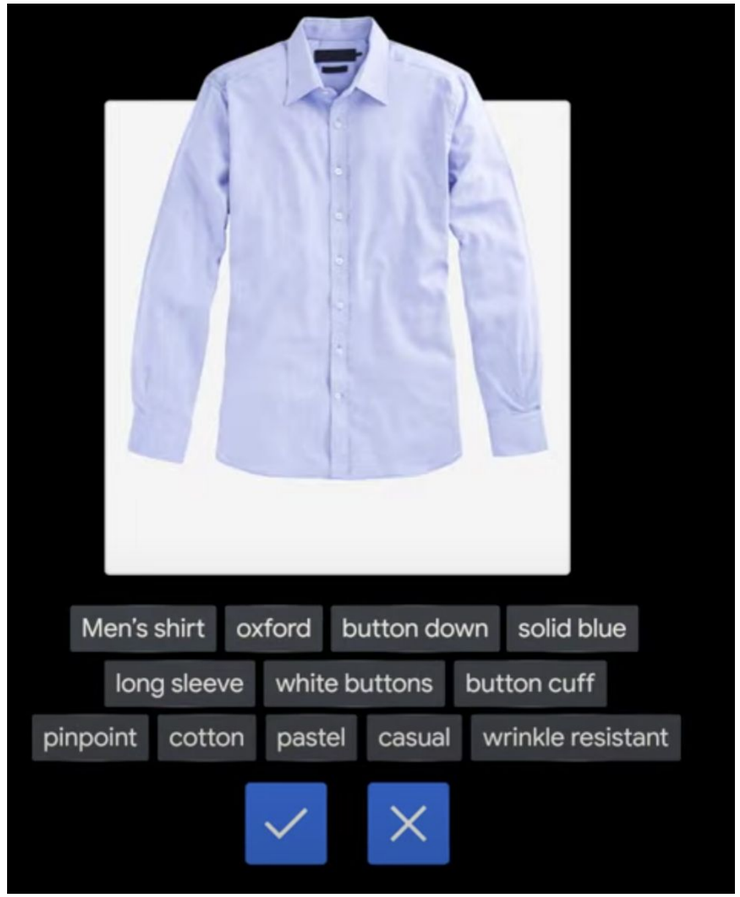
Task 3

Create tags (labels) for the product

Can AI help with this task?
If so, how would we use it?

Some options include:

- Image captioning and extracting nouns & adjectives
- Visual QA to ask, “Please provide a comma-separated list describing attributes of this shirt.”



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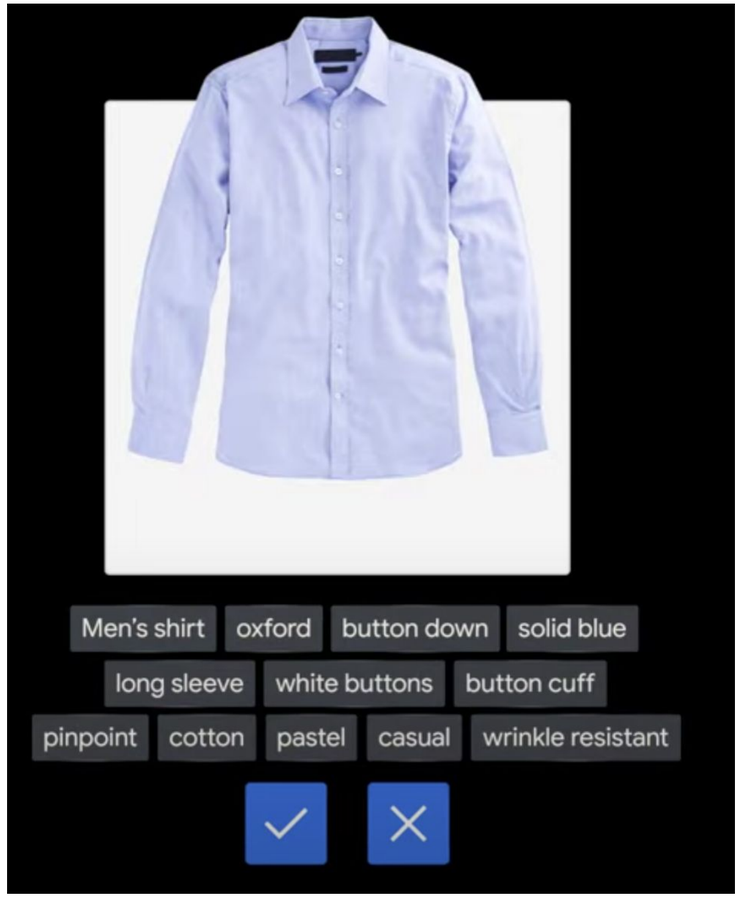
Task 3

Create tags (labels) for the product

If we didn’t use generative AI, how would we approach this?

Some options include:

- Human labelers
- AutoML multiclass & multi-label image classification



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Task 4

Generate a name for the product

Can AI help with this task?
If so, how would we use it?

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Task 4

Generate a name for the product

Can AI help with this task?
If so, how would we use it?

Possibly. One option includes:

- Text-Bison with a high temperature and a context of other best-selling product names

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Task 4

Generate a name for the product

If we didn’t use generative AI, how would we approach this?

Some options include:

- Let our designers lead the market, rather than follow past trends
- Combine our tags, possibly with an ordering heuristic

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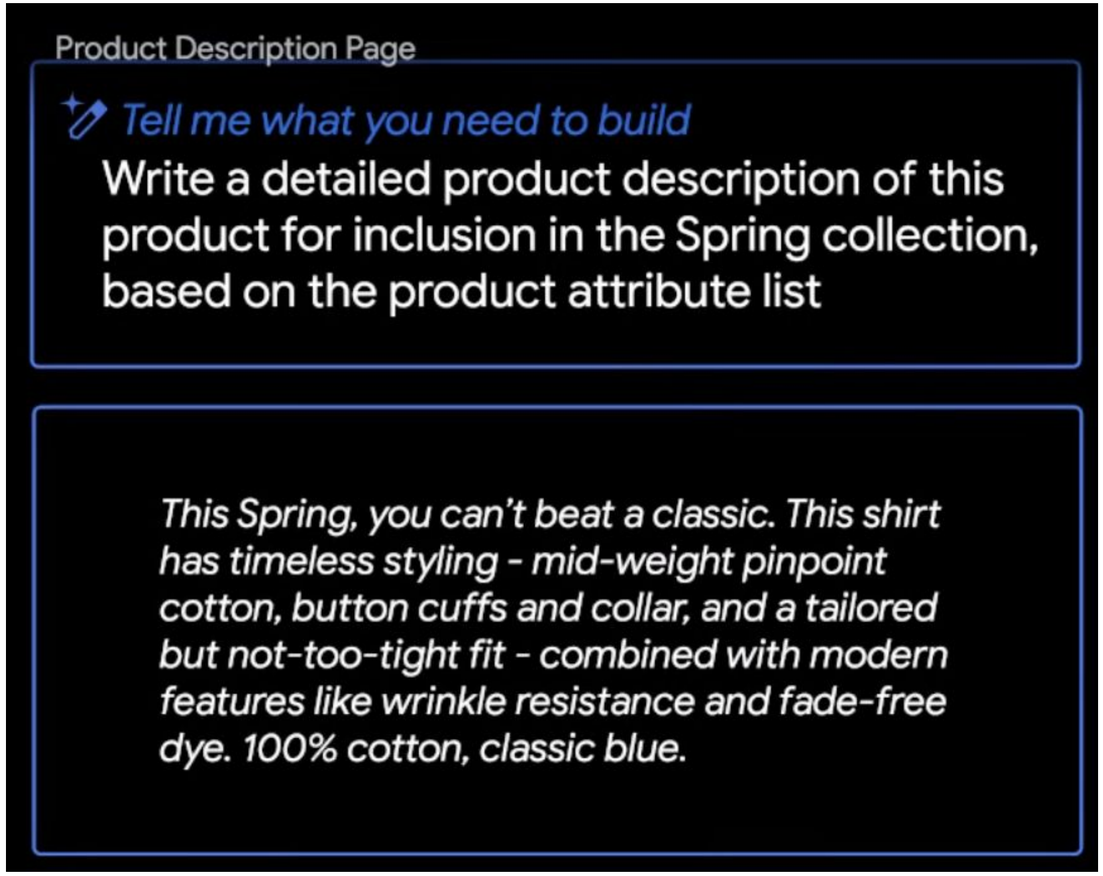
Task 5

Write a product description

Can AI help with this task?
If so, how would we use it?



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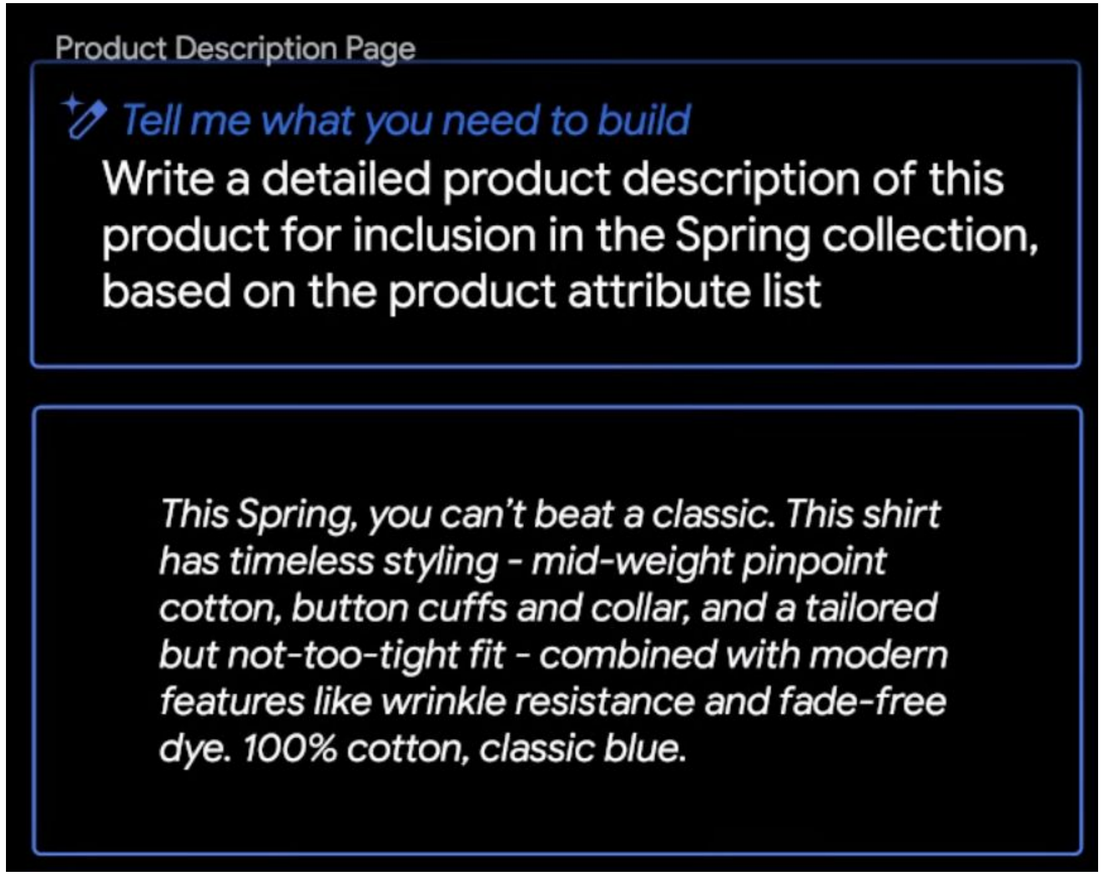
Task 5

Write a product description

Can AI help with this task?
If so, how would we use it?

Possibly. One option includes:

- Text-Bison with a high temperature and a context of the upcoming season (spring, holidays, etc.) and example product descriptions.



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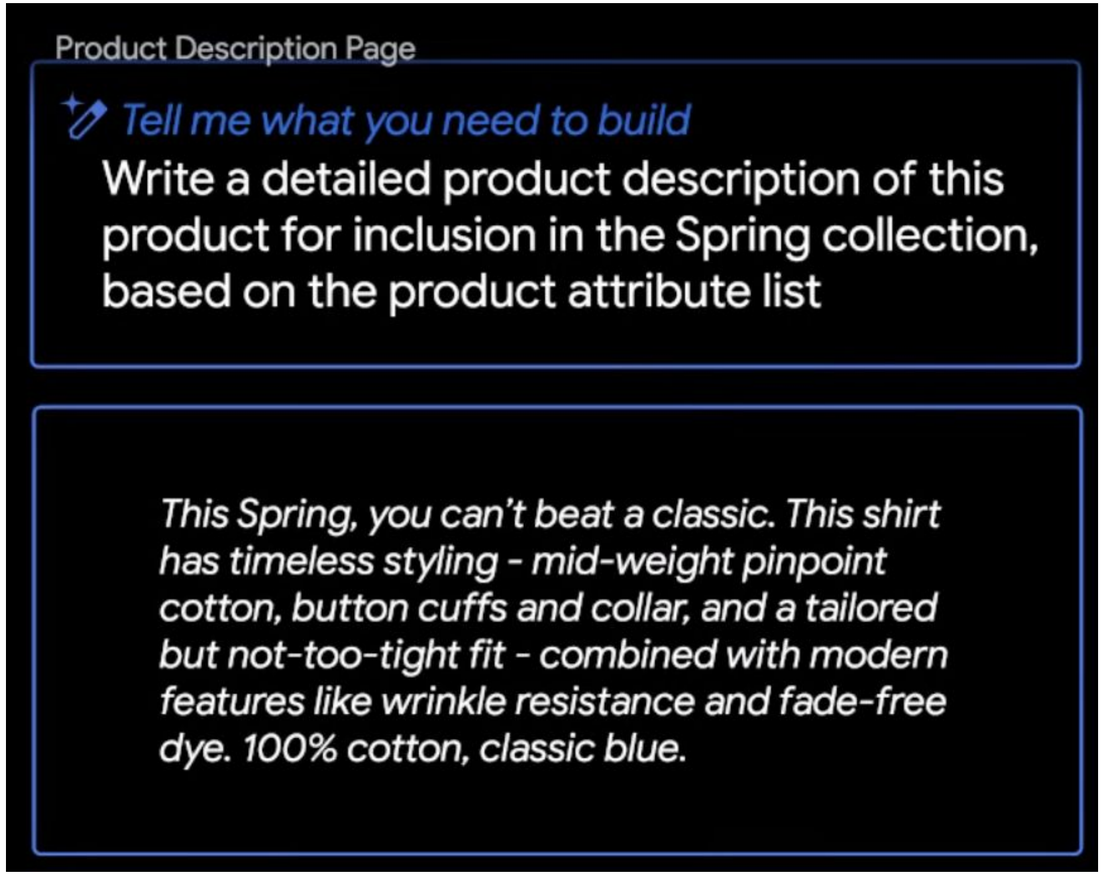
Task 5

Write a product description

If we didn’t use generative AI, how would we approach this?



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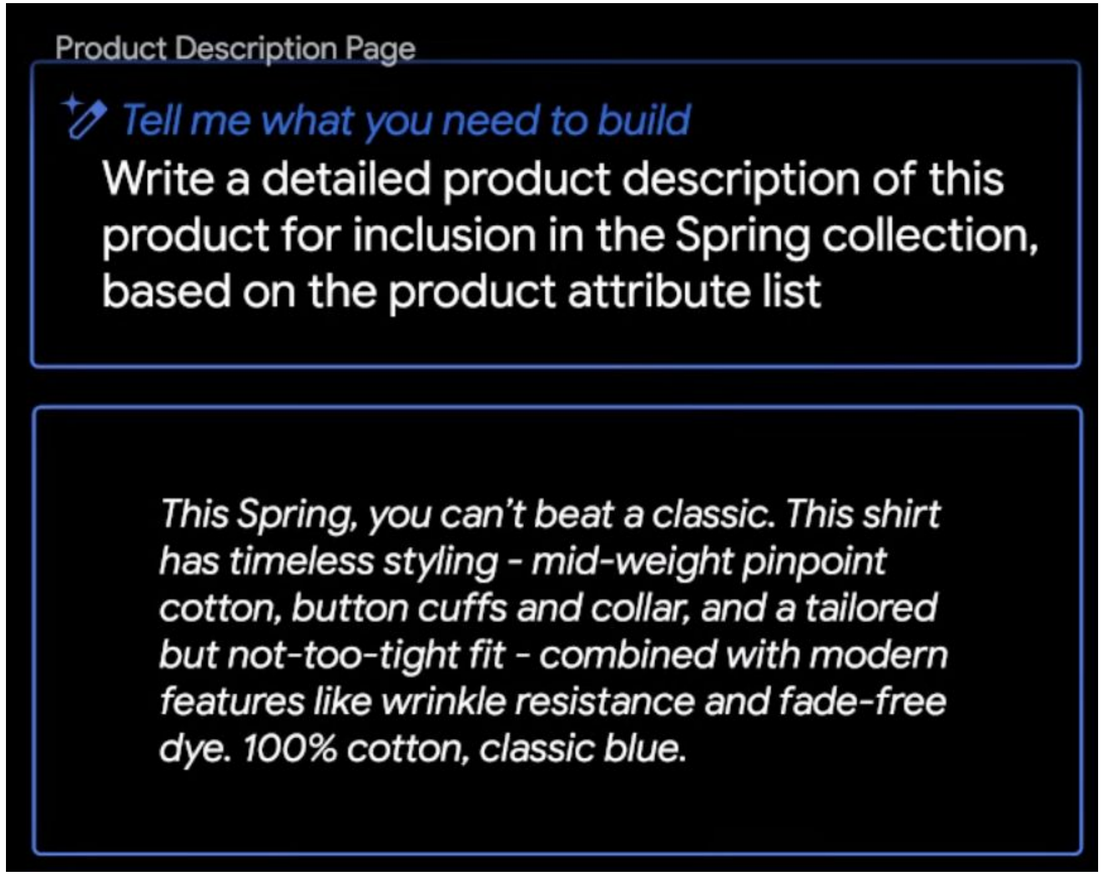
Task 5

Write a product description

If we didn’t use generative AII, how would we approach this?

A human approach:

- Manual updates by our marketing team



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Task 6

Write product HTML metadata

Can AI help with this task?
If so, how would we use it?

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Task 6

Write product HTML metadata

Can AI help with this task?
If so, how would we use it?

Possibly. One option includes:

- Using Codey to generate valid HTML given the list of SEO keywords & product tags

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Task 6

Write product HTML metadata

If we didn’t use generative AI, how would we approach this?

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Task 6

Write product HTML metadata

If we didn’t use generative AI, how would we approach this?

A more traditional approach:

- Build the header deterministically from SEO keywords and approved product tags

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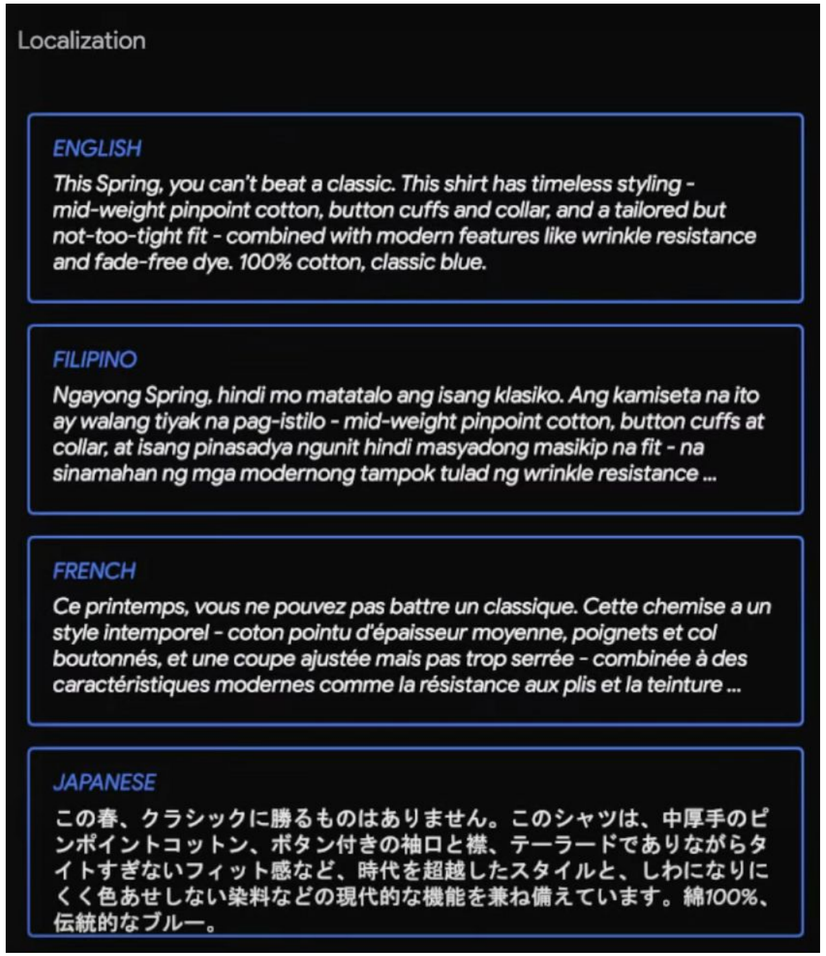
Task 7

Translate product content into other languages

Can AI help with this task?
If so, how would we use it?



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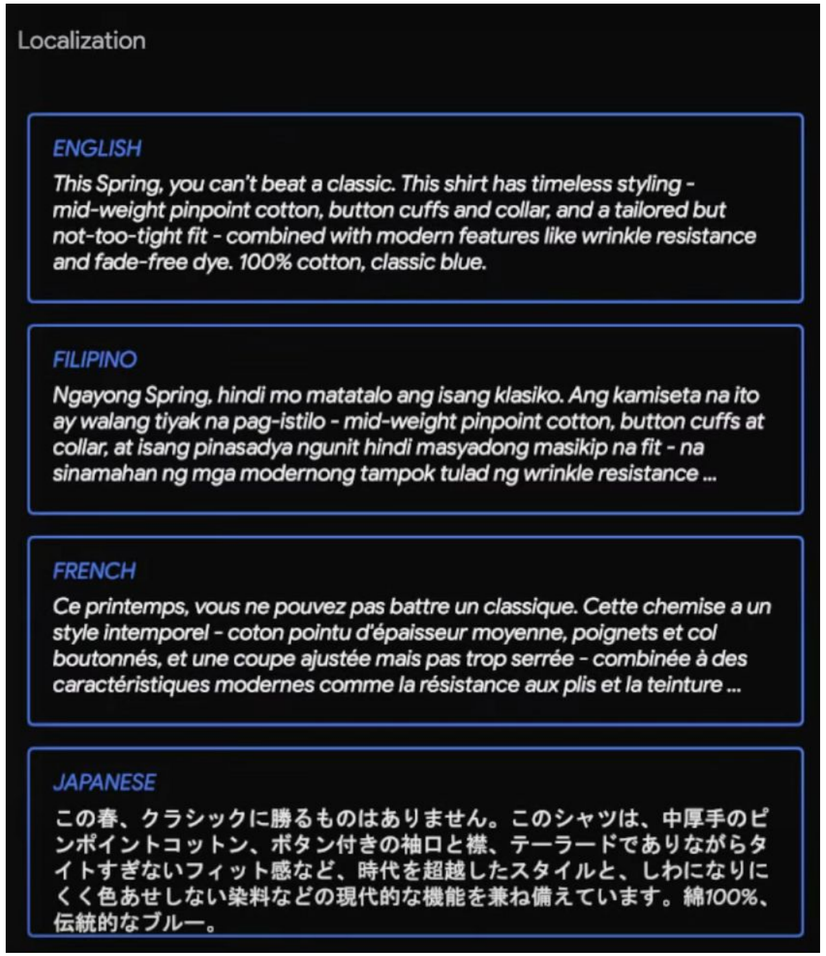
Task 7

Translate product content into other languages

Can AI help with this task?
If so, how would we use it?

Possibly:

- Feed the description to Text Bison and ask for the translation with a low temperature



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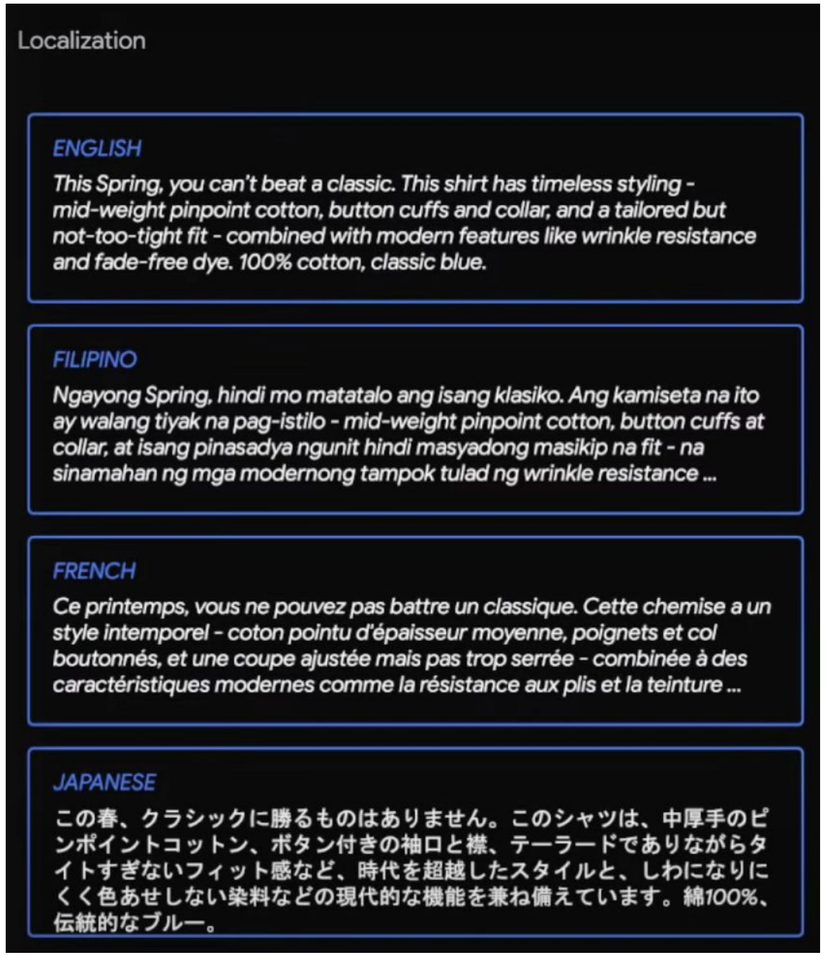
Task 7

Translate product content into other languages

If we didn’t use generative AI,
how would we approach this?



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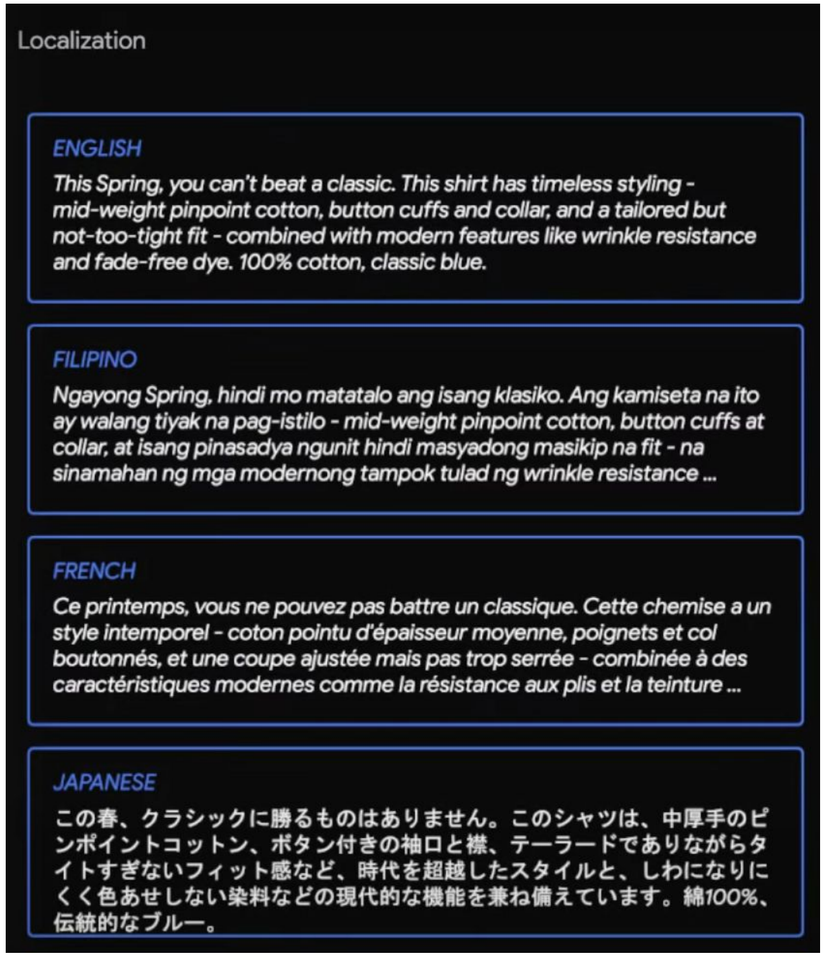
Task 7

Translate product content into other languages

If we didn’t use generative AI, how would we approach this?

A more traditional approach:

- Use the Translation API



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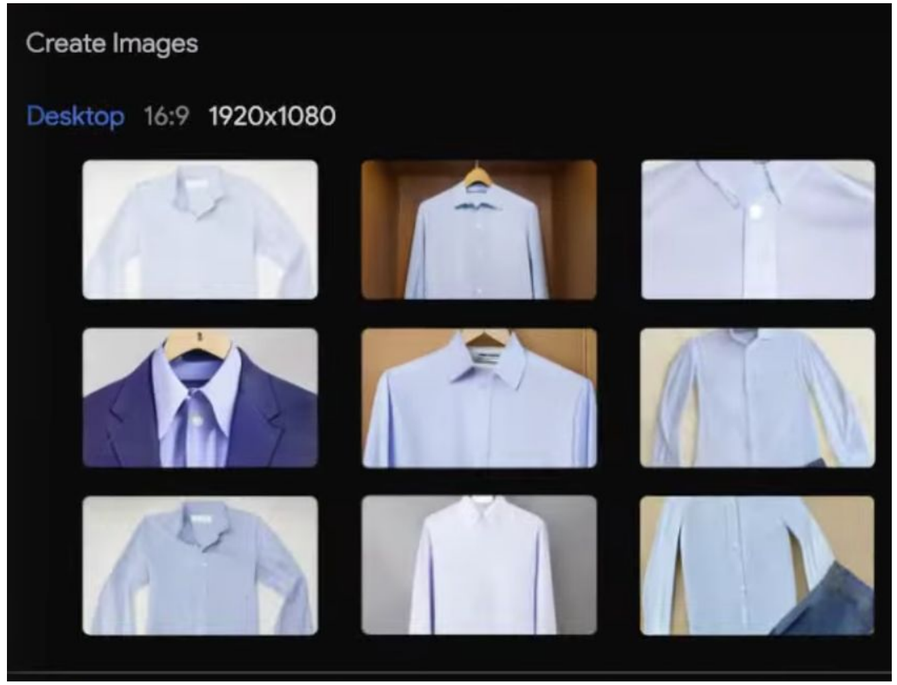
Task 8

Create alternate images

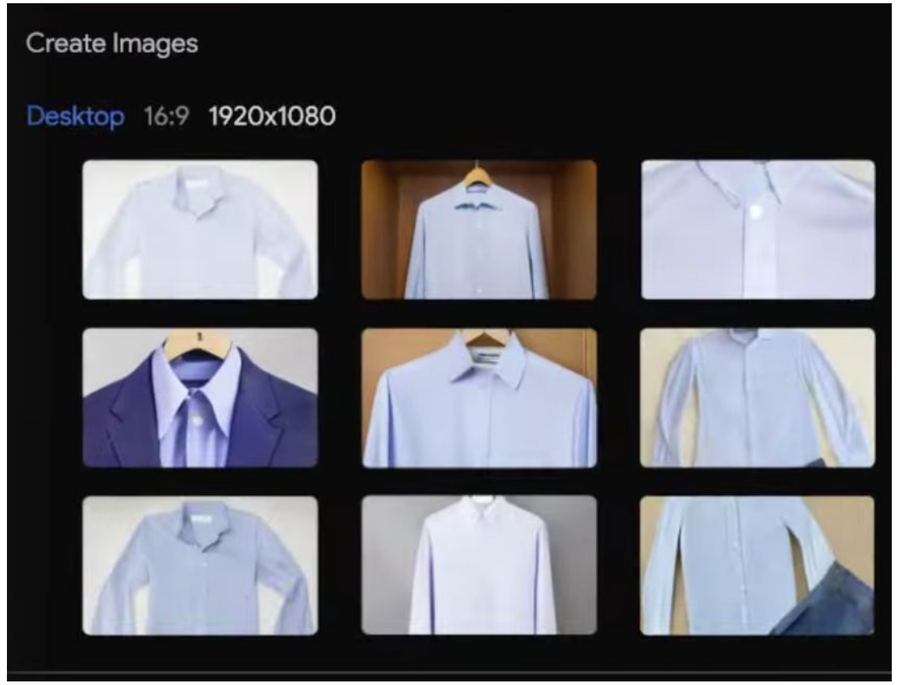
Can AI help with this task?
If so, how would we use it?



Task 8

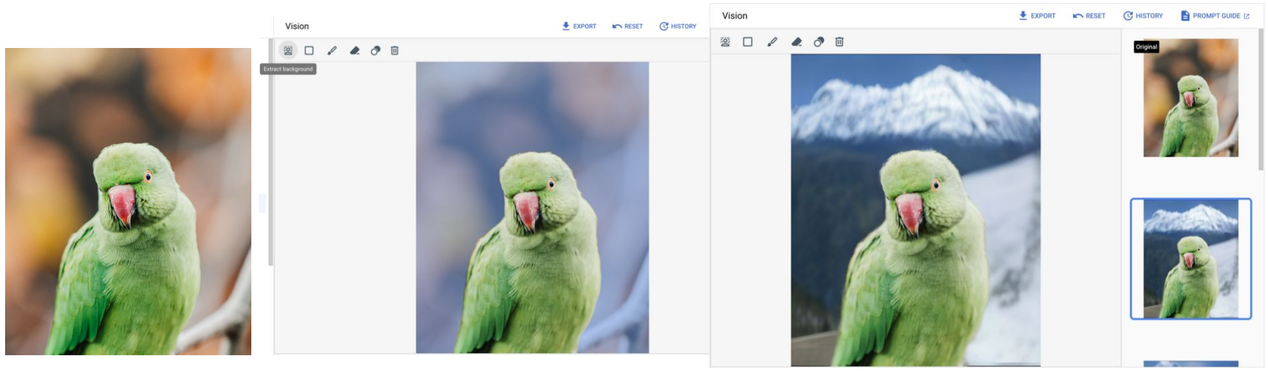
Create alternate images

Can AI help with this task?
If so, how would we use it?



Possibilities:

- Imagen using masked-based or product background editing:



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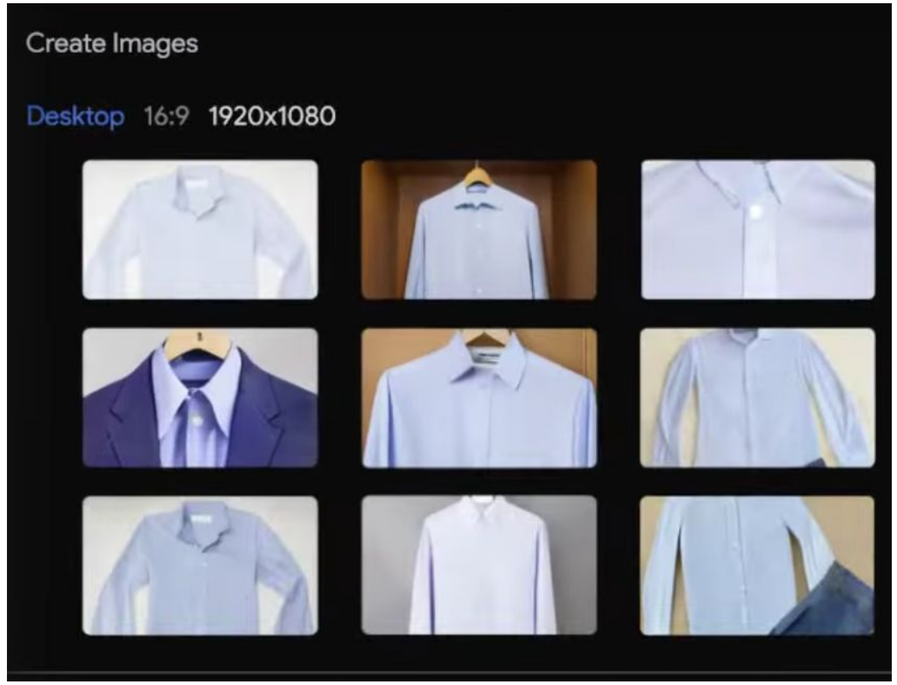
Task 8

Create alternate images

If we didn’t use generative AI, how would we approach this?



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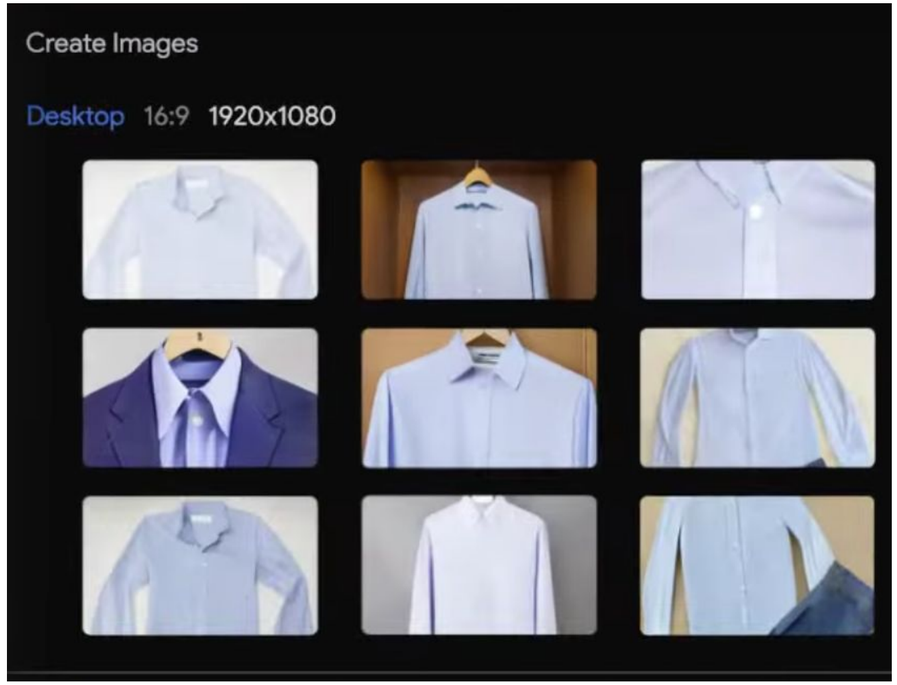
Task 8

Create alternate images

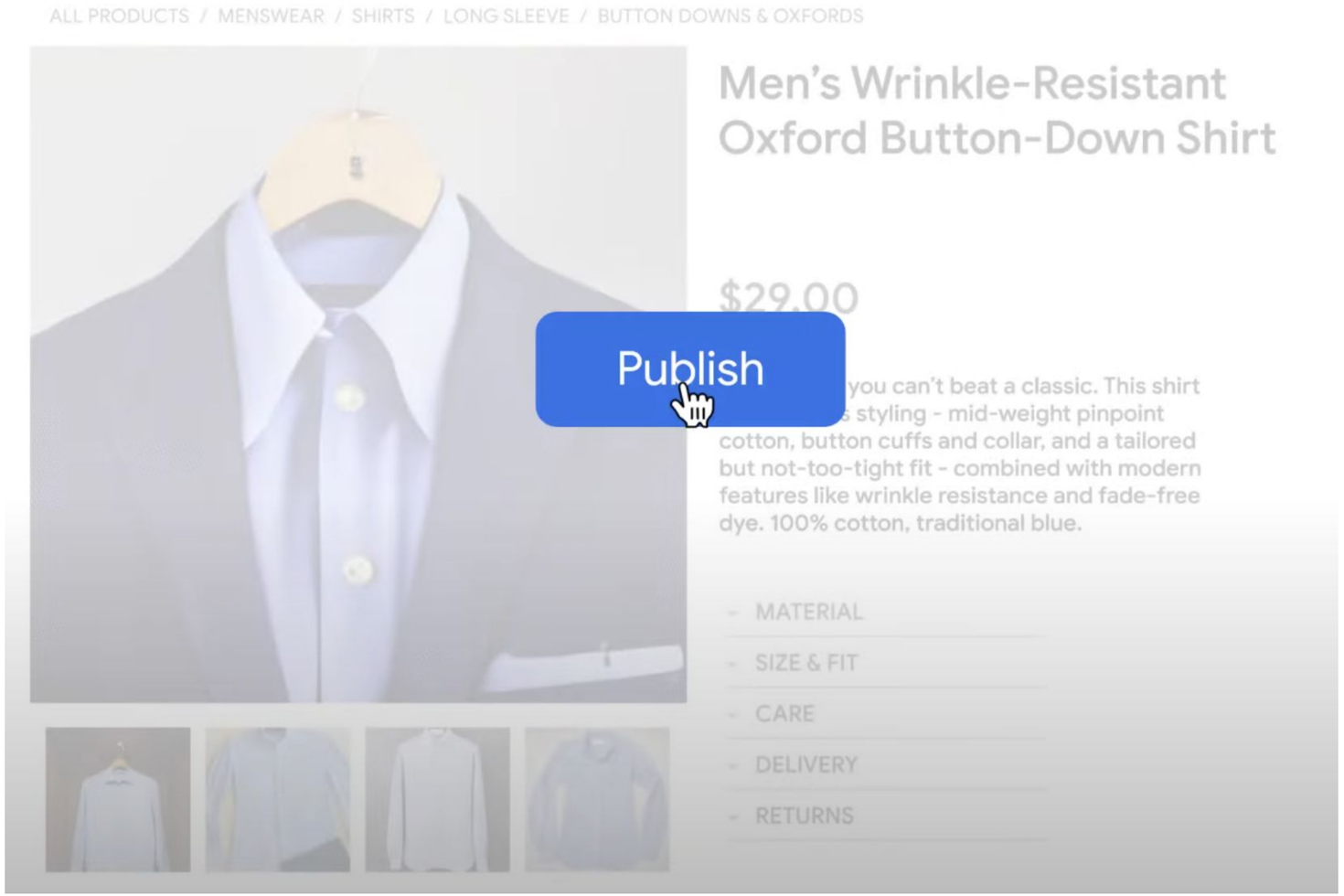
If we didn’t use generative AI, how would we approach this?



Other approaches:

- A team of human photographers / artists
- Solicit customer uploads

After the tasks are completed, publish the product



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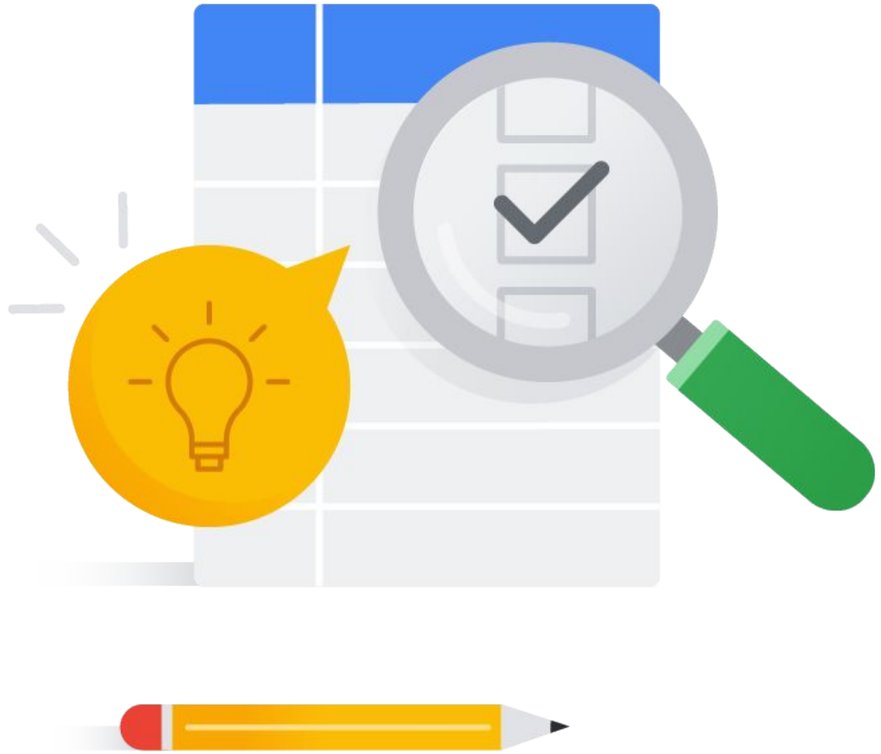
Discussion: At what steps in this process was there a human in the loop verifying the accuracy of the AI?



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Topics

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03	Architecting the Catalog Management Solution

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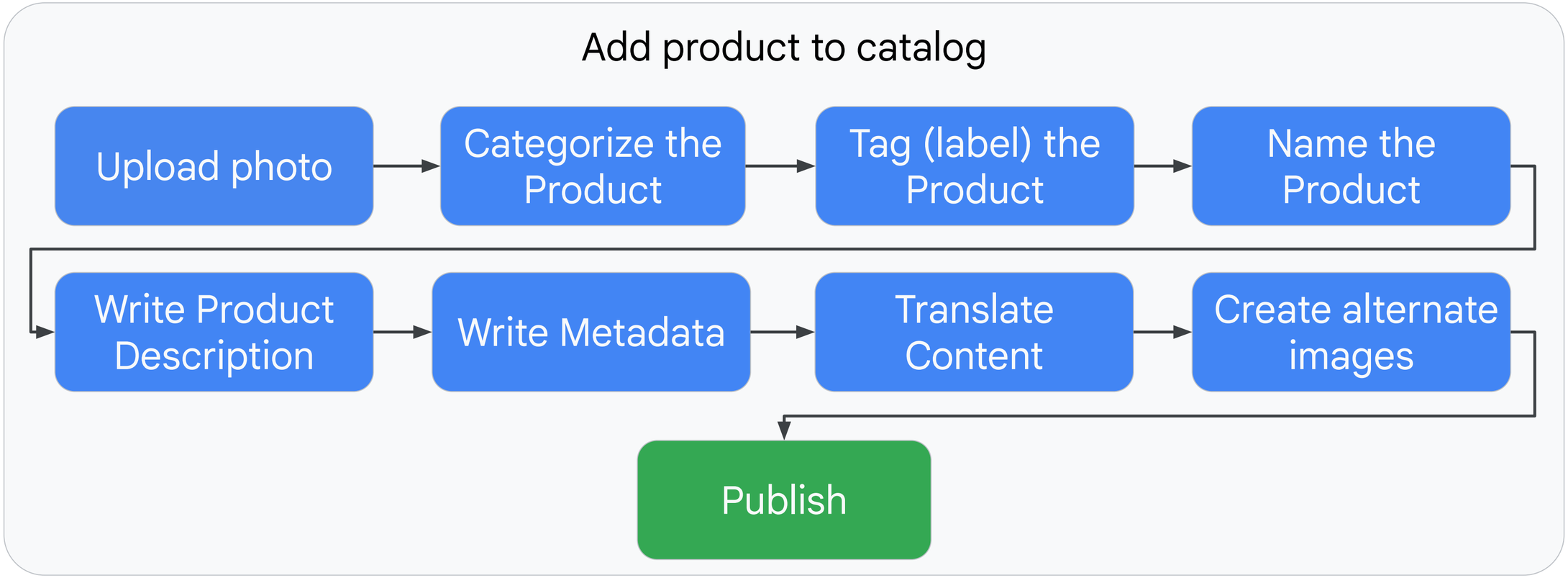
The first step to automating a complex process is to break it into a set of smaller, discrete tasks



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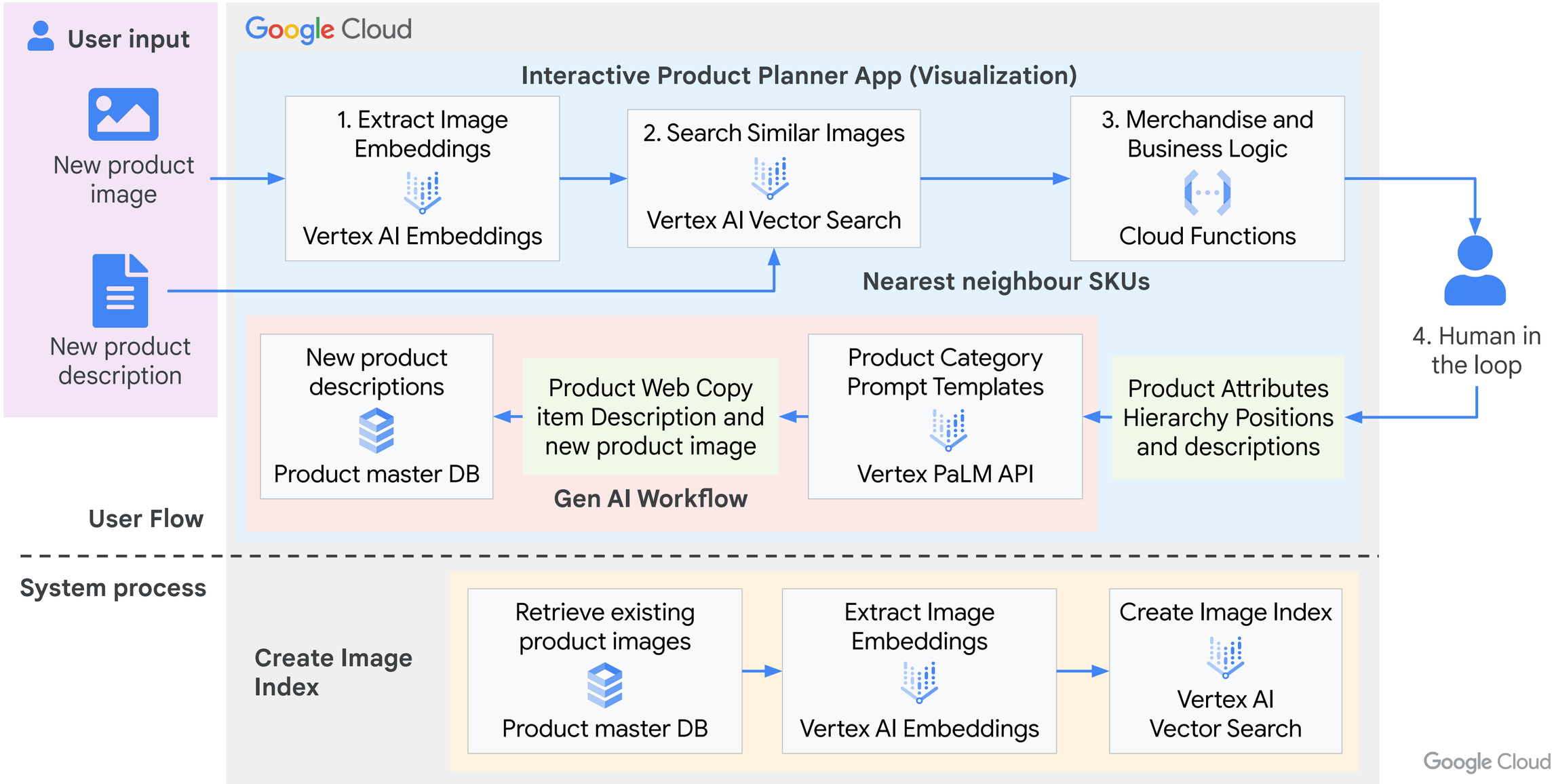
Reference Architecture for Product Catalog



Google Cloud

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