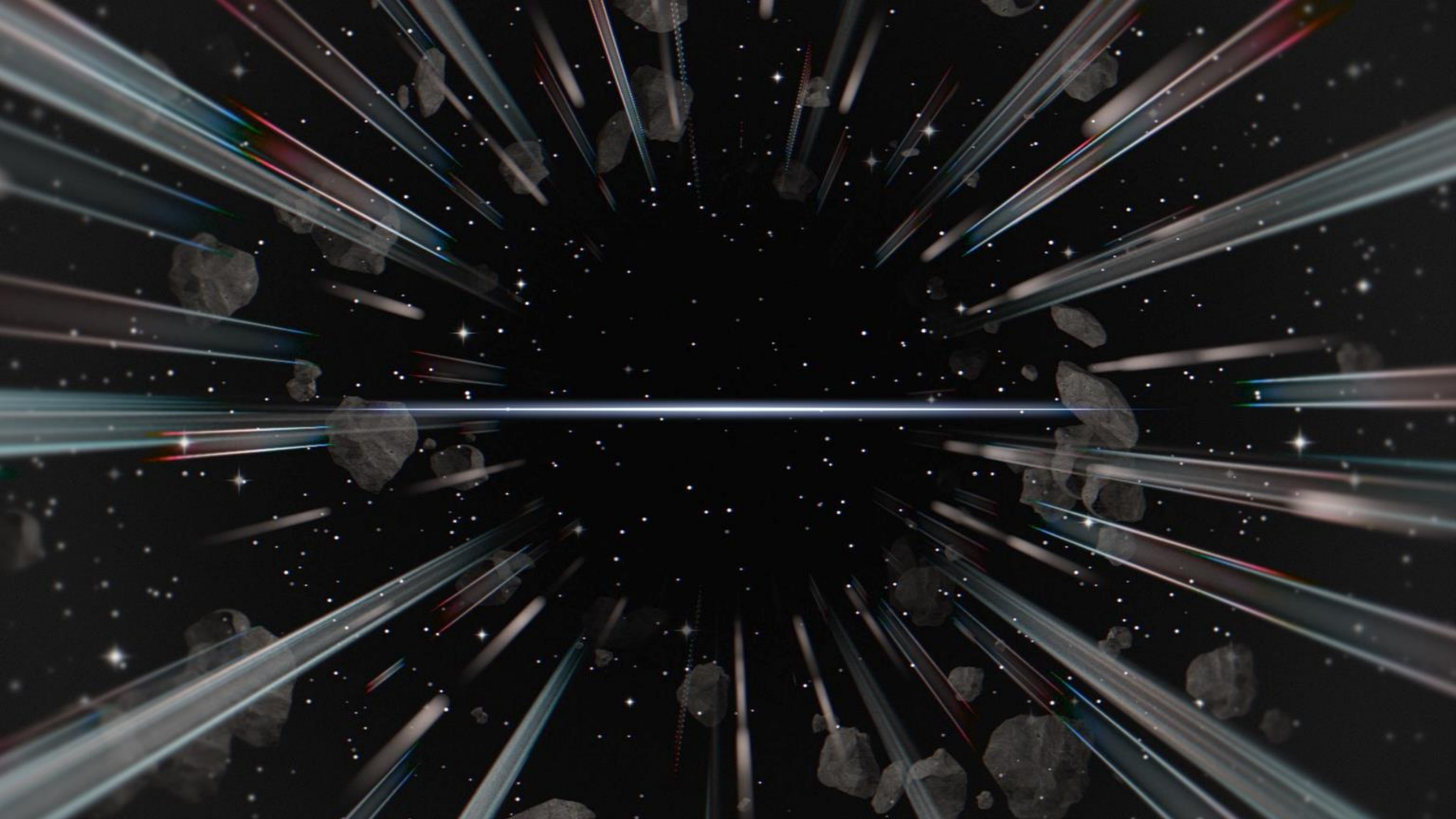
CONTEXT-AWARE COPILOTS

into Web Apps



Agenda

01 **UX in AI**
Copilots

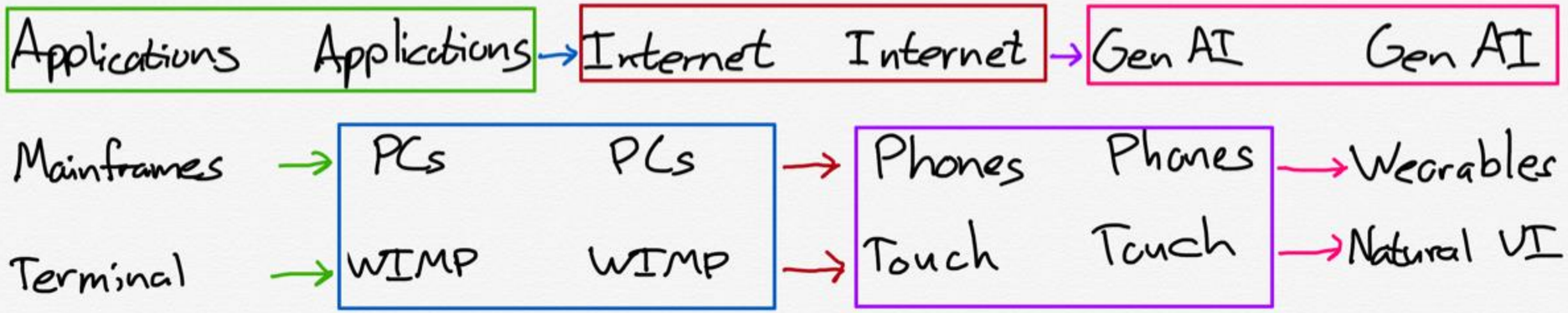
02 **COPILOT**
Build Trust

03 **COPILOT KIT**
Features and benefits

04 **DEMO**
Spellcasting

05 **SLM**
Small Language Model

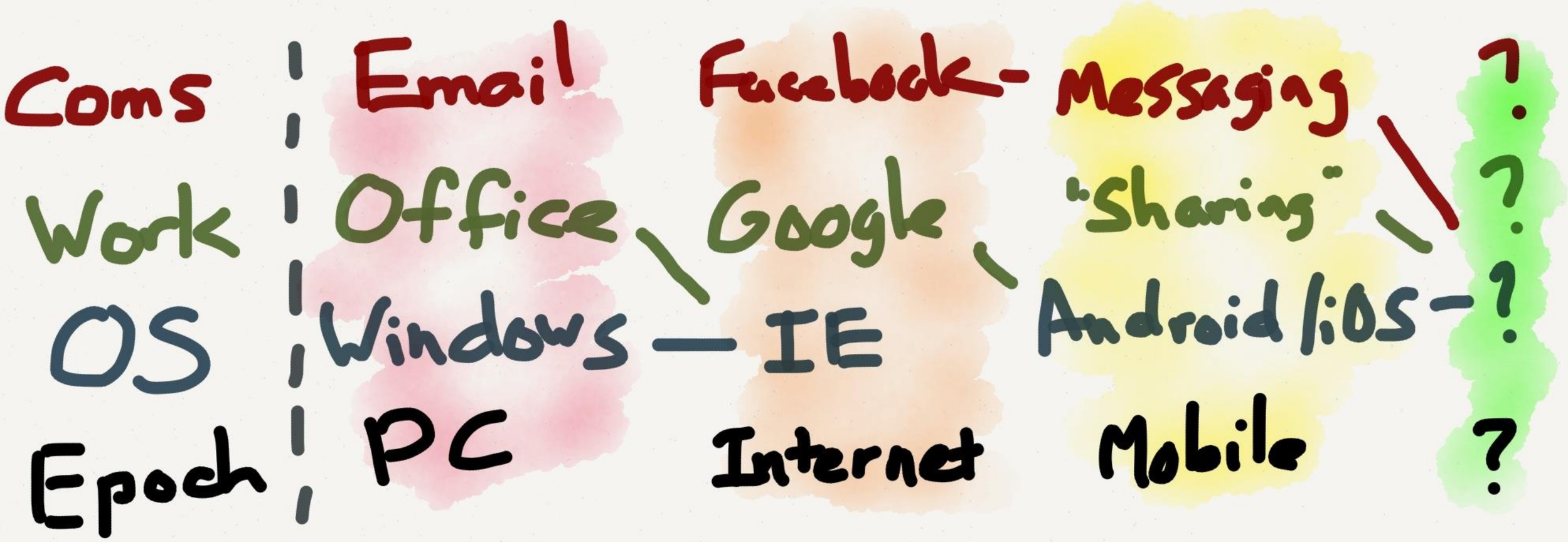
06 **CONCLUSION**
Embrace the Fantasy



https://stratechery.com/2024/the-gen-ai-bridge-to-the-future/

THE THREE EPOCHS OF CONSUMER TECH

stratechery.com

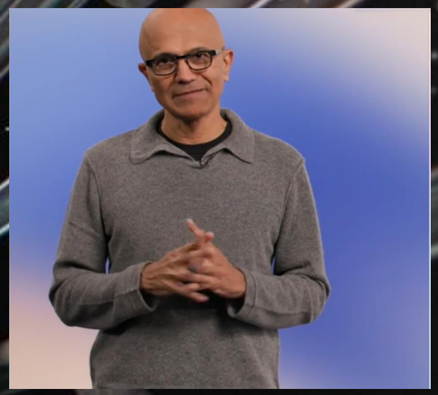


Data + Machine Learning =

Data + Artificial Intellifence =

Data + Generative AI =

Data + Agentic AI =



Copilot as the UI for AI

-Satya Nadella,
Microsoft's CEO

USER EXPERIENCE IN AI

USABILITY

Performs and completes tasks as intended

ACCESSIBILITY

Designed for all abilities and inclusion

RELIABILITY

Consistently performs well without errors.

PLEASANTNESS

Enjoyable and appealing to the users

GENERATIVE AI FOR BEGINNERS

BUILD TRUST

OVER TRUST

overestimates capability of AI

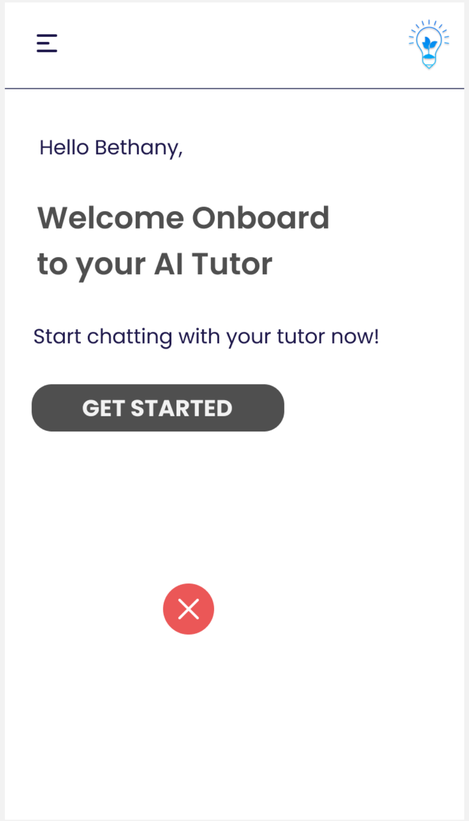
users trusting the AI system too much

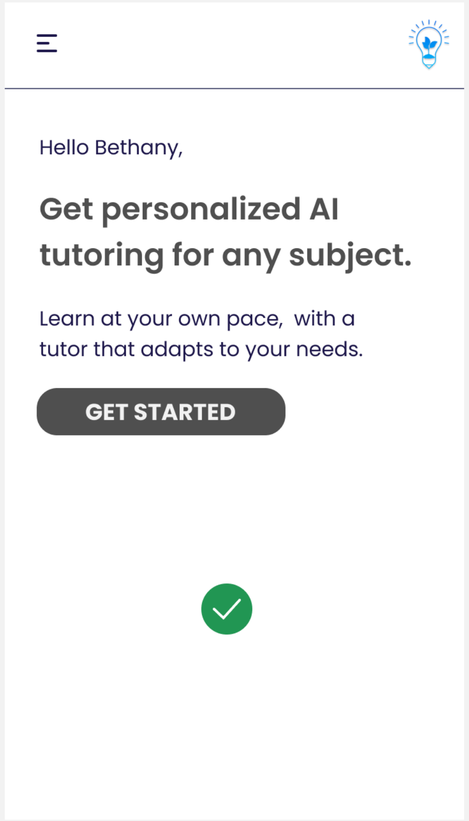
MISTRUST

little or no trust in an AI system

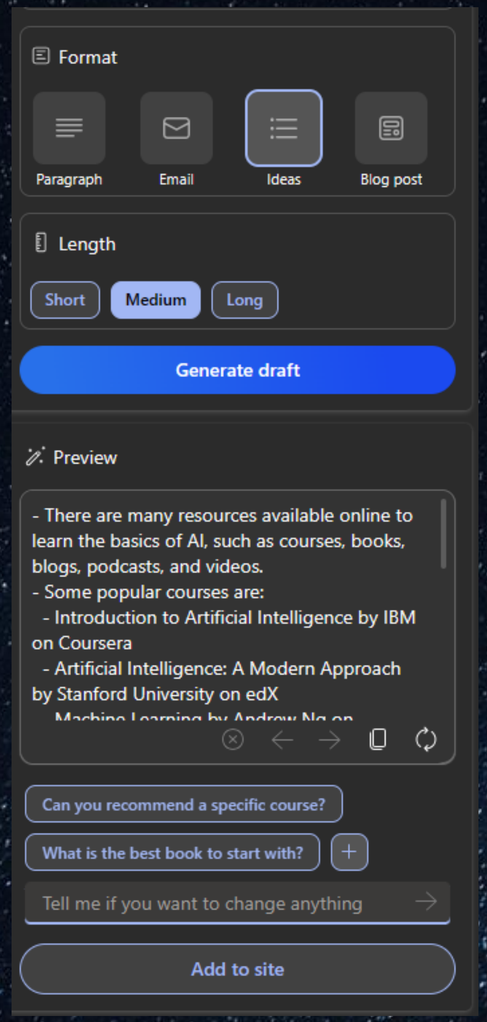
user rejecting your application

Explainability





Control


Format
Paragraph
Email
Ideas
Blog post
Length
Short
Medium
Long
Generate draft
Preview
- There are many resources available online to learn the basics of AI, such as courses, books, blogs, podcasts, and videos.
- Some popular courses are:
- Introduction to Artificial Intelligence by IBM on Coursera
- Artificial Intelligence: A Modern Approach by Stanford University on edX
Can you recommend a specific course?
What is the best book to start with?
Tell me if you want to change anything
Add to site

Copilots vs Agents

AI-driven	• Utilize AI to analyze data, provide relevant information, actions.
Task-oriented	• Help complete specific tasks more efficiently
Contextual awareness	• Adapt responses on current situation and user context
Integration with existing systems	• Integrated into various applications and workflows • provide assistance

Agents

Autonomy	• Designed to work independently, without constant input from a user.
Goal-oriented	• AI agents are built to achieve specific outcomes • Like managing workflows or processing data.
Learning	• Learn from their environment • adapts to meet evolving priorities
Use cases	• Can be used to automate • customer support, manage supply chains, make investment recommendations

Copilots

Collaboration

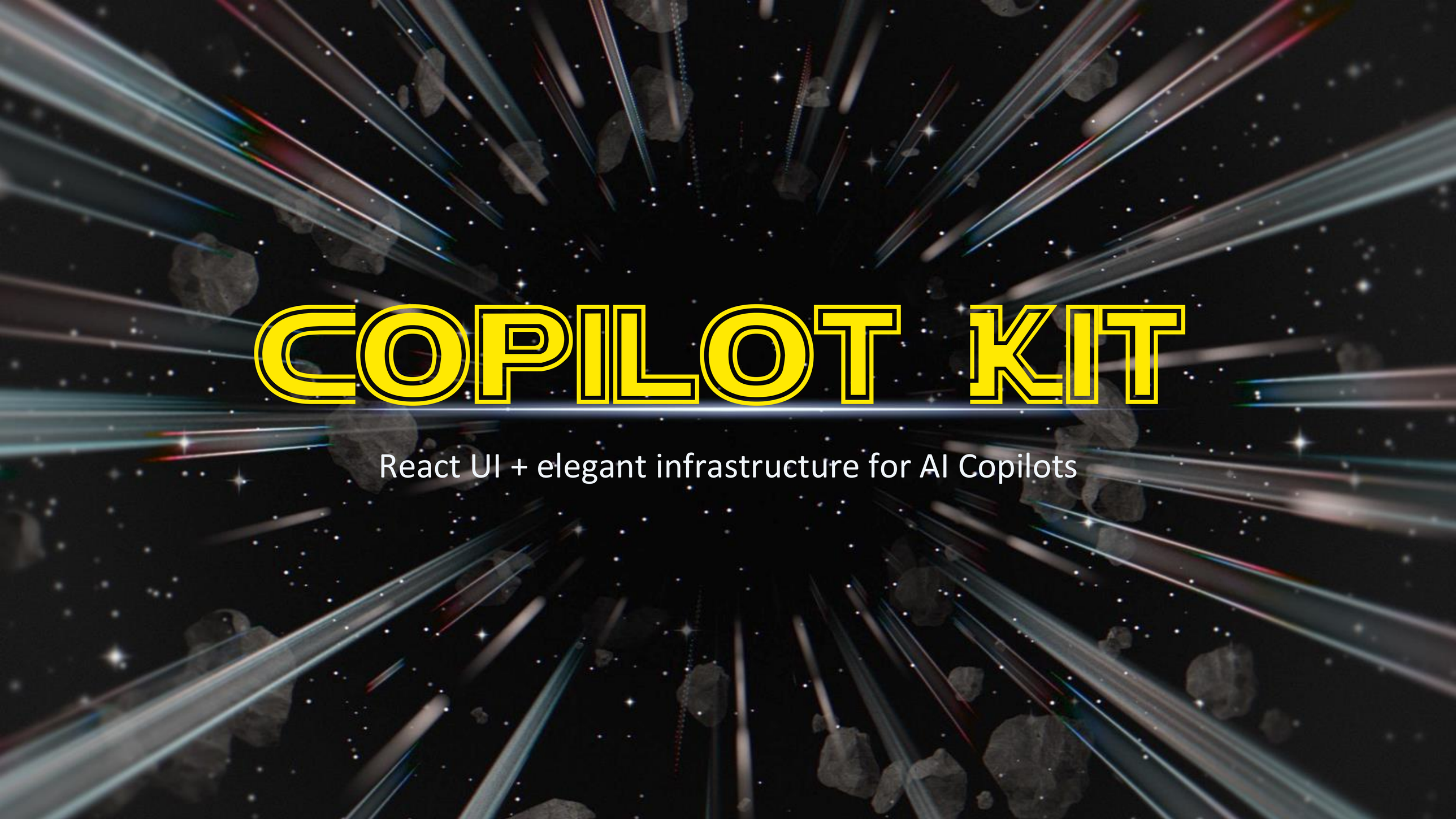
- type of agent that works side-by-side w/ users to enhance decision-making
- Relies on USER INTERACTION

Assistance

- Provide real-time support, suggestions, insights, recommendations
- help complete tasks

Automation

- Not Fully Automated
- Can Automate repetitive tasks to help users complete complex tasks more efficiently


COPILOT KIT
React UI + elegant infrastructure for AI Copilots

COPILOT KIT

COPILOT KIT

ChatBots

- Context-aware in-app chatbots
- take actions in-app.

CopilotTextArea

- AI-powered text fields
- context-aware autocomplete and insertions.

Co-Agents

- In-app AI agents
- interact with your app and users,
- powered by LangChain/CrewAI

BENEFITS

Bring context-aware AI to your app

- Connect your data to AI Assistant.
- Customize the behavior of your AI assistant.
- Enable your Copilot to take actions in the frontend.
- Auto-generate suggestions in the chat window based on real-time application state. Copilot Textarea for AI-powered autosuggestions.

Backend Actions & Agents

- Use any LLM model to power your AI assistant.
- Enable backend actions and agents in your Copilot.

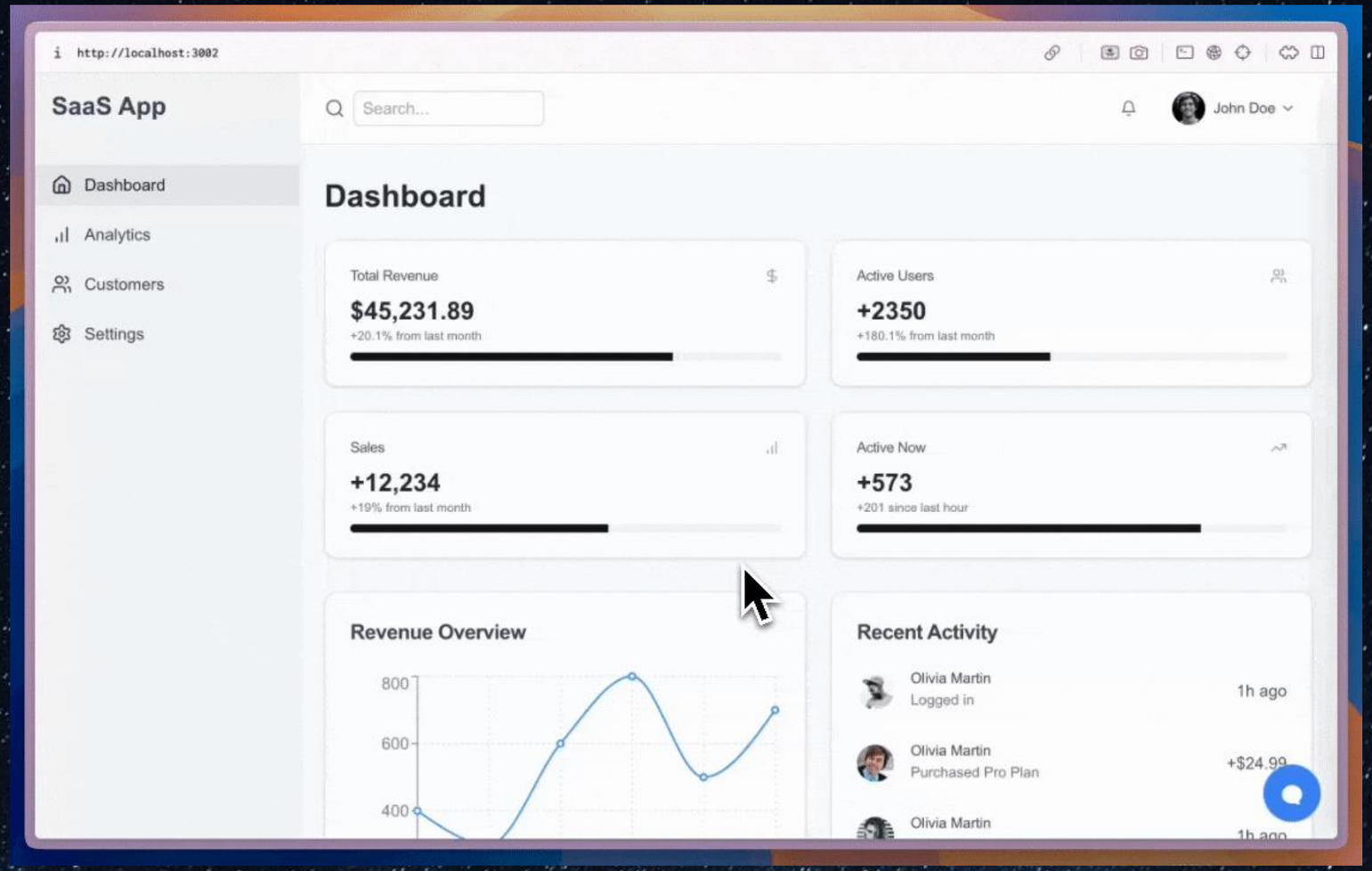
Customize the look and feel of the built-in Copilot UI components

- Embed custom UI components in the Copilot window.
- Built-in Copilot UI components.
- Fully customize your Copilot's UI from the ground up using headless UI.

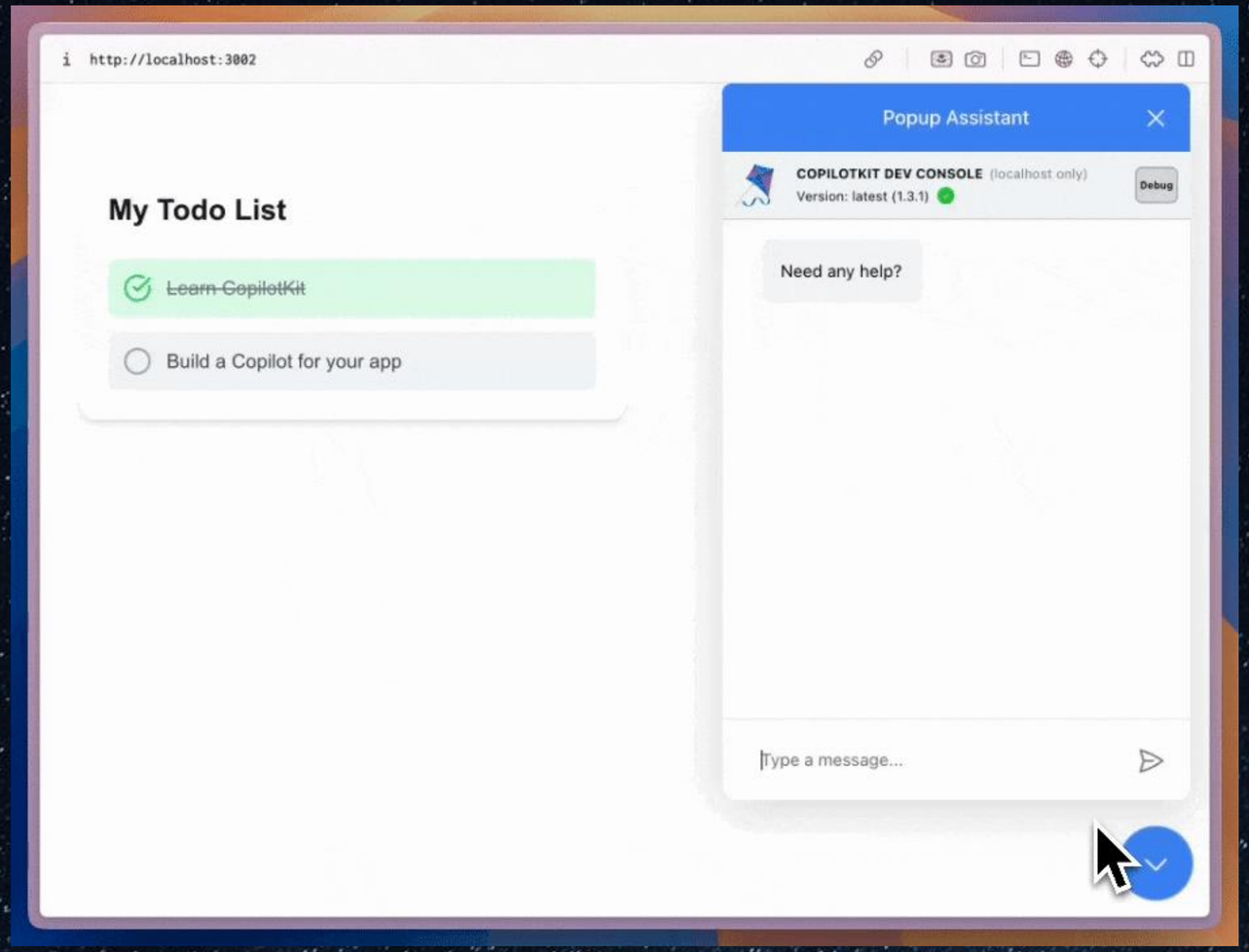
FEATURES

Integration Components	• plug-and-play components
Contextual Awareness	• Access real-time, user-specific data, • relevance and effectiveness.
Actionable Intelligence	• Copilots to perform actions on behalf of users • streamline workflows and improving efficiency.
CoAgents Integration	• integration with LangGraph/CrewAI agents.
Generative UI	• Render fully custom React components within the chat interface.
AI-Enabled Text Editing	• AI-powered text editing • Autocompletions and insertions • serving as a drop-in replacement for any textarea.

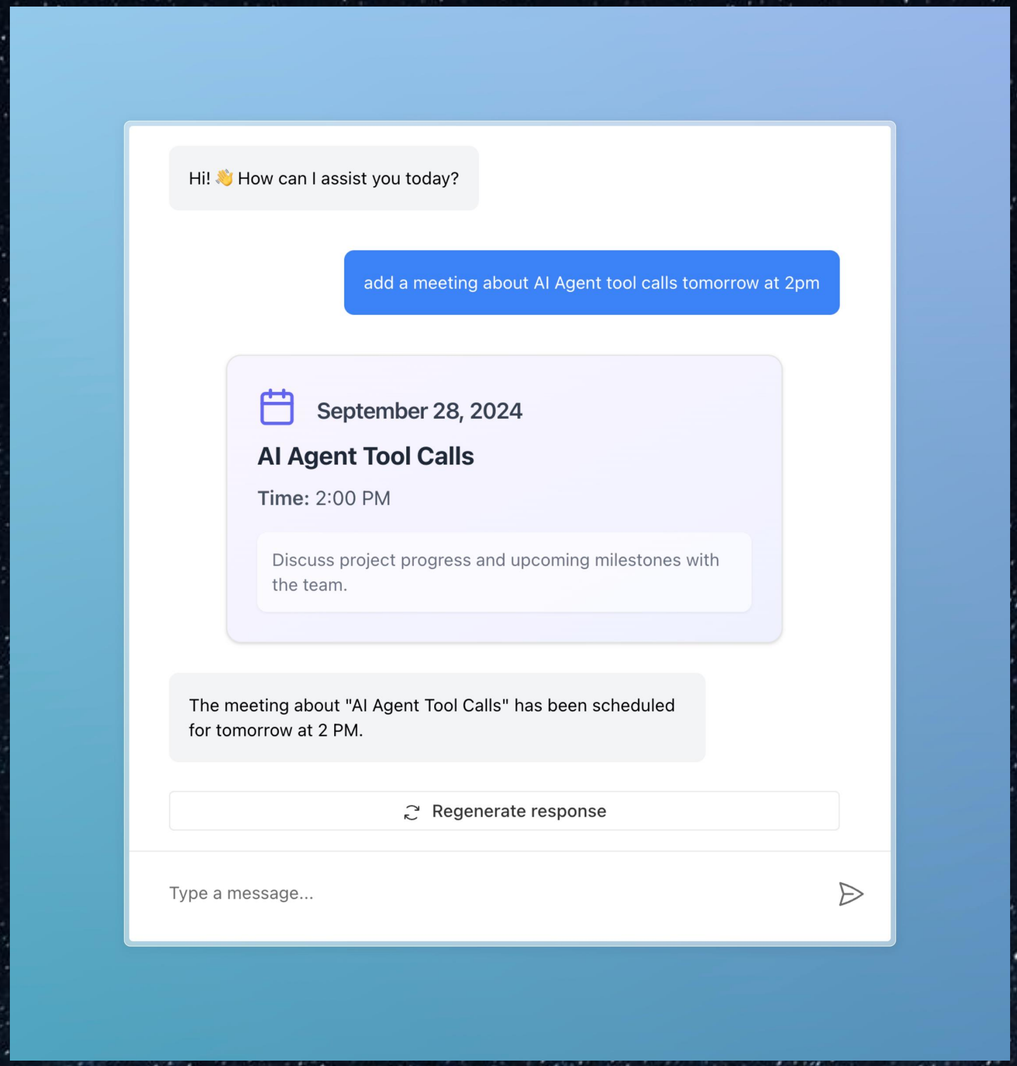
SLIDEBAR


http://localhost:3002
SaaS App
Search...
John Doe
Dashboard
Analytics
Customers
Settings
Dashboard
Total Revenue
$45,231.89
+20.1% from last month
Active Users
+2350
+180.1% from last month
Sales
+12,234
+19% from last month
Active Now
+573
+201 since last hour
Revenue Overview
800
600
400
Recent Activity
Olivia Martin
Logged in
1h ago
Olivia Martin
Purchased Pro Plan
+$24.99
Olivia Martin
1h ago

ACTIONS

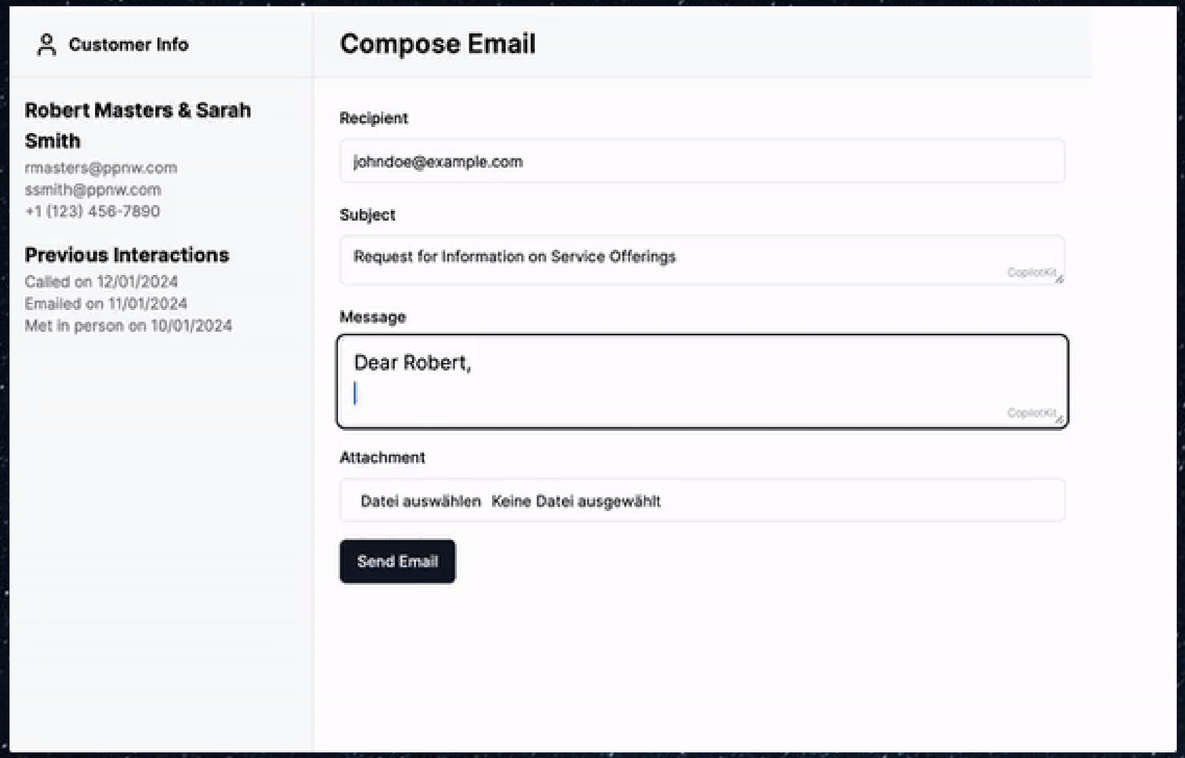

http://localhost:3002
My Todo List
Learn CopilotKit
Build a Copilot for your app
Popup Assistant
COPILOTKIT DEV CONSOLE (localhost only)
Version: latest (1.3.1)
Debug
Need any help?
Type a message...

CUSTOM CHAT


Hi! 👋 How can I assist you today?
add a meeting about AI Agent tool calls tomorrow at 2pm
September 28, 2024
AI Agent Tool Calls
Time: 2:00 PM
Discuss project progress and upcoming milestones with the team.
The meeting about "AI Agent Tool Calls" has been scheduled for tomorrow at 2 PM.
Regenerate response
Type a message...

SUGGESTIONS

AUTOCOMPLETE



LIMITATIONS

Framework Compatibility	• Primarily designed for React applications.
Customization Complexity	• deep customization require significant effort • Fully custom headless UI involves using hooks like `useCopilotChat`.
AI Model Dependencies	• Performance and capabilities are influenced by the underlying AI models. • Limitations in handling specific languages or domain-specific knowledge, can affect effectiveness.
Resource Requirements	• Integrating AI functionalities can be resource-intensive • potentially impacting application performance.
Data Privacy and Security	• Processing user data • data privacy and security • protect sensitive information • comply with data protection regulations

DEMO

- 💡 Embed an in-app copilot with a chat UI
- 💡 Copilot to read the state of your app
- 💡 Copilot to perform actions

1 Checkout the repository

We'll begin by checking out the base code of the todo list app. We'll start from the `base-start-here` branch.

```
git clone -b base-start-here https://github.com/CopilotKit/example-todos-app.git
cd example-todos-app
```

2 Install dependencies

To install the dependencies, run the following:

```
npm install
```

3 Start the project

Now, you are ready to start the project by running:

```
npm run dev
```

You should be able to go to http://localhost:3000 and see the todo list app. Feel free to play around with the app to get a feel for it.

Install Dependencies

To install the CopilotKit dependencies, run the following:

npm | pnpm | yarn | bun

```
npm install @copilotkit/react-core @copilotkit/react-ui
```

Create a new route to handle the `/api/copilotkit` endpoint.

app/api/copilotkit/route.ts

```ts
export async function getLangChainGithubOpenAIAdapter() {
  const { LangChainAdapter } = await import("@copilotkit/runtime");
  const { ChatOpenAI } = await import("@langchain/openai");
  return new LangChainAdapter({
    chainFn: async ({ messages, tools }) => {
      const model = new ChatOpenAI({
        modelName: "gpt-4o",
        apiKey: process.env.GITHUB_OPENAI_API_KEY,
        configuration: {
          baseURL: 'https://models.inference.ai.azure.com'
        }
      }).bindTools(tools);
      return model.stream(messages, { tools });
    },
  });
}
```

```ts
const runtime = new CopilotRuntime();

export const POST = async (req: NextRequest) => {
  const { handleRequest } = copilotRuntimeNextJSAppRouterEndpoint({
    runtime,
    serviceAdapter: await getLangChainGithubOpenAIAdapter(),
    endpoint: req.nextUrl.pathname,
  });

  return handleRequest(req);
};
```

Configure the CopilotKit Provider

layout.tsx

```tsx
import "./globals.css";
import { ReactNode } from "react";
import { CopilotKit } from "@copilotkit/react-core";

export default function RootLayout({ children }: { children: ReactNode }) {
  return (
    <html lang="en">
      <body>
        {/* Make sure to use the URL you configured in the previous step  */}
        <CopilotKit runtimeUrl="/api/copilotkit">
          {children}
        </CopilotKit>
      </body>
    </html>
  );
}
```

app/page.tsx

```tsx
"use client";

import { TasksList } from "@/components/TasksList";
import { TasksProvider } from "@/lib/hooks/use-tasks";
import { CopilotKit } from "@copilotkit/react-core";
import { CopilotPopup } from "@copilotkit/react-ui";
import "@copilotkit/react-ui/styles.css";

export default function Home() {
  return (
    <>
      <TasksProvider>
        <TasksList />
      </TasksProvider>
      <CopilotPopup />
    </>
  );
}
```

lib/hooks/use-tasks.tsx

```tsx
// ... the rest of the file

import { useCopilotReadable } from "@copilotkit/react-core";

export const TasksProvider = ({ children }: { children: ReactNode }) => {
  const [tasks, setTasks] = useState<Task[]>(defaultTasks);

  useCopilotReadable({
    description: "The state of the todo list",
    value: JSON.stringify(tasks)
  });

  // ... the rest of the file
}
```

The `useCopilotAction` hook makes actions available to our copilot. Let's implement it in the `lib/hooks/use-tasks.tsx` file.

```
// ... the rest of the file

import { useCopilotReadable, useCopilotAction } from "@copilotkit/react-core";

export const TasksProvider = ({ children }: { children: ReactNode }) => {
  const [tasks, setTasks] = useState<Task[]>(defaultTasks);

  useCopilotAction({
    name: "addTask",
    description: "Adds a task to the todo list",
    parameters: [
      {
        name: "title",
        type: "string",
        description: "The title of the task",
        required: true,
      },
    ],
    handler: ({ title }) => {
      addTask(title);
    },
  });
```

SMALL LANGUAGE MODELS

SMALL LANGUAGE MODELS (SLM)

- subset of language models
- scaled-down variant of a large language model (LLM)
- leveraging architectural principles and techniques of LLMs
- reduction in model size decreases complexity
- compact and efficient
- significantly reduced computational footprint.
- efficient in memory usage, computational requirements

SMALL LANGUAGE MODELS (SLM)

- Cost Effective
- Deployment Flexibility
- Latency Reduction
- Easier to manage and fine-tune
- Data Privacy

SMALL LANGUAGE MODELS

Text Generation

- Creating coherent and contextually relevant sentences or paragraphs

Text Completion

- Predicting and completing sentences based on prompt.

Translation

- Converting text from one language to another.

Summarization

- Condensing long pieces of text into shorter, digestible summaries.

APPLICATIONS

Chatbots	• Providing customer support and engaging with users in a conversational manner.
Content Creation	• Assisting writers by generating ideas or even drafting entire articles.
Education	• Helping students with writing assignments or learning new languages.
Accessibility	• Creating tools for individuals with disabilities, such as text-to-speech systems.

CONSIDERATIONS

Size	• ChatGPT (GPT-4), = 1.76 trillion parameters • Mistral 7B = 7 billion. • Phi3.5 mini = 3.8 billion / Phi3.5 small = 7 billion
Comprehension	• highly specialized • limited in broad contextual understanding across multiple fields of knowledge
Computing	• LLM training and deployment -> resource-intensive processes • SLM training and deployment -> local machines equipped with good GPU. Takes hours to train
Bias	• Bias is a known issue in LLMs, nature of the training data. • SLMs, trained on domain-specific datasets, are less bias (fine-tuned)
Inference	• inference speed • outputs efficiently on local hardware without extensive parallel processing

OLLAMA

easier to run
LLMs locally

support various
models
Llama 3.2, Phi 3.5,
Mistral, and Gemma

simplifies the process

single package – bundled
model weights,
configuration, and data

customize and create
own models

Deploy LLMs without
relying on cloud services.

macOS, Linux, and
Windows

DEMO

Transformer.js

Run Transformers directly in your browser, with no need for a server!

run pretrained models locally on your machine

https://huggingface.co/docs/transformers.js/index

https://huggingface.co/spaces/webml-community/phi-3.5-webgpu

https://huggingface.co/spaces/Xenova/doodle-dash

Transformer.js

Name	Description	Links
Whisper Web	Speech recognition w/ Whisper	code, demo
Doodle Dash	Real-time sketch-recognition game	blog, code, demo
Code Playground	In-browser code completion website	code, demo
Semantic Image Search (client-side)	Search for images with text	code, demo
Semantic Image Search (server-side)	Search for images with text (Supabase)	code, demo
Vanilla JavaScript	In-browser object detection	video, code, demo
React	Multilingual translation website	code, demo
Text to speech (client-side)	In-browser speech synthesis	code, demo
Browser extension	Text classification extension	code
Electron	Text classification application	code
Next.js (client-side)	Sentiment analysis (in-browser inference)	code, demo
Next.js (server-side)	Sentiment analysis (Node.js inference)	code, demo
Node.js	Sentiment analysis API	code
Demo site	A collection of demos	code, demo

Ron Dagdag

- R&D Engineering Manager at 7-Eleven
- 9th year Microsoft MVP awardee
- www.dagdag.net
- @rondagdag
- Linked In
  www.linkedin.com/in/rondagdag/
- Thanks for geeking out with me about Copilots

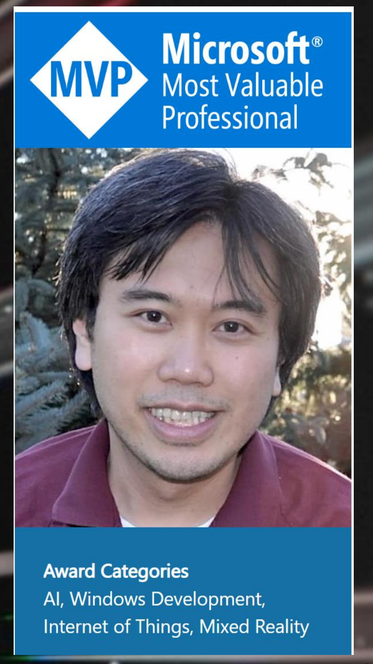


Image: Unsplash

UNICORN

A record of the number of unicorns spotted in the fantasy realm and the beauty and mystery that surrounds these enchanting creatures.

DRAGON

A closer look at the art of taming dragons and the brave adventurers who dare to take on these fearsome creatures.

PRICING PLAN

BASIC

- Access to the entry-level dungeons.
- A limited number of quests and battles per month.

$10/MONTH

ELITE

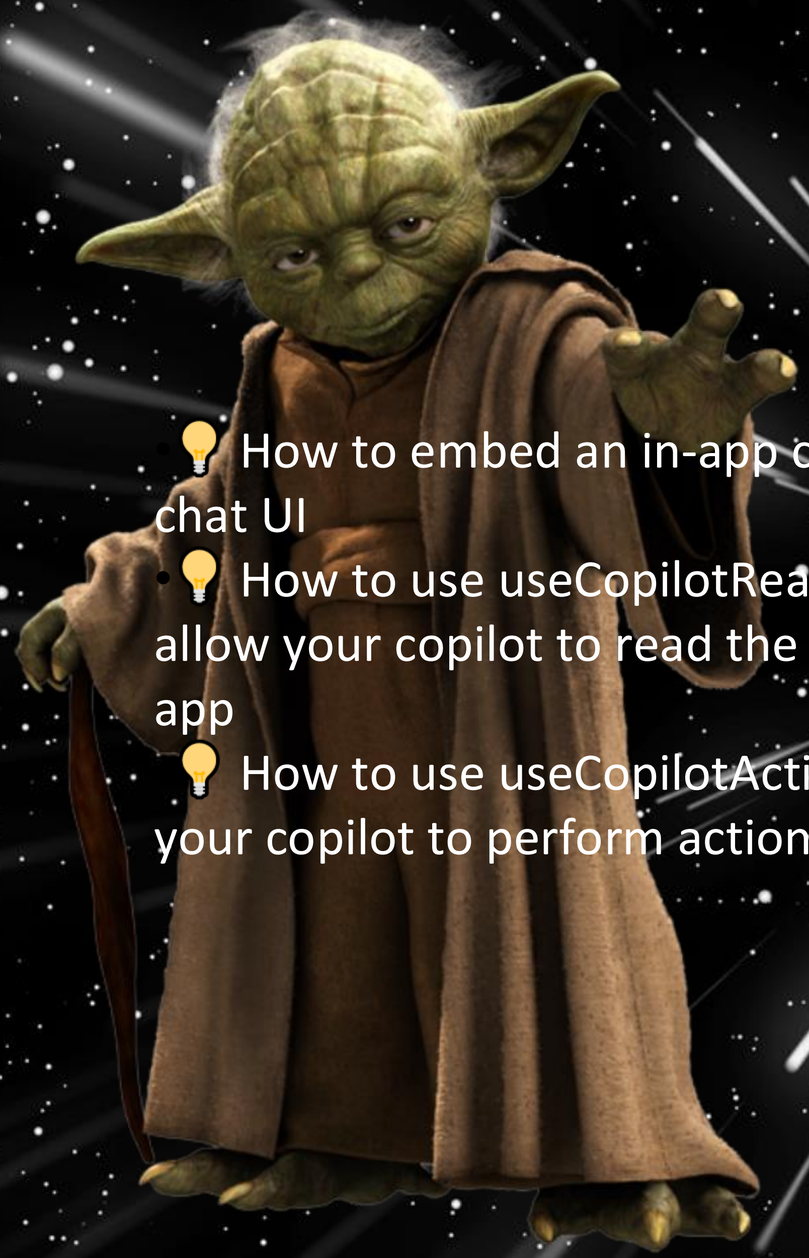
- Access to the intermediate and advanced dungeons.
- Ability to form larger parties.

$50/MONTH

LEGENDARY

- Access to the most challenging dungeons.
- The ability to form the largest parties.

$100/MONTH



DEMO

- 💡 How to embed an in-app copilot with a chat UI
- 💡 How to use useCopilotReadable to allow your copilot to read the state of your app
- 💡 How to use useCopilotAction to allow your copilot to perform actions

75%

ENCHANTED CREATURES
possess the ability to cast spells.

60%

MAGIC-WIELDING INDIVIDUALS
practice the art of illusions.

90%

SPELLS CAST
are dark magic, foretelling danger.

UNICORN SIGHTINGS

A record of the number of unicorns spotted in the realm and the beauty and mystery.

DRAGON TAMING

A closer look at the art of taming dragons and the adventurers who take on these creatures.

DRAGON TAMING

A guide to taming and caring for dragons in the realm of magic.

THE UNICORN

Tips and tricks for spotting the elusive unicorns in their natural habitat.

DRAGON TAMING

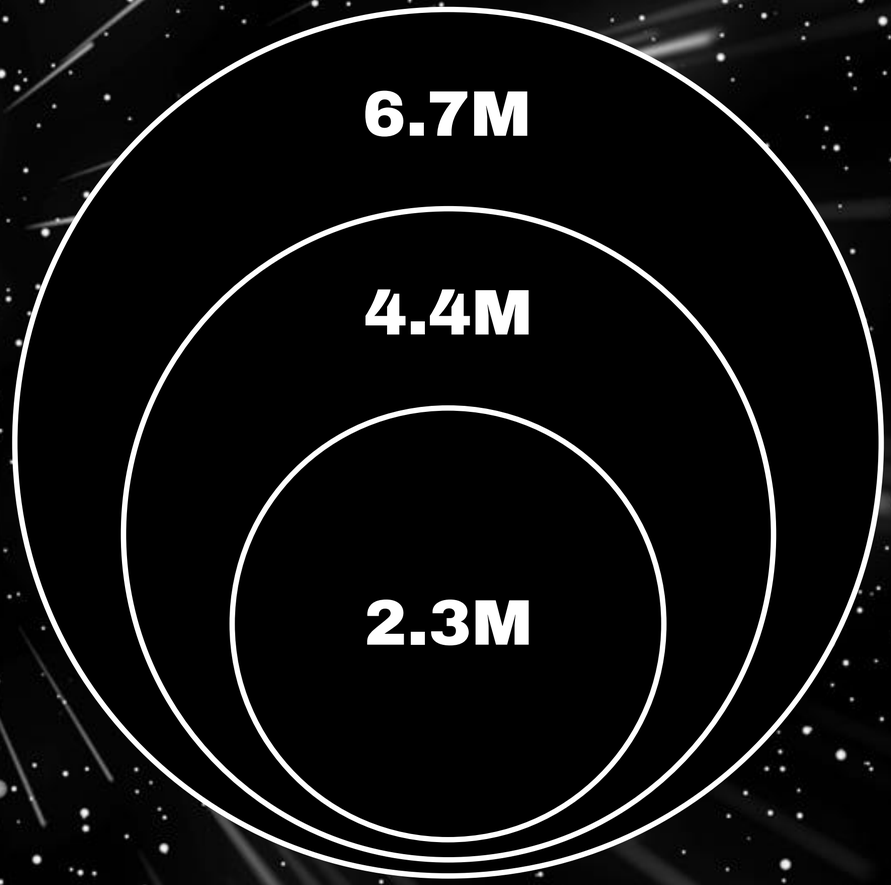
A guide to taming and caring for dragons in the realm of magic.

THE MAGIC OF DRAGONS

"The Art of Archery": Discover the intricacies of the Art of Archery .

"The Music of the Elves": Immerse yourself in the enchanting music of the elves.

"The Life of an Elf": Learn about the customs and daily life of the elves.



S

ECLIPSE

Rare event causes unpredictable magic.

QUEST

Adventurers seek immortal artifact.

W

ECLIPSE

Rare event causes unpredictable magic.

QUEST

Adventurers seek immortal artifact.

O

ECLIPSE

Rare event causes unpredictable magic.

QUEST

Adventurers seek immortal artifact.

T

ECLIPSE

Rare event causes unpredictable magic.

QUEST

Adventurers seek immortal artifact.


234,567
Unicorn Sightings
A tally of the number of unicorns spotted in the fantasy realm.

233 COINS

Treasure Found

85%

Wished Granted

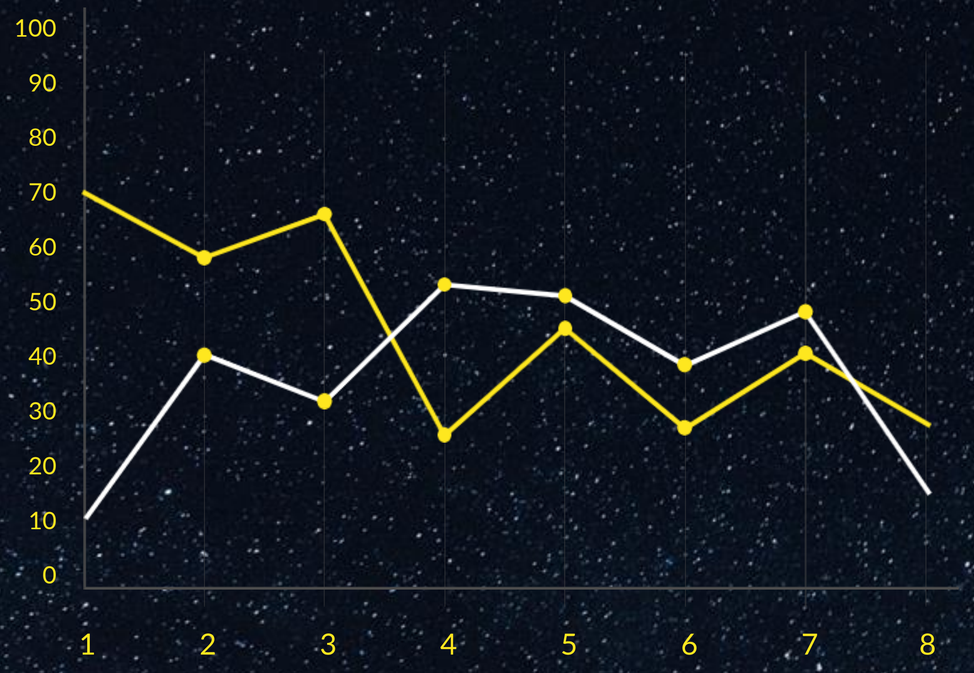
456 HOURS

Duration of Spell Casting

535 KM

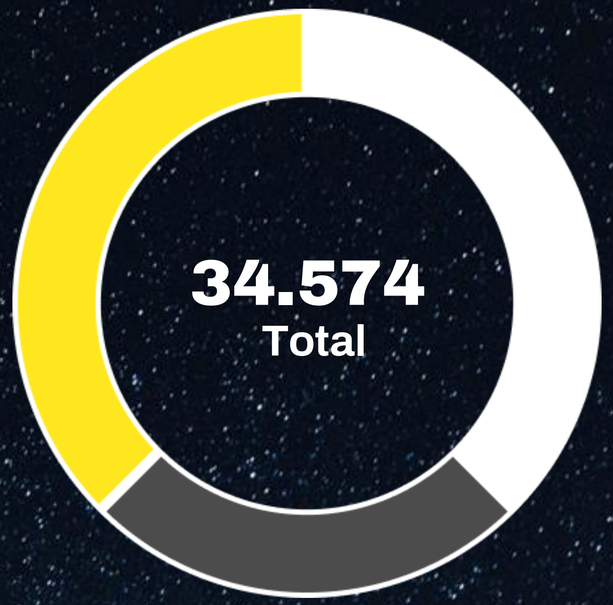
Journey Distance

SOME GRAPH



SPELLCASTING PROGRESS

A record of the number of spells cast per year



TREASURE FOUND

A record of the amount of treasure found per month

PORTAL TO ADVENTURE

A WEB APPLICATION

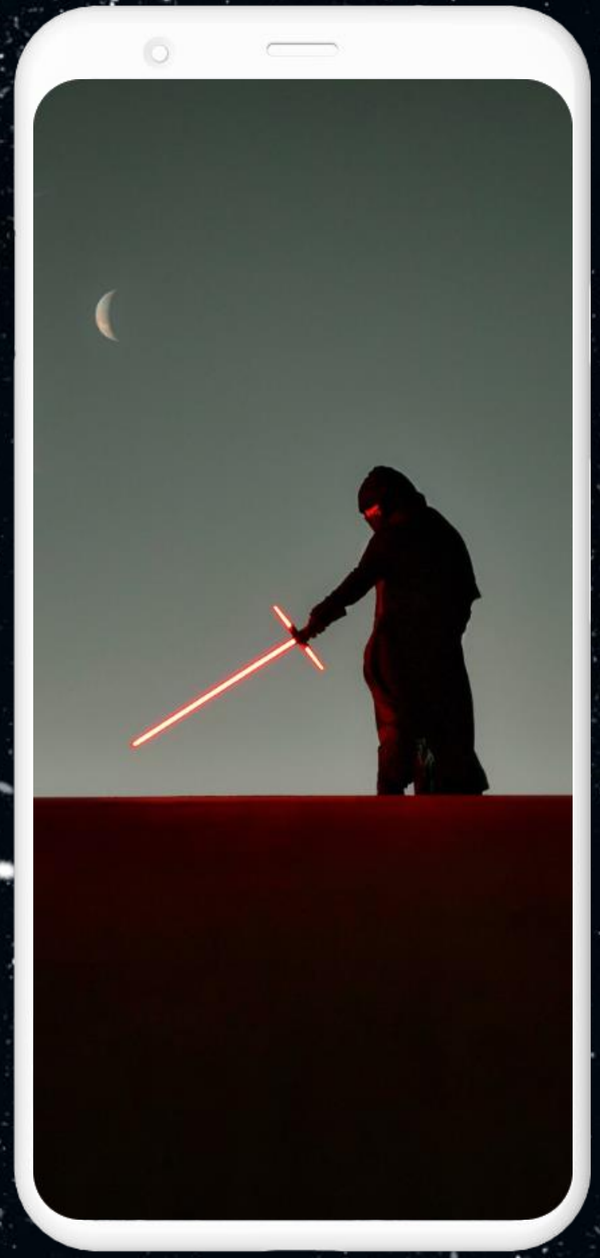
A web application designed for discovering the world of fantasy

THE FUTURE OF FANTASY

AN MOBILE APP

An app designed for exploring and experiencing the enchanting realm of fantasy

- Explore a magical world
- Experience fantasy firsthand
- Immerse in a realm of magic
- Discover untold wonders
- Live your fantasy dreams



A MAGIC PICTURE

FANTASY REALM AT A GLANCE

THE FOREST

A magical forest filled with talking animals and enchanted creatures.

THE CAVES

A network of underground caves filled with precious gems and crystals.

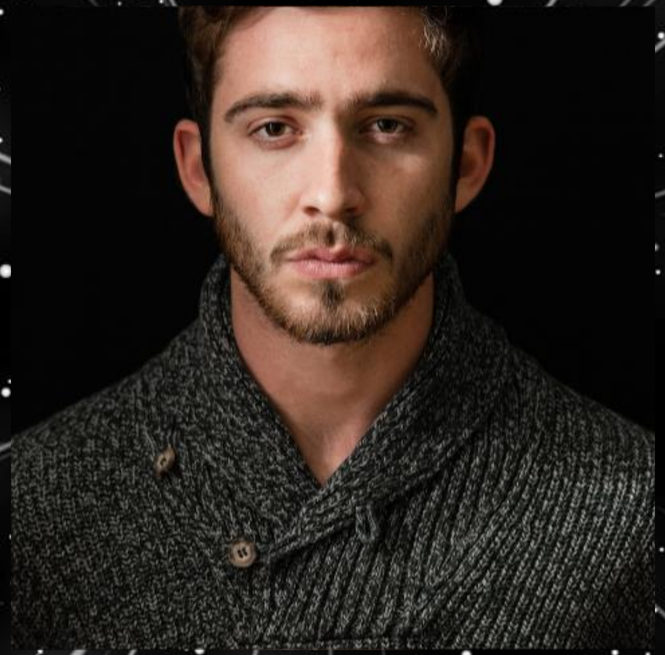
THE LAIR

A dangerous and mysterious place where dragons reside.

OUR TEAM

ELDRUIN

The Fire Mage



ELEMENTALEN

The Guardian

LUNARIA

The Moon Priestess

THE ORGANIZATION

CHLOE NG
The Mage

VALTORIN
The Assassin

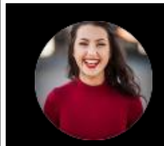
AURIELLE
The Priestess

THERONIS
The Warrior

DARIANA
The Shaman

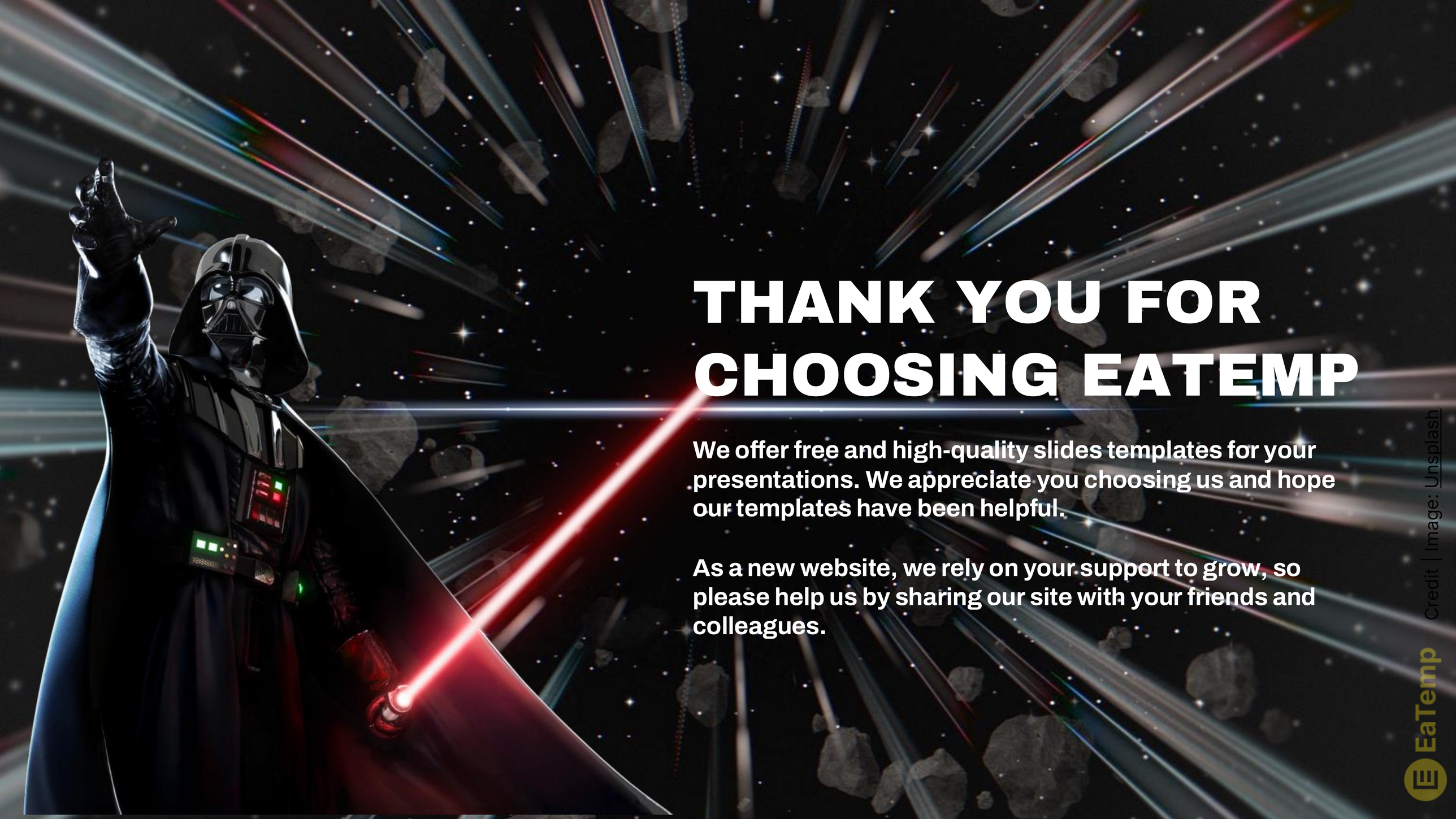
LUCIAN
The Conjurer

ELVINA
The Oracle



CEDRIC
The Timekeeper

SERAPHINA
The Lightbringer



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