



BCGX

WHITE PAPER

Building the Future of UX in a World of Generative AI

July 2023

By Matthew Scharpnick and Anthony Monahan

Building the Future of UX in a World of Generative AI

Much of the attention around generative AI (GenAI) has focused on the incredible capabilities of foundation models such as large language models (LLMs) and those powering generative art applications such as Midjourney and DALL-E. As this rapidly evolving space integrates GenAI models with the tools we use every day, we will see an explosion of new possibilities with major implications for designing successful user experiences. Getting these experiences right will be key to product adoption and commercial success. While we are still in the early stages of GenAI – with a strong emphasis on conversational AI chatbots – this will expand rapidly and UX patterns we’ve been used to for years will have to be revisited. Based on BCG X’s work in this space and emerging trend observations, here we outline several GenAI considerations when building these products and services and how designers can begin to navigate this new phase in design.

Exhibit - UX for GEN AI | Unique characteristics to consider when designing a successful product or service with this technology



New Patterns

Success will require guidance

Share sample prompts and build design elements to help users solicit effective results

Traditional UIs will merge with conversational AIs

Surface traditional UI tools in conversational AIs - eventually creating real-time UIs to solve complex needs

Foundation models will integrate with existing applications

Move beyond chatbots to design multimodal interfaces that work seamlessly with a wide variety of familiar applications



Infinite Possibilities

Outputs will be unpredictable

Consider guardrails to model outputs and deliver a consistent brand voice

Experiences will be highly personalized

Leverage journeys and de-risk early with rapid prototyping and testing to design a successful holistic experience for each user

Trust will be earned through traceability

Provide citations, pathways to, and previews of source documents when appropriate



Rapid Change

Specialized interfaces will emerge

Use cases like world building and generative science will require specific new types of UIs

Agent models will automate increasingly complex tasks

Visualize agent pathways to surface activity from APIs and plug-ins and allow user intervention when needed

Things will change quickly and often

Design with flexibility in mind, knowing that key UX patterns and capabilities will change often

New Patterns


Users are still beginning to understand where GenAI fits into their personal and professional toolkits, and how to get the most out of these tools. Unlike most interfaces, GenAI creates unique outputs for each user. Instead of using traditional UI elements like buttons or filters, users have an undefined and infinitely variable way of getting these tools to accomplish a task.

We've seen in the development of a number of conversational AI chatbots that users struggle to understand the ideal ways to prompt these systems to achieve desired results. More than ever before, users will need guidance to understand the full potential and ideal ways to interact with these generative technologies. By providing sample prompts and initiating a dialogue with users, users can better understand what's possible and how to achieve the best results. For example, instead of just presenting an empty input field, [Inflection's AI assistant Pi](#) greets users with the following script: "Hey there, great to meet you. I'm Pi, your personal AI. My goal is to be useful, friendly, and fun. Ask me for advice, for answers, or let's talk about whatever's on your mind. How's your day going?"

Traditional UI elements are also important in creating an ideal experience. Not all interactions work best via voice or text. For example, the [Kayak plug-in from ChatGPT](#) outputs a paragraph of top choices for flight options. Adjusting these options would be far easier with a visual UI modal that enters the chat and uses traditional filters and sorting mechanisms. As conversational AIs mature, we are likely to see a mixture of familiar UI tools alongside new conversational capabilities.

Furthermore, we are likely to see these models integrate not just with traditional UIs but with existing applications. Microsoft, Google, Salesforce, and others are [already building](#) GenAI capabilities into their suites of tools, and it's likely that most enterprise software will do the same. Applications we use every day, such as email and maps, will interact with conversational AI chatbots to create an integrated experience. Multimodal inputs and outputs – text, voice, image, video, code – will allow users to interact with new and existing applications in novel ways that will require new UX thinking and patterns. Consider planning a vacation itinerary: powered by a conversational AI integrated with rating sites and map applications, a simple request can create a list of top sites and restaurants to visit, along with suggested timing and routes all mapped out efficiently.

I'll be in Vienna from 7/14 to 7/17. Can you put together a daily itinerary for me with some attractions and restaurants while I'm there?

Source:  Kayak

Of course! I'd be happy to help you plan a three day itinerary for Vienna.

Since there's so much to see in this beautiful city, I'll focus on some of the key highlights that are located relatively close together for a manageable walking tour. I've chosen some culturally and historically important places for you to visit, and all of the restaurants are vegetarian-friendly. I've included maps of each location. Here's a suggested itinerary:

7/14 Morning



1 | Hofburg Palace

Start your day at the former principal imperial palace of the Habsburg dynasty that now serves as the official residence and workplace of the President of Austria.



2 | Stephansdom

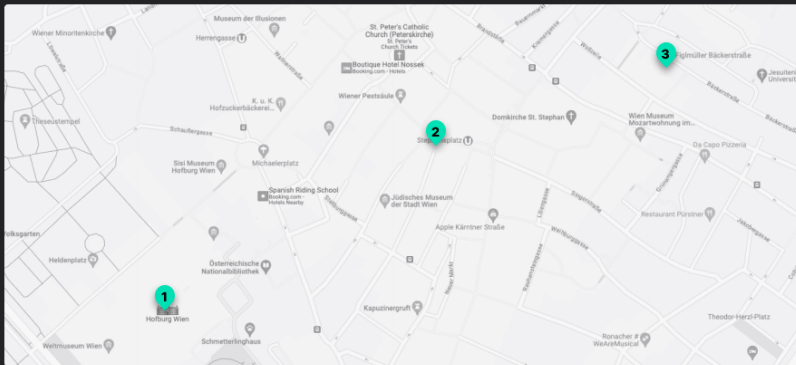
Nearby is this iconic symbol of Vienna. It's one of the tallest churches in the world and offers a breathtaking view if you decide to climb the 343 steps to the tower room.



3 | Lunch: Figlmüller Wollzeile

This restaurant is famous for its wiener schnitzel, a must-try dish when in Vienna.

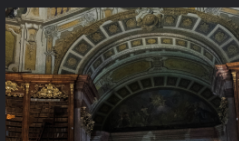
Source:  Google Maps



7/14 Afternoon



1 | Albertina Museum



2 | Austrian National Library

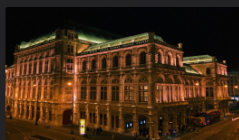


3 | Belvedere Palace

7/14 Evening



1 | Café Sacher



2 | Vienna State Opera



3 | Dinner: Plachutta Wollzeile

Please note that availability may vary, and it's always a good idea to book reservations in advance. Let me know if you would like me to make arrangements.

[RESERVE NOW](#)



“

Users are still beginning to understand where GenAI fits into their personal and professional toolkits, and how to get the most out of these tools.

Infinite Possibilities

The magic and challenge of GenAI is that it produces a different outcome for each user. While this allows for amazing new possibilities for personalization, it also means giving up a certain amount of control. Traditional ways of testing products with users will have to be supplemented with new thinking around how products that function differently for each user are designed.

One aspect of this challenge will be for companies to create experiences that present users with the desired voice, tone, and content. This could mean ensuring that generative technologies don't produce inappropriate responses or that they create experiences that feel right for a given brand. The former is the subject of complex debates around censorship, representation, and accuracy. One of the leading companies creating a foundational LLM, Anthropic, is [pushing](#) "constitutional" AI – attempting to align around a set of universal values and automate the creation of "harmless" AI. Whether or not this becomes a standard, specific products will be needed to allow companies to fine-tune their outputs to create the on-brand experiences they want to deliver to their customers.

Going beyond avoiding risks, designing the right brand experience presents an opportunity for deep personalization as we have never seen before. GenAI can allow organizations to push beyond existing capabilities such as product recommendations and craft specific contexts and stories to match the value of the right product with the needs of a given customer. For example, a conversational AI chatbot can tell a customer why a product makes sense for a specific set of circumstances and can even build additional products or product extensions in real-time. However, models rarely produce flawless executions of these kinds of experiences on their own. To get these interactions right, traditional product development methodologies such as mapping out customer journeys, rapid prototyping, and conducting ongoing user testing will be essential. With unique outputs for each user, data collection through feedback mechanisms such as the thumbs up and down responses on ChatGPT can help continuously tune and improve models.

A stumbling block for many LLMs has been "hallucinations," or generated content that is nonsensical or factually incorrect in how it uses source content. At least for now in the development of GenAI, in situations where a specific right answer is required, users cannot be sure if they can always trust a model's outputs. As users utilize LLMs for a mix of generating creative outputs as well as searching for factual and accurate content, designers will need to build in citations and pathways back to source content to build trust. Creative design solutions will be needed to find innovative ways to preview, pin, and store these embedded source documents without sending users away from the conversational AI interface, and to reduce the need to scroll endlessly through conversation histories retracing steps.

Rapid Change

Writing about patterns in GenAI is almost comically difficult as the newness of the field and the rapid pace of change render many conclusions moot within weeks if not days. However, the potential of this technology requires us to make an effort to codify some principles even as the ground constantly shifts beneath us. Anyone moving to tap into the potential of GenAI in these early days by building products and services will have to be nimble and remain highly aware of the changing landscape.

An area likely to see significant change going forward is in the types of generative content that models produce and the types of new interfaces needed to navigate these outputs. Early generative art models took a single text field and outputted an image. We are now seeing models such as DragGAN that allow users to stretch and bend photos in all directions, for example to dynamically change the direction an animal is facing in an image, or to increase the height of trees on the horizon. These types of real-time adjustments to outputs will grow in sophistication and expand to new modalities. Designing interfaces for the equivalent in video is still a step away, but we can imagine a more interesting task to enable elaborate world building for video games and movies, and the possibility of building generative molecules as more complex specialized use cases emerge.

Basic agent-based models are already available with plug-ins from ChatGPT, and experiments built on technologies such as LangChain. While many of these models are currently unreliable or limited to a small set of use cases, at some point soon we will see GenAI building entire interfaces and applications in real time for users. The next challenge will be visualizing these agent pathways by surfacing a view of the application programming interfaces (APIs) they use to accomplish tasks and finding ways for users to adjust those actions, enabling users to have control over and confidence in the output created by GenAI.

1 Create a chart showing how commodity prices have been trending for the last two years alongside prices for our products and build a webpage for it.

2 Of course! I'd be happy to help.

Searched web for commodity pricing 2021-2022

Sourced commodity pricing:

INDEX	PRICE	% CHANGE
Gold	1,976.60	+0.02%
Silver	23.59	-1.16%
Natural Gas	2.34	-2.50%

Data as of May 23, 4:59 PM EDT

INDEX	% CHANGE
Gold	+0.02%
Silver	-1.16%
Natural Gas	-2.50%

The New York Times

INDEX	% CHANGE
Gold	+0.02%
Silver	-1.16%
Natural Gas	-2.50%

The Economist

The Wall Street Journal

Created chart



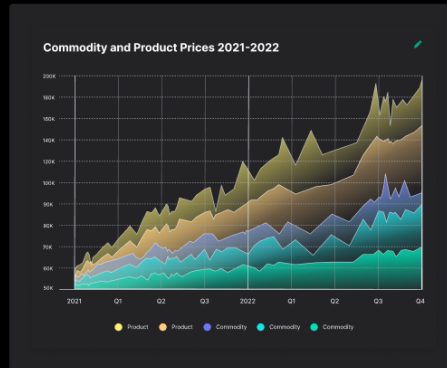
Area Chart



Bar Graph



Scatter Plot



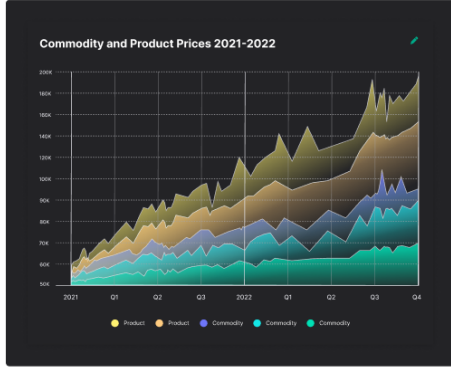
Published web page

Commodity Pricing Website

Gold

Gold is considered a safe-haven asset and is often used as a hedge against economic uncertainties and inflation. Over the past two years, the price of gold has shown significant volatility, influenced by various factors:

- In June 2021, the price of gold reached an all-time high of around \$1,900 per ounce, driven by concerns over the global economic impact of the COVID-19 pandemic.
- Throughout 2021, as the global economy started to recover and inflation concerns grew, the price of gold experienced downward pressure. By the end of 2021, it had declined to around \$1,800 per ounce.
- In 2022, gold prices fluctuated within a range of \$1,700 to \$1,900 per ounce, influenced by factors like interest rate decisions, geopolitical tensions, and fluctuations in the US dollar.
- In 2023, gold prices have seen some upward momentum, as inflation concerns and global economic uncertainties persist. As of the current date, the price of gold hovers around \$1,900 to \$2,000 per ounce.





“

Anyone looking to harness the potential of GenAI will need to move quickly, build iteratively, and pivot often.

No time to wait

The changes we outline here are only a few examples of where this technology is heading. Remember, just six months ago, most of the world had never even heard of GenAI. Never have we seen a digital technology that evolves so quickly and in so many directions. Building products that will integrate GenAI models will require a level of flexible design we haven't seen before. While the field has much maturation still to undergo, waiting for this to happen before moving to take advantage of GenAI would likely come at too great a cost, with so many players looking to capitalize on it. Yet, at the same time, looking now to map out overly distant road maps for it would be equally risky, given the likelihood of further exponential advancements in the technology. Anyone looking to harness the potential of GenAI will need to move quickly, build iteratively, and pivot often.

Boston Consulting Group

Boston Consulting Group partners with leaders in business and society to tackle their most important challenges and capture their greatest opportunities. BCG was the pioneer in business strategy when it was founded in 1963. Today, we work closely with clients to embrace a transformational approach aimed at benefiting all stakeholders—empowering organizations to grow, build sustainable competitive advantage, and drive positive societal impact.

Our diverse, global teams bring deep industry and functional expertise and a range of perspectives that question the status quo and spark change. BCG delivers solutions through leading-edge management consulting, technology and design, and corporate and digital ventures. We work in a uniquely collaborative model across the firm and throughout all levels of the client organization, fueled by the goal of helping our clients thrive and enabling them to make the world a better place.

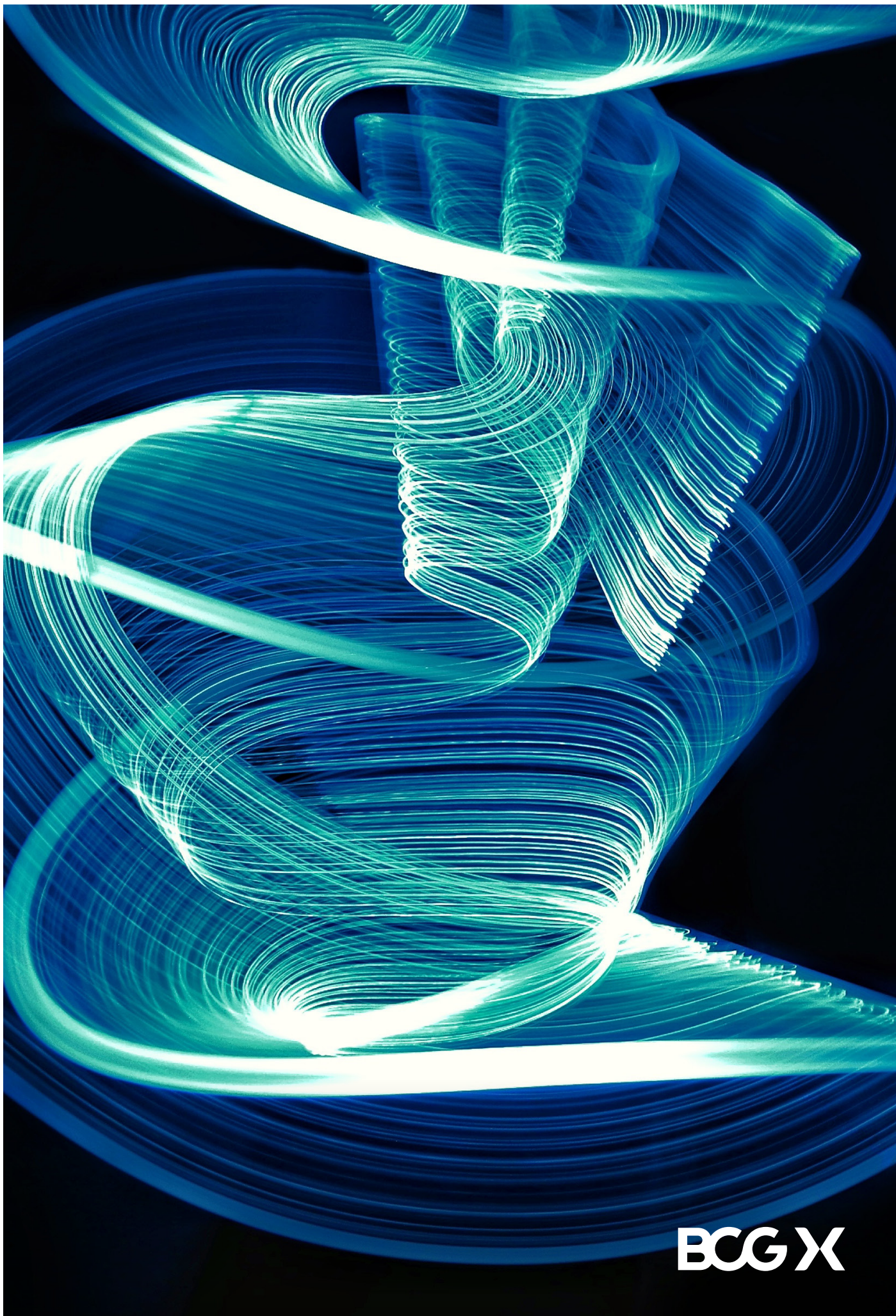
BCG X

BCG X is the tech build & design unit of BCG.

Turbocharging BCG's deep industry and functional expertise, BCG X brings together advanced tech knowledge and ambitious entrepreneurship to help organizations enable innovation at scale.

With nearly 3,000 technologists, scientists, programmers, engineers, and human-centered designers located across 80+ cities, BCG X builds and designs platforms and software to address the world's most important challenges and opportunities.

Teaming across our practices, and in close collaboration with our clients, our end-to-end global team unlocks new possibilities. Together we're creating the bold and disruptive products, services, and businesses of tomorrow.



BCGX