Managing Innovation with Gen AI

The Gains, the Flaws and the Risks

Gen AI opens new doors to innovation and removes hurdles for users, but it also presents obstacles and risks that call for creative solutions.

Managing innovation in the world of Generative AI calls for both tried and tested strategies, as well as some that are out-of-the-box. Gen AI can produce a large number of innovation ideas that was hitherto unthinkable. Proven statistical frameworks will then help distill the best idea out of a large sample. Creative approaches can also convert Gen AI's drawbacks into a plus. Above all, enterprises can use the technology to successfully address their biggest objective: to listen to their customers and maximize user experience.

Christian Terwiesch, Professor of Operations, Information and Decisions at Wharton and Co-Director of the Mack Institute for Innovation Management, identified several properties of GPT that could transform innovation: (a) users do not need any training or adjustments in their workflow; (b) the technology is friendly, and oftentimes competent, but it also makes "surprising mistakes" (c) technology is improving at breathtaking speed; and (d) it brings skills and capabilities that go beyond what one might imagine.

Terwiesch shared those insights at a conference titled "Driving Innovation with Generative AI: Strategies and Execution" in November 2023 hosted jointly by The Mack Institute and AI at Wharton. Speakers at the conference explored the question of how to utilize generative AI in innovation management.

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Valery Yakubovich
Mack Institute for Innovation Management

Higher output at lower cost

Gen AI innovation received its biggest stimulus with OpenAI's ChatGPT chatbot, which was launched in November 2022, and is the most popular example of Gen AI technology. GPT, short for "generative pretrained transformer," is a large language model, or LLM, that powers ChatGPT. OpenAI's competitors such as Google's Bard and Microsoft's Bing Chat also use LLMs, which Microsoft defines as "a colossal digital library brimming with billions of words, ideas, and contexts."

LLMs can dramatically increase innovation output and at a lower cost than human effort. "An innovation is a novel match of a solution and need that creates value," said Terwiesch. With Gen AI, "we have amazing opportunities for innovation in health care, in finance, in education and beyond."

But LLMs also bring big frailties such as "hallucinations," where inadequately trained data can produce output that is inaccurate or biased, and does not match real-world settings. "ChatGPT is more creative," noted Valery Yakubovich, Executive Director of the Mack Institute for Innovation Management. "And it more creative because it hallucinates. For innovation, it's great. But for problem-solving, it's problematic."

Applying the Extreme Value Theory

Terwiesch likened the payoff from an innovation process to a lottery, where some ideas will be blockbusters, some will be rejects and most others will fall in the middle.
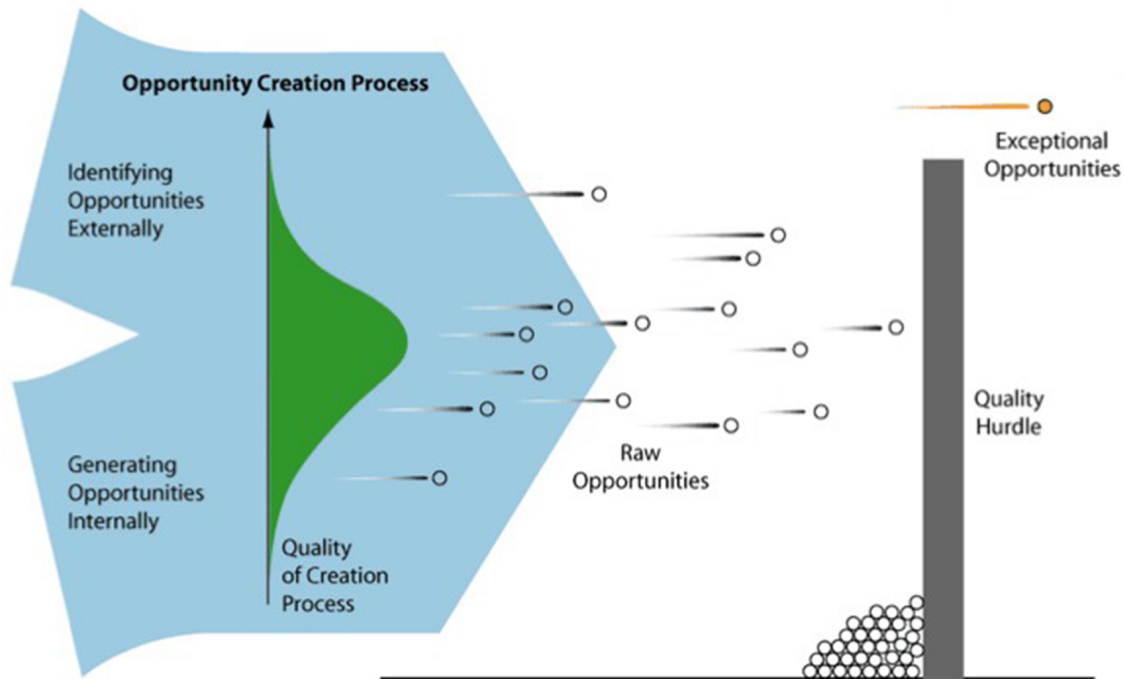
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> Out of a sample of ideas, it's only the top value that matters. It doesn't do me any good to have a great idea unless I recognize it as a great idea.

Christian Terwiesch
The Wharton School

The Four Drivers of the Quality of the BEST Idea

Opportunity Creation Process

Identifying Opportunities Externally

Generating Opportunities Internally

Quality of Creation Process

Raw Opportunities

Exceptional Opportunities

Quality Hurdle

Source: Terwiesch and Ulrich 2009, 2023

"It's really all about fishing the outliers," he said. That is unlike the standard operational setting where the emphasis is on consistency and average performance, he explained. "In innovation, it's all about the outliers.

That notion of outliers resonates with a branch in statistics called "Extreme Value Theory," where "extreme values drive performance," Terwiesch said. Terwiesch and

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Generative AI has created a whole new set of tools for us in terms of inventing with customers.

Drake Pruitt
Amazon Web Services

Karl Ulrich, Professor of Operations, Information and Decisions at Wharton, developed a framework for the Extreme Value Theory, where they identified the "Four Drivers of the Quality of the Best Idea," which are listed below:

* More ideas
* Better ideas
* Higher variance, and
* Better evaluation

"All four levers will increase the value of the BEST idea," Terwiesch noted. "Out of a sample of ideas, it's only the top value that actually matters. It doesn't do me any good to have a great idea unless I recognize it as a great idea," Terwiesch said.

In a research project, Terwiesch and his colleagues applied that framework to GPT, andsuccessfully filtered out the best idea from a large sample. They had a simple goal in their experiment: to design products for college students that would retail for $50 or less, and pick the winning idea. They found that ChatGPT can generate higher quality business innovation ideas than MBA students at an elite university, and that it does so at a faster rate and lower cost.

The hallucination problem: From a bug to a feature

Significantly, with that experiment, Terwiesch and his colleagues were also able to convert the hallucination problem into an innovation advantage. They used LLMs to generate a large number of ideas, but postponed judgment on those. "The

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Mark Spykerman
Cencora

hallucinations and inconsistent behavior of LLMs increase the variability in quality, which, on average, improves the quality of the best ideas," they wrote in a paper titled "Ideas Are Dimes A Dozen: Large Language Models For Idea Generation In Innovation." Terwiesch coauthored the paper with Karan Girotra, Professor of Operations, Technology and Information Management at Cornell Tech; Lennart Meincke, Research Assistant at Wharton; and Karl T. Ulrich. "For ideation, an LLM's lack of judgment and inconsistency could be prized features, not bugs," they concluded.

Amazon's innovation process and Gen AI

Gen AI innovation is exceptionally useful in enabling private equity investors to extract higher value from their portfolio companies, according to Drake Pruitt, Senior Innovation Advisor at Amazon Web Services. His business unit works with the top 500 private equity owners and their portfolios, helping them to build operational value through applied technology and knowhow. "Generative AI has created a whole new set of tools for us in terms of inventing with customers," Pruitt said.

As a digital innovation and product innovation advisor, Pruitt works closely with portfolio companies "that need to build a new, or to extend an existing product value proposition for their customers." Often private equity investors or their acquired companies undergoing technology and business transformations seek input from Amazon "on our principles of innovation and how we organize to deliver winning products," he explained.

Amazon organizes its innovation effort around four pillars. The first of those is made up of "the cloud technology stack and tools that empower rapid growth, experimentation and change." Pruitt noted that as "the inventor of the cloud," Amazon created a technology approach "as a means for rapid experimentation, agility, and cost-effective use of compute and storage resources."

The second pillar is 'Culture' where Amazon employees all share common values, known as Leadership Principles, which instill a 'belief and ways of acting system' that

guide Amazonians in how they work with customers. "Amazon's focus and commitment to leadership principles shapes how we think about our customers' needs, how we move quickly, how we think about trial and error, and how we make decisions," he said. "When it comes to innovation, our culture ensures that we put the customer at the center of our thinking. Their needs are the primary drivers of everything that we're doing, and we work quickly on their behalf."

Amazon's third pillar is 'Organization,' where it builds small, cross-functional teams from different parts of the business, who sit closest to its customers. The teams "are very diverse skill and background-wise, and they are not dominated by a single group," Pruitt said. "When a team delivers a product, it will own it through its useful life. This helps ensure a great long-term experience for our customer," he added.

Mechanisms, or "encoded team behaviors that facilitate speed and execution," make up the fourth innovation pillar. "Mechanisms are the way in which we use methods and tools to take one-off practices and turn them into scalable, repeatable motions for the benefit of the whole company," Pruitt said.

Through a "unique approach to innovation," technology serves to fulfill the needs of the customer, Pruitt continued. "When we think about building great products, the technology is secondary to what the customer's desired outcome must be. With a new technology like Gen AI, initially customers can be tempted to work in the opposite fashion—to take a tool and ask, 'what can we invent with it?' While experimentation to understand possibilities is helpful, successful innovation is centered around customer need first, and the selection of technology to meet the need comes second," he added.

According to Pruitt, Gen AI has potential to bolster Amazon's innovation work with customers. First, it can help it to "gain greater breadth and depth of ways to understand the customer, gain insights, and analyze customer behavior data." Next, it can bring new insights in terms of how it thinks about customer needs and ways of inventing to solve their problems. "Also, the measurement of behaviors and feedback is always a

difficult challenge when trying to understand customers," he noted. "In complex products like application software, it's even harder to gather and associate feedback with how the service behaves. Gen AI could help aggregate the data leading to insights in where customer pain points are evolving over time."

How Amazon helps private equity companies embrace Gen AI innovation

"Private equity investors are impatient and want to see rapid improvement in cash flow at their portfolio companies," Pruitt noted. "One of the chief objectives in the sponsor's playbook is to improve the productivity of their portco workforces. Naturally, their initial interest in Gen AI has been to assess its role in augmenting productivity and reducing costs."

In addition to managing cost, private equity investors want to know how Gen AI can help portfolio companies grow, Pruitt continued. They task their portco product executives to understand how Gen AI can create better experiences and products for customers that lead to topline growth. "Investors have quickly come to understand the strategic and market implications of Gen AI adoption, and they want to move decisively," he said.

Private equity investors are "strategic risk managers and value-builders; they don't adopt technology for speculative purposes," Pruitt noted. "Along with their portco executives, sponsor operating partners are seeking clarity on whether Gen AI presents risk, opportunity or both for their businesses, and they want to act accordingly and with urgency."

How Gen AI enables novel solutions

Mark Spykerman, Chief Information Officer at Cencora, a global pharmaceutical solutions organization headquartered in Conshohocken, PA, shared two use cases where LLMs are enabling solutions to problems that were not possible earlier. The first use case is where Cencora is improving the quality and resiliency of the pharmaceutical supply chain by increasing the breadth of data used to identify "the best manufacturers to buy drugs from."

LLMs made way for a solution. Cencora is able to analyze unstructured data sets such as news items scraped from the web and announcements by the Food and Drug Administration (the regulator). "Now, we're able to assess volumes of data in a way that was not possible before; human beings couldn't do that because the volume of information was too high and the information changes too quickly for people to keep up with," Spykerman said. That enabled Cencora to inform drug purchasers of "who they should work with, why, and what questions they should ask."

The second use case Spykerman presented has to do with clinical trials. One of the biggest challenges the pharmaceutical industry faces is in finding a sufficient number of patients that meet the criteria to participate in clinical trials, he noted. With the help of LLMs, Cencora could pull together data on the broad array of clinical trials of new drugs and match that with patient data or their attributes. The insights from these types of analyses could empower physicians to find and offer enrollment into clinical trials to patients who may be willing to participate. The end result would be broader enrollment in clinical trials and more lifesaving drugs developed.

How Gen AI removes barriers

Many users find it difficult and complex to learn how to use technology products such as Adobe Photoshop. Gen AI removes barriers by helping create "smart assistants"

that make it easier to use those products, Pruitt said. "Without intention, there's a market segment that's confined to who knows how to [use a technology product] or can take the time to learn the tools." He noted that many clients of Amazon Web Services happen to be working on building smart assistants. Gen AI also allows creators of websites or other such products to use "natural language prompts" for help with their designs. A creator who is not fully qualified is able to now have tools that only a pro would have either known how to use or have the talent for it, he explained.

"Writer's block is now gone," Spykerman said, with Gen AI's ability to read through and summarize large volumes of data. Examples of that could be writing emails on challenging topics or drafting performance reviews, he added. "The creative process is opened up now because there's no longer that barrier of 'I don't know where to begin.'"

Gen AI is also removing obstacles for users such as their inability to write software code or lack of technical knowledge. "Imagine just being able to talk to a machine and say what you wanted a routine to do," Pruitt said. "As those tools become more available, people who are less technical by background, but who have great creative ideas and good connections to value of business and other means of measuring value, will find there is more room for their participation. [There will be] more democratization of the ability to contribute."

Gen AI in risk management

For all its advantages, Gen AI also brings risks for users who are uninitiated in its ways. According to Pruitt, "in the short term, Gen AI is a compounder to risk management." Gen AI brings existential threats to companies that are rooted in pre-Gen AI technology, such as information intermediaries like content aggregators. "Now, with GPT or with public foundation models, anyone with a prompt could ask a question to return a lot of the data that you consider to be proprietary or unique to your service," he said. "There's a risk of being disintermediated by GPT as a business threat from other startup teams" that can severely undercut incumbents in pricing, he explained.

Another risk from Gen AI for companies is when they do not have secure policies in place to use the technology. Pruitt spoke of how such companies are dealing with situations where employees have inadvertently leaked sensitive intellectual property into foundation models by using prompts.

All considered, Gen AI is not about to replace human judgment. "If you go to an image generator, you can go generate five, 10 or 1,000 images of very similar things," Spykerman said. "You need to be able to judge what is good or not. Can you train models to judge as well? Maybe. I'm still leaning on humans to make those judgments with the human in the loop."

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