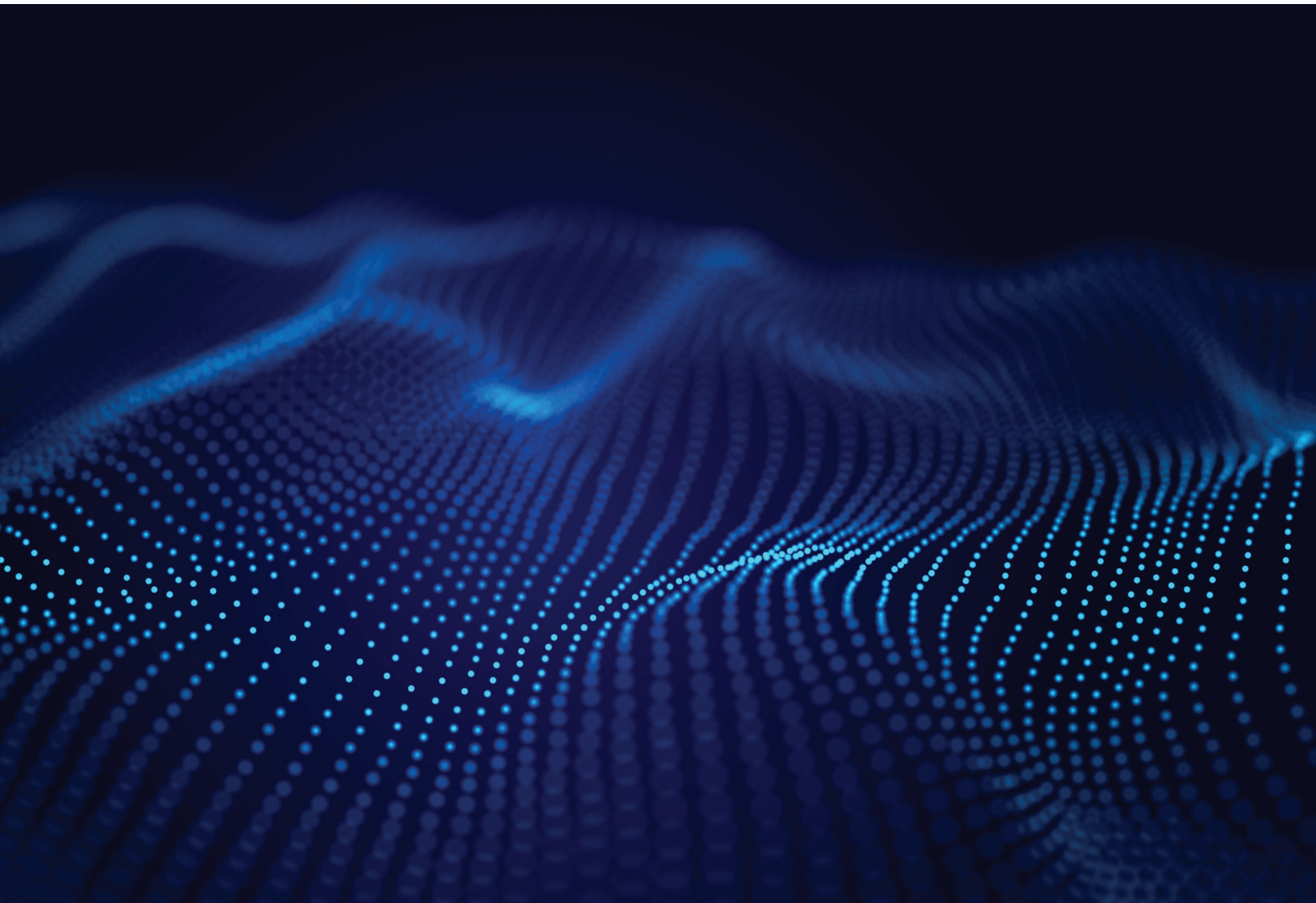


Designing trust:

Innovative patterns to accelerate generative
AI adoption in capital markets



EMBRACING THE GenAI MOMENT

The role of generative AI (GenAI) in finance has evolved from an experimental capability to a pivotal necessity in a matter of months. In fact, GenAI's impact on productivity could add \$2.5 – \$4 trillion of value to the global economy annually.¹ To stay competitive in a quickly changing Capital Markets landscape and reap productivity benefits, it's not a question of whether to adopt — it's how and when.

Generative Pre-training Transformer (GPT) technology may create a seismic shift in Capital Markets, but it is not without its own set of concerns. Businesses have concerns about how they can overcome some of the risks and challenges of GPT tools, such as Large Language Model (LLM) hallucinations, the intellectual property of client's queries and system responses, and data security.

Although there are risks with GenAI — as there are with any nascent technology — there are also ways to mitigate them. Broadridge has invested in and developed AI products for many years, predating the rise of GenAI that has democratized AI for both consumers and enterprise users within the past year.

Broadridge is innovating with architectural design patterns that, in conjunction with safety and accuracy controls, responsibly implement GenAI technology to address the above concerns systematically.

Further, Broadridge has developed an AI platform that incorporates these patterns and controls, which was recently released to Broadridge associates and product development teams. This platform safeguards both the client's and Broadridge's proprietary information and provides safe access to LLMs, including commercial SaaS products like ChatGPT as well as private Broadridge cloud-hosted models.

CAPITAL MARKETS FIRMS CAN USE GenAI TO:

- Act as a “virtual co-pilot” to generate industry or business-specific insights
- Optimize and personalize customer operations
- Accelerate software engineering and product research and development
- Personalize marketing and sales content

Launched on June 6, 2023, by Broadridge subsidiary LTX, BondGPT is one of the first products to implement these design patterns and to run on the Broadridge AI platform. The deep coupling of GenAI and our proprietary machine learning algorithms powers BondGPT. This combination gives bond traders immediate access to insights derived from large quantities of information on the market.

In building BondGPT, we were able to navigate and overcome the biggest considerations and barriers to harnessing GenAI's power. The result is the fixed income industry's first GPT-enabled application that helps users answer complex bond-related questions in seconds versus minutes without sacrificing accuracy or privacy.

LTX is a subsidiary of Broadridge that operates an AI-powered corporate bond trading platform. BondGPT is available through the LTX trading platform and through desktop and mobile applications.

¹The economic potential of generative AI: The next productivity frontier. McKinsey & Company. Published June 14, 2023.



COMMON CONCERNS ABOUT USING GenAI IN CAPITAL MARKETS

We consulted directly with many of our buy- and sell-side clients throughout the process of building AI capabilities, and heard concerns from our large customers about deploying AI at their firms. From the first instance we have incorporated technologies, design patterns, and controls that deal with those concerns.

CONCERN 1: PROTECTING PROPRIETARY DATA

FIRMS ARE CONCERNED ABOUT INADVERTENTLY SURRENDERING PROPRIETARY INFORMATION. MANY FEAR EMPLOYEES COULD ACCIDENTALLY SUBMIT:

- Sensitive business data
- Personally identifiable information
- Proprietary knowledge

There are concerns that entering this information into an LLM could unwittingly train the model on information it should not use when answering public queries. There is also a perceived risk that comes with transmitting confidential information to unknown third parties when using AI tools.

We considered these issues when building AI capabilities and products, based on our deep experience in securing and managing highly sensitive client data.

The BondGPT design pattern serves three primary functions:

1. Understand the question in real-time
2. Retrieve the right information from various curated data sources
3. Answer the question accurately, often seamlessly blending and performing calculations on many disparate pieces of data

We implemented sophisticated data retrieval techniques that use a range of verified bond market data, as well as proprietary data and models. These design patterns prevent sensitive data from passing through OpenAI and remove the potential for hallucinations from the LLM being passed to the user.

Additionally, as a mutualized solution provider, Broadridge has the existing knowledge and capabilities to anonymize data. In the case of BondGPT, the information the model receives comes from Broadridge itself, rather than individual clients. This adds another layer of obfuscation and security, protecting sensitive business data, identifiable information, and intellectual property. Further, our partnership with OpenAI comes with contractual obligations that ensure privacy and technical verification that Broadridge data is secured.

CONCERN 2: ENSURING ACCURACY AND MITIGATING HALLUCINATIONS

Concerns around LLM hallucinations are a barrier to AI adoption. Potential users want quick answers to complex questions, and want to be able to confidently rely on the answers to make business decisions. Because of its purpose for institutional fixed income users, BondGPT's number one design challenge was that responses had to be accurate. BondGPT's reliance on verified, curated sources not only ensures that sensitive data doesn't get passed to the public LLM, but it also ensures accuracy and eliminates hallucination risk. BondGPT isn't using AI to generate responses; rather, it's retrieving the right information from verified and disparate data sources at once, often seamlessly blending and performing calculations on these pieces of data. The fact that these sources are industry standard and reliable helps ensure that responses are accurate.

BondGPT uses a sophisticated implementation of LLM technology to assemble the most up-to-date and curated information on bonds, such as real-time liquidity and LTX's patent-pending bond similarity data, rather than using internet data about the bonds themselves. Thus, the model doesn't need to be all-knowing: rather, it understands where it can retrieve the right information, right when it's needed. This capability enables BondGPT to scale by including additional sources of market, proprietary, or customer data.

Further, the LLM is also augmented with bond industry-specific terms so that questions including industry-specific terminology are understood and answered accurately.

Our design patterns followed two guiding principles.

Scrutinize the user's input

In order to ensure that BondGPT has properly understood the user's intentions, every response begins with structured playback of the user's request. This playback affirms that BondGPT understood the exact question that the user asked. BondGPT also suggests follow-on questions for even more specific, targeted answers.

Proper GenAI design means always validating the user's input. BondGPT doesn't allow users to update the model, negating the risk that they can try to force the platform to articulate non-compliant answers or feed it data. This helps ensure that the LLM does not get hijacked by false information.

GenAI models should handle the user's input with care. This also means sanitizing what the user sends to the LLM to avoid information leakage — and ignoring prompts that ask BondGPT to provide wrong or inappropriate answers. Firms offering GenAI products must ensure that users cannot “jailbreak” a GPT application, which means overriding the program's guardrails that ensure correct, proper answers. BondGPT is built with multi-level safeguards that prevent this from happening.

Scrutinize the LLM's output

Never pass the LLM's output directly to the user. Unchecked answers have a higher risk of generating and displaying incorrect information. We developed techniques to tackle this issue with BondGPT. The program asks the LLM to generate an identifier that ties each output to the input. BondGPT also asks the LLM to format its output in a specific syntax. This reduces the chance of hallucination: if the answer doesn't pass syntax checks, it's unlikely to be suitable for the end user.



CONCERN 3: REMAINING COMPLIANT

The regulatory landscape around GenAI is trying to catch up with the technology. GenAI itself is capable of answering queries and delivering information on a host of subjects; but in a financial services capacity, it's critical to teach the LLM about the existing regulations and laws that govern industry practices.

The agent makes sure answers are trained on existing compliance rules, which are then enforced on BondGPT's answers. The application is also ready to incorporate upcoming regulatory rules as they come into effect, allowing for real-time compliance updates.

GENAI TOOLS MUST:

- Manage against risk
- Offer transparency on how information is used
- Protect against bias
- Comply with consumer and employee protection laws

The financial services industry's existing rules have set up a framework for our AI products. In BondGPT, for example, the model is designed to not offer advice, such as bond recommendations. Rather, it's a tool that traders use to assist in making their own bond selections. The design also includes a compliance layer in the form of an AI agent that monitors the app's output.

EMBRACING THE GENAI FUTURE — SAFELY

When it comes to AI and GPT technology, the benefits outweigh the potential risks in most cases. AI tools help professionals calculate data in seconds rather than minutes so these professionals can provide meaningful analysis to clients. They can also find operational efficiencies throughout their organization, providing a competitive advantage that translates into smarter decisions.

Broadridge is committed to continuing innovation, providing safe and responsible AI products at scale. We are leveraging our deep industry knowledge and technical expertise to build a pipeline of both client facing products across asset classes in our capital markets post-trade and front office businesses, as well as internal productivity and efficiency boosts. We work hands-on with each of our clients who are interested in incorporating AI into their operations in a safe, compliant way.

ABOUT LTX

LTX is an electronic trading platform that enables corporate bond market participants to trade smarter, combining powerful, patented artificial intelligence with innovative e-trading protocols to improve liquidity, efficiency, and execution. LTX is a division of Broadridge Business Process Outsourcing LLC, the broker-dealer subsidiary of Broadridge Financial Solutions.

For more information, visit www.LTXtrading.com.

ABOUT BROADRIDGE

Broadridge Financial Solutions (NYSE: BR), a global Fintech leader with over \$6 billion in revenues, provides the critical infrastructure that powers investing, corporate governance, and communications to enable better financial lives. We deliver technology-driven solutions that drive business transformation for banks, broker-dealers, asset and wealth managers and public companies. Broadridge's infrastructure serves as a global communications hub enabling corporate governance by linking thousands of public companies and mutual funds to tens of millions of individual and institutional investors around the world. Our technology and operations platforms underpin the daily trading of more than \$10 trillion of equities, fixed income and other securities globally. A certified Great Place to Work®, Broadridge is part of the S&P 500® Index, employing over 14,000 associates in 21 countries. For more information about us, please visit broadridge.com.

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