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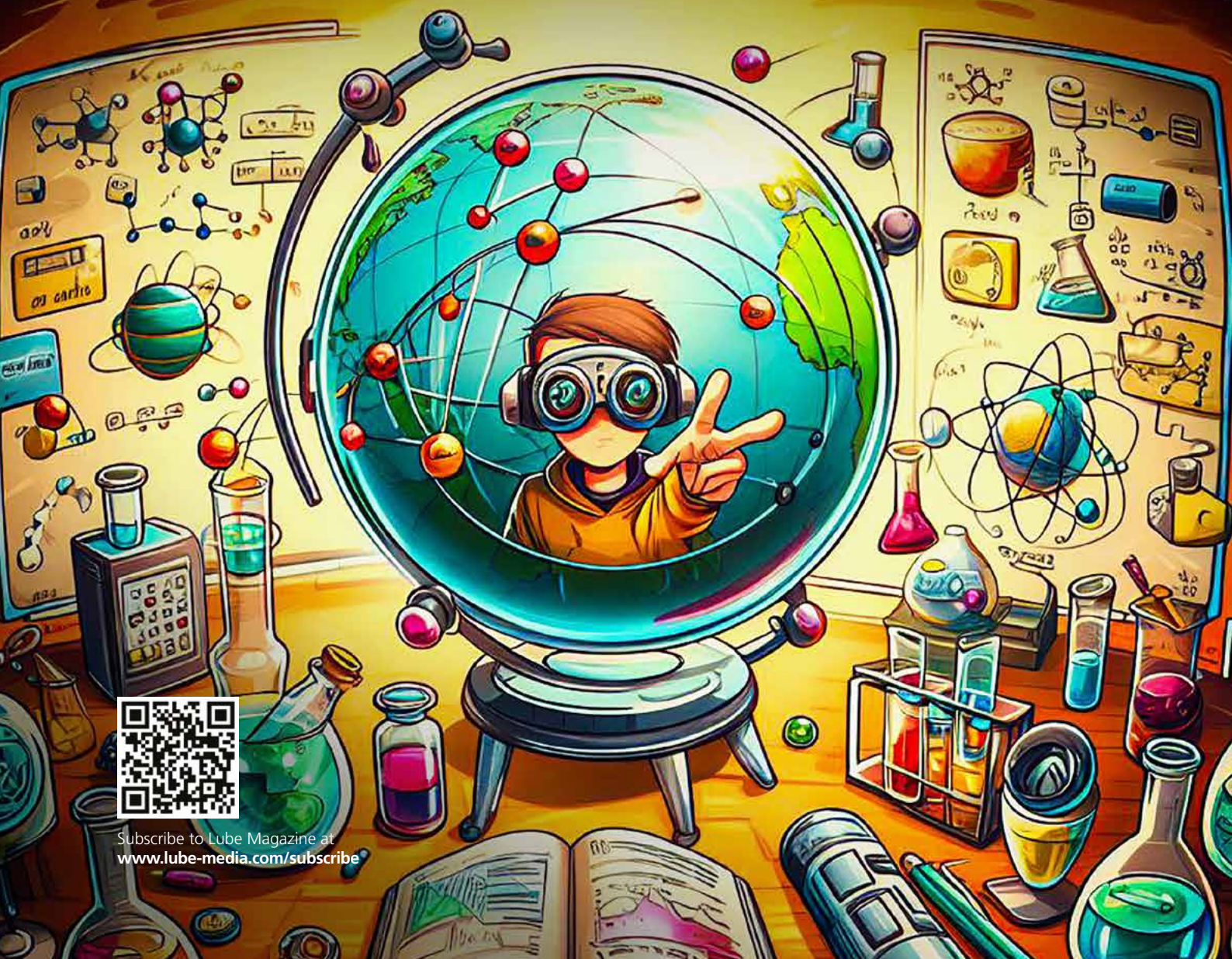
Embarking on the generative AI journey

Colin Morton, Specialty Chemicals Industry Consultant

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What key words come to mind when thinking about artificial intelligence (AI)? Namely - automation, creativity, cybersecurity, data, disruption, ethics, innovation, opportunity, productivity, strategy, transparency.

Generative AI looks set to profoundly impact a great deal, in both our private lives and the workplace, with trade, industry and commercial channels all set to evolve. It was relatively easy to grasp the basics through online learning, become an amateur prompt engineer and to start putting large language models to use.

It is particularly worthwhile to get comfortable with the basics, inform your own views and consider the implications - good, bad or otherwise. Many articles have been published on the topic of AI. These perhaps felt trend like and futuristic only a few years ago, but they are all so real today. It is therefore timely to put suitable governance, policies, training and guidance in place for key sectors and companies before rapid adoption takes hold.

With this in mind, it seemed appropriate to ask Chat GPT itself for an opinion about the use and proliferation of generative AI – this led to a curious set of outcomes which you can check out below for a gentle introduction to this topic.

When ChatGPT was asked for a short evaluation of generative AI, it concludes that its use should be approached with careful consideration, taking into account ethical, legal, and societal implications.

In general terms
Arguments for:
- Accessibility – AI-generated content can make information more accessible through translations across diverse languages and summaries.
- Consistency – Maintains a consistent style or tone, which can be challenging for human creators to achieve over time.
- Cost savings and efficiencies – By automating mundane tasks.
- Creativity – Generation of novel content, aiding artistic and innovative efforts.
- Innovation – Enhanced by enabling the rapid development of new products, services and applications.
- Personalisation – Of user experiences, such as recommending products or content tailored to individual preferences.
- Scalability – More easily scale content production to meet growing demands.

Arguments against:
- Bias and ethics – Could perpetuate and even amplify biases present in the training data, leading to unfair or harmful outputs.
- Creative stagnation and dependency – Over-reliance may stifle human creativity and discourage original thinking, further eroding human skills and decision-making capabilities.
- Environmental impact – Training large generative models requires significant computational power and can contribute to increased energy consumption.
- Erosion of authenticity – There is a risk of eroding the authenticity and genuineness of human experiences and interactions.
- Legal, copyright and intellectual property – Determining ownership of AI-generated material could be complex.

- Loss of jobs – Automation may lead to job displacement.
- Privacy and security concerns – Use in applications like deepfakes can compromise individual privacy and lead to personal data misuse.
- Quality control – Content may lack the feel and emotion of human-produced content.
- Regulatory challenges – Rapid development has outpaced regulatory frameworks, leading to uncertainties around its use and oversight.
- Resource intensive – Training and deploying advanced generative models can require substantial computational resources, limiting access for smaller organisations and individuals.
- Transparency – Content often lacks transparency, making it difficult to understand how a particular output was generated.
- Unintended consequences – It could produce unexpected and unintended results, which can be challenging to predict or prevent.

Striking a balance between harnessing its potential and addressing its challenges is essential to its responsible and beneficial use in various domains.

Domain - chemicals industry
When probed further on the potential application across the chemicals industry, ChatGPT raised some additional points of note.

Arguments for:
- Accelerated R&D – AI-driven algorithms can significantly speed up R&D. This can reduce the time and resources required to bring new products to market. It can also help design chemicals and formulations tailored to specific customer or industry needs.
- Competitive advantage – Early adopters could potentially gain an advantage by developing innovative products and solutions faster than their competitors.
- Molecular and material design – Can help chemists design new molecules and materials more efficiently. It can generate a vast number of molecular structures and predict their properties, supporting lead discovery.
- Predictive analytics – Can analyse vast amounts of data which can help anticipate market trends, customer preferences, and potential issues, leading to more informed decisions.

- Predictive maintenance – Can predict when equipment and infrastructure in manufacturing facilities need maintenance or repair, minimising downtime.
- Process optimisation – Help optimise manufacturing processes.
- Safety enhancement – Can predict and prevent accidents by analysing data and identifying potential hazards in production and handling.
- Sustainability – Can help optimise chemical processes, minimising waste and energy consumption, as well as optimising recycling processes, and supporting life cycle assessments.

Arguments against:
- Complexity and expertise – Developing and implementing generative AI systems requires significant expertise, which can be a barrier for many companies.
- Data dependency – Relies on large datasets to make accurate predictions and designs. If a company lacks sufficient data or has poor-quality data, the effectiveness of AI may be limited.
- Data privacy – The use of AI in chemical research relies on extensive data, which can lead to privacy and security risks if not handled properly. Protecting proprietary information and customer or supplier data becomes increasingly critical. Determining ownership and patent rights for AI-generated chemical designs can be complex and contentious.
- Ethics – The use of AI in designing chemicals raises ethical concerns about transparency, accountability and the potential for unintended consequences.
- Human expertise – AI may not fully replace the expertise of human chemists and engineers. Judgment, intuition, the ability to adapt to unexpected challenges and serendipity are crucial in chemicals development. Over-reliance on AI may diminish these skills over time.
- Costs – Implementation could require a significant upfront investment in infrastructure, software and talent. Smaller companies may find this prohibitive.
- Lack of data – Possible lack of high-quality data to train models effectively.
- Quality control and validation – AI-generated chemical designs may not always meet the required quality and safety standards, leading to regulatory and product quality issues.
- Regulatory challenges – The chemicals industry is subject to strict regulations.

- Safety – The application in chemical processes raises safety concerns, as errors or vulnerabilities in AI systems could lead to accidents or disasters, without proper human oversight or controls.
- Security risks – The use of AI in chemical processes may expose vulnerabilities to cyberattacks and industrial espionage.
- Sustainability – While AI can contribute to sustainability efforts, there is a risk that it may be used to develop chemicals and processes that prioritize profit over environmental concerns.

Companies should carefully consider these factors when deciding whether and how to implement AI into their chemical operations.

The lubricants sector: road ahead for AI transformation

It was intriguing to put these queries to Chat GPT for an opinion, and the responses were insightful, with a longer list of arguments against AI's use than in support. It is understandable to be staggered, inspired, and anxious in equal measure by the power and emerging capabilities of generative AI. The next few years will bring advancement and reward for those industry players that push the envelope, but changing fortunes perhaps for those who fall behind.

Players across the lubricants value chain will require to invest strategically in AI adoption, aligned with their wider business goals, allocating resources accordingly which will compete with other strategic priorities. This will build on a culture that embraces data-driven decision-making and continuous learning as employees adapt to AI tools and methods, cutting across various business verticals and horizontals.

Successful implementation will require collaboration between technology providers, industry players, and regulatory bodies. Partnerships can facilitate knowledge exchange and ensure that solutions are suitably tailored. Leadership teams will need to ensure ethical AI use, with suitable governance and transparency in business processes, whilst ensuring that entrepreneurial endeavour is encouraged, and measured risk-taking accepted, to realise the benefits.

This all comes at a time when the lubricants sector is on a path of transformation towards a more sustainable future, with a changing global landscape,

an evolving demand-supply picture in recent years, culminating in a shift in how category value can be best realised across value chains. The adoption of generative AI could further alter market dynamics, leading to increased competition and pressure on market participants.

Surely then it is a good time to upskill, to get back to continuous learning and training for professionals at all levels across the lubricants market. Embrace generative AI, sharpen your strategic thinking, uncover the real-world use cases, then adapt your businesses to win.

As the lubricants industry embarks on this journey, it must do so with a clear vision and commitment to leveraging AI for the greater good, ensuring that the advancements in technology translate into value for businesses, consumers, and the environment alike.

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Disclosure: ChatGPT was applied in the writing of this article. Cover image created through OpenAI with DALL•E 3