The arrival of GenAI: When Convenience Destroys Creativity

A perspective paper

November 2023

EY Parthenon

Building a better working world

GenAI is disrupting operating models in multiple industries and this is reflected in the explosive market growth

1. The arrival of GenAI
2. The hidden trap of convenience
3. How to strategically apply GenAI
4. The new rules of competition and the wealth gap

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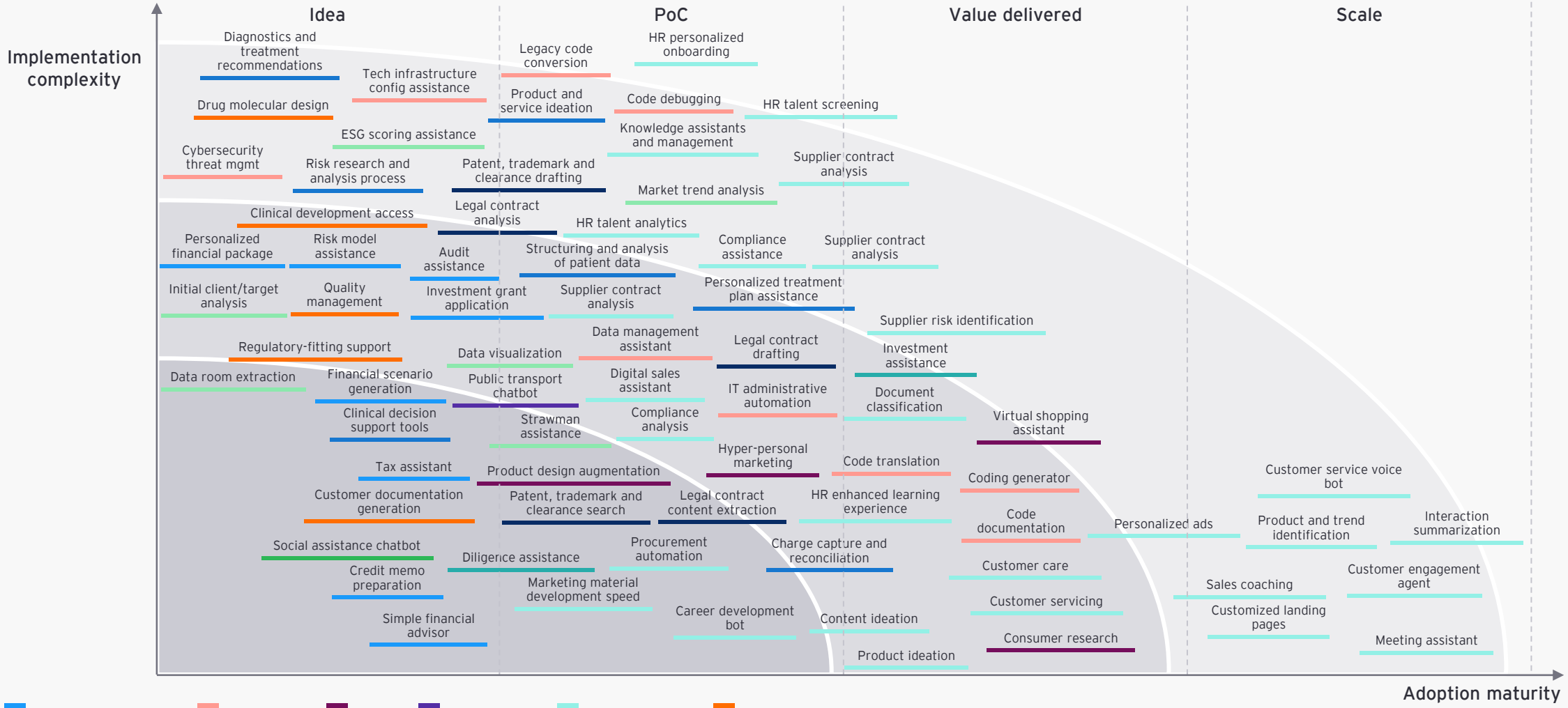
Over the past year, we saw Generative AI disrupting established operating models and nurturing new business model opportunities in multiple industries

GenAI use-cases disrupting established operating models, not exhaustive



Source: EY-Parthenon analysis

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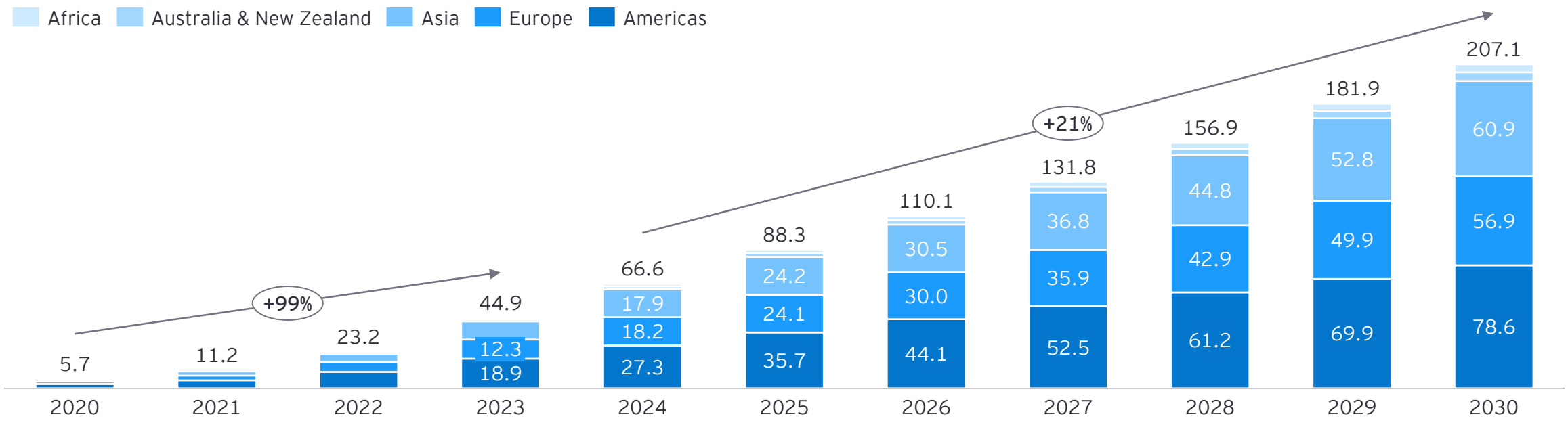
The disruptive impact is evident in the market's growth, showcasing remarkable Compound Annual Growth Rate (CAGR) of 99% over the past three years, transitioning into a CAGR of 21%

Global Generative AI market

Generative AI market size by region 2020-30E *($b)*



Commentary

- The CAGR of c. 99% of the past four years has mainly been driven by the hype around the launch of ChatGPT in the end of 2022. Growth for the coming years is still forecasted to be strong but slows down to a 21% CAGR
- Recent growth is largely attributed to general availability of foundational models (e.g., BERT, GPT). Future growth is not expected to be at similar rates owing to improved realization of capabilities of these models and is potentially linked to the hype cycle of innovation
- The European market size in the Generative AI market is projected to reach $12.25b in 2023 and is expected to grow to $ 56.85b by 2030. Currently, the largest market size exists in the United States at $16.14b in 2023

Source: Statista Market Insights; EY-Parthenon analysis

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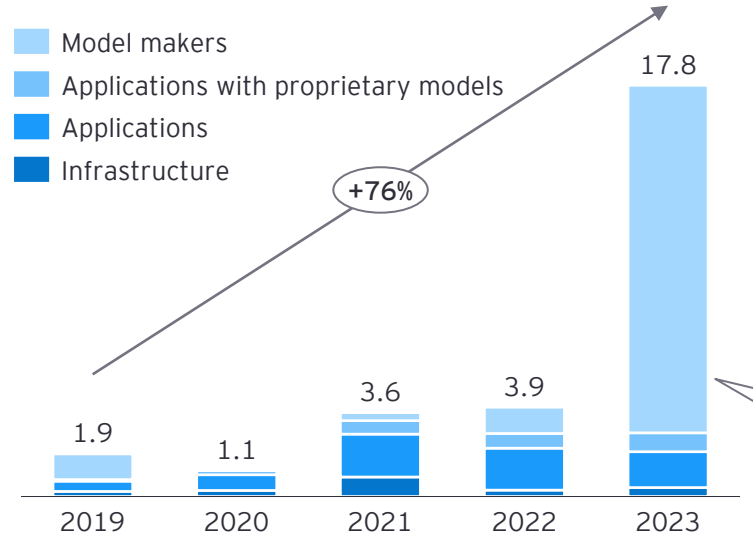
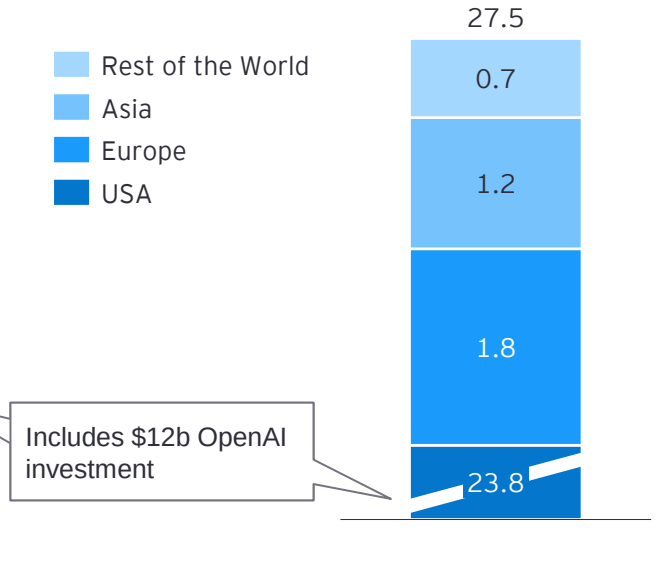
GenAI VC funding grew significantly and is dominated by investments in model makers and applications

Global Generative AI venture capital funding landscape

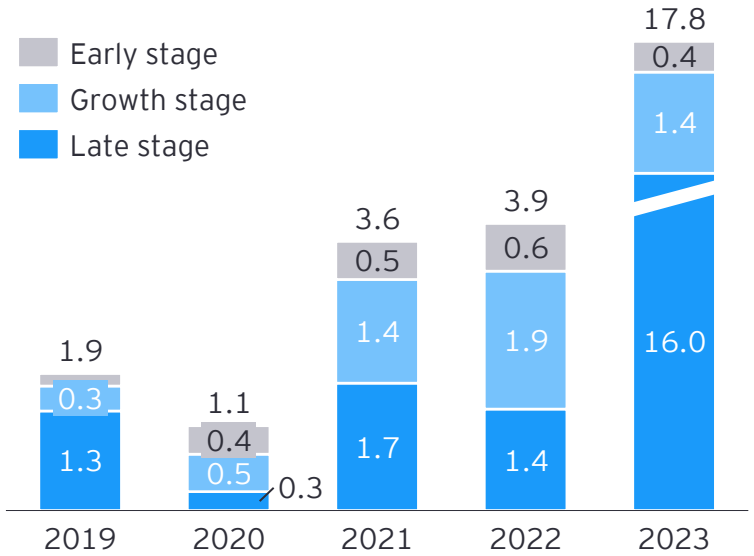
Global GenAI VC investment by segments 2019-23 ($b)



Cumulative GenAI VC investment by region 2019-23 ($b)



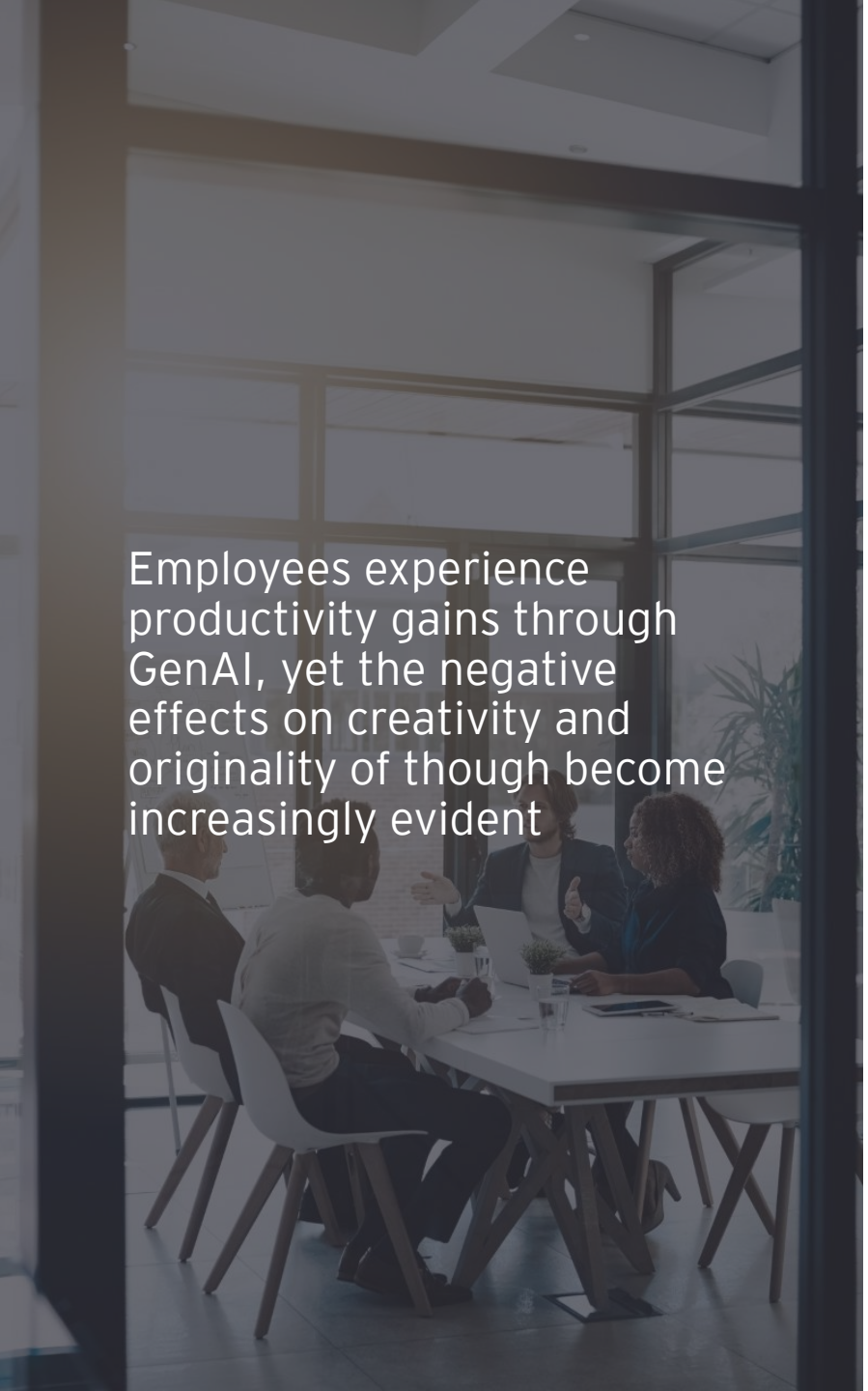
Global GenAI VC investment by stage[1] 2019-23 ($b)



Commentary

- Global GenAI VC investments rose the past years where the majority of the funding for 2023 ($12b) is attributed to the OpenAI investment. In terms of cumulative VC investment for the past five years (2019-23), the US leads even without the OpenAI investment. Europe follows the USA with $1.8b in VC funds ahead of Asia with $1.2b of funding
- The majority of the funding is for model makers and applications (built on third-party foundational models). Model makers require considerable funding owing to the high costs associated with training and deployment of the models. There is also verticalized model makers emerging (e.g., Hippocratic.ai which is a health-focused LLM). Applications primarily focus on use-cases covering text (copywriting, chatbots, knowledge management), code generation, image generation and speech generation
- Early-stage and growth investment into GenAI startups has steadily increased from 2019 potentially indicative of rise of new startups focusing on GenAI. There is some slowdown in 2023, however this could potentially be attributed to reporting delay. Late-stage funding is attributed to a few companies which are mostly model makers (e.g., OpenAI) raising large capital

1.Early stage: Pre-seed, seed and Series A (up to $15m); Growth stage: Series B and Series C (up to $100m); Late stage: More than $100m
Source: Dealroom.co; EY-Parthenon analysis



Employees experience productivity gains through GenAI, yet the negative effects on creativity and originality of though become increasingly evident

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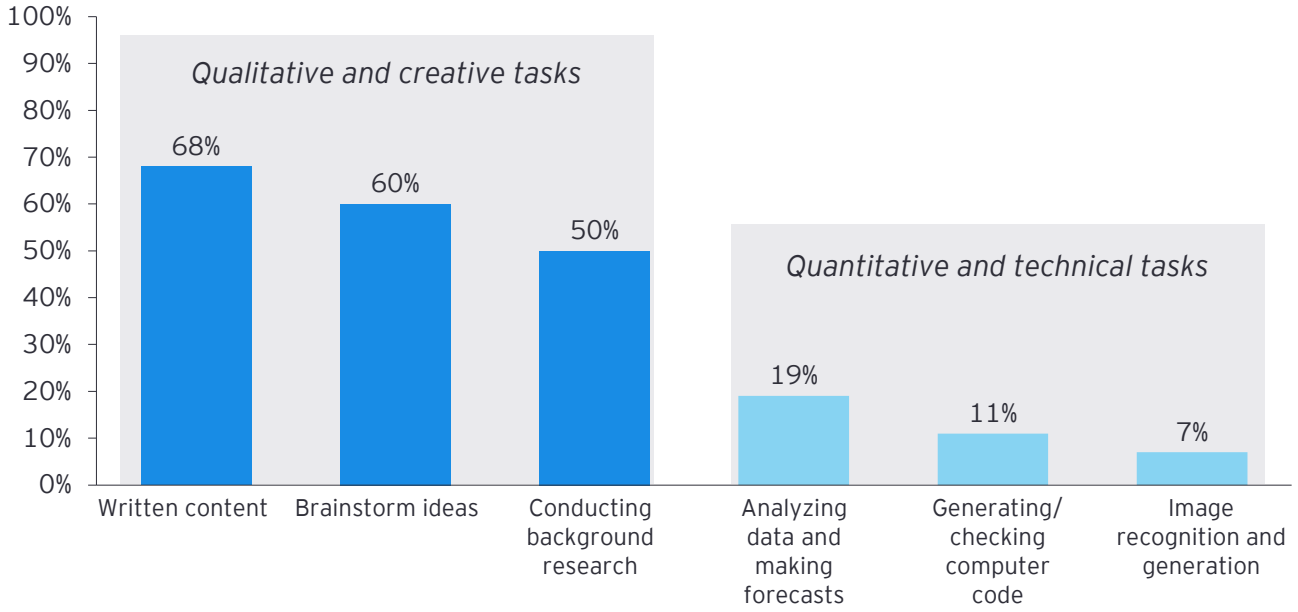
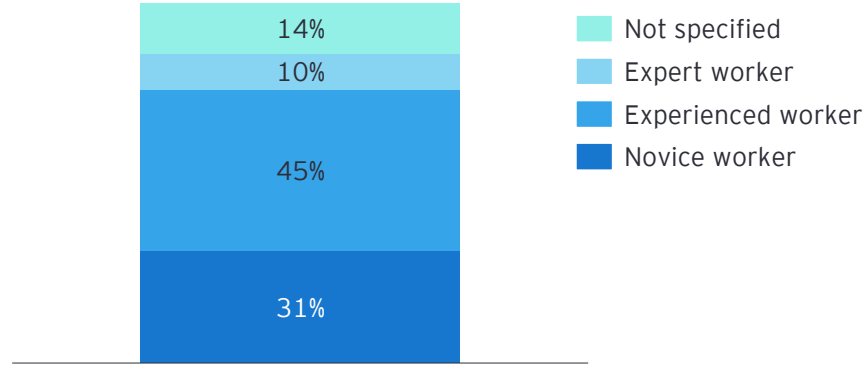
GenAI is predominantly employed for fundamental tasks to support humans, with over 75% of its quality assessed as equivalent to or surpassing that of an experienced worker…

GenAI use-cases and quality of output

Percentage of use on different types of tasks for GenAI tools



Quality of AI output compared to seniority of human workers



> Generative AI is already delivering work product that meets or exceeds the quality of employees with years of experience—at least on specific tasks.
>
> Leader of the Conference Board Human Capital Center

- GenAI is primarily used for assistance in foundational tasks foremost entailing copywriting, ideation and background research. Trust in the performance of GenAI on quantitative and technical tasks like data analysis, code writing and image recognition seems to lack resulting in less use
- The reputation of GenAI making up answers even when it does not have the information is weighted more heavily in tasks where it's more difficult to spot errors once the analysis is finalized (quantitative and technical tasks) in contrast to where it's easier to adjust later (foundational tasks)

- The output produced by GenAI is evaluated to be of significant quality with 45% of the output being of the quality of an experienced worker and 10% being of the quality comparable to an expert worker. This indicates positive future perspective for the use of GenAI on specific tasks of daily business operations

Source: The Conference Board; EY-Parthenon analysis

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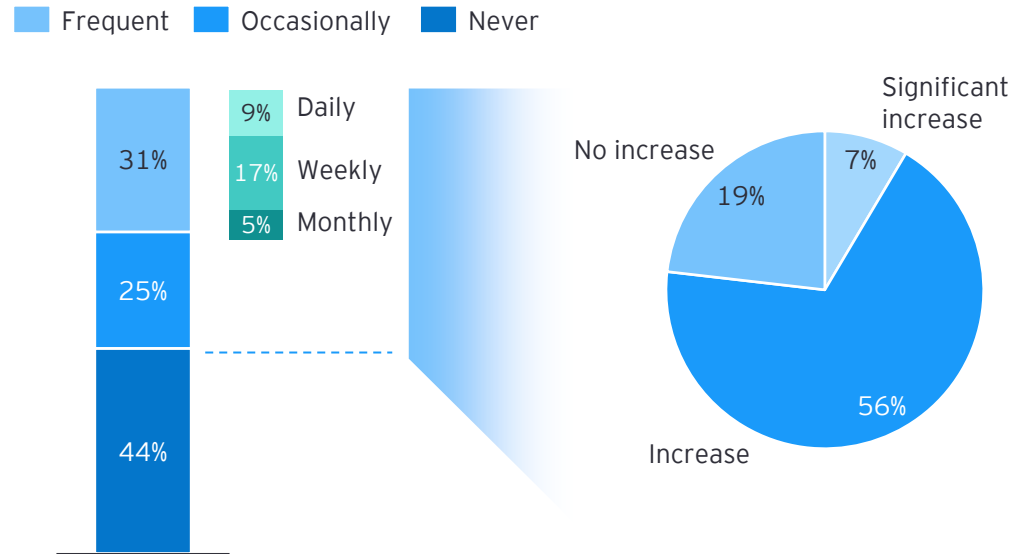
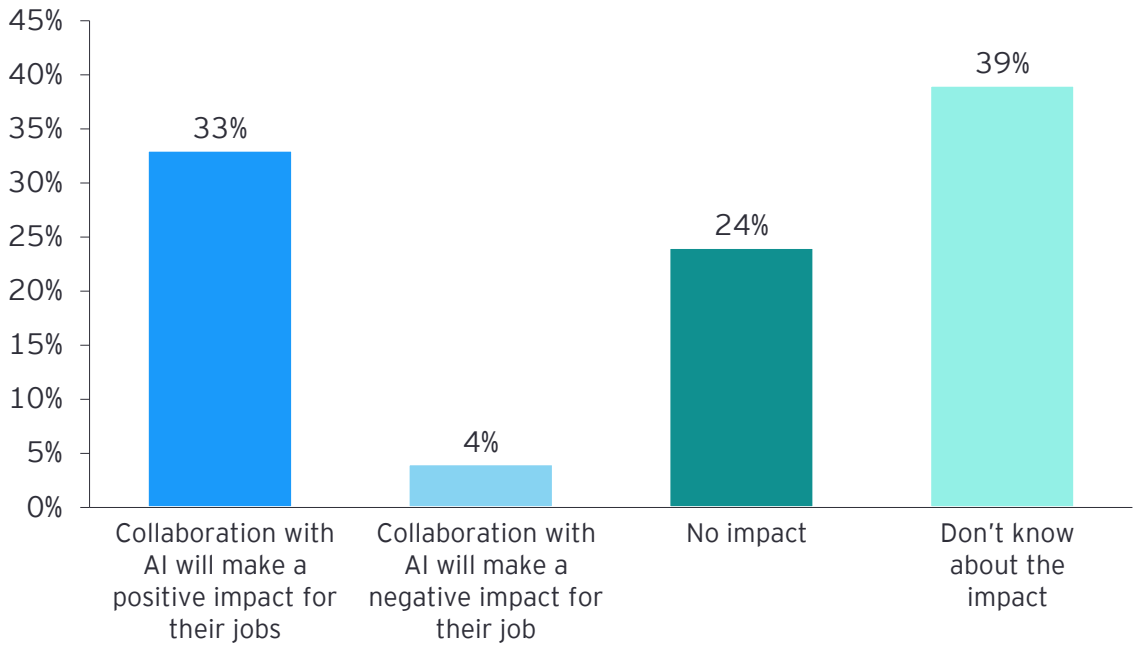
… and generally, most of the surveyed employees experience an increase in productivity

GenAI usage by US organizations and employees

Adoption of GenAI tools for work tasks and productivity increase



Employee expectations of impact on job tasks



- Understanding where GenAI can increase productivity will be key in extracting most value. As more employees try out the technology, empirically the business value will become more clear

- The increase in productivity is mostly evaluated positively on replacement of elements of people's jobs. Less time will be spent on repetitive tasks containing little value and more time can be spent on creative and high value-adding tasks

Source: The Conference Board; EY-Parthenon analysis

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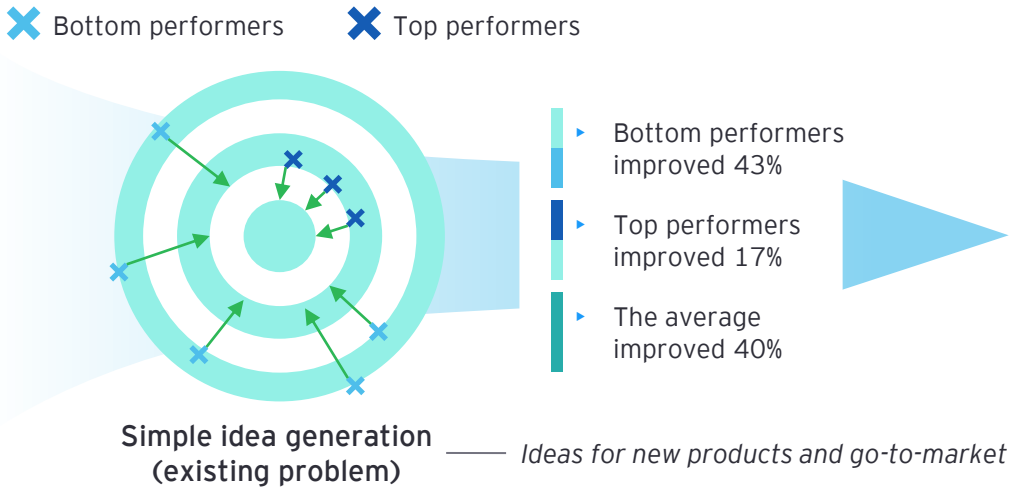
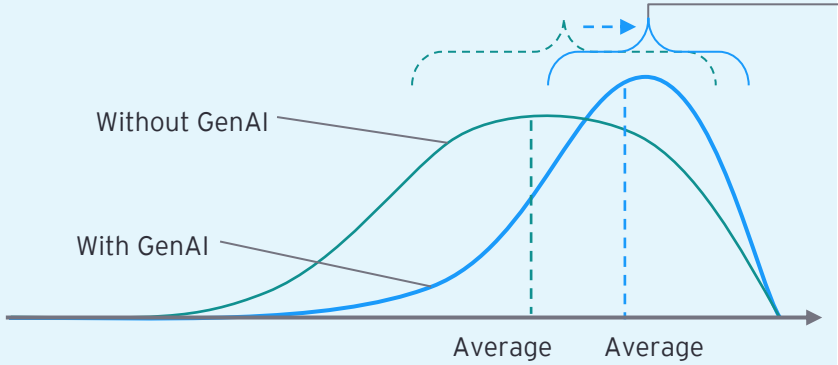
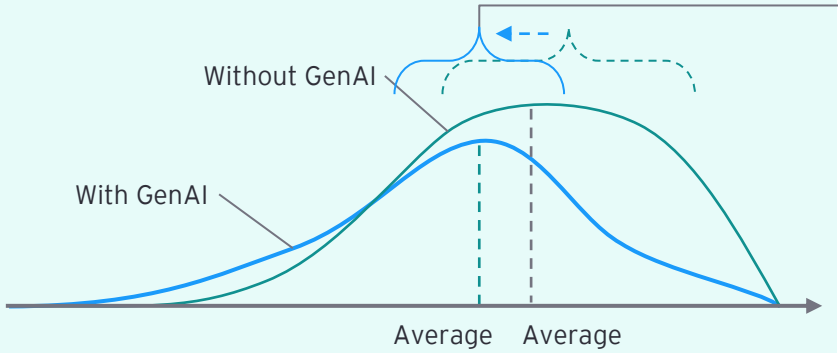
However, while GenAI improves output in some cases and allows the bottom performers to close in on top performers, in other cases it will harm the quality

GenAI enhanced performance on simple idea generation versus complex problem solving





- GenAI boosts the overall performance on creative product innovation where bottom performers benefit most



- For business problem solving GenAI impacts the overall results negatively where the bottom performers are also impacted most

GenAI also decreases the variance of the quality of the output of both creative product innovation and business problem solving

Source: Boston University Questrom School of Business, BCG, EY-Parthenon analysis

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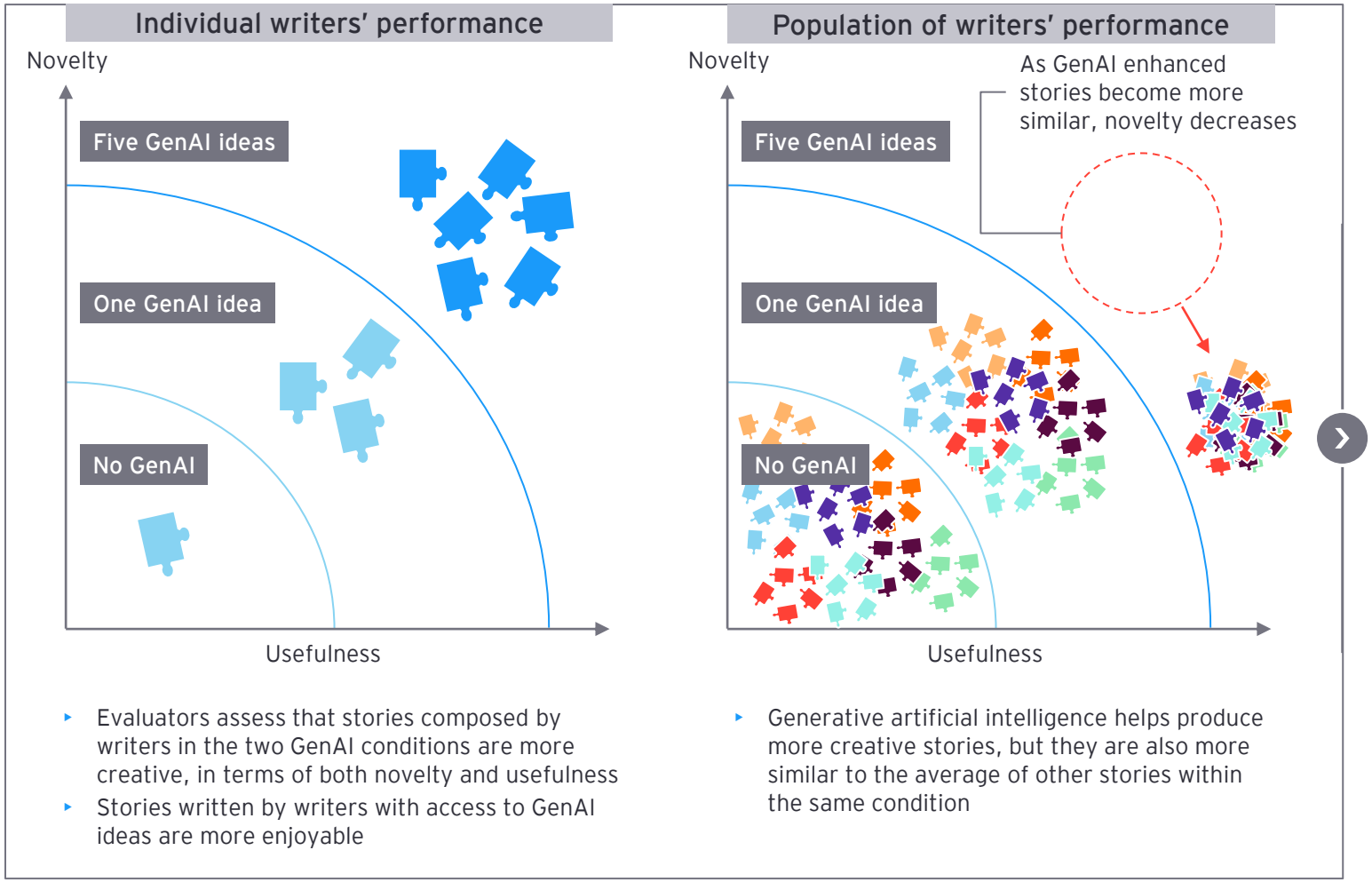
For creative ideation, more exposure to GenAI increases the quality but impairs the diversity of thought, leading to decreased novelty

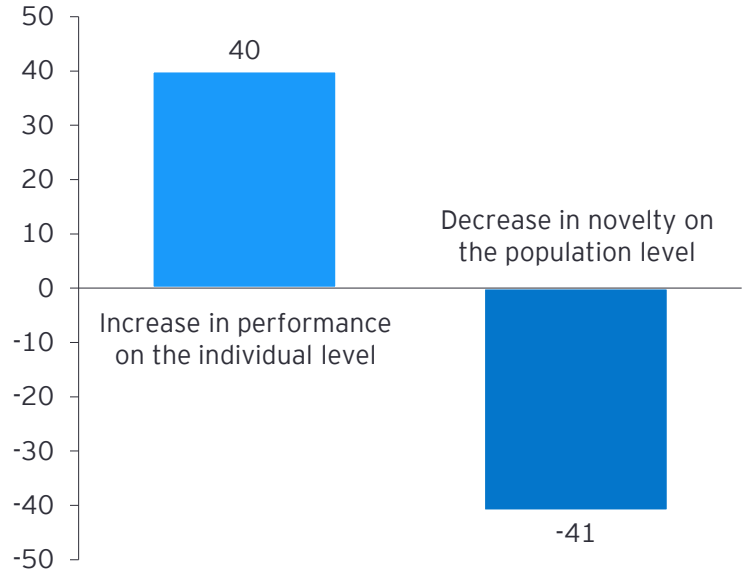
GenAI enhanced output by individuals vs a population



- Evaluators assess that stories composed by writers in the two GenAI conditions are more creative, in terms of both novelty and usefulness
- Stories written by writers with access to GenAI ideas are more enjoyable

- Generative artificial intelligence helps produce more creative stories, but they are also more similar to the average of other stories within the same condition

GenAI's impact on individual performance in connection to the impact on population novelty *(%)*



- GenAI boosts individual performance but may undercut population novelty

Source: UCL School of Management, London; University of Exeter; BCG; EY-Parthenon analysis

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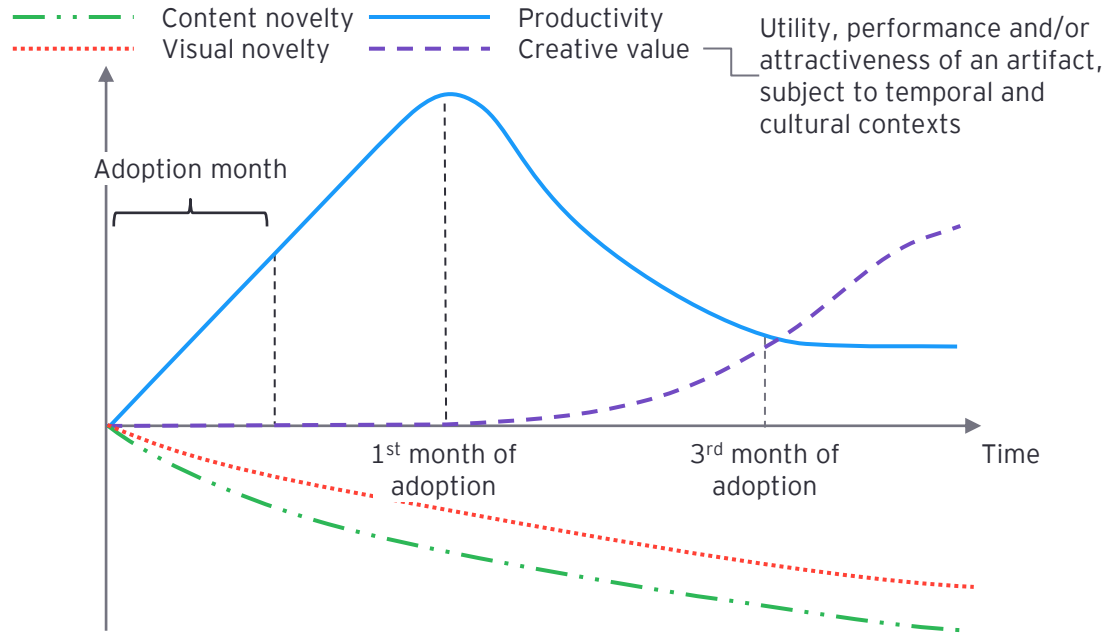
Over time, GenAI-enhanced content creation leads to consistently decreasing novelty; the initially positive impact on productivity and utility plateaus

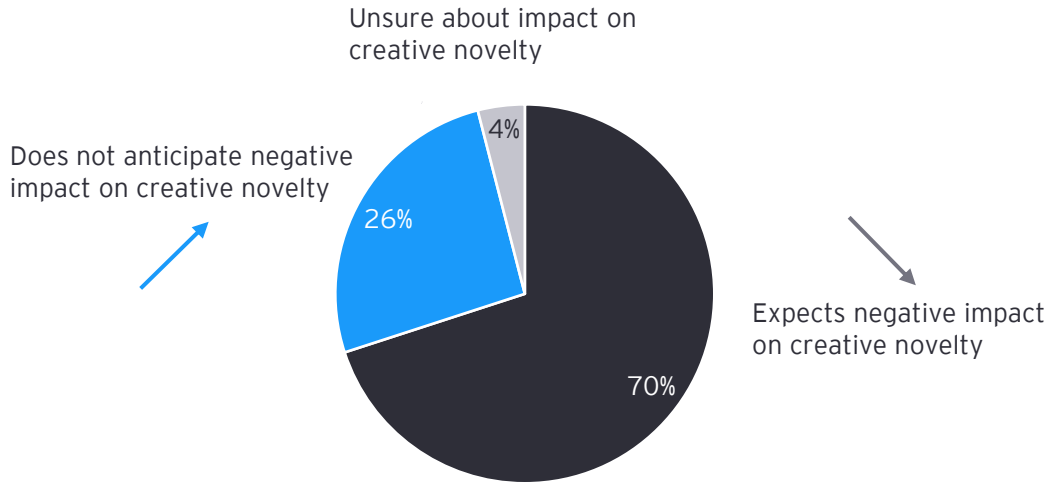
GenAI enhanced output over time

Artists' GenAI tool supported artwork output over time



- Overall productivity increases 100% during the adoption and first month and drops to 25% increase after three months in contrast to no GenAI enhancement
- Creative value increase is slow at first but improves after three months of GenAI adoption resulting in a significantly more valuable evaluation
- Content novelty decreases over time amongst adopters, meaning that the focal objects and themes within new artworks produced by AI adopters are becoming more similar over time when compared to untreated units
- Visual novelty decreasing over time means adopters converge to a preferred visual style from which they diverge little

Employees' expectations of long term GenAI impact on creative abilities



- Most employees expect that GenAI will negatively impact their creative abilities over time. This expectation is in line with the outcome of the study on artwork output when we look at content novelty and visual novelty
- Creative value in the left chart improves over time but individual's performance on creative abilities when GenAI is not used as support is expected by employees to have a negative impact

Source: Boston University Questrom School of Business, BCG, EY-Parthenon analysis

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Understanding for which problems and solutions GenAI is most applicable is crucial for implementation success

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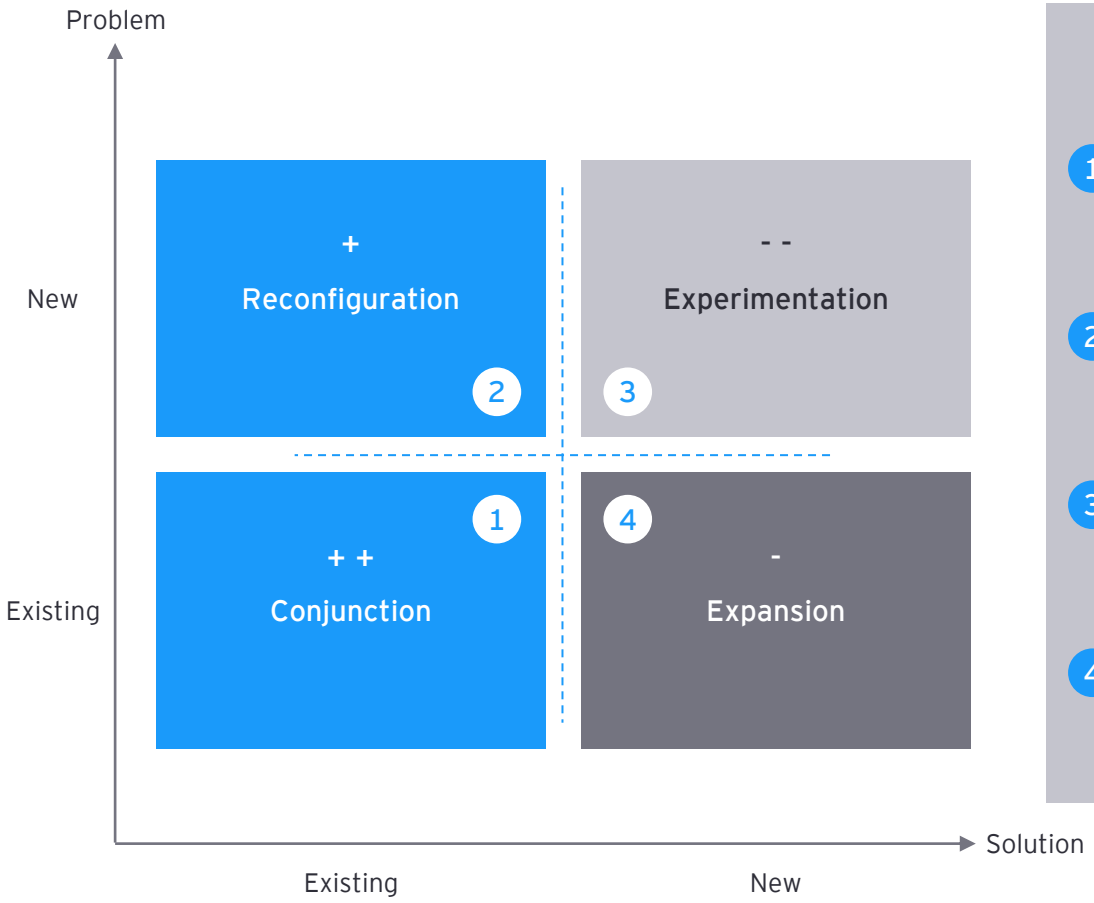
Beware of the hidden trap of convenience: superior results in Conjunction and Reconfiguration do not guarantee comparable output in Experimentation and Expansion



		Examples
1	**Conjunction** Existing knowledge is applied to existing problems resulting in quicker problem solving, hence causing a decrease in novelty	Retrieving information from a knowledge base in a Q&A style with a conversational look and feel
2	**Reconfiguration** Existing knowledge for new problems can work by supporting the problem solver to find new solutions	Propose code snippets for building new software products, supporting with best practices pieces of code
3	**Experimentation** Insufficient understanding of the problem requiring too much novelty, hence an iterative, creative approach required not suited for GenAI	New diseases that require completely new drugs with limited similarities with known diseases or viruses can be found
4	**Expansion** New solutions for existing problems create unfit solutions that seem clever on first sight but lure convenience to beat creativity	Business problem solving with constrained training data, resulting in generating too many, and too broad recommendations

Source: S. Kortmann, I. Mikhalev, 2023

Conjunction is the most suited problem-solution combination for GenAI, offering strong solutions for existing problems; however, also posing a high likelihood of convergence

The conjunction quadrant

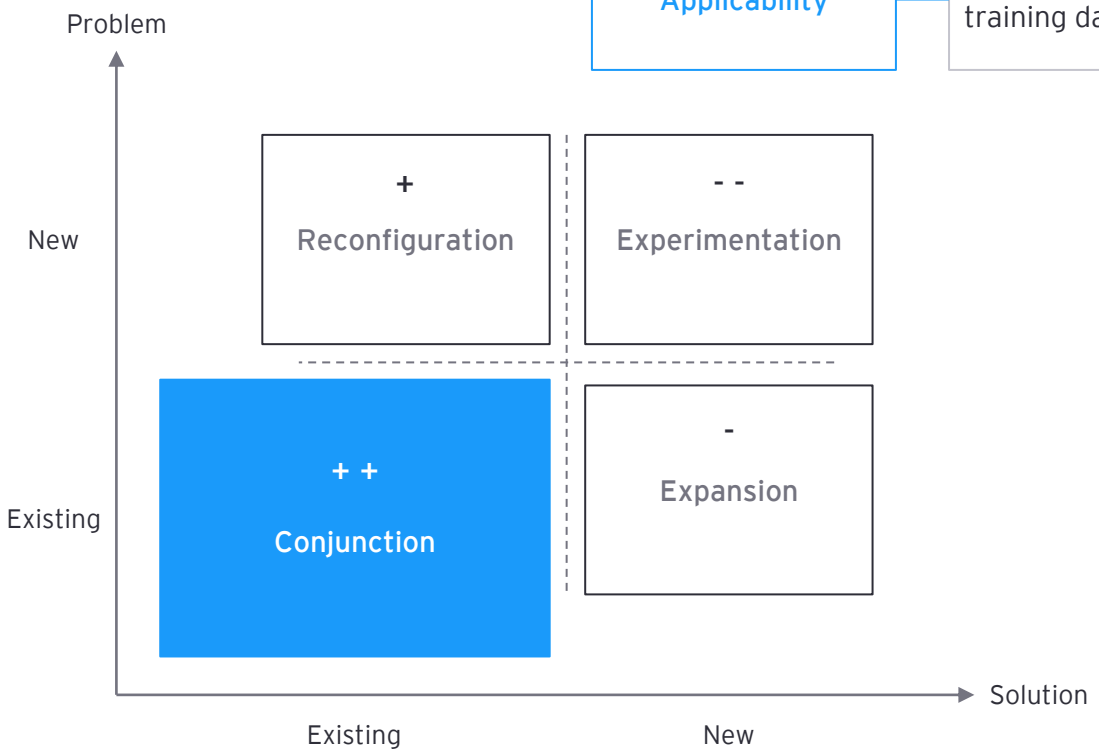
Conjunction

GenAI fit ✓ ✓

Works very efficiently as all required knowledge is contained in the training data. There exists a high likelihood for convergence of output due to the reuse of solutions from previously solved problems

Applicability

Simple tasks for which the information and causal relationship is definitely and exhaustively in the training data can be asked from GenAI and will result in significant efficiency gains



Supported use-cases	Existing solutions	Human skills
Ideation for marketing campaign content	Google searches Looking at older campaigns Generative text-to-image models	Creative thinking Design and user experience
Perform simple medical diagnosis	Doctor's analysis Medical AI software diagnosis	Analytical thinking Empathy and active listening
Translate languages	Professional translator Generative text-to-text models	Multi-lingualism Reading, writing and mathematics
Provide initial customer service	Telephone operator answering questions Customer service chatbots	Service orientation and customer service Empathy and active listening
Perform typical contractual analysis	Administrative staff	Analytical thinking Attention to detail

Source: EY-Parthenon analysis

EY Parthenon

Reconfiguration leverages the augmenting capabilities of GenAI, suggesting existing solutions to new problems, which can work if the user adjusts accordingly

The reconfiguration quadrant

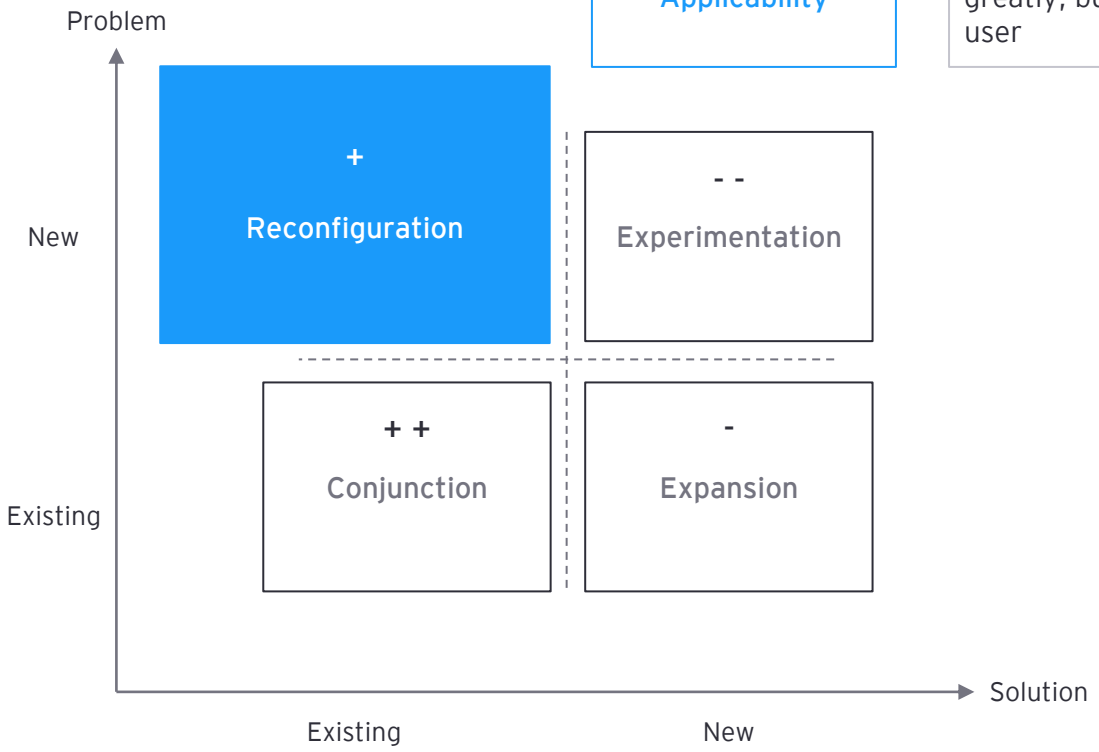
Reconfiguration

GenAI fit ✓

Can work to support but solution need to be adjusted by the user to the new problem

Applicability

For existing solutions to a new problem GenAI will provide a broad selection of options assisting greatly, but contextualization, prioritization and specification of the output must come from the user



Supported use-cases	Existing solutions	Human skills
Provide research assistance	Google Scholar searches Looking at other research Generative text-to-text models	Analytical thinking Technological literacy
Provide code assistance	Google and Stack Overflow search Coding manual search	Technological literacy Multi-lingualism Analytical thinking Programming
Assist in financial due diligence	Data visualization tools Old reports searching	Analytical thinking Technological literacy Quality control
Create game animations	Game designer drawing Game visualization software	Creative thinking Design and user experience
Visualize real estate designs	Architecture drawing Digital design software	Design and user experience Technological literacy

Source: EY-Parthenon analysis

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Experimentation use-cases are not well suited for GenAI as the problem is not understood by the model, resulting in an inability to formulate a fitting solution

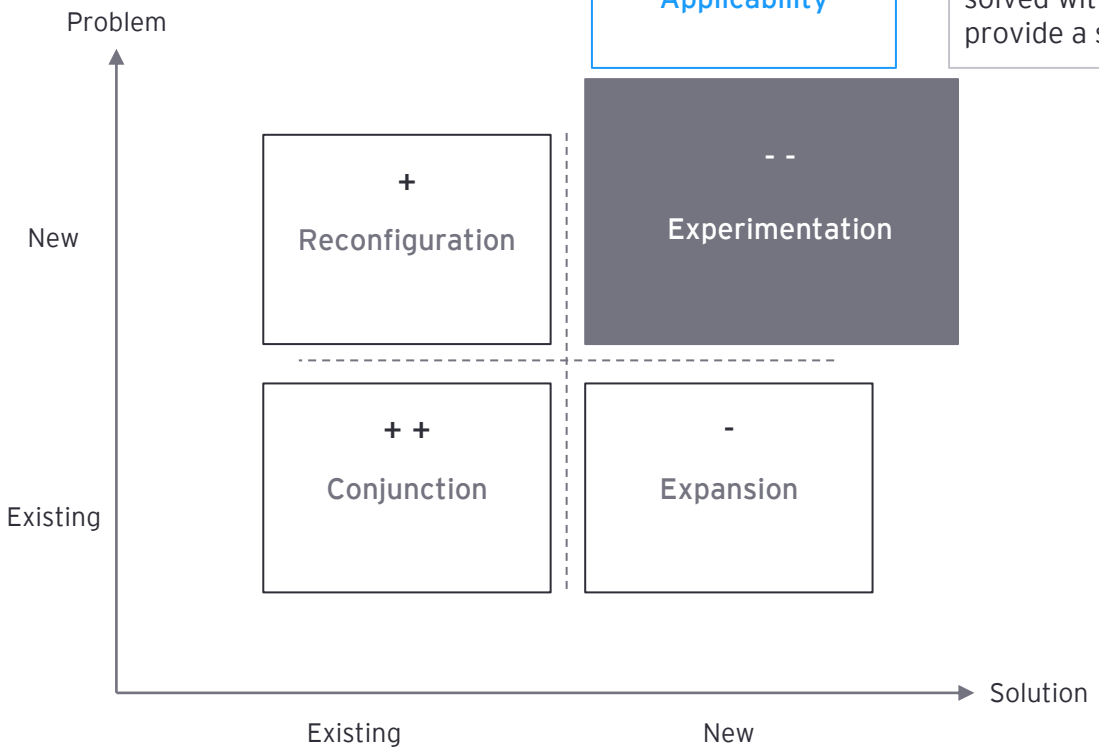
The experimentation quadrant

Experimentation

GenAI fit	
Applicability	

Does not work. There is insufficient understanding of the problem to define the best solution, hence an iterative, creative approach is required and current GenAI models should be avoided

Problems that are genuinely new or require a deep understanding of complex relations cannot be solved with GenAI (yet) as it lacks the required level of understanding of the problem and reason to provide a solution



Supported use-cases	Existing solutions	Human skills
Develop drugs for new diseases	Lab experiments Interdisciplinary ideation	Creative thinking Analytical thinking Curiosity and lifelong learning
Resolution of human crisis (e.g. war)	Scenario/uncertainty thinking Rapid reaction to unpredictable situations	System thinking Creative thinking Resilience, flexibility and agility
Counseling of deep personal issues	Psychologists with genuine empathy and understanding of complex human emotions	Empathy and active listening Resilience, flexibility and agility
Creation of artistic masterpieces	Unique creativity Personal expression Emotional experiences	Creative thinking Sensory-processing abilities
Mitigating impact of environmental shocks (e.g. natural disaster)	Understanding of complex ecological interrelationships Ecosystem problem solving	Abstract thinking System thinking

Source: EY-Parthenon analysis

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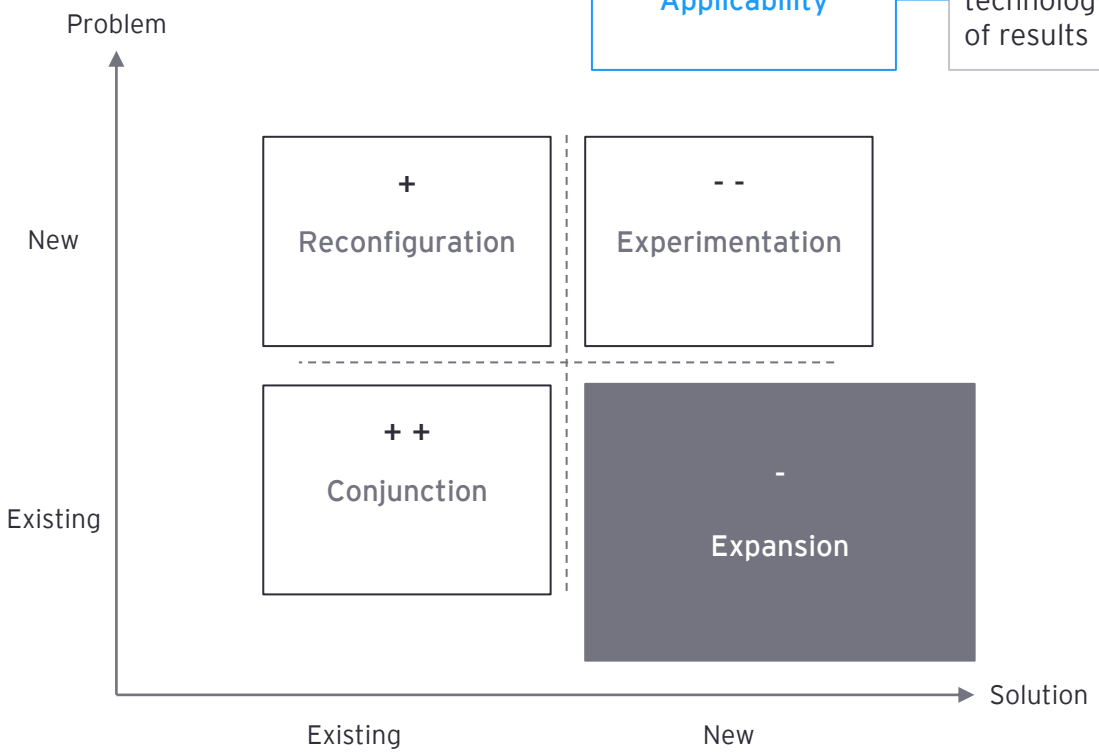
GenAI applied to Expansion use-cases is arguably harmful as it formulates a supposedly fitting answer while actually being unable to produce it, thus tricking the user into a wrong solution

The expansion quadrant

Expansion

GenAI fit ⊗	Does not work. Tendency to rely on GenAI and finding somewhat fitting solutions in no time; might carve out/reduce motivation to come up with truly innovative solutions
Applicability	Problems where a best solution to an existing problem is known are not (yet) fit for GenAI as the technology lacks the capabilities related to the contextualization, personalization and prioritization of results



Supported use-cases	Existing solutions	Human skills
▸ High-level strategic planning	▸ Scenario planning ▸ Root cause analysis ▸ Market and trend analysis	▸ Creative thinking ▸ Leadership and social influence ▸ System thinking
▸ Designing of personalized education	▸ Identify unique educational needs ▸ Learning style application	▸ Teaching and mentoring ▸ Empathy and active listening
▸ Interpretation of cultural differences	▸ Understanding of cultural nuances ▸ Interpretation of societal contexts	▸ Global citizenship ▸ Empathy and active listening
▸ Complex legal argumentation	▸ Complex legal analysis ▸ Argumentation with human intuition	▸ Analytical thinking ▸ Dependability and attention to detail
▸ Managing complex human to human relationships	▸ Complex human relationship management ▸ Morale and talent development	▸ Talent management ▸ Empathy and active listening

Source: EY-Parthenon analysis

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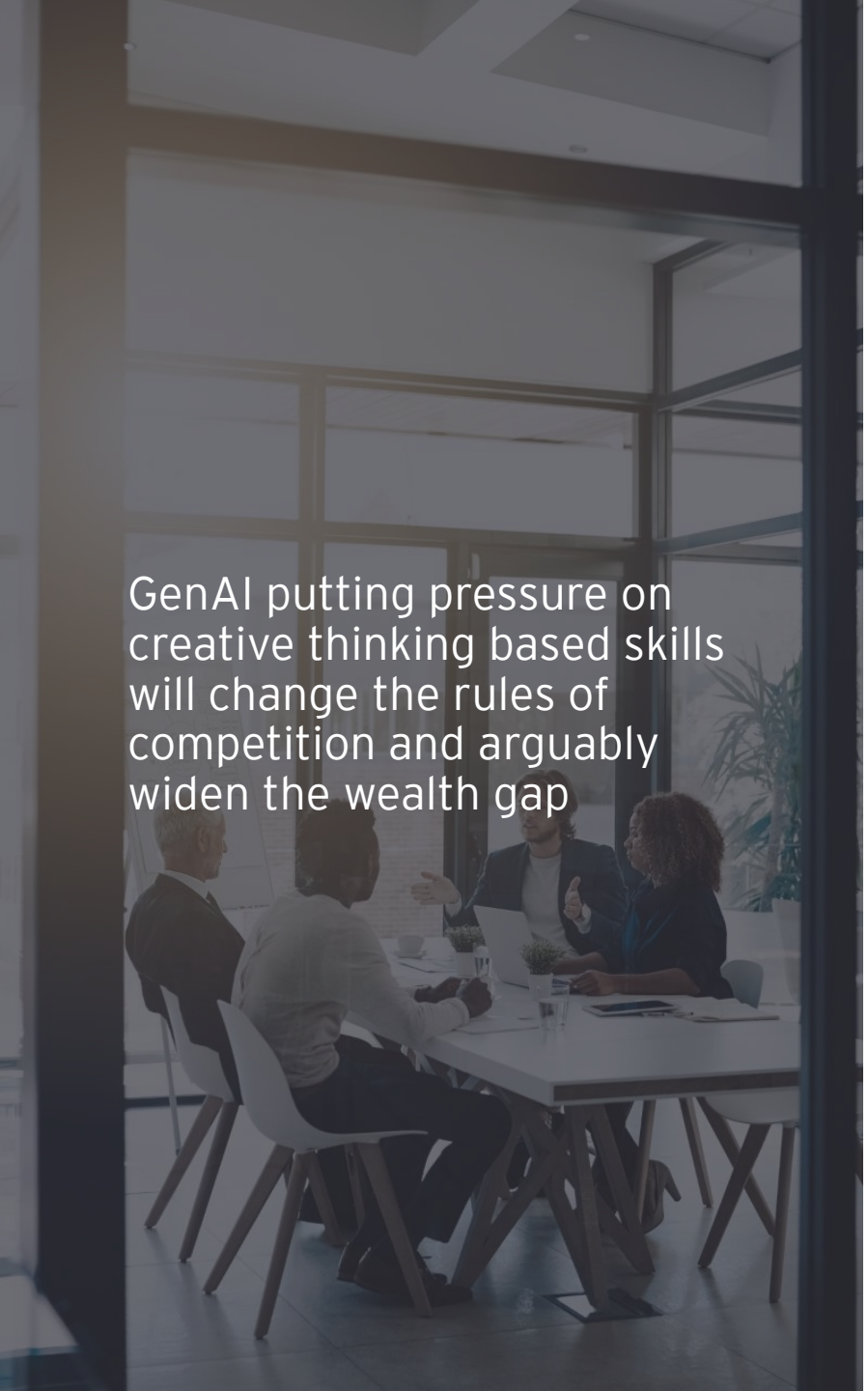

GenAI putting pressure on creative thinking based skills will change the rules of competition and arguably widen the wealth gap

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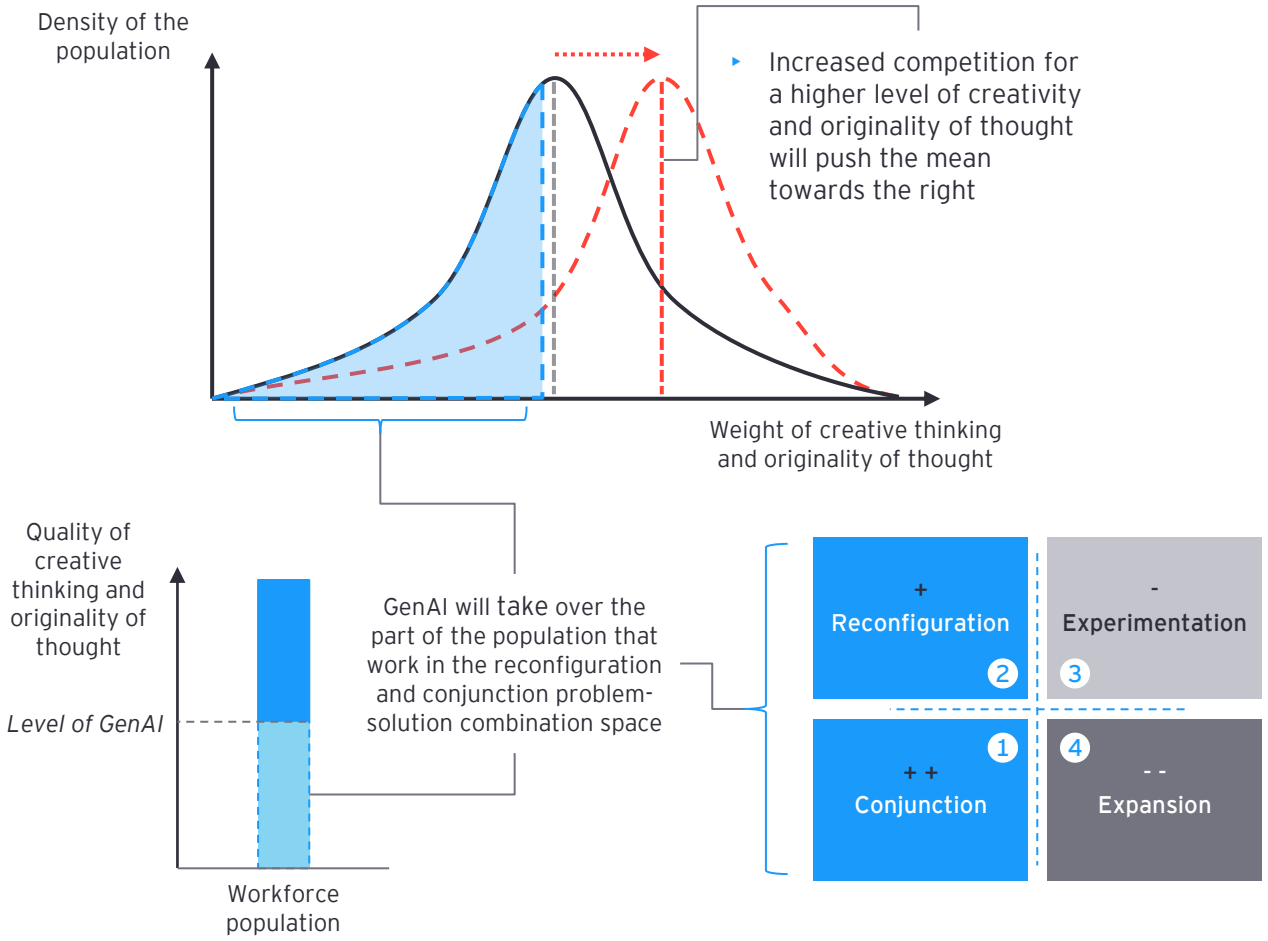
A significant part of the population's creative thinking and originality of thought will be substituted, shifting organizations' needs, widening the wealth gap and impacting education

The distribution of the workforce population on creative thinking and originality of thought



Strategic implications

- A greater proportion of outcomes will meet higher professional standards, yet converge in terms of novelty. Peak performers that create truly novel solutions and are able to solve complex (business) problems are becoming increasingly scarce

- Limited availability of exposure to the key environmental factors leading to the development of creative thinking based skills arguably widens the disparity in the capability to outperform GenAI on novelty and hence in the wealth gap

- Corporate reskilling, training, and creativity mobilization become major priorities to ensure the workforce's core skills remain competitive and synergistic with the new technological advancements

Source: EY-Parthenon analysis

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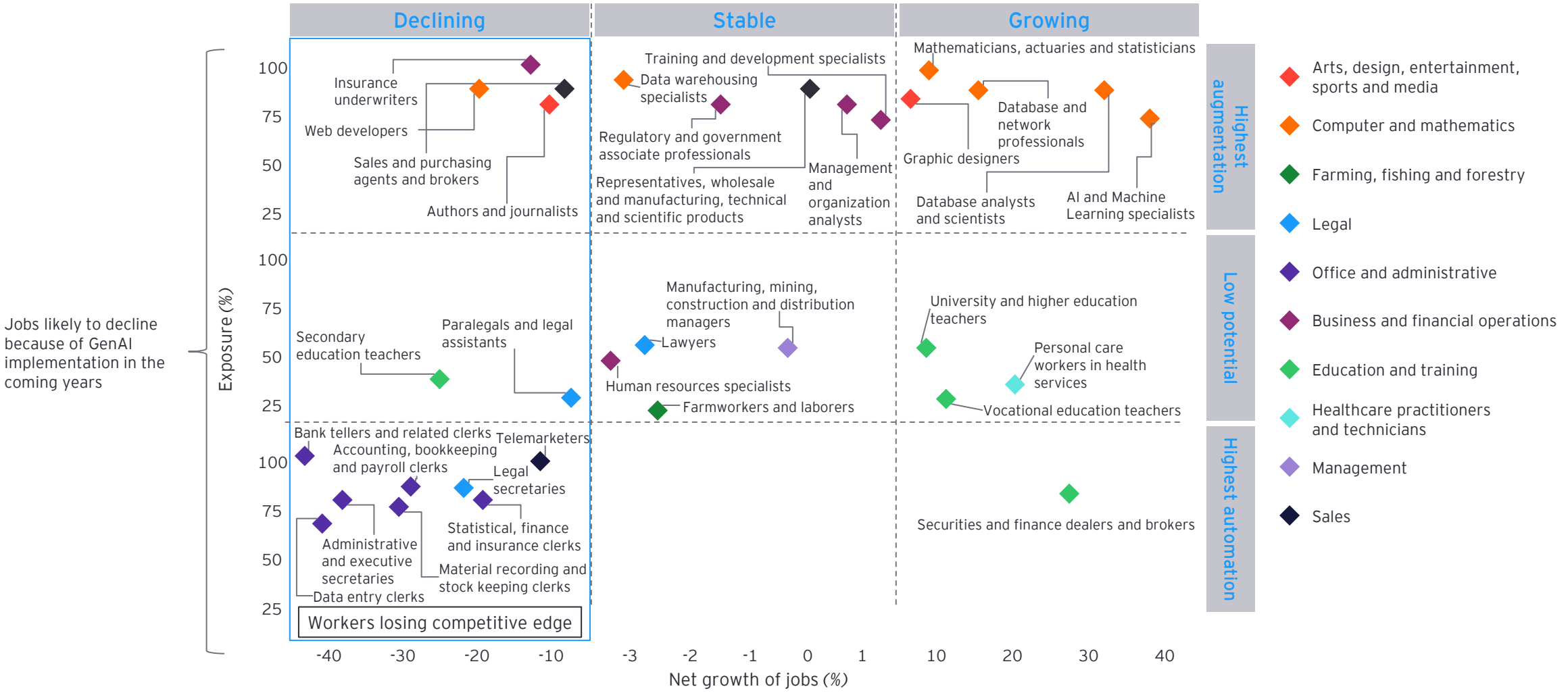
It is plausible that GenAI will push certain jobs out of the market and create opportunities for others, potentially resulting in a wider wealth gap

Job exposure potential vs growth potential in the coming years



Source: World Economic Forum; EY-Parthenon analysis

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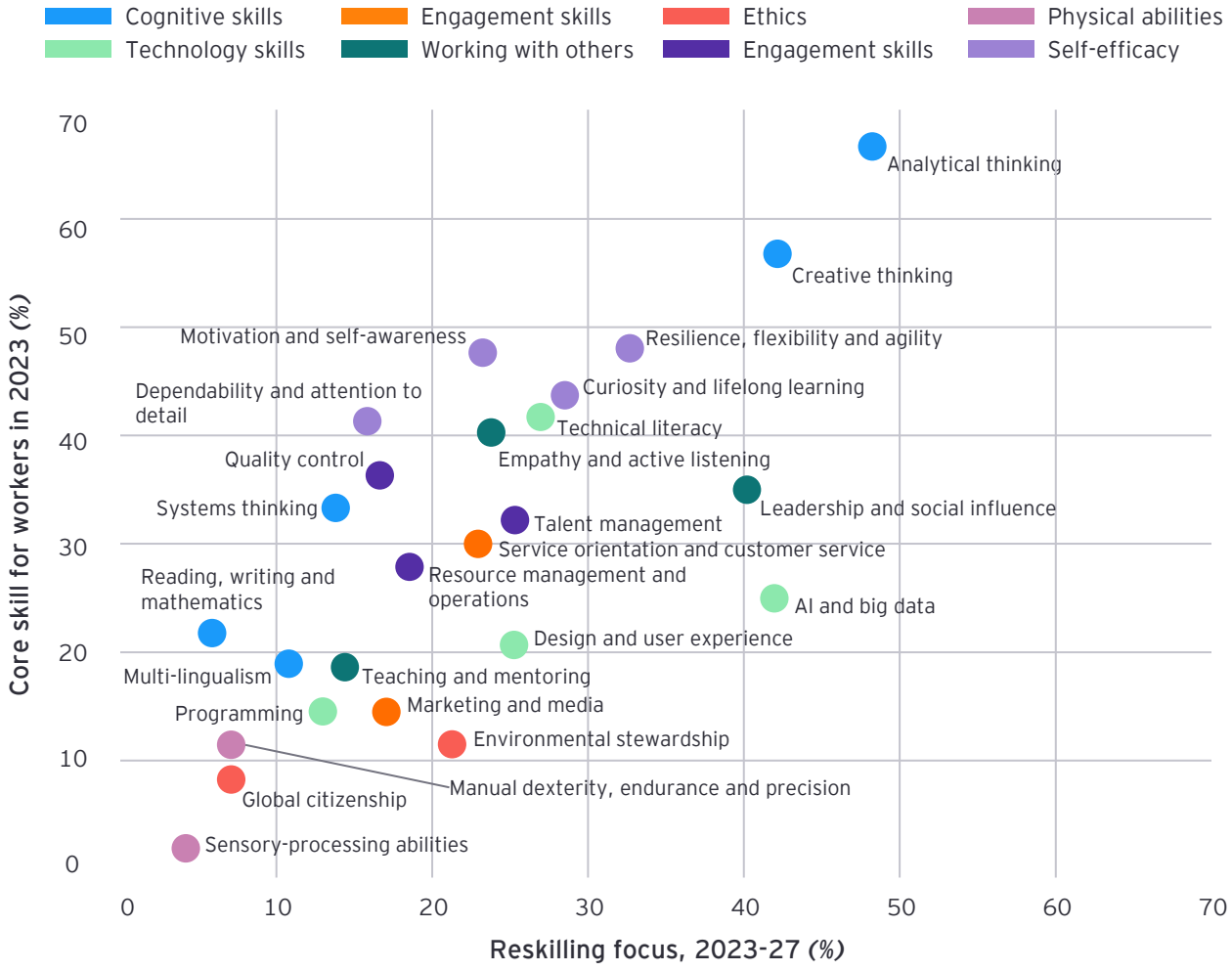
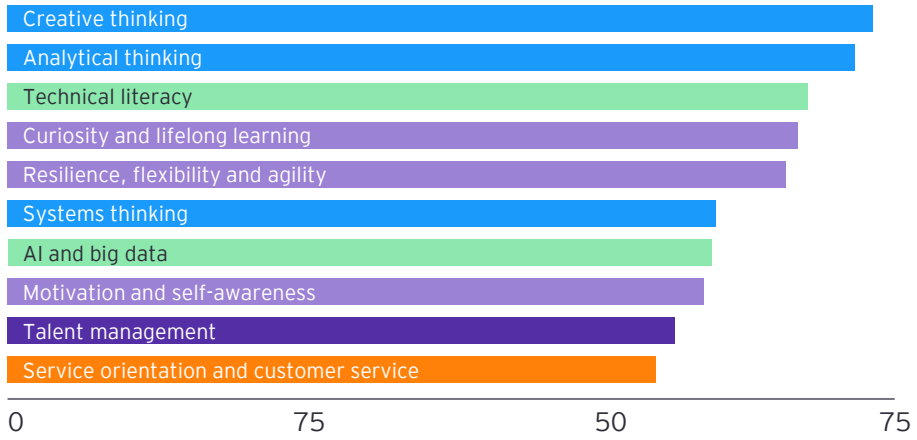
Catalyzed by the arrival of GenAI, companies will need to focus on specific reskilling initiatives in the upcoming years to improve their competitiveness

Core skills for the upcoming years

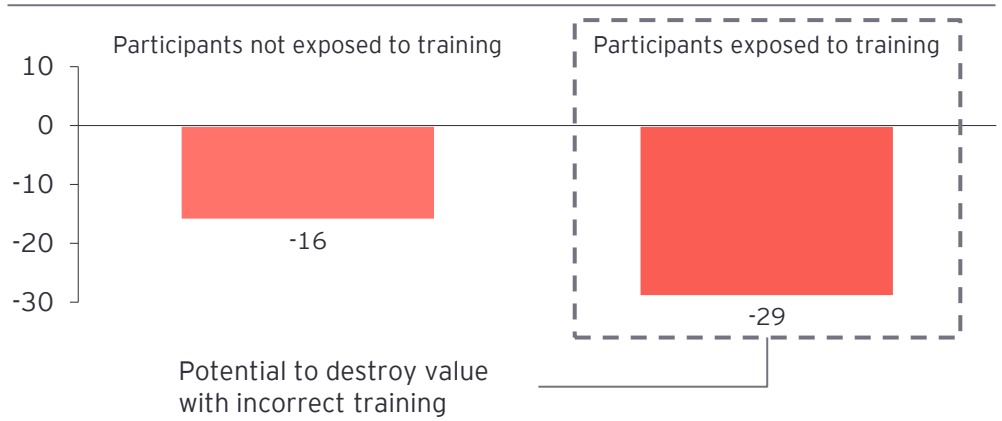


Top 10 skills increasing in importance 2023-27

(net % difference of share of organizations consider an increase or decrease)



Average change in individual performance on business problem solving with and without simple training *(%)*



Source: World Economic Forum; BCG; EY-Parthenon analysis

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November 28, 2023

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