

AI as an Opportunity for Businesses

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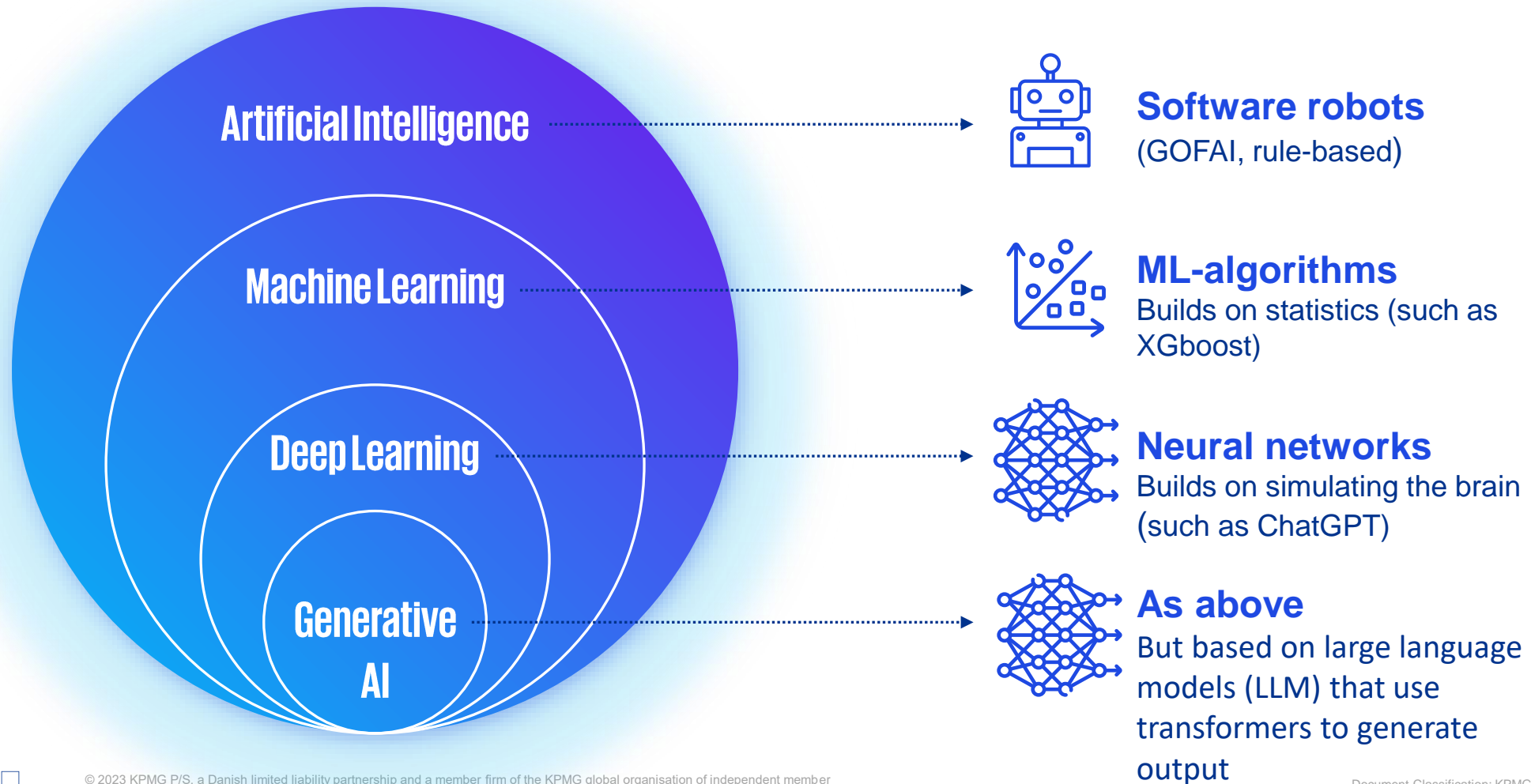
Meet me... or my replicant



- Partner, Nordic Head of NewTech
 - Global Head of KPMG Quantum hub
 - Mbr of Global Emerging Tech Advisor Council
 - MSc Computer Science and AI
 - BSc Mathematical Economics,
 - CD Business Administration
 - + Harvard and MIT studies
-
- AI work for Nordea, Lego, TDC, Danske Bank, Carlsberg, Nexi, Chamber of commerce, Novo Nordisk etc
 - Podcast host: Tech Talk KPMG
 - Fintech/AI Committee member @Finanstilsynet
 - External lecturer at CBS Board Education and at INSEAD Exec MBA
 - Head of IT-branchen NewTech Policy Board
 - Digital Wiseperson at Academy of Science
 - Founder of the professional ethical council
 - Board of Danish Quantum Community
 - Mbr of National Committee Save the Children

"AI is the ability of software to do tasks that are usually done by humans because they require human intelligence"

Britannica 2023




What is generative AI?

Generating text

OS

Give me a brief historical summary of Tallinn from 1900 - 2000 in two paragraphs.




Certainly!


From 1900 to 1940, Tallinn, the capital of Estonia, experienced significant political and social changes. At the beginning of the century, it was a part of the Russian Empire, but with the onset of the First World War and the subsequent Russian revolutions, Estonia declared its independence in 1918. Tallinn flourished during the interwar period, undergoing modernization and cultural development. However, this period was cut short when the Soviet Union occupied Estonia in 1940, leading to a period of Soviet occupation during World War II.

The post-war era saw Tallinn firmly under the control of the USSR in 1944. Soviet rule led to the Russification of the city, with Russian-speaking settlers and a suppression of Estonian language and culture. During the Second World War, Tallinn was strategically significant due to its location. In the late 20th century, a surge of nationalistic sentiment led to a series of events that culminated in Estonia's regained independence in 1991. In the 21st century, Tallinn re-embraced its unique identity, focusing on modernization and integration with the global economy.

Generating pictures out of text

 Midjourney Bot

containership flying above canal in futuristic fantasy city, sustainability, movie scene --ar 16:9 --v 5.0



Make Variations

Vary (Region)

Zoom Out 2x

Zoom Out 1.5x

Making pictures come alive

Midjourney



Gen-2 in Runway



Generating original music



Generative AI

What is ChatGPT / Large Language Models (LLM)?

How does it work?

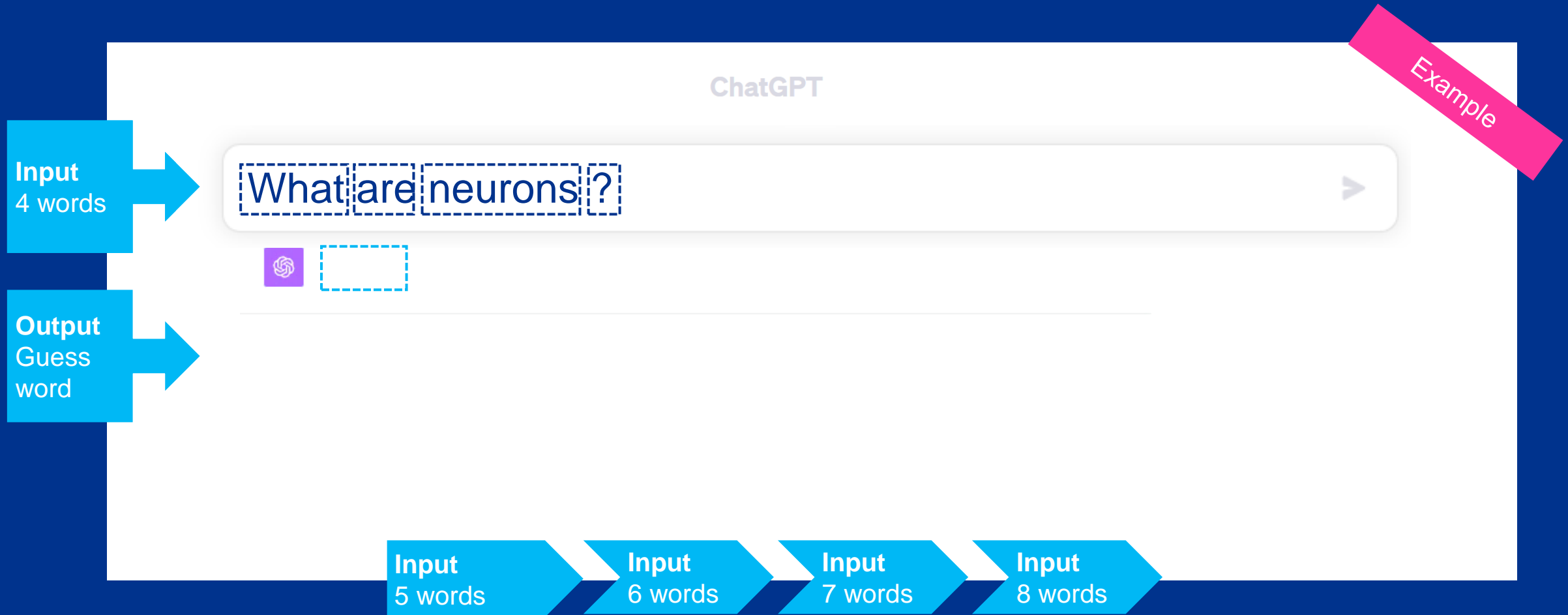
Input
4 words

What are neurons?

Example

What is ChatGPT / Large Language Models (LLM)?

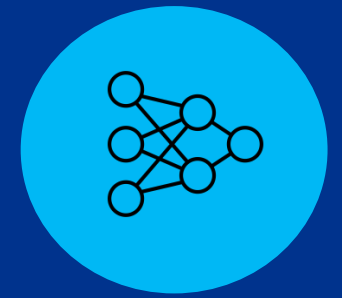
How does it work?



What happens when it guesses a word?



Human brain



Digital brain

It doesn't do any search or look up on the internet.

It just knows

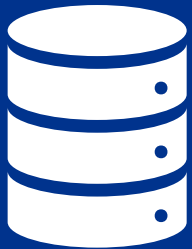
An LLM/ChatGPT is a deep neural network that has been **pre-trained** and is using **transformer architecture**

It's compartmentalized
It doesn't share information with other users, but based on settings any next pretrained version might share

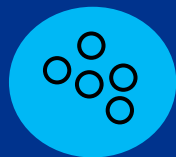
What happens when it guesses a word?

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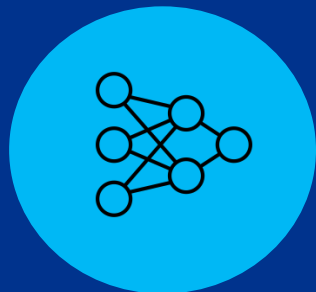
It just knows



Storage of conversations



New knowledge



Digital brain

An LLM/ChatGPT is a deep neural network that has been **pre-trained** and is using **transformer architecture**

It's **compartmentalized**
It doesn't share information with other users, but based on **settings** any next pretrained version might have the info

ChatGPT is an experienced assistant & partner

Prime the bot!



OS

Assume I am the CEO of a bank focussed on lending capital to small and medium sized corporations. Present me with a 3 step plan of how I can analyze my organization using the COSO Enterprise Risk Management Framework.



Absolutely! Utilizing the COSO Enterprise Risk Management (ERM) Framework, you can dissect your bank's risk profile, especially concerning lending to SMEs. Here's a straightforward three-step plan to analyze your organization:

Step 1: Define Objectives & Risk Appetite

a. Set Clear Objectives: Clearly articulate your bank's mission and strategic objectives in the SME lending sector. Are you looking for growth, market diversification, or innovation in the SME lending process?

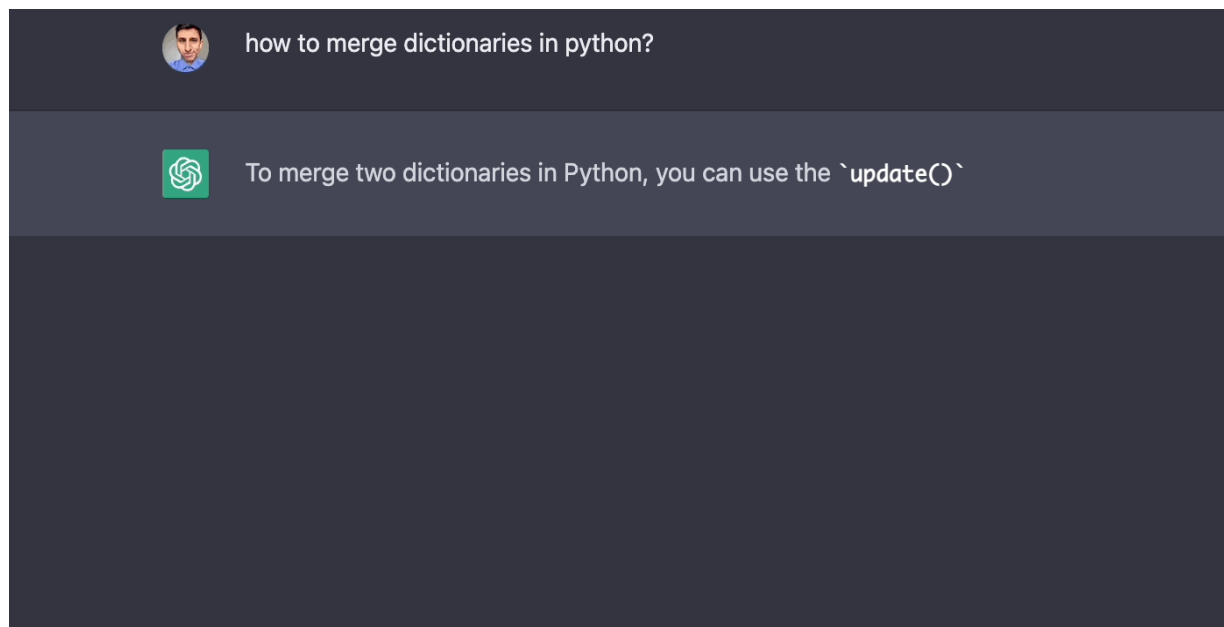
b. Determine Risk Appetite: Understand the amount of risk your bank is willing to accept to achieve its objectives. This involves quantitative measures (e.g., acceptable non-performing loan ratios) and qualitative aspects (e.g., reputation).

c. Align with Stakeholders: Gather input from key stakeholders, including board members, senior management, loan officers, and even a representative sample of SME clients, to ensure alignment in objectives and perceived risks.

Step 2: Risk Identification & Assessment

And It keeps going!

Example: IT-work about 50% productivity uplift



“ *In 5 years 80% of all code will be written by large language models*

“ *It happens way before and the productivity uplift is higher*
- Bent Dalager

ChatGPT-3.5: a respectable tutor for quantitative risk management?

Assessing ChatGPT's Proficiency in Quantitative Risk Management

Abstract

The purpose and novelty of this article is to investigate the extent to which artificial intelligence chatbot ChatGPT can grasp concepts from quantitative risk management. To this end, we enter a scholarly discussion with ChatGPT in the form of questions and answers, and analyze the responses. The questions are classics from undergraduate and graduate courses on quantitative risk management, and address risk in general, risk measures, time series, extremes and dependence. As a result, the non-technical aspects of risk (such as explanations of various types of financial risk, the driving factors underlying the financial crisis of 2007 to 2009, or a basic introduction to the Basel Framework) are well understood by ChatGPT. More technical aspects (such as mathematical facts), however, are often inaccurate or wrong, partly in rather subtle ways not obvious without expert knowledge, which we point out. The article concludes by providing guidance on the types of applications for which consulting ChatGPT can be useful in order to enhance one's own knowledge of quantitative risk management (e.g., using ChatGPT as an educational tool to test one's own understanding of an already grasped concept, or using ChatGPT as a practical tool for identifying risks just not on one's own radar), and points out those applications for which the current version of ChatGPT should not be invoked (e.g., for learning mathematical concepts, or for learning entirely new concepts for which one has no basis of comparison to assess ChatGPT's capabilities).

“ *Non-technical aspects of risk (...) are well understood by ChatGPT*

“ *More technical aspects (such as mathematical facts) (...) are often inaccurate*

Hofert, Marius. 2023. "Assessing ChatGPT's Proficiency in Quantitative Risk Management" *Risks* 11, no. 9: 166. <https://doi.org/10.3390/risks11090166>

Classic GPT4. Teach me about Value at Risk (VaR)



Explain the core principles of Value At Risk. Explain it to me like I was 17 years old. Give me an example of Value At Risk.



Alright! Let's talk about Value At Risk, commonly known as VaR.



What is VaR?

Imagine you've saved up some money from your part-time job and decided to invest it in the stock market. Now, just like in any investment, there's a chance you might lose some of that money. VaR is a fancy way of saying, "Based on past patterns, this is the most money I could expect to lose over a certain period for a given confidence level."

Core Principles of VaR:

1. **Time Period:** VaR is always associated with a specific time frame. For example, a day, a month, or a year.
2. **Confidence Level:** It tells you the probability that your losses won't exceed the VaR amount. Common confidence levels are 95% or 99%.
3. **Loss Amount:** This is the actual VaR number – the maximum loss you might face.

GPT4: Advanced data analysis explaining sudden high inflation

OS



Food price inflation World Bank.xlsx
Spreadsheet

I have attached a data sheet consisting of Food Consumer Price Inflation. Give me an brief summary of the development of Food Consumer Price Inflation for Estonia and how the inflationary development may have been affected by global developments.



The plot provides a visual representation of the Food Consumer Price Inflation for Estonia from 1970 to 2022. Here are some observations:

- Early Years (1970s to 1990s):** There's missing data for the initial years until the early 1990s. This is possibly due to Estonia regaining its independence from the Soviet Union in 1991, and data prior to this might not be available or accurate.
- Post-Independence (1990s):** There's a noticeable spike in inflation during the 1990s, especially in the mid-90s. This can be attributed to the economic transition Estonia underwent after gaining independence. During this period, many post-communist countries experienced high inflation due to factors like price liberalization and monetary expansion.

GPT4: Advanced data analysis showing 2008-crisis and covid crisis

3. **2000s to 2010:** Inflation seems to stabilize and even decrease during the early 2000s.

However, there's another noticeable spike around 2008. This could be related to the global financial crisis, which affected economies worldwide.

4. **2010 onwards:** Post-2010, inflation appears to be more stable with some fluctuations.

There's another rise around 2021-2022, which might be influenced by global events such as the COVID-19 pandemic and its economic repercussions.

To further understand the influence of global developments on Estonia's inflation, let's compare Estonia's inflation trends with the global average over the same period.

Finished working

Show work ▼



The comparison between Estonia's Food Consumer Price Inflation and the global average from 1970 to 2022 reveals some insights:

GPT4: Advanced data analysis helping risk managers with assessing Tallinna Kaubajama using their latest annual report



You have read the risk part of the annual statement. What can you say about their view on risk management. What are 3 things that I should look further into as a risk manager in a bank?



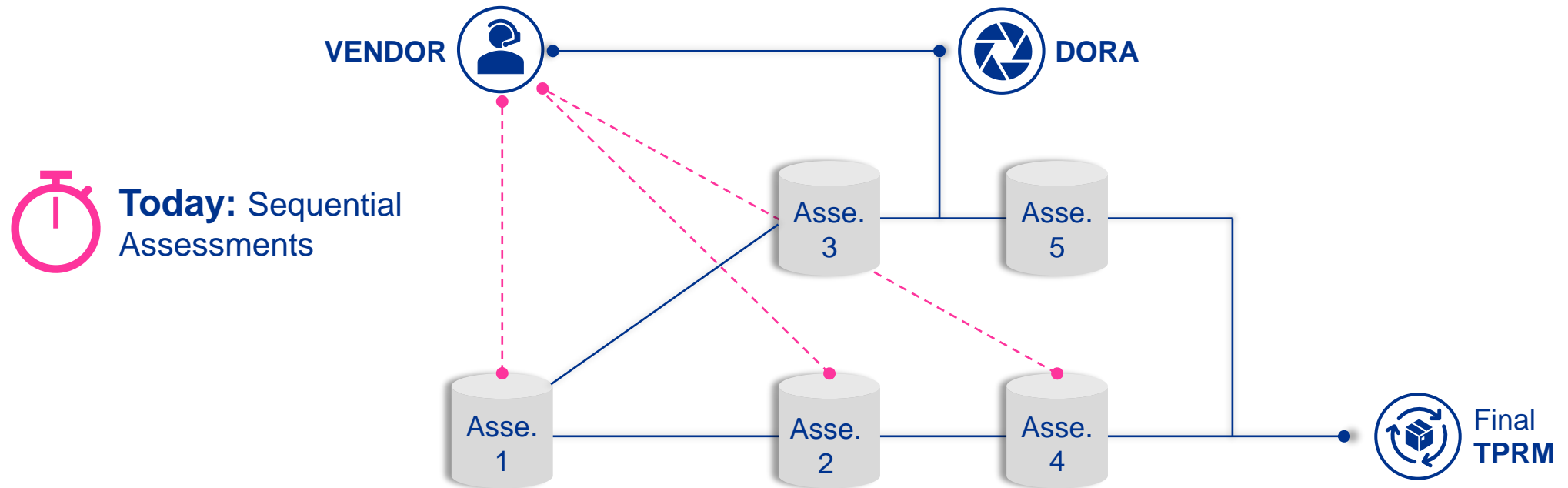
Their View on Risk Management:

Tallinna Kaubamaja Grupp places significant emphasis on risk management, as an integral part of their overall business strategy. They focus on achieving an optimal balance between potential losses or profits and the resources allocated for risk management. Their approach leans towards proactive prevention of risks rather than reactive measures. The company employs a standardized methodology for risk identification, assessment, prioritization, and treatment, suggesting a structured and well-thought-out approach to managing business risks.

Three Areas for Further Investigation:

- Methodology and Tools:** The report mentions that the Group uses a "common methodology" for risk management. As a risk manager in a bank, you might want to understand the specifics of this methodology. Are they using any particular risk models, software, or other tools that could be beneficial for a financial institution?
- Risk Types and Scenarios:** The report is not specific about the types of risks that the company considers (e.g., market risk, credit risk, operational risk, etc.). Given that retail and wholesale trade have different risk profiles compared to banking, understanding their risk landscape could offer insights into managing non-traditional risks that might be applicable to a bank.
- Metrics and KPIs:** The report states that the ability to "identify, measure, and control" risks impacts the Group's profitability significantly. Understanding what metrics or KPIs (Key Performance Indicators) they use to quantify risk and its impact could provide a more

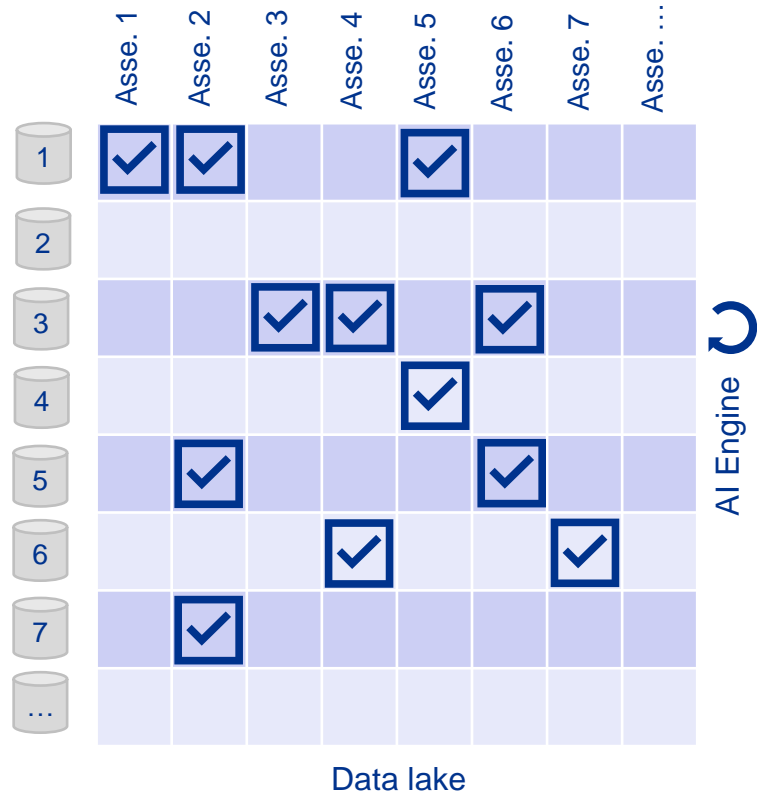
Leveraging AI in Third Party Risk Management – An example



Leveraging AI in Third Party Risk Management – An example

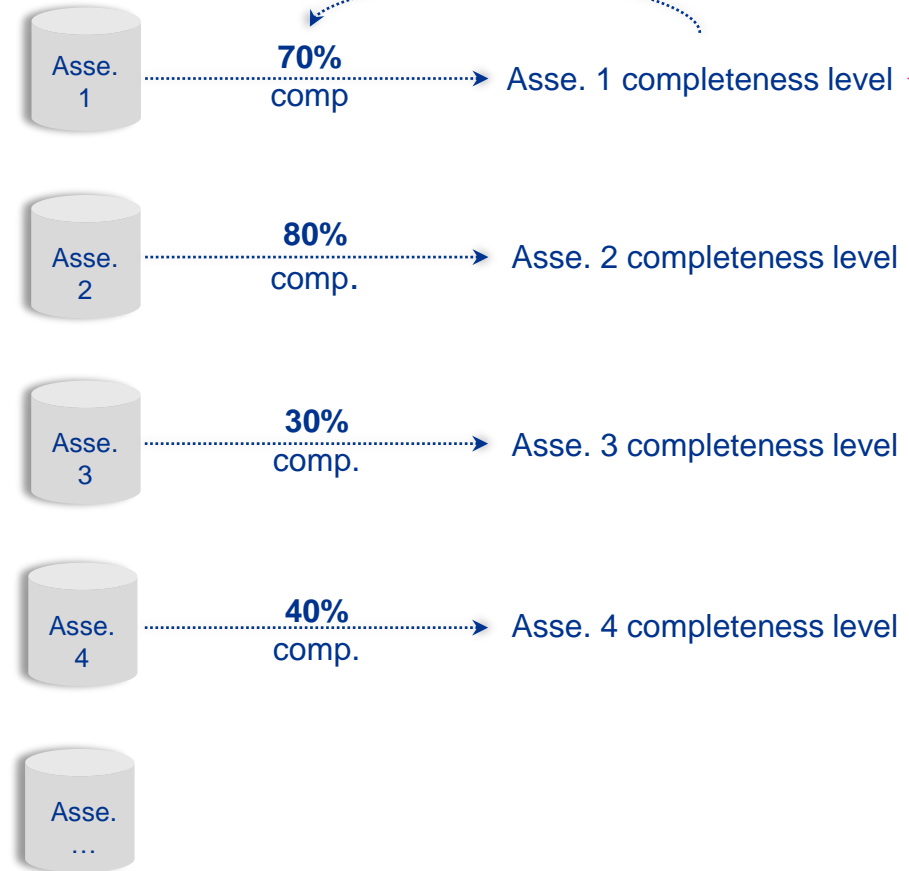


Tomorrow:
Parallel
assessments



Vendor

AI Orchestration generates high completion rates:
70% → 80% → 90%



Leveraging quantum technologies for VaR (Value At Risk)



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Quantum is a description of
the world on the smallest **Scale**

Nature behaves *strange*
when we go subatomic

Quantum technology takes
advantage of these effects

There is business **value**

Three possible roads to quantum optimization:



**Gate Based
Quantum Computing**

QUBO

QAOA



**Quantum
Annealing**

QUBO

**Special purpose
quantum hardware**



**Quantum Inspired
Optimization**

QUBO

**Classical hardware &
classical solvers**

Focus on Financial Services: risk management



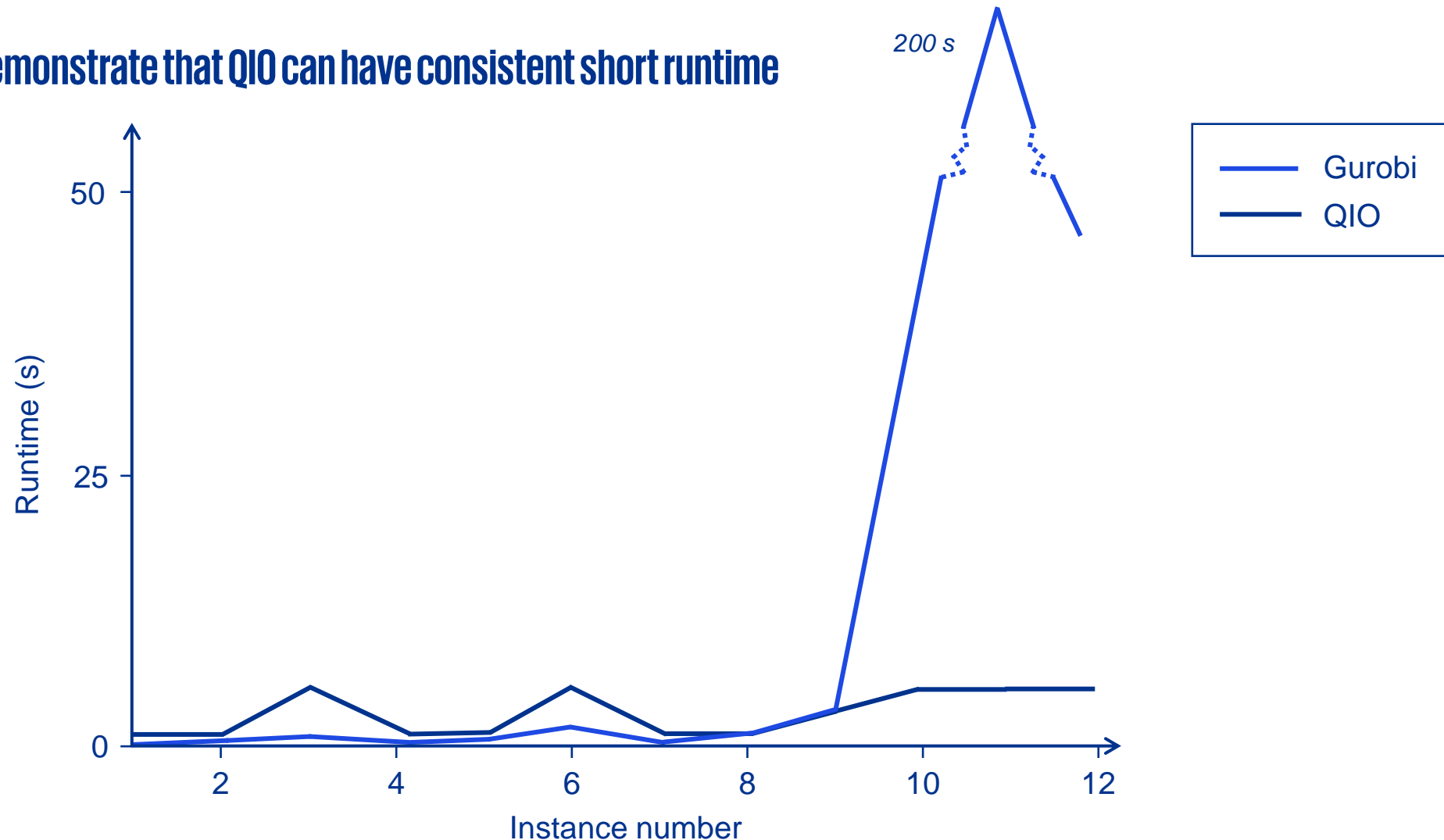
The client wished to find an **optimal hedging strategy** for a certain portfolio to **minimize risk**

Re-casting the minimization problem into a mathematical form suitable for **Quantum Annealers** allowed **better solutions** to be found by examining a larger solution space

10% Value-at-Risk improvement compared to existing approach, realized using **Quantum Inspired Optimization**

Using quantum computing enables much larger problems to be solved

Examples demonstrate that QIO can have consistent short runtime



ChatGPT3.5 failed a master's degree exam. GPT4 gets 12!

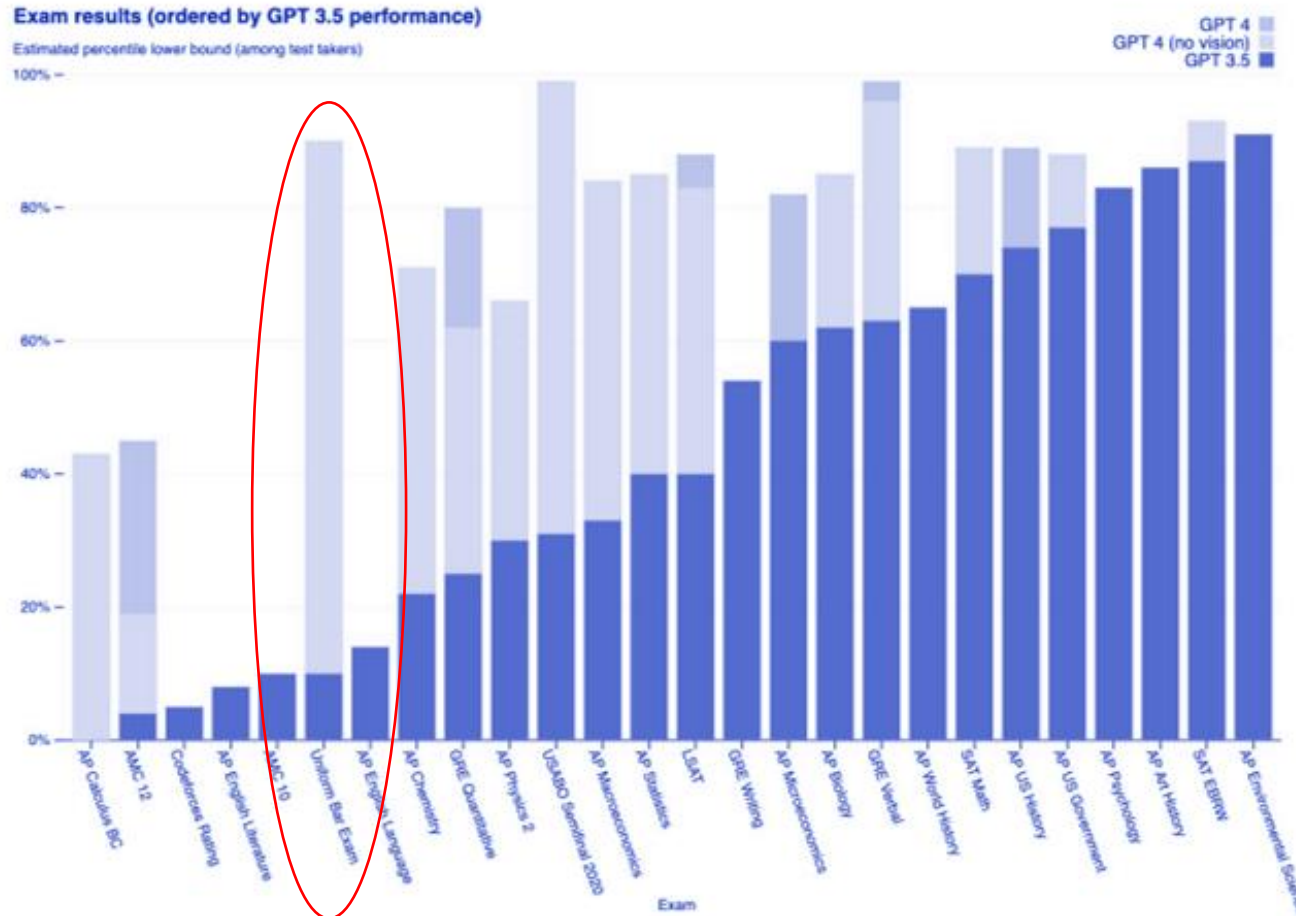



Figure 1: To get a sense of how quickly model capabilities are progressing – consider the jump in exam performance between GPT-3.5 and GPT-4 (OpenAI, 2023b).

The future: We have just started. The models get a lot better



GPT 3.5
Nov.
2022



175.000.000.000

GPT4: Advanced data analysis can make machine learning models. Here it creates a credit risk model based on a data set



Please build a simple credit risk model based on the data set



Finished working

Show work ▼

I've built a simple credit risk model using a Random Forest Classifier. Here are the evaluation metrics based on the test set:

Evaluation Metrics

1. **Accuracy:** 83.5%
2. **Confusion Matrix:**
 - True Negative: 167
 - False Positive: 1
 - False Negative: 32
 - True Positive: 0
3. **Classification Report:**
 - Precision for Default (1): 0.00
 - Recall for Default (1): 0.00
 - F1-Score for Default (1): 0.00
 - Precision for No Default (0): 0.84
 - Recall for No Default (0): 0.99
 - F1-Score for No Default (0): 0.91

While the model shows a high accuracy of 83.5%, it's important to note that it failed to correctly identify any of the default cases (True Positive = 0). This is likely due to the imbalance in the dataset, where the majority of cases are non-default.

Go from problem solving to asking the right questions

Problem-finding is the new premium skill

The most essential human skill is going to shift from problem-solving to problem-finding.

This contrasts with how workplaces have functioned since the Industrial Revolution. For decades, the emphasis has been on taking an obvious problem and finding an unobvious solution. But AI — when combined with human ingenuity — has unprecedented problem-solving power, so much so that it may free humans to spend more time in creative pursuits. The real challenge of applying AI productively is going to be “use case” discovery: identifying cross-disciplinary urgent problems that are best suited to AI technology.

One good illustration of a surprising application of AI is boosting the productivity of salmon farming — a crucial step towards promoting sustainable aquaculture. Fish farmers are now using AI and machine perception tools (that can take in and process sensory information) to automate feeding time in accordance with the hunger levels of the fish. This reduces wasted feed, trimming a significant carbon emissions source, while improving salmon growth metrics.

A recent collaboration between Tidal AI (a project inside X, Alphabet’s Moonshot Factory) and Cognizant will build on the initial success and expand to other sectors of what’s known as the Blue Economy, including shipping and

World Economic Forum 2023

The second Copernican revolution: AI-centricity!





Let's connect!



Bent Dalager ✓ · 1.

Head of Innovation. Nordic Head KPMG NewTech. Global Head KPMG Quantum hub. Ext lecturer INSEAD+CBS. Mbr of prof. ethics council, Board of IT-branchen and Danish Quantum Society. Fintech Advisor Finanstilsynet(FSA).



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