



ITEA Topical roadshow
Large Language Models
Generative AI for the
software development
life cycle

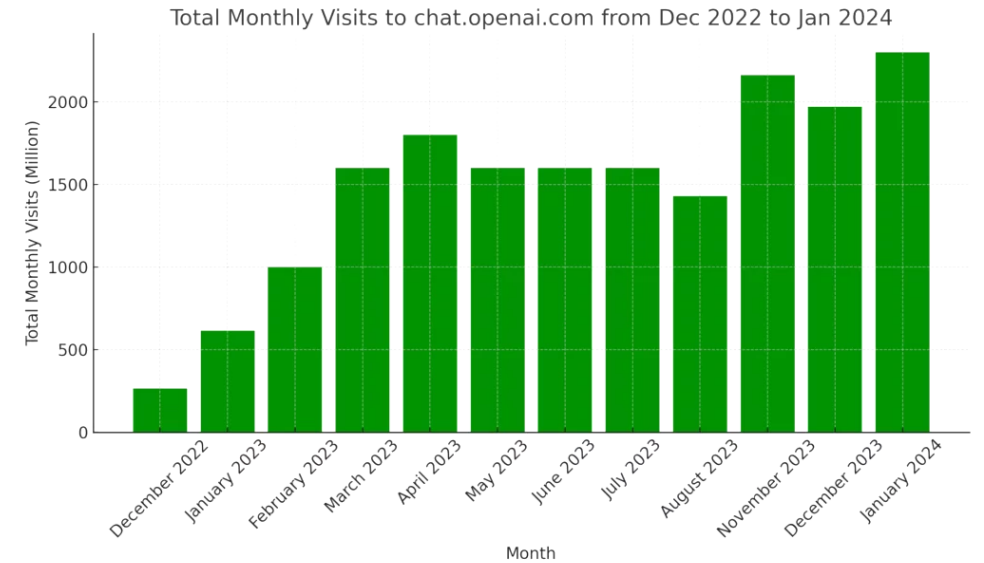
26 March 2024 | Online
Robin Gröpler (IFAK)

Motivation

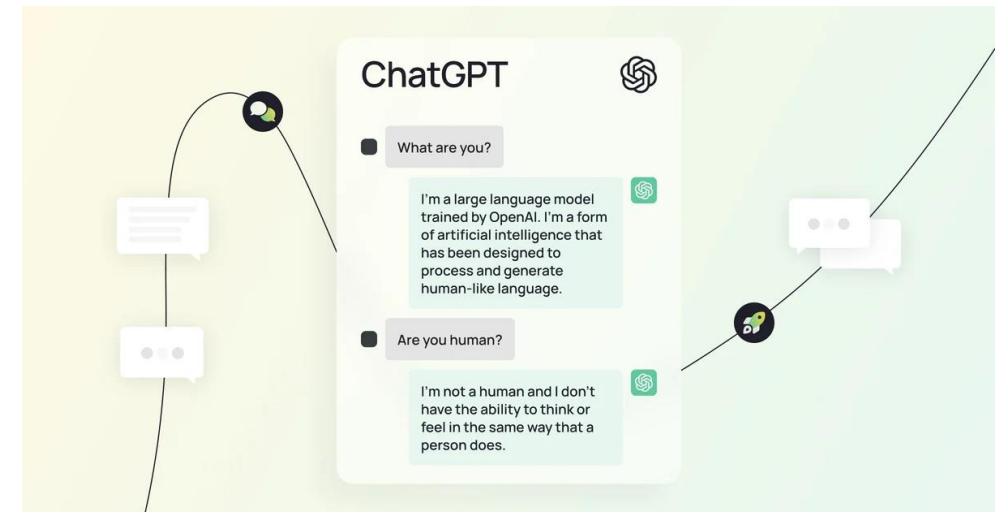
“ChatGPT” moment

Large Language Models such as ChatGPT are a breakthrough in AI!

- Improved generalization capabilities without task-specific fine-tuning
- Perform well on tasks with minimal or no task-specific training data
- Contextual understanding
- Fast human-like feedback and dialogues



<https://nerdynav.com/chatgpt-statistics/>

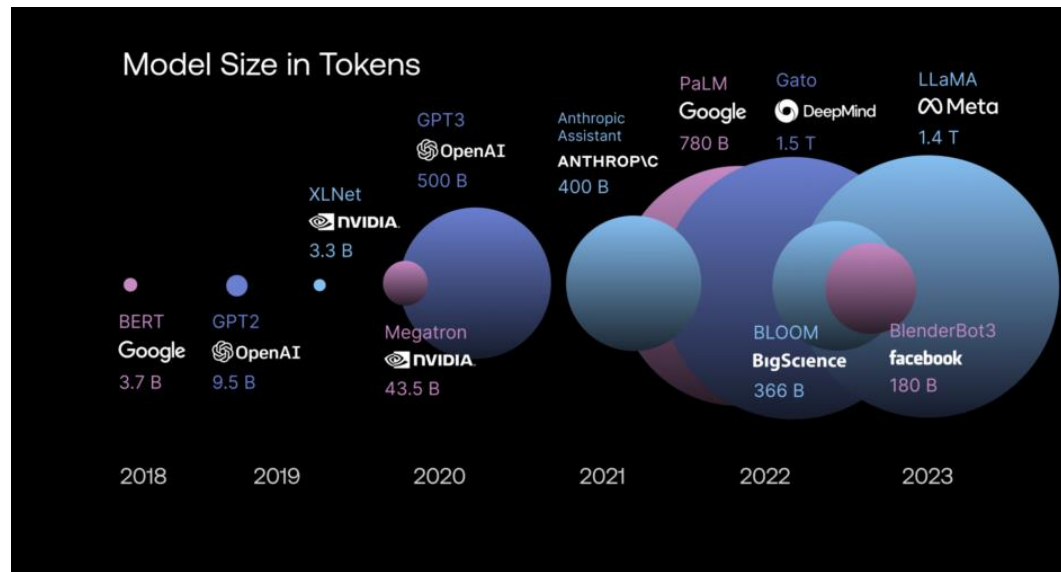


<https://www.ultimate.ai/blog/ai-automation/chatgpt-the-tech-behind-the-hype-and-what-it-means-for-your-support>

Motivation

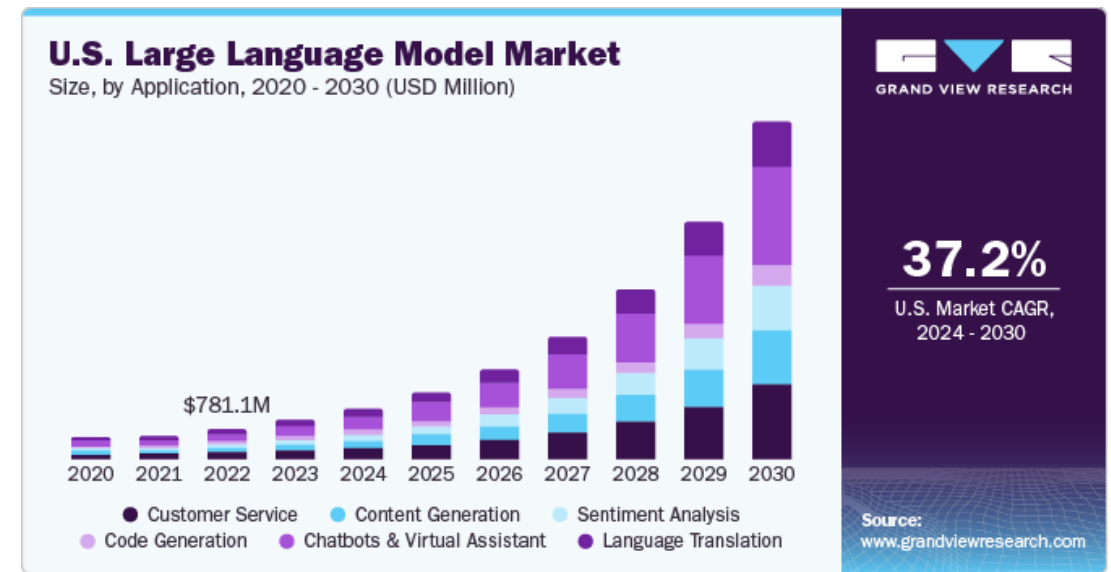
Key Selling Points

- Rapidly growing development and improvement of Large Language Models



<https://datasci101.com/what-are-llms-part-1/>

- Large Language Model Market is a Key Engine of AI Market Growth

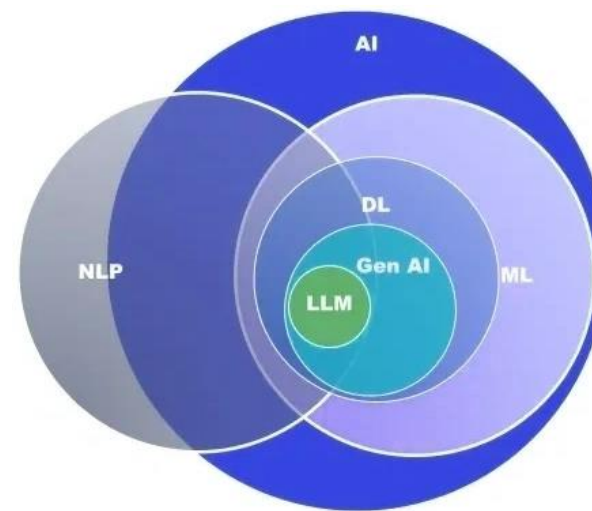


<https://www.grandviewresearch.com/industry-analysis/large-language-model-llm-market-report>

State of the Art

Evolution of LLM

- **The Beginning:** Natural Language Processing
 - Rule-based approaches
 - Linguistic processing (Tokenization, Stemming, Lemmatization, Part-of-speech-tagging, Parsing)
- **Statistical Era:** Language Models
 - N-gram, TF-IDF (Information retrieval)
- **Neural Awakening:** Neural Language Models
 - RNN, LSTM, Word embeddings (Semantic similarity)
- **Revolution:** Large Language Models (LLM) Era
 - Large scale neural networks, Transformers (Generalization, Text generation)



Evolution of LLM *Arockialiborious*

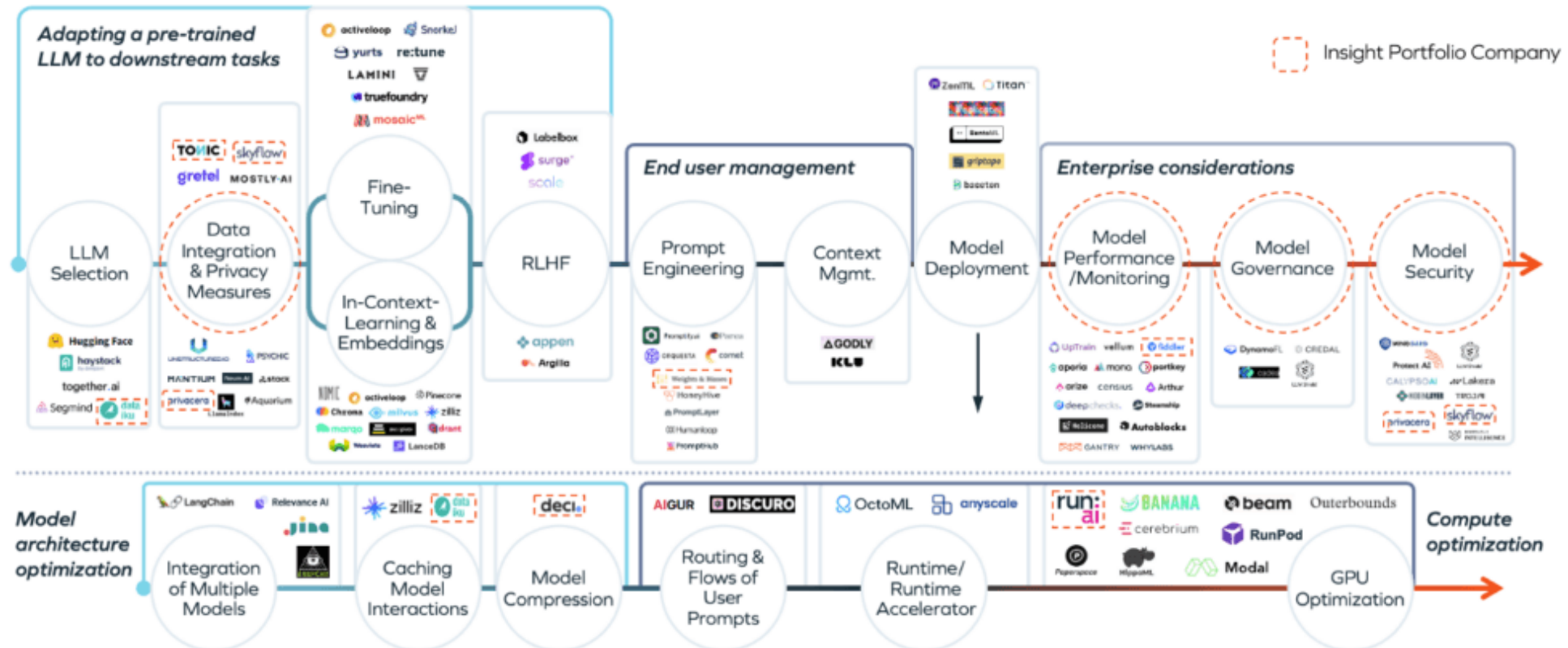


<https://arockialiborious.com/f/a-gentle-introduction-to-llm-part-1>

State of the Art

LLM for Software Development

- DevOps, MLOps, LLMOps integration
- Vast amount of models, services, downstream tasks



State of Practice

LLM for Software Development

- ChatGPT in use by many employees, also software engineers
- Code assistants such as GitHub Copilot and CodeWhisperer in use in several large enterprises (mostly in US)
- Not yet or very rare use of LLMs for Requirements Engineering, System Design and Testing

	Incumbents These gold-standard tools helped power Software 1.0.	Challengers Some innovative dev tools are adding AI features.	Dev Tools 2.0 Beyond Copilot, where else will AI change how software is made?
Deployment	OBSERVABILITY	splunk, DATADOG, dynatrace, Grafana, Cribl, baselime, ctrlstack	
	CLOUD COST MANAGEMENT	CloudHealth by VMware, Spot by NetApp, Infracost, Vantage	
	HOST	aws, Azure, Google Cloud, Terraform, Vercel, netlify, Deno, Temporal, render, Fly.io, Railway, seaplane, akeero, zeet, Pulumi	?
	FEATURE FLAGS	LaunchDarkly, Optimizely, STATSIG, split	
	CI/CD	Jenkins, circleci, GitHub, GitLab, harness, Buildkite	
Implementation	COMMIT & REVIEW CODE	GitHub, GitLab, Graphite, planar, Codeball	"AI Teammates"?
	DEBUG & GET HELP	stackoverflow, Developer Tools, Replay, Adrenaline, ChatGPT	
	WRITE DOCS	readme, swim, Redocly, Stenography, Readable, Mintlify	
	WRITE & MAINTAIN CODE	Humans, AUTOPILOTS? { Magic, grit, Second}, "COPILOTS" { GitHub Copilot, tabnine, Sourcegraph, codeium, codium, mutable.ai}	
	DEVELOPER PORTAL	Backstage, cortex	
Setup	IDES & ENVIRONMENT	Visual Studio, eclipse, Release, Coder, Gitpod, replit, Cursor	
	TERMINAL	iTerm2, Fig, warp	
	ISSUE TRACKER	Jira, asana, Linear	

<https://www.sequoiacap.com/article/ai-powered-developer-tools/#>

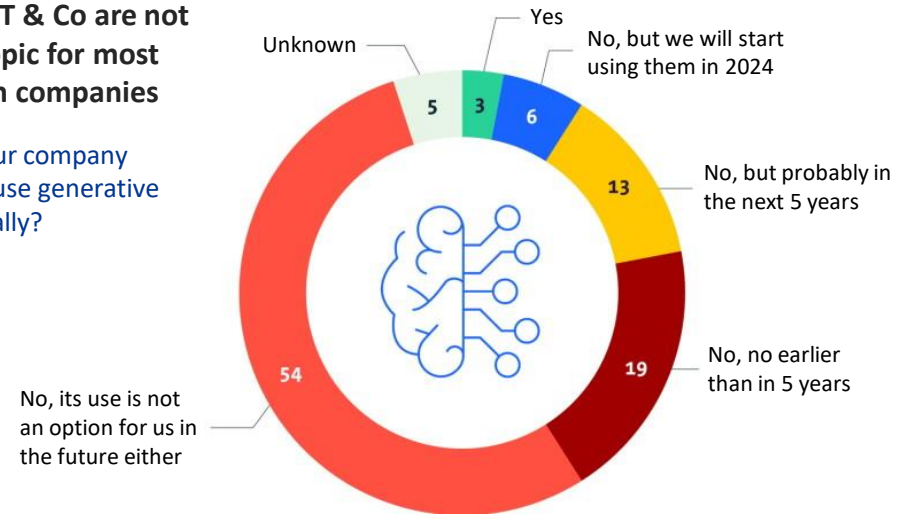
State of Practice

LLM in German companies

- ChatGPT, Gemini & Co. still have a difficult standing in German companies
- Only 3 percent use generative AI centrally
- 6 percent plan to do so in the current year
- For more than half (54 percent) of companies, the use of generative AI will not be an option in the future
- Many still have concerns about the company-wide use of AI, mainly due to a lack of knowledge, but also to concerns about the data quality and privacy

ChatGPT & Co are not yet a topic for most German companies

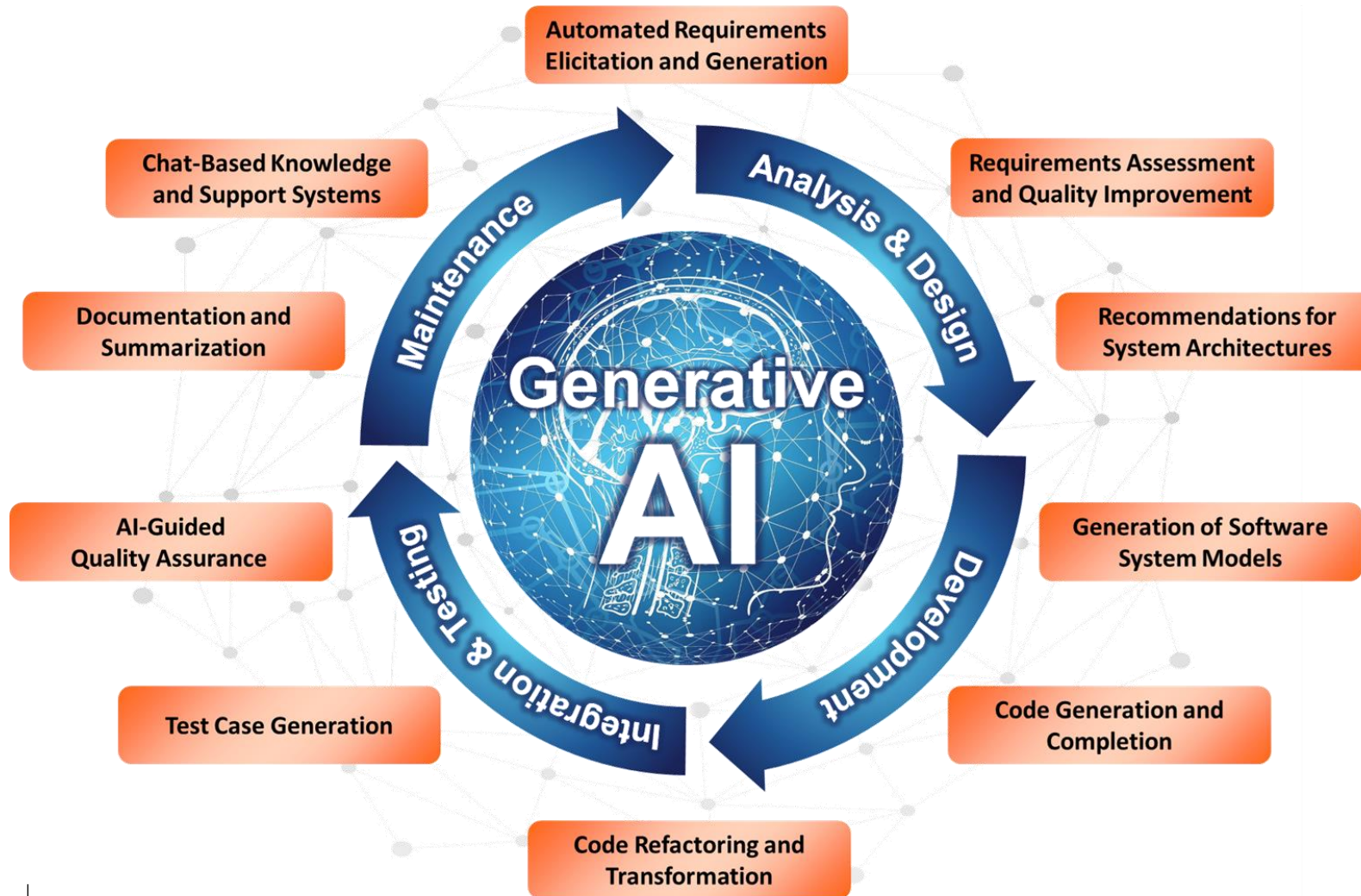
Does your company already use generative AI centrally?



<https://www.bitkom.org/Presse/Presseinformation/Deutsche-Unternehmen-zoegern-bei-ChatGPT-Co#>

Planned ITEA project: GENIUS

GenAI-based solutions for the software development life cycle



Planned ITEA project: GENIUS

Challenges and risks in the realization of GenAI-based solutions

Data privacy
and legal
concerns

Selection of
models and
workflows

Scalability and
sustainability

Data
aggregation
and company-
specific
resources

Integration into
existing and
legacy
processes

Trustworthiness
and biases of
results

Quote from a German philosopher



“I believe that artificial intelligence can free people from a lot of boring work.”

Richard David Precht: „Künstliche Intelligenz und der Sinn des Lebens. Ein Essay“, München 2020



ITEA4

<https://itea4.org>

ITEA is the Eureka Cluster on software innovation

Σ eureka

<https://eurekanetwork.org>

Thank you