



Generative Adversarial Networks and Testing

How the technology made popular by deep fakes is now renewing quality assurance?

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Introductions

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Generative Adversarial Networks (GANs)

GANs aim at making machine-generated samples to look like being from real world.

1. Discriminator learns to recognize real sample from generated sample.
2. Generator learns how to fool the discriminator.

GANs are the source of today's "deep fakes", but what good could you do with the technology?

Fake or Real?

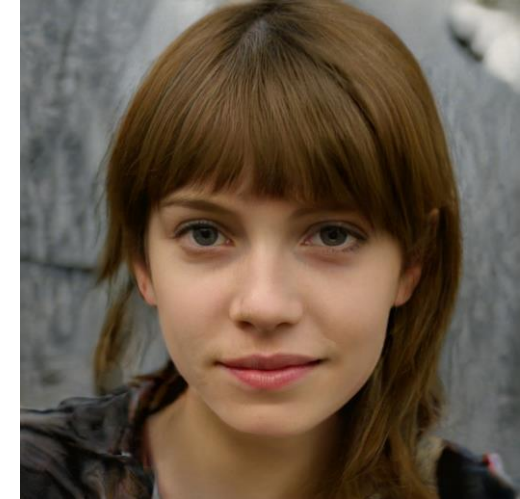
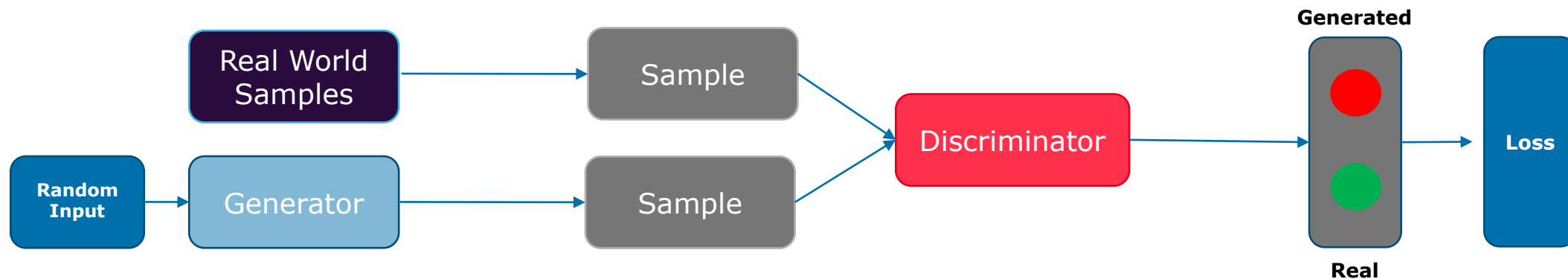
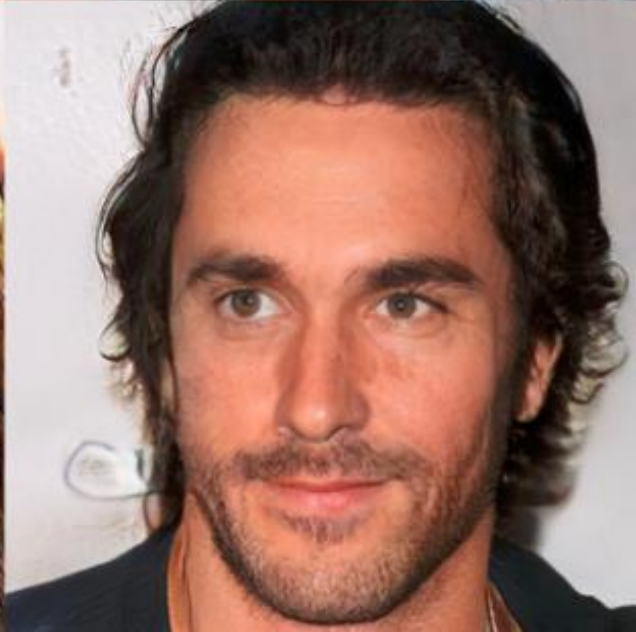


Image source
https://en.wikipedia.org/wiki/Generative_adversarial_network#/media/File:Woman_1.jpg

GAN Rudimentary Architecture







AI & Quality Assurance

*[W]e're seeing that **AI is changing the way test automation routines are built**, and hence how testing as a whole is done. Specifically, it's helping with the development and maintenance of automation scripts, introducing an element of **scriptless automation and self-healing**. The application of AI in this area is **reducing cycle times and improving speed to market**.*

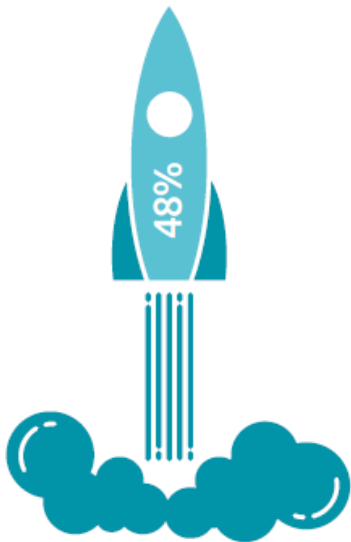
<https://www.sogeti.fi/wqr2021-22>



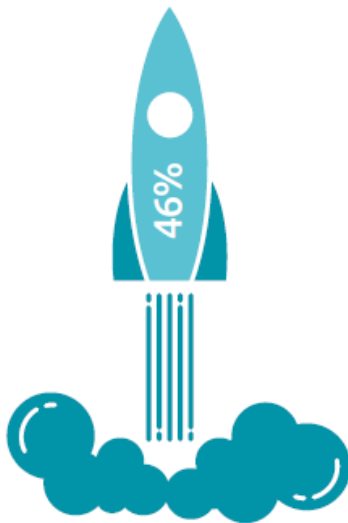
AI/ML Testing Readiness in Organizations

Top 2 box summary: 7 Strongly agree + 6

■ 2021 total



We have an established repository of test execution data required by AI/ML platform



My organization is willing to act on intelligence provided by the AI/ML platform



Business owners trust the intelligence provided by the AI/ML platform



I have identified applications/ programs that have a need/ benefit from AI/ML



Application owners trust the intelligence provided by the AI/ML platform



I have confidence that my test execution data repository is correct and accurate

Source: World Quality Report 2021-22, <https://www.sogeti.fi/wqr2021-22>

ADA

– Artificial Data Amplifier



What Is Artificial Data Amplifier



A synthetic data generating solution using advanced deep learning



Generates all types of data (image, tabular, text etc.)



Data characteristics & relationships are preserved



Accelerates sophisticated AI models that need lots of data



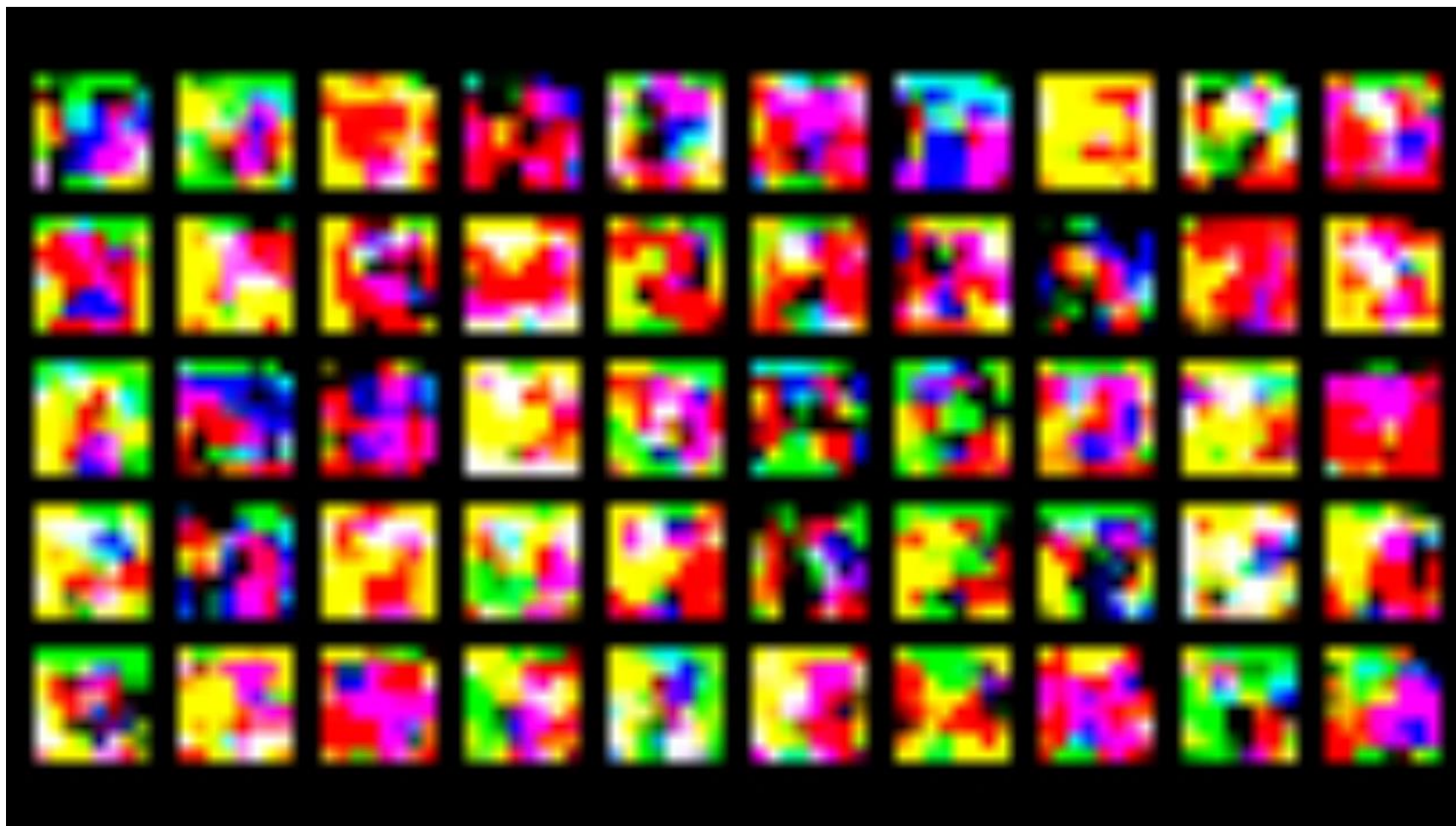
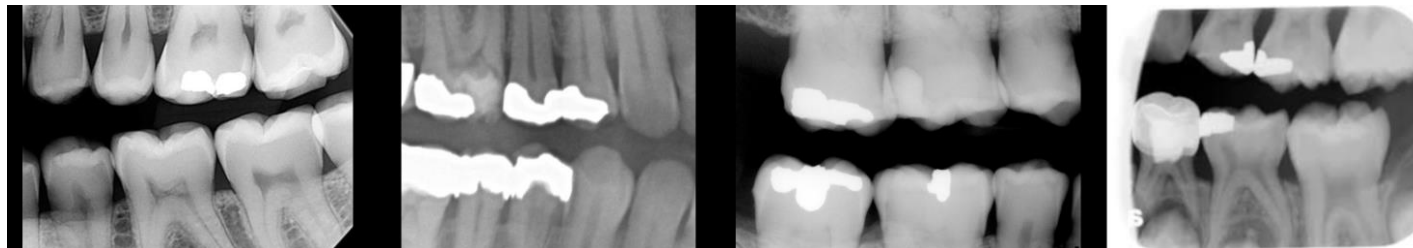
Anonymizes data and helps in getting more GDPR compliant



ADA is not a generic data management tool but a custom method

ADA Image Model Demo

Synthetic x-ray generation for boosting ML models



Why Is ADA Relevant for Testing and Software Development?



Sensitive Data

- GDPR
- Customer data is sensitive
- Strict on data usage
- Needs anonymization
- Financial Implications



Unlock Testing

- Cannot use production data
- Automated testing processes



Unlock AI Services

- AI solutions require tons of historical data
- Quality data is hard to come by & difficult to make model robust
- Challenging implementing DevOps

ADA addresses data challenges and helps mitigating GDPR compliance risk

The Problem with 'Anonymous' Data

*With machine learning methods, it is possible to re-identify **99.98%** of anonymized individuals in data sets*



Data anonymization is reversible

About 90% of anonymised data can be re-identified with just 4 attributes

Current approaches of subsetting and sampling data for anonymization is not enough

Only if data cannot be traced back to individuals can it be considered as 'anonymous' under GDPR

ADA Image Model Demo

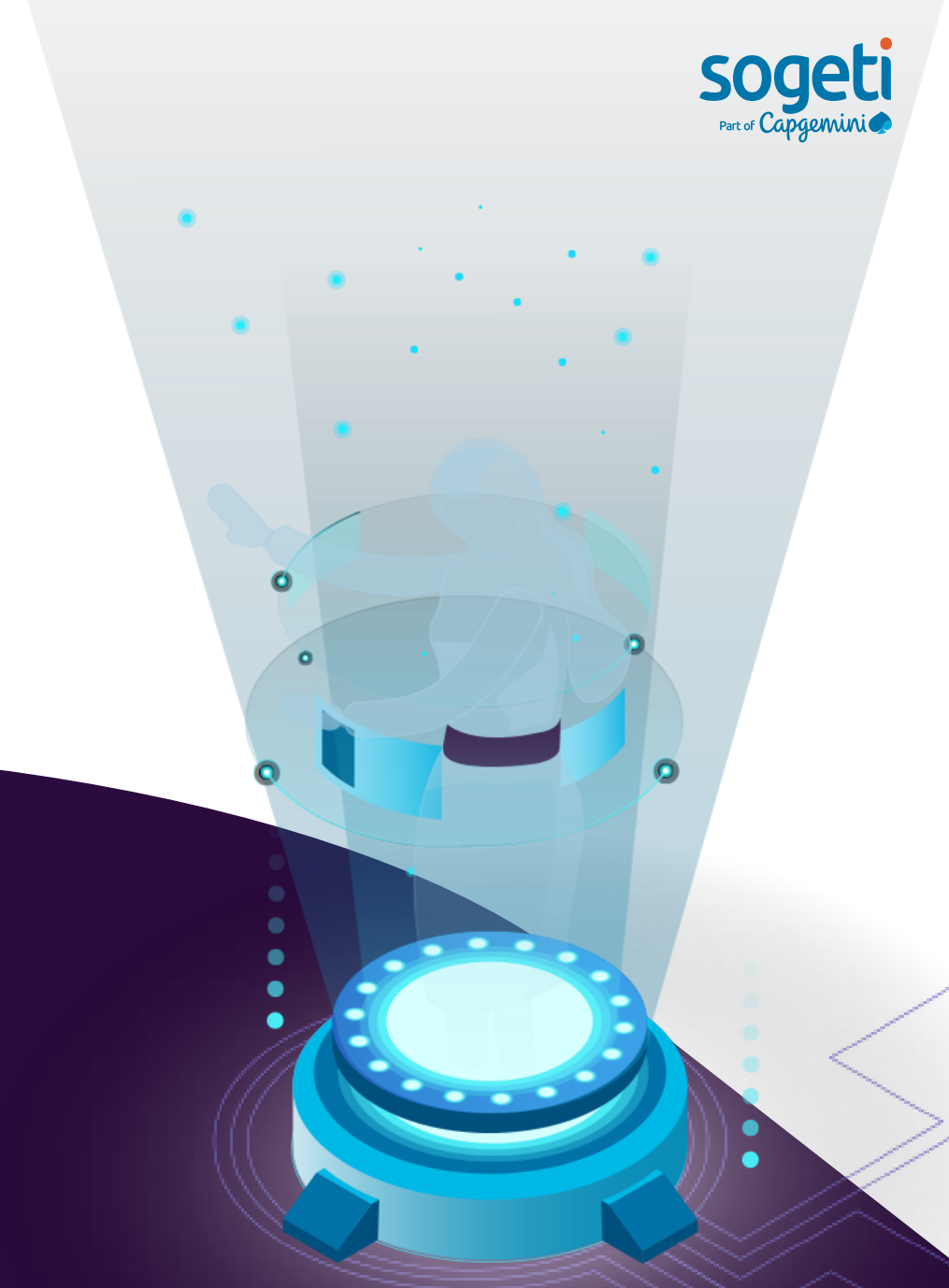
*Synthetic
scanned
document
generation*

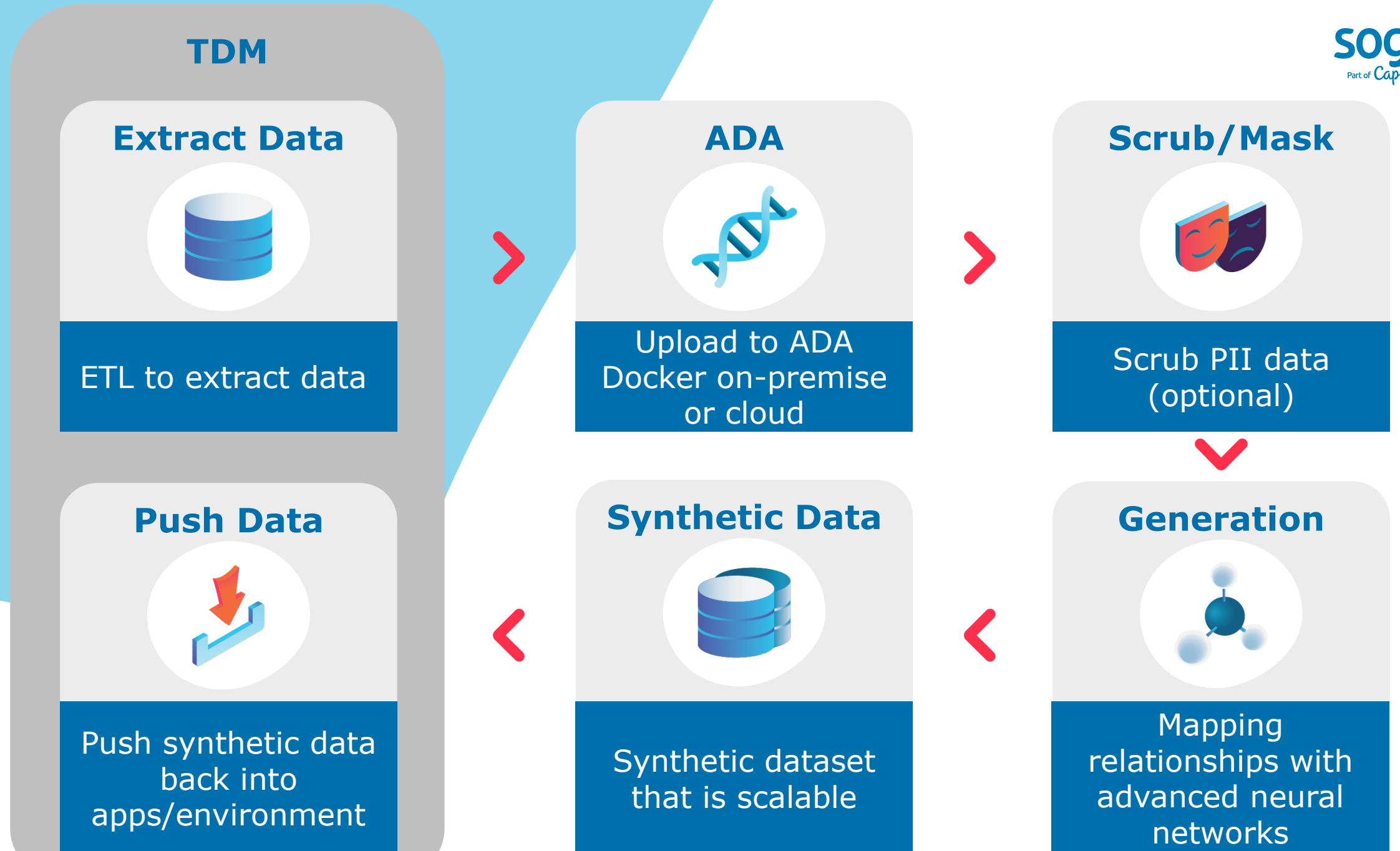


How Does ADA Bring Value?

ADA vs Traditional Alternatives

- Cannot be reverse engineered
- Uses advanced AI
- Minimal manual effort
- Not a tool
- Scalable





Synthetic Video Sequence



Can AI Be Creative?

Some examples from the world

Can AI Be Creative?

Human: "Suppose we lived in a universe where, every sixty seconds, gravity switched between being an attractive and a repulsive force. Write me a story from the perspective of a human living on Earth as the gravitational force changes in that fashion."

GPT-3: "One day, one human is going to school. It's a normal day. But suddenly, without any warning, gravity starts to change! The human thinks this isn't real, but it happens anyway. He's too scared to walk to school now. He goes back home, and starts watching TV. Then, he realizes that he doesn't need to stand up to change the channel! He gets out of his chair, and is weightless. He loves this new feeling. Suddenly, he touches the ground, and is hit by a large force! It's too strong for him to bear. Will the human survive this force? Find out next time on Gravity Falls!"

Source:

<https://www.lesswrong.com/posts/L5JSMZQvkBAx9MD5A/to-what-extent-is-gpt-3-capable-of-reasoning>



MODEL	COLLECTION	GENRE	ARTIST	TEMP ▾
Search...	Search...	Search...	Search...	Search...
5b	No lyrics conditioning	Soundtrack	John Williams	1.0
5b	No lyrics conditioning	R&B/Soul	Al Green	1.0
5b	No lyrics conditioning	Classical	Enrico Caruso	1.0
5b	No lyrics conditioning	Country	Hank Williams Jr.	1.0
5b	No lyrics conditioning	R&B/Soul	The Supremes	1.0
5b	No lyrics conditioning	Rock	Prince	1.0
5b	No lyrics conditioning	Rock	Queen	1.0
5b	No lyrics conditioning	Blues Rock	John Hammond	1.0
5b	No lyrics conditioning	Dark Wave	Dead Can Dance	1.0
5b_lyrics	Re-renditions in another style	Country	Lonestar	1.0
5b	No lyrics conditioning	French Pop	Jenifer	1.0
5b	No lyrics conditioning	Hip Hop	Lupe Fiasco	1.0
5b	No lyrics conditioning	Rock	Sweet	1.0
5b	No lyrics conditioning	Folk	Greg Brown	1.0
5b_lyrics	Continuations	Pop	Ed Sheeran	1.0
5b_lyrics	Re-renditions in another style	Jazz	Ella Fitzgerald	1.0
5b	No lyrics conditioning	Pop Rock	P!nk	1.0
5b	No lyrics conditioning	Rock	The Beatles	1.0
5b	No lyrics conditioning	Classical	Philadelphia Orchestra	1.0
5b	No lyrics conditioning	Rock	Peter Dinklage	1.0
5b	No lyrics conditioning	Hip Hop	Kendrick Lamar	1.0
5b_lyrics	Re-renditions in another style	R&B/Soul	Earth, Wind & Fire	1.0
5b	No lyrics conditioning	American Folk	John Denver	1.0
5b	No lyrics conditioning	Hard Rock	AC/DC	1.0
5b_lyrics	Re-renditions in another style	Blues Rock	Joe Bonamassa	1.0
5b	No lyrics conditioning	Pop	Ed Sheeran	1.0
5b	No lyrics conditioning	Rock	The J. Geils Band	1.0
5b	No lyrics conditioning	Vocal	Shirley Bassey	1.0
5b	No lyrics conditioning	Pop	Engelbert Humperdinck	1.0
5b	No lyrics conditioning	Axé	Ara Ketu	1.0
5b_lyrics	Re-renditions in another style	Country	Alan Jackson	1.0

Jukebox: A Generative Model for Audio

blog | paper | code



about

Source: <https://jukebox.openai.com/>

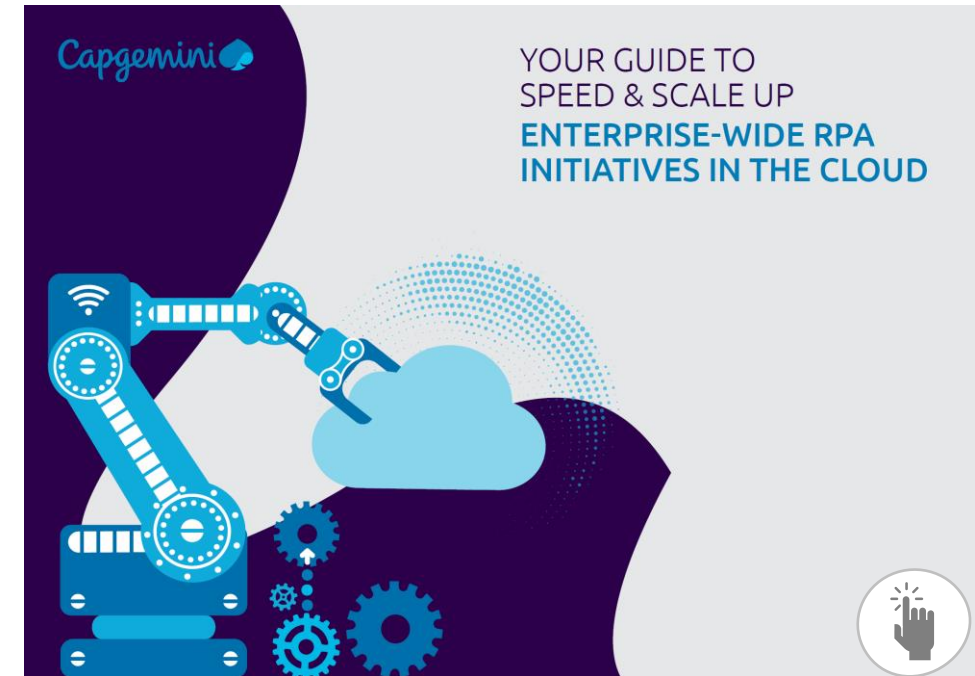
Further Reading

World Quality Report 2021-22



Current trends in quality assurance and testing
<https://www.sogeti.fi/wqr2021-22>

Finnish Thought Leadership in Hyperautomation



Automation, AI and Analytics insights provided by Sogeti's Finnish team
<https://www.sogeti.fi/aaa>



Thank You!

www.sogeti.fi/wqr2021-22

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