



The future of assurance testing

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LRQA Nettitude

A photograph of a lighthouse on a rocky island at night. The lighthouse is illuminated, and its beam of light extends across the dark sea towards the horizon. The sky is filled with stars and the Milky Way galaxy is visible. The image is split diagonally, with the top half being a solid dark blue and the bottom half showing the lighthouse scene.

**Leadership
Series**

Agenda

01

Data explosion

02

Automation and AI

03

Market feedback

04

Future of assurance testing

But first...

Ikea or Cheese?

Have you spent too much time at those cheese fairs or wandering the endless pathways in your local Ikea?

Ikea



Cheese



Ikea or Cheese

Gullunge

Ikea or Cheese



Gullunge

Changing Mat



Ikea or Cheese

Bergkäse

Ikea or Cheese



Gullunge

Changing Mat



Bergkäse

Ikea or Cheese

Bygel

Ikea or Cheese



Gullunge

Bygel

Changing Mat

Kitchen Cart



Bergkäse

Ikea or Cheese

Smaka

Ikea or Cheese



Gullunge

Bygel

Smaka

Changing Mat

Kitchen Cart

Cheese Slice



Bergkäse

Ikea or Cheese

Mongstad

Ikea or Cheese



Gullunge

Bygel

Smaka

Mongstad

Changing Mat

Kitchen Cart

Cheese Slice

Mirror



Bergkäse

Ikea or Cheese

Sardo

Ikea or Cheese



- Gullunge
- Bygel
- Smaka
- Mongstad

- Changing Mat
- Kitchen Cart
- Cheese Slice
- Mirror



- Bergkäse
- Sardo

Ikea or Cheese

Klappor Haj

Ikea or Cheese



Gullunge

Bygel

Smaka

Mongstad

Changing Mat

Kitchen Cart

Cheese Slice

Mirror

Klappar Haj

Stuffed shark (toy!)



Bergkäse

Sardo

Ikea or Cheese

Bitto

Ikea or Cheese



Gullunge

Bygel

Smaka

Mongstad

Changing Mat

Kitchen Cart

Cheese Slice

Mirror

Klappar Haj

Stuffed shark (toy!)



Bergkäse

Sardo

Bitto

Ikea or Cheese

Lighvan

Ikea or Cheese



Gullunge

Bygel

Smaka

Mongstad

Changing Mat

Kitchen Cart

Cheese Slice

Mirror

Klappar Haj

Stuffed shark (toy!)



Bergkäse

Sardo

Bitto

Lighvan

Ikea or Cheese

Caravane

Ikea or Cheese



Gullunge

Bygel

Smaka

Mongstad

Changing Mat

Kitchen Cart

Cheese Slice

Mirror

Klappar Haj

Stuffed shark (toy!)



Bergkäse

Sardo

Bitto

Lighvan

Caravane

Ikea or Cheese

Västerbotten

Ikea or Cheese



Gullunge

Bygel

Smaka

Mongstad

Changing Mat

Kitchen Cart

Cheese Slice

Mirror

Klappar Haj

Stuffed shark (toy!)



Bergkäse

Sardo

Bitto

Lighvan

Caravane

Västerbotten

Data explosion

“We are surrounded by data, but starved for insights.”

Jay Baer, marketing and customer experience expert

Data Statistics

Why data is embedded in our world



University Level Education

Bachelor's degrees in data science were practically non-existent five years ago, according to Discover Data Science. Now over 50 higher education institutions in the US currently offer one.



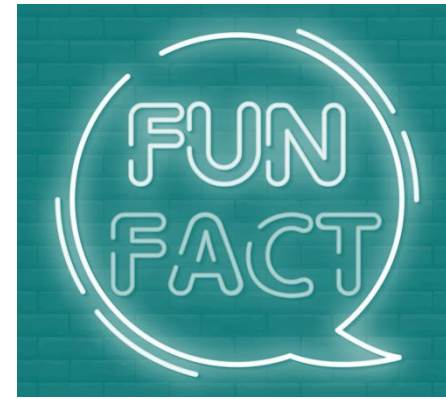
Want to learn a new language?

In 2015 a poll among UK school students and their parents found that a majority of them preferred to learn Python over foreign languages.



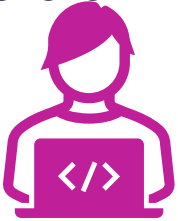
Data Transformation

99% of organisations are actively investing in data transformation initiatives.



Cyber Data Statistics

What is happening out there



FBI Cyber Most Wanted List

In 2016 approximately 19 people were on the hit list of the FBI, and each was responsible for taking around \$100 Million inappropriately from consumers.

The number rose to 41 later in 2018; and now stands at 119 (2023).



SME's are often the target

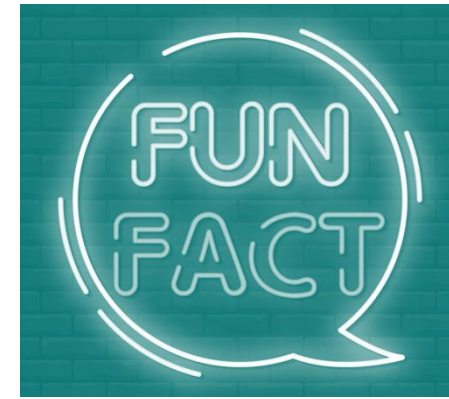
Forty-three percent of cyberattacks are aimed at small businesses, but only 14% are prepared to defend themselves, according to Accenture.



Prolific Malware Creation

Between March 2021 and February 2022, there were 153 million new malware samples that cybercriminals were testing out.

<https://portal.av-atlas.org/malware>



Global Data Creation

Between the dawn of time and 2003, five exabytes of data had been created at Google.



1

By 2010, this amount of data was being created every 30 days, and by 2021 it was being created every 24 hours.

2

By 2010, this amount of data was being created every 10 days, and by 2021 it was being created every 10 hours.

3

By 2010, this amount of data was being created every 2 days, and by 2021 it was being created every 40 minutes.



Knowledge

What d'ya really know?

‘Information is the oil of the 21st century,
and analytics is the combustion engine.’

Peter Sondergaard, senior vice president, Gartner Research



A DAY IN DATA

The exponential growth of data is undisputed, but the numbers behind this explosion - fuelled by internet of things and the use of connected devices - are hard to comprehend, particularly when looked at in the context of one day

500m

tweets are sent every day

Twitter



4PB

of data created by Facebook, including

350m photos

100m hours of video watch time

Facebook Research

294bn

billion emails are sent

Radicati Group

320bn

emails to be sent each day by 2021

306bn

emails to be sent each day by 2020

3.9bn

people use emails

4TB

of data produced by a connected car

Intel

DEMYSTIFYING DATA UNITS

From the more familiar 'bit' or 'megabyte', larger units of measurement are more frequently being used to explain the masses of data

Unit	Value	Size
b bit	0 or 1	1/8 of a byte
B byte	8 bits	1 byte
KB kilobyte	1,000 bytes	1,000 bytes
MB megabyte	1,000 ² bytes	1,000,000 bytes
GB gigabyte	1,000 ³ bytes	1,000,000,000 bytes
TB terabyte	1,000 ⁴ bytes	1,000,000,000,000 bytes
PB petabyte	1,000 ⁵ bytes	1,000,000,000,000,000 bytes
EB exabyte	1,000 ⁶ bytes	1,000,000,000,000,000,000 bytes
ZB zettabyte	1,000 ⁷ bytes	1,000,000,000,000,000,000,000 bytes
YB yottabyte	1,000 ⁸ bytes	1,000,000,000,000,000,000,000,000 bytes

*A lowercase "b" is used as an abbreviation for bits, while an uppercase "B" represents bytes.

65bn

messages sent over WhatsApp and two billion minutes of voice and video calls made

Facebook

463EB

of data will be created every day by 2025

IOE

95m

photos and videos are shared on Instagram

Instagram Business

28PB

to be generated from wearable devices by 2020

Statista

ACCUMULATED DIGITAL UNIVERSE OF DATA

4.4ZB

44ZB

PwC

2013

2020

Searches made a day

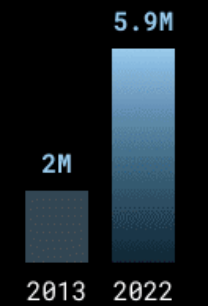
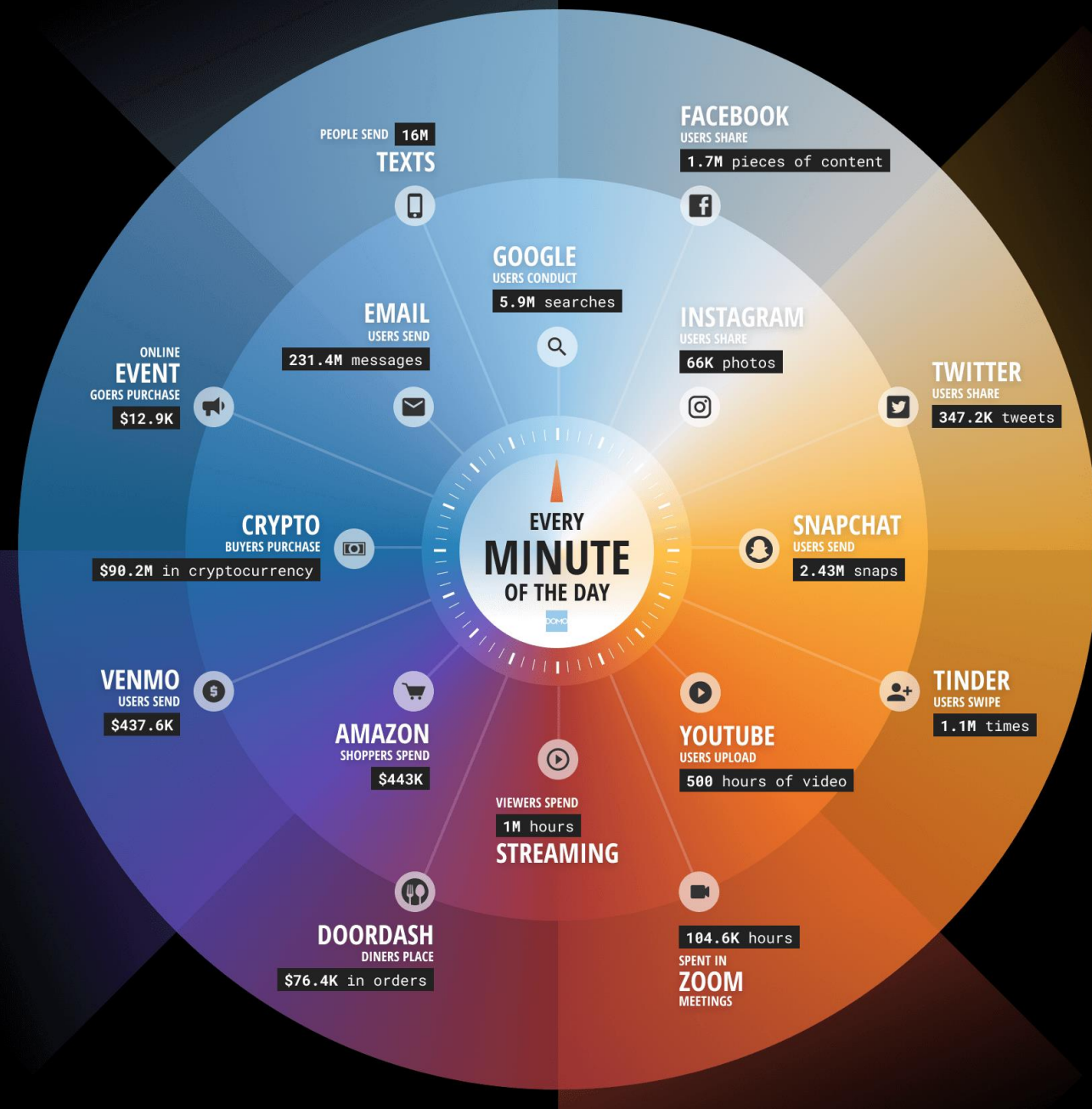
5bn

Searches made a day from Google

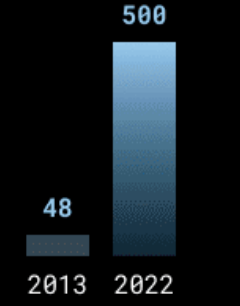
3.5bn

Smart Insights

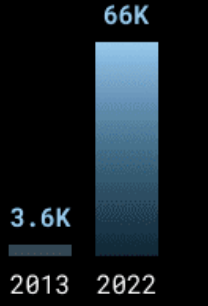
DATA NEVER SLEEPS 1.0 VS. 10.0



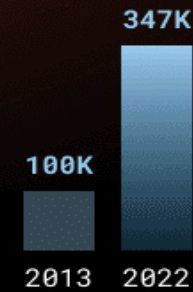
GOOGLE
USER QUERIES



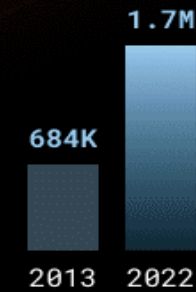
YOUTUBE
HOURS UPLOADED



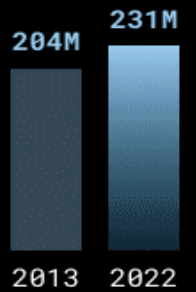
INSTAGRAM
PHOTOS SHARED



TWITTER
TWEETS SHARED



FACEBOOK
CONTENT SHARED



EMAILS
EMAILS SENT

LIGO Facilities



LIGO Caltech | Hanford Observatory | Livingston Observatory | LIGO MIT |

LIGO Laser Interferometer Gravitational-Wave Observatory
Supported by the National Science Foundation
Operated by Caltech and MIT

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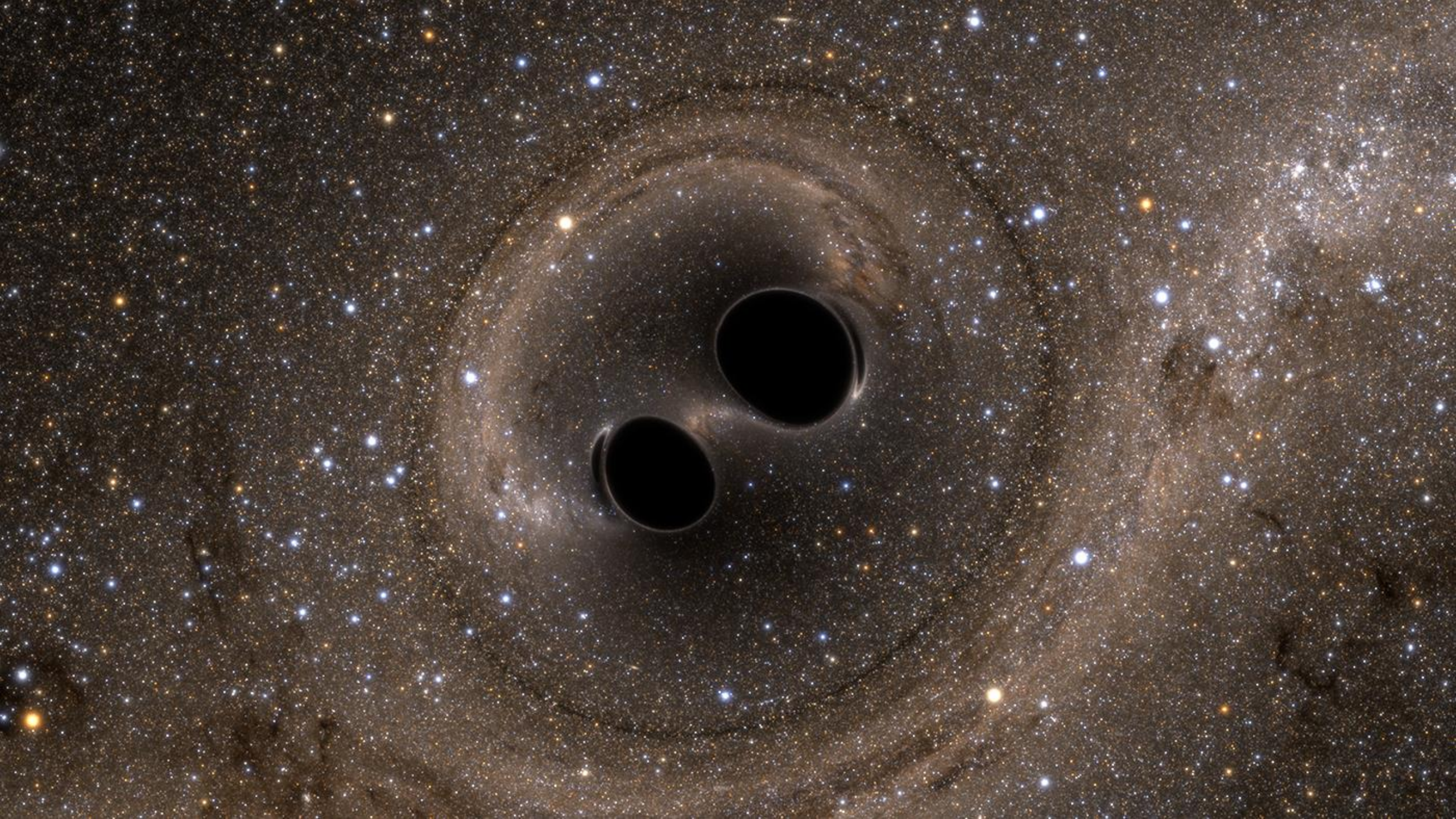
[1](#) [2](#) [3](#) [4](#)

A “bang” in LIGO and Virgo detectors signals most massive gravitational-wave source yet
News Release • September 2, 2020
GW190521, a binary black hole merger likely produced gravitational waves equal to the energy of eight suns.

HEADLINES
LIGO-Virgo-KAGRA Webinar to Discuss New Results on the Gravitational-wave Background
News Release • February 2, 2021

FEATURED PRESS RELEASES

- GW190914: Mystery object in mass gap
- 1st BNS GW observation, EM counterparts
- 2017 Nobel Prize
- GW150914: 1st direct GW observation
- GW150914 detection portal



ELEMENTA

PHYSICÆ EXPERIMENTALIS

USUI TIRONUM APTATA

AUCTORE

ANTONIO GENUENSI

P. P.

TOMUS SECUNDUS.



DOMINICUS TERRES

edidit

APUD FRATRES RAYMUNDIOS

NEAPOLI

1779.

ELEMENTI DI FISICA SPERIMENTALE

AD USO

DE GIOVANI PRINCIPIANTI

DI

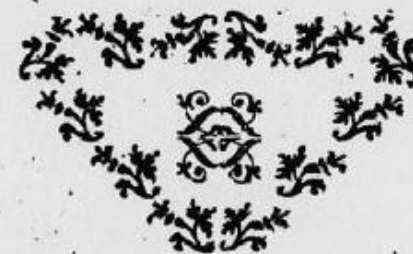
ANTONIO GENOVESI

Trasportati dal Latino in Italiano

DALL' ABATE

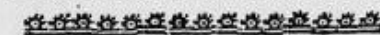
MARCO FASSADONI.

TOMO PRIMO.



IN VENEZIA,

APPRESSO FRANCESCO DI NICCOLÒ PEZZANA.



MDCCLXXXIII

CON APPROVAZIONE, E PRIVILEGIO.



What does this mean for us?

Tooling

Data &
Information

Challenges

Opportunities

Greater
Complexity

Data Security

Attackers tooling
based on AI

Continuous
Assurance

Skill sets better
utilised

Consolidated
Platforms

New Insights and
Value from Data

AI/ML

3rd
Parties



Market feedback

What does the market say?



Cyber Attacks

The UK
Government
Department for
Digital, Culture,
Media and Sport
run an annual
Cybersecurity
breaches survey



1

In 2022 our survey results show that in the last 12 months, 24% of UK businesses identified a cyber attack.

2

In 2022 our survey results show that in the last 12 months, 39% of UK businesses identified a cyber attack.



3

In 2022 our survey results show that in the last 12 months, 57% of UK businesses identified a cyber attack.

Gartner Analysis

Key Highlights

1. Adopt an attacker's mindset to prioritise your risk mitigation efforts
2. Adopt security models that embrace agility and security by design
3. Prioritise and optimise investments in employee behaviour to enhance and sustain the efficacy of your security
4. Drive a focus on the essential role of people for security programme success and sustainability
5. Implement technical security controls that provide far greater visibility and responsiveness

Top Cybersecurity Trends in 2023

 Responsive Ecosystems	 Restructuring Approaches	 Rebalancing Practices
<ul style="list-style-type: none">• Threat Exposure Management• Identity Fabric Immunity• Cybersecurity Validation	<ul style="list-style-type: none">• Cybersecurity Platform Consolidation• Security Operating Model Transformation• Composable Security	<ul style="list-style-type: none">• Human-Centric Security Design• Enhancing People Management• Increasing Board Oversight

Sustainable Balanced Cybersecurity Programs

Human Centric Security Design

- ✓ Move from a focus on technology to users and their behaviour
- ✓ Review past incidents for cybersecurity induced friction
- ✓ Examine your security plans and review those that will impact humans, deploy human centric design principals
- ✓ Upskill staff in how to deliver more empathy driven, outcome focused policy and processes

CISO Viewpoints

The following findings were observed from a review of global CISO's conducted by UCL:

1. Trying to represent cyber security through simplistic indicators and easy metrics can do more harm than good

2. Cyber risk information is being whitewashed before reaching the boards

3. Boards know more than they think they do about cyber risk

4. There is a mental health crisis in the CISO/CIO community that threatens to undermine business resilience

5. Service providers are highly vulnerable due to complex ownership of domains and data, plus unclear contractual arrangements.

6. An urgent discussion is needed about how Higher Education institutions allocate their cyber security budgets.

7. The Higher Education sector in the UK would benefit from greater collaboration – the mechanisms in place are not effective

8. Key players need to take a joint role to alleviate community fragmentation, improve communication and threat intelligence sharing

9. Security awareness campaigns will not save your business

10. Lower management/CISO/Exec/Board relationships need attention – they need to work both upwards and downwards

11. Organisational culture and even business objectives/priorities can influence attention/approaches to cyber risk

12. Boards in certain sectors (transport, food, etc) appear to be lagging behind others in terms of their engagement with and understanding of cyber risk

Market analysis and client feedback

Market reviews and questionnaires

We have run several market surveys with our clients that include:

- Questionnaires to our client groups/sectors
- ‘Show and Tell’ review of portal mock-ups

We have also conducted market research with external agencies

Client feedback

The **most important** findings were:

1. Being able to see immediately results and findings, plus access remediation advice/reproducing conditions
2. Access data digitally (not through PDF documents)
3. View threat data on their company

The **biggest concerns** were around:

1. Control over data retention, access and availability
2. Geographic location of the data



Automation and AI

There's a lot of automation that can happen that isn't a replacement of humans, but of mind-numbing behaviour.

Stewart Butterfield



Global Data Creation

The byte is a unit of digital information that most commonly consists of eight bits

The byte is the number of bits used to encode a single character of text in a computer



1

There are approximately **4,000 bytes** of data for every grain of sand on earth.

2

There are approximately **40,000 bytes** of data for every grain of sand on earth.

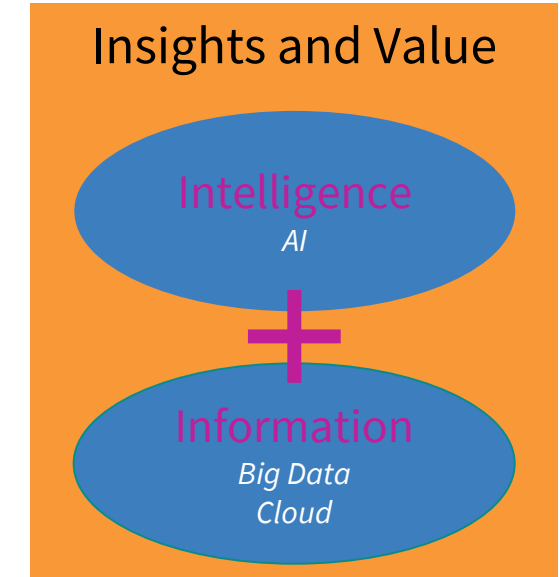
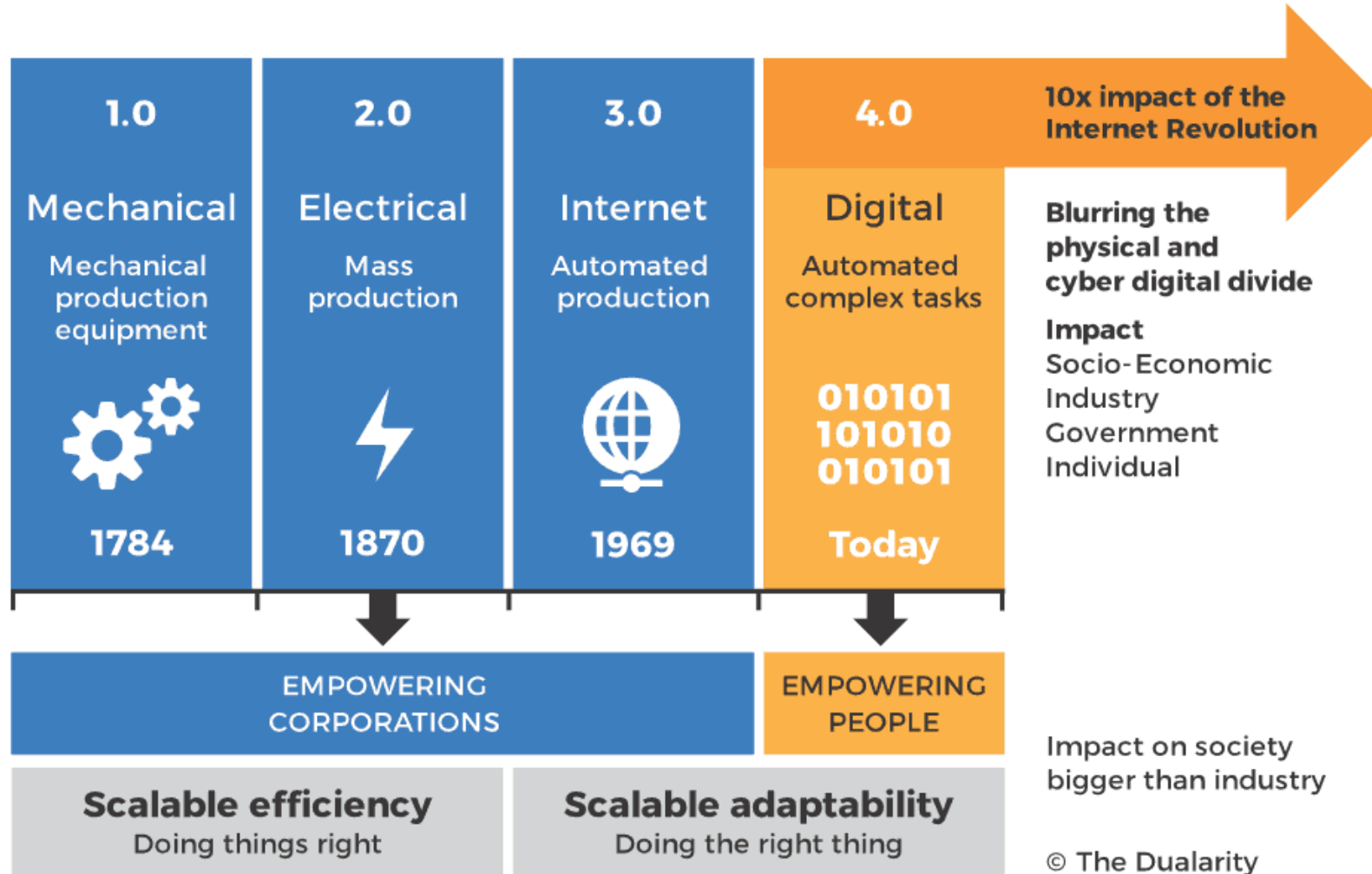
3

There are approximately **400,000 bytes** of data for every grain of sand on earth.



Welcome to the Industrial Revolution 4.0

010101
101010
010101

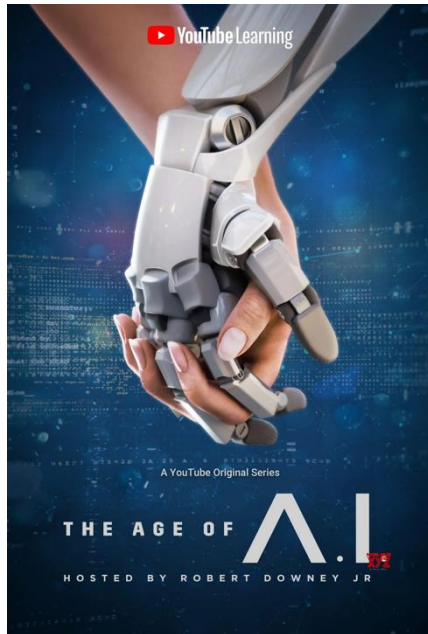


Generative AI Realism

AI (and Generative AI in particular) is here to stay

...But will the world be threatened by AI machine takeovers and unintended consequences?

i.e. Terminator, The Matrix, Eagle Eye, even The Mitchells vs The Machines), [insert favourite film]...



Human Driven

AI Assisted

AI Automated

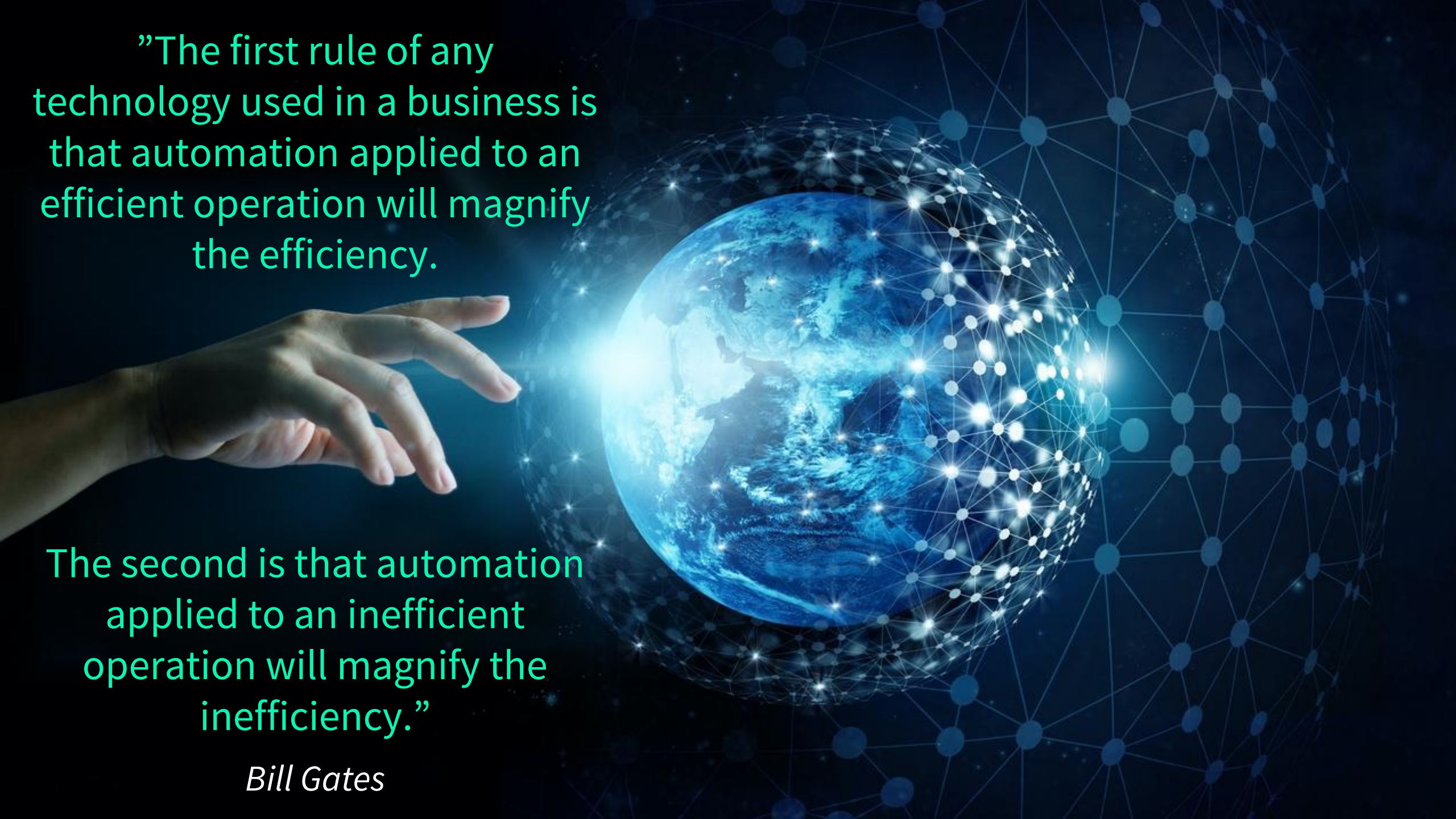
Reality

- #1: No AI deployment can be better than the data on which it is trained
 - ✓ The push for larger data sets can run head-on into concerns about privacy, data security, and intellectual property protection
 - Domain expertise - limiting the scope of an AI instance to a single topic or area of interest and making sure it is optimally trained for prompts on that subject
- #2: Can we really trust the output?
 - ✓ Generative AI is going to be used primarily to assist human workers.
 - If those workers don't trust the responses they get from prompts, that aid will be limited.

"The first rule of any technology used in a business is that automation applied to an efficient operation will magnify the efficiency.

The second is that automation applied to an inefficient operation will magnify the inefficiency."

Bill Gates



We need to be on the ship, not the shore

Generative AI is not the silver bullet (Nothing ever is!)

- ✓ Generative AI will impact our businesses and will deliver efficiencies
- ✓ It will mostly make our existing jobs more efficient rather than replace head count
- ✓ For now, it will always be AI Assisted

Pitfalls to avoid

1. Over-Reliance on AI
2. Lack of Customisation
3. Misinterpretation of Data
4. Ethical Concerns
5. Limited Creativity
6. Unintentional Plagiarism
7. Irrelevant Content
8. Lack of Emotional Intelligence
9. Dependence on Quality of Training Data

Maximise your impact

1. Embrace Human Collaboration
2. Customize Your AI
3. Provide Quality Training Data
4. Balance Transparency and Privacy
5. Stay Up-to-Date with AI Developments
6. Avoid Over-Dependence on AI
7. Check for Copyright Issues
8. Ensure Cultural and Emotional Sensitivity


Where will AI assist Cyber Applications?

Well, let's ask AI 😊

Generative AI is a branch of artificial intelligence that can create new content or data based on existing data or rules. It has many potential applications in cybersecurity, such as:

1. Generating realistic and diverse phishing emails or websites to test the security awareness and resilience of employees or systems.
2. Creating synthetic data sets that can be used for training or testing security models without compromising the privacy or confidentiality of real data.
3. Enhancing threat intelligence and analysis by generating natural language summaries, visualizations, or recommendations from large and complex security data.
4. Automating incident response and remediation by generating scripts, policies, or actions based on the detected threats and the best practices.
5. Improving fuzz testing and vulnerability discovery by generating random inputs or code snippets that can trigger errors or crashes in software systems.



Bing Chat
Enterprise 

AI-powered co-pilot for the web



Future of assurance testing

What is needed to help us from a cyber assurance perspective?



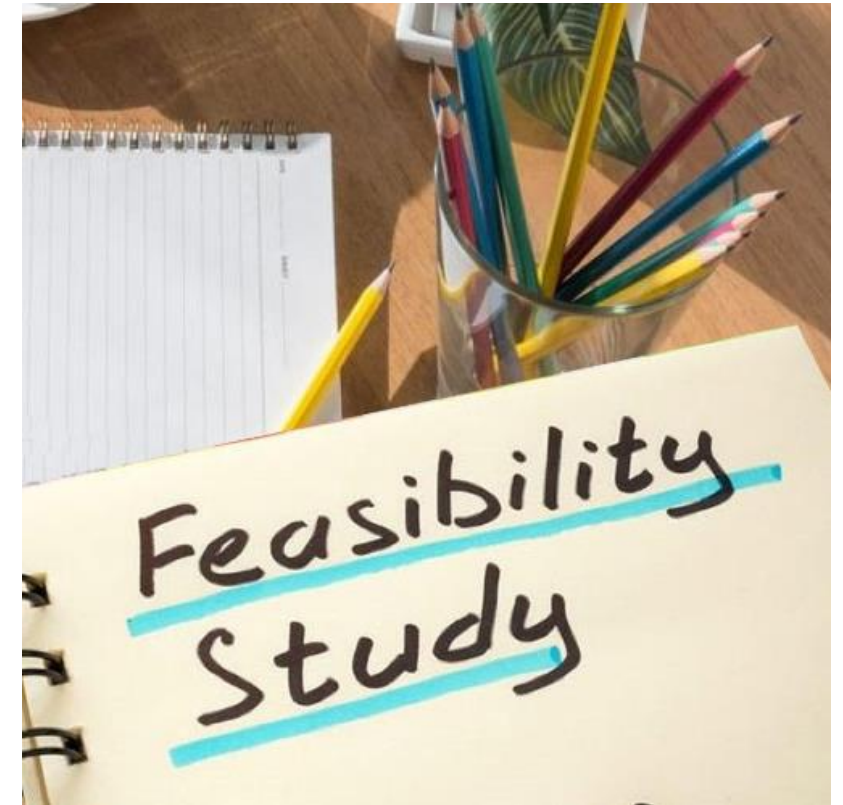
Research: Augmented Penetration Testing

Feasibility Study

An initial feasibility study looked at the **top 100 findings** of the LRQA Nettitude Assurance Testing team, and assessed how amenable they were to different forms of automation.

Conclusions were:

1. **42%** of findings could be automated for in a **straightforward, deterministic manner**.
2. A further **51%** would require **sophisticated modelling** of the target website, and a substantial part of that would be dependent on machine learning.
3. The final **7%** required an understanding of the **high-level intent of the website** that is probably unachievable without the use of advanced AI techniques.



Automated/Augmented Penetration Testing

What have our clients asked for?

1. To be delivering **continuous penetration testing assurance services** providing findings, trends, risks in content

2. Giving simultaneous **visibility and contextual risk awareness** to engineering teams and the board room

3. Platform must be **secure**, and users want to be **in control** of their data

4. Findings will need to be **trustworthy and reliable** in decision making. All automated delivery must be full of integrity

5: Deliver **positive testing** showing what's working as well as what's not

This is an active, ongoing conversation, and will continue to be so for the future

Ambitions



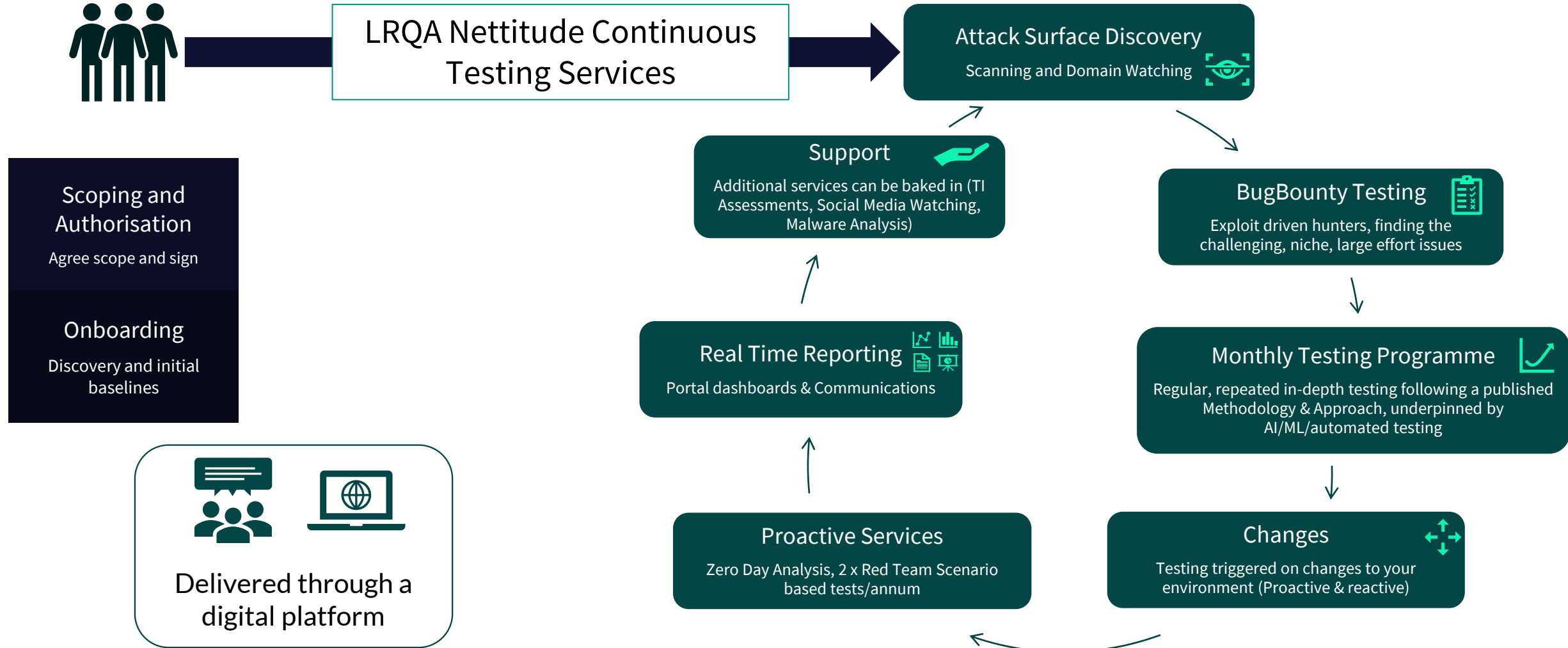
Fundamentally the portal needs to enable:

- ✓ New Services around Continuous Testing/BugBounty
- ✓ Augmentation/automation of Assurance Testing
- ✓ Value Creation through CISO level insights and risk reporting

In addition, enable:

- Collaboration and deeper relationships
- Self-help and self-service – consumption and purchasing
- Data insights through industry trends, client trends, new insights and actions/impacts
- Digital Contracts/Signatures
- Remediation guidance and follow on services
- Events & Training
- API, Mobile App, client SSO authentication

Continuous Testing Services (Example)

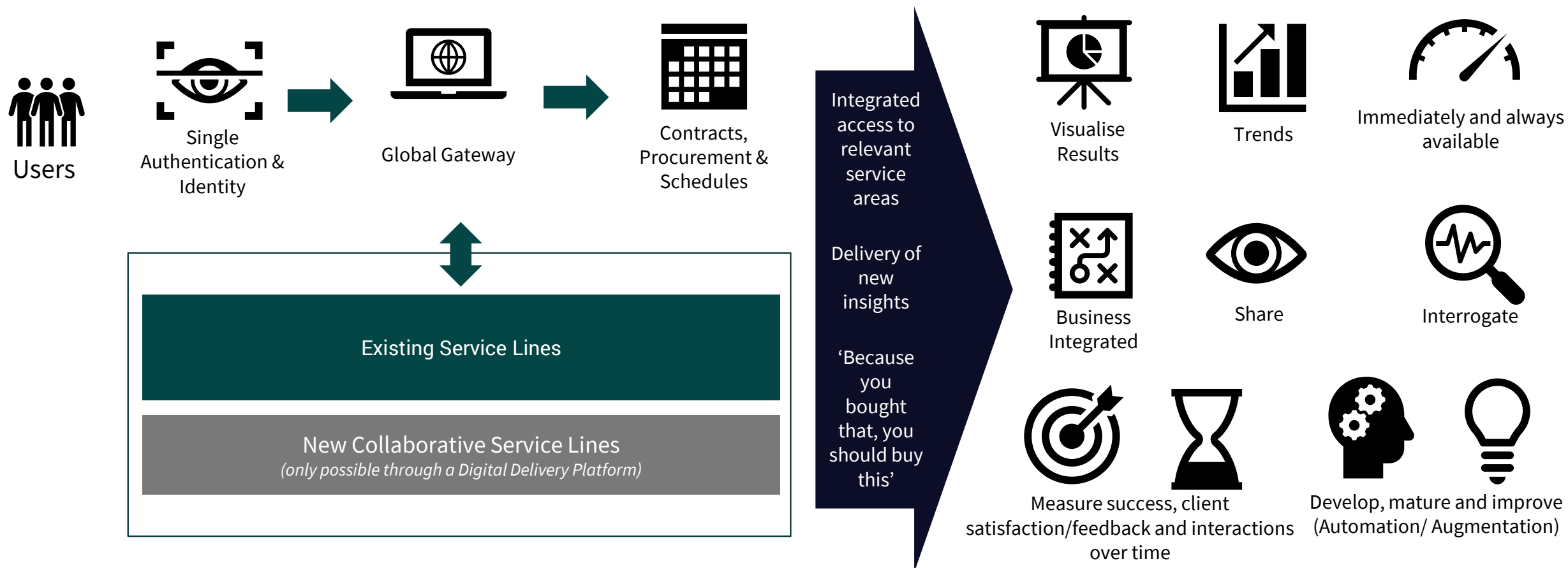


One LRQA: Fitting into a Wider Vision

Client Experience

Delivered through a seamless interactive experience

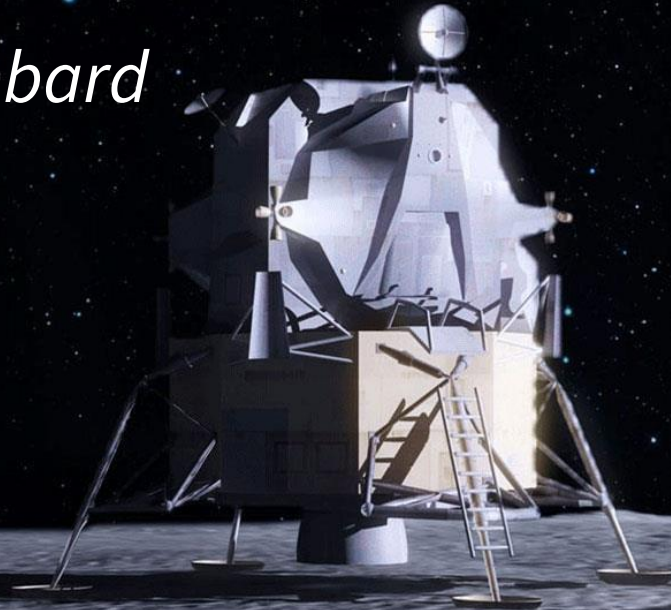
Service Consumption



“One machine can do the work of
fifty ordinary people.

No machine can do the work of one
extraordinary person.”

Elbert Hubbard





Thank you

Any questions?