The People behind AI

ConnectAI 2022 Digital Masterclass

"AI or NOT AI: Is there a choice?"

Natasa Milic-Frayling, Intact Digital

25 January 2022, 17:30-19:15 UTC+1

https://pheedloop.com/connectai/virtual/?page=sessions&section=SESTF47SLMQSLVOO7

https://us02web.zoom.us/j/85765088102?pwd=aW05T3p6OXNWTDB2bGdhSGZSbG00UT09

AI or Not AI: Is there a choice?

"The trend is unstoppable. If we don't take it up, our competitors will."

Innovation strategy perspective

Dr Natasa Milic-Frayling
CEO & Founder, Intact Digital

Topics

AI TECHNOLOGY ECOSYSTEM

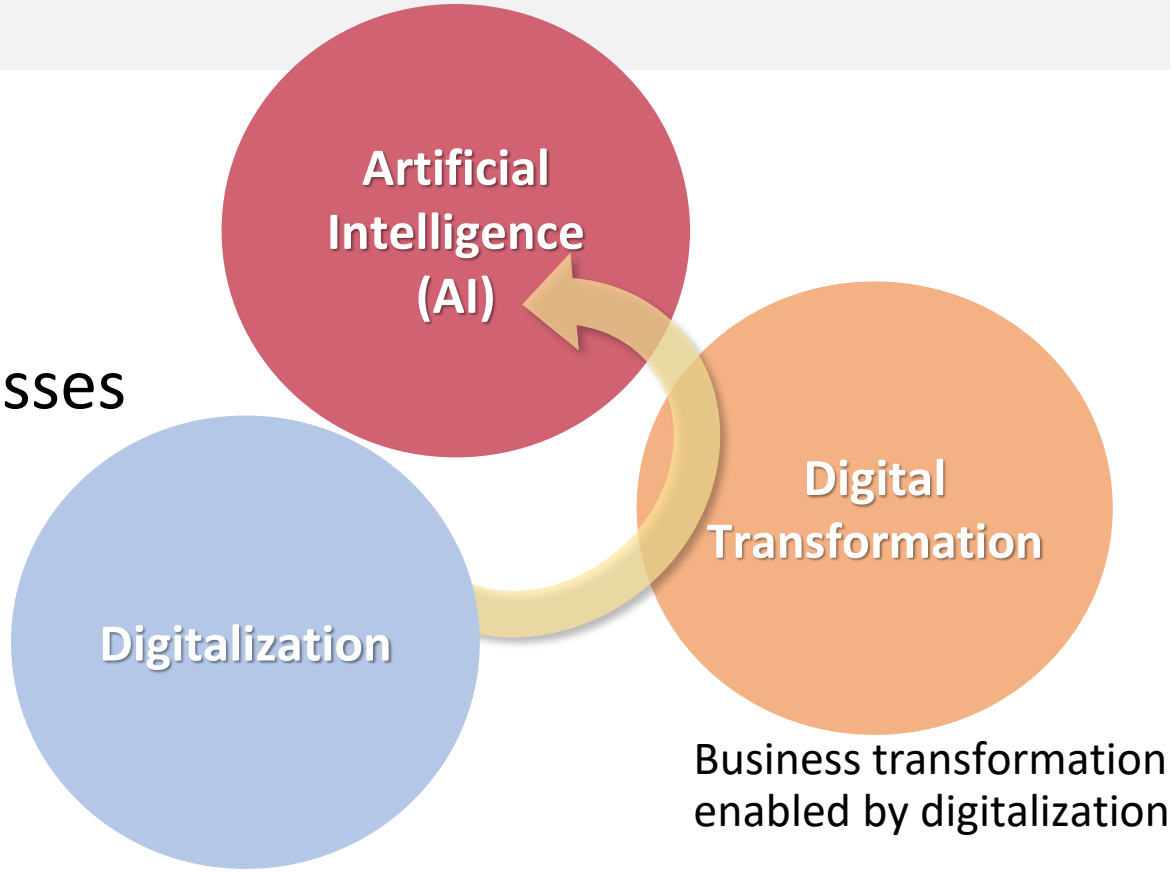
- Supply & Demand: Businesses producing and businesses adopting AI technologies
- Value chain: AI production, integration and delivery

AI ADOPTION FACTORS

- Core business: Factors to consider when incorporating AI in core products and services.

Definitions

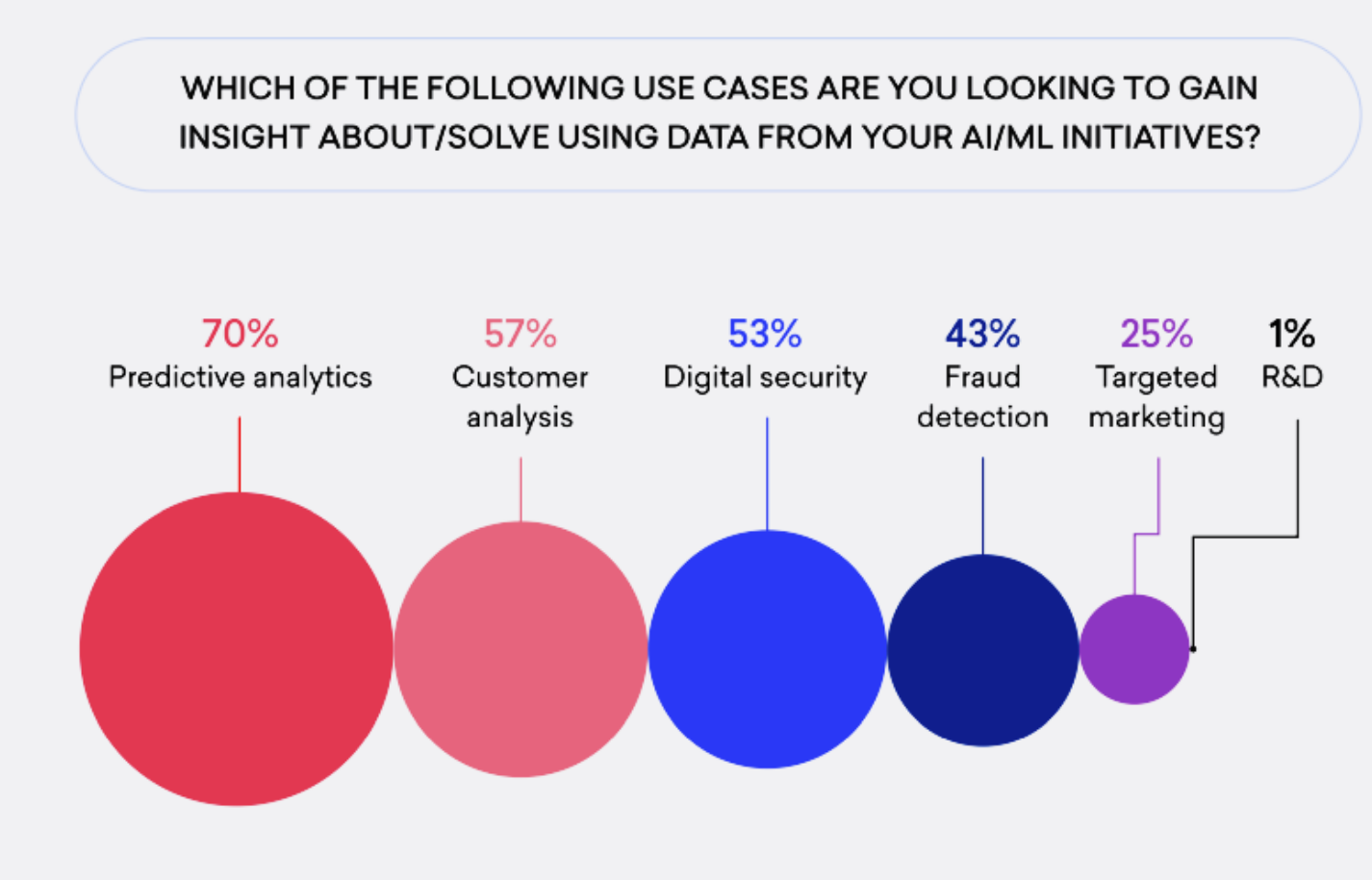
- Artificial Intelligence (AI)
- Digital transformation of businesses
- Digitalization of processes



Business transformation enabled by digitalization

Use of digital technologies and digitized/digital data in business processes

Trends: Optimizing operations with AI



Red Hat and Pulse surveyed 100 enterprise IT and data leaders who use AI and ML to uncover why they implemented the technology, the types of AI/ML tools they rely on, and the most popular initiatives they're investing.

[cl-open-source-cloud-based-ai-analyst-material-f27925-202103.pdf (redhat.com)]

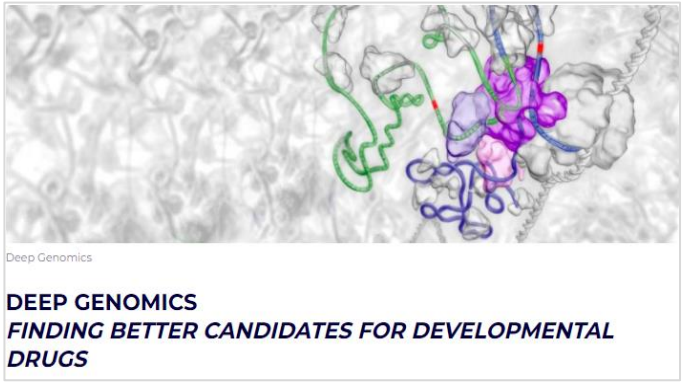
Committing to AI in core products

New approaches and technologies serve as differentiators

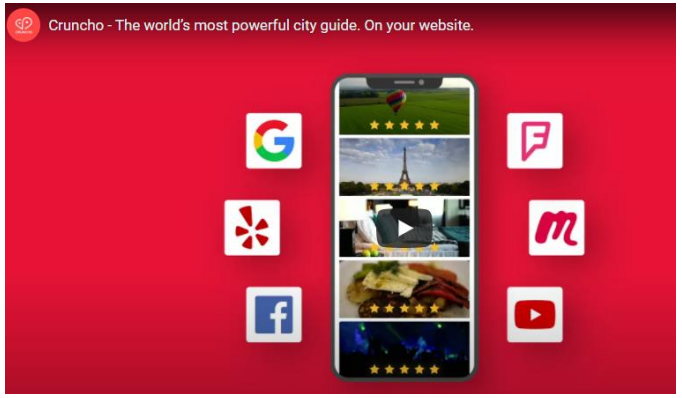
- Start-ups often bring disruptive technologies and business models into the market place

Once established and proven beneficial, the new technology becomes a requirement

- If not included, the product is outdated.



https://builtin.com/artificial-intelligence/artificial-intelligence-healthcare



AI-powered, Fully Automated Products | Cruncho

Ecosystem

Supply

- Producers of **core AI** technologies and providers of **AI services**
- Consultants, system integrators and solution providers – Facilitators

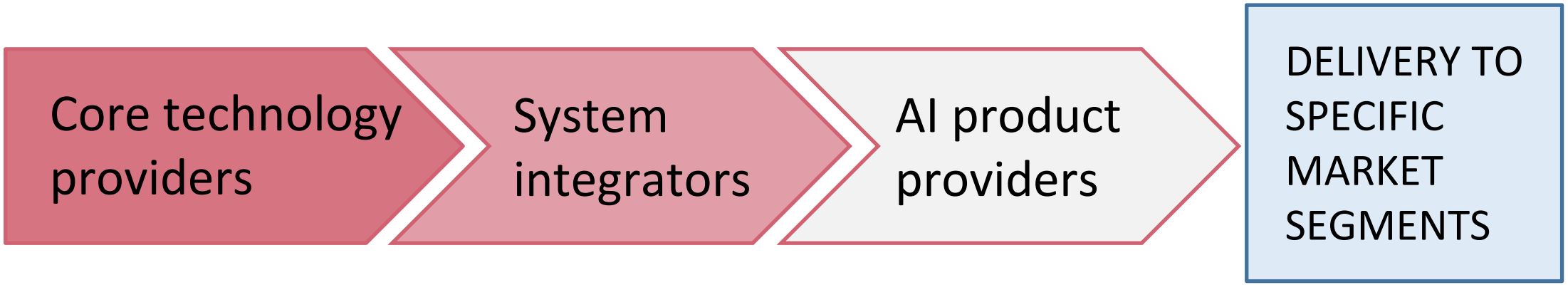
AI Demand

- Businesses incorporating **AI into products**
- Businesses **optimizing operations** and processes using AI
- **Consumers** of AI based systems and services: individuals & organizations

Operational and business considerations

- System reliability (SR)
- Quality assurance (QA)
- Quality control (QC)

- Accountability (**A**)
- Responsibility (**R**)
- Liability (**L**)



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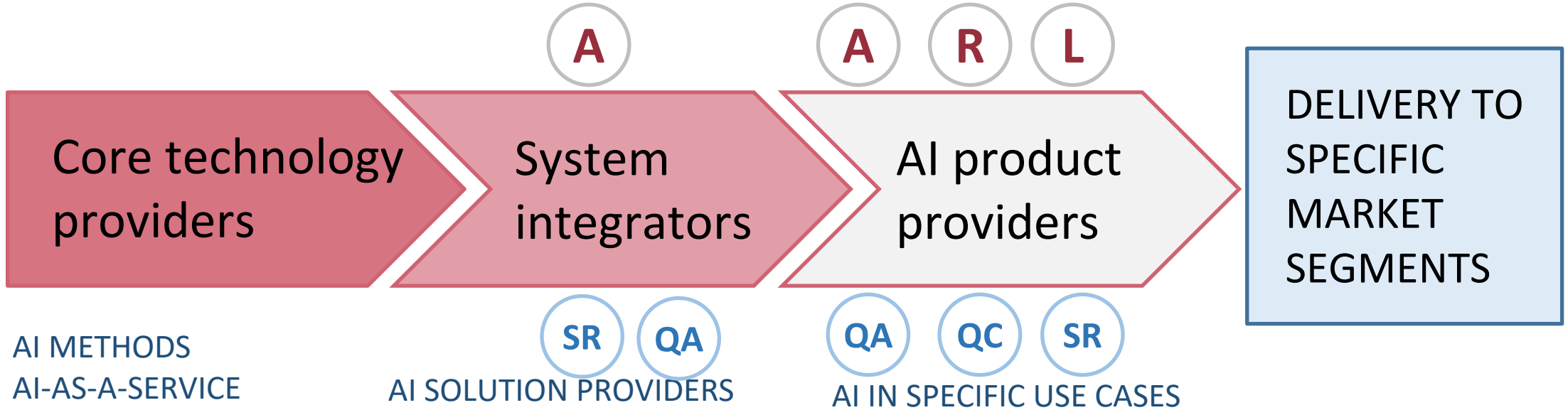


Actions and consequences

ACCOUNTABILITY

- Accountability is answerability – one is compelled to or called to account for one's action
- Applies to **all those involved** in a specific action
- Assessed **from the nature of an action** and the relationship of the person to the action's outcome.

MORAL RESPONSIBILITY

- One's **voluntary actions** have **morally significant outcomes** that would make it appropriate to blame or praise them
- Assessed by establishing a link between a person and someone or something that is **affected by the actions** of the person.

LIABILITY

- Liability is focused on a **person who is to blame** and needs to **compensate victims** for damages suffered after the event
- Liability is rooted in the **suffering of victims**
- The starting point for assessing liability is the victim's condition.

Value-chain dynamic

Technology suppliers

Core technologies

- Algorithms and methods
- Data
- Performance metrics

AI Cloud services (AIaaS)

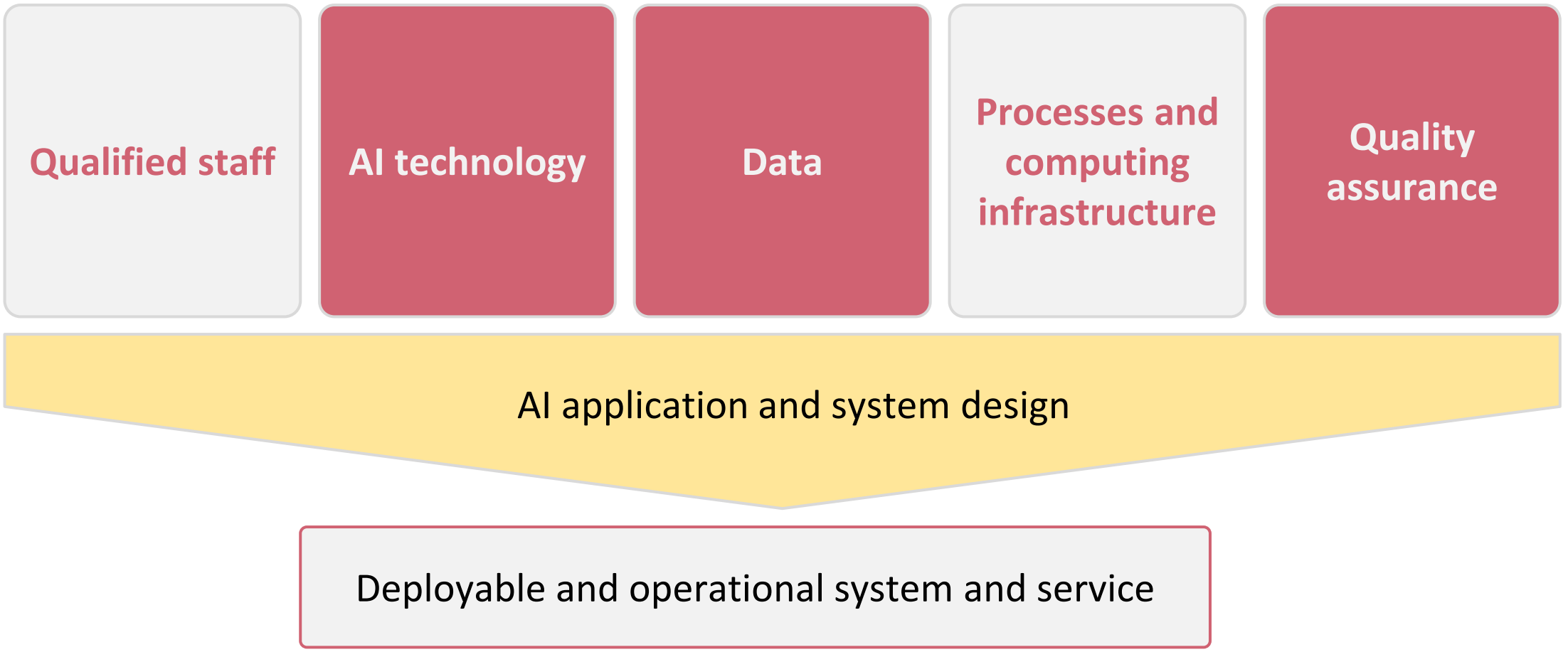
- Pre-trained AI models
- Service and service APIs

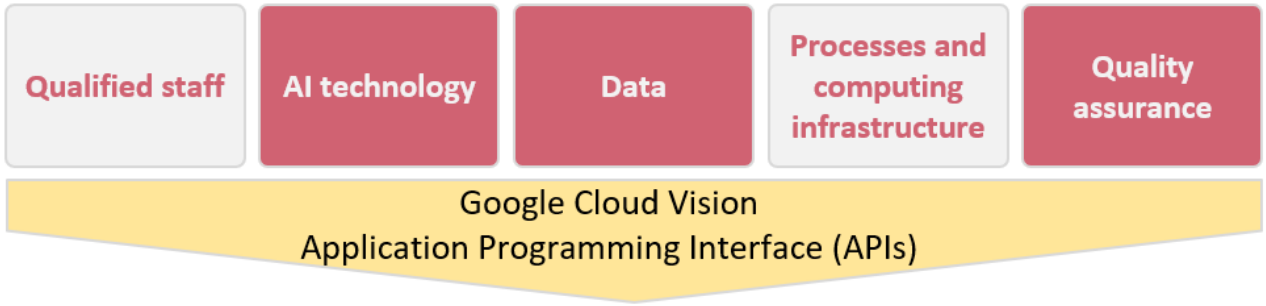
Technology adopters

Product design and development

- Use scenarios
- Method selection
- Data selection
- Validation processes

Key factors in AI based operations

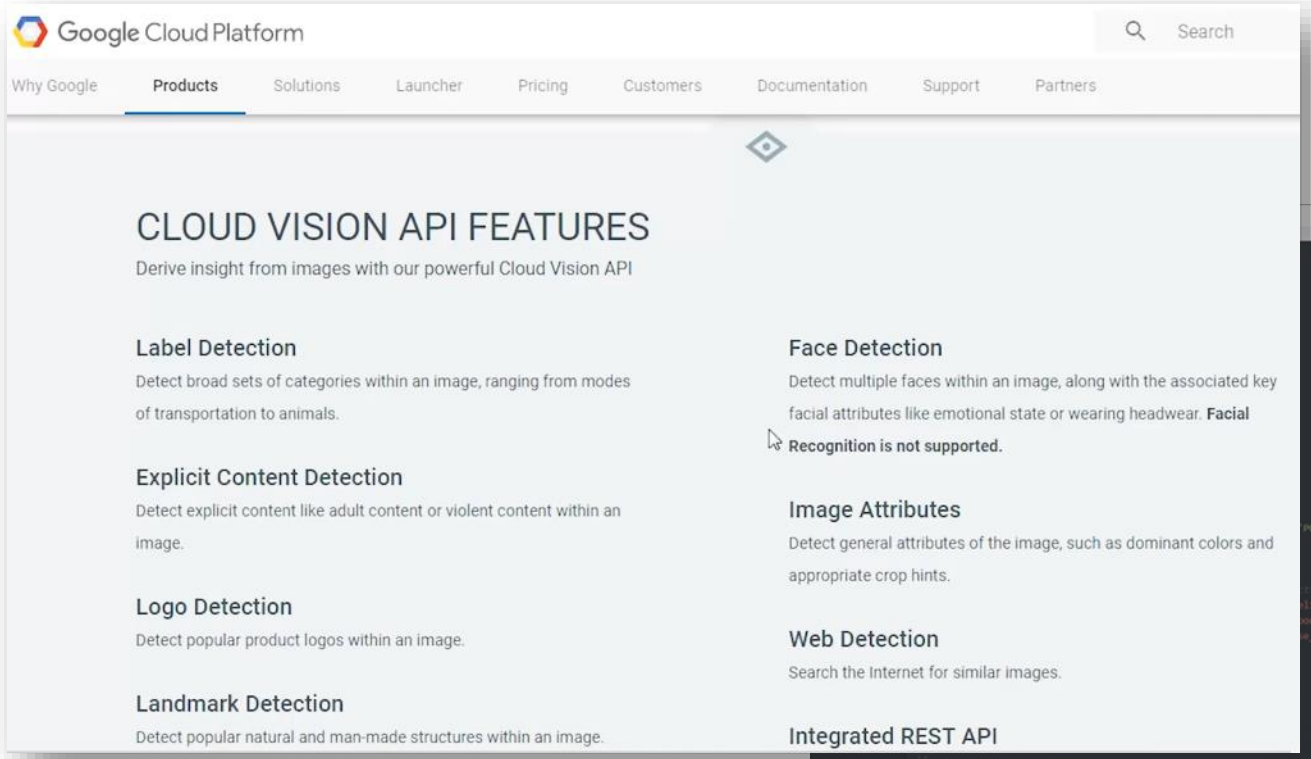


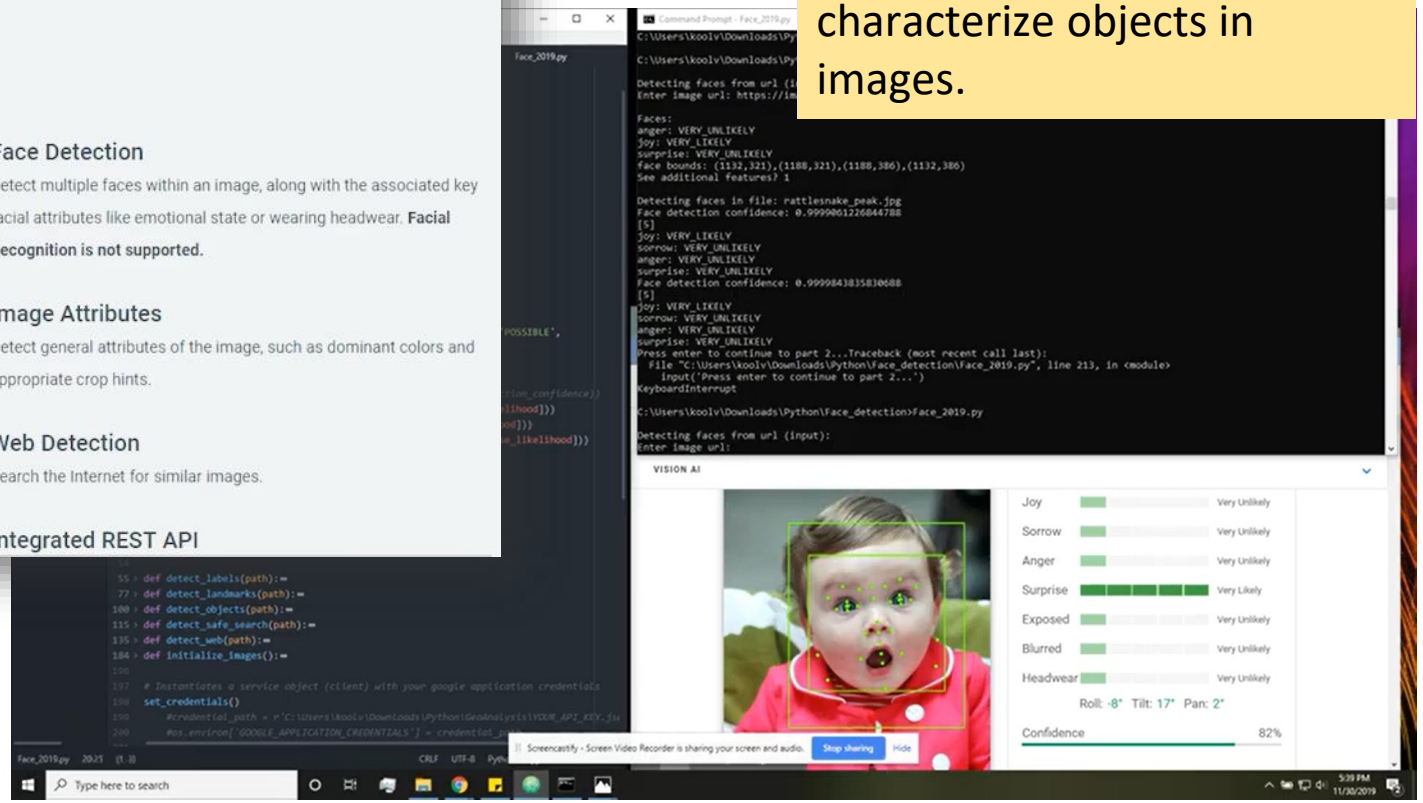


AI Technology provider – Google

APIs for AI-as-a-service

AI-as-a-service: Google Cloud Vision and APIs





Incorporating API calls into a program that can submit images to Google Vision to characterize objects in images.

Innovation: General purpose vision APIs

Qualified staff

AI technology

Data

Processes and computing infrastructure

Quality assurance

Google Cloud Vision
Application Programming Interface (APIs)

Object detection

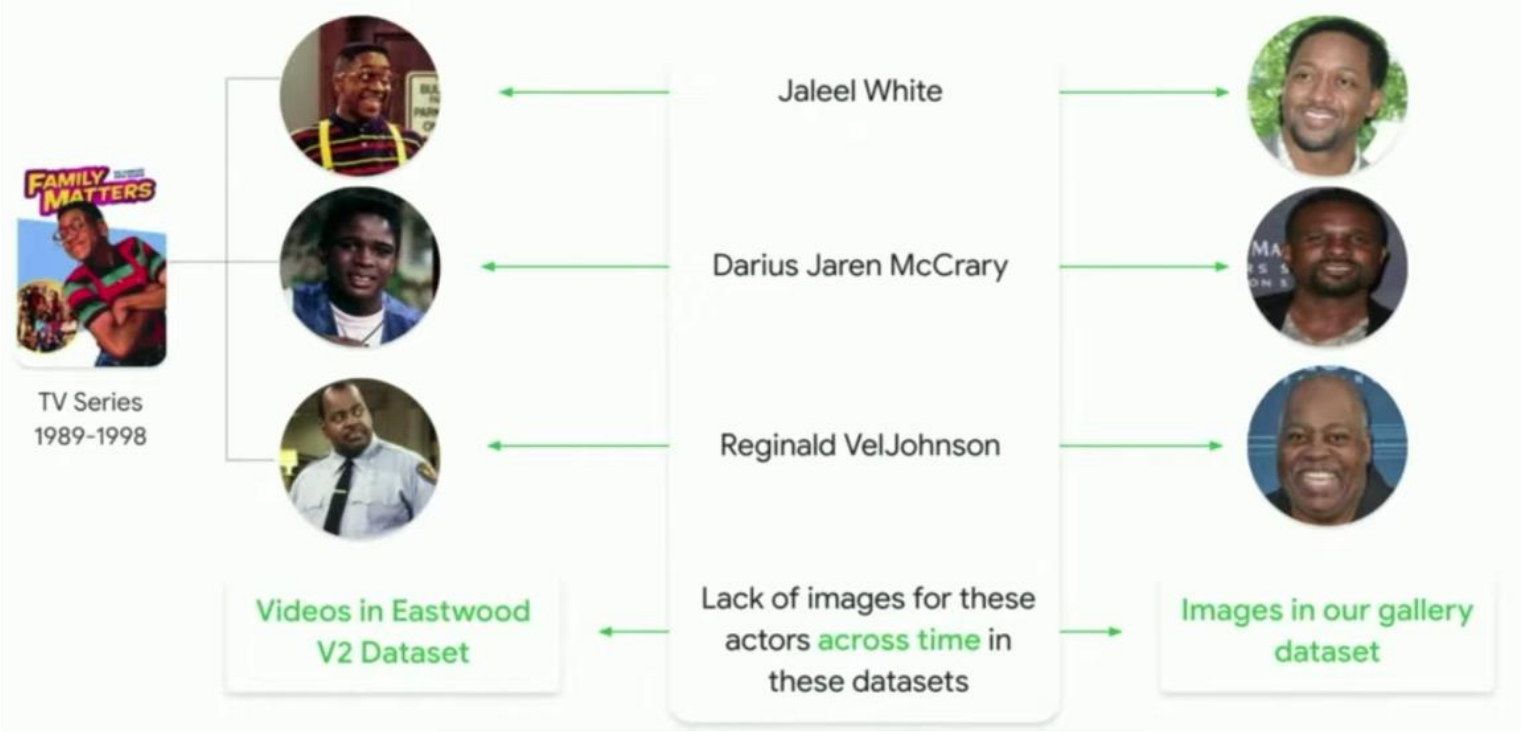
Automated emotion recognition

Landmark detection and recognition

Applications across industry sectors: Publishing, Marketing, Hospitality, Tourism, Law Enforcement, Surveyance

Data problem: Celebrity face recognition

- Insufficient data to detect individuals as they age
- Generalization across data sets is a fundamental and well known problem in machine learning.

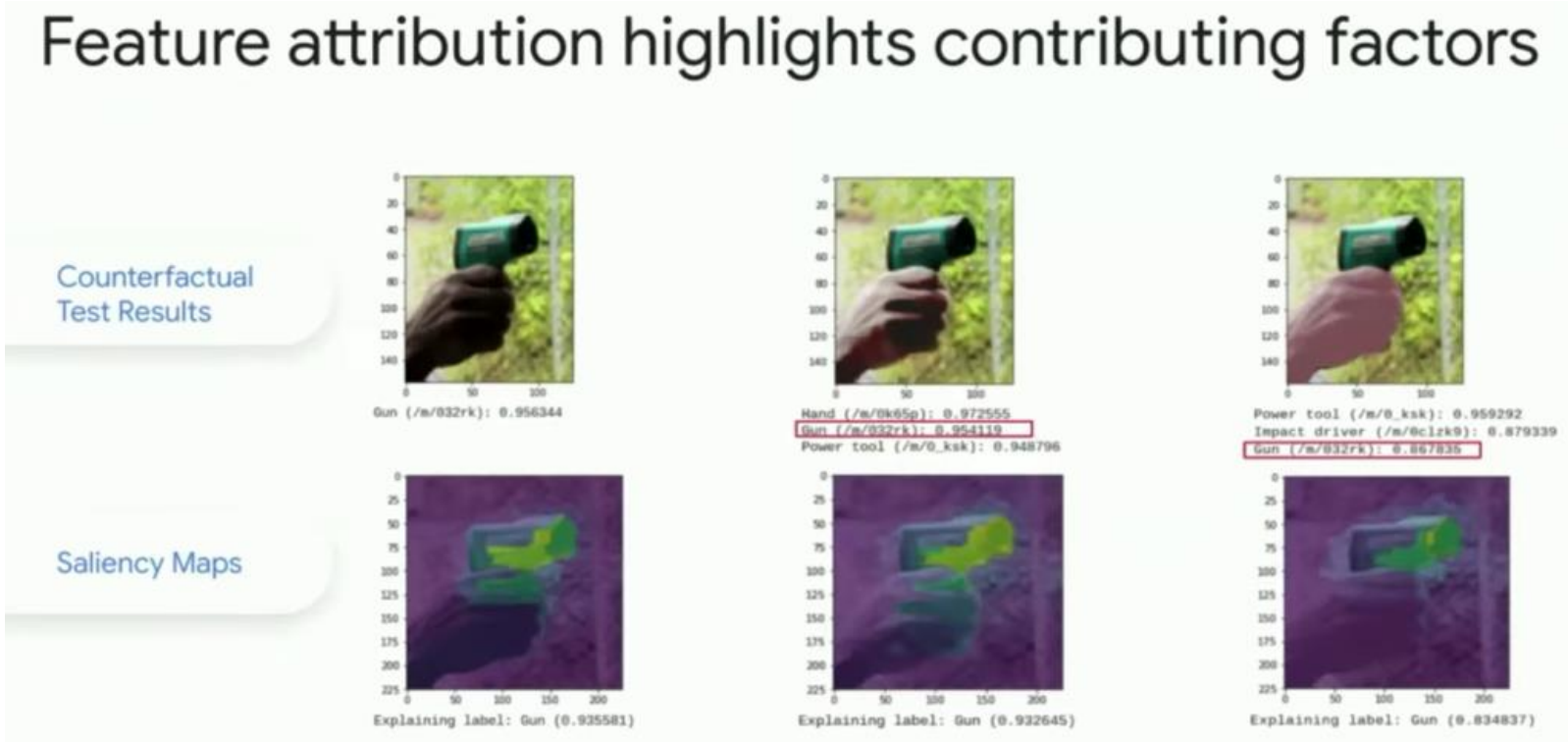


INCOMPATIBILITY OF TRAINING AND TEST DATA

Training data did not have images of actors at different age.

Data problem: Imbalanced representation entities

- Not all the objects are equally represented in the databases.
- Problem of imbalanced classes is a well known machine learning problem.



HIGHLY IMBALANCED REPRESENTATION OF OBJECTS IN DATA

Many more images of individuals with dark skin colour holding a gun than holding a thermometer. Generally very few images of hand-held thermometer.

Lessons learnt: Quality assurance is key

Qualified staff !	AI technology	Data !	Processes and computing infrastructure	Quality assurance !

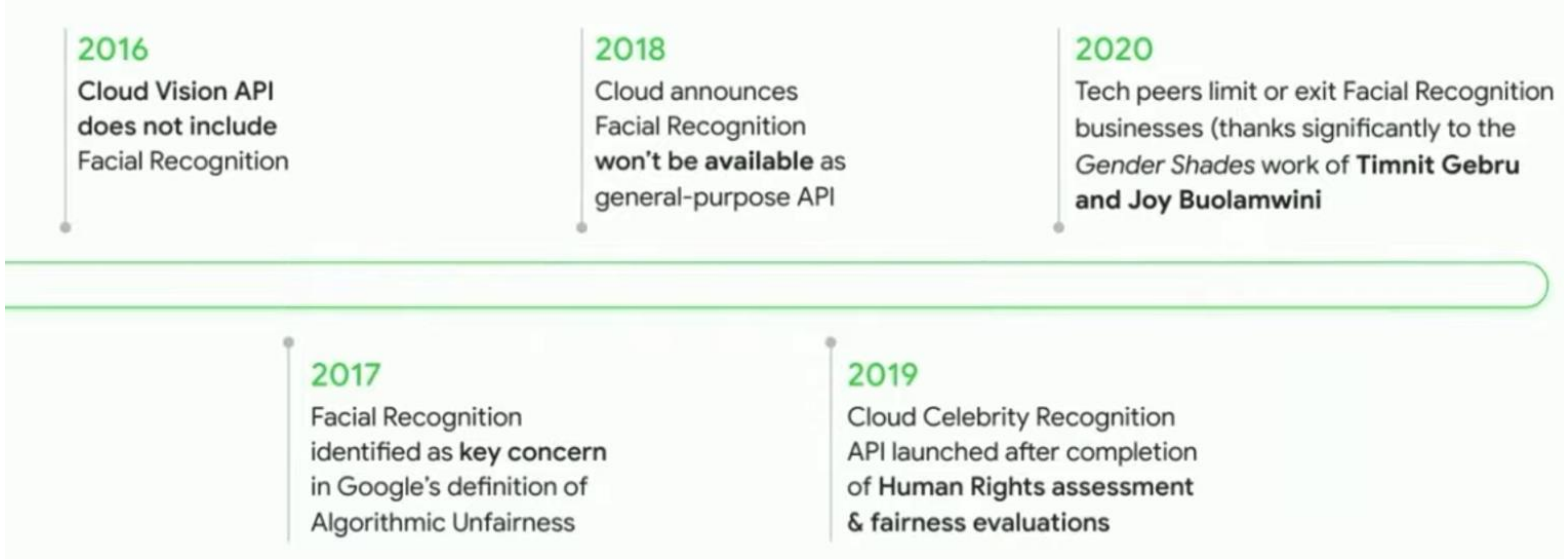
Error investigations showed systemic problems with the data preparation and model training

Pre-mature innovation attempt

- Google picked a hard problem. It stopped the development of general purpose API for facial recognition and was pleased that other companies also exited:

"In mid-2020, just recently, we welcomed the news that other technology companies were limiting or exiting their facial recognition business"

from Responsible AI: From theory to practice - YouTube



- Lack of quality assurance and competence in machine learning added fuel onto ongoing debates and contributed to the fears of harm that wide and uncontrolled adoption of AI can bring about.

Microsoft Responsible AI Framework

AI Technology provider – Microsoft

Responsible AI Framework

Responsible AI by Microsoft

"We need to translate academic thought to a language that our engineers and sales people are familiar with."

Our approach to responsible AI - YouTube

Transparency: about AI methods

"A crucial part of transparency is what we refer to as **intelligibility**, or the useful explanation of the behavior of AI systems and their components.

Improving intelligibility requires that **stakeholders comprehend how and why they function** so that they can identify potential performance issues, safety and privacy concerns, biases, exclusionary practices, or unintended outcomes.

We also believe that those who use AI systems should be honest and forthcoming about when, why, and how they choose to deploy them."

From [Identify guiding principles for responsible AI - Learn | Microsoft Docs]

ONLY SOME AI AND MACHINE LEARNING TECHNIQUES PROVIDE MODELS THAT CAN BE REASONED ABOUT TO EXPLAIN THE OUTCOME

If intelligibility is a priority over performance, than a particular AI/ML technique should be used.

Transparency: About AI use

"When AI systems are used **to help inform decisions** that have tremendous impacts on people's lives, it is critical that **people understand how those decisions were made**.

For example, a bank might use an AI system to decide whether a person is creditworthy, or a company might use an AI system to determine the most qualified candidates to hire."

From [Identify guiding principles for responsible AI - Learn | Microsoft Docs]

Confusion of who makes a decision: AI system or individuals.

This is a matter of practice, i.e., adoption of the AI technology as part of operations.

Accountability

"The people who **design and deploy AI systems must be accountable** for how their systems operate.

Organizations should draw upon industry standards to develop accountability norms.

These norms can ensure that AI systems **are not the final authority** on any decision that impacts people's lives and that **humans maintain meaningful control** over otherwise highly **autonomous AI systems**."

From [Identify guiding principles for responsible AI - Learn | Microsoft Docs]

ACCOUNTABILITY IS NORMALLY NOT AN ISSUE: PEOPLE WILL ADMIT THAT THEY PARTICIPATED IN BUILDING THE SYSTEM>

Systems are too complex for any individual to know the implications of their work. Thus, they may not be responsible for any harm.

Fairness

"When designing and building AI systems, **developers should understand how bias can be introduced and how it can affect AI-based recommendations**.

To help mitigate bias, they should use training datasets that reflect the diversity of society. They should also design AI models in ways that allow them to learn and adapt over time without developing biases.

To help them develop AI systems that treat everyone fairly, developers **can leverage tools, methodologies, techniques**, and other resources that help detect and mitigate biases."

From [Identify guiding principles for responsible AI - Learn | Microsoft Docs]

QUALIFIED STAFF IS KEY.

Software developers are not necessarily equipped to deal with complex machine learning issues.

BIAS – DATA DISTRIBUTIOSNS

Output of only some methods can be easily explained based on statistical distributions of data collections.

AI Consultant & System Integrator – PwC

PricewaterhouseCoopers LLP(PwC) on AI Risks and Responsibility

PwC: Risks advice

- Are your algorithms making decisions that align with **your values**?
- Do customers **trust you with their data**?
- How is your brand affected if you **can't explain** how AI systems work?
- It's critical to **anticipate problems and futureproof your systems** so that you can fully realize AI's potential.
  - It's a responsibility that falls to all of us — board members, CEOs, business unit heads, and AI specialists alike.

ALGORITHMS AND VALUES

ALGORITHMS MAKING DECISIONS

LACK OF EXPLAINABILITY = LACK OF TRUST

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PwC: AI Risks

AI Risks

1. Performance

AI algorithms that ingest real-world data and preferences as inputs, run a risk of learning and imitating our biases and prejudices.

Performance risks include:
- Risk of errors
- Risk of bias
- Risk of opaqueness
- Risk of instability of performance
- Lack of feedback process

2. Security

For as long as automated systems have existed, humans have tried to circumvent them. This is no different with AI.

Security risks include:
- Cyber intrusion risks
- Privacy risks
- Open source software risks
- Adversarial attacks

3. Control

Similar to any other technology, AI should have organisation-wide oversight with clearly-identified risks and controls.

Control risks include:
- Risk of AI going rogue
- Control malevolent AI

4. Economic

The widespread adoption of automation across all areas of the economy may impact jobs and shift demand to different skills.

Economic risks include:
- Risk of job displacement
- Risk of concentration of power within 1 or a few companes
- Liability risk

5. Societal

The widespread adoption of complex and autonomous AI systems could result in "echo-chambers" developing between machines and humans.

Societal risks include:
- Risk of autonomous weapons proliferation
- Risk of an Intelligence divide

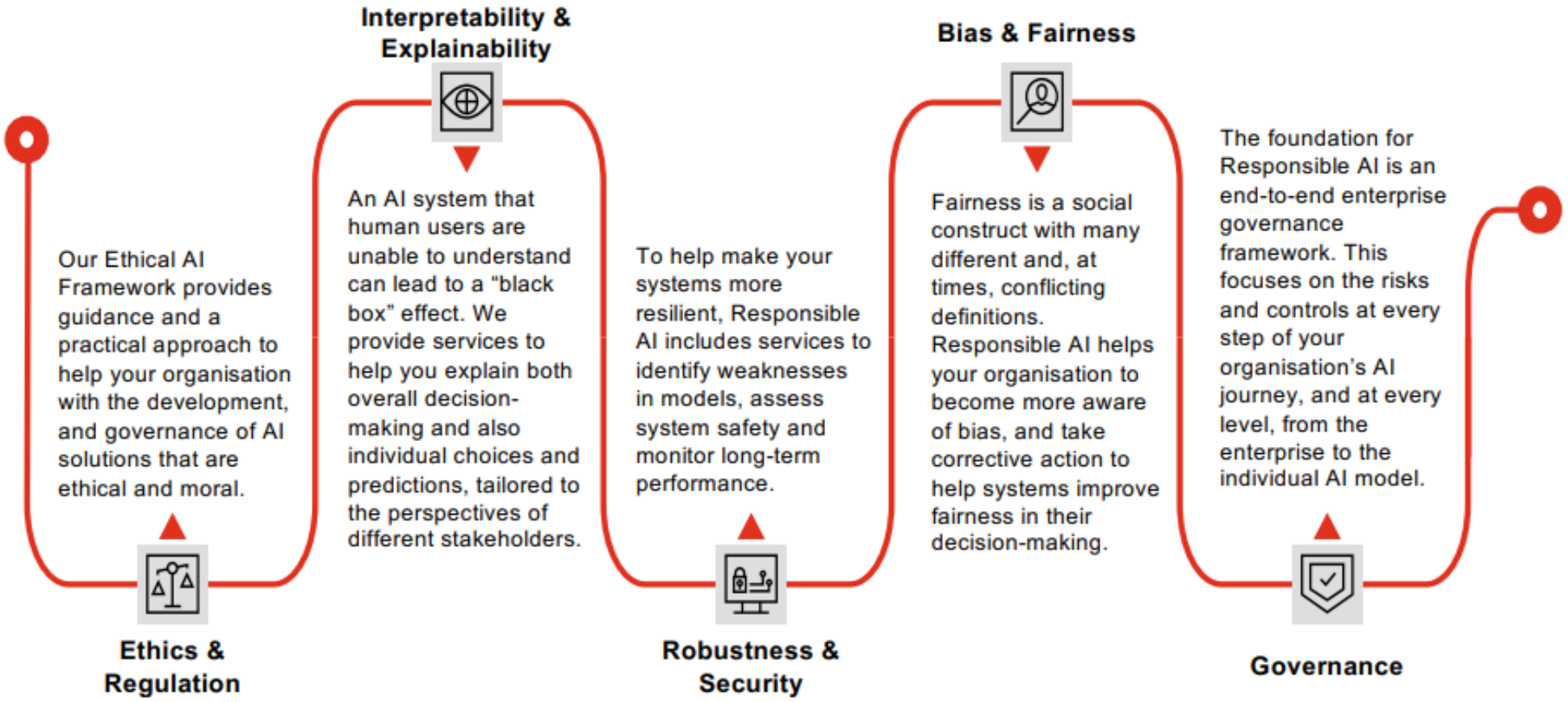
6. Ethical

AI solutions are designed with specific objectives in mind which may compete with overarching organisational and societal values within which they operate.

Ethical risks include:
- Lack of values risk
- Values misalignment risk

From [11052019_PLACEMAT_A4_v8(FINAL) (pwc.com)]

PwC: Responsible AI Framework



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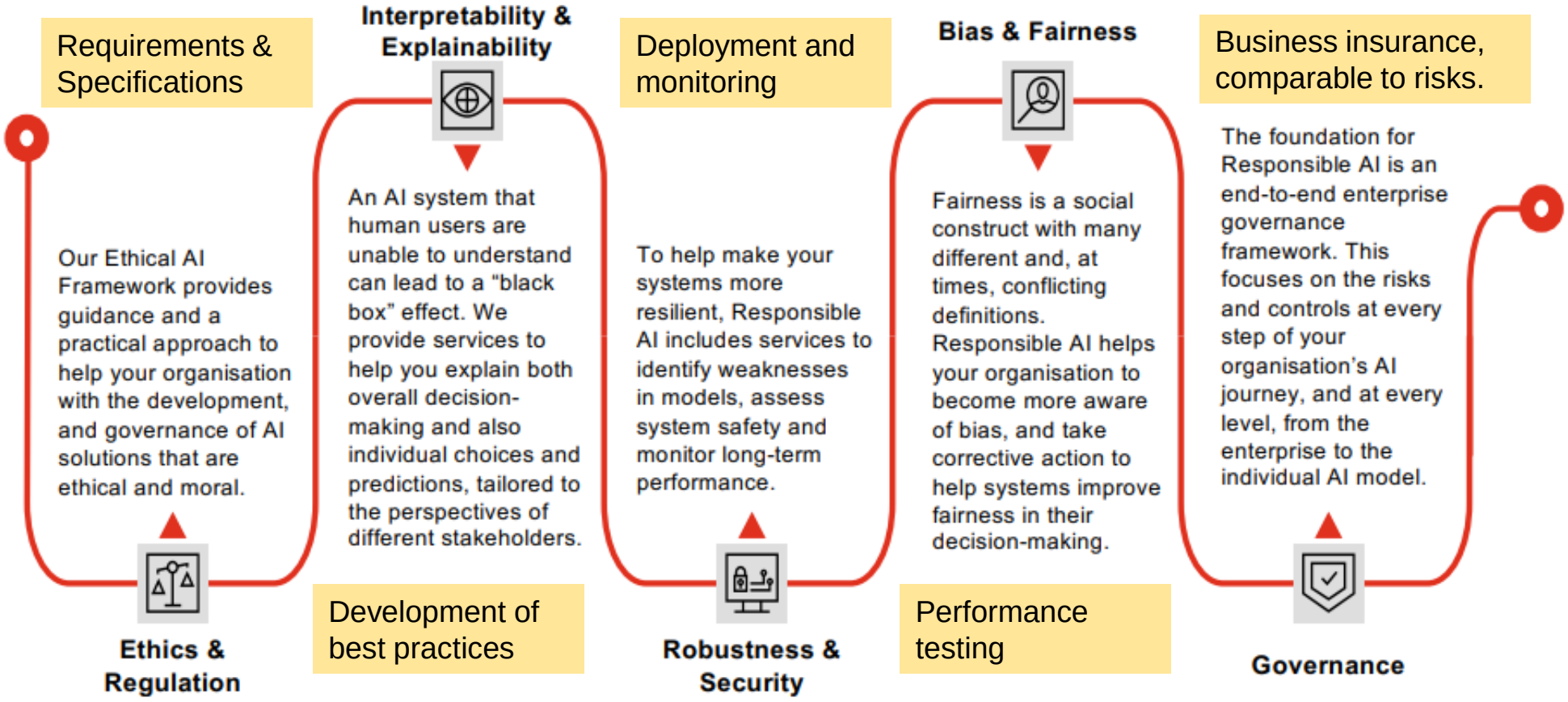
PwC: Responsible AI Framework



From [11052019_PLACEMAT_A4_v8(FINAL) (pwc.com)]

AI or Not AI? AI is a 'must'

How to get ready?

Successful AI adoption can be achieved in a principled manner

Organizational capacity: Skilled staff

- Must have organizational capacity to use available AI toolkits and develop a bespoke solution.
- Skilled machine learning experts should be employed or hired as consultants.
- If adopting AI solution by a third party, carefully adapt and evaluate.

Clear requirements and specifications

- Many ethical and liability issues are due to AI reliability rather than organizational policy issues
- Select use scenarios that can be addressed reliably with AI. For others AI may not be applicable (yet).
- Clearly specify performance requirements and implement quality assurance processes.

Ongoing monitoring and quality assurance

- Models constantly need to be evaluated and improved based on new data.
- Previous models need to be retained for benchmarking and quality tracking.
- Retired models need to be retained for regulatory and legislative purposes.

Thank you!

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