AI today, beyond the myth

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For: ETSI Summit on Artificial Intelligence

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A Short History of Artificial Intelligence

Early Days

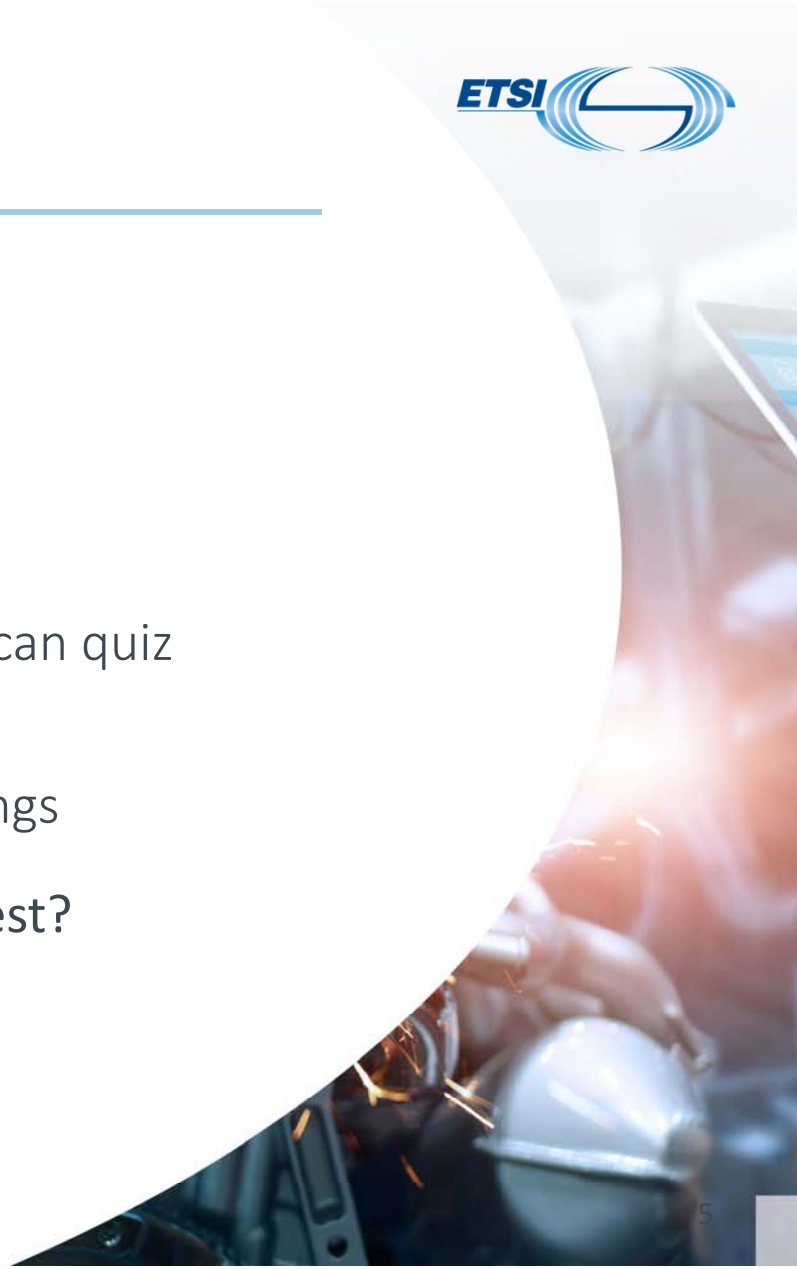
- 1950 Alan Turing published “Computing Machinery and Intelligence”
  - “Imitation Game” see also John Searle’s “Chinese Room”
- 1956 John McCarty held the first academic conference on the subject
  - The term artificial intelligence was coined
  - Marvin Minsky *"Within a generation [...] the problem of creating 'artificial intelligence' will substantially be solved,"*

AI Winter

- 1974–80 Initial optimism fades as progress in AI is slow
  - government funding stops
  - interest in the field drops off
  - Winter has begun
- Thaw begins in 1980
  - British government funds AI research again
- Winter returns from 1987 to 1993
  - Market Crash

AI Breakthrough

- 1997 IBM's Deep Blue
  - Computer beats chess grandmaster Garry Kasparov.
- 2011 IBM Watson
  - Watson's question-answering system won the American quiz show "Jeopardy!"
  - beats reigning champions Brad Rutter and Ken Jennings
- 2014 Chatbot called Eugene Goostman passes Turing test?



AI today

- Art
- Music
- Fraud
- Healthcare
- Autonomous Vehicles
- News and Media
- Recommendations
- Fishing

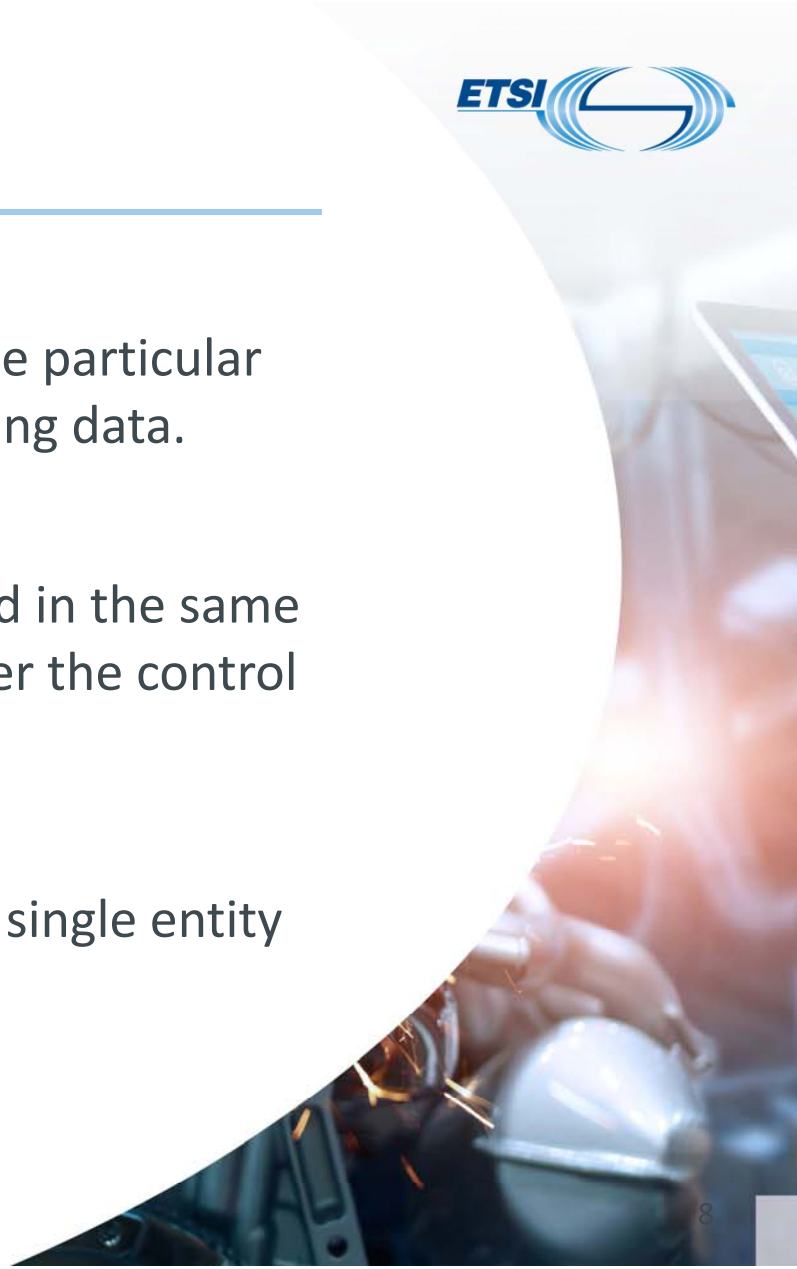
- Data Centres
- Sentiment Analysis
- Customer behaviour
- Cyberbullying

AI Computing

AI Hardware

Three types of AI computing

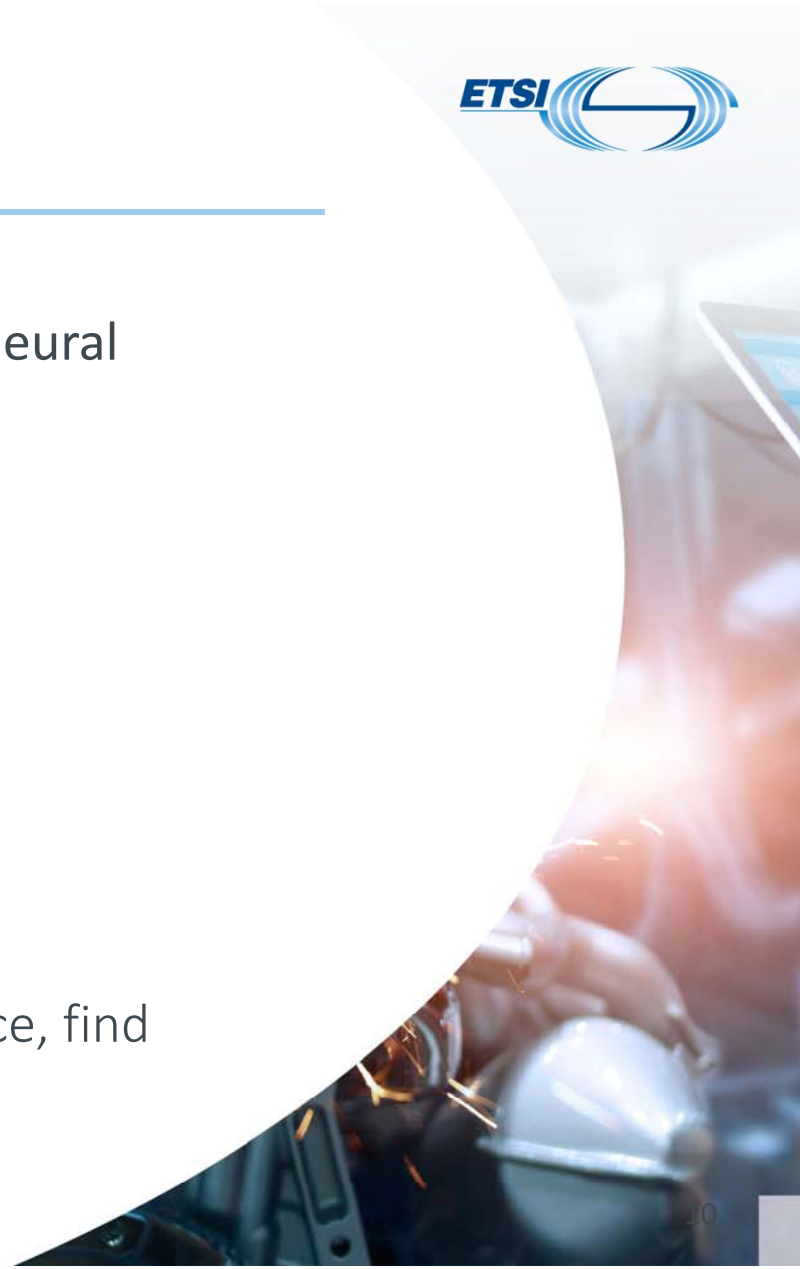
- **Centralized environment,** all calculations are done on one particular computer system, such as a dedicated server for processing data.
  - the single server model bottleneck
- **Distributed computing**, not all transactions are processed in the same location, but that the distributed processors are still under the control of a single entity.
  - SETI
- **Decentralized computing**, on its end, entails that no one single entity has control over the processing.
  - no leakage of sensitive data or attack on security



AI Chips

Microprocessors 1

- Nvidia dominant vendor of GPUs updating to support neural networks
- Googles Tensor Processing Unit (TPU)
  - 30 times faster , 80 times less power consumption
- Facebook and Intel Nervana Chip NNP-I
  - optimized for trained algorithms
- AWS Inferentia
  - large workloads, lower latency, designed for inference, find patterns in large data



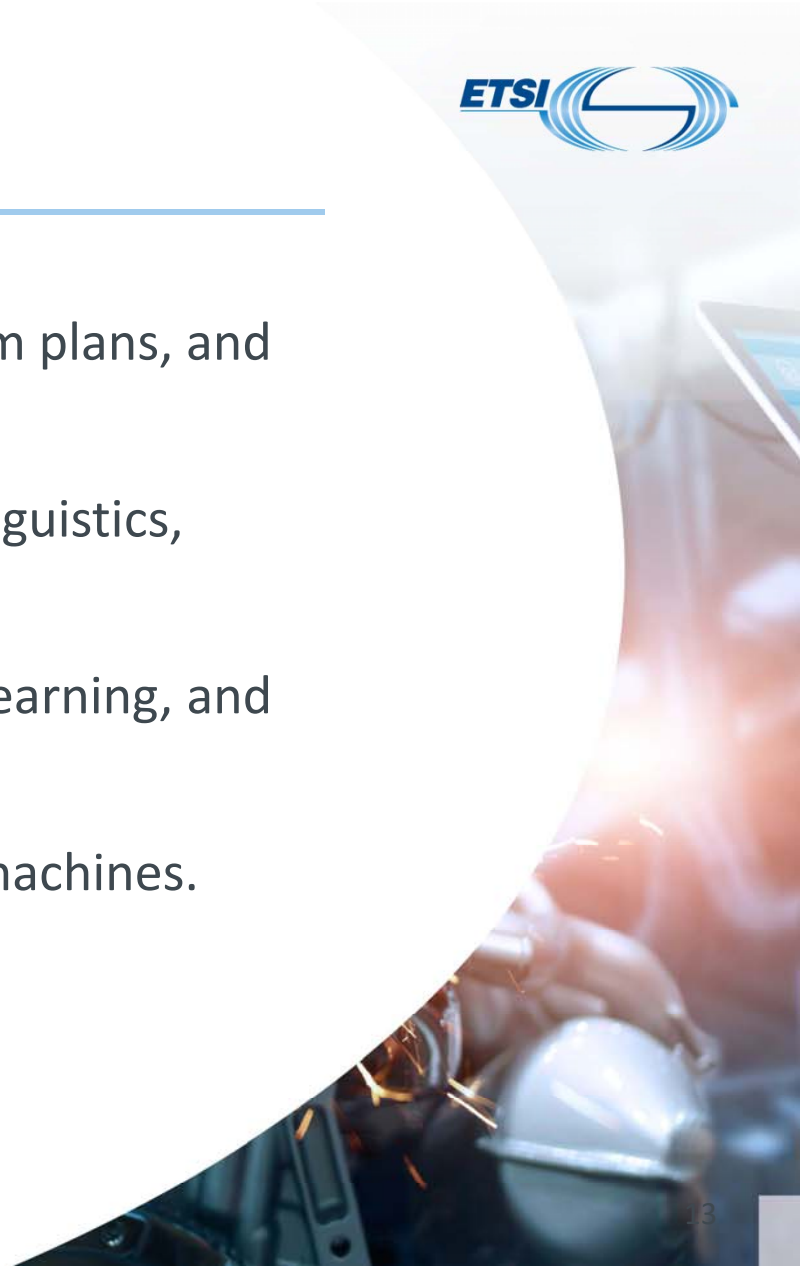
Microprocessors 2

- Intel's Myriad 2 AI Chip
  - Movidius enhanced low power AI for vision and imaging
- IBM's 8-Bit Analog chip
  - based on phase-change memory
  - double the accuracy and consumes 33x less energy
- Huawei's Ascend 910 and Ascend 310
  - AI Chips for datacentres, smartphones, smartwatches and IoT
- Qualcomm AI Chips
  - Face recognition on smartphones

AI
ML
DL

What is Artificial Intelligence?

- Programmed Agents that sense their environment, form plans, and make decisions to achieve their goals.
- Includes mathematics, logic, philosophy, probability, linguistics, neuroscience, and decision theory.
- Sub fields such as computer vision, robotics, machine learning, and natural language processing
- Incorporating human intelligence into programmable machines.

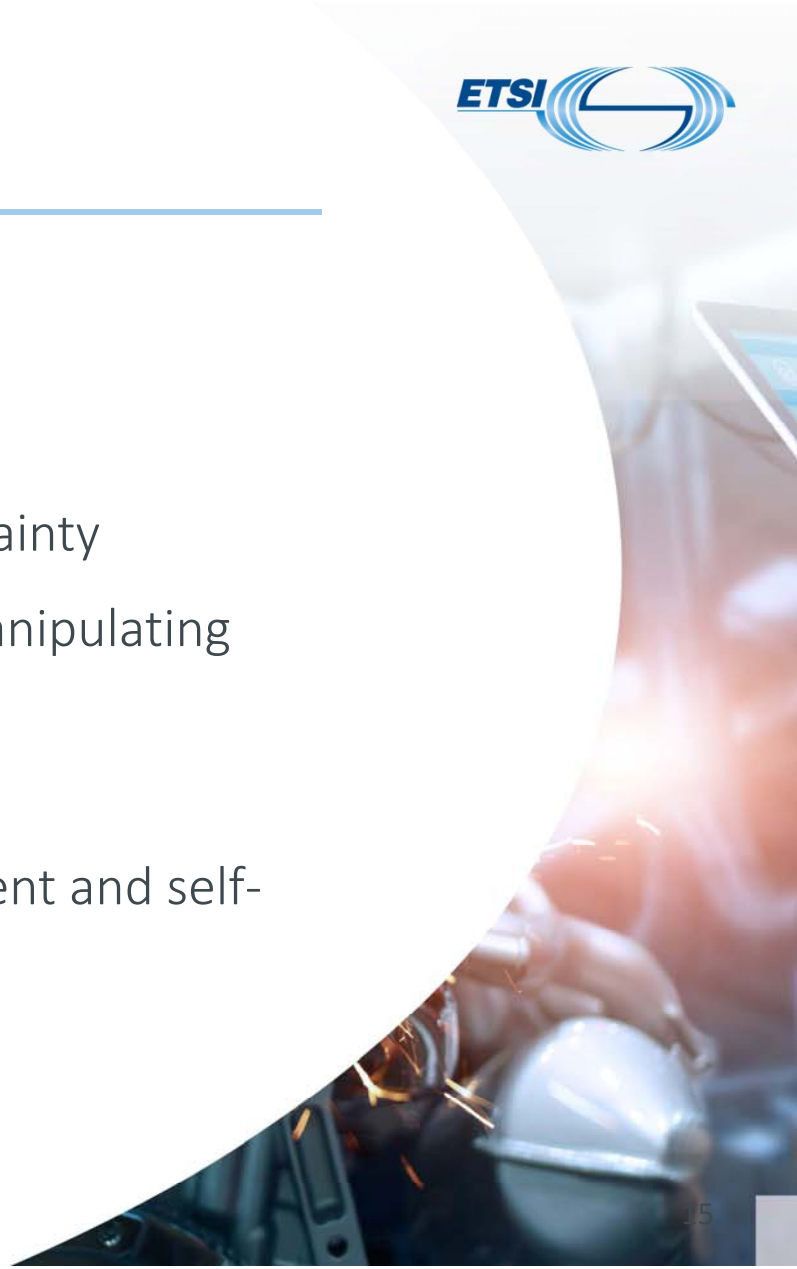


Artificial Narrow Intelligence (ANI)

- **Artificial Narrow Intelligence** (ANI) machines can perform specific tasks very well, sometimes better than humans.
  - effectively perform a narrowly defined task
  - Speech Recognition (can only recognize speech)
  - Voice Assistants i.e, Alexa (act on voice commands to perform a certain action)
  - Weak AI is where we are , namely systems that exhibit intelligent behaviours despite being “mere“ computers.

Artificial General Intelligence (AGI)

- **Artificial General Intelligence (AGI)**
  - comparatively intelligent as the human brain.
  - learning, planning and decision-making under uncertainty
  - communicating in natural language, making jokes, manipulating people, trading stocks,
  - reprogramming itself.
  - Strong AI similar to a “mind” that is genuinely intelligent and self-conscious.



What is Machine Learning (ML)?

- ML is a subset of artificial intelligence
  - a suite of techniques for realizing AI
- enables machines to learn by themselves taking provided data as input and making accurate predictions.
- Contains algorithms that enable pattern identification, model construction, and make predictions without explicit pre-programmed rules

Example of Machine Learning (ML)

Supervised Learning

- Decision Trees (True False)
- Naive Bayes Classification (Spam)
- Ordinary Least Squares (Linear Regression)
- Logistic Regression (Logic)
- Support Vector Machines (Gender)
- Ensemble Methods (Bayesian Averaging)

Unsupervised Learning

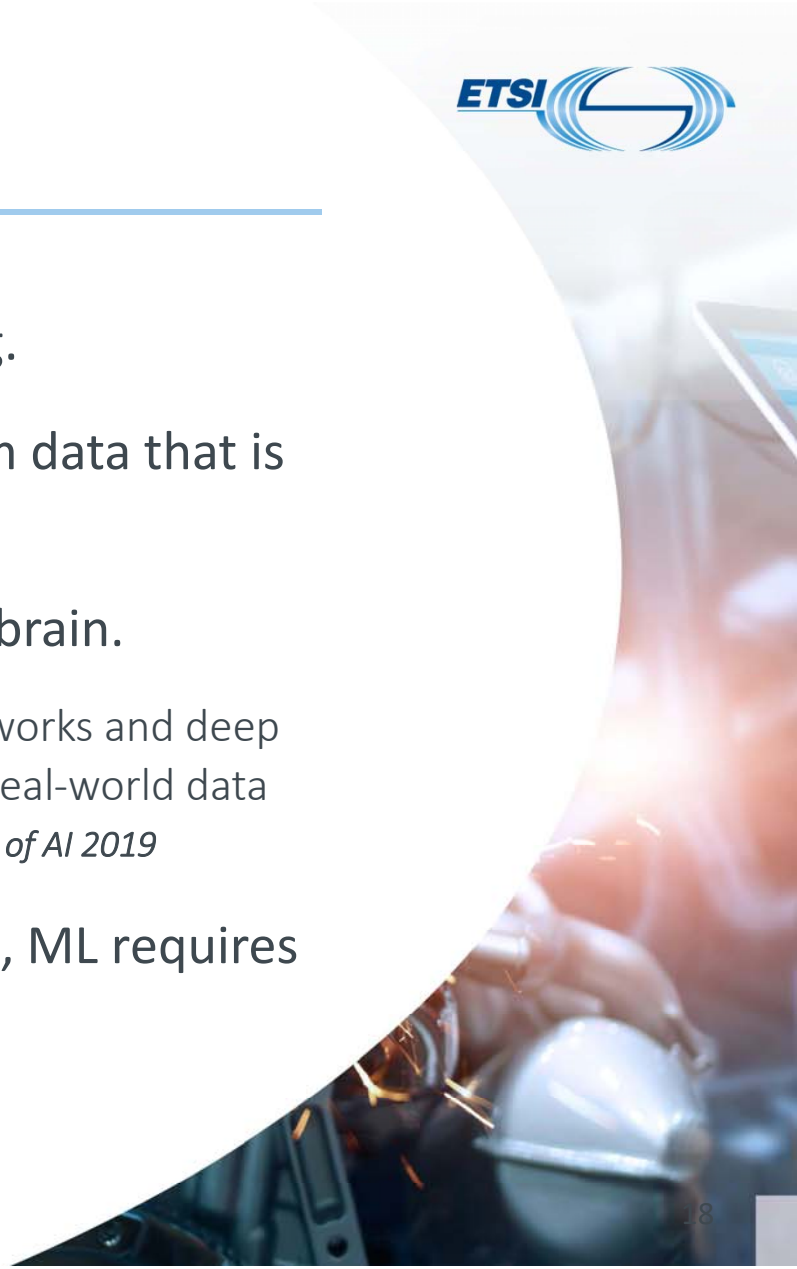
- Clustering Algorithms (Centroid, Density)
- Dimensionality Reduction (Variance)
- Neural networks (Deep Learning)
- Principal Component Analysis (Compression)
- Independent Component Analysis (Psychometric Measurements)

What is Deep Learning (DL)?

- subset of ML, techniques for realizing machine learning.
- Neural Networks capable of learning unsupervised from data that is unstructured or unlabeled.
- DL algorithms are inspired by processing in the human brain.

> "AI has been greatly boosted by the come-back of neural networks and deep learning techniques capable of processing images and other real-world data better than anything we have seen before" *Elements of AI 2019*

- DL can automatically discover features for classification, ML requires these features to be provided.



Where to now?

AI Future

- AI will influence our lives more than any other innovation
- Data storage and computer processing power increasing rapidly
  - Big Data and Deep Learning potential
- Changing work practices
  - augmenting efficiency and effectiveness
- Smart Homes, Smart Health (Sensors, IoT, … and AI)
  - Smart Energy, Smart Transport, Smart Manufacturing

AI Challenges

- Standardization
- Trustworthiness
- Bias
- Ethics / Morality
- Transparency
- Governance

Thank you!

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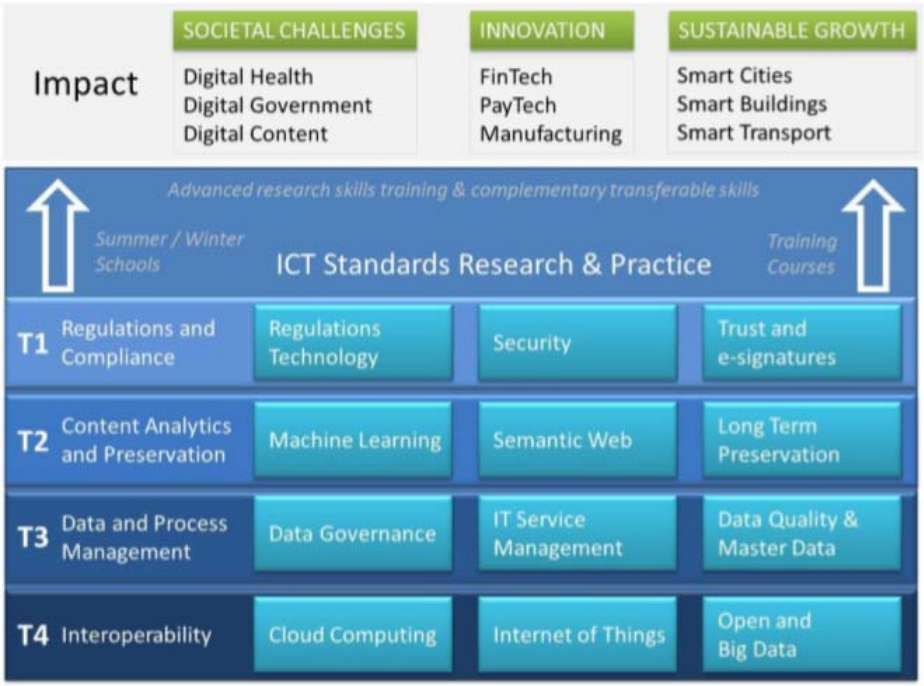
ELITE-S Fellowship Programme

ELITE-S is **Marie Skłodowska-Curie COFUND** Action for new intersectoral training, career development and mobility fellowship programme based at the ADAPT Centre (DCU). The Programme will offer **16 prestigious two-year fellowships** for incoming mobility across two calls over the 60 months duration of the programme. Fellowships will be targeted to experienced researchers (ER) and will be offered in the four core research areas **Regulations and Compliance, Content Analytics and Content Preservation, Data and Process Management, Interoperability**.



First Call

ELITE-S is currently looking for:

- ✓ Applicants – Post doc candidates
- ✓ Expert Reviewers in the 4 theme areas
- ✓ Industry partners

Schedule	
Open date of Applications	01st February 2019
Application Deadline	31st May 2019 @23:59 IST (Irish Standard Time)
Peer Review	June/July 2019
Interviews	August/September 2019
Fellowships to be awarded	01st November 2019

Website: http://elite-fellowship.eu/
E-mail: info@elite-fellowship.eu