









Cross-KIC Activity "Innovation Impact Artificial Intelligence" Summary of 2020 results

Agenda



10:00	Mission and Team of the Cross-KIC Activity Impact of Artificial Intelligence	Federico Menna, EIT Digital
10:10	Educating on AI - How the EIT Community addresses education in AI	Madalina Burghelea, EIT Health
10:30	Leveraging AI - How the EIT Community addresses AI in their business	Timo Scherer, EIT Manufacturing, William Wu, EIT Urban Mobility
11:00	Shaping AI made in Europe - How the EIT Community engages in the discussion	Achim Luhn, EIT Digital, Harald Rauter, EIT Climate KIC
11:25	Outlook for 2021 - The topics proposed for next year	Achim Luhn, EIT Digital











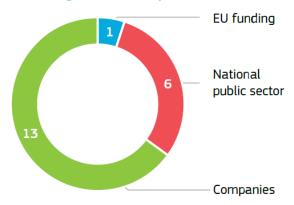


Cross-KIC Activity
"Innovation Impact Artificial
Intelligence"
Mission and Team

Federico Menna, Achim Luhn – EIT Digital November 30, 2020

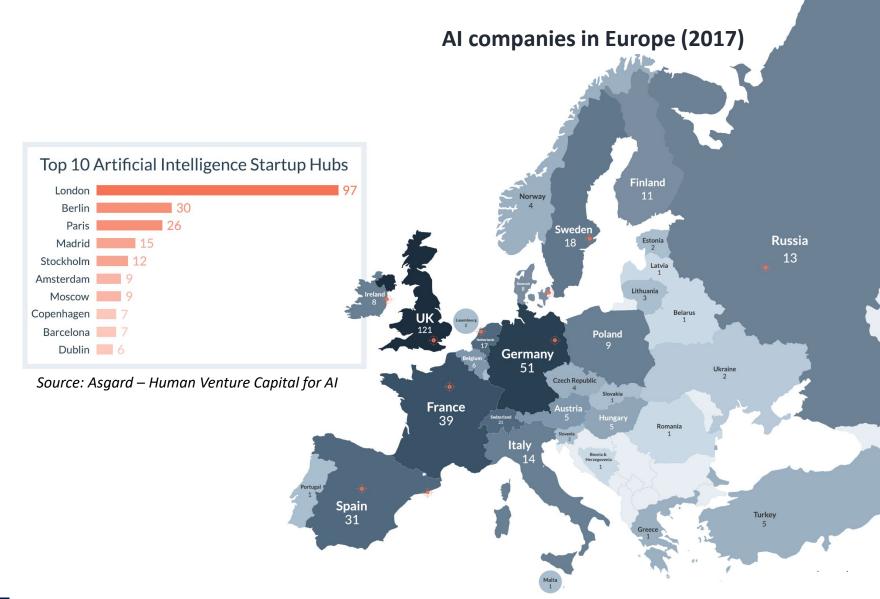
Al «Made in Europe» – setting the stage

EU Investment in AI: target €20bn by 2025



Made in Europe: Human-centric and trustworthy AI:

- Human agency and oversight
- Technical robustness and safety
- Privacy and Data Governance
- Transparency
- Diversity, non-discrimination and fairness
- Societal and environmental wellbeing
- Accountability



Cross-KIC Activity Impact of Artificial Intelligence - Mission



- Showcase and disseminate the main achievements of the KICs in the area of Artificial Intelligence (Innovation projects, startups/scaleups, education programmes)
- Engage with other relevant European-wide initiatives and stakeholders

thereby positioning EIT and the KICs as an important stakeholder in the European AI Landscape

Cross-KIC Activity Impact of Artificial Intelligence - Team





Achim Luhn, Federico Menna, with Sandro Battisti (FBK)



Madalina Burghelea, Peter Lauffs



Manufacturing Timo Scherer, Christian Bölling, Gian Mario Maggio



William Wu, Maria Marrugat, Gareth Macnaughton



Harald Rauter, Sanne Kaasen, with Andreas Liebl (UnternehmerTUM)

Educating on AI - How the EIT Community addresses education in AI





Al Education in the EIT Community

Madalina Burghelea
Head of Data Strategy
EIT Health

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Digital jobs in general in high demand ~350k vacancies in Europe.

Among those, Al Specialists are #1 emerging job according to LinkedIn Study 2020(74% annual growth)

Europe is behind in external Al investment, which totalled \$3 to \$4 billion in 2016, compared with \$8 to \$12 billion in Asia and \$15 to \$23 billion in North America

More than 40% of Machine learning engineers jobs are still open after 60 days

European AI workforce concentrated in Germany, France, and the UK.

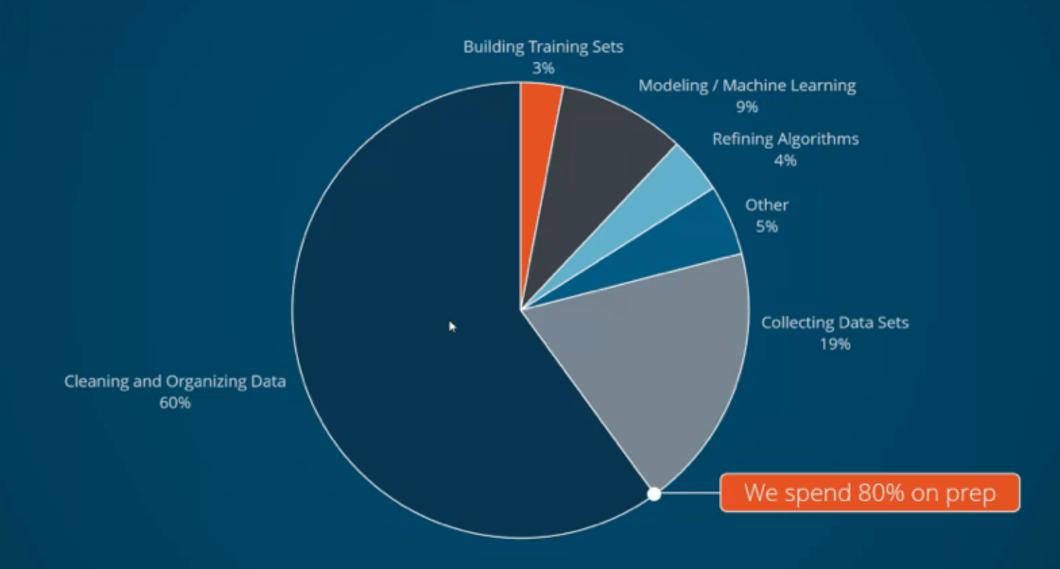
Only around 16% of all Al workers in the EU are women.

Governance of AI becoming increasingly demanded.





What data scientists spend the most time doing



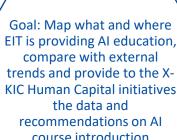
Machine learning project process steps

General	This label applies to introductory or business-focused courses that provide a general overview over all stages of a data-driven project.	
Project design	Planning and management of data science and machine learning projects or how to monetize datasets.	
Data Collection	Data acquisition related processes like information retrieval and extraction to the management of open data and knowledge graphs.	
Data preparation	All tasks required for data preprocessing, cleaning.	
Explorative analysis	Data visualization and related topics.	
Model construction	In depth methods and skills related to the creation and training of machine learning models.	
Model deployment	Technical concepts and tools to use AI models in production.	
Model evaluation	Continuous monitoring of the performance under production using business-related KPIs, and possible re-fitting of AI models.	
Privacy/Security	Topics related to governance and safety of using data underlying AI models. Also everything related to ethics.	
Infrastructure	Tools required to build technical infrastructure to develop and use AI models.	



EIT AI Education Offering Study

EIT is providing AI education, compare with external trends and provide to the X-KIC Human Capital initiatives the data and recommendations on AI course introduction







What has been done already?

558 Courses from different EIT KICs mapped and documented

Data was enriched with information about skills, user ratings, hosting country or pricing scheme

29 EIT KICs AI relevant ones were selected for further analysis

Add information about **353** lectures from the EIT Digital Data Science Master program



382 external courses from most popular platforms (e.g. Coursera, edX, Udacity)



EIT Digital DSC Master - Data collection methodology

Add information about **353** lectures from the EIT Digital Data Science Master program



- 2 year Masters program with focus on data science and entrepreneurship
- 353 lectures from the EIT Digital DataScience Master program
- 12 European universities

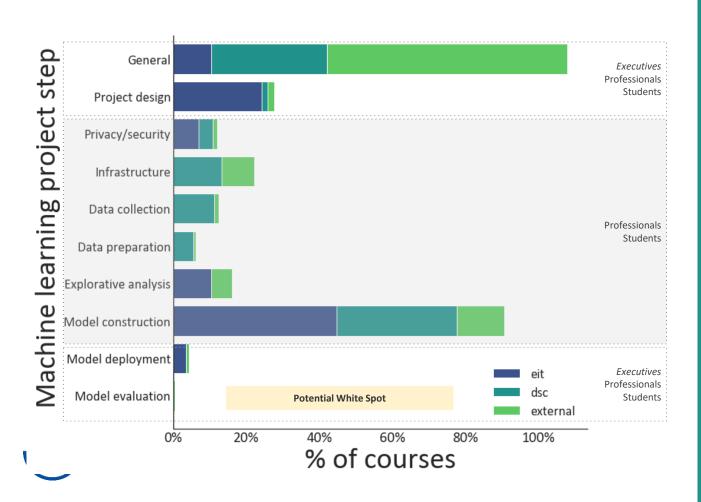


What have we learned during this analysis?





EIT courses covers basic ML/DS topics, while DSC provides a wider "applied courses" range



- EIT internally focuses in the "ML tool-chain" on model construction, project design, which are core to machine learning engineering
- Data Collection, Data Preparation and Privacy and Security education needs to further develop
- Model evaluation as white spot

Where do we go next?

In collaboration with the Human Capital initiative







Top 6 KEY AI enabling roles to further develop in 2021 Data Manager (applied expert for data preparation & cleaning)

Data Engineers for Data collection, integration and operationalization of the developed AI algorithms

Data Stewards and Data Governance Organisation

AI-tailored Project
Management - Translator
roles

Ethics and Data Privacy Officers, with profound understanding of AI technologies Build specialists in continuous ML algorithm evaluation and interpretability



Educate with purpose

Foster dedicated AI education programs for females to close the gender gap in the EU

 Offer scholarships for females in AI education Complement AI talent education with tech-related "soft skills"

 Offering Al-related business modules like Design Thinking, user (stakeholder) centricity, problem solving for Al, and creative thinking (see MIT Media Lab courses) Offer education for AI governance with renowned EIT certification

 Set up a dedicated education program with certification for an "AI governor" responsible for AI technology being explainable, transparent, and ethical



Applied Al Education on European topics

Create an EU platform for AI online learning

Create an European
 Coursera-like online
 learning platform (with
 EU security standards
 and topics) with
 academic partner
 institutions

Focus course content on unique European topics within applied courses

- Course offering example A: Applied EU Data Privacy projects: How to set up a GDPRconform chatbot?
- Course offering example B: Challenges within Multilinguality -An applied NLP project

Ethics and Data Privacy in Al

 Extend education offerings to legal and regulatory consulting and ethic evaluation support



Want to know more? Do not hesitate to contact us.

eithealth.eu

30.11.2020

Madalina Burghelea Head of Data Strategy madalina.burghelea@eithealth.eu



Leveraging AI - How the EIT Community addresses AI in their business







Leveraging Al

How the EIT Community addresses Al in their business

Data & Algorithms

Applications & Business



Data and data management

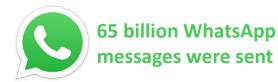
In a single day in 2019...



500 million tweets were sent



294 billion emails were sent





each connected car created 4 TB of data

More to come

90 % of all data was created in the last two years (IBM study from 2017)

In 2020, every person will generate 1.7 megabytes per second → 40 trillion gigabytes overall

In 2025, 463 exabytes (0.463 trillion gigabytes) of data will be generated every day

Data management platforms















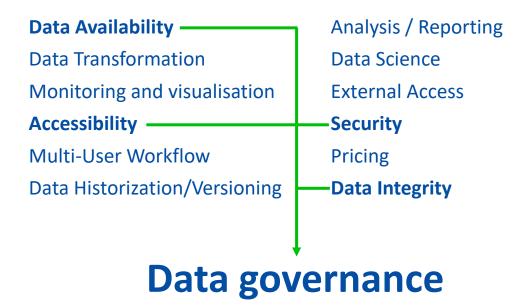








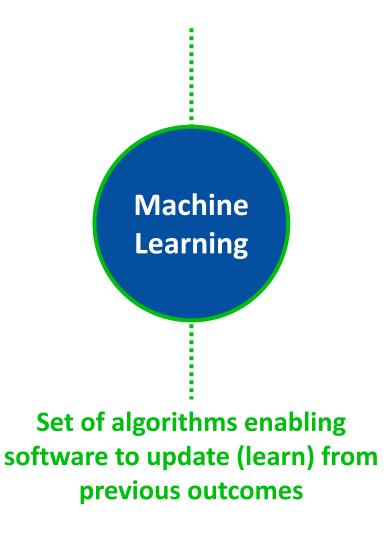
Platform functions and characteristics



Data to power machine learning algorithms

ML algorithms (selection)

Attention Mechanisms & Memory Networks
Bayes Theorem & Naive Bayes Classifiers
Decision Trees
Eigenvectors, Eigenvalues
Evolutionary & Genetic Algorithms
Graph Analytics
Linear Regression
Logistic Regression
LSTMs and Recurrent Neural Networks
Markov Chain Monte Carlo Methods
Neural Networks
Random Forests
Reinforcement Learning

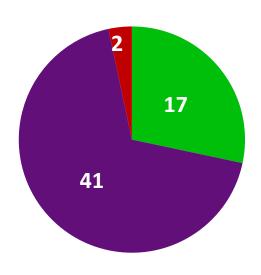


ML applications (selection)

Optical character recognition
Handwriting recognition
Speech recognition
Face recognition
Artificial creativity
Computer vision
Image processing
Photo and video manipulation
Game theory
Computer game bots
Natural language processing
Nonlinear control and robotics

Online survey on data, algorithms and AI application

Responder distribution



- Slight variation in survey design depending on respondent role
- Responses of 60 KIC affiliates from 17 countries
 - Majority from EIT M, EIT UM, and Climate-KIC
 - Healthy mixture of industry, university, and RTOs
- Organisation size
 - 65 % of adopters > 250 employees
 - More even distribution with solution providers



Al technology adopters

organisations that (plan to) use Al to improve their processes



Al solution providers

organisations offering Al solutions and applications



Al tech ology in estors

organistions that invest in Al and/or Al solution providers

Comparing the perceived data governance situation



60 %

Data governance body (DGB) present and functional

have a functional DGB

Evaluation of data availability

54 %

Most data available

Evaluation of data integrity

0 % Available data can't be trusted

Evaluation of data security

0 % Never experienced security breaches

60 %: rarely any/some customers have functional DGB

21 %

Most customer data is available

12 %

Available customer data can't be trusted

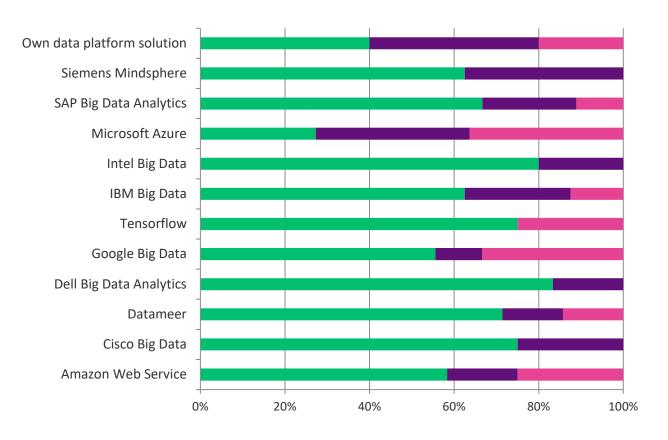
54 %

Have witnessed security breaches with their customers

Discrepancy in the perceived data governance situation between adopters and providers of AI solutions

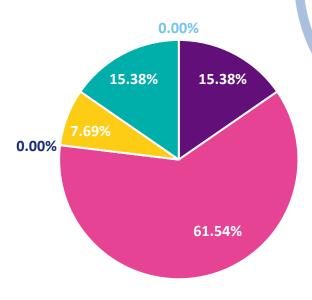
Data platforms | Operators and multiple solutions

Interaction with data platform operator





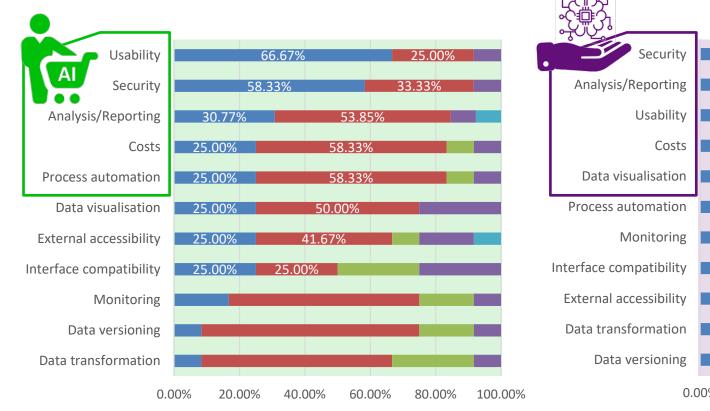
Al adopters using multiple data platforms

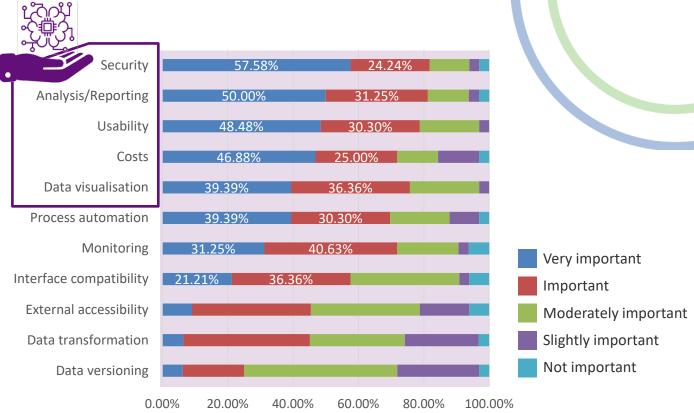


- No, we don't use any sort of data platform.
- No, we only use a single data platform.
- Yes, we use multiple platforms, and have been encountering issues.
- Yes, which is why we plan to use a single platform in the future.
- Yes, we use multiple platforms, but never faced issues.
- I don't understand./ This does not apply to our organisation.

Data platform functionality

Most valued data platform functionality



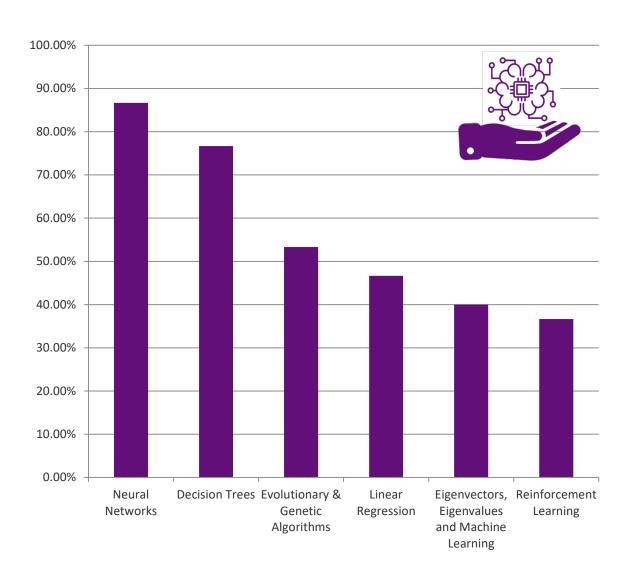


Top 5 desired platform functions

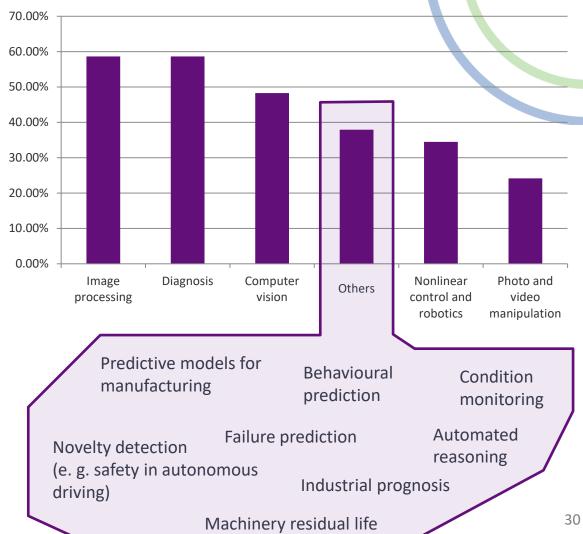
Usability | Security | Analysis | Costs Automation / Visualisation

Algorithms and applications

Share of solution providers using ML algorithms



Share of solution providers offering Al applications



European leadership in AI

€3.6bn

Was raised by European AI start-ups in 2017, almost three times more than in 2016.

76%

European AI firms focus on B2B compared to 24% on B2C.

5

Top industries that AI operate in are FinTech, HealthTech, MadTech (marketing, advertising and technology), business intelligence, and automotive.

Leadership

In AI manufacturing in Europe. Leadership in low-power electronics & neuromorphic solutions that are suited to automating industrial processes (industry 4.0) and transport modes in Europe.

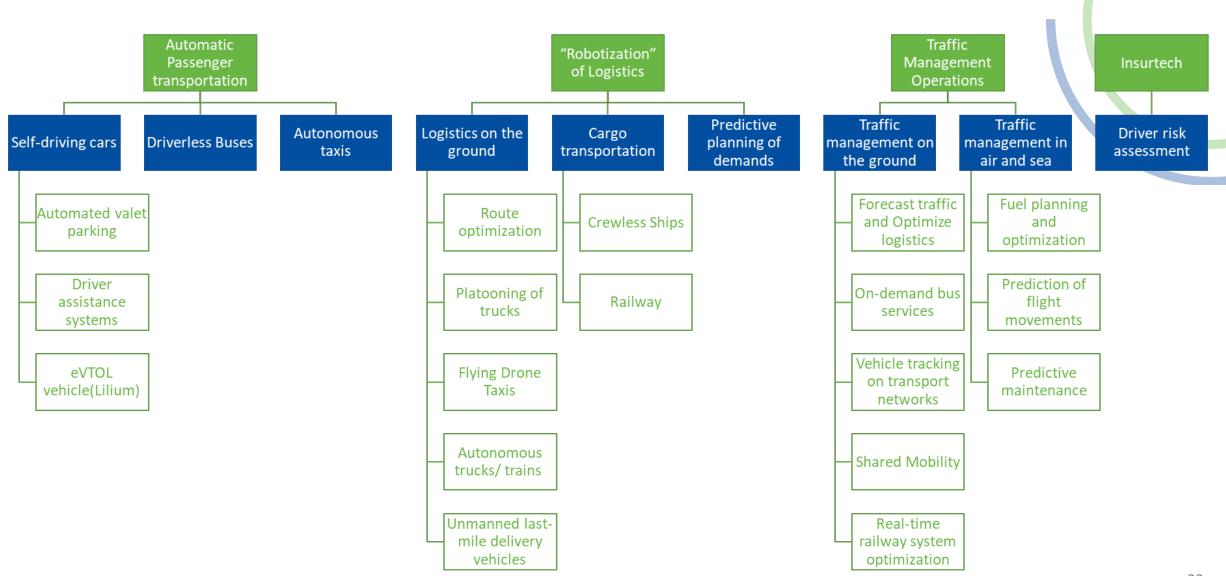
Academic strength

In quantum computing & algorithmic foundations of Al

Common AI business model

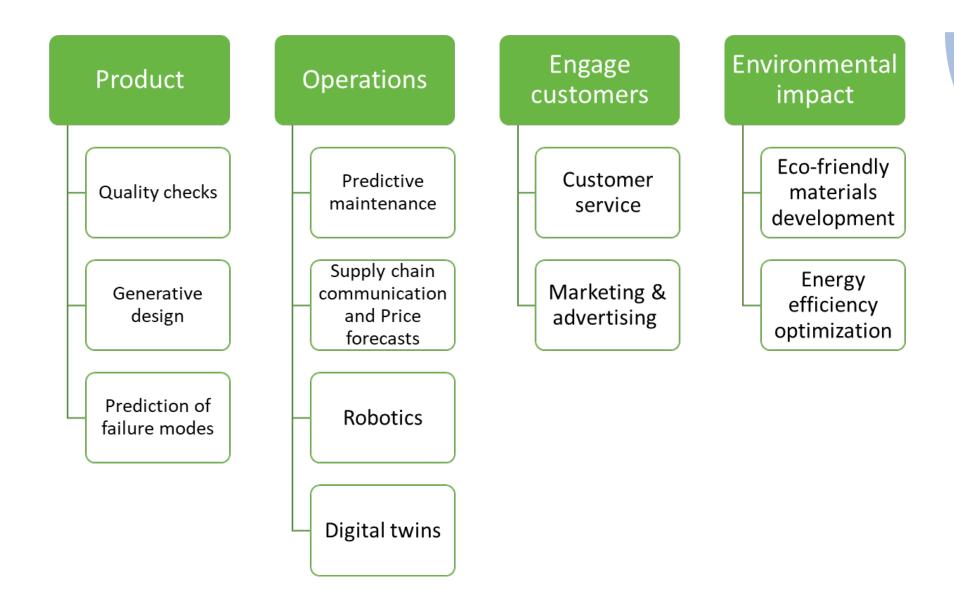
Model	Definition	Notes
Al Application as a Service	The business model is more or less similar to the SaaS model. Develop applications for specific use-cases defined by their clients and provides ready to go Al applications that can interact with other systems. Al solutions are priced by transaction completed computation, which means the more work Al does, the more you pay for Al.	To accentuate the role of sectorally competent AI companies in Europe. New network value would be created, and emerging AI consulting services would be closer to their own sectors. Financial value would be maintained within Europe and upscaling of AI SME is attainable.
Al Infrastructure as a Service	Provide computational services like the infrastructure and pre-trained algorithms. It is generally based on API calls. Because of intensive and costly deployments process, this model is mostly adopted by leading AI global companies. Revenue comes from the development of a tailored-made solution and monthly running costs as well as	This model has its benefits in reducing capital, operational and staffing costs while its draw backs are overt dependency on a limited number of external contractors with a risk of "lock in" and challenges in service quality and change management.
	operational support/training.	Europe needs to ask if we want to strength the existing dominance of key multinationals as we move Al adoption forward.

Al applications in Mobility

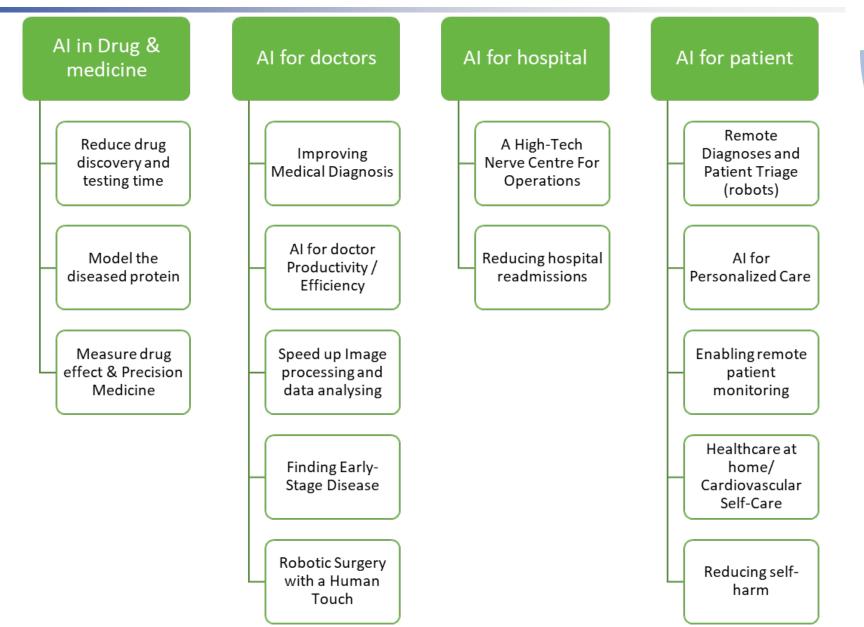


Source: EIT AI Impact project WP3 report (2020): AI busines model and applications in Europe

Al applications in Manufacturing



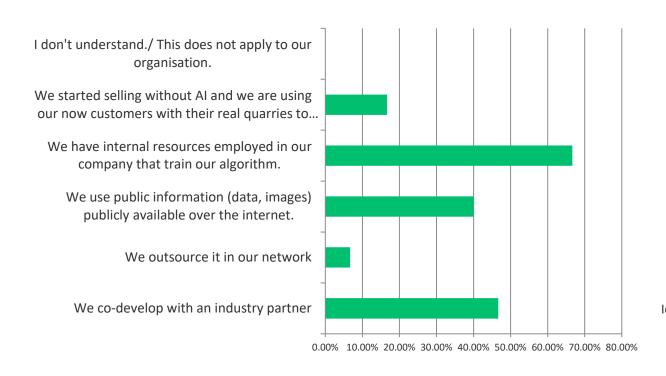
Al applications in Healthcare

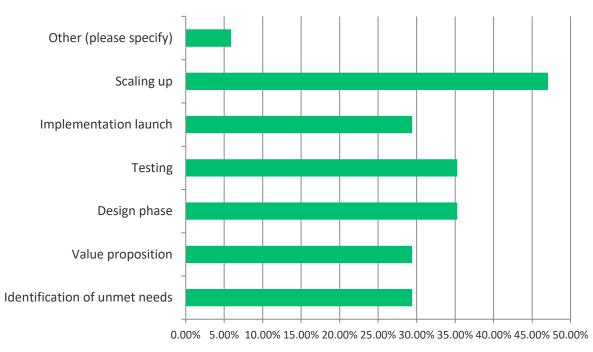


35

Survey Findings – AI development in EIT ecosystem

- For Al algorithm development, industrial partner collaboration & in-house development are the two main approaches.
- Over 50% of AI developers rely on external partners to develop AI solutions, mainly in scaling up, testing & design phases.





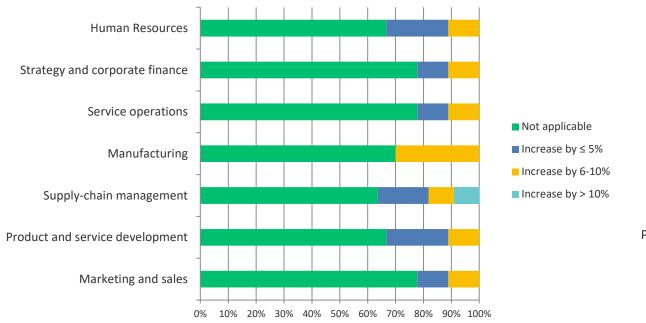
Survey Findings – AI beneficial impact in EIT ecosystem

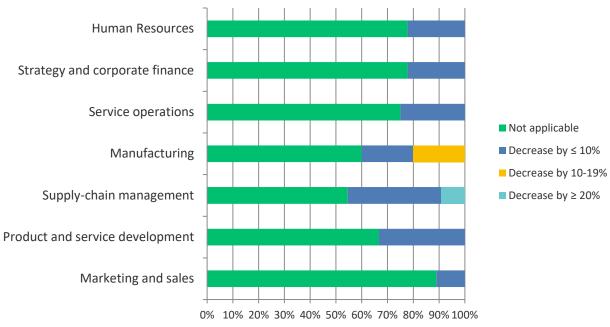
Al Impact: Revenue Generation

- Most responders do not feel Al deployment helped with revenue generation.
- 10% responders suggested that AI solution could increase revenue in supply-chain management by over 10%. Almost 30% responders suggested that AI could increases revenue in Manufacturing by 6-10%.

Al Impact: Operational Efficiency

- Most responders do not feel that AI solution deployment in their organisations helped with cost reduction.
- Around 30% responders felt that AI solutions have helped with cost reduction in product and service development, and supply-chain development. Around 20% responders felt AI could reduce cost in Manufacturing by over 10%.





Revenue increase in different functions by adopting AI solutions

Cost reduction in different functions by adopting AI solutions

Survey Findings – AI beneficial impact in EIT ecosystem



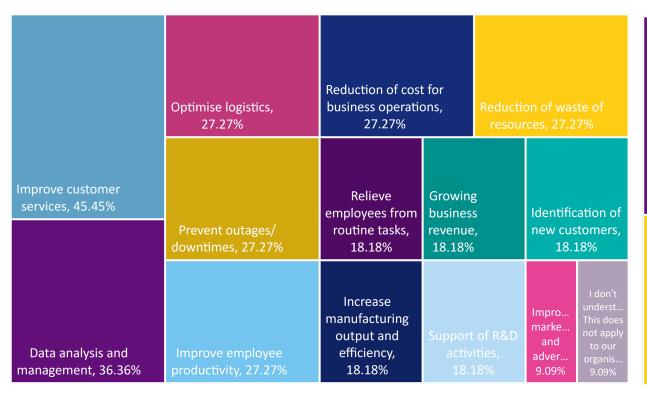
Al technology adopters' view of Al benefits

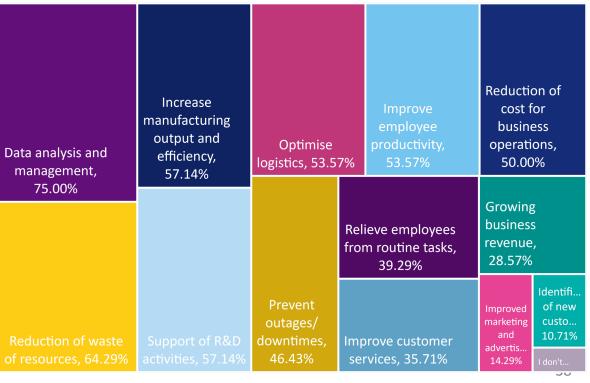
Al can mostly be impactful in 'improving customer service', and help with 'data analysis and management'.



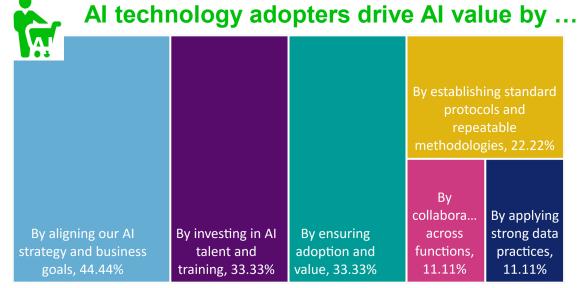
Al solution providers' view of Al benefits

Al can have most impact on 'data analysis and management' and 'reductions of waste of resources'.





Survey Findings – Drive AI value in EIT ecosystem





Al solution providers help customers to drive value and impact of Al solutions by...



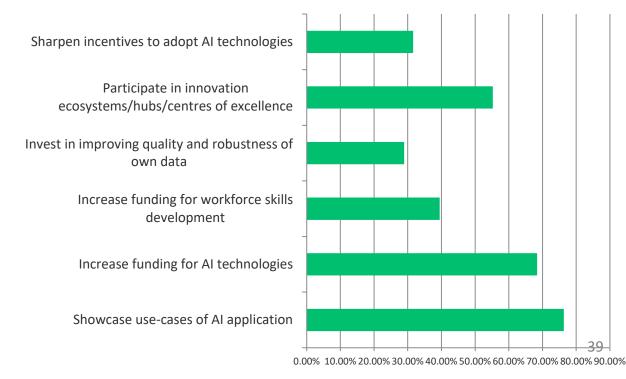


Top 1 action: showcase use cases of AI application;

Top 2 action: increasing funding for AI tech;

Top 3 action: EIT to participate in AI ecosystem/hubs/centres

of excellence



Al Impact in EU | Report on Al Business Model and Applications in EU

Al business models & applications in EU

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5	Al ac	doption barriers and risks
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Thank you

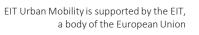


- in linkedin.com/company/eit-urban-mobility
- in linkedin.com/company/eit-manufacturing









Shaping AI made in Europe -How the EIT Community engages in the discussion



Shaping AI made in Europe – Engaging with Stakeholders



Informing the debate on whether and how to regulate AI in Europe

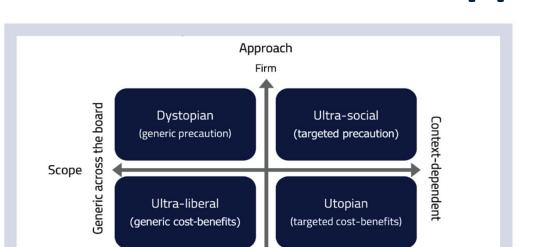


Download your copy www.eitdigital.eu/ai-report

Publication and Distribution

- EU R&I days
- Tier 1 Media (interviews in 6 countries)
- EIT Digital Web Site
- Direct mailings
 - 400 institutional stakeholders (e.g. EU commissioners, cabinet members, MEPs,...
 - 250 non-institutional stakeholders (e.g. trade associations, think tanks, ...)
 - To all engaged KICs

A scenario based approach



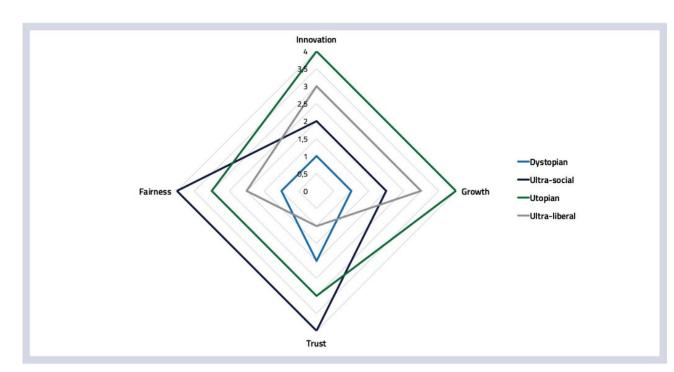
Vertical axis: 'Algorithms and Data Governance', meaning regulation of the algorithms and their underlying data ranging from soft to firm

Horizontal axis: 'Scope' ranging from 'context-dependent' to 'generic across-the-board'.

- Context-dependent means tailored to sectors
- Generic across the board means same approach and instruments applied irrespective of sectors



Scenarios are assessed according to the 4 parameters fairness, innovation, growth, trust



Identified Levers and Conclusions



Policy levers are identified in important areas of concerns and opportunities:

- General
- In Manufacturing
- In Urban Mobility
- In Health
- In Climate and Energy

Main Conclusions:

- To ensure effective policy in the area of AI it is necessary to take context (sectors of application) into account.
- Policies regarding application of AI on personal data should be allowed to differ from policies regarding application of AI on machine data, especially in certain application sectors.
- General regulation or policy measures can be considered in relation to algorithm transparency and explainability.
- Regulation should be adaptable and flexible, whilst minimising and mitigating risks and ensuring human rights and European values.

Shaping Al made in Europe - establishing a structural base supporting analysis and strategy



Limiting global warming to 1.5°C would require rapid, far-reaching and unprecedented changes in all aspects of society . . . [including] transitions in energy, land, urban and infrastructure (including transport and buildings) and industrial **systems**.

ipcc

Source: IPCC SR 15 D.5, Summary for Policy Makers



Our working hypothesis for WP1:

- Artificial Intelligence can play a critical role in the structural societal and economic transformation towards a zero-carbon future
- High Level European Strategies (European Green Deal, Digital Europe) require a re-thinking of existing Al Taxonomies to be in service of the societal transformation
- Any potential new AI Taxonomy must account for the particularities of "AI – made in Europe" and must be seamlessly compatible to existing taxonomies



Key Result and Outcomes:

- Workstream 1: Building an overarching AI Taxonomy Architecture fit for purpose to reflect the European Ambition that AI should play in the societal transformation
- Workstream 2: Building innovative open-source infrastructure to visualize massive multi-dimensional datasets for better decision making
- Workstream 3: Working towards a decision framework how to link top-down ambition with existing networks and ecosystems.



Work-stream1: Key facts on the taxonomy

- Review of 34 existing Al taxonomies
- Assess categories against mutual exclusivity as well as how collectively exhaustive they reflect the overall Al landscape
- Technology-related dimensions should clearly focus on core AI technologies and cover all (even emerging) AI technologies
- Assess the degree to which AI taxonomies account for emerging interdisciplinary fields relevant for AI made in Europe (e.g. AI and law, AI and ethics, etc)



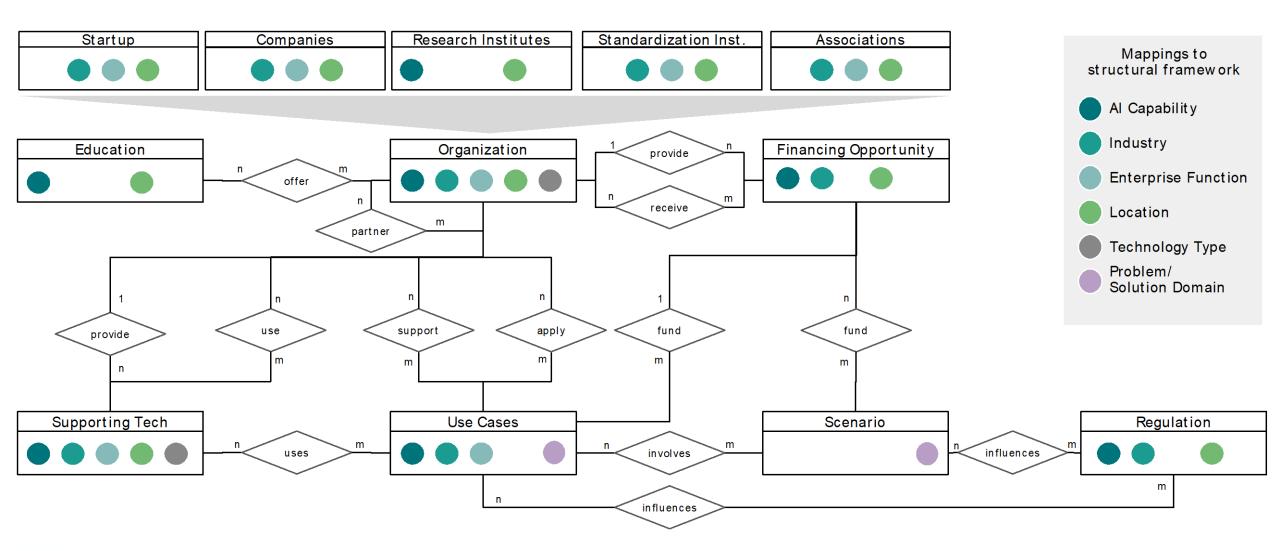
Structural Framework vs. dynamic content elements

Structural Framework Defines **dimensions and characteristics** per dimension that help to group and structure content. The general structural framework is **generally static** but allows to be **extended dynamically**.

Content Elements Defines **what is being mapped** (e.g. organizations, use cases etc.) For each type of content elements it is defined which dimensions of the structural framework apply. The types of entities to be mapped are **static**.



Relations allow to associate content elements with each other



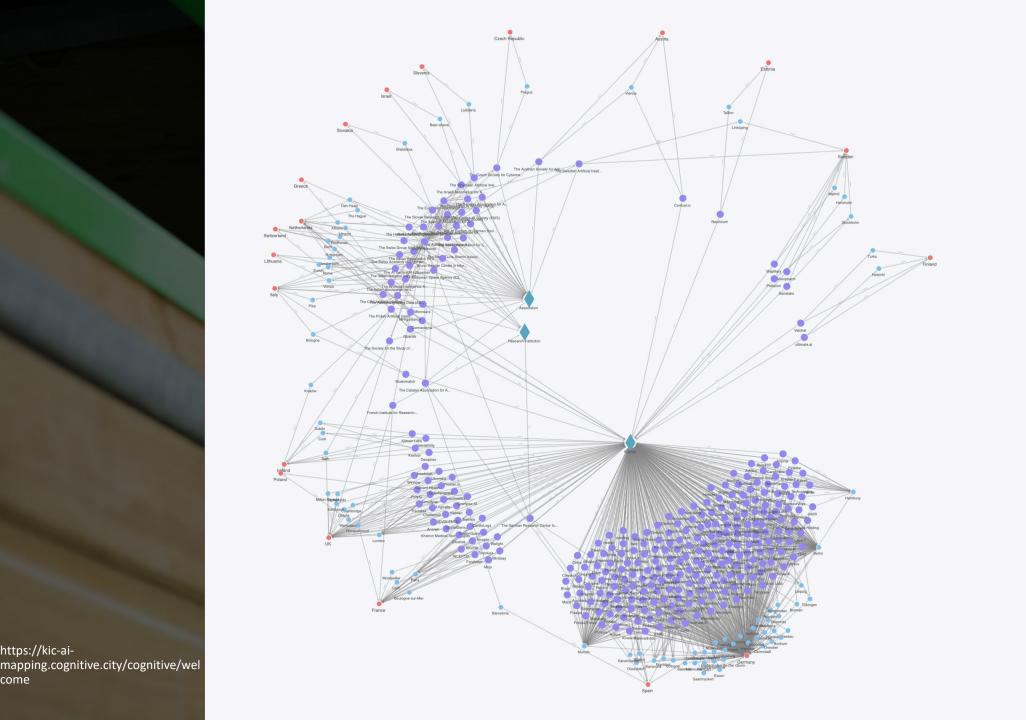




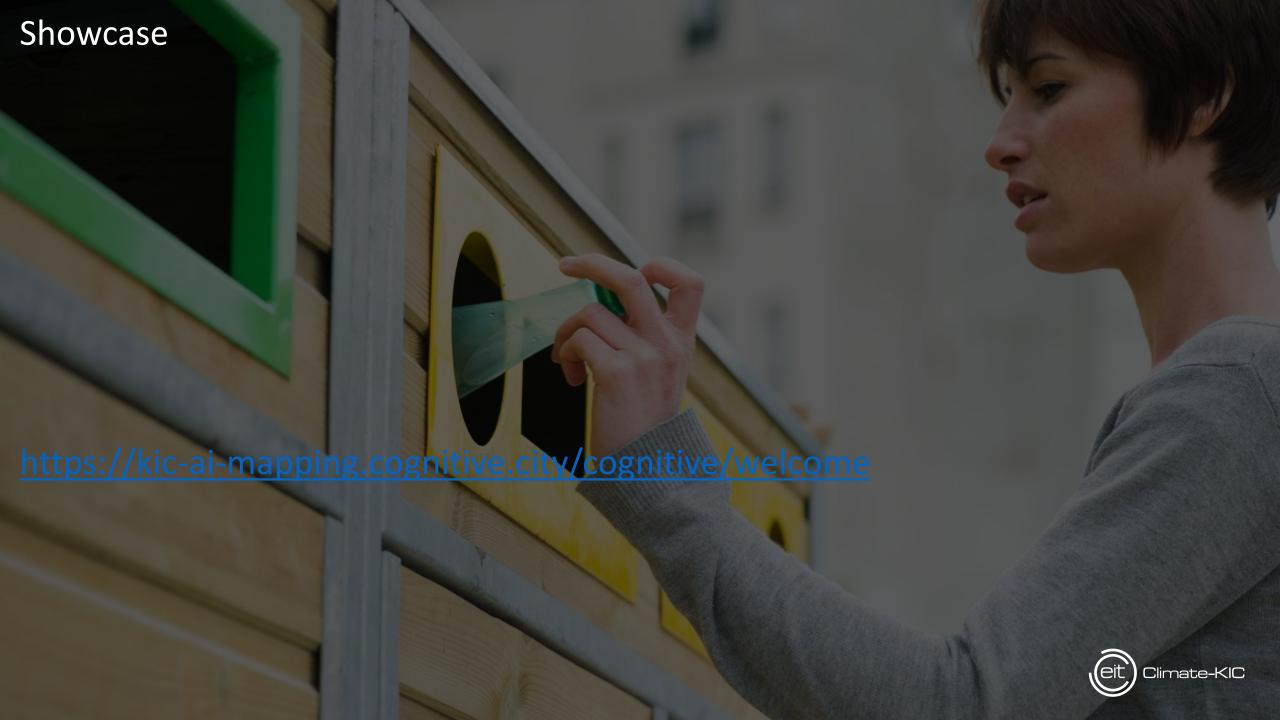
Work-stream2: Key facts on the open access UX interface

- Choose a visualization tool which allows for a playful interaction with- and interrogation of complex data sets
- Choose a platform which is freely accessible to enable maximum impact of the generated knowledge
- A platform easy to use by any consumer









Work-stream3: Advancing the alignment of the European AI community and ecosystem with the European Ambition - the intention:

- Enabling the interrogation of existing networks and infrastructures with the lens of the European ambition.
- Providing a guide how to reconcile the different high-level documents in the context of Al
- Providing actionable tools to support decision making around AI in service of the European ambition.



What did we look at? And what does the taxonomy account for?

- EU White Paper on Al
- Ethics Guidelines to Trustworthy Al
- Policy and Investment Recommendations for Trustworthy AI
- Compatibility with EIT Digital A European Approach to AI (Policy)
- Civil liability regime
- Framework of ethical aspects
- IP Rights
- European Green Deal
- etc



Ecosystem of Excellence Working with member states Research institutes Standardization Inst. Associations Focusing the efforts of the Mappings to structural framework research & innovation comm. AI Capability Industry **Skills Financing Opportunity** Organization Education Enterprise Function Location **Focus on SMEs** Technology Type Problem/ Partnership with fund provide the private sector Promoting the adoption of Al **Supporting Tech Use Cases** Scenario Regulation by the public sector influences Securing Access to data and computing infrastructures **International Aspects** Risk based **Trustworthy Al** Standardization / dimensions Certification approach **Ecosystem of Trust**

Figure 11: Mapping of the EU white paper on AI to the outlined structure

What now?

- We will continue to develop the granularity of the taxonomy in Exaptive and share it publicly
- We will share the background reports on the taxonomy (workstream 1) and the recommendations (workstream 3) more widely with the interested public
- We will start to upskill KIC-internally, using the outcomes, to provide better intelligence for the use of AI for transformational Innovation activities
- We will start to use the outcomes to strategically approach potential future partners and institutions that promise to bring additionality to our partner communities





Outlook for 2021 - The topics proposed for next year



Outlook for 2021 *



Educating on Al

- Collaborate with XKIC Human Capital in developing new profiles and educational programs needed in the entire AI environment (ex: learning paths for data governance resources, data engineers, AI project managers etc.)
- Enrich the SkillsCharge project AI algorithm (InnoEnergy)
 with the CrossKIC databases of the AI courses identified
- Prototype a data sets and algorithms catalogue available across KICs, to facilitate future data sharing, matchmaking and data mining across KICs

Outlook for 2021 *

Digital

Leveraging AI

- Prototype a data sets and algorithms catalogue available across KICs, to facilitate future data sharing, matchmaking and data mining across KICs
- Structured showcase of Al applications and business models in EU in 2021
- Assessing how matching projects to AI resources/ Data Scientists can be automated in the entire EIT network
- Support stakeholders with **focus on SMEs**
- Tooling to **link self assessment results to assets** in the KIC community
 - Link KIC AI experts with potential clients
 - Link KICs with SMEs as potential members
 - Assist SMEs in their journey towards AI

Outlook for 2021 *

Digital

Shaping Al

- Advancing the alignment of the European AI community and ecosystem with the European Ambition under the European Green Deal.
- Develop scenarios on how to best leverage AI for the Green Deal (study/report)
- Operationalize the stakeholder, topics, technologies mapping and make it publicly available

General

- KIC InnoEnergy will join the team
- Communication and Dissemination strengthened (own work package)