FINTECH RISK MANAGEMENT
www.fintech-ho2020.eu

European Commission

FIRAMIS

Financial Risk and Asset Management with Intelligent Systems

eXplainable AI in regulated financial services

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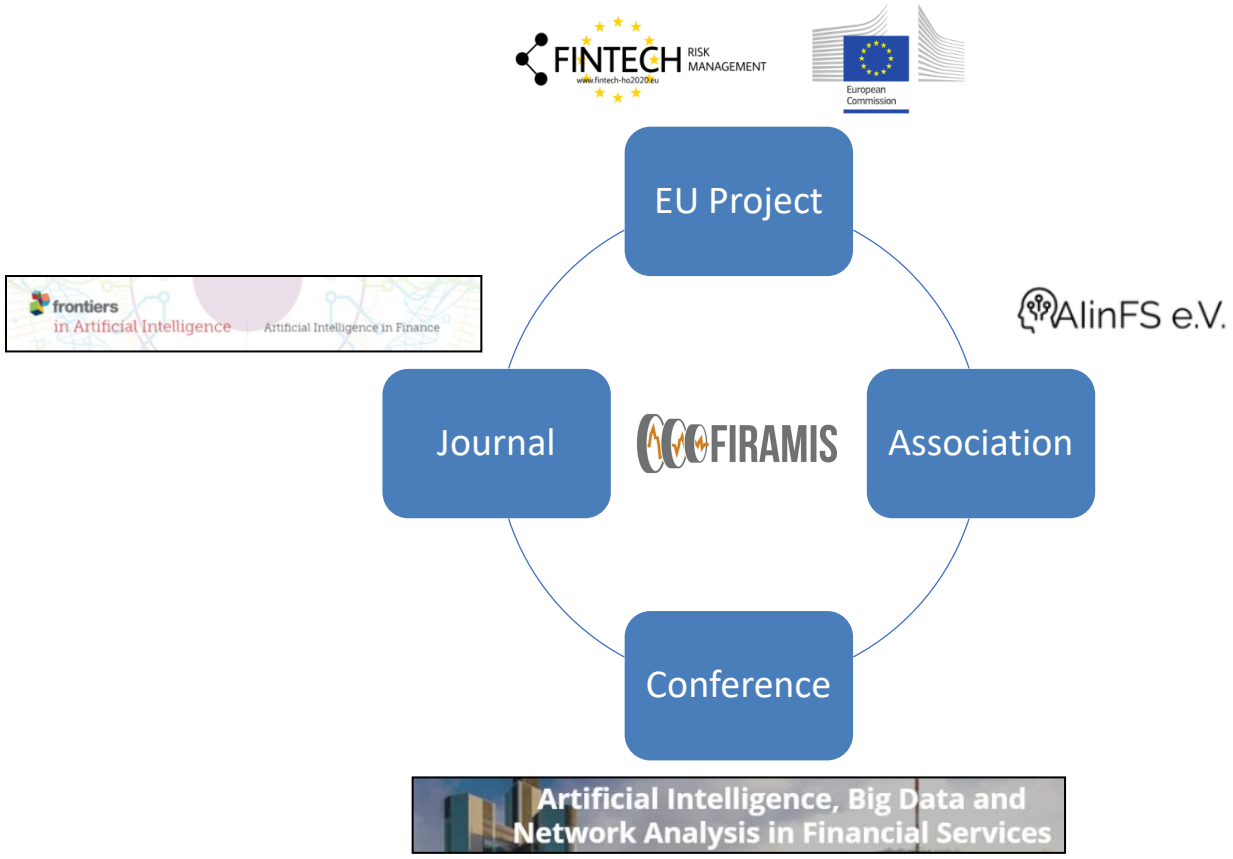
This project has received funding from the European Union's Horizon 2020 research and innovation program under grant agreement No 825215. All material presented here reflects only the authors' view. The European Commission is not responsible for any use that may be made of the information it contains.

What we do



- B2B FinTech from Frankfurt
- Clients across Europe' financial industry
- Customised SaaS–Platform
- Combine scientific approach with financial industry know-how and deep tech

- Our role in FIN-TECH project:
- dissemination
- evaluation
- coding platform
- knowledge workshops
- events

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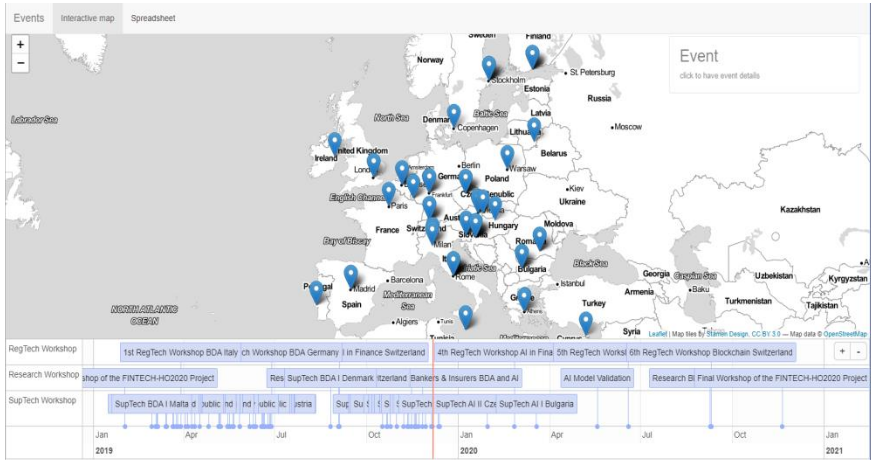
Aim of the project

- scale Fintech in Europe
- improve dialogue between stake holders, cross-border networking of ecosystems
- common understanding and interpretation of data-related policies and rules
- Innovation hubs and regulatory sandboxes



The project network includes:

i) 24 partners: 21 universities, 3 FinTechs

ii) 6 European FinTech hubs

iii) The national supervisors of all 28 EU countries plus Switzerland

iv) 8 international regulators and supervisors (BIS, IMF, OECD, EC, EBA, ESMA, EIOPA, ECB)

v) A panel of International advisory board members

UNIVERSITIES and RESEARCH CENTRES | FINTECH HUBS and ASSOCIATIONS | REGULATORS and SUPERVISORS

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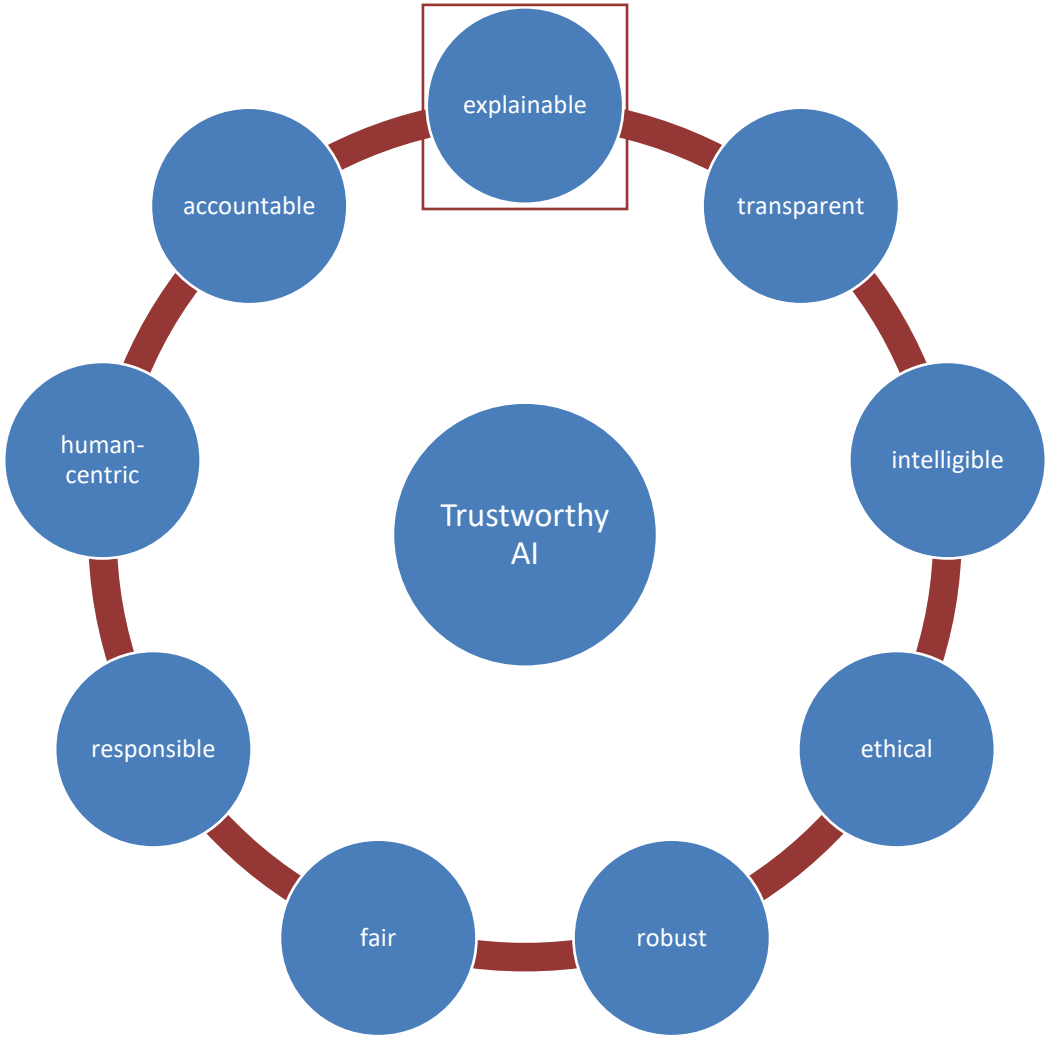
Components of trustworthy AI



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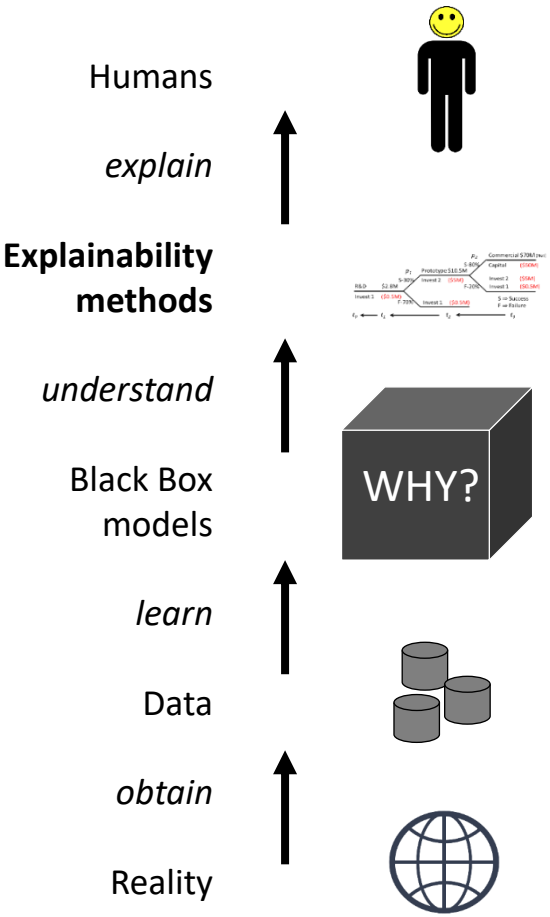
eXplainable AI (XAI) – basics

A major conclusion from the FIN-TECH Horizon 2020 project is that black box AI is not suitable in regulated financial services.

What is XAI?

- When is a model explained? When you can't ask 'why' any more.
- XAI produces details or reasons to make its functioning clear or easy to understand.
- The ability to explain model outputs to stakeholders is a major lever in ensuring compliance with expanding regulatory and public expectations and in fostering trust to accelerate adoption." *)



*) McKinsey: https://www.mckinsey.com/business-functions/mckinsey-analytics/our-insights/leading-your-organization-to-responsible-ai

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XAI - Importance

Both economic and regulatory need for XAI:

"The ability to explain model outputs to stakeholders is a major lever in ensuring compliance with expanding regulatory and public expectations and in fostering trust to accelerate adoption." *)

XAI is an important building block in data-driven financial services.

*) McKinsey: https://www.mckinsey.com/business-functions/mckinsey-analytics/our-insights/leading-your-organization-to-responsible-ai

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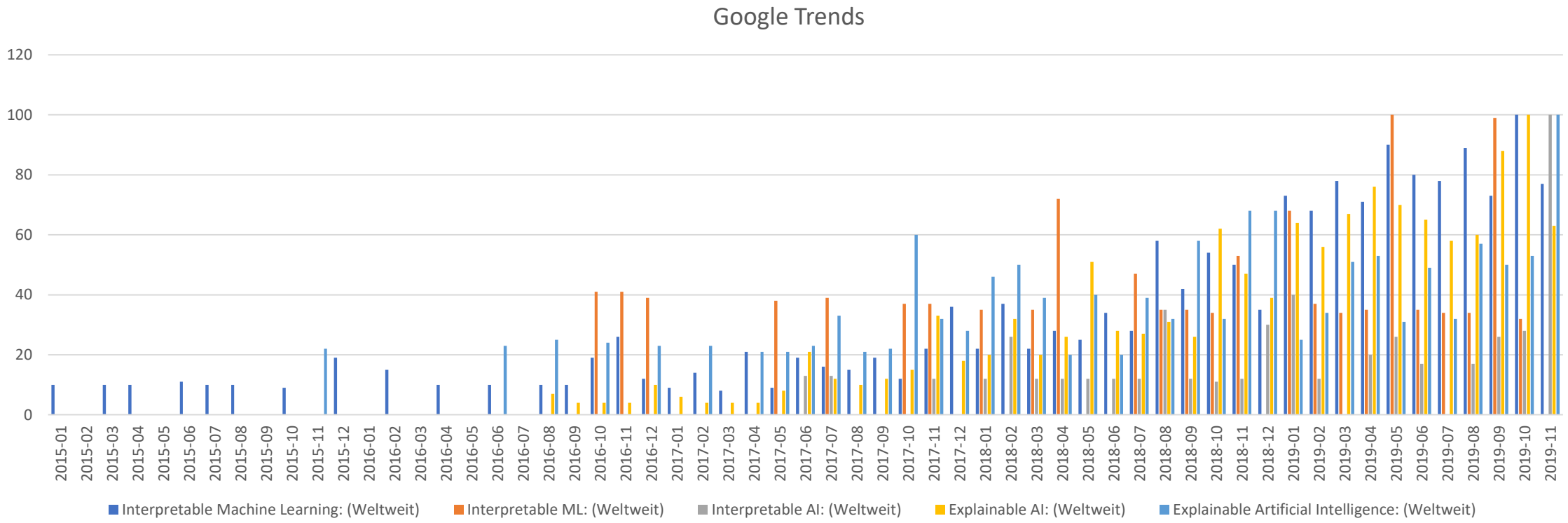
XAI gets global attention

Many financial institutions and startups have started to embrace XAI.

Tech companies like Microsoft and IBM have launched XAI initiatives and programs.

XAI could emerge as industry standard



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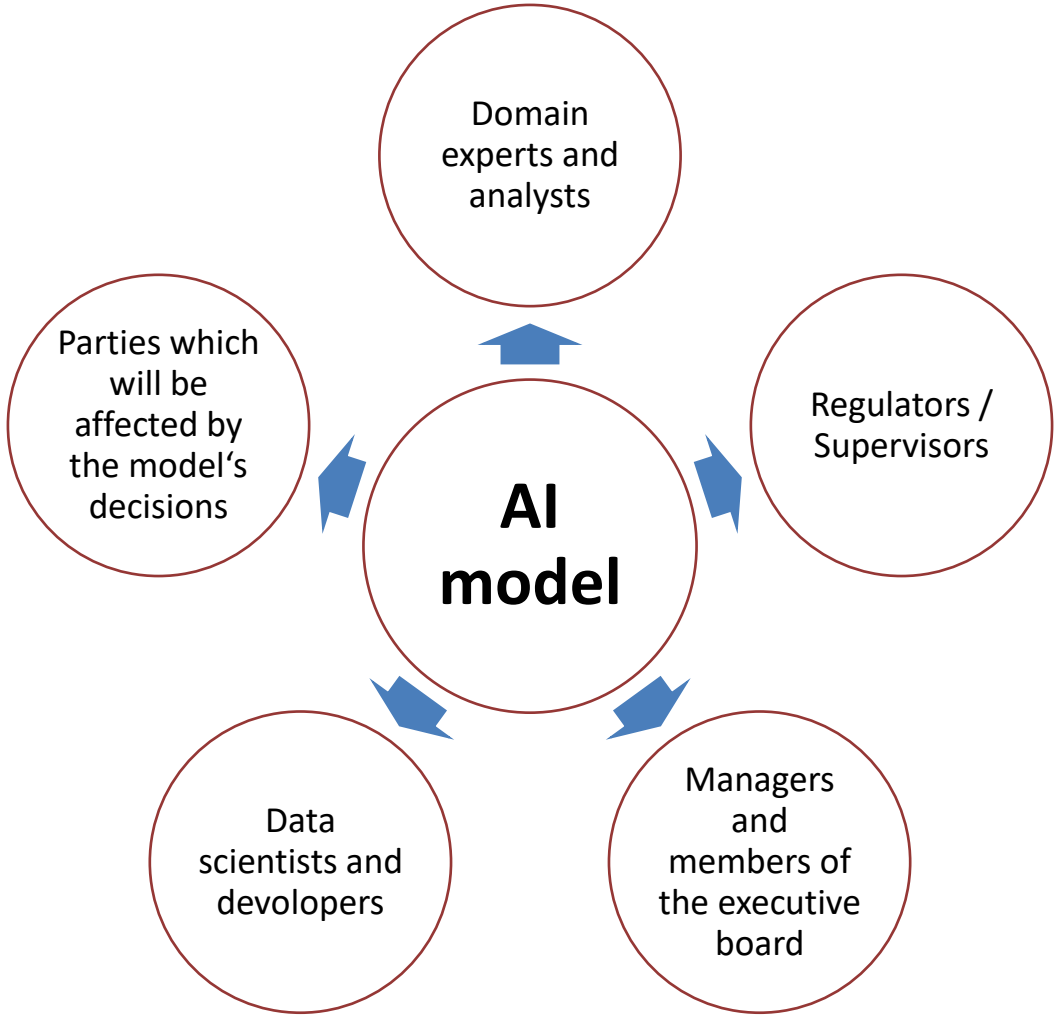
XAI for which audience?



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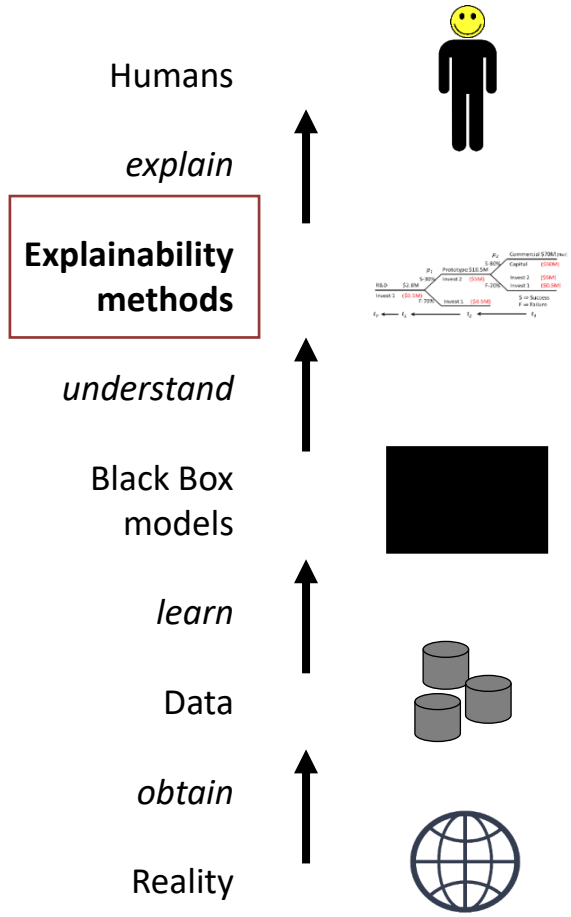
How humans interface with XAI

- Visualisation
- Simplification
- Numbers / figures
- Examples
- Local + global features
- Feature interaction and sensitivity
- Textual



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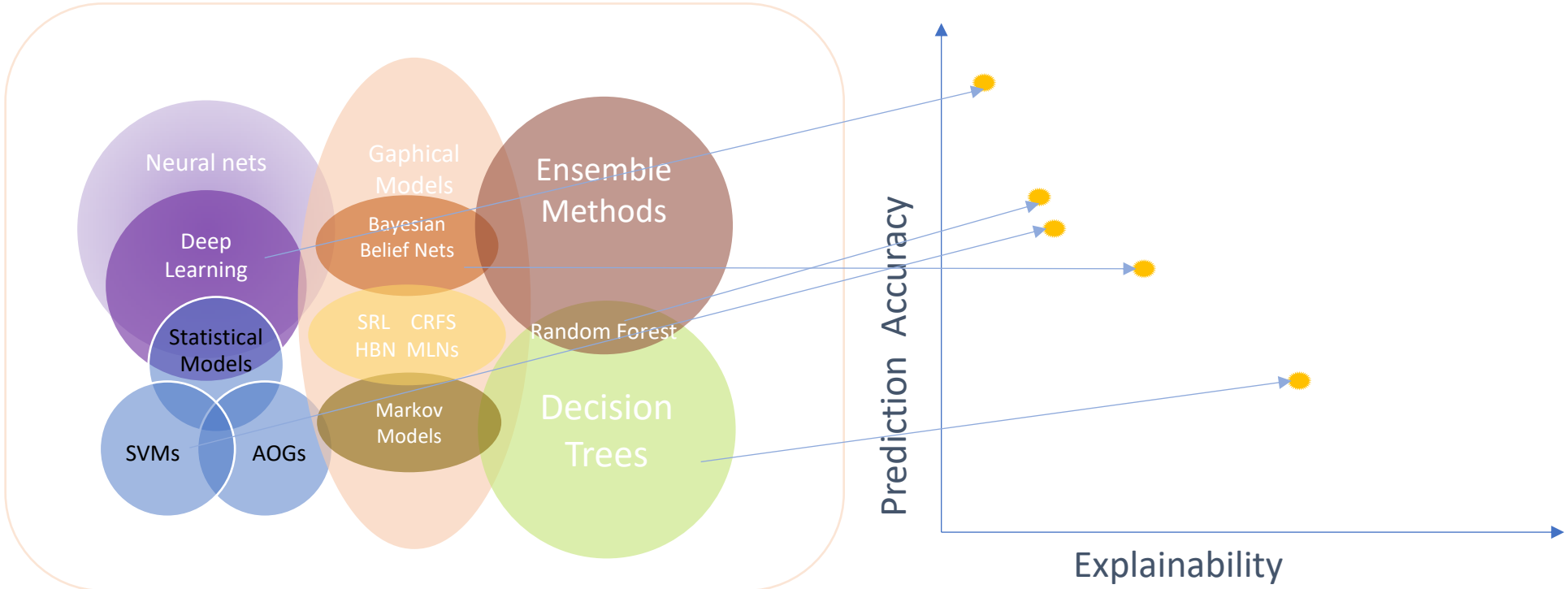
Usual Trade-OFF in ML approaches



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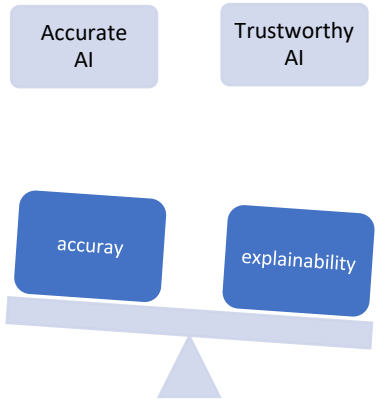
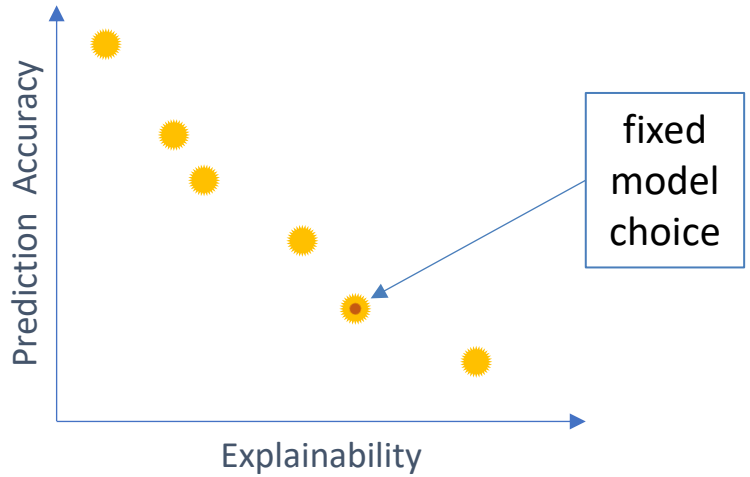
Explainability vs. Accuracy?

Financial Institution chooses the level of accuracy and explainability

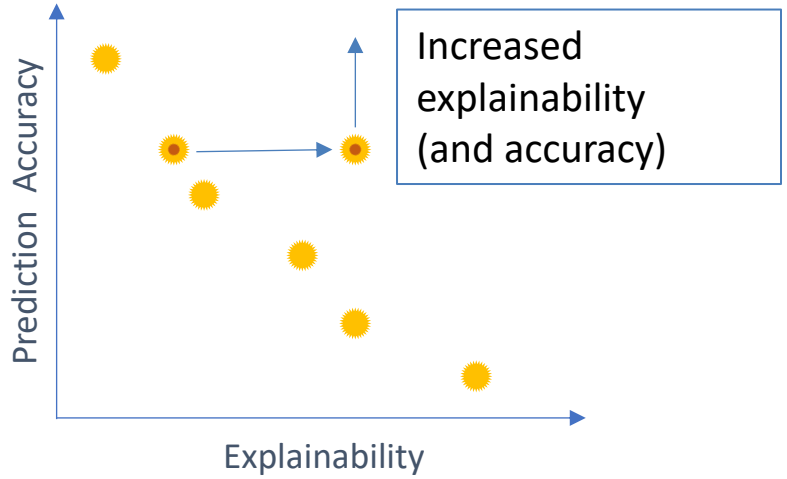




With explantion technologies

Start with a highly accurate model and introduce a layer of explanation technology

Does the output meet strategic requirements?



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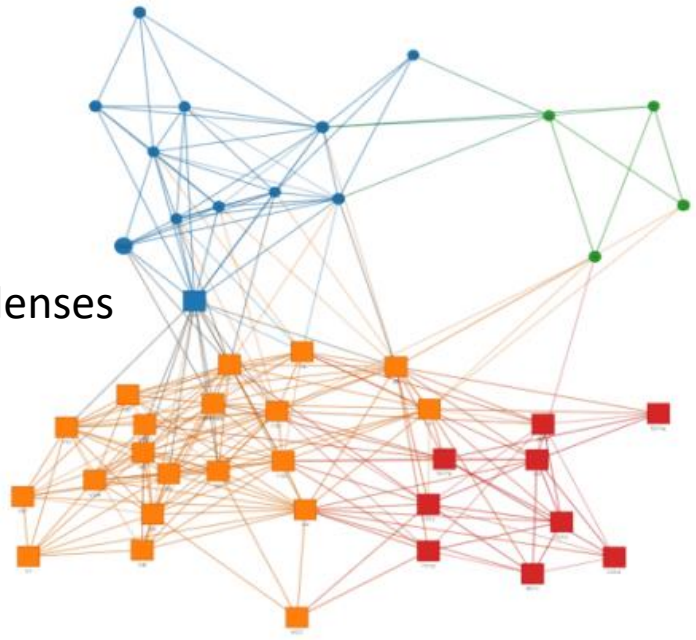
Why network analysis?



Graph theory and represenation learning

Mapping of complex data by mathematically reduced structures, shapes and data lenses

Connecting the dots by finding relations/groups in data

Advantages:

- Finding and visualising hidden relationships like segmentations in diverse resolutions, trends, anomalies, hot spots, emergent effects and tipping points
- Smart combination with traditional machine learning
- Revealing model failure in traditional approaches
- Answers to questions that have not yet been asked

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Approaches to XAI

Pre-modeling explainability

Goal:
Understand / describe data used to develop models

Explainable modeling

Goal:
Develop inherently more explainable models

Intrinsic

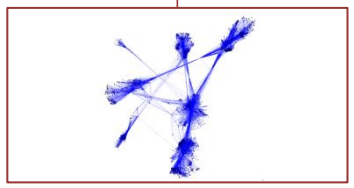
Post-modeling explainability

Goal:
Extract explanations to describe pre-developed models

Agnostic

Visual map to understand linkages, groups and connections of input features

Network metrics as additional explainbale input features



Graph theory and representation learning

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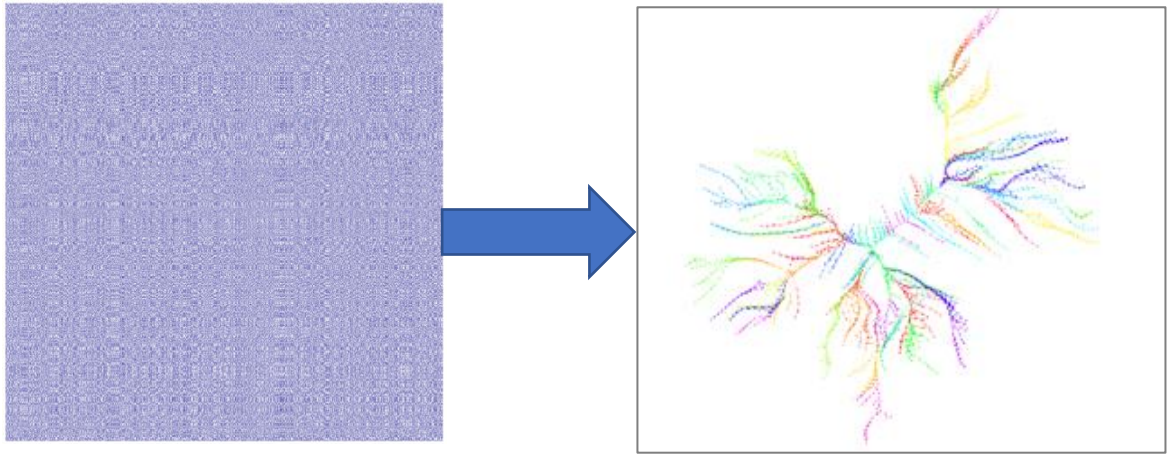
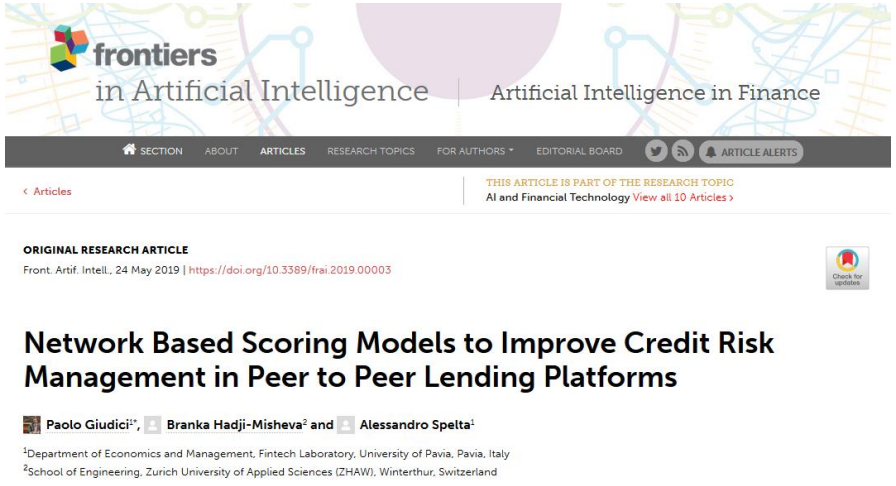
Network example from project use case 1

Extract cluster or network structure from feature distance matrix





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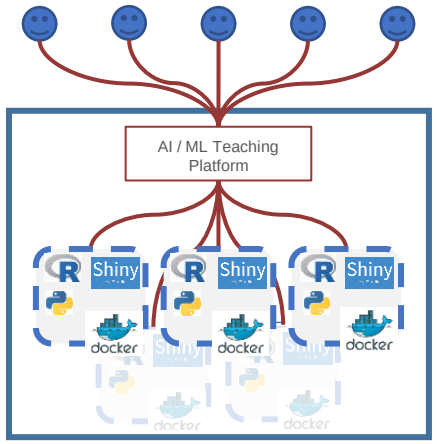
The project platform

Existing use cases:



Extension:

- FIRAMIS has built a demonstration platform that wraps up the use cases and substantially extends them by the latest developments in eXplainable AI

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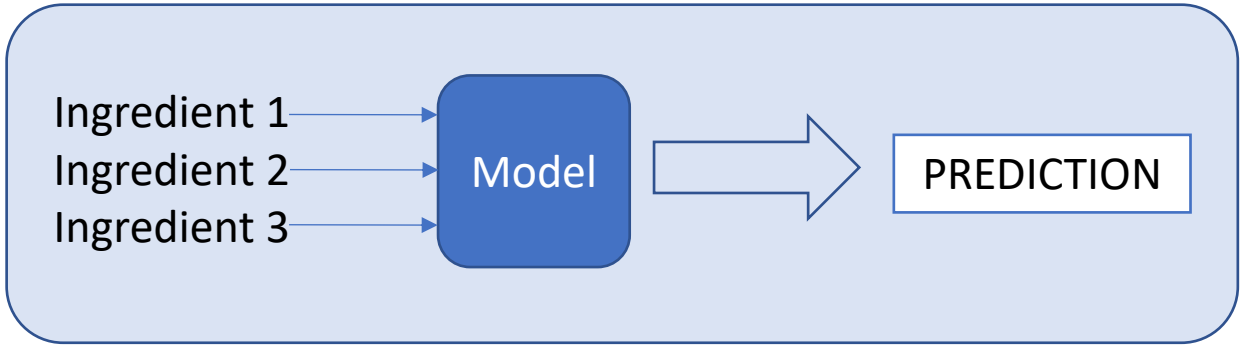
Shapley Values

- What influenced a specific prediction?
- Rooted in cooperative game theory



- The feature importance is evaluated by treating the prediction as a coalition game where each player gets a payoff that is fair respect to the gain that the coalition gets from his/her collaboration.

Fair payout properties: **Efficiency**, **Symmetry**, **Dummy** and **Additivity**

Lipovetsky, Stan, and Michael Conklin. "Analysis of regression in game theory approach." Applied Stochastic Models in Business and Industry 17, no. 4 (2001): 319-330.

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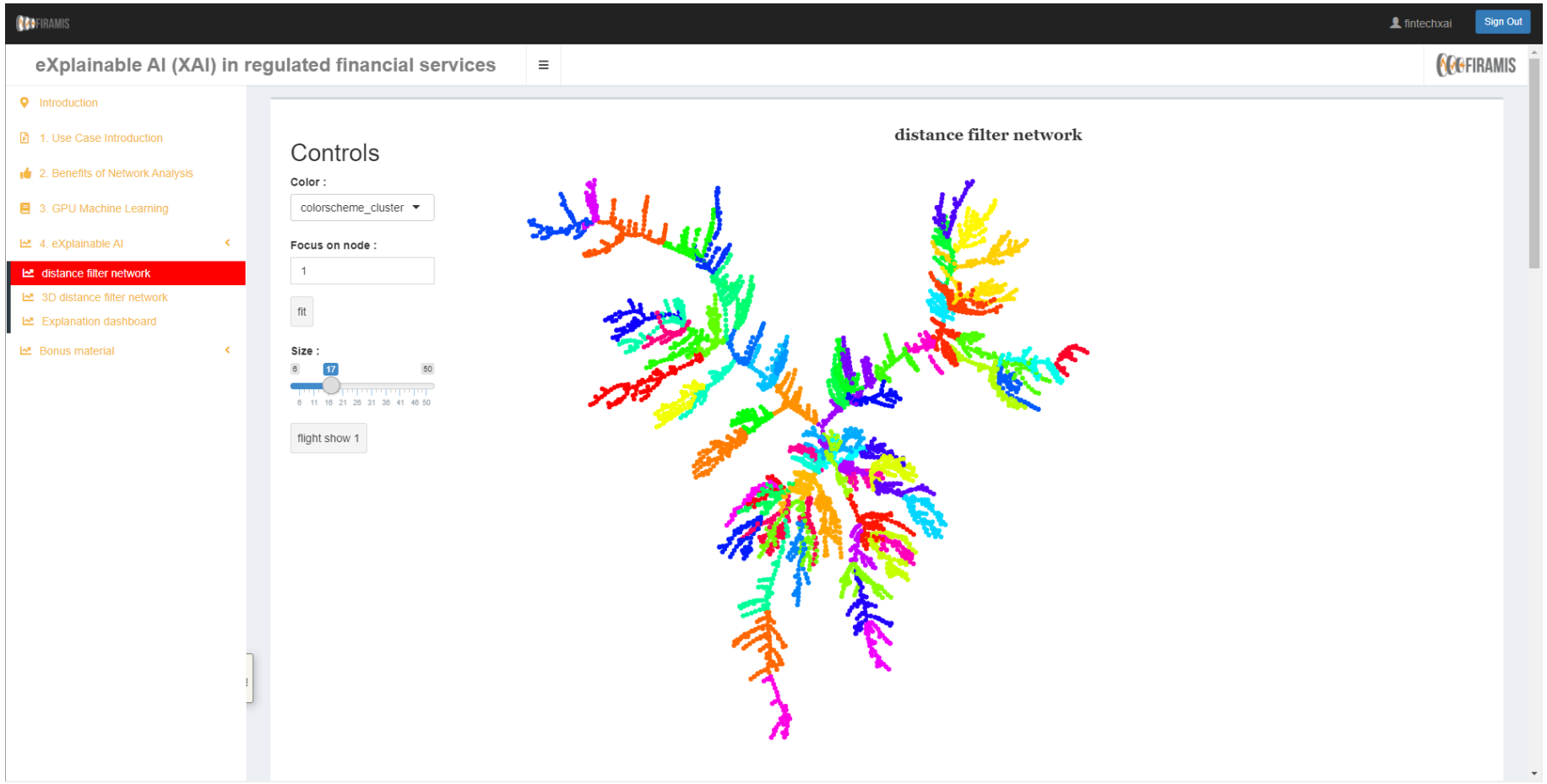
Shapley Value Network



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InvestTech | RiskTech | RegTech | SupTech