Situation-Aware eXplainability (SAX) for Business Processes

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Fabiana Fournier

IBM Research – Israel

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Automation has the potential to significantly contribute to building a livable and sustainable society in the future

One way is in environmental conservation

For example: autonomous vehicles can enhance transportation efficiency, reduce traffic congestion, and minimize fuel consumption.

Artificial Intelligence (AI) is the fuel that drives automation, replacing human labour with machines.

Trustworthy AI requires explainability

FEAS principle – Toreini at al. *The Relationship between Trust in AI and Trustworthy Machine Learning Technologies*. In Proceedings of the 2020 Conference on Fairness, Accountability, and Transparency

As digital technology becomes a central part of every aspect in our lives, people should be able to trust the systems they use.

Trustworthiness is also a prerequisite for the uptake and adoption of automated systems.

New regulations: GDPR EU, EU AI Act

Think of sitting in an autonomous vehicle that makes a sudden stop without saying anything… will you continue using it?

Explainability is a major element in trustworthy AI

What is eXplainability of AI (XAI)?

The ability to understand and interpret how AI systems make decisions or arrive at conclusions

In our previous example of an autonomous vehicle that makes a sudden stop, the car will explain why it suddenly stopped

XAI plays a crucial role in building a livable and sustainable society in the future

How can explainability promote a livable and sustainable society in the future? (1/2)

- **Trust and acceptance**: When individuals understand the reasoning behind AI decisions, they are more likely to trust and accept the technology.
- **Ethical considerations**: Explainability helps to evaluate and address potential biases, discrimination, or unfairness in AI algorithms.
- **Compliance and regulation**: As AI becomes increasingly integrated into various aspects of society, regulatory frameworks are necessary to govern its use. Example: EU AI Act.

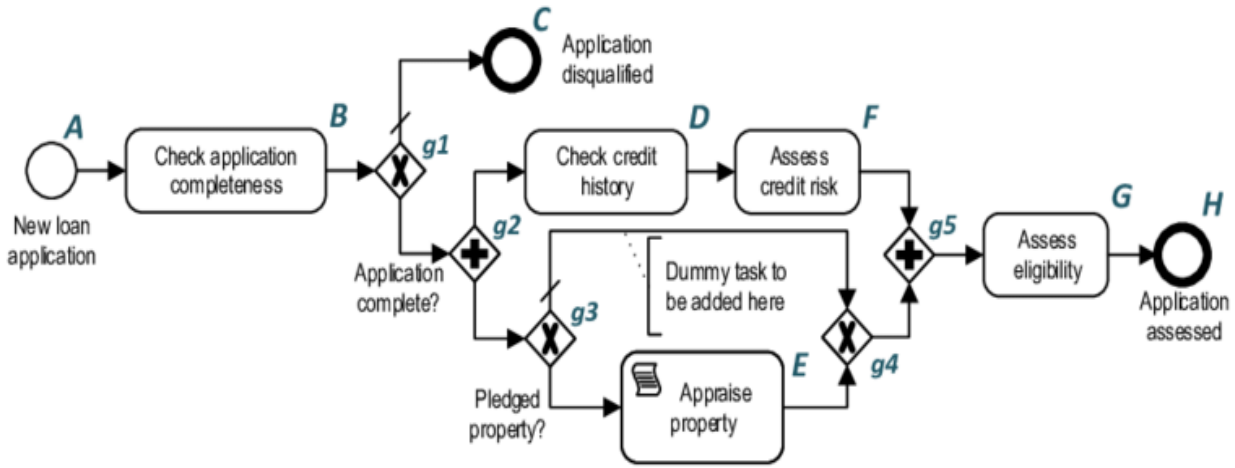
How can explainability promote a livable and sustainable society in the future? (2/2)

- **Safety and risk mitigation**: By understanding the decision-making process, experts can identify potential vulnerabilities, errors, or unintended consequences.

- **Continuous improvement and innovation**: By understanding how decisions are made, developers can identify areas for enhancement, refine algorithms, and address limitations.

Our focus is on AI embedded in *business processes*

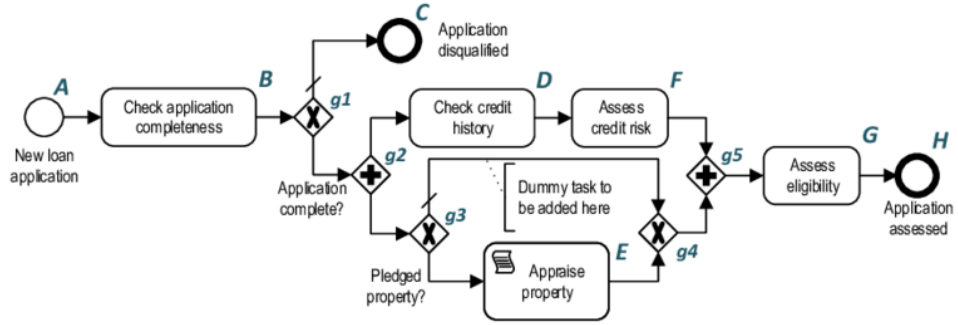
Mortgage application business process scenario



A business process is a chain of entangled decisions. We call business processes that embed AI, AI-augmented business processes

What is the problem with state-of-the-art XAI techniques when applied to AI-augmented business processes?

Mortgage application business process scenario



Why did I need to apply 3 times till my application was accepted?

Why was my mortgage application rejected when submitted a couple of weeks ago?

When is the best time to re-apply for an application?

How come my first application was rejected and the subsequent one accepted?

State-of-the art techniques fail to include the richness of *contextual situations* **and** *chain of decisions* **that affect process outcomes.**

Typically, such situations are not explicitly recorded in the business process, but rather can be observed from contextual situational conditions or other external data sources.

A 'flight recorder' device that nowadays integrates both a flight data recorder and a **cockpit voice recorder**

Situation Aware eXplainability (SAX) acts as a “flight recorder” for business processes

Current Directions in SAX (AutoTwin EU project)

Extensions to XAI techniques (e.g., LIME, SHAP) to systematically constraint the explanation space for process-awareness

E.g.: taking into account the business process model

Leveraging techniques of complex event processing for the sake of enriching the process model with situation/context related data

E.g., taking into account potential external factors to the business process

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Applying causal inference for extracting “true” outcomes causes

E.g., discovering the real cause of a business process execution outcome

Thank you

Fabiana Fournier
IBM Research – Israel

fabiana@il.ibm.com