

# 20<sup>th</sup> XBRL EUROPE DAY

In Copenhagen

FEBRUARY 1<sup>st</sup> 2018

*Hosted by Deloitte*

---

Technical Groups on Jan. 31  
*Hosted by Danish Business Authority*

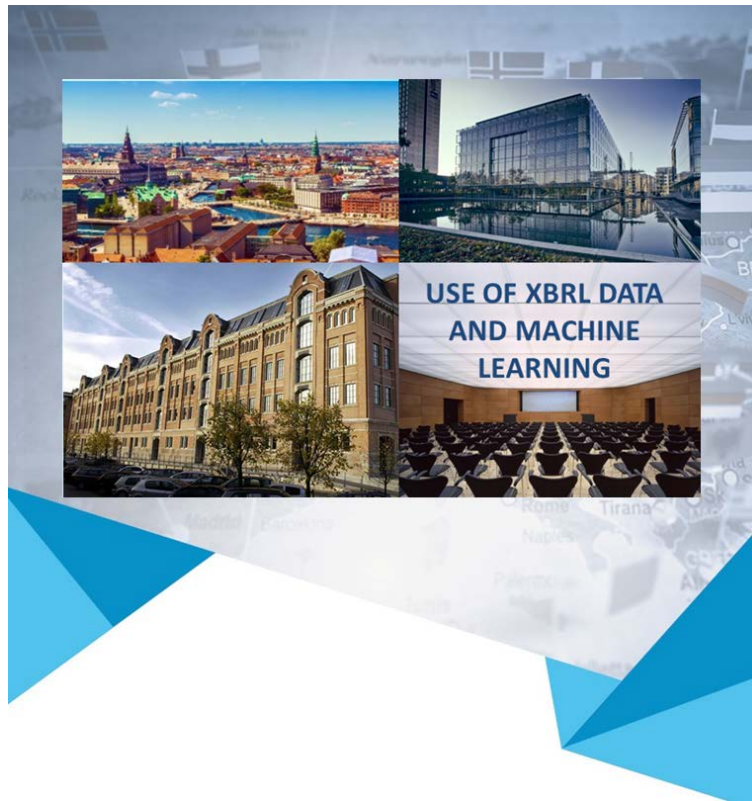
**XBRL | EUROPE**

**XBRL | DENMARK**

## Early Warning on Machine Learning and annual reports in XBRL

---

- Niels-Peter Rønmos
- Danish Business Authority
- Board Member of XBRL Denmark



# Traditional Enterprises Will Embrace the AI Paradigm Change in Three Steps

1

How can we **augment** our **existing services**?

2

How can we **change our existing services** to fit better with the new paradigm?

3

What **new services** can we make that was not possible in the old paradigm?

#GartnerSYM

© CONFIDENTIAL AND PROPRIETARY | © 2017 Gartner, Inc. and/or its affiliates. All rights reserved. Gartner and ITapo are registered trademarks of Gartner, Inc. or its affiliates.

Gartner

Model management

Training data

Model evaluation

DevOps (LabOps)

Explicianability

Model performance  
evaluation

Tools

Etics

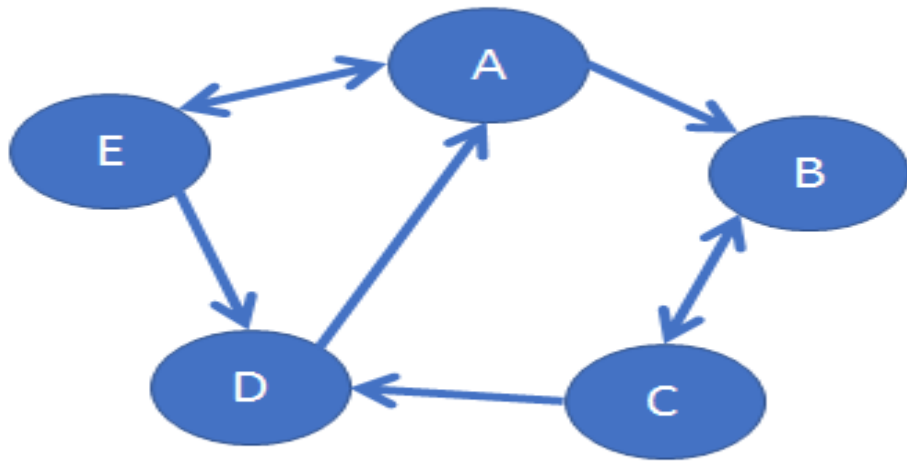
Feature extraction

Supervised/  
Unsupervised

Deep Learning

Distributed Learning

# Feature extraction (in general)



	A	B	C	D	E
A	■	■	□	□	■
B	□	■	■	□	□
C	□	■	■	■	□
D	■	□	□	■	□
E	■	□	□	■	■

# XBRL NORDIC III conference 27th of November 2017 at the Danish Business Authorities.

**CASE:** Correct reporting of "Land and buildings"  
and "Long-term investments in group enterprises"

## Hypothesis:

- By learning the machine to "read" accounting policy we can validate accounting data.
- ... and warn the company when they try to submit with an error!!

# Benefits from Machine Learning on Annual reports

**SCALABILITY**

**HIGHER COMPLIANCE ON ALL 240.000  
ANNUAL REPORTS**

**NEW SERVICES**

**PROACTIVE GUIDANCE TO  
THE COMPANIES**

**KNOWLEDGE**

**DEEP STRUCTURED INSIGHT IN THE REPORTS**

# Case: Early warning



**RISK  
AHEAD**

5 Business Development Centres (Væksthusene) located around Denmark.

**Goal of EW: to create more growth entrepreneurs.**

Studies show that bankruptcy is the biggest fear among entrepreneurs, and because of this, seeking help is often embarrassing and a failure. Early Warning is created to help entrepreneurs get on safe ground again.

**Stages of guidance**

- **Turnaround**
- **Bankrupted / Reconstruction**
- **After bankruptcy**

# Case: Early warning

## Hypothesis:

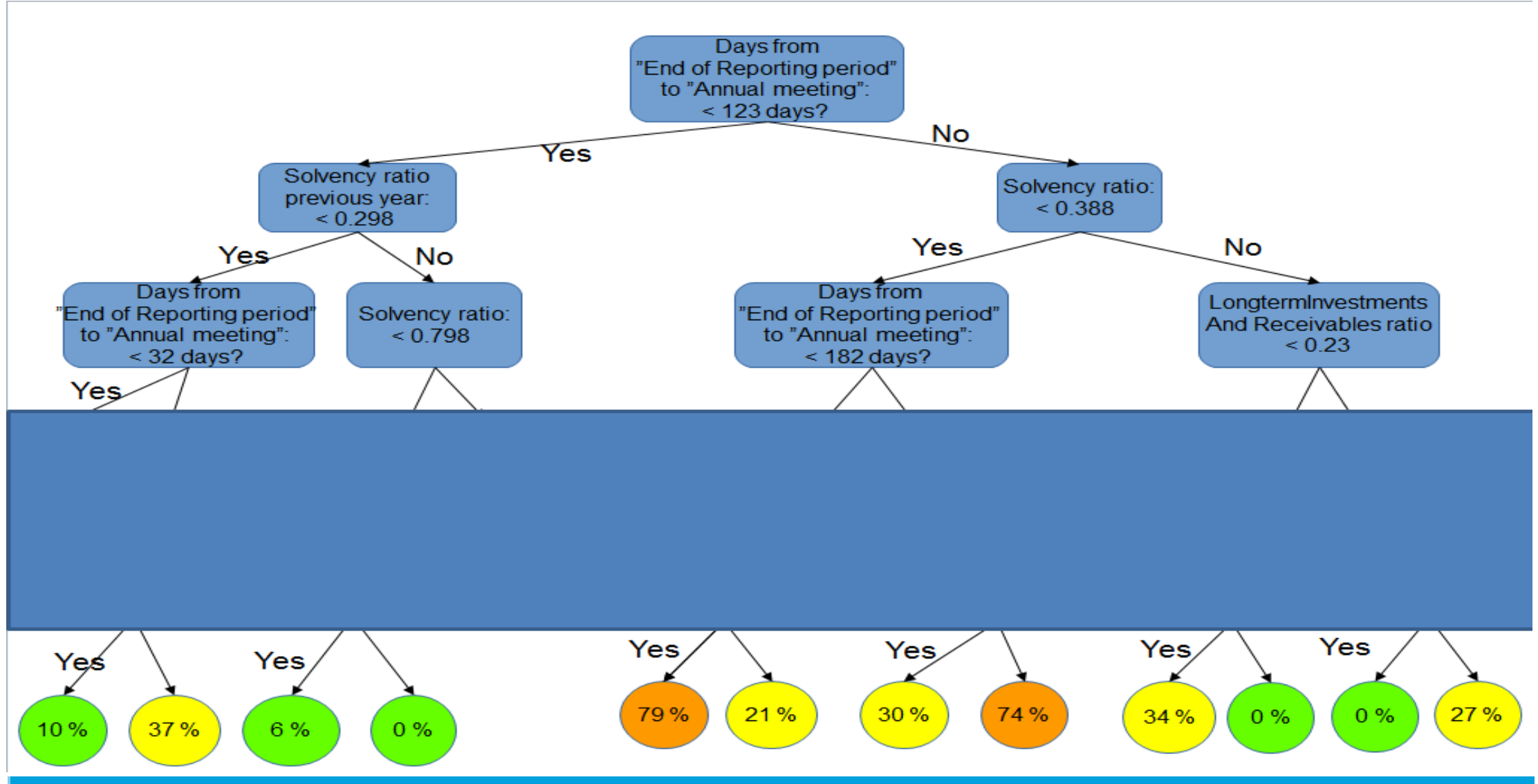
- By looking at accounting and business register data we can use machine learning to identify and help companies in crisis - early!
- .... And share our findings with other European countries in Early Warning Europe.



# Result:

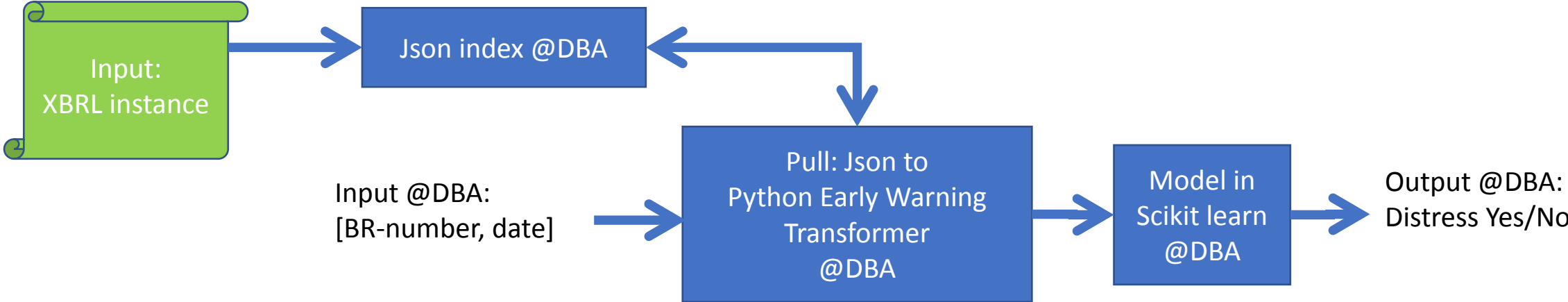
Trained on 2757 companies. Tested on 690 companies.		Model for Early Warning: Is a company in distress?		
		Predicted: NO	Predicted: YES	
Facts from Early Warning: Is a company in distress?	Actual: NO	True Negative:	False positive:	Specitivity: 97 %
	Actual: Yes	False Negative:	True positive:	Sensitivity: 79 %
Model: GradientBoostingClassifier ROC_AUC: 84.5		Precision NO: 93 %	Precision YES: 87 %	

# White box model!

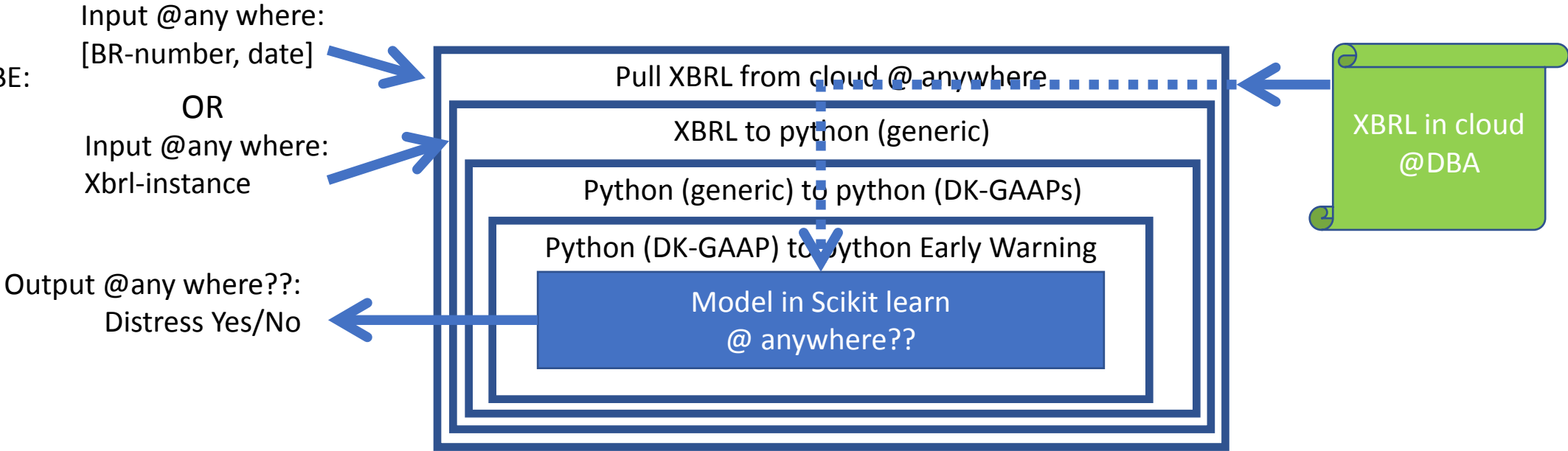


# Architectural goals

AS IS:



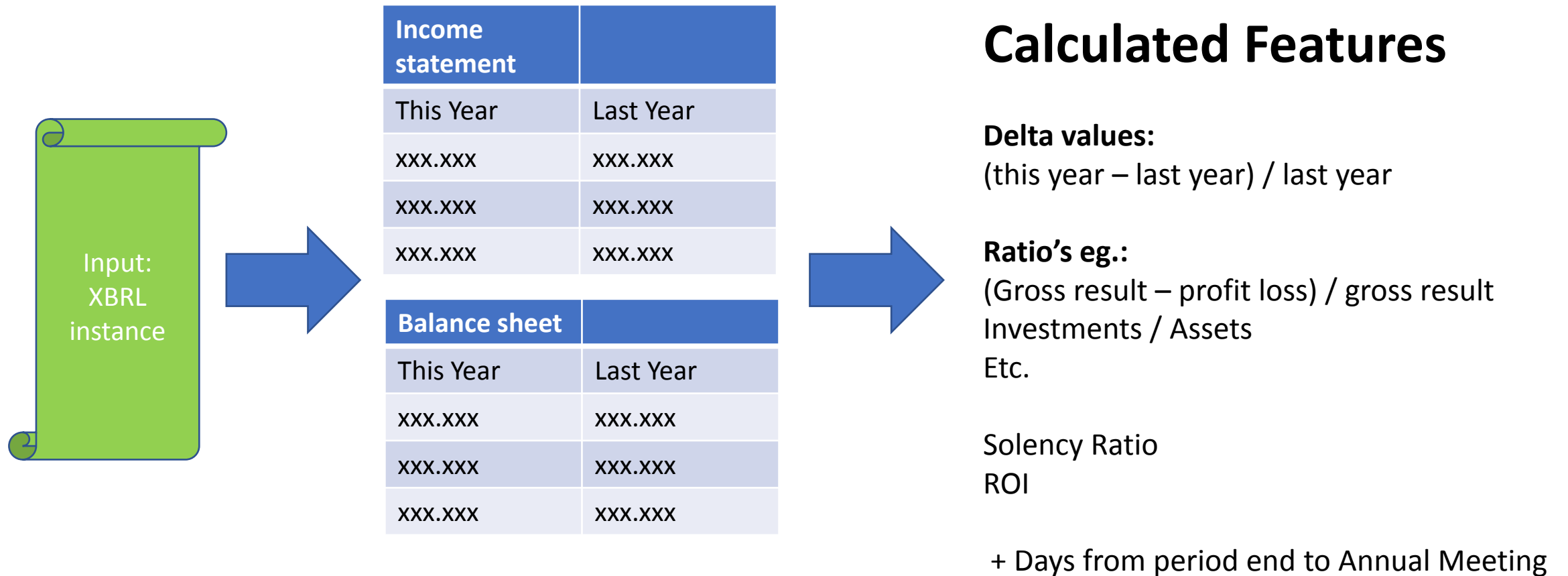
TO-BE:



# Feature extraction (EW)

**DIRECTIVE 2013/34/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL**

**on the annual financial statements, consolidated financial statements and related reports of certain types of undertakings**



# Questions?