Predicting Successful Commercial Leads

TeMa Workshop – University of Groningen 2022

Decision Science Unit

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Contents of the Workshop

- *Who are we?* – Tetra Pak – Future Talent Program- The Tetra Pak Decision Science Unit
- *What do we do?* – Decision Science
- *How do we work?* – The Decision Science Value Delivery Process
- *Workshop* – Predicting Successful Commercial Leads with AI

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Who are we?

- Tetra Pak
- Future Talent Program
- The Tetra Pak Decision Science Unit

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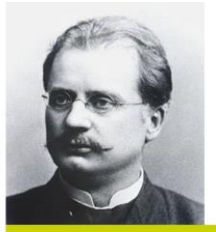
Tetra Pak Food Processing and Packaging Systems

We specialise in providing customers with **complete solutions** for the processing, packaging and distribution of food products

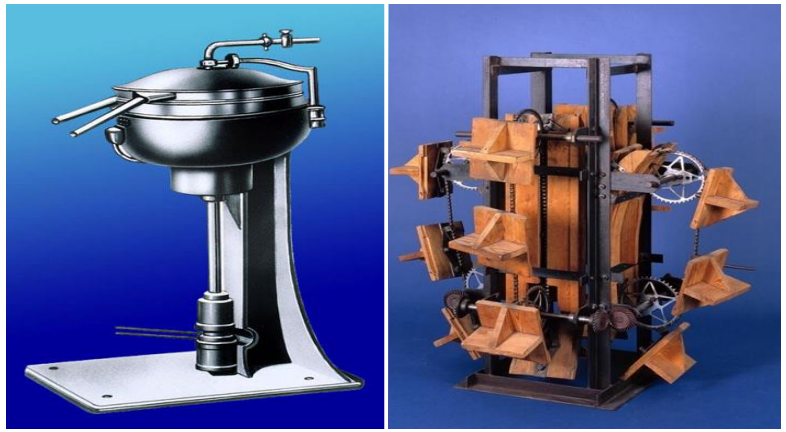
Services: **Processing & Packaging Solutions**

Two important innovations


Ruben Rausing


Gustaf de Laval

Continuous separator



Packaging machine

Tetra Pak in figures

11.4B
2017 Sales

24K
Employees

188B
Packages produced

170
Countries

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Tetra Pak at your side

Wherever you are

93 Sales offices

28 Market companies

8 Technical Training Centers

53 Productions plants

6 Customer Innovation Centers

6 R&D units

Tetra Pak impact on every day life

Tetra Pak's Future Talent Programme

The Future Talent is a Tetra Pak global development program to employ and offer Young Graduates the opportunity to develop their skills in preparation to their future career in the company

1. **Tetra Pak commits in hiring young graduates every year**
2. **Long term investment to build technical and leadership skills**
3. **Opportunity to have a global experience**

Student Development Programmes

The **Future Talent Programme** is for graduates

The programme is scheduled to start every September:

from day one, you will be delivering results as a true team member and hold a real position at Tetra Pak.

You will be trained through one of two tracks:

- **Leadership Track**: 18 months programme to develop your leadership skills and give you broad business knowledge in an international environment.
- **Technical Track**: 18 months programme to develop your engineering skills and bring you leading technical knowledge in an accelerated way.

After the programme finishes you will have gained great experiences to help you continue your exciting career within our company.

What do we do?

Decision Science

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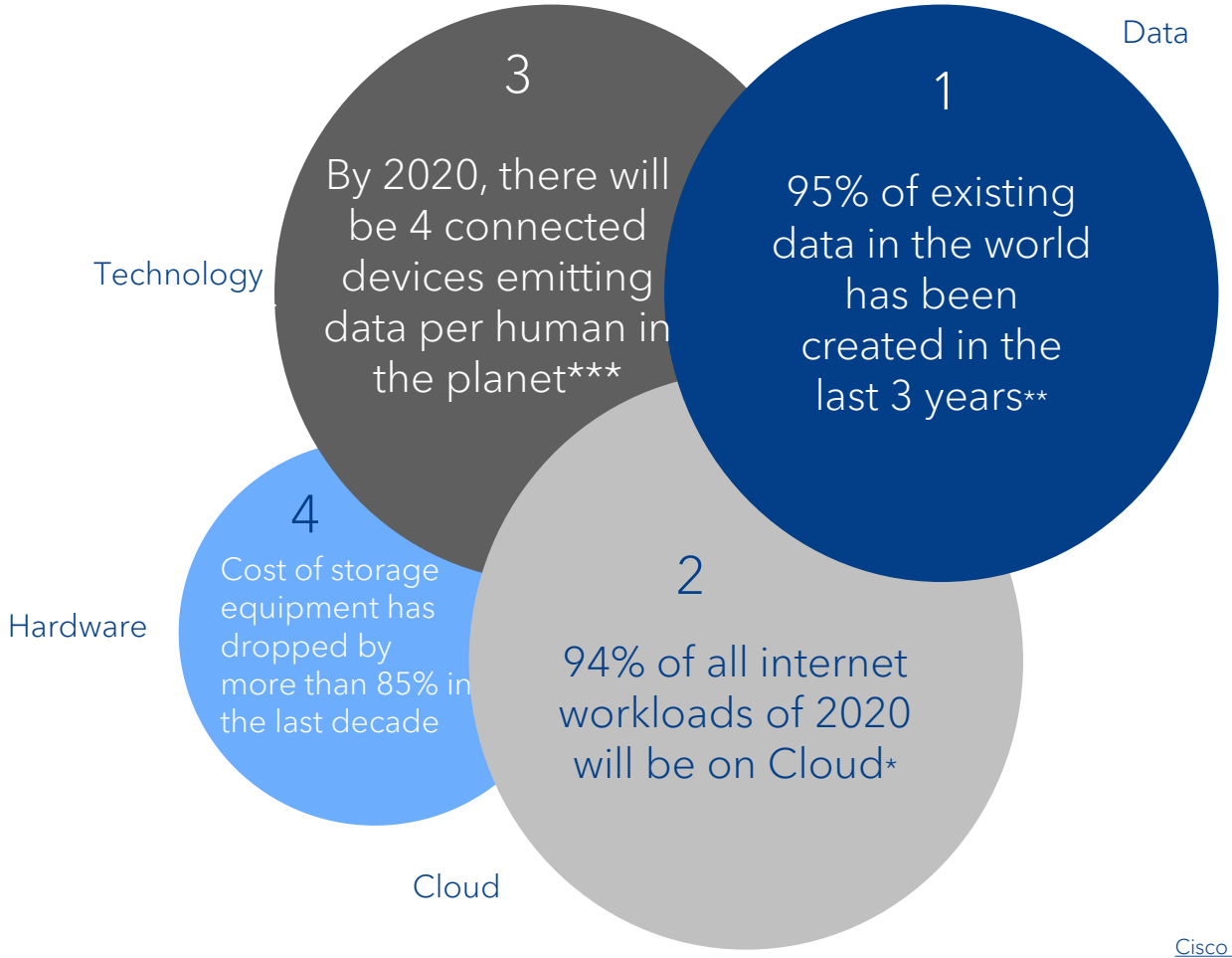
Data… seems to be everywhere…



2010-2020 – A decade of amazing changes…

Explosion of Big Data

More data every day – terabytes of information

Appearance of Cloud Computing

No need of expensive hardware investment

Rise of New Technologies

IoT and Machine Learning libraries

Cheaper Hardware

Substantial decrease in costs of computing power

Cisco says almost all workloads will be cloud based within 3 years, Cisco Systems*
How Much Data Do We Create Every Day? The Mind-Blowing Stats Everyone Should Read, Bernard Marr**
Leading the IoT***
The battery decade: How energy storage could revolutionize industries in the next 10 years, Pippa Stevens****

… This has created the necessity of analyzing data… And worldwide leaders in technology have emphasized on it…

"Data is the new oil!"

Clive Humby
CDS, Royal Academy of Arts

"Data really powers everything that we do"

Jeff Weiner
CEO, Linkedin

"The goal is to turn data into information, and information into insight"

Carly Fiorina
CEO, HP

Nevertheless… results in the private sector are very diverse…

Current Global Situation

83% CEOs say AI is a strategic priority

MIT Sloan Management Review

$3.9T Business value created by AI in 2022

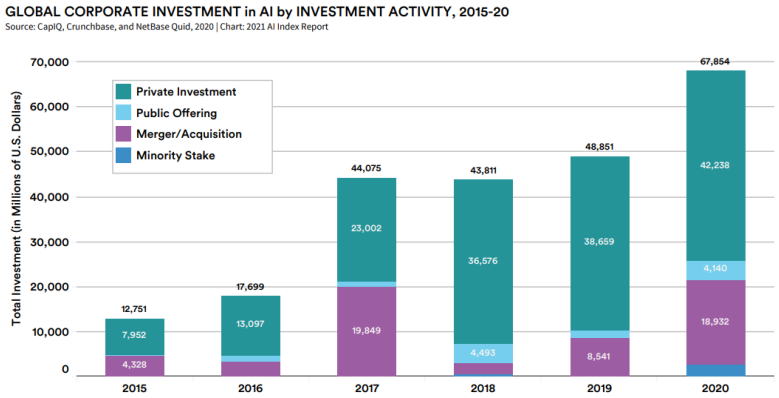
Gartner

85% of big data projects fail

Gartner

87% of data science projects never make it into production

VB



Leaders Situation

"Companies that are **strategically scaling AI** have nearly **2x the success rate and 3x the return from AI investments** vs. companies pursuing siloed proof of concepts."

Built to Scale | Accenture

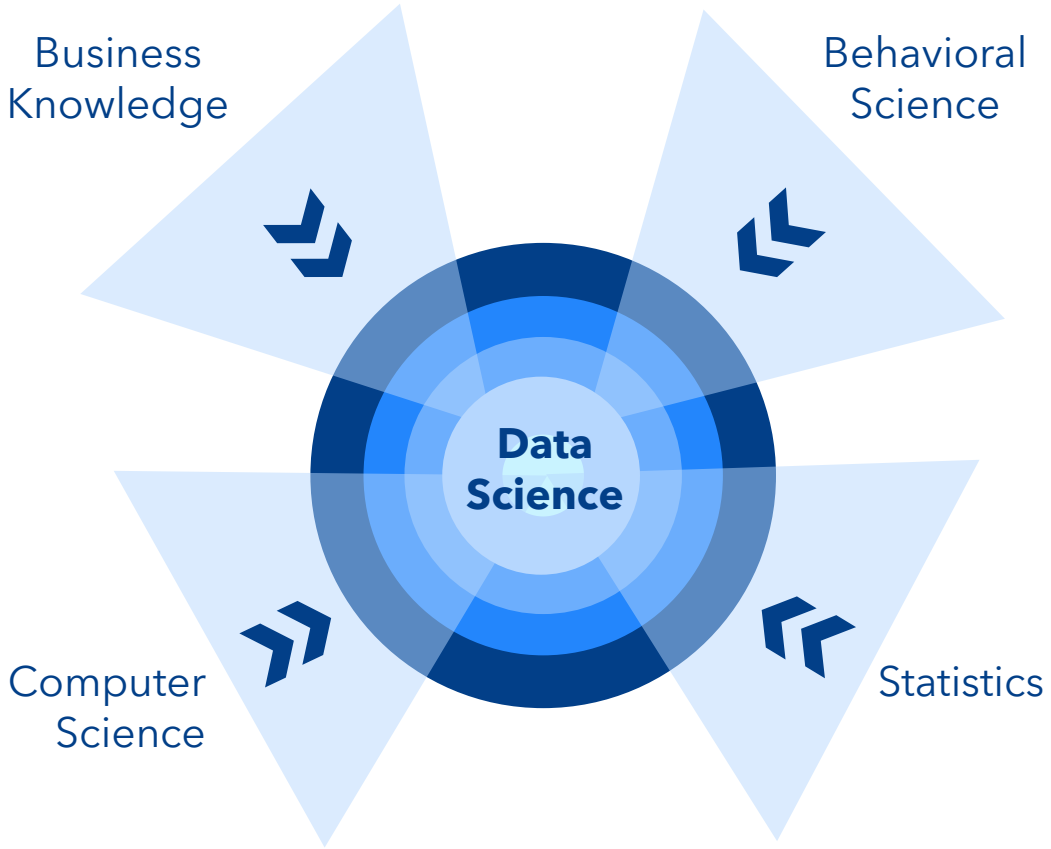
"Companies reporting the **highest returns on AI** are more likely to **enact effective change-management** practices **through Decision Science**, with leaders modeling these behaviors."

Reimagining your business to scale AI | McKinsey

"**AI Leader companies** spend more than **half their Analytics budget** on **landing the last mile**, to **obtain the trust** of the customers."

Tipping the scales in AI: How leaders capture exponential returns | McKinsey

In this environment rises Decision Science…



"It is an interdisciplinary field (sourced by Statistical knowledge, Computer Science, Business expertise and Behavioral Sciences), whose mission is ***to deliver business value through the analysis of data,*** the study of the behavior of customers, *and the use of scientific algorithms."*

Decision Science is the natural evolution of Data Science

When facts meets humans

Data Science

Mathematical Centrical

Analytics

Statistics

Machine Learning

AI

Decision Science

Behavioral Science

Psychology

Neuroscience

Economics

Managerial Sciences

Our Team

Director

Alberto Barroso

Quality

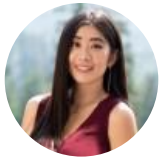
Noah Schellenberg

Do Tran

Niccolò Battola

Andrew Segar

Belete Boru



Kylie Liu

Supply Chain

Pedro Corral

Niklas Rystedt

Leo Cong Ronggang

Customer Success

Rasmus Thornberg

Klas Bogsjö

Marcus Gidekull

Chiara Mondino

Finance

Aníbal Martínez-Sistac

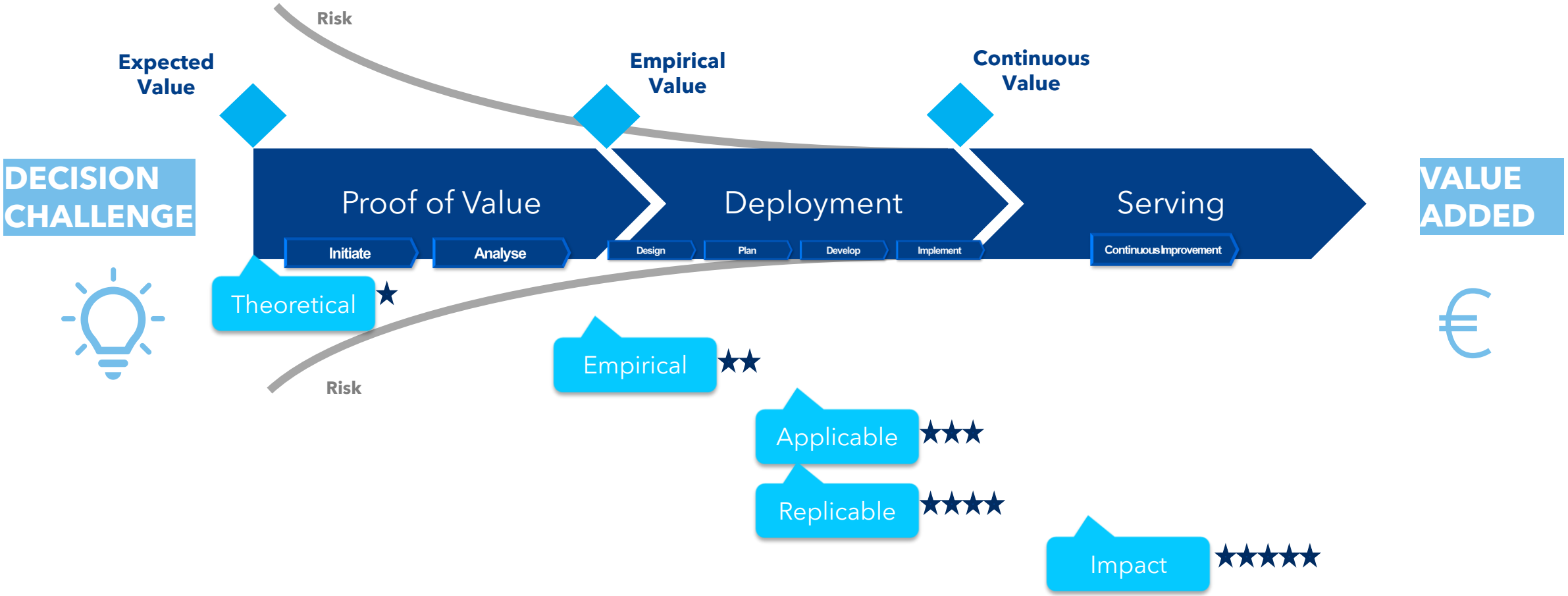
Marieke Lundqvist

Lucinda David

Stephany Rojas

Laura Huber

The way we work: Our Process compatible with the THEARI framework



- For more info about Standards for Evidence in Decision Making

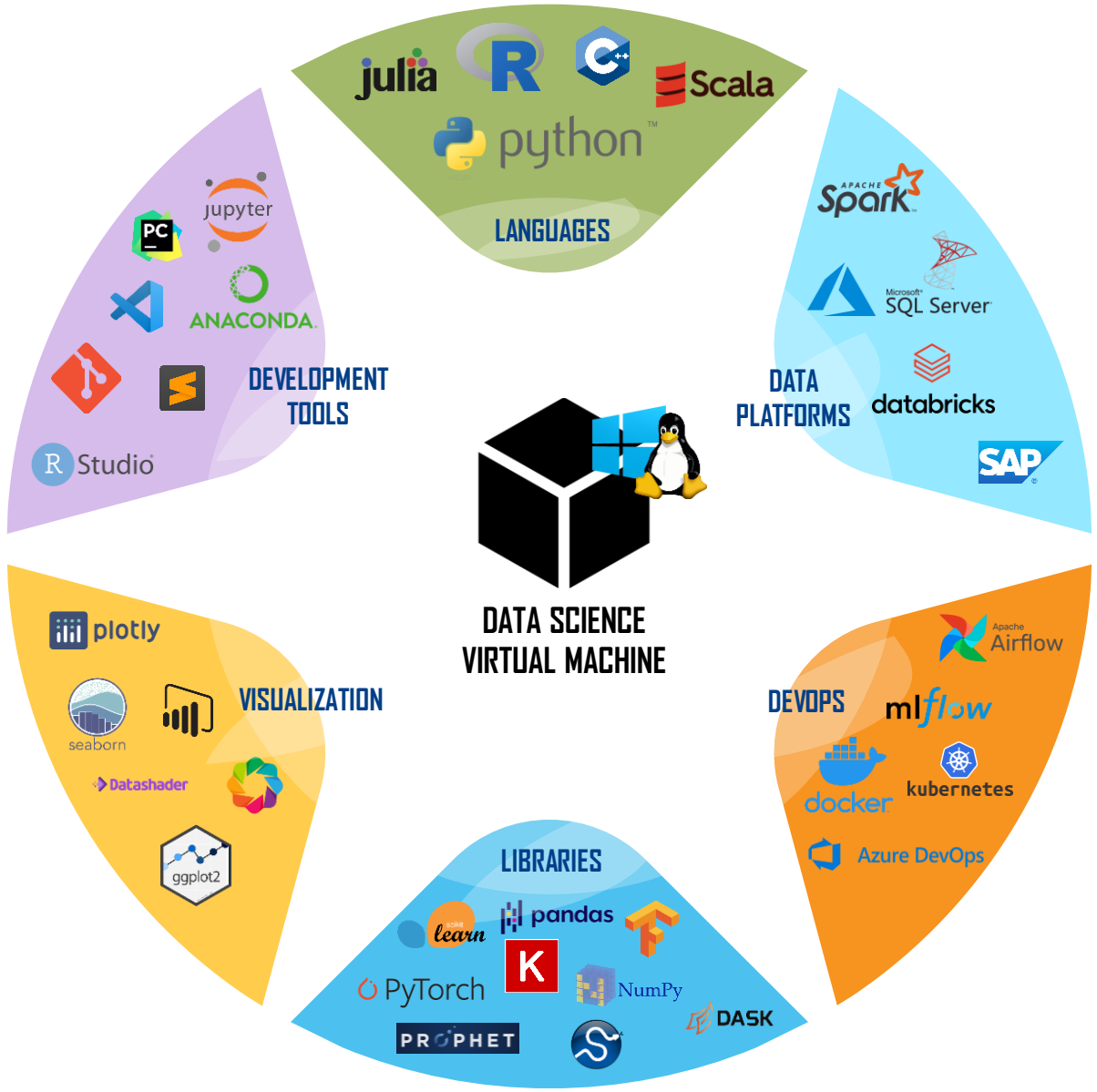
★ Evidence Score

What is THEARI Framework? A state-of-the-art process for guaranteeing quality of evidence in analytical projects

Steps	Rating	Description of standard for evidence	An Example: Tetra Pak Cheese Optimization
Theoretical Possible explanation stated	★	A business belief has been proposed but lacks empirical validation.	172 M USD per year in market opportunity for Cheese outcome-based services based on a 0.4% moisture increase assumption with a DS solution.
Empirical Concept described but not utilized	★★	Insights on historical data explain a business challenge	Moisture increase by 0,52% in customer of PoV with historical data. This would lead to 1700 pounds of more cheese yielded by year (1,1 M USD net market value) with DS solution.
Applicable Concept has been used to cause effect	★ ★★	Application is completed in a controlled clinical trial.	0,3% increase in Moisture on 1st Clinical Trial, which would report an increase of 360 000 pounds of cheese yielded per year (730K USD in net market value).
Replicable Effect has been repeated independently	★★ ★★	We obtain converging conclusions through successful replication in several clinical trials.	0,2% increase in Moisture on 2nd Clinical Trial, which would report an increase of 240 000 pounds of cheese yielded per year (480K USD in net market value).
Impact Effect has been appropriately replicated in practice with measurable value in real world	★★★ ★★	Successful translation of insight is applied at scale, producing results in line with prior conclusions. Prepared to enter production.	We are working on having this solution deployed as a Tetra Pak outcome-based service.

Ruggeri, K., van der Linden, S., Wang, Y. C., Papa, F., Riesch, J., Green, J. (2020). Standards for evidence in policy decision-making. Nature Research Social and Behavioural Sciences, 399005. go.nature.com/2zdTQIs

A zoom into some of the Data Science tools we use...



Data Scientists – Interesting Academic background

Economics
- Economics
- Business Management
- Actuarial Sciences
- Finances
- …

Quantitative Sciences
- Statistics
- Mathematics
- Physics
- Chemistry
- …

New trend in DS!

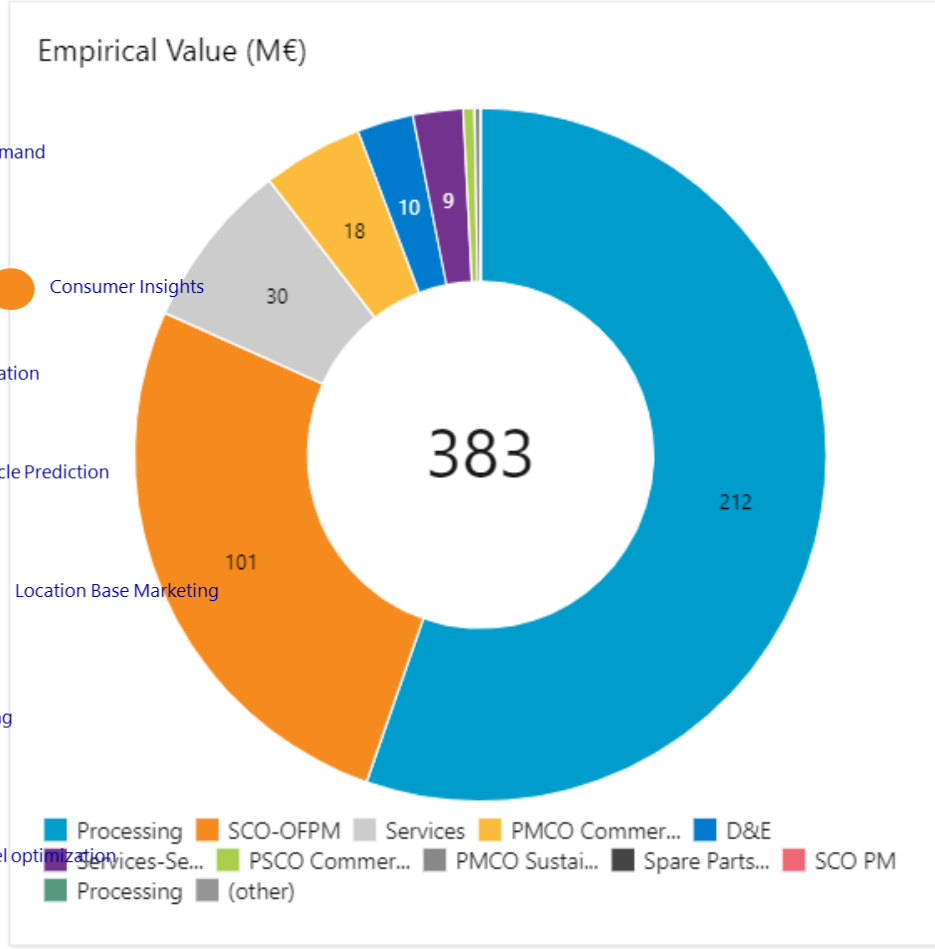
Engineering
- Computer Science
- Industrial Engineering
- Engineering Physics
- Electrical Engineering
- …

Behavioral Sciences
- Psychology
- Sociology
- Biology
- Neurolinguistics
- …

We are collaborating with all Tetra Pak´s business areas

Current pipeline and proven value till today

Customer Lifetime Value
Predictive Maintenance
Safety Stock Optimization
Lead Optimization
Predictive Functions
Base Mat Safety Stock Optimization
Design To Value Analytics
Claims impact on Pack Mat Demand
Tactical capacity planning
Maintainability Optimization
Production / Quality Optimization
Market basket & product mix analysis
Issue Classification
Aseptic Performance
Consumer Insights
Product Pricing optimization
Production capacity optimization
Total Cost to Serve Analytics
Workforce capacity planning
Customer Insights
Product Lifecycle Prediction
Spend Analytics
Sustainability Analytics
Customer demand forecasting
Location Base Marketing
Customer churn prediction
Net Promoter Score optimization
Predict cross-up selling
Fraud detection
Warranty Analytics
Strategic forecast
Channel optimization
Process analytics (intra-factory logistics)
Energy Optimization



Workshop

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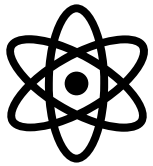
Sales Leads Journey

We are contacted by the customer.

Algorithm should be triggered here.



Creation of Sales Lead

Feasibility

In this phase, our engineers analyze if the solution requested can be delivered with our klnow.-how.

Budgeting

Our analysts calculate the cost for the customer. This task can be very expensive.

Firm Quotation

We approve the quotation to be sent.

Sale is Done

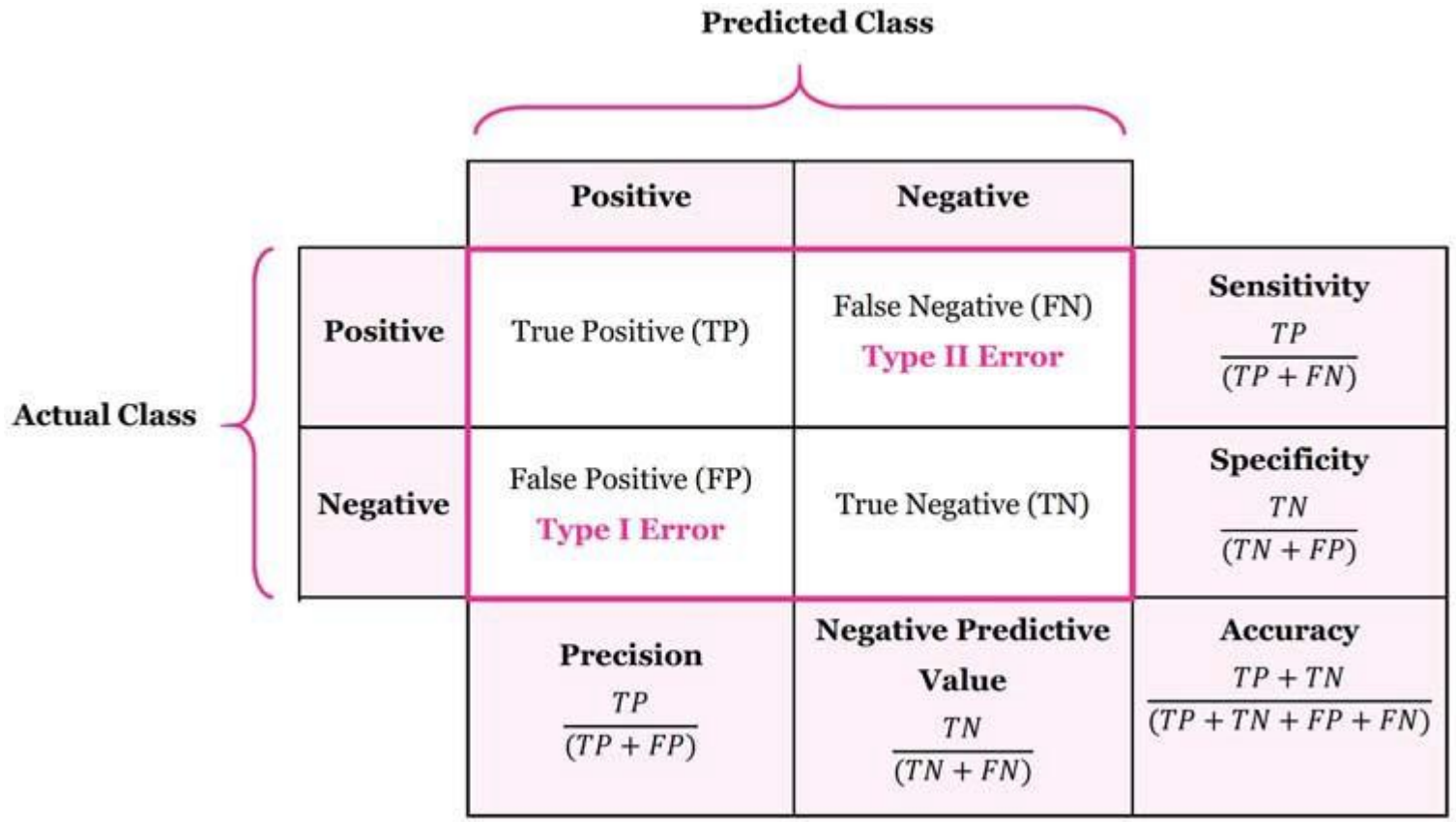
Objectives of the Sales Opportunities Optimization PoV

- **Predict** probability of winning the opportunity early on and along the sales funnel
- **Prioritize** sales investment, maximizing Total Sales and minimizing Costs
- **Reduce** the Time to Value by controlling it
- **Understand** main drivers of these probabilities
- **Identify** opportunities with expected Total Net Value lower than initially estimated

Measuring Sales Leads Prediction Performance

What happened at the end of the opportunity		Predicted at beginning of opportunity: Sale will happen	Predicted at beginning of opportunity: Sale will not happen
	Sale happened	True Positive	False Negative
	Sale not happened	False Positive	True Negative

Measuring Sales Leads Prediction Performance



Baseline = Ratio of observed successful sales in data set.

Empirical Value associated to Processing Sales Opportunities Optimization

For all projects, the DS unit calculates its **Empirical Value**. Which is a justification for beginning the project based on its expected benefit. The empirical value is defined formally as:

$$Empirical\ Value\ (€) = To\ Be\ \text{Scenario}\ (€)\ - As\ Is\ \text{Scenario}\ (€)$$

The *To Be* scenario corresponds to selecting which processing opportunities to go for based on the **DS winning rate**. The *As Is* scenario corresponds to selecting which sales opportunities to go for based on the **TecBase winning rate**. So, we could translate the previous formula into:

$$Empirical\ Value\ (€) = DS\ Model\ Criteria\ (€) - TecBase\ Get\ Rate\ Criteria\ (€)$$

Workshop

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Please download the data set and PPT!

- You can find the data set and PPT to do the exercises at our Git repo prepared for TeMa:

https://github.com/quantumds/groningen

Workshop Questions to Answer

1. Build the Confusion Matrix.
2. What is the classification Baseline?
3. What is the Accuracy of the solution?
4. What is the Precision of the Solution?
5. What is the Recall (also called “Sensitivity”) of the Solution?
6. Based on the Previous information. Is it a good or a bad model? How would you fix it?
7. Do an exploratory analysis of relevant numerical features. Are their range of values OK? Do you see weird values? How would you get rid of outliers?
8. What is the average lead time of an opportunity? And the Median? Do you see differences? Why? Which one would you choose?
9. What country has higher rate of positive conversions?
10. What is the average profitability by lead type?
11. What is the Empirical Value of the AI solution? How would you calculate it based on financial metrics of your data set?

Looking for a new adventure?

Join our Future Talent Programme starting in September 2023!

Submit your application here: