Redefining SME lending through ML and Social Physics

BBVA
Data & Analytics

trust·u

NORTH AMERICA

Estados Unidos
México

SOUTH AMERICA

Argentina
Bolivia
Brasil
Chile
Colombia
Paraguay
Perú
Uruguay
Venezuela

EUROPE

Alemania
Bélgica
Chipre
España
Finlandia
Francia
Holanda
Italia
Irlanda
Luxemburgo
Malta
Portugal
Reino Unido
Rumanía
Suiza
Turquía

ASIA-PACIFIC

China
Hong Kong
Japón
Singapur

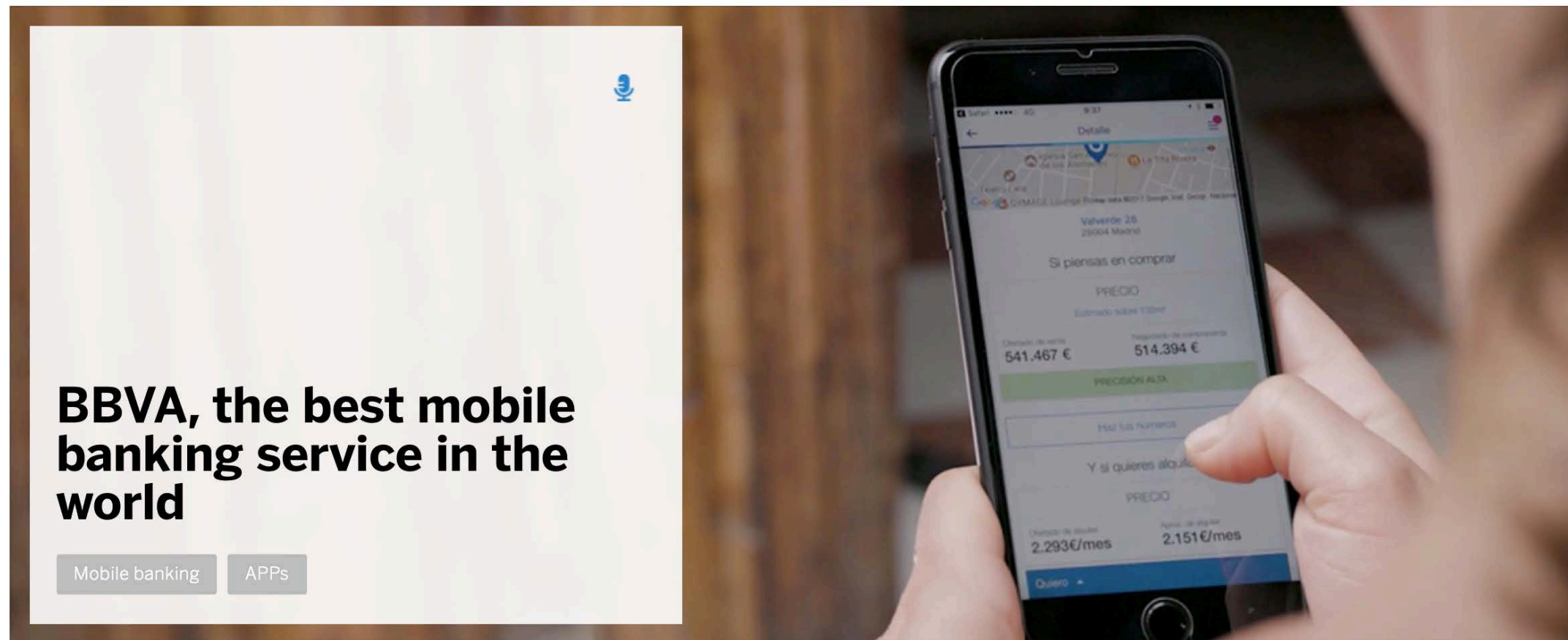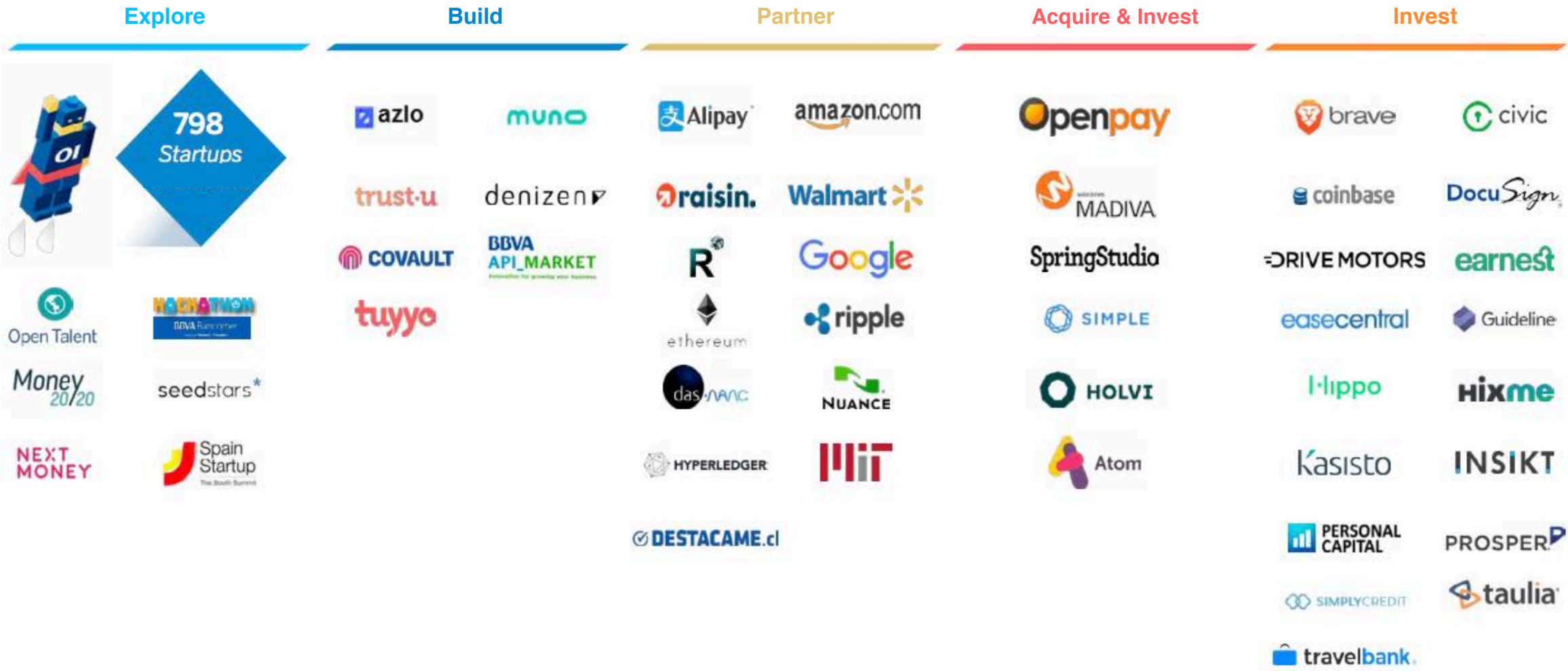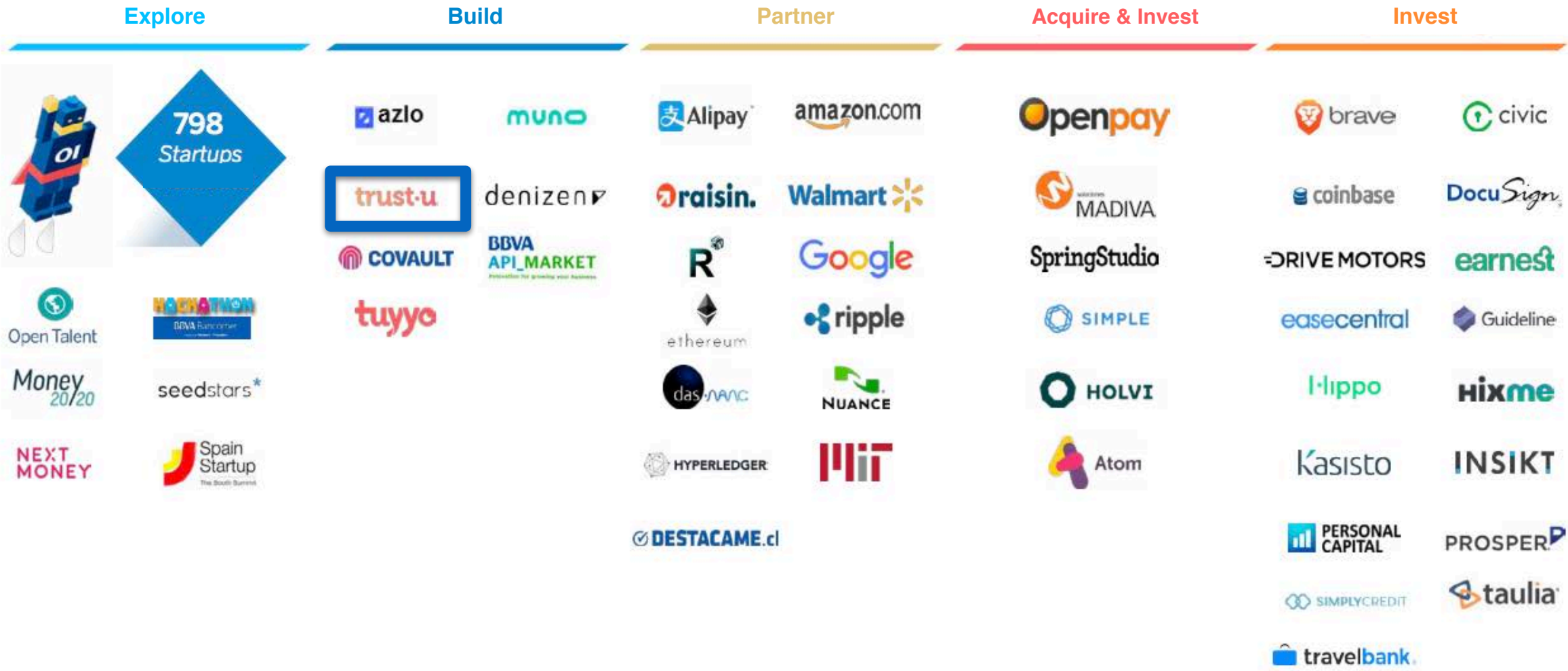| € 690	72	>30	8.271	31.688	131.856
BILLION ASSETS	**MILLION CLIENTS**	**COUNTRIES**	**BRANCHES**	**ATMs**	**EMPLOYEES**

Best mobile banking service in the world

*According to Forrester Research 2017 report "2017 Global Mobile Banking Benchmark."

New Business Models

Explore	Build	Partner	Acquire & Invest	Invest

New Business Models

Explore	Build	Partner	Acquire & Invest	Invest

Why?

SMEs

60%*

Of total employment is created by SMEs

50-60%*

Of value added on average comes from SMEs.

*OECD Financing SMEs and Entrepreneurs 2018

The Pain

FINANCIAL TIMES

Eurozone SMEs struggle to access finance

Michael Steen in Frankfurt APRIL 1, 2013

Teldat, a small Spanish designer and maker of internet routers for corpora use, is exactly the kind of company th

The Telegraph

External financing - should SMEs take the leap?

Growing pains: start-ups often struggle to fund expansion CREDIT: GETTY

11 MAY 2017 • 10:45AM

By A

FINANCIAL TIMES

"Banks just aren't set up to understand small businesses"

There is an estimated $2tn gap between SME funding needs and what banks will provide

Sofie Blakstad, chief executive of Hiveonline, says banks are not set up to serve small businesses well

Maija Palmer OCTOBER 16, 2017

SME news

UK SMEs Strugg Find Adequate F To Boost Product

December 18, 2017

UK SMEs are struggling to fin funding to invest and boost th productivity, according to rese Close Brothers Group.

Just 41% of UK SMEs have bee access capital through their cho funding route, and even those a

THE IRISH TIM

Wherever you g it's not easy bei an SME

Evidence from other countries s access to finance can prove ver for small companies

Fri, Feb 24, 2017, 01:00

realbusiness

DECEMBER 15, 2017   LETITIA BOOTY

UK SMEs struggling to access suitable funding for scaling up

Growing businesses in the UK are still struggling to access suitable funding, despite many requiring further financial support.

UK SME owners are struggling to find funding for their scale-up plans, with just 41 per cent of able to access capital through their preferred funding route.

INDEPENDENT

News › Business › Business News

Small and medium businesses are struggling to get funding, new research reveals

Failure to access sufficient capital could hamper productivity growth

Stephen Little
Tuesday 12 December 2017 17:13 GMT

The Pain

5,5 million SMEs don't have any access to financing or are underserved in Europe*

25% of financing requests by SMEs in Europe are not successful (no funding or lower than 75% of amount required)*

New businesses are **not served** (+2 years of operation is typically required to approve financing)

*SAFE - Survey on access to finance of enterprises 2015, European Commission

The Pain

___

SMEs with less than 2 complete accounting years are **not directly served** as 2 complete financial statements are required to compare.

Entrepreneurs previous **experience** is **not taken into account**, every time they start a new venture, they do it from scratch.

The Pain

Most of newly created SMEs in Spain are **Private Limited Companies.**

However, banks usually ask for a guarantee, personal, joint , several or joint and several.

This is contradictory with the nature of PLCs.

SMEs

---

139 Bn*

Informal investment in Europe represents a significant part of SME's funding

*INE, Eurostat, 2006 Financing Report, Babson and LBS, BBVA analysis

54%*

European young SME's get funds from friends and family

*Founding and Sponsoring Institutions, 2006 Financing Report, Babson and LBS

40-90%*

Average APR is very high and able to harm SMB's

*BBVA analysis

What?

trust·u

The Solution

Trust·u is a **co-lending** platform that formalizes the loans of the inner circle of SMEs (friends & family) and contributes additional finance based on a new risk model.
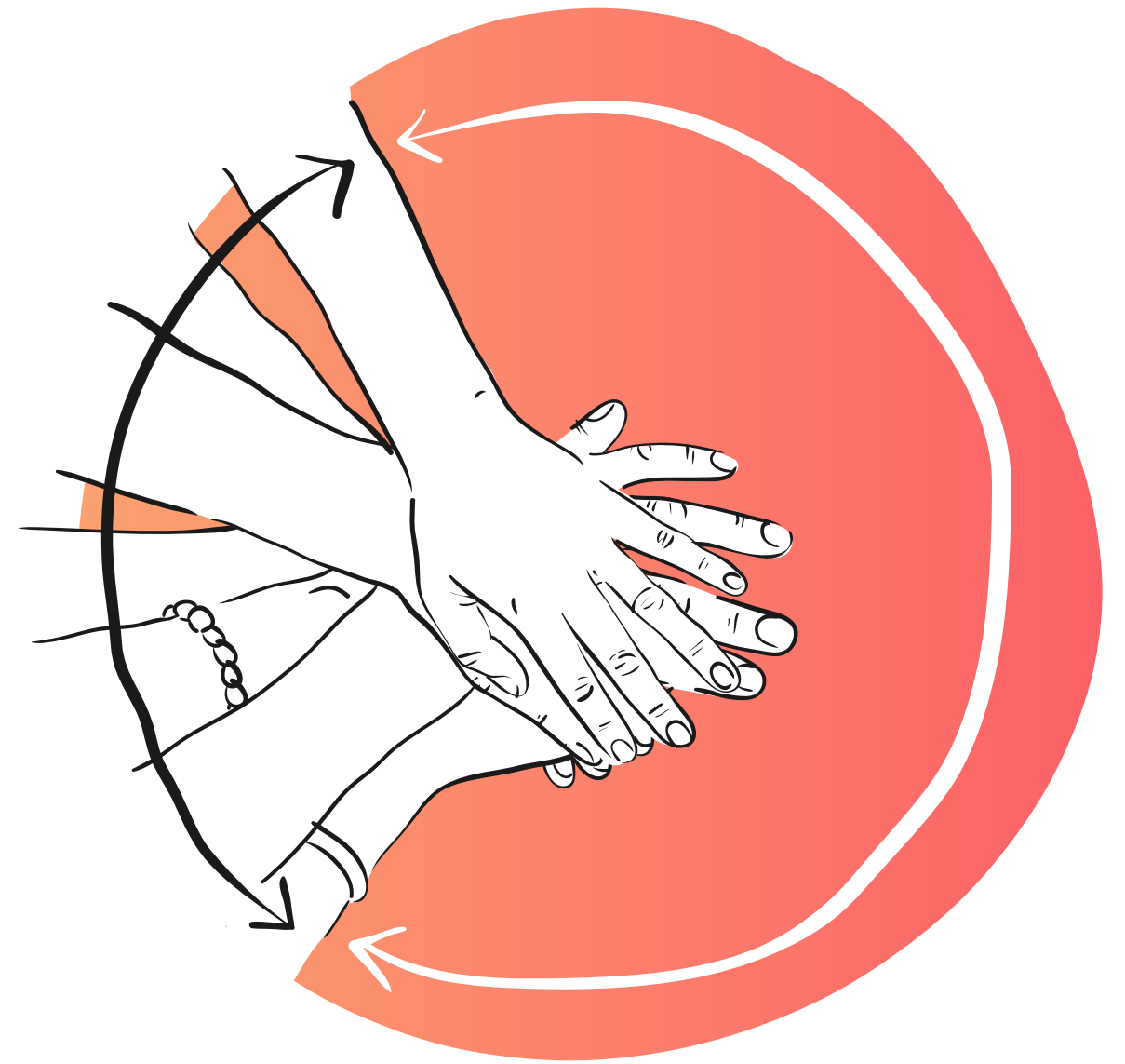
Example

Trust·u

28.000€

6.686% APR

24 months

+

F&F

2.000€

You decide the terms of
this private loan

30.000€

FOR YOUR BUSINESS
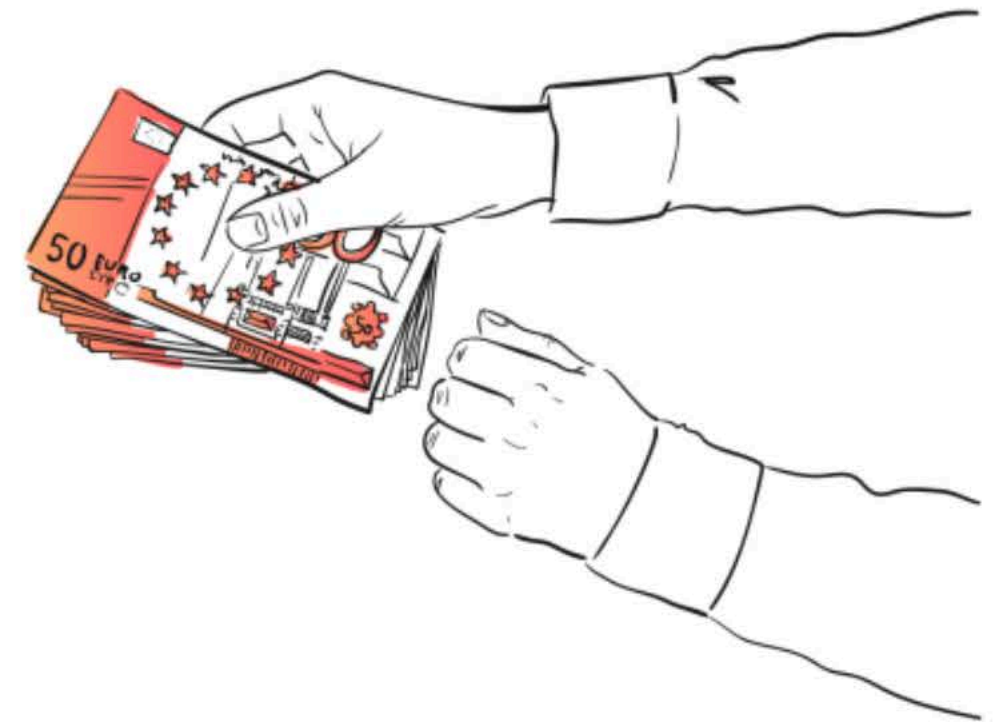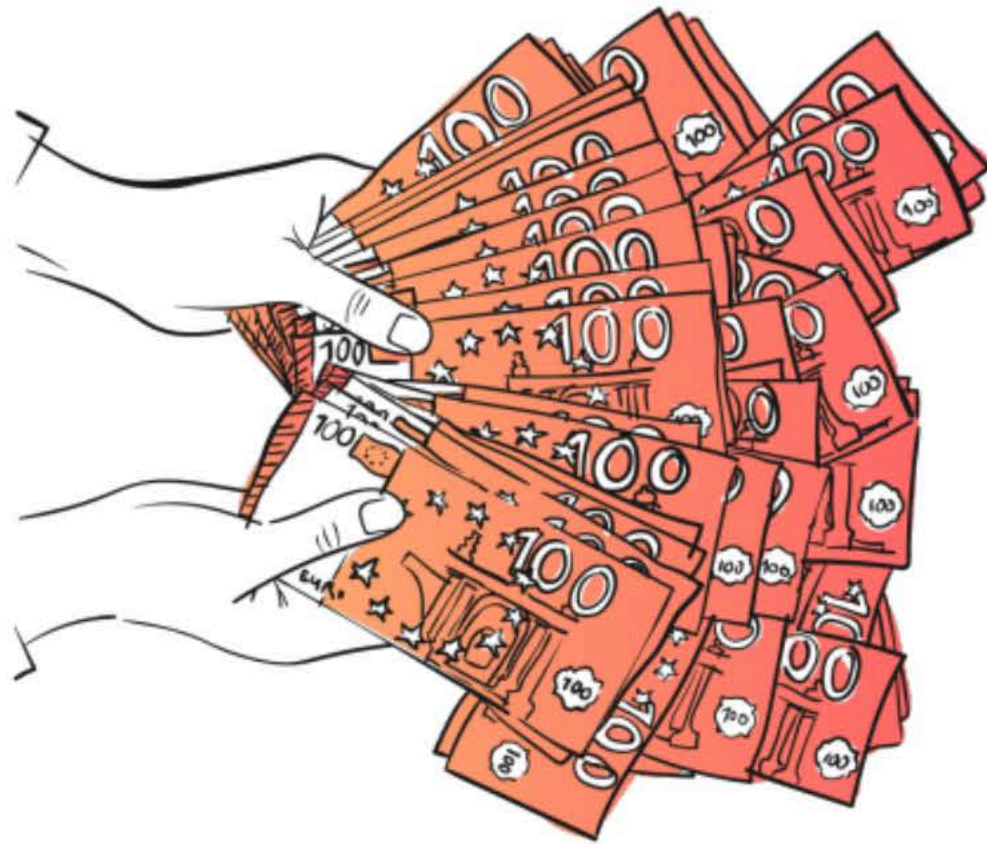
The Hypotheses

Social Underwriting

Close network has an extensive set of data and evidence allowing powerful scoring to complement our own risk model

Social Collateral

Having friends & family involved in the operation can end up with better repayment behavior keeping default and LGD at acceptable rates

Co-lending

F&F lenders are willing to accept negative returns converting their contribution in a 'cushion' to allow lending at early stages of SMB's development

Timeline

JANUARY

MARCH

JUNE

Panel Session

Trust Index

Full MVP Released

JAN

FEB

MAR

APR

MAY

JUN

...

SET
2016
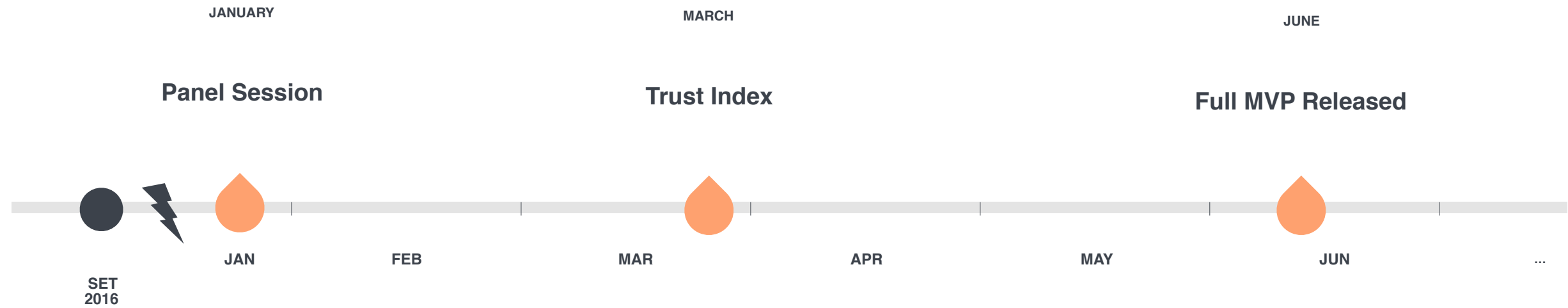
Early Test

Invited SMEs to test our product
and get real feedback on UX.
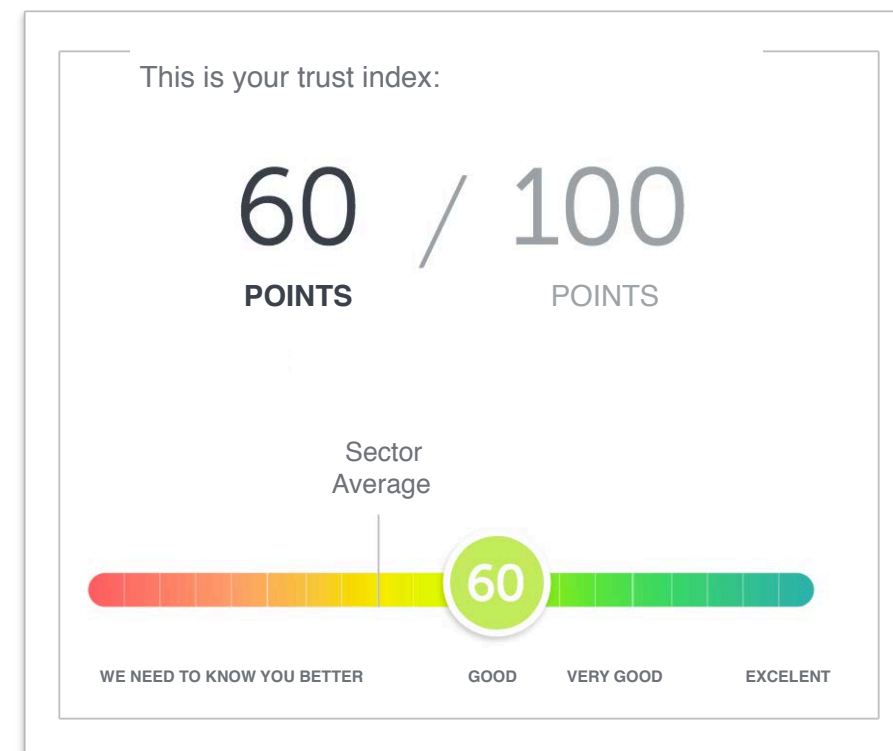
This is your trust index:

60 / 100

POINTS

POINTS

Sector
Average

60

WE NEED TO KNOW YOU BETTER

GOOD

VERY GOOD

EXCELENT

How?

Social Underwriting

Many SMEs ask their F&F for money to start their business.

Some get the money from their circle, and some don't.

Behind this decision there is a social underwriting knowledge that has an incredible potential for newborn enterprises.

New Data Sources

We have incorporated new data sources to our model, thanks to the features obtained from **bank data aggregation techniques.**

Allowing aggregations from top 20 Spanish enterprise banks.

+ 70%

of our model is based on transactional features

New Risk Model

Traditional internal admission rating models are typically developed using ML **linear models** with monotonous features.

However, our approach was **non-linear**, as backtesting shown a significant improvement.

60% better* performance than non client models applied to our segment as compared to the traditional approach.

"If you can't explain it simply, you don't understand it well enough"

*Gini index improvement

New Risk Model

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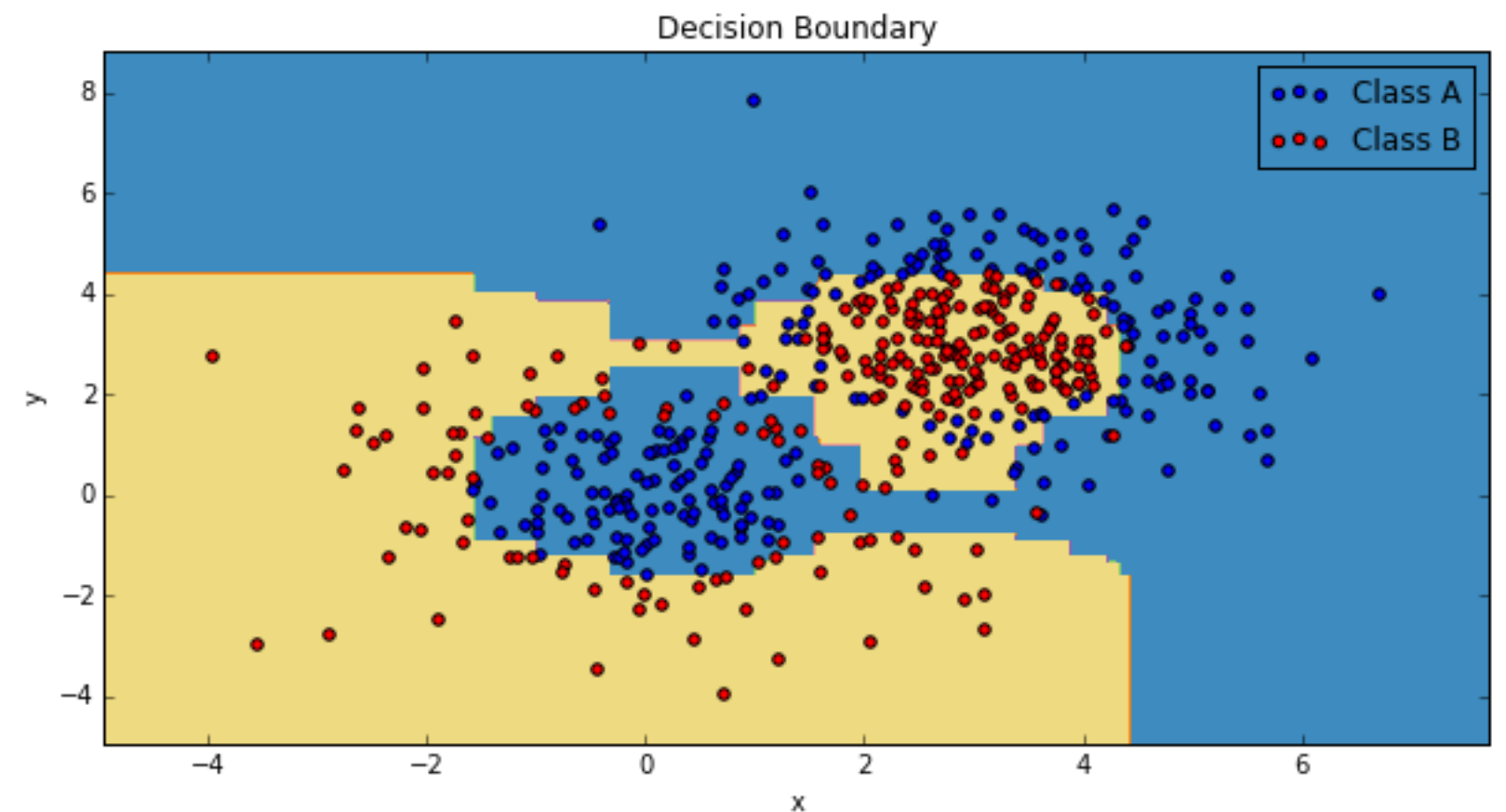
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*Gini index improvement

Decision Boundary

Interpretability

We have proved, non linear models can be built to solve these problems.

However, due to the **interpretability-performance tradeoff** an interpretability feature is needed to have internal confidence and to be compliant with current and future **right to explanation** regulation.

EU's Right to Explanation: A Harmful Restriction on Artificial Intelligence

By Special Guest / January 25, 2017
Nick Wallace

Last September, a U.K. House of Commons committee concluded that it is too soon to regulate artificial intelligence (AI). Its recommendation comes too late: The EU General Data Protection Regulation (GDPR), which comes into force next year, includes a right to obtain an explanation of decisions made by algorithms and a right to opt-out of some algorithmic decisions altogether. These regulations do little to help consumers, but they will slow down the development and use of AI in Europe by holding developers to a standard that is often unnecessary and infeasible.

DATASHEET

Video
Sound
Collaboration
System for
Huddle
Rooms

Although the GDPR is designed to address the risk of companies making unfair decisions about individuals using algorithms, its rules will provide little benefit because other laws already protect their interests in this regard. For example, when it comes to a decision to fire a worker, laws already exist to require an explanation, even if AI is not used. In other cases where no explanation is required, such as refusing a loan, there is no compelling reason to require an explanation on the basis of whether the entity making the decision is a human or a machine. (Loan companies have to tell applicants what information their decisions are based on whether they use AI or not, but they do not have to explain the logic of their reasoning.)

Interpretability

Interpretability is a **hot topic** right now, not only on the law side due to all its consequences on AI and its impact in daily used services such as Facebook, Google or Amazon, but a hot topic on academia too.

The Mythos of Model Interpretability

Zachary C. Lipton [1]

...no one has managed to set it in writing, or (ii) the term interpretability is ill-defined, and thus claims regarding interpretability of various models may exhibit a quasi-scientific character. Our investigation of the literature suggests the latter to be the case. Both the motives for interpretability and the technical descriptions of interpretable models are diverse and occasionally discordant, suggesting that inter...

"Why Should I Trust You?"
Explaining the Predictions of Any Classifier

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ABSTRACT

Despite widespread adoption, machine learning models remain mostly black boxes. Understanding the reasons behind predictions is, however, quite important in assessing *trust*, which is fundamental if one plans to take action based on a prediction, or when choosing whether to deploy a new model. Such understanding also provides insights into the model, which can be used to transform an untrustworthy model or prediction into a trustworthy one.

In this work, we propose LIME, a novel explanation technique that e... terpretable ... model loc... method to ... vidual predi... way, fram... lem. We d... explaining ... and image ... utility of ex... and with h... trust: deci... between mo... identifying ...

how much the human understands a model's behavi... opposed to seeing it as a black box.

Determining trust in individual predictions is an imp... problem when the model is used for decision making. ... using machine learning for medical diagnosis [6] or ter... detection, for example, predictions cannot be acted u... blind faith, as the consequences may be catastrophic.

Apart from trusting individual predictions, there is ... need to evaluate the model as a whole before deployin... the wild". To make this decision, users need to be co... that the model will perform well on real-world data, ac...

1. INTR...

Machine lea... science of ... of humans i... humans or ... or are deplo... remains: *if ... they will na... two differen... prediction,... sufficiently ... a model, i.e... reasonable ...

Permission to m...
classroom use is ...

A Unified Approach to Interpreting Model Predictions

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Abstract

...y a model makes a certain prediction can be as crucial as the ...y in many applications. However, the highest accuracy for large ... often achieved by complex models that even experts struggle to ...nsemble or deep learning models, creating a tension between ...*pretability*. In response, various methods have recently been ...rs interpret the predictions of complex models, but it is often ... methods are related and when one method is preferable over ... this problem, we present a unified framework for interpreting ... (SHapley Additive exPlanations). SHAP assigns each feature ... for a particular prediction. Its novel components include: (1) ...f a new class of additive feature importance measures, and (2) ...showing there is a unique solution in this class with a set of ...s. The new class unifies six existing methods, notable because ...ods in the class lack the proposed desirable properties. Based ...his unification, we present new methods that show improved ...ormance and/or better consistency with human intuition than ...s.

Mind the Gap: A Generative Approach to Interpretable Feature Selection and Extraction

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Abstract

We present the Mind the Gap Model (MGM), an approach for interpretable feature extraction and selection. By placing interpretability criteria directly into the model, we allow for the model to both optimize parameters related to interpretability and to directly report a global set of distinguishable dimensions to assist with further data exploration and hypothesis generation. MGM extracts distinguishing features on real-world datasets of animal features, recipes ingredients, and disease co-occurrence. It also maintains or improves performance when compared to related approaches. We perform a user study with domain experts to show the MGM's ability to help with dataset exploration.

1 Introduction

Not only are our data growing in volume and dimensionality, but the understanding that we wish to gain from them is increasingly sophisticated. For example, an educator might wish to know what features characterize different clusters of assignments to provide in-class feedback tailored to each student's needs. A clinical researcher might apply a clustering algorithm to his patient cohort, and then wish to understand what sets of symptoms distinguish clusters to assist in performing a differen-

...rpret a prediction model's output is extremely important. It engenders ...s insight into how a model may be improved, and supports understanding ...d. In some applications, simple models (e.g., linear models) are often ...interpretation, even if they may be less accurate than complex ones. ...bility of big data has increased the benefits of using complex models, so

Interpretability

After trying out some public academia implementations of explanations frameworks, we realised they were not suited for our specific needs.

Current approaches try to explain models **locally**, "vicinity" of an observation, and **globally**, providing a set of non-redundant explanations.

You did not ask for enough money

Your region has a high default rate

Interpretability

We built our **own explanations framework**, capable of efficiently exploring our risk models decision boundaries, and give useful feedback to the client.

Don't stay more than 5 days in a row in overdraft

Keep your income-expenses ratio at a maximum of 81%

The opportunity

Being **pioneers** in addressing SMEs financing problem is key, not only to help those SMEs but to be aligned with EU regulations on data privacy and aggregation, **PSD2** and **GDPR.**

Payment Services Directive (PSD2)

The opportunity

Trust·u is a great approach to attract **non BBVA customers**.

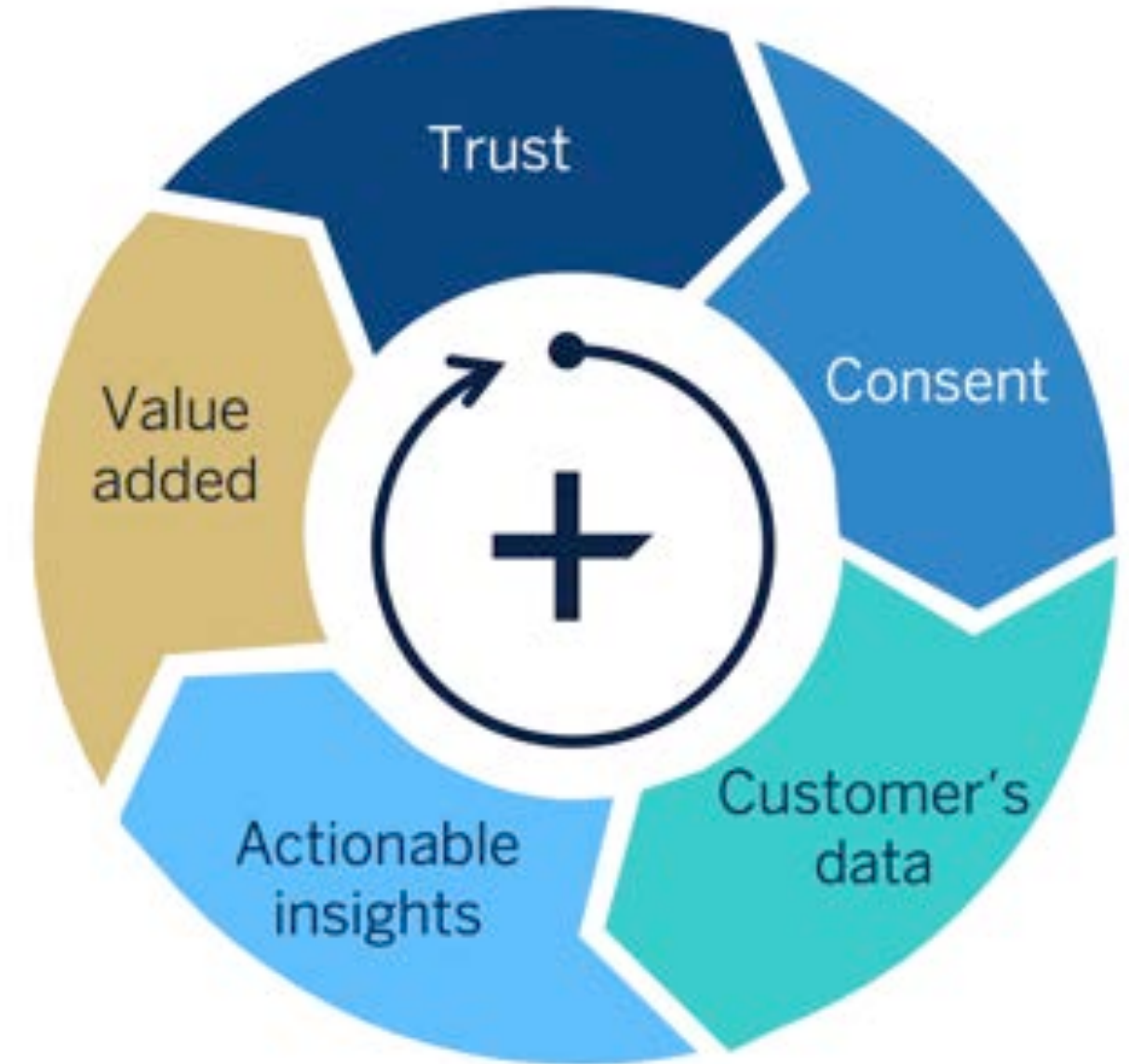## 90%

of our customer base is non BBVA.

The opportunity

Non customer **transactional data**, is an **asset** itself to improve future products, and return data based added value to customers.

Always gathering data from customers under their **consent** and in a **transparent** way.

Millions
of transactions aggregated over alpha stage

Trust Circle

Conclusions

Conclusions

Demand is real

SMEs and freelancers really need new ways to access financing.

As banks we should be willing to accept the challenge, and change our data sources and models to better understand their needs.

Data is key

Understanding how this social networks work is key, as well as learning from transactional data to improve future models and data added value services.

Giving data back to customer in the form of positive feedback empowers them to make better decisions, and increase their chance to success.

Internal ventures foster innovation

Having a place to try out new algorithms and processes in an agile way is key to future improvements with bigger impact to our big customer base, and to disrupt ourselves.

The Team

+ OUR BELOVED BOTS @HODOR & @TRUSTPI

Questions?

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www.trustu.es

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