POSEIDON

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Ministero dell'Economia e delle Finanze

DIGITAL IDENTITY
PRIVACY THREATS AND BUSINESS OPPORTUNITY, WILL THE TECHNOLOGY FIX EVERYTHING?

Horizon 2020 – PoSeID-on Public Launch Event

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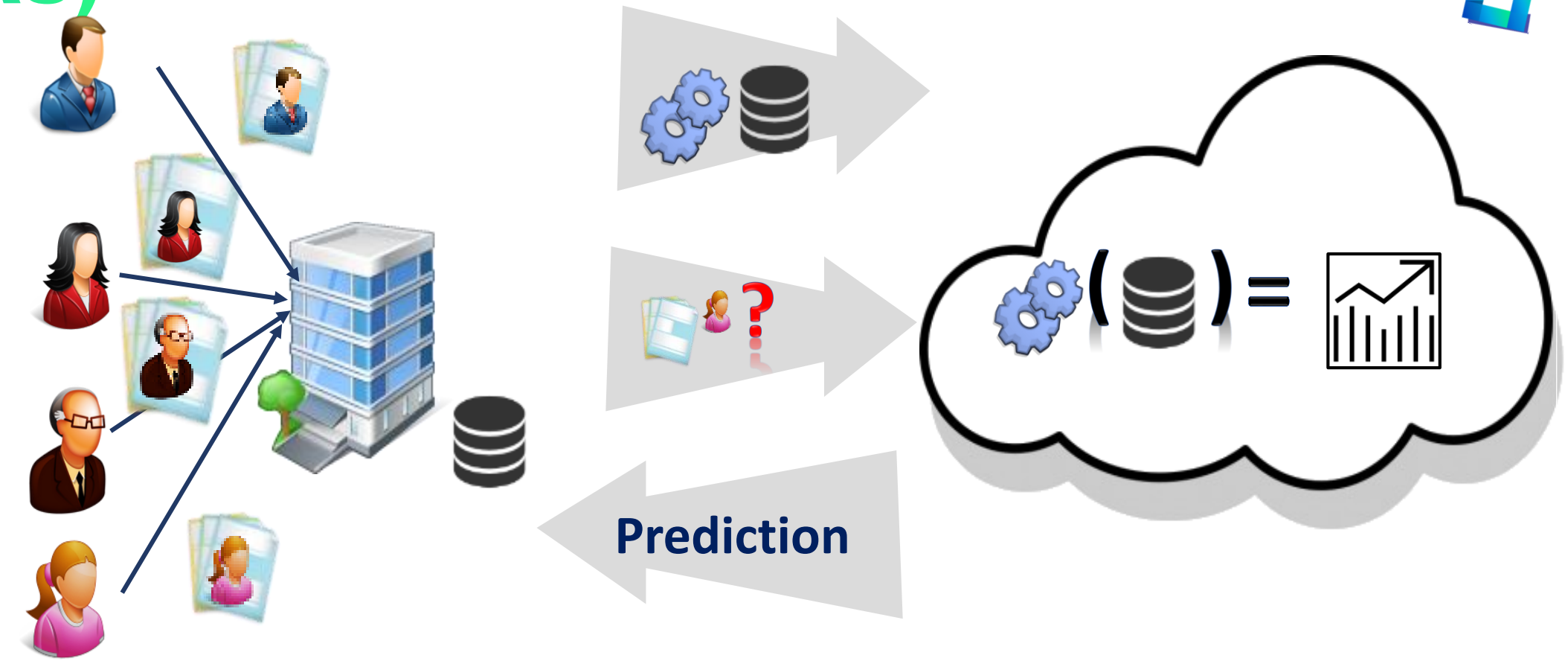
PAPAYA (PlAtform for PrivAcY preserving data Analytics)

Rome, October 25th 2018

Ministero dell'Economia e delle Finanze · BRZ · accenture · tecnalia · Universidade de Coimbra · SOFTEAM · PNO · e-lex · Jibe

DATA ANALYTICS AS A SERVICE (DAAAS)



Sensitive data: health data, web browsing, customer habits, **identity,** etc.

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IDENTITY ANALYTICS - DATA ANALYTICS FOR DIGITAL IDENTITY

"**Identity analytics** [..] provide insights for making **better IAM decisions**. They enable organizations to take a contextual, dynamic, **risk-based approach to IAM**. The organization can bridge the gap between administrative controls and runtime access, add context and risk awareness to access decisions, and **continuously monitor, detect, and remediate malicious behavior**."

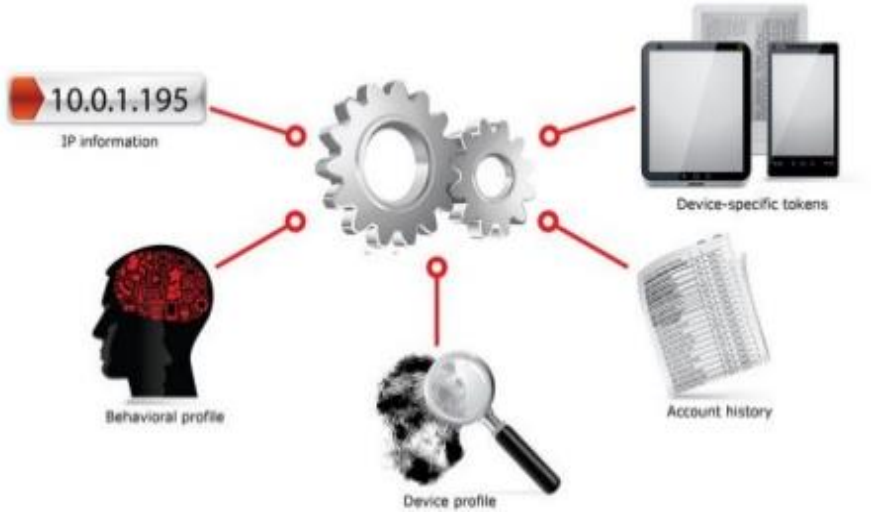
BENEFITS

Data presentation and visualization

Identity correlation and profiling Behavioral and data analysis

Risk scoring, computation and analysis

Monitoring and alerting



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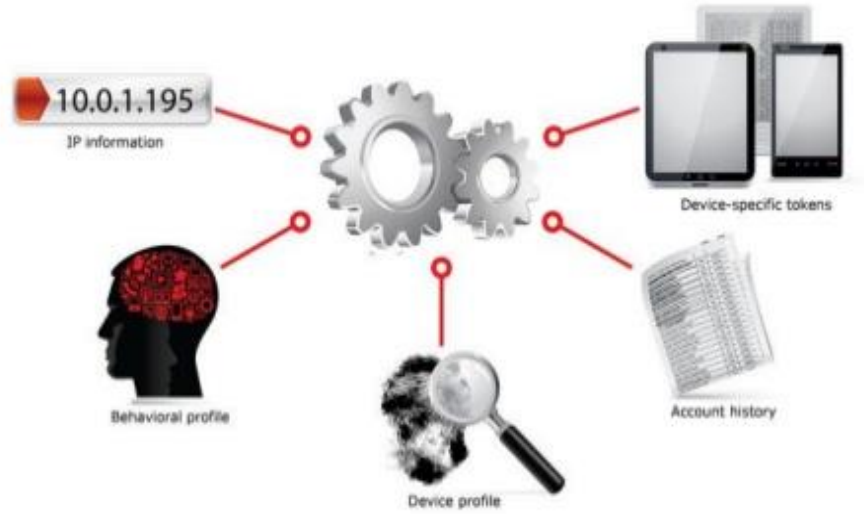

Source: https://www.slideshare.net/wso2.org/2018-iam-checklist-best-practices-trends-and-the-future

BENEFITS

- Risk scoring, computation, and analysis
- Identity correlation and profiling
- Behavioral and data analysis
- Monitoring and alerting
- Data presentation and visualization

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DATA BREACHES IN 2018

Average Cost

Global: 3.86M$, Per record: 148$

Top 3 sectors

Health, Financial, Services

Factors increasing cost

Extensive migration to cloud
Third party involvement
Compliance failures

Factors decreasing cost

Extensive use of encryption
Use of security analytics
Provision of ID protection

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GDPR EFFECT

- **Effective since May 2018**
- **Fines ~ 20 million euros or 4% of turnover**

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PRIVACY REQUIREMENTS

WHAT TO PROTECT?

- Data
- Query
- Model

FROM WHOM TO PROTECT?

- Cloud server
- Querier
- Data collector

HOW TO PROTECT?

- Anonymisation
- Encryption
- User Control

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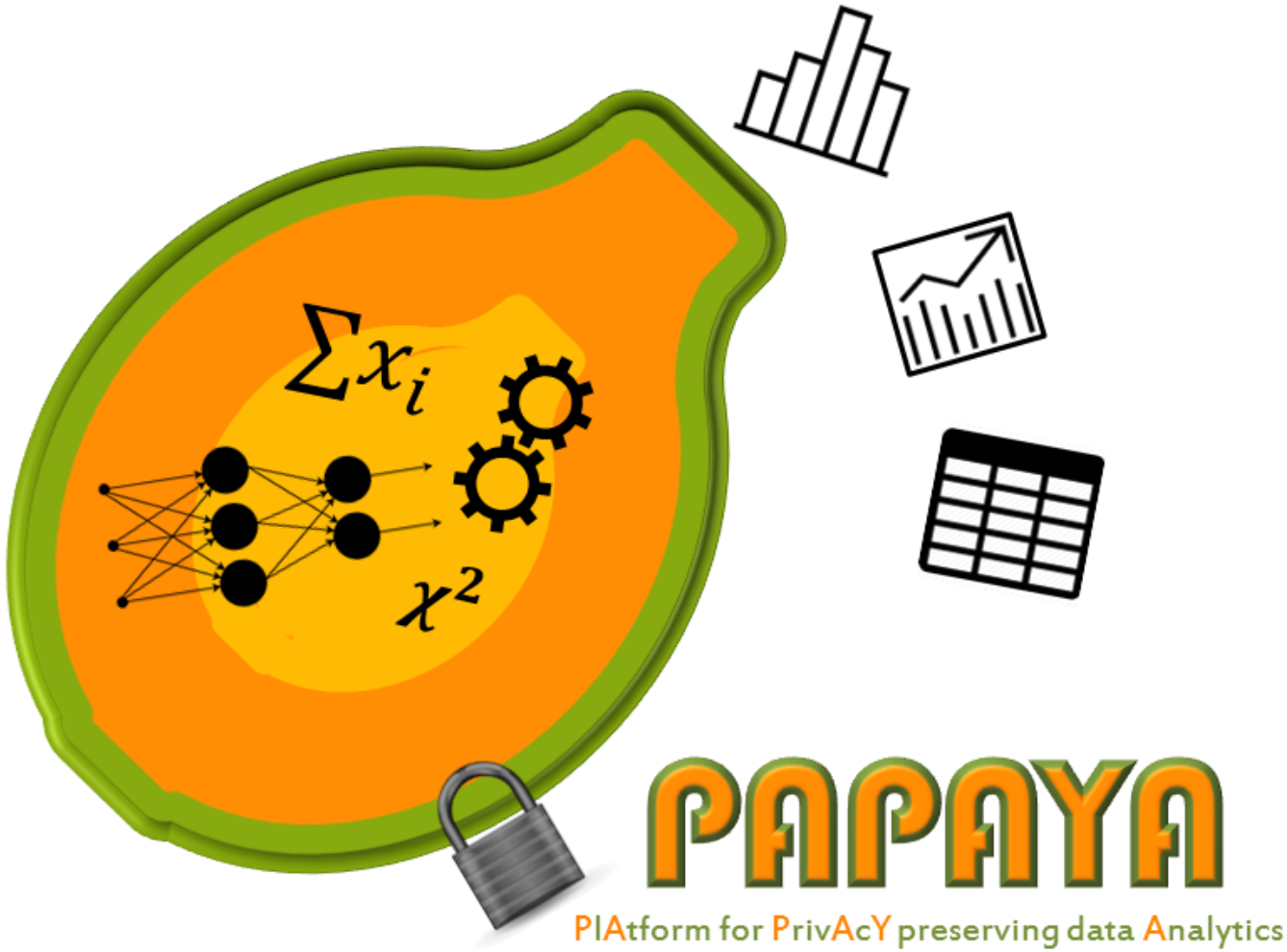
PAPAYA – PLATFORM FOR PRIVACY PRESERVING DATA ANALYTICS



OBJECTIVES

- **Privacy by design**
- **Different settings**
- **Integrated platform**

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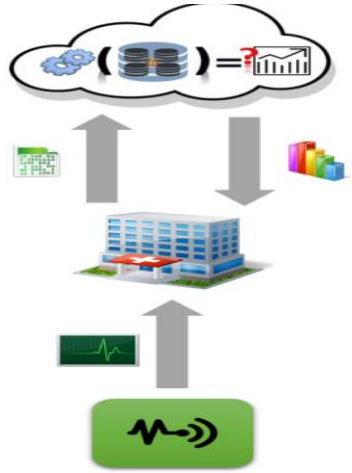
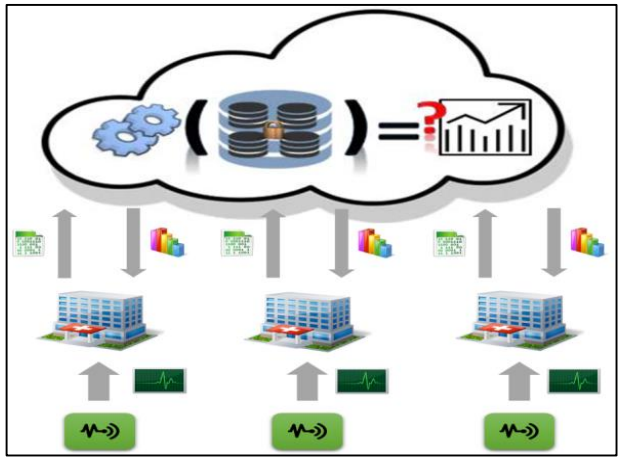
TWO USE CASES – 4 USAGE SCENARIOS

Use Case 1: E- Health

MEDIACLINICS
Wearable Health Applications



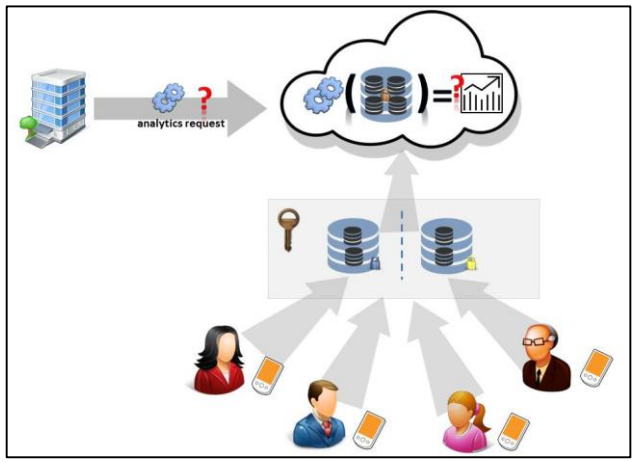


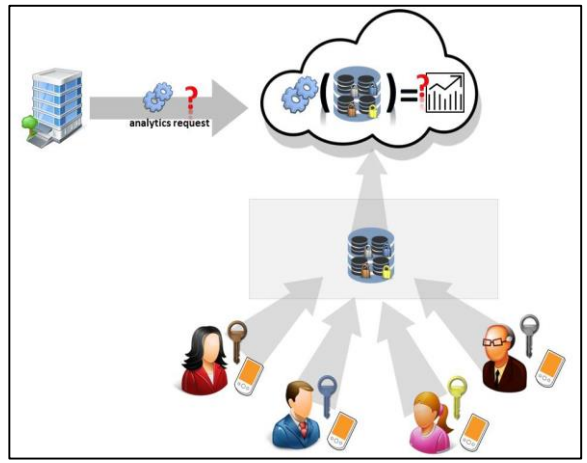
Single Data Owner

Collaborative Data Analytics

Use Case 2: Web & Mobile Data

orange™

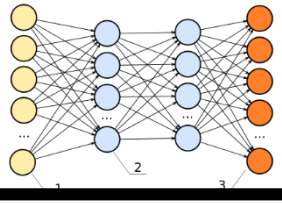




Single Data Owner Third Party Querier

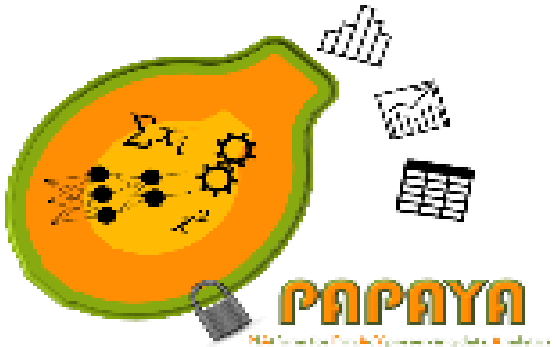
Multiple Data Sources Third Party Querier

PAPAYA PETS MODULE – EXAMPLE



x

$y = NN(x)$



Compute NN(x), without knowing x (Prediction)

Data protection tools

FHE

Functional **E**ncryption (FE)

Secure **M**ultiparty **C**omputation (**SMC**)

TEE

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NEURAL NETWORKS OVER PROTECTED DATA - CHALLENGES

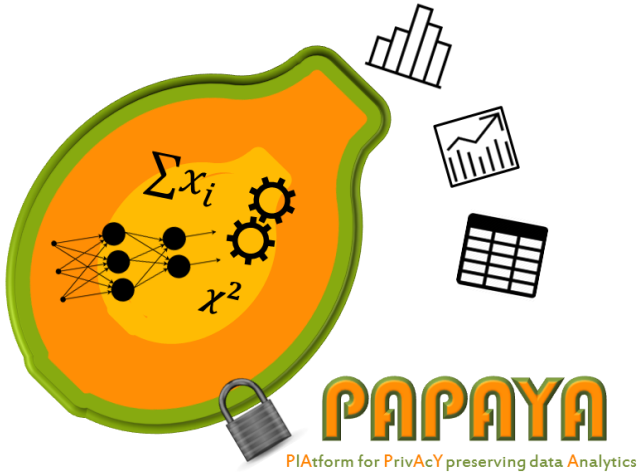
Neural Network Layers

- Convolution, Fully Connected : linear functions
- Activation: sigmoid, tanh
- Pooling layer: softmax

Challenges

- Large data, non linear operations

Arrythmic



PAPAYA Solution with ECG data

Approximation of non linear operations

- Privacy with efficiency
- Privacy with accuracy

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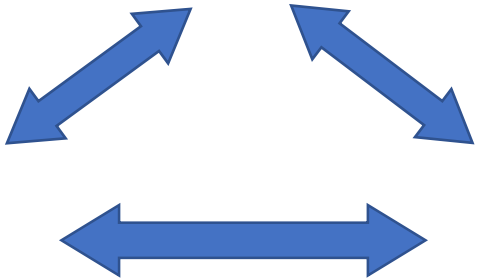
PAPAYA CHALLENGES - SUMMARY

Data analytics

Sum, Average, Neural Networks, Clustering, etc.



Cryptographic Techniques

Homomorphic encryption, Secure Multi-party Computation, Secure data aggregation

Privacy control

What to protect? From whom to protect?

- Dedicated cryptographic constructions & data analytics
- User Dashboard

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THANK YOU
FOR YOUR ATTENTION

and enjoy the conference

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