



PAPAYA Project

eHealth Use Cases

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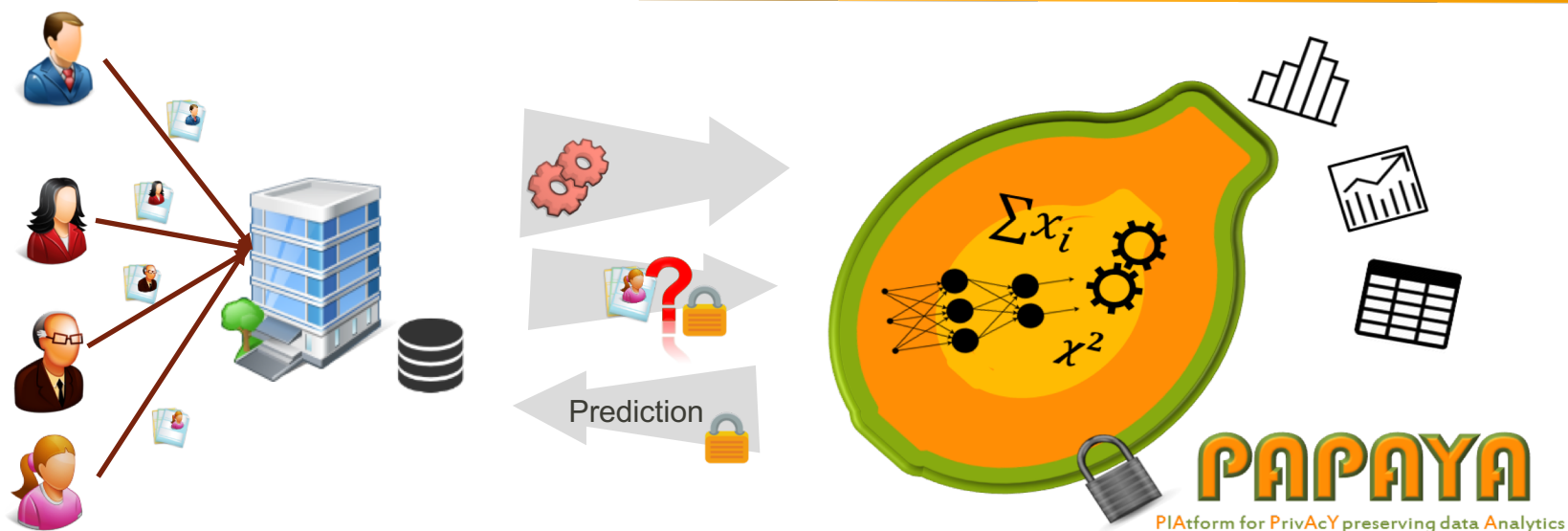


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Cyberwatching.eu eHealth Webinar, 10.12.2020



Data Protection - Requirements

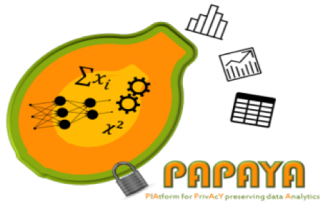


What to protect?

- ⇒ Data
- ⇒ Query
- ⇒ Model

From whom to protect?

- ⇒ Platform
- ⇒ Querier
- ⇒ Data collector



Data Protection - Tools

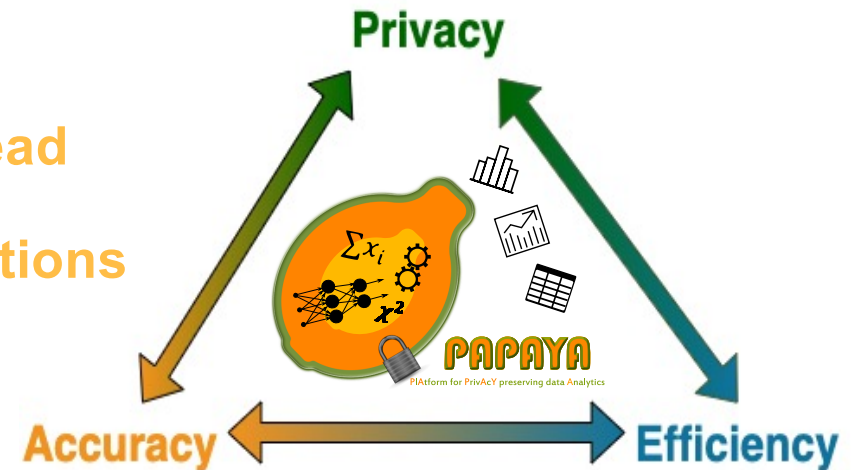
- Traditional PETs → not adapted

- Advanced PETs

- Homomorphic Encryption
- Secure Multiparty Computation
- Differential Privacy
- Functional Encryption




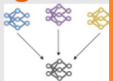

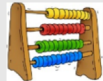
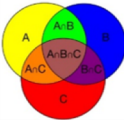
- Additional overhead

- Only some operations are supported



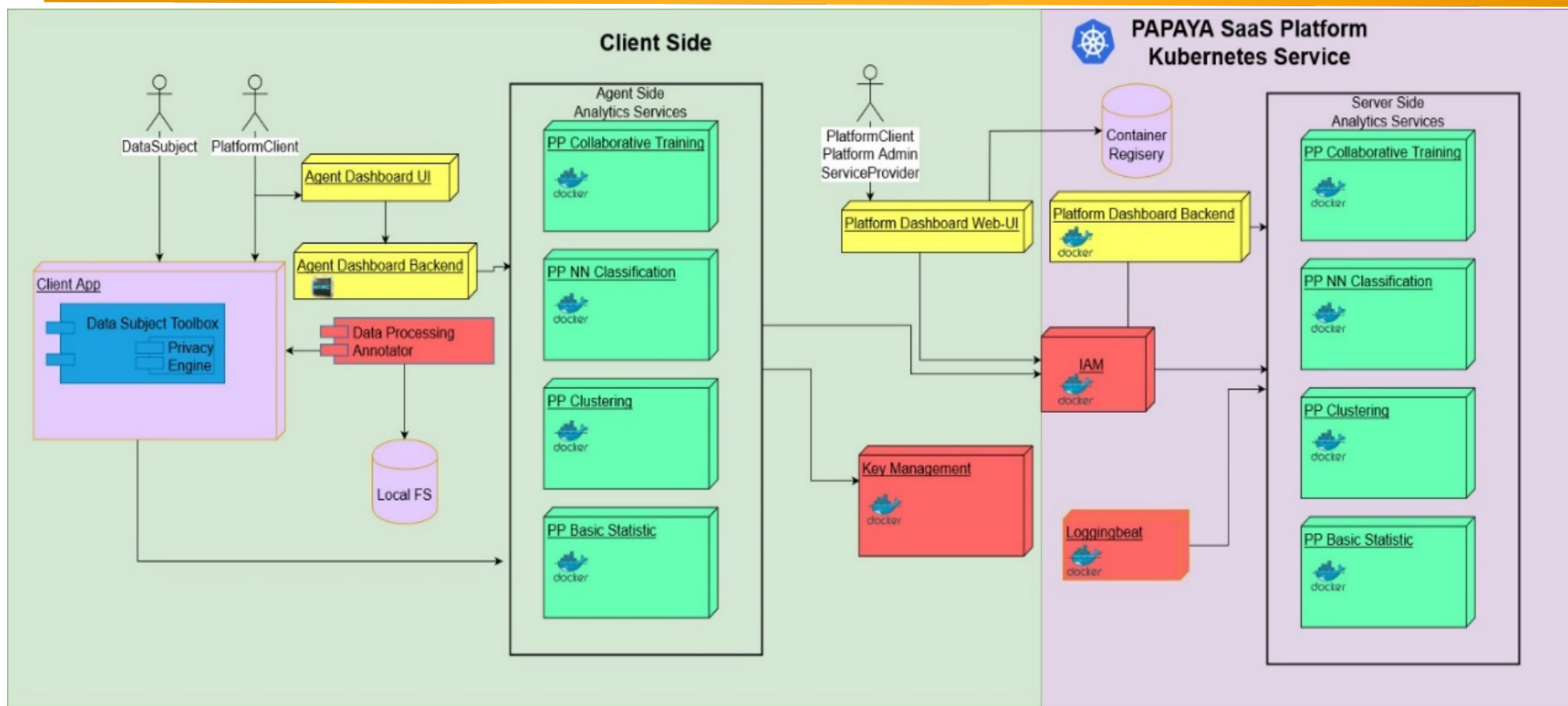


PAPAYA Privacy Preserving Analytics

Use Cases	Arrhythmia Detection	Stress Detection	Mobility Analysis	Mobile Phone Usage	Threat Detection
Data Analytics Techniques					
Neural Network Training & Classification 	MPC & Homomorphic Encryption				Homomorphic Encryption
Collaborative Training 		Differential Privacy			
Trajectory Clustering 			MPC		
Counting & Set Operations  				Encrypted Bloom Filters & Functional Encryption	

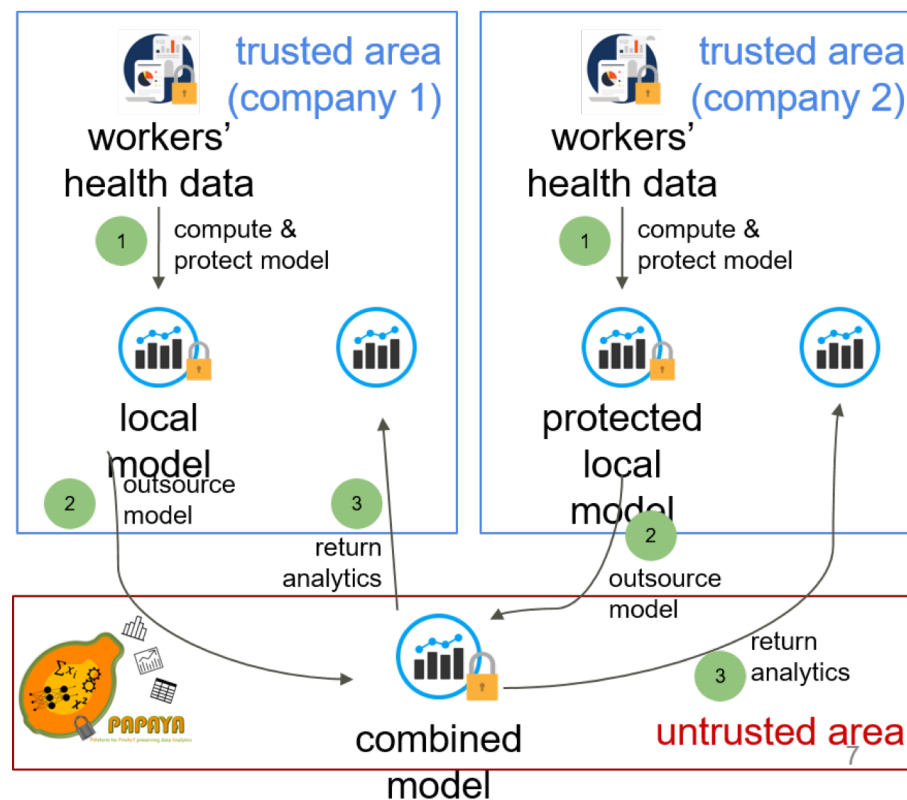


PAPAYA Platform



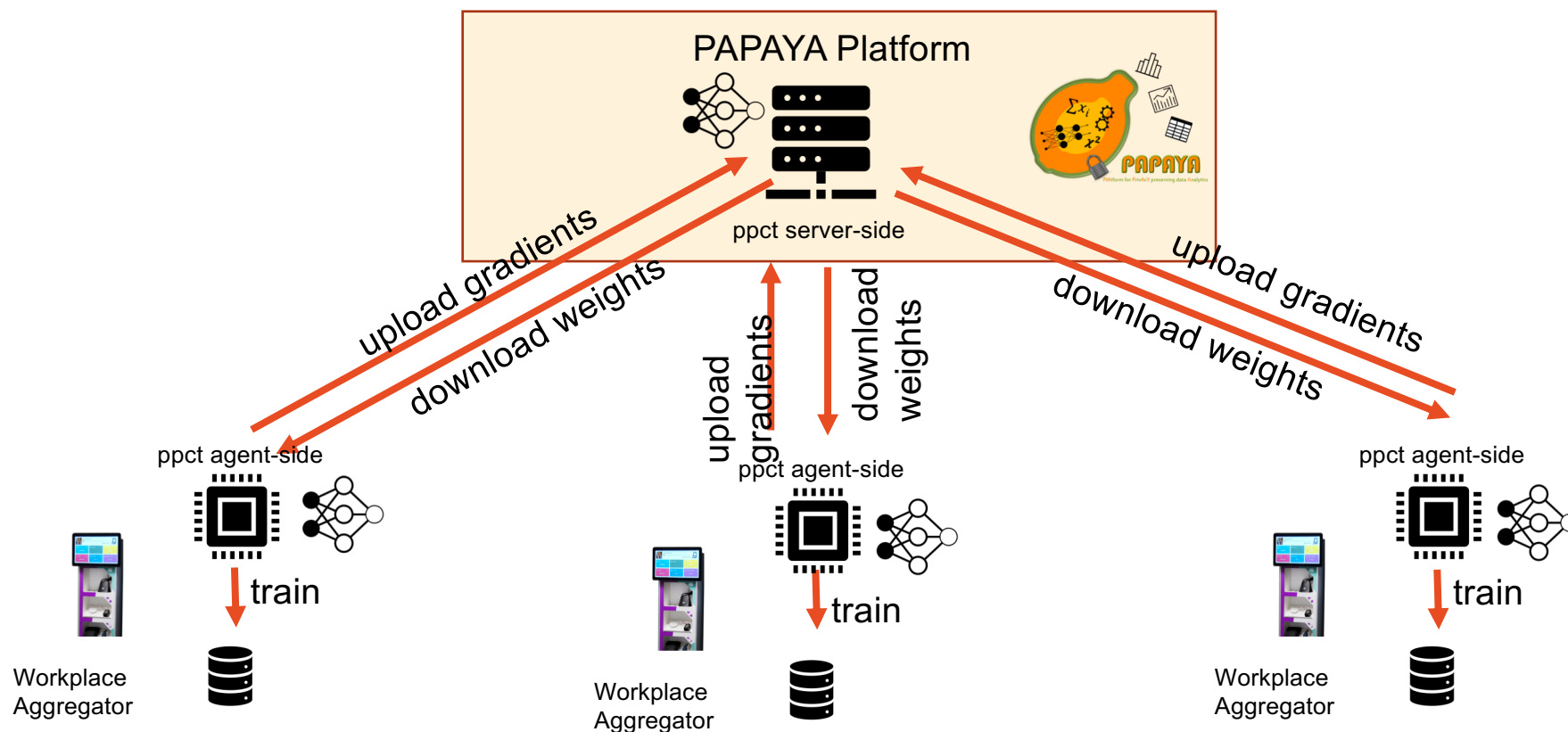


Use Case – Stress Detection





Collaborative training in Machine Learning





Use Case – Arrhythmia Detection

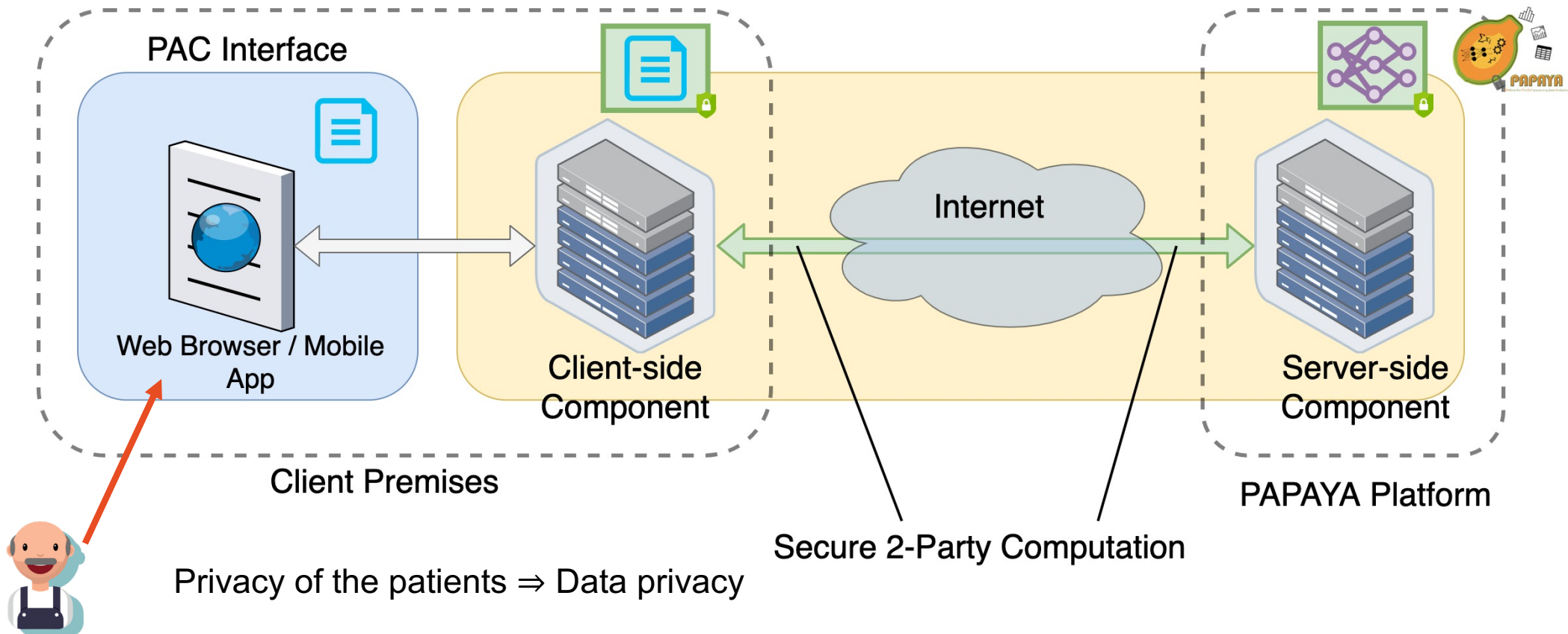
Heart arrhythmia is a set of conditions in which the heartbeat is not regular.

- Several arrhythmia symptoms:
 - heart failure, stroke, etc.
- Arrhythmia detection by monitoring / processing **Electrocardiogram (ECG) signals**.
- Solution: **use of NN classification**





Arrhythmia Classification based on 2PC



Privacy of the patients \Rightarrow Data privacy

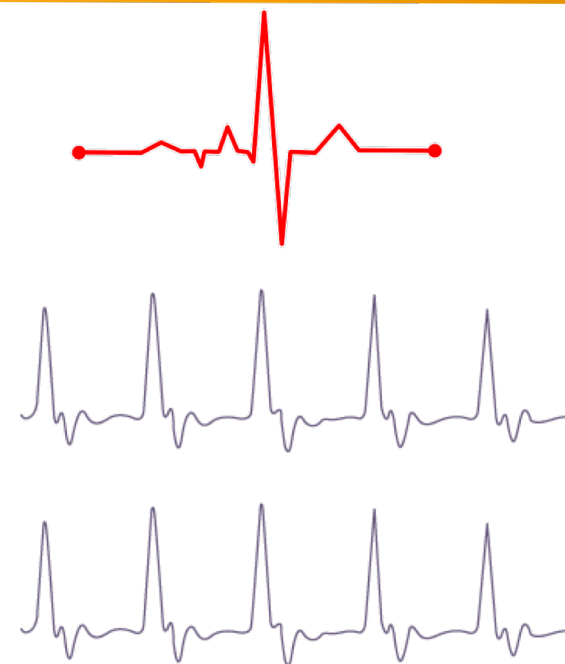
Secrecy of the NN model \Rightarrow Service confidentiality



Demo Scenarios



- Classification of a single heartbeat
- Classification of multiple heartbeats for a single patients
- Classification of multiple heartbeats for multiple patients





Thank you

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