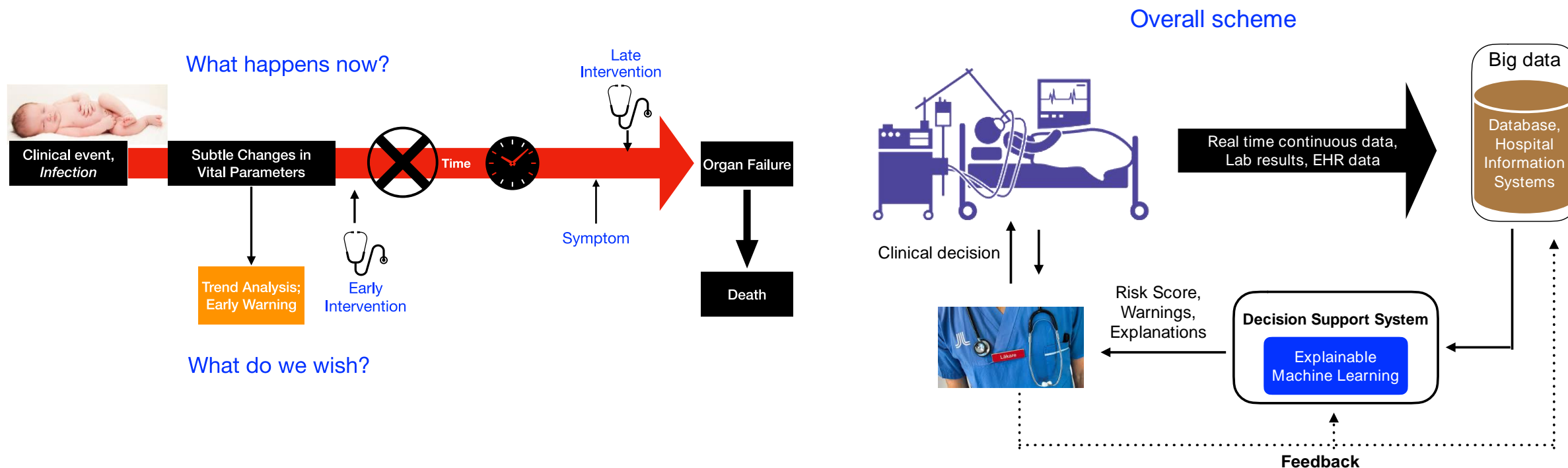# Saikat Chatterjee

Machine Learning, Data Science, Signal, Image Processing

EMERDENSY -
Explainable Machine Learning for Development of Early Warning Systems

- **Vision:** Digitilization of Decision Support System in Critical Health Care
- **Why?** Saving Lives in Hospitals By Early Detection of Adverse Events using AI
- **What?** Explainable AI / Machine Learning for Trust-worthy Early Warning Systems
- **How?** Continuous monitoring of physiological data and other individual patient data

Overall scheme

What happens now?

Late Intervention

Clinical event, *Infection* → Subtle Changes in Vital Parameters → Time → Organ Failure → Death

Trend Analysis; Early Warning

Early Intervention

Symptom

What do we wish?

Real time continuous data, Lab results, EHR data

Big data
Database, Hospital Information Systems

Clinical decision

Risk Score, Warnings, Explanations

Decision Support System
Explainable Machine Learning

Feedback

DANSE -
Data-driven Nonlinear State Estimation of Model-free Process

Kalman Filter –
Needs a state space
model

Ours – No model

Unsupervised Learning

State Estimation

3-D State Trajectories

Noisy measurements

Random instances of a process

Measurement System

Unobserved data

Unlabelled training data

Learning Parameters of RNN / Transformer

True State

Noisy Measurements

Estimated State

Training Phase

Test Phase