



## SECOND TECH TALK

### Challenges and opportunities of big data for healthcare

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**WOMEN IN DATA SCIENCE**  
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Maastricht University

# Challenges and opportunities of big data for healthcare

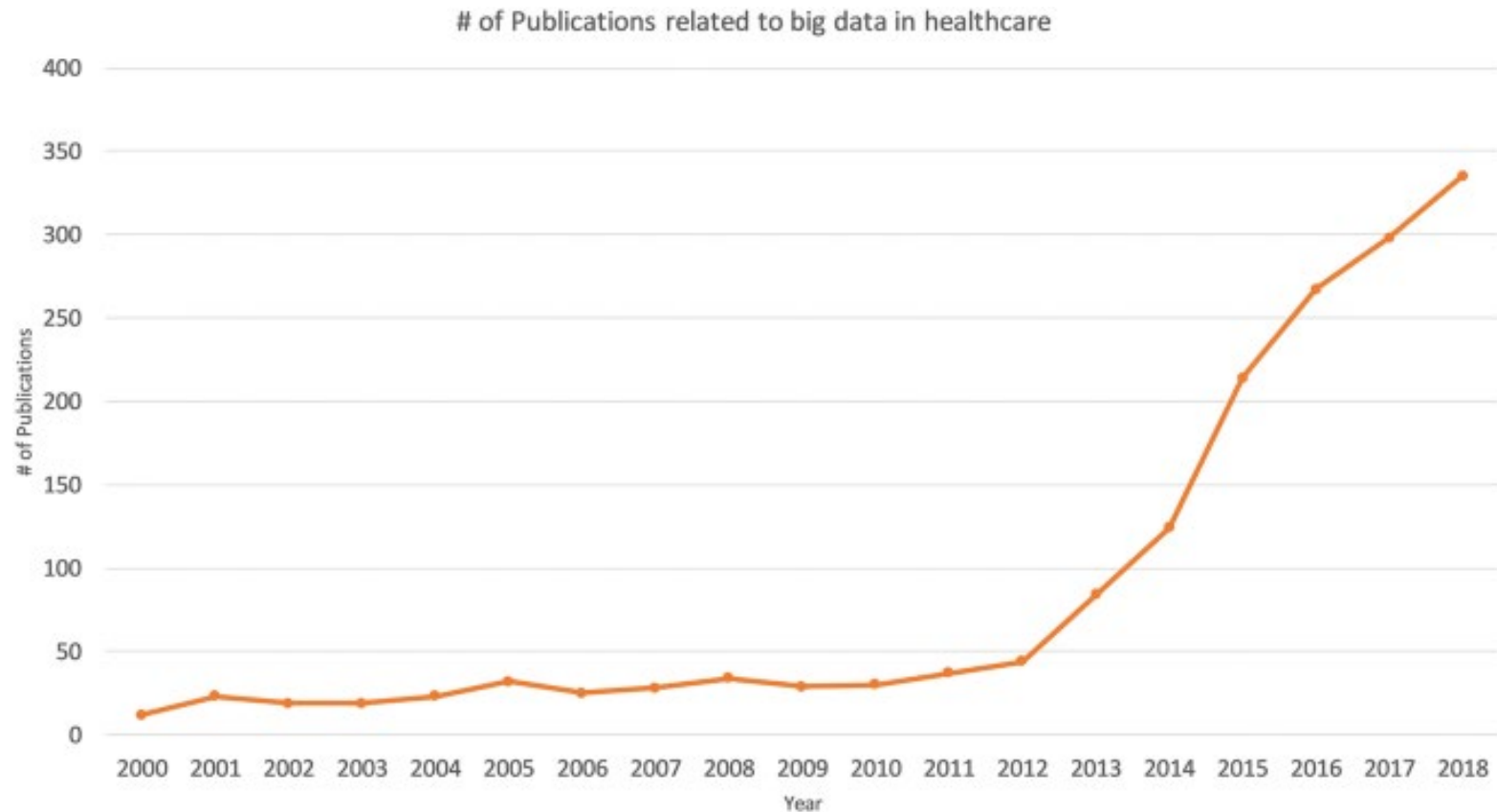
Fadila Zerka



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#WiDSMaastricht2023

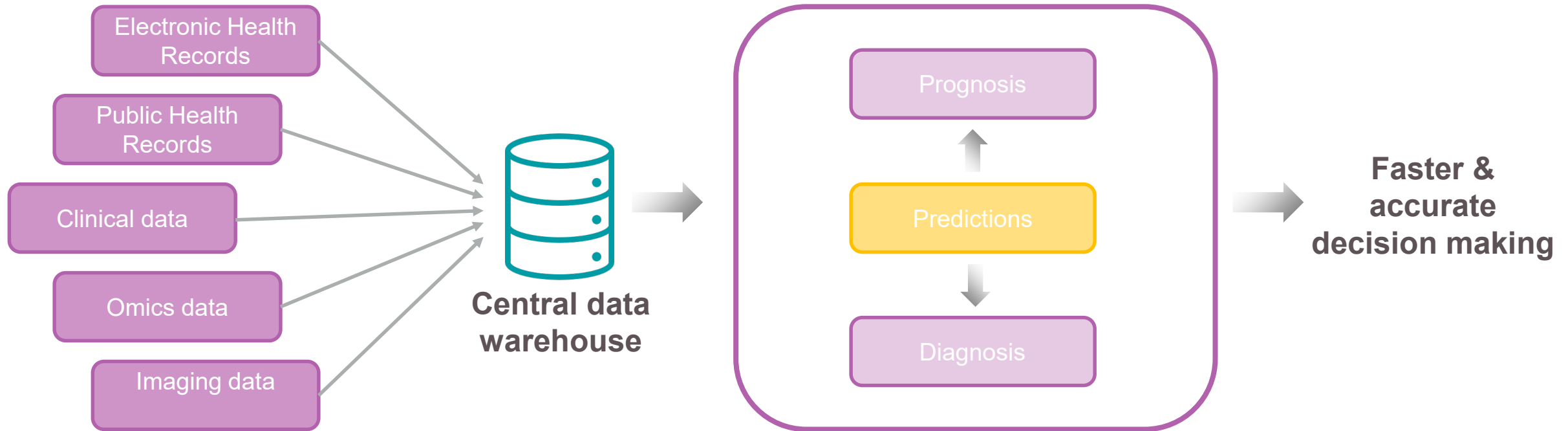
# Big data in healthcare



<https://link.springer.com/article/10.1186/s40537-019-0217-0>



# Convectional data access



# Data privacy concerns



## Privacy regulations

- National data protection
- International (GDPR)



## Ethics

- Informed consent
- Cost
- Benefit

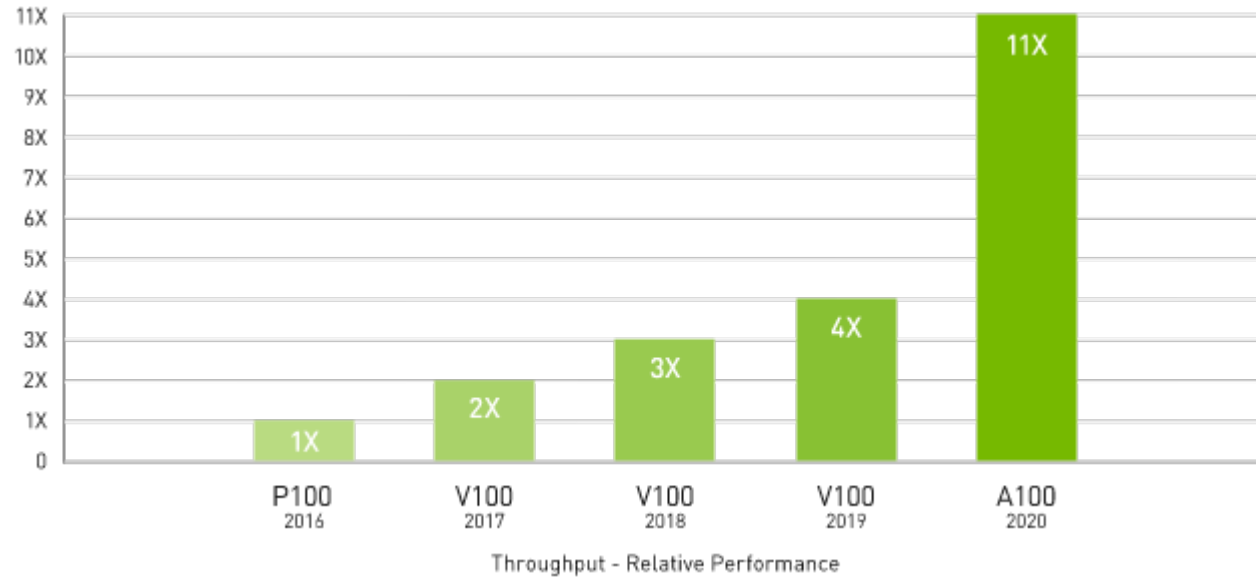


## Trust

- Organization wise
- Technology wise



# Distributed learning



<https://www.nvidia.com/en-us/data-center/a100/>

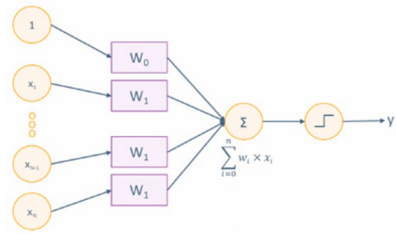
- Not enough space
- Not enough memory

➔ Data parallelization

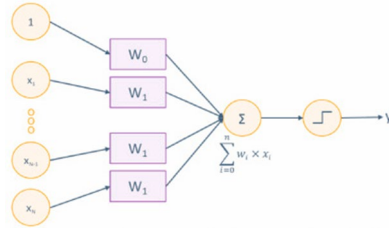


# Distributed learning in healthcare

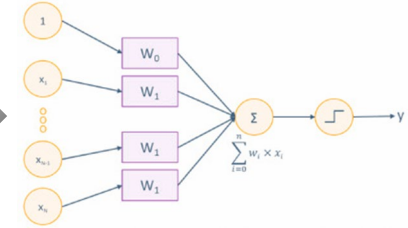
Analyze



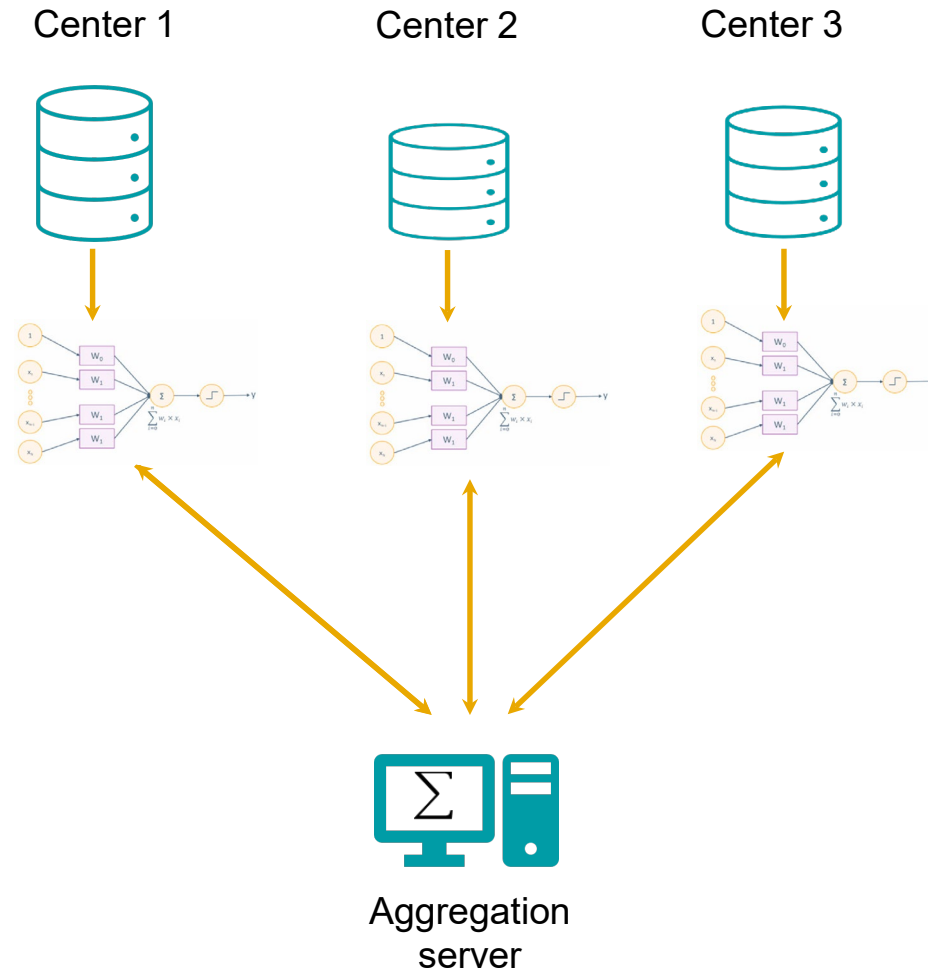
Analyze



Analyze

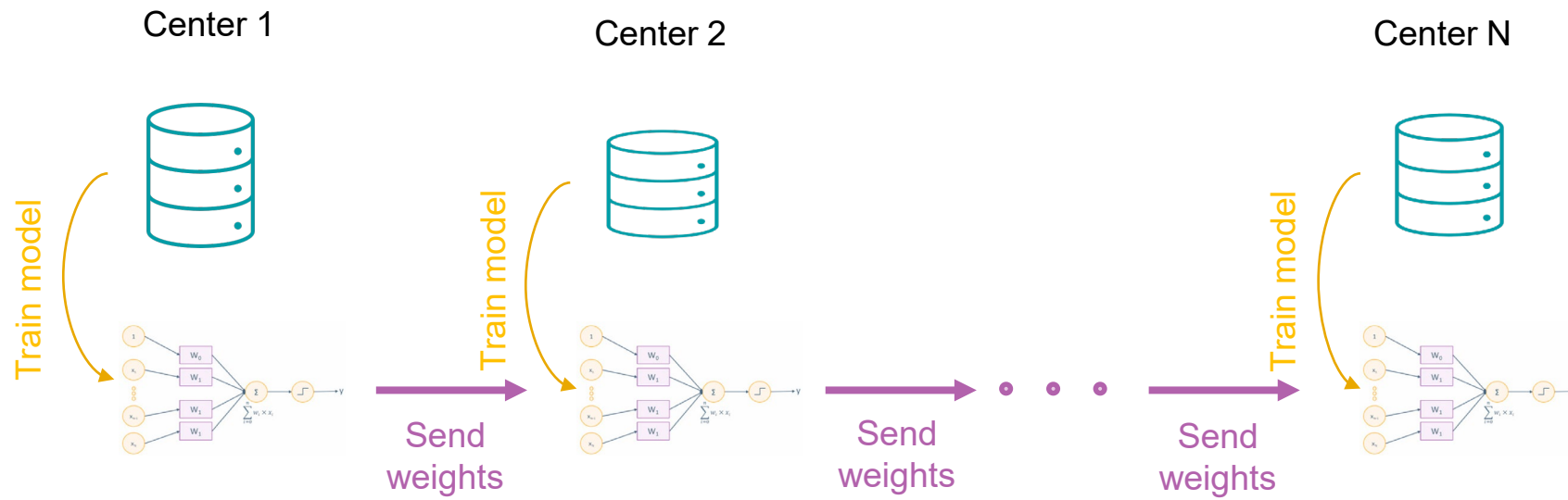


# Federated learning





# Sequential learning

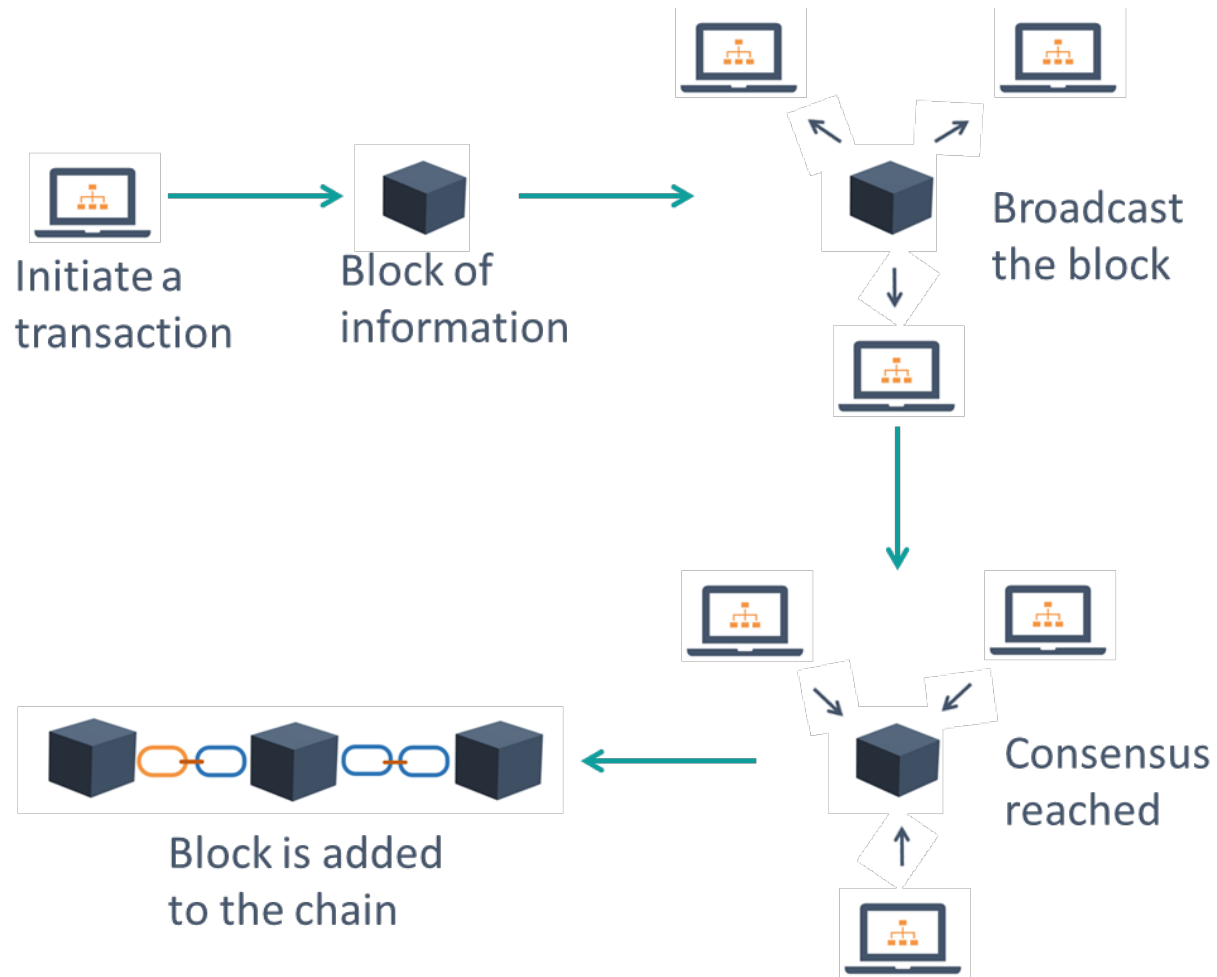


# Challenges of distributed learning

- Trust
- Traceability of the data
- Lack of transparency



# Blockchain for distributed learning

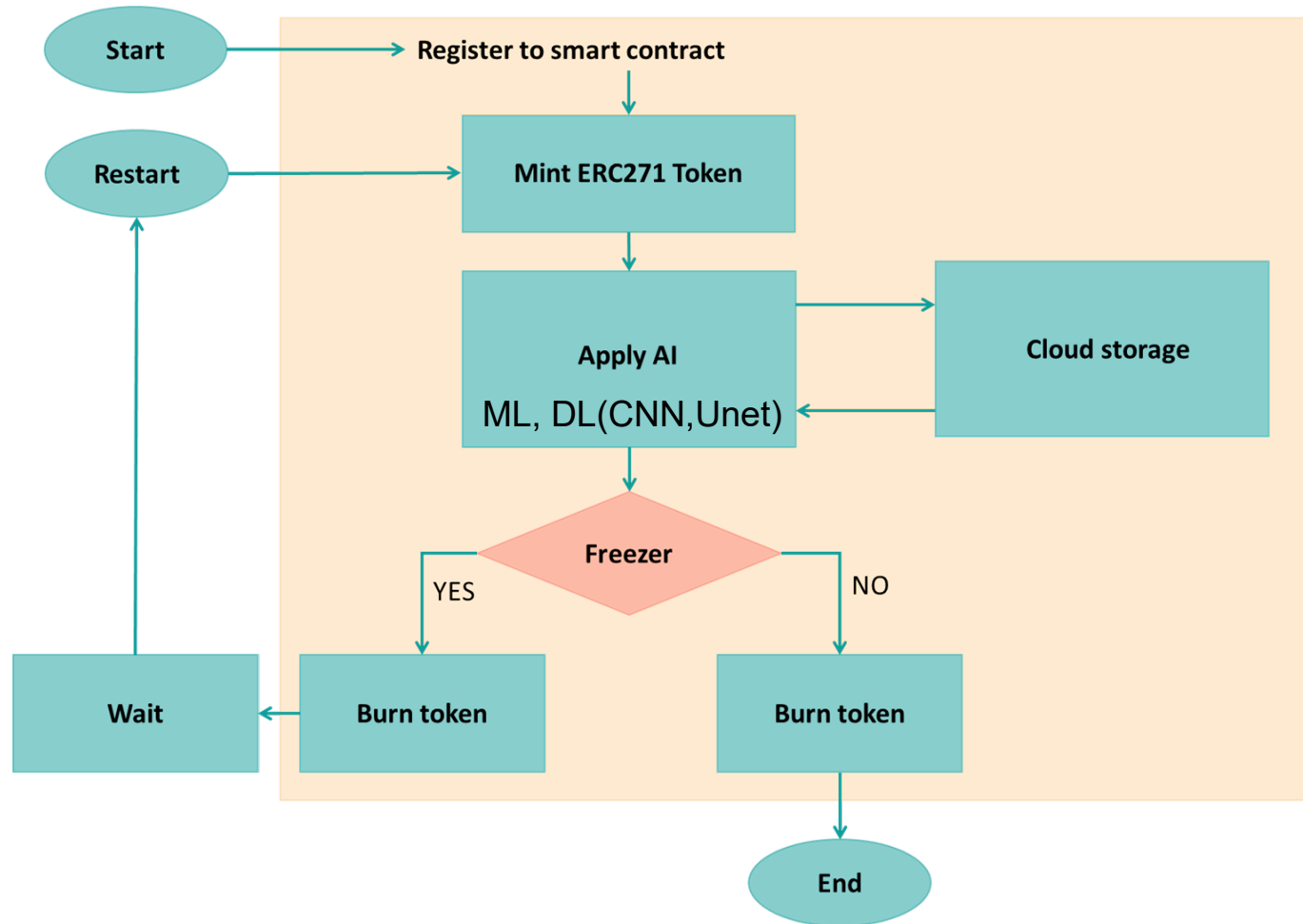


Blockchain is immutable by design & enforces:

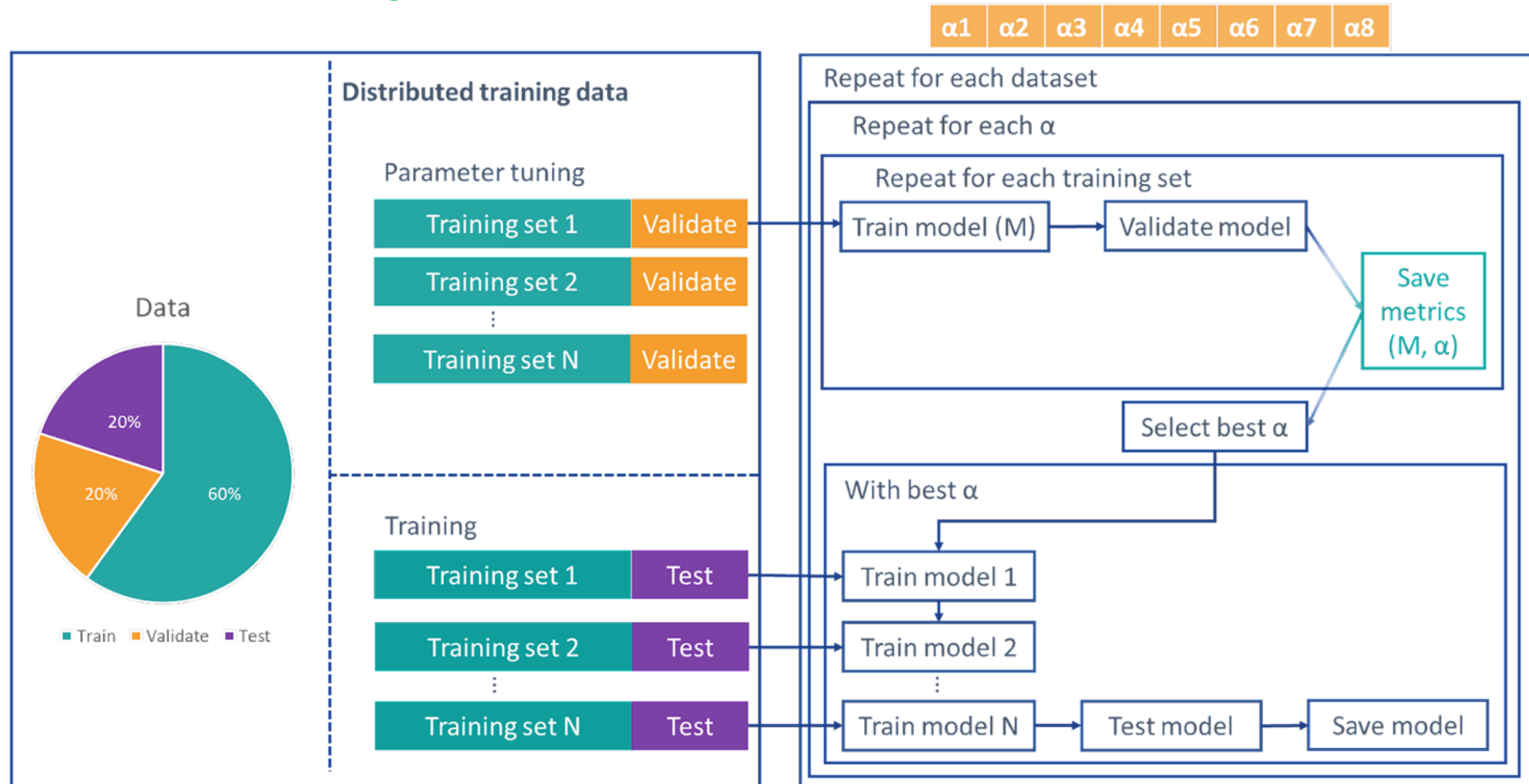
- Trust,
- Traceability,
- Security



# Blockchain for distributed learning (GDis triM)

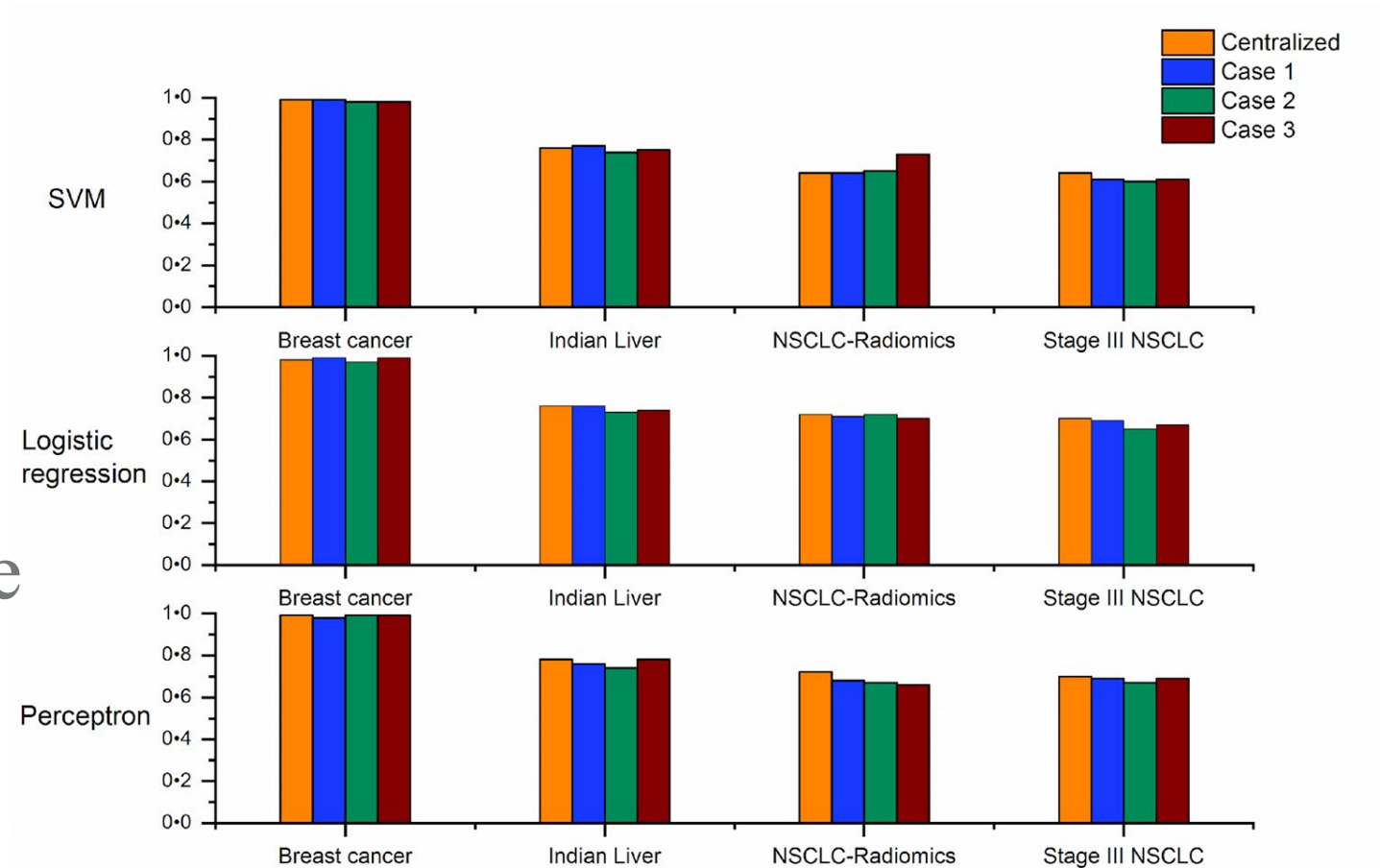


# Distributed learning for small data sets

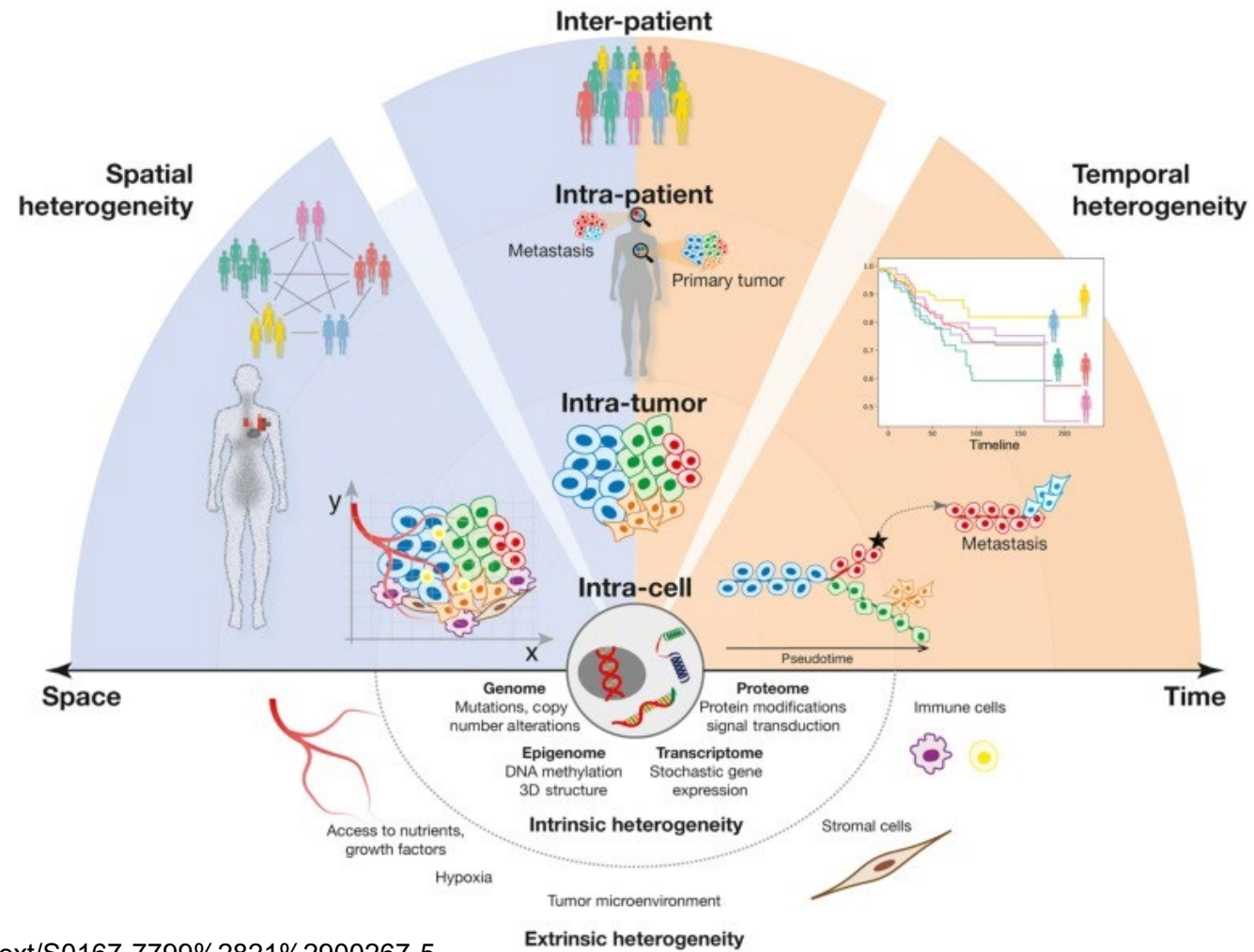


➤ Equivalent results

➤ No statistically significant difference



# Data heterogeneity



<https://www.cell.com/trends/biotechnology/fulltext/S0167-7799%2821%2900267-5>

Trends in Biotechnology



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# Integration in clinics

- Port opening
  - Connect the DL computer to guest network
  - Collaborate with research centers
- Someone need to push the start button





# What is next?

- Bring distributed learning closer to the clinics
  - Implement new solutions that do not require port openings
  - Increase transparency & traceability
- Integration with clinical systems
  - Update model with new data



Thank  
you

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