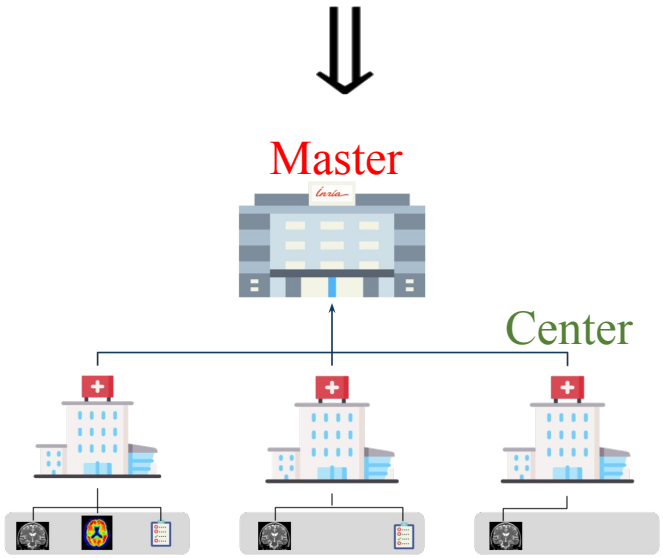
Federated Generative Modeling of Variability in Heterogeneous Multi-View Datasets

Irene BALELLI, Santiago SILVA, Marco LORENZI - Inria Sophia Antipolis - Méditeranée, Epione Research Project

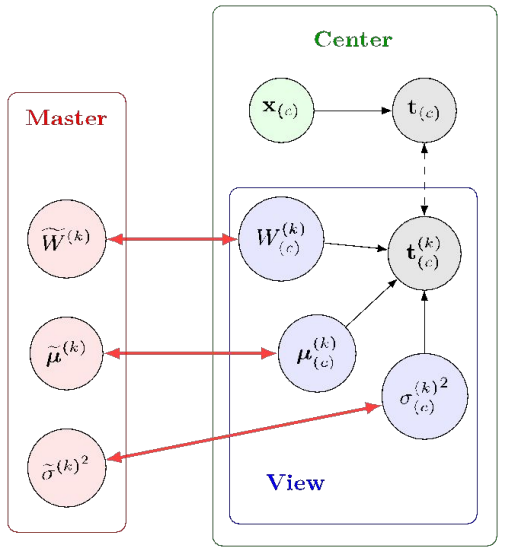
Multicentric biomedical studies faces 2 main challenges:

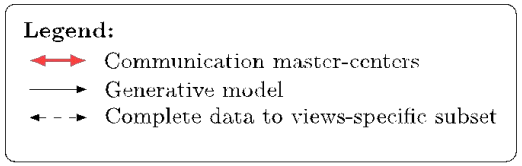
1. Heterogeneous distribution of datasets across centers
2. Complex multi-view high dimensional data



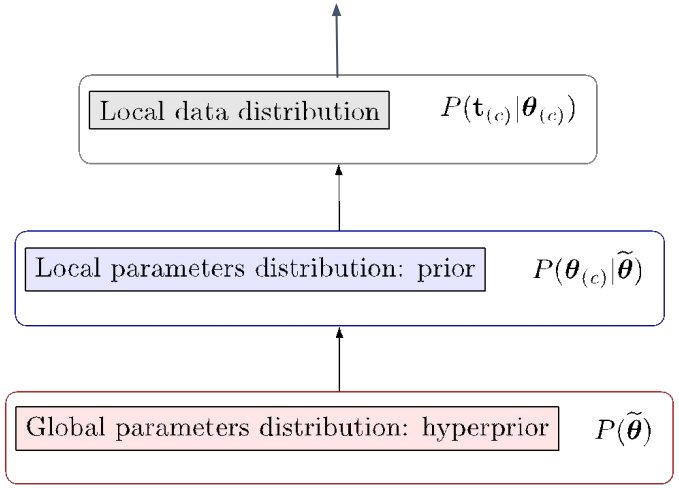
(a) Development of a novel **Federated Learning** paradigm

(b) For dimensionality reduction of **multi-view data**

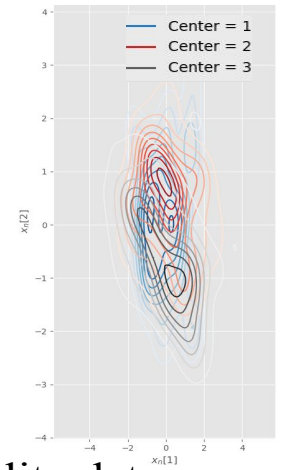
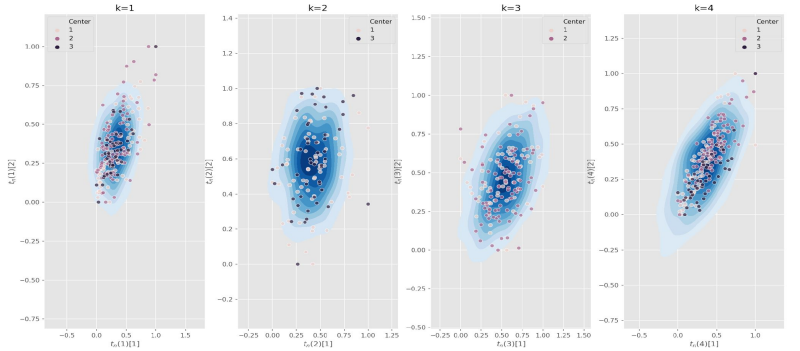




$$\mathbf{t}_{(c),n}^{(k)} = W_{(c)}^{(k)} \mathbf{x}_{(c),n} + \boldsymbol{\mu}_{(c)}^{(k)} + \boldsymbol{\varepsilon}_{(c)}^{(k)}$$



(c) Based on a hierarchical **generative model**



- High-quality data **reconstruction** even in highly non-iid settings
- **Interpretability** of data **variability**