

# Digital Twins

## from concept to reality

According to IBM, “*A digital twin is a virtual representation of an object or system that spans its lifecycle, is updated from real-time data, and uses simulation, machine learning and reasoning to help decision-making.*”

Innovation *accelerating* **open-source software platform** that

- ▶ produces time-lapse data-consistent CO<sub>2</sub> *predictions*
- ▶ makes *data-informed predictions* on future CO<sub>2</sub> plume behavior
- ▶ is *uncertainty aware* & allows for scenario testing & control
- ▶ informs on how much & where to *collect data*, thus *reducing* CCS monitoring costs

Møyner, O., et.al. 2023. Sintefmath/Jutul.jl: V0.2.5 (version v0.2.5). Zenodo. <https://doi.org/10.5281/zenodo.7775759>

Luporini, F., et. al. 2022. devitocodes/devito: v4.6.2 (v4.6.2). Zenodo. <https://doi.org/10.5281/zenodo.6108644>

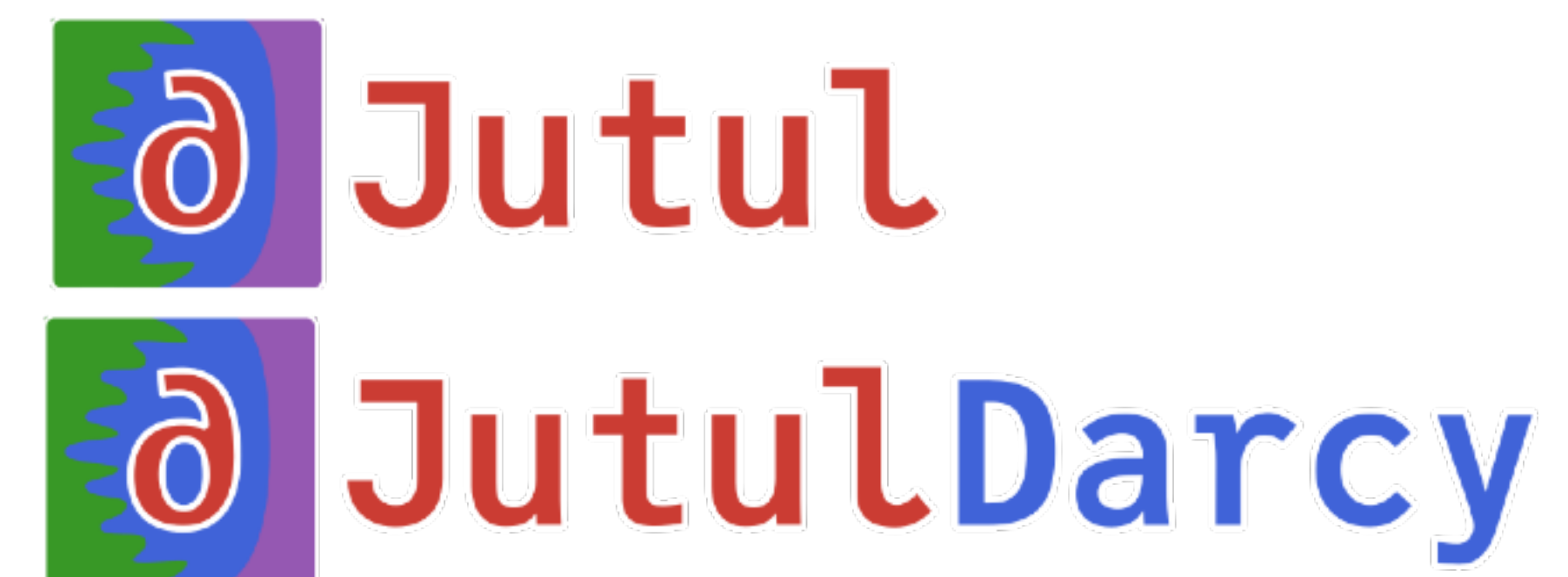
Witte, P., et.al. 2020. slimgroup/JUDI.jl: DOI release (v2.0.2). Zenodo. <https://doi.org/10.5281/zenodo.3878711>

Witte, P., et.al. 2021. slimgroup/InvertibleNetworks.jl: v2.1.0 (v2.1.0). Zenodo. <https://doi.org/10.5281/zenodo.5761654>

# Open source scalable 2/3D code

## Flow simulations:

- ▶ Jutul.jl
- ▶ JutulDarcy.jl



## Wave simulations & imaging:

- ▶ Devito
- ▶ JUDI.jl



## Machine learning:

- ▶ InvertibleNetworks.jl
- ▶ Flux.jl

