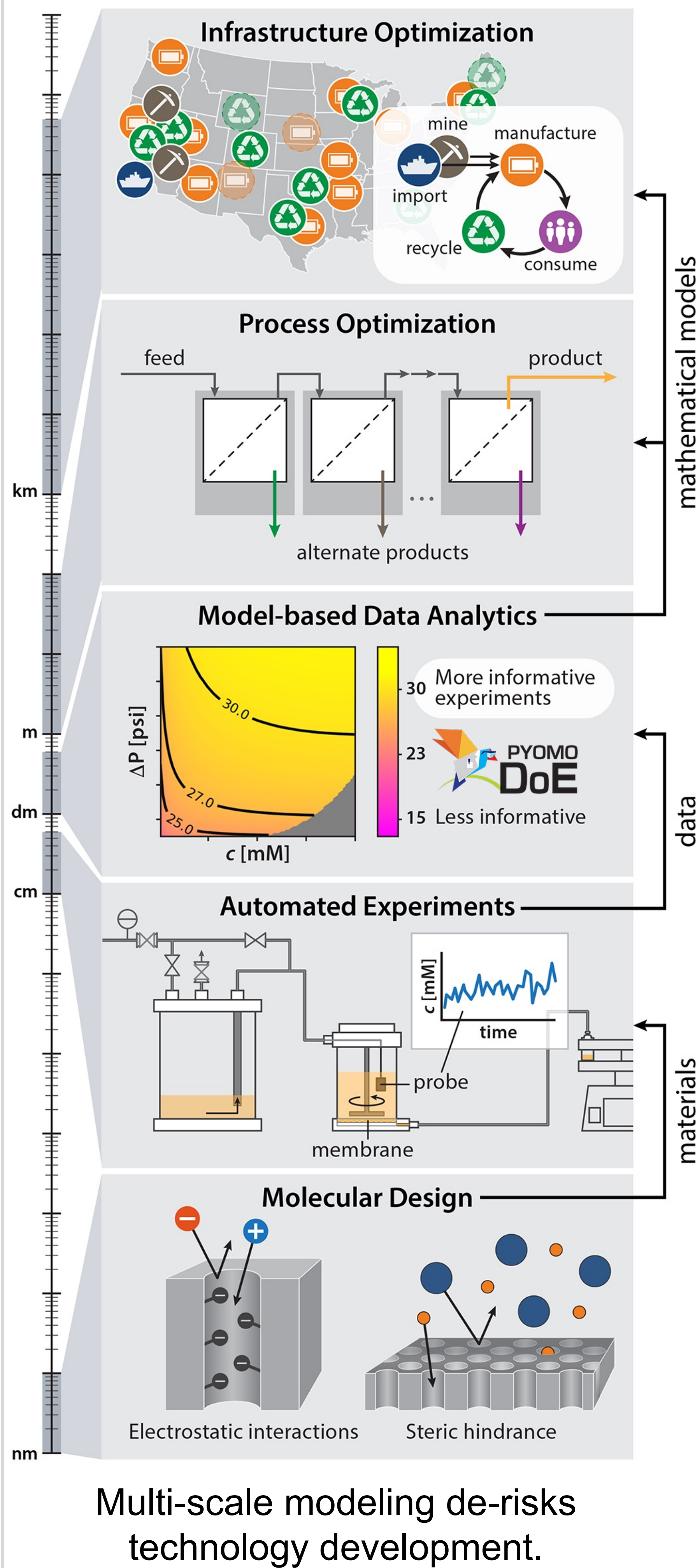
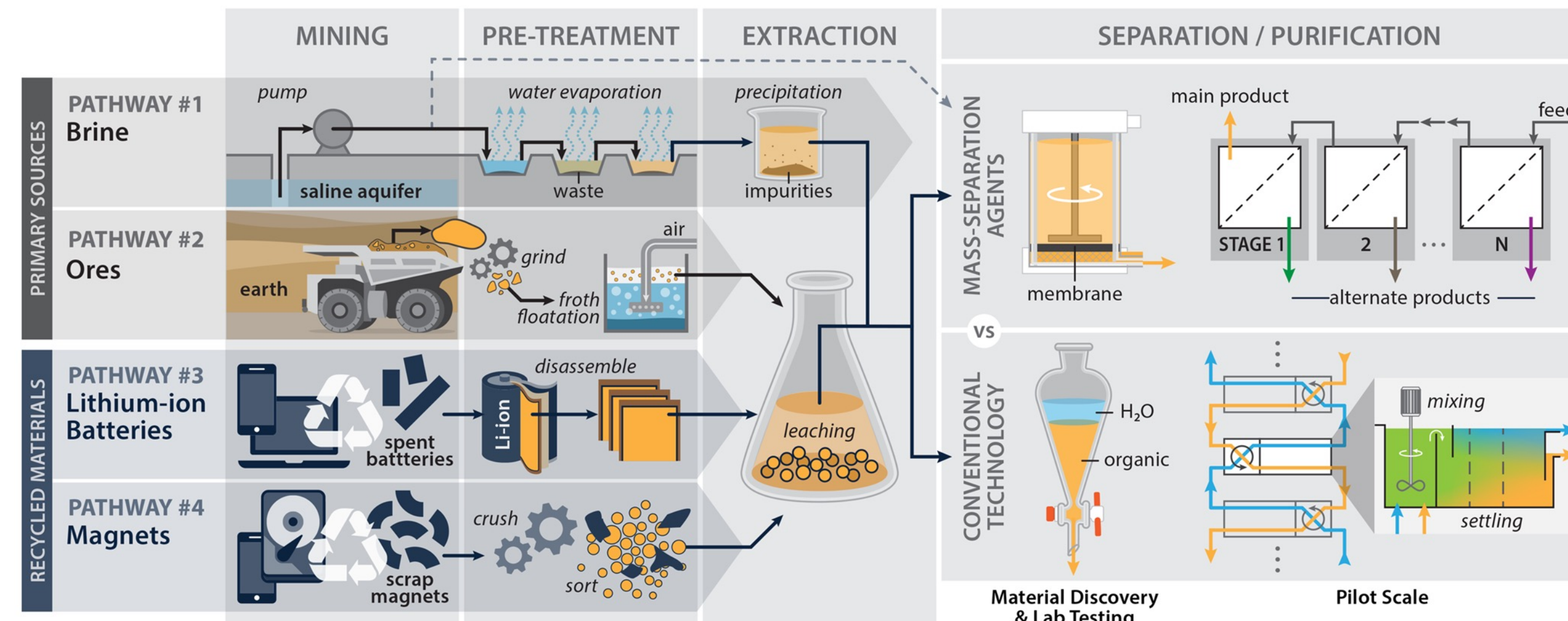


Critical mineral processing is a multi-scale problem^[1]

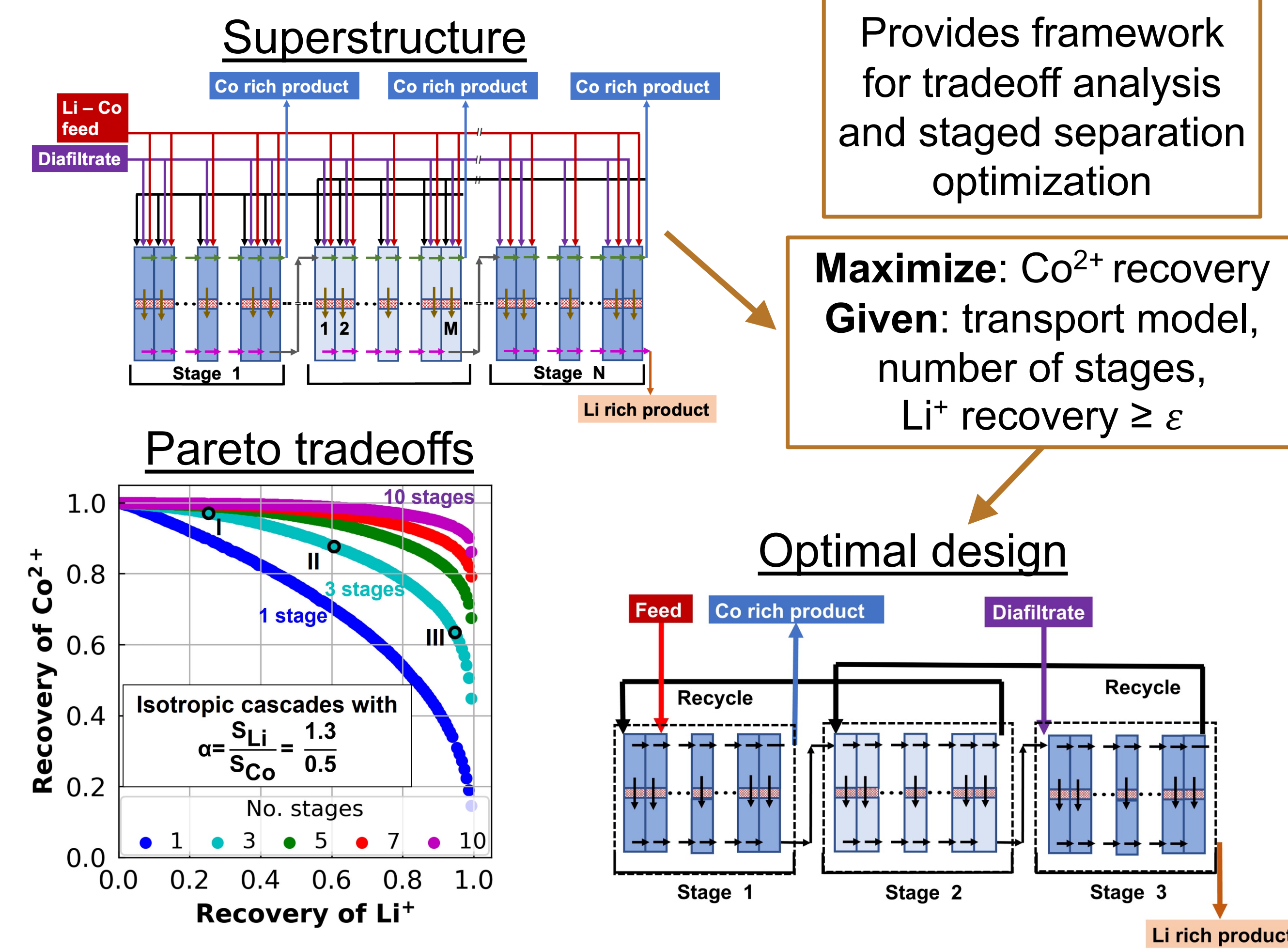


Membranes offer process intensification opportunities within critical mineral processing^[1]



- ✓ Reduce chemical reagent requirements, process footprint, and energy costs
- ✓ Increase speed and flexibility of systems
- ✓ Enable staged separations with modular design

Example: Superstructure optimization of diafiltration cascades to recycle spent lithium-ion batteries^[2]

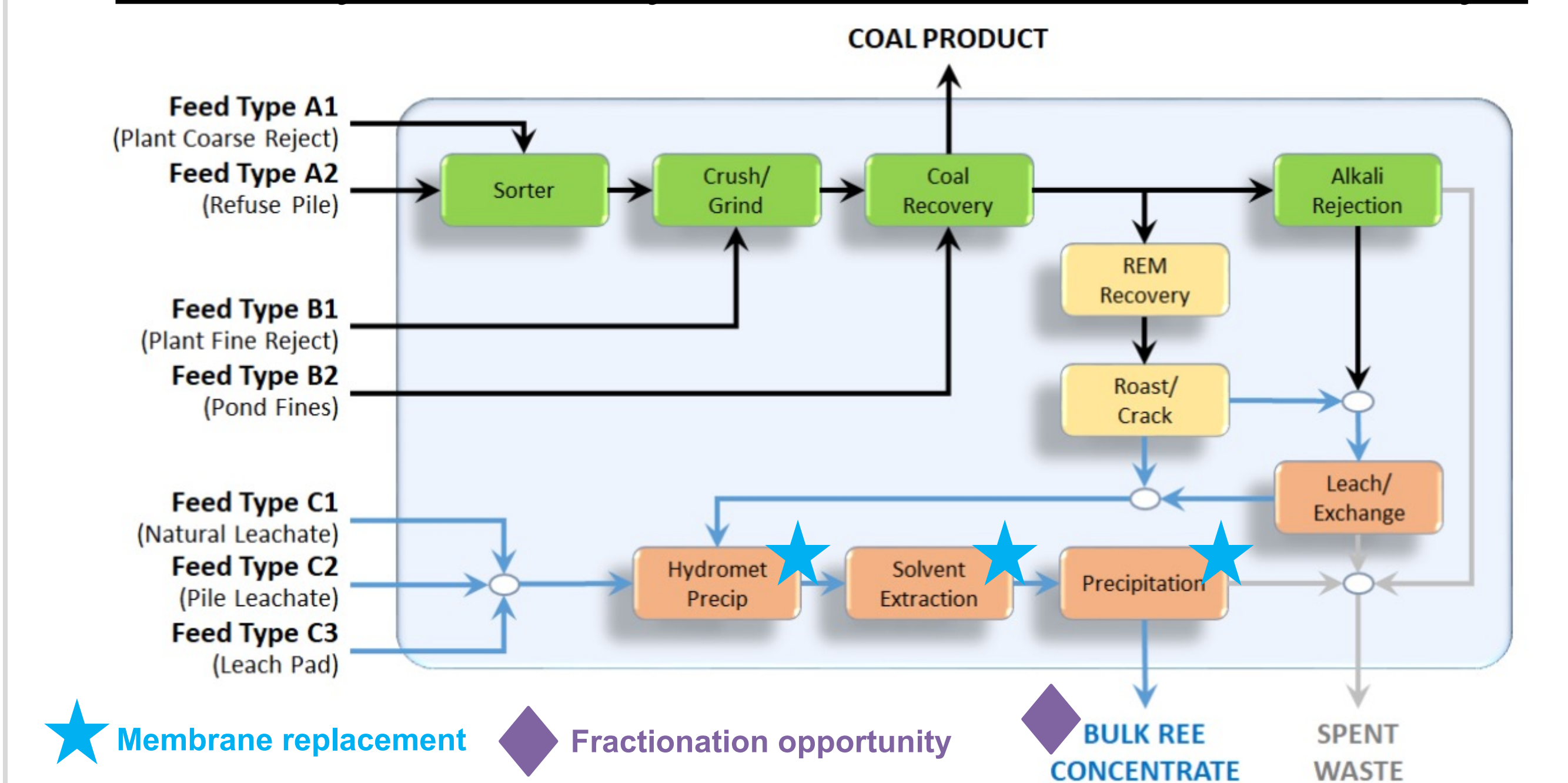


PrOMMiS enables faster process development, optimization, and scale-up

How do we...

- incorporate new feed streams into the existing infrastructure to promote a **circular economy**?
- optimize bespoke processes within **supply chains**?
- address **uncertainty** across scales?
- account for **variability** in sources and process performance?
- embed the optimized membranes within a **larger process**?

University of Kentucky Pilot Process for Coal Recovery^[3]



Acknowledgements

This effort was funded by the U.S. Department of Energy's Process Optimization and Modeling for Minerals Sustainability (PrOMMiS) Initiative, supported by the Office of Fossil Energy and Carbon Management's Office of Resource Sustainability. For more information, please reach out to Thomas Tarka, PrOMMiS Technical Director (Thomas.Tarka@netl.doe.gov)

Contact: Alexander W. Dowling, adowling@nd.edu

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