



— BUREAU OF —
RECLAMATION

More Water Less Concentrate

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MSSC 2024 Annual Salinity Summit

Spurring Less Concentrate Innovations

- Grant based R&D Efforts
- Open Innovation
 - background – what is it
 - Examples
 - MWLC case study
 - Novel Technology
 - Needs
 - Problem statement development
 - Partnerships
 - SMEs
 - Etc.



WATER
PRIZE COMPETITION CENTER

Hundreds of thousands in prize \$\$\$!

DESAL PLANT

Saltwater → Freshwater ↓ Salty Concentrate ↓

Can YOU help Desalination plants make more water and less concentrate?

Follow us at [Challenge.gov](https://www.challenge.gov)
(search Reclamation)

RECLAMATION  WERF  Water Research Foundation

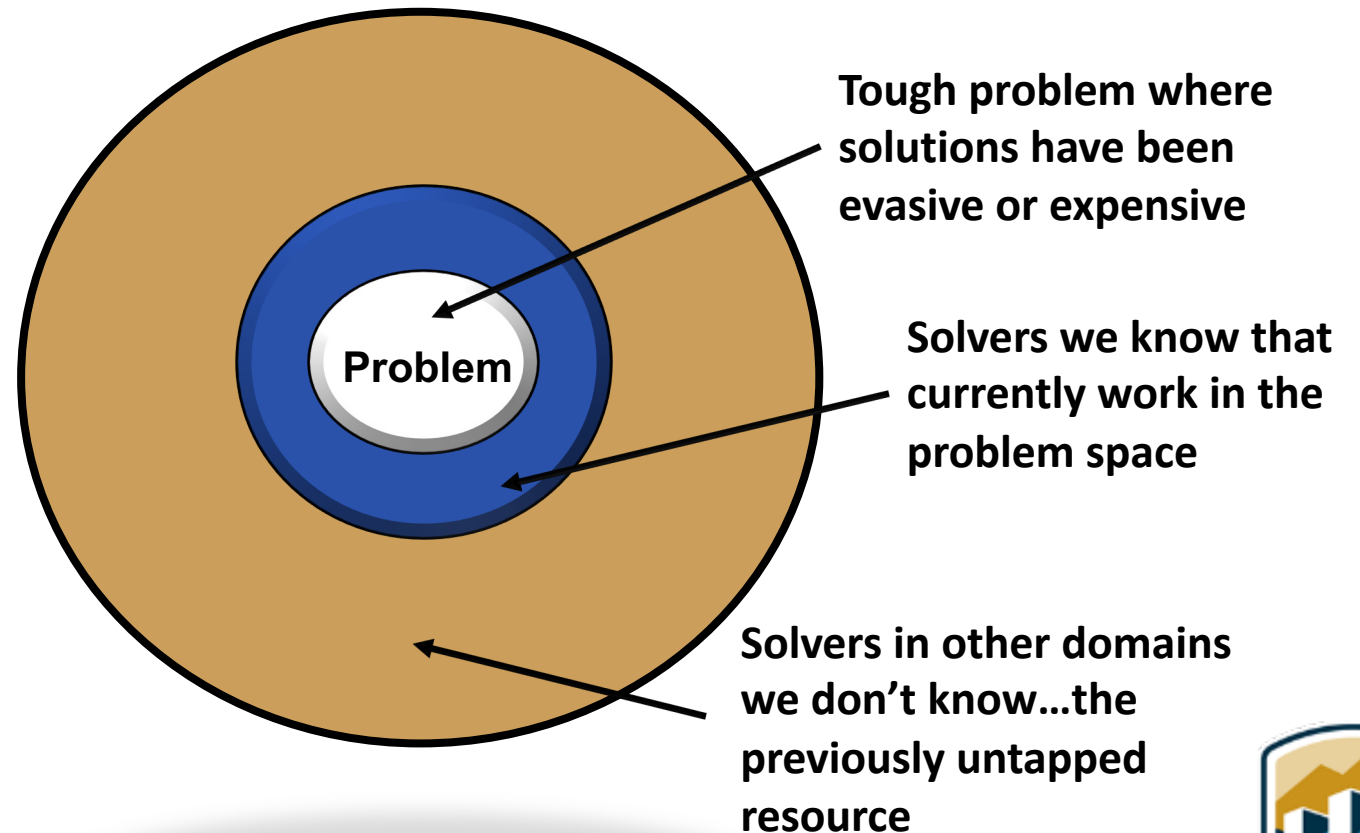


Prize Competitions

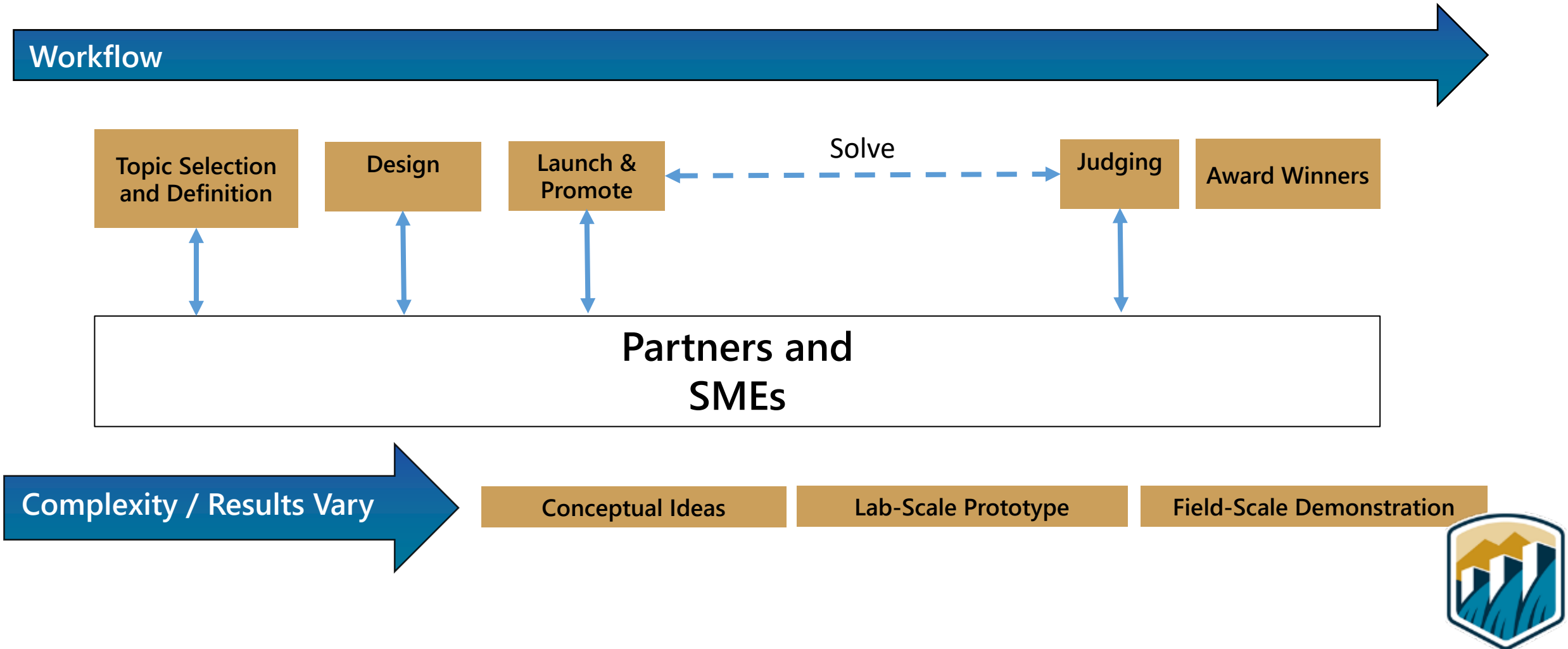
A Tool for solving tough issues and advancing research through crowdsourcing

Provides a "pay for performance" paradigm as compliment to traditional "pay for potential"

Collaboration is Vital



Prize Competition Process



Reclamation Prize Competitions

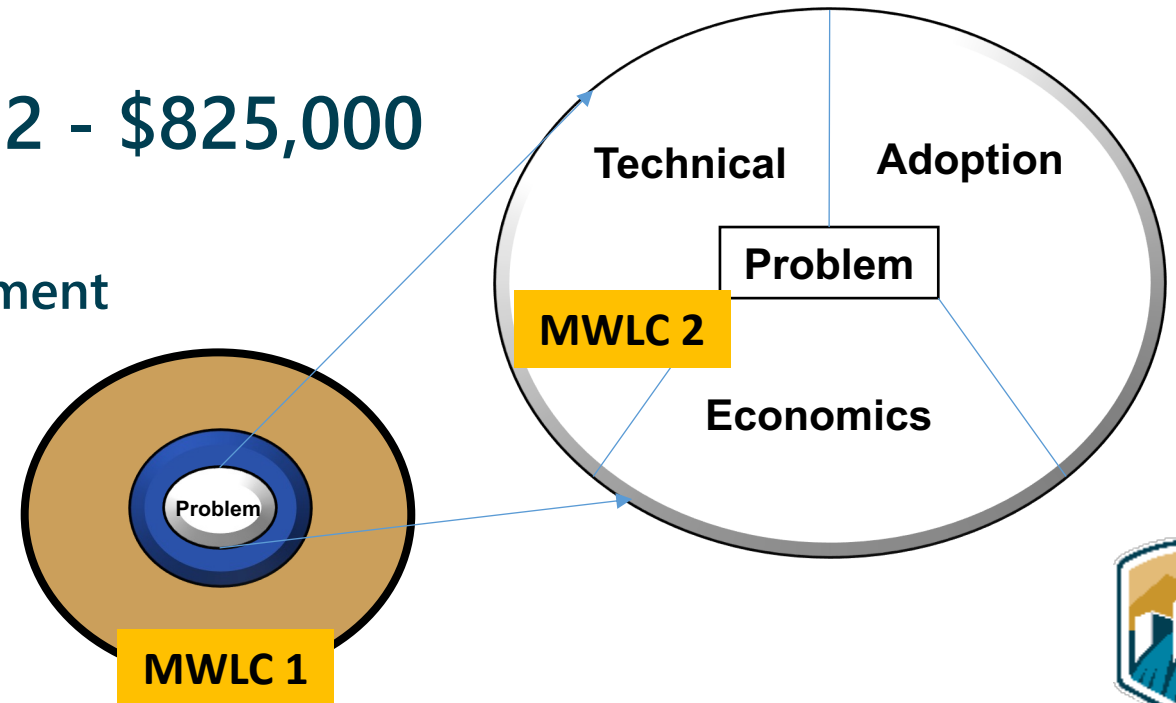
Crowd-sourcing solutions for complex technical challenges

- 34 competitions launched since FY 15, hundreds of winning solutions, over \$6.5m in prizes paid
- Recent Competitions
 - Streamflow Forecast Rodeo
 - Guardians of the Reservoir
 - Canal Safety
 - Water American's Crops
 - Imperfection Detection
 - Veg Out Challenge
 - More Water Less Concentrate



Concentrate Open innovation

- MWLC 1 – White Paper – 2016/17 – \$150,000
 - Open call
 - Canvas the crowd for solutions
- MWLC 2 – Demo Testing – 2020/22 - \$825,000
 - Specific problem statement
 - Used MWLC 1 to define problems statement
 - Tech Demo Testing in Yuma
- MWLC 3 – ??

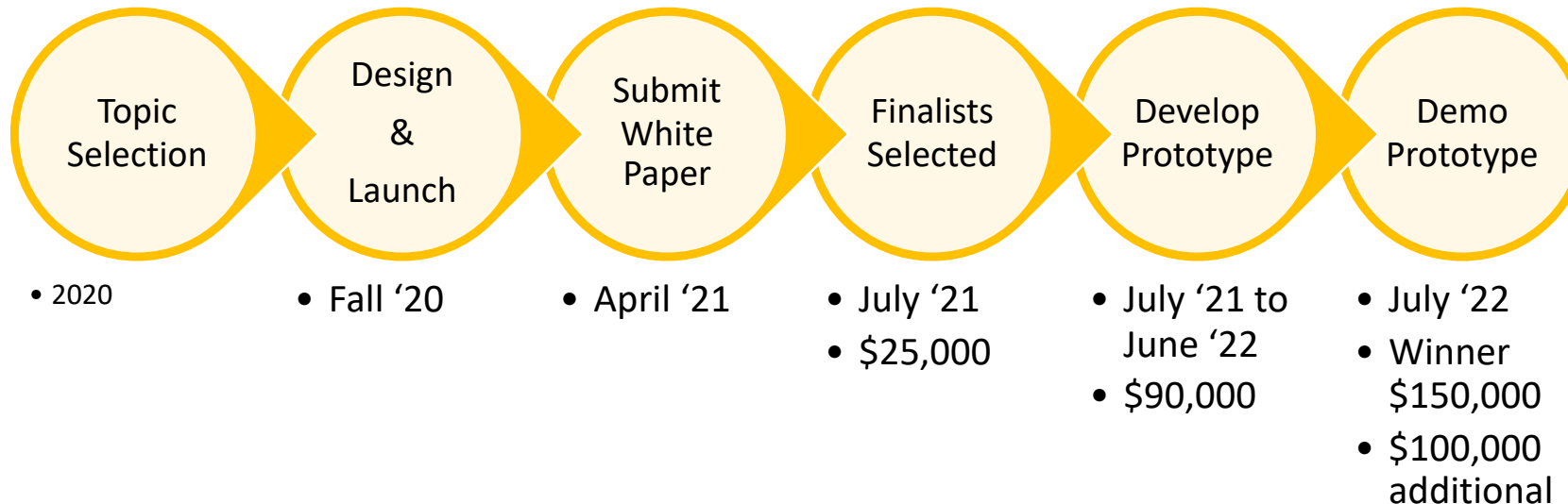




**MORE
WATER**
LESS CONCENTRATE

Developing innovative solutions for inland desalination

- **Reduce concentrate volumes**
- **Increase fresh water supplies in water short areas**
- **Affordable**
- **Environmentally sound**
- **\$825,000 in prizes**





**MORE
WATER**
LESS CONCENTRATE

- Olin Desal Winner– \$265k
 - Batch RO
- Pacifica – 115k+
 - Electrified RO membranes
- UTEP – 115k+
 - EDM
- Membrion – 115k+
 - Ceramic ED
- AIL – 115k+
 - HDH
- Additional testing at YUMA was an extra incentive



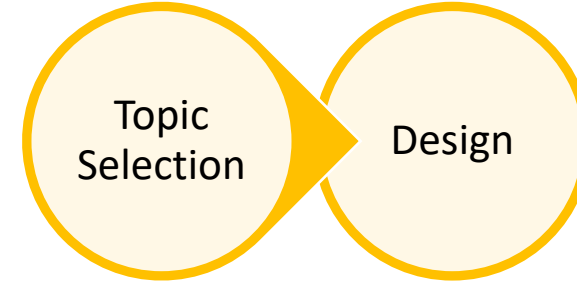
MWLC 3

- Seeking additional support

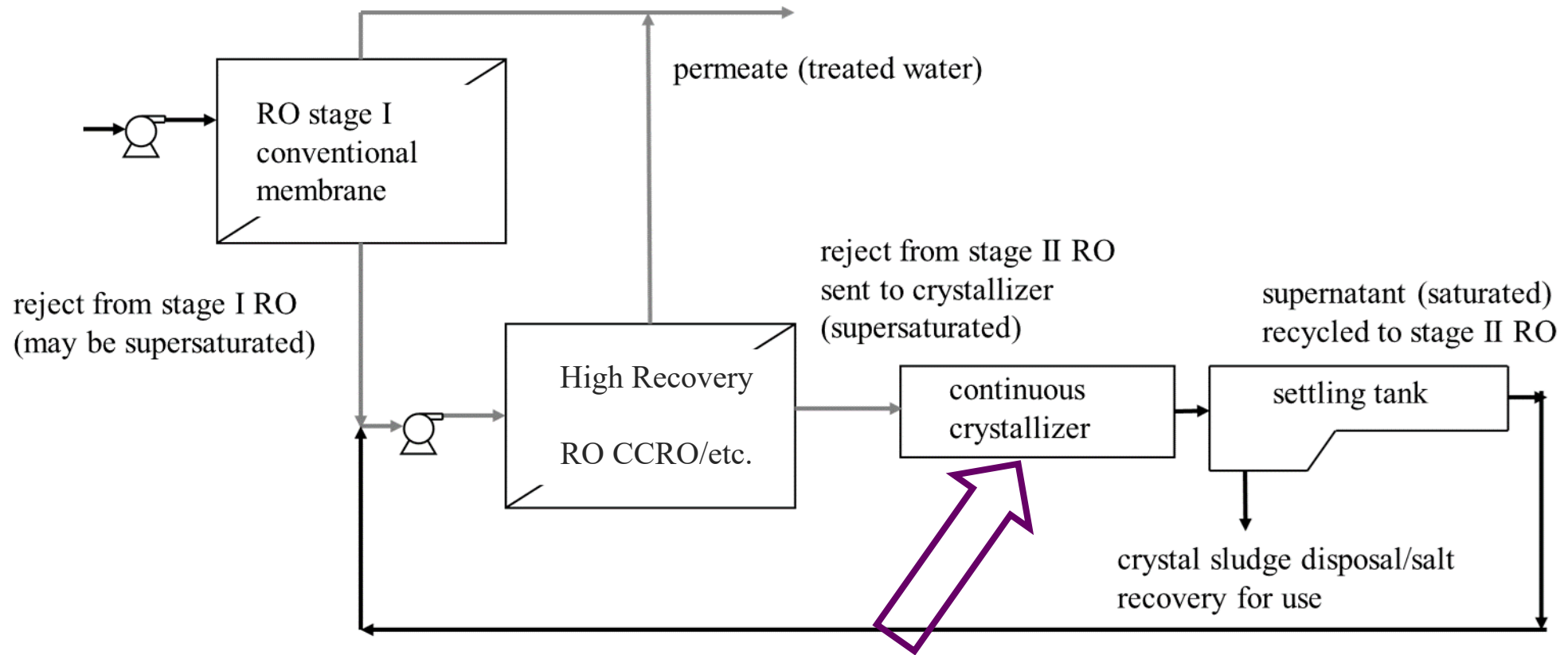
- Partnership
- Collaboration
 - SME
 - Outreach
 - IKS
 - Etc.

- Topic Selection – Where to draw the box

- Technical
- Adoption
- Economics



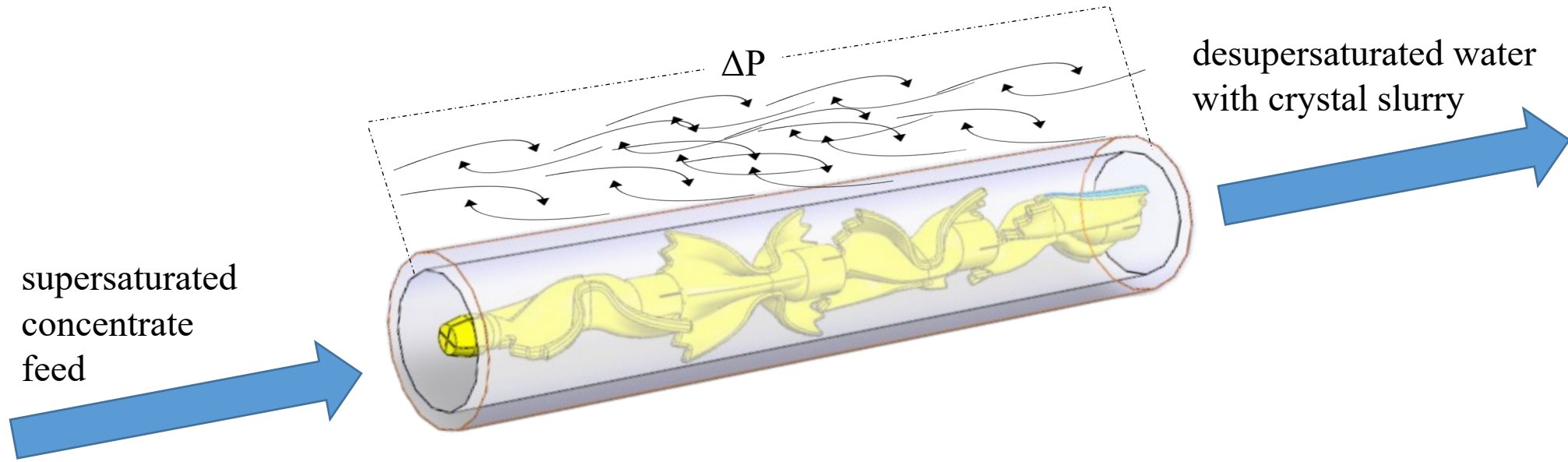
Inline Mixer Crystallizers – MLD/ZLD



focus of this work



Inline Mixer – Shape and Material



- drawing on from our previous studies, we are working on designing static mixer crystallizers for treating supersaturated brines.
- the static mixer elements are inspired by different pasta shapes



Inline Mixer – Lab and Early Stage Pilot Tests

Turbidity (NTU) is a surrogate for nucleation of crystals.



farfalle

shell

Q	ΔP_{avg} (psi)	τ (min)	$m_{deposited}(g)$	NTU
1.74	0.238	5.43	0.0081	50
2.04	0.224	4.05	0.0274	75
3.03	0.223	3.15	0.0439	200
3.53	0.250	3.38	0.0253	150



Focus of Next Competition?

- Innovation

- MLD
 - What to do with “sludge”
- ZLD
 - What to do with mixed salts
- Beneficial byproducts
 - Selective precipitation

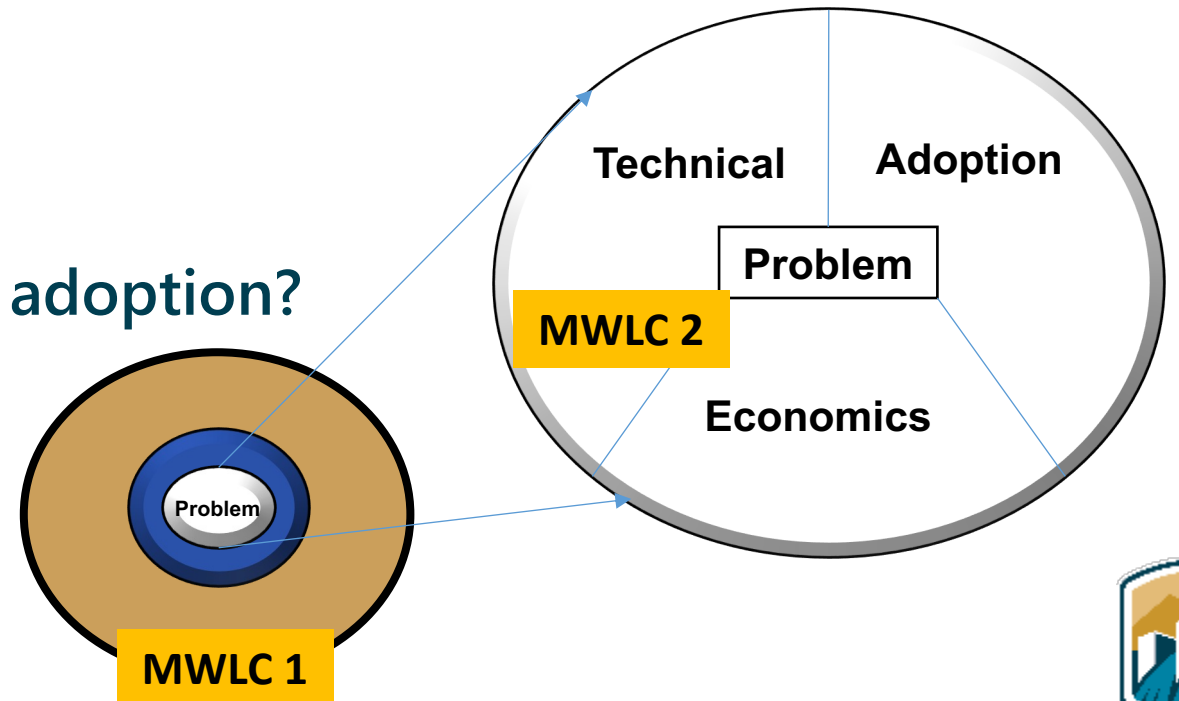
- Adoption

- What needs improvement for wider adoption?

- Economic

- LCC
- OPEX
- CAPECX

MWLC 3
???



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