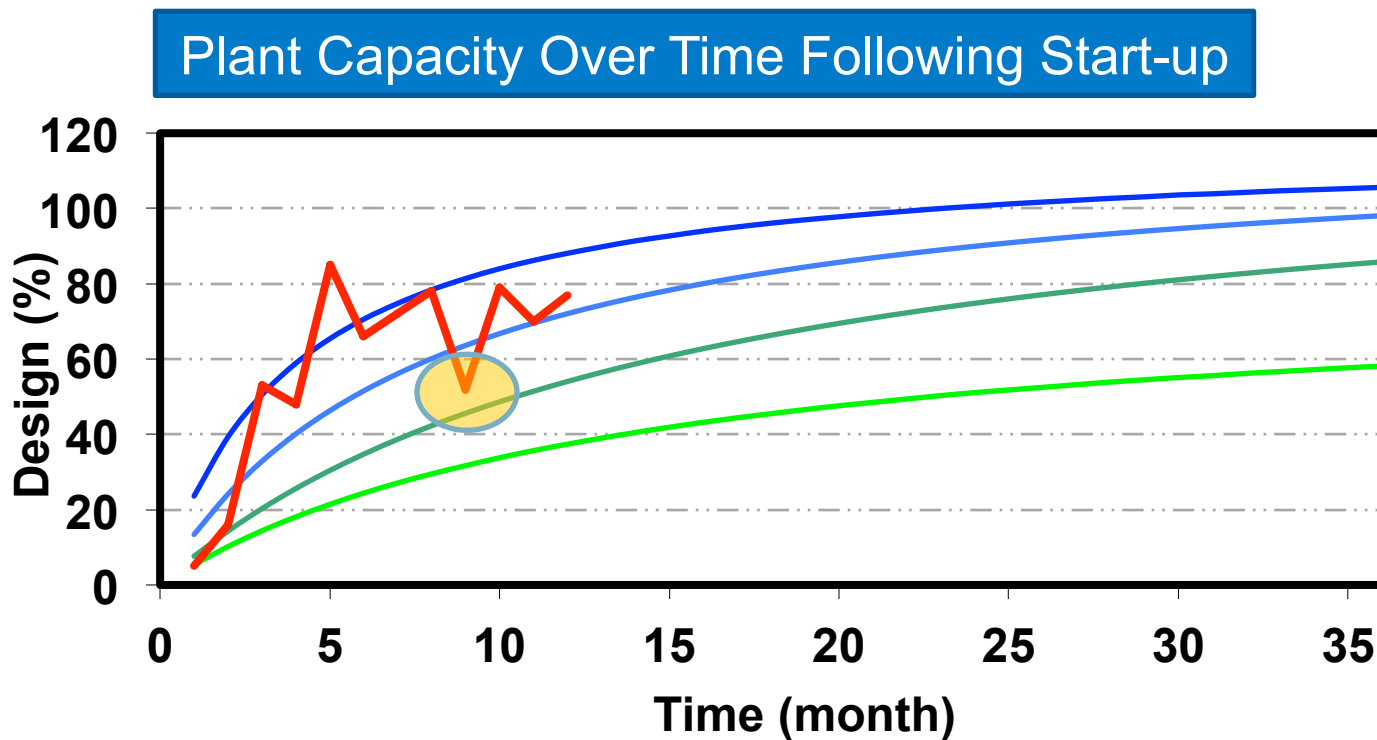


Developing a Solution to Selenium Speciation

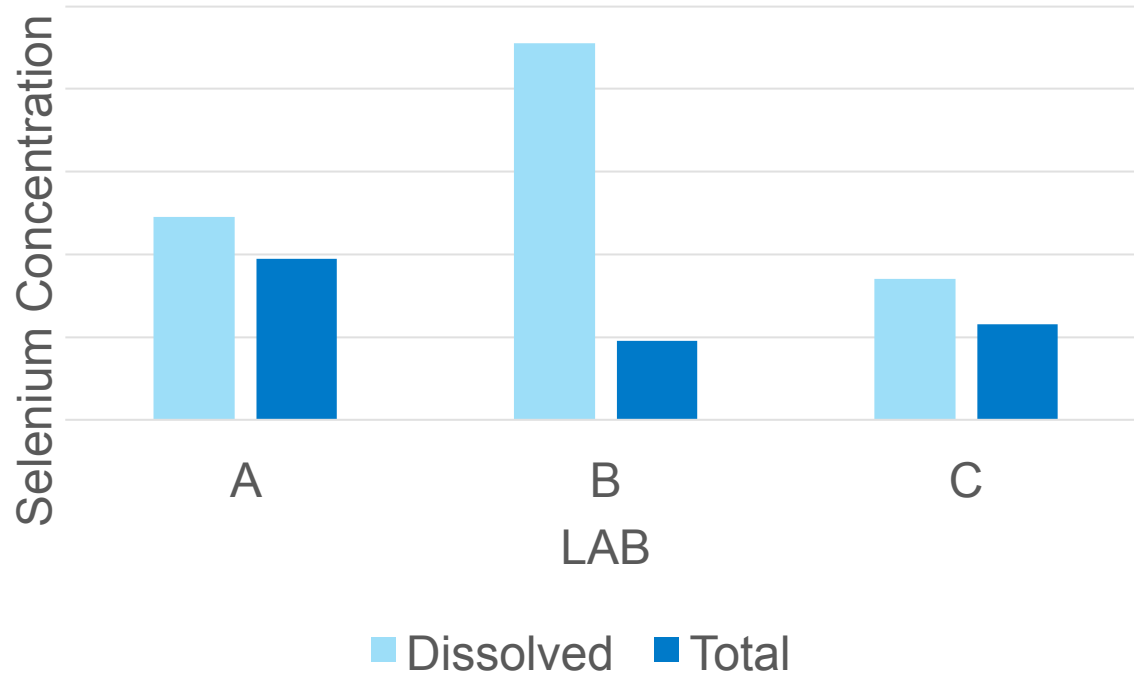
Thomas Davidson
MEND 2019 Presentation
December 5, 2019



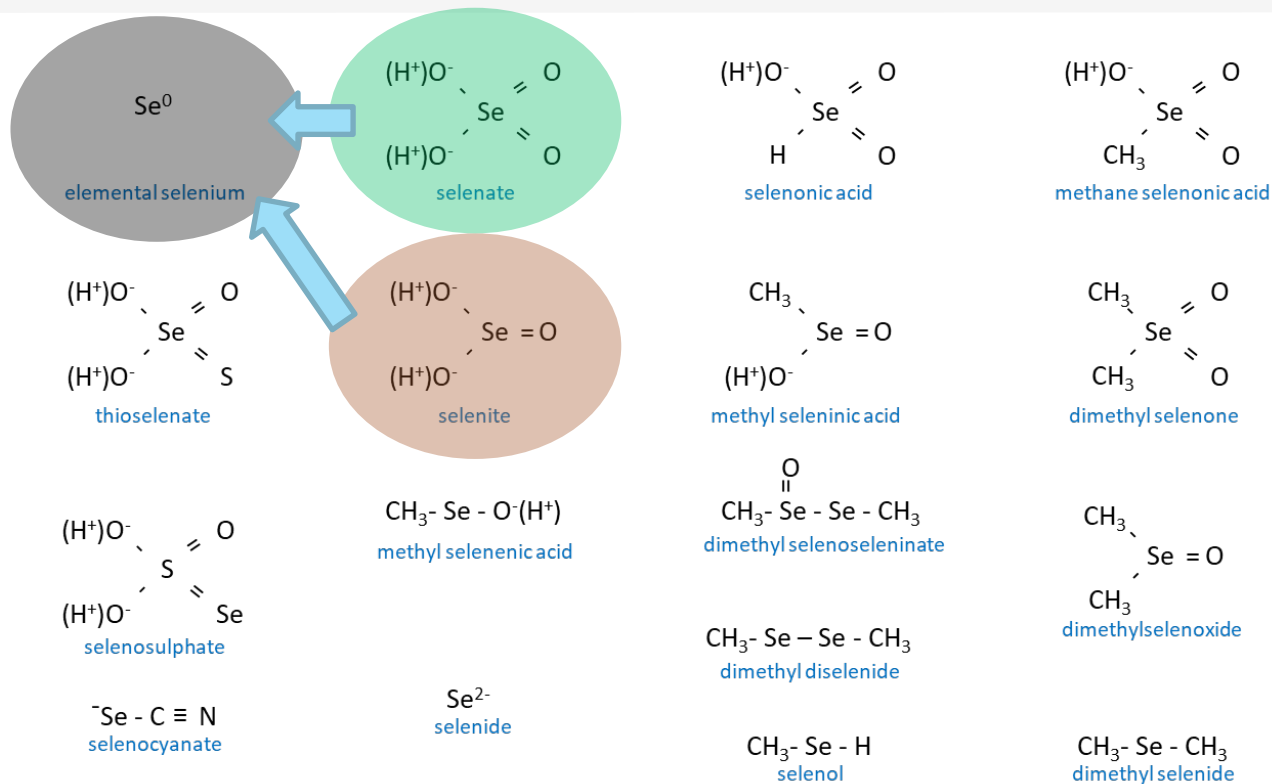
Normal Start-Up



What's Up With Our Selenium Assays?



What is Selenium Speciation?



Start the Timeline

Issue?

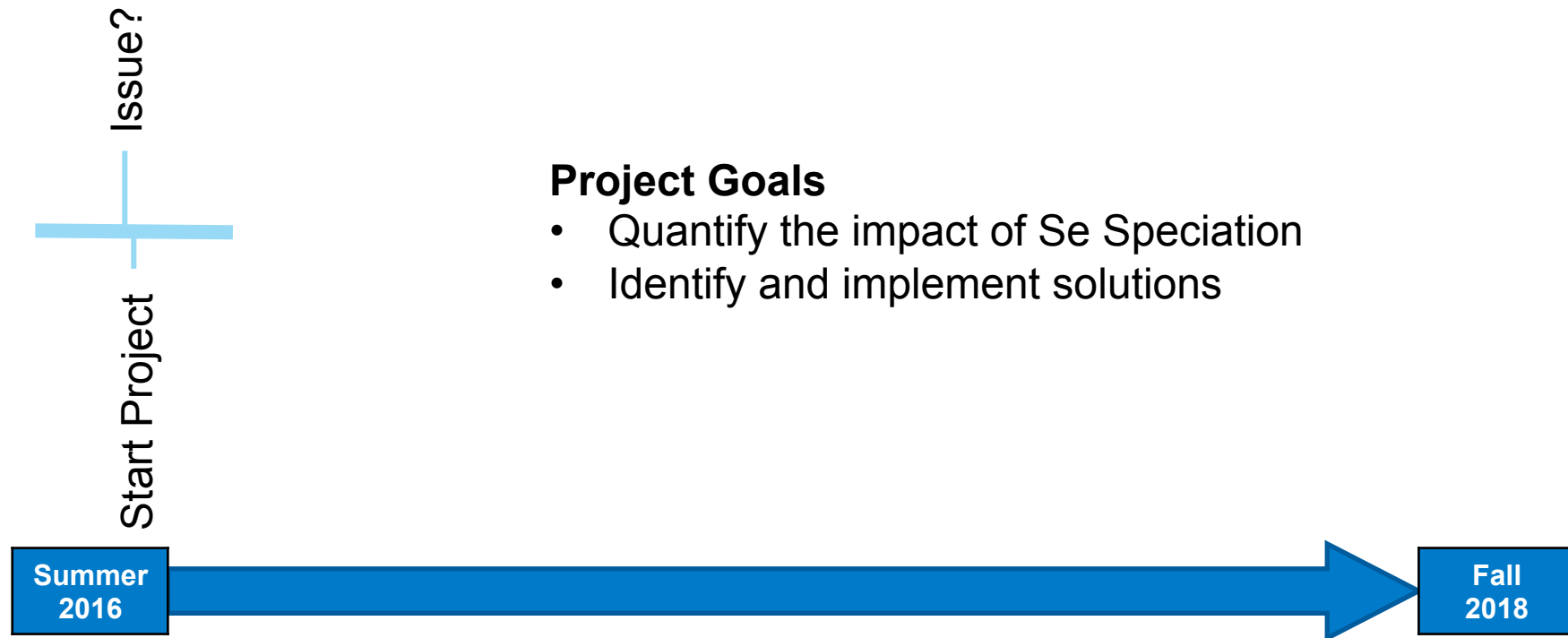


Summer
2016



Fall
2018

Project Starts



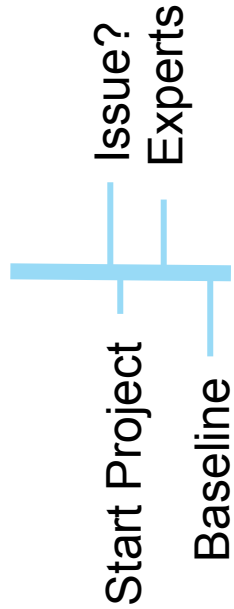
Project Goals

- Quantify the impact of Se Speciation
- Identify and implement solutions

Gather the Experts



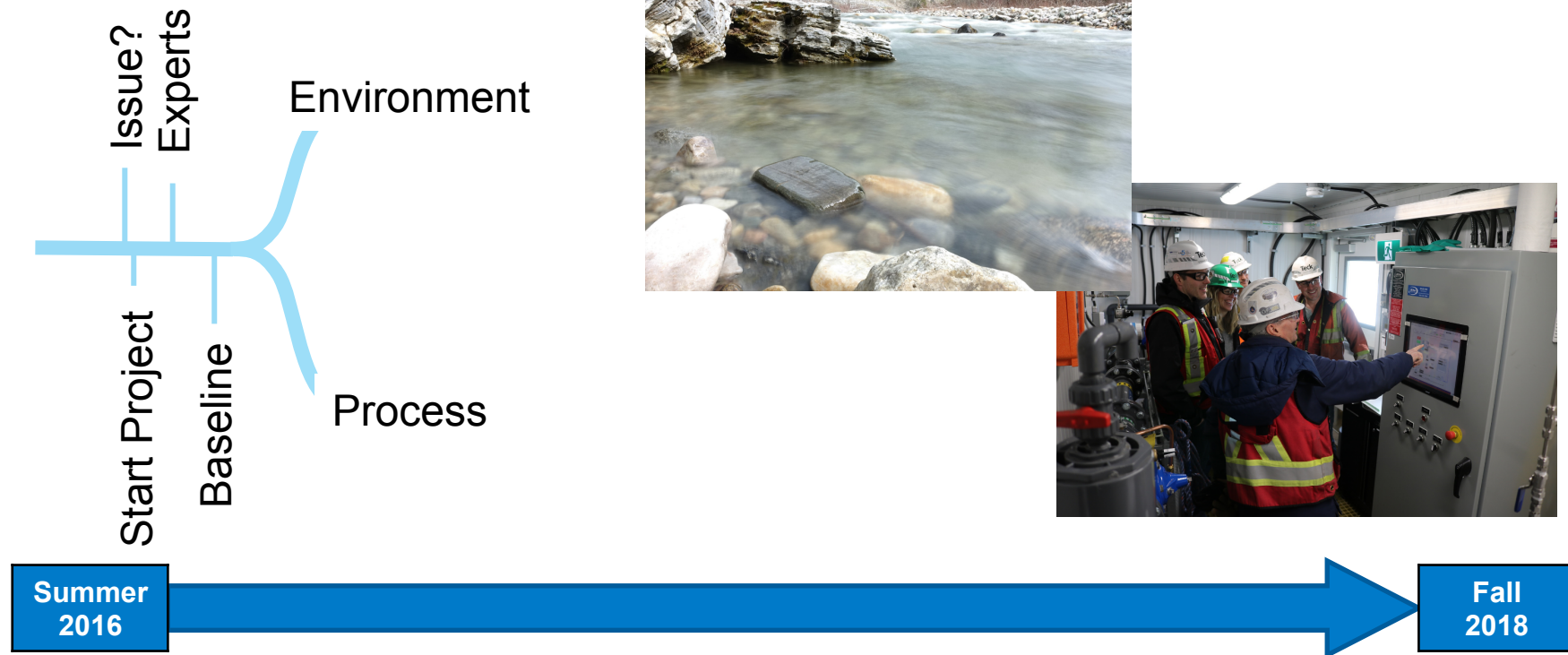
Baseline Workshop



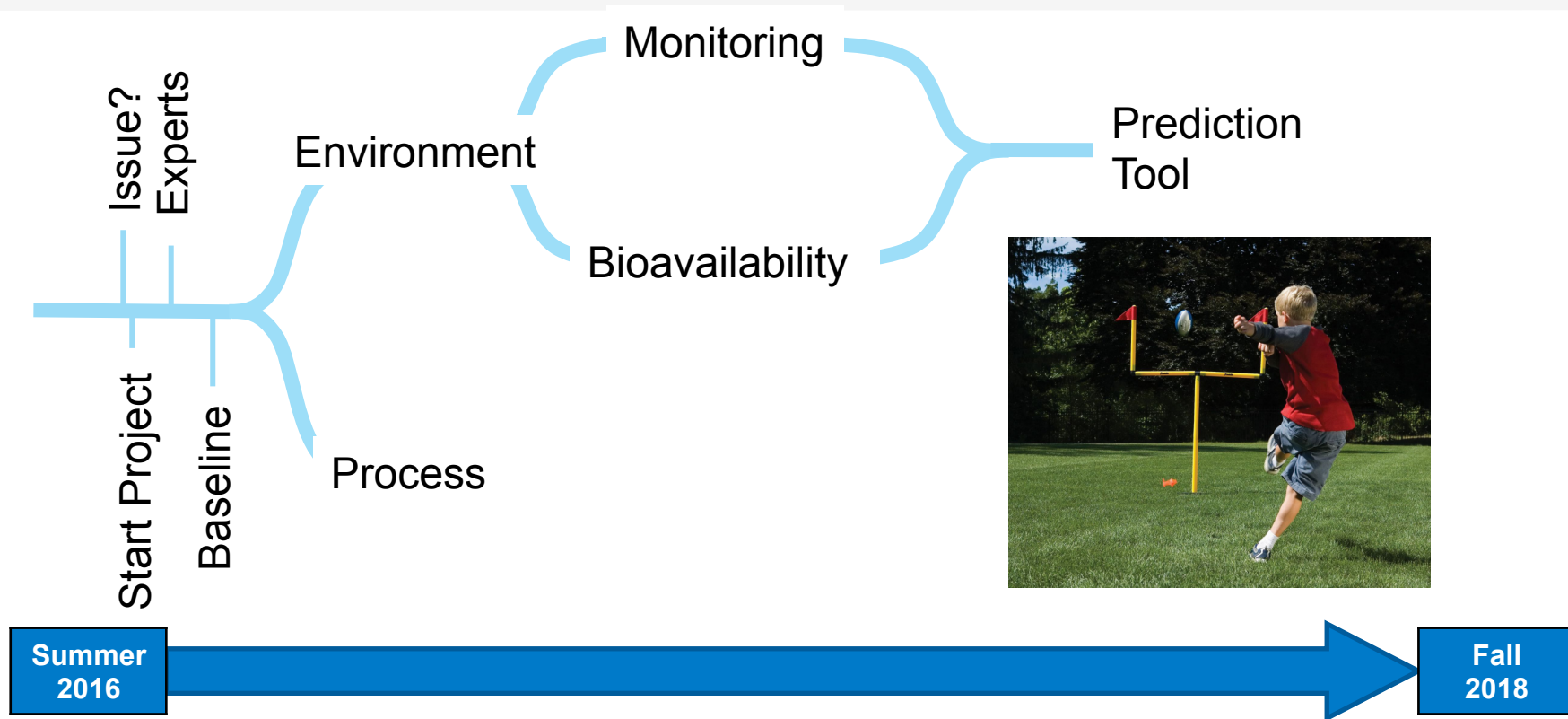
Summer
2016

Fall
2018

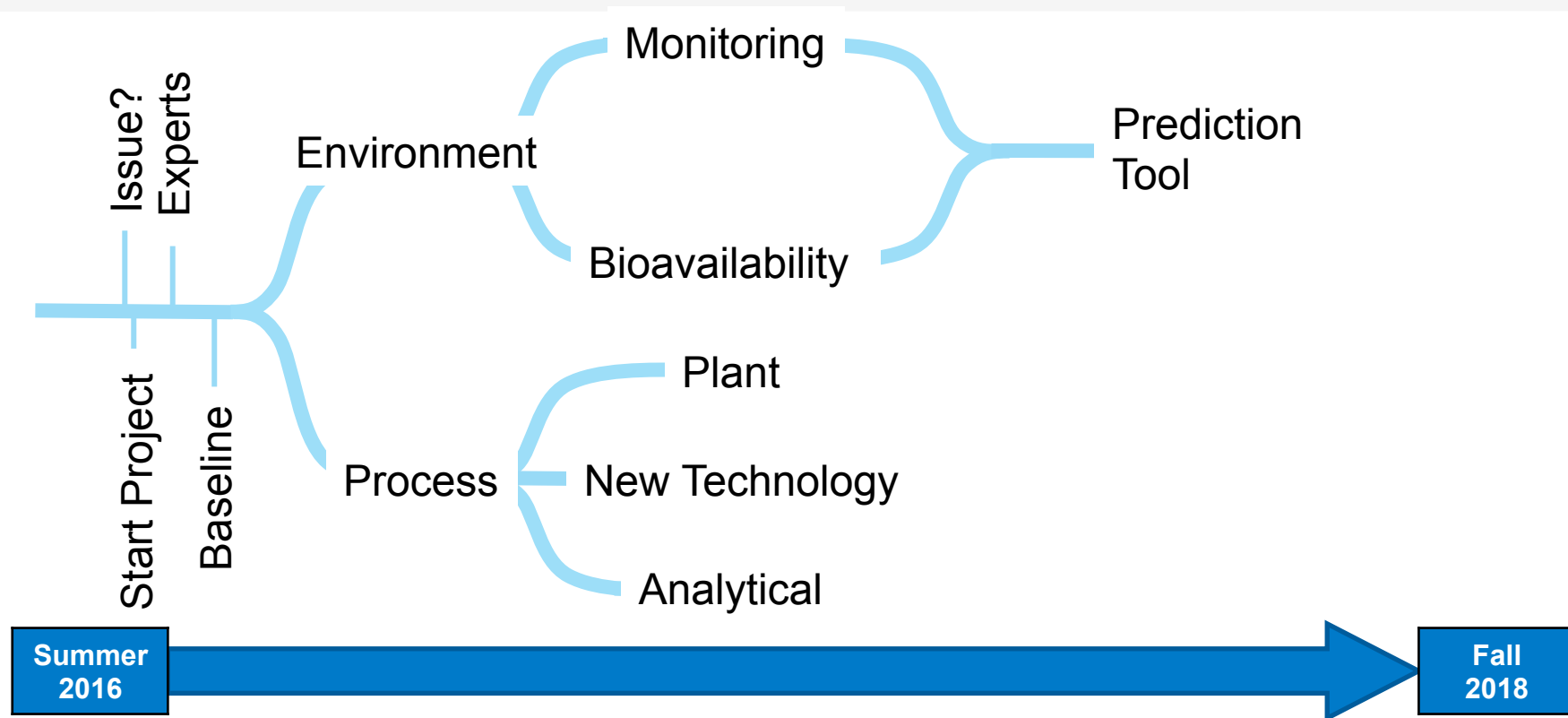
Brainstorm and Classify



Set the Goal Posts and Keep Score

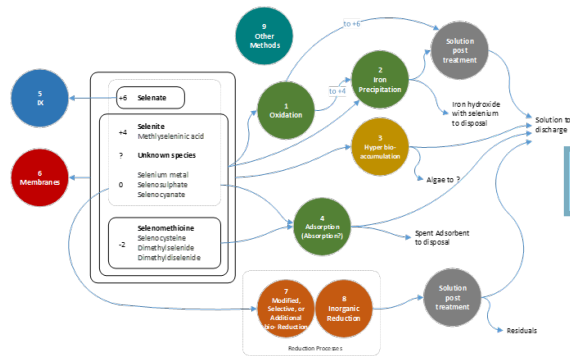


Process Work Packages

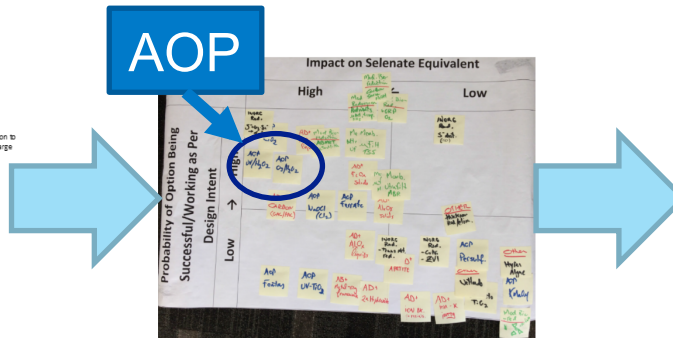


How do you distill down the options?

Ideas



Ranking



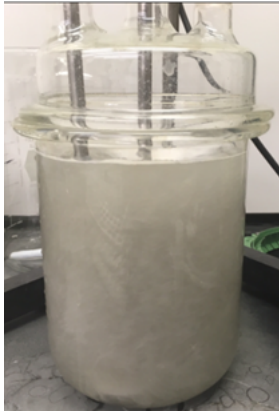
Probability of success vs

- Level of impact
- Speed to implement
- Cost

SWOT

Strengths	Weaknesses
Opportunity	Threats

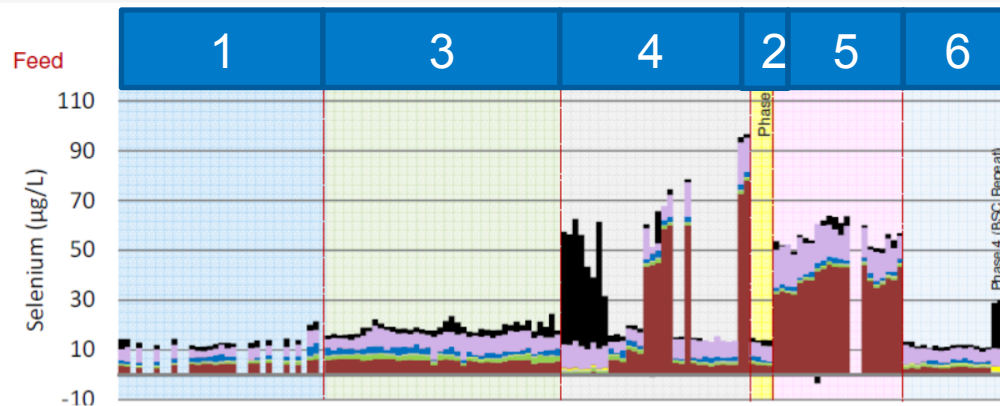
Bench Scale and Piloting



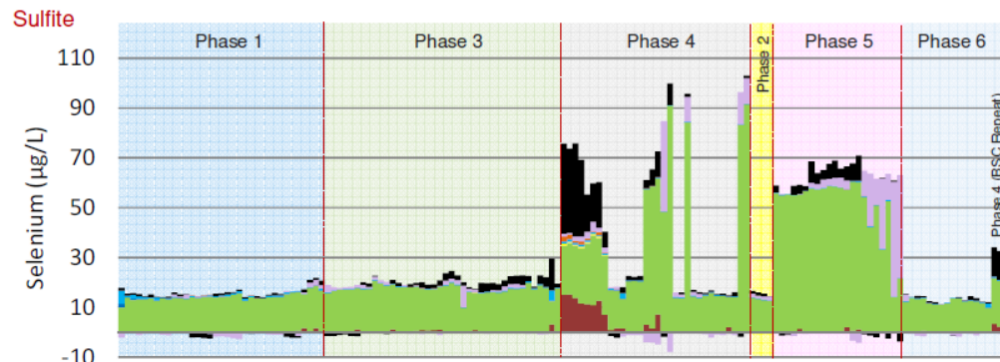
Advanced oxidation process (AOP)

Pilot Results: Green is Good

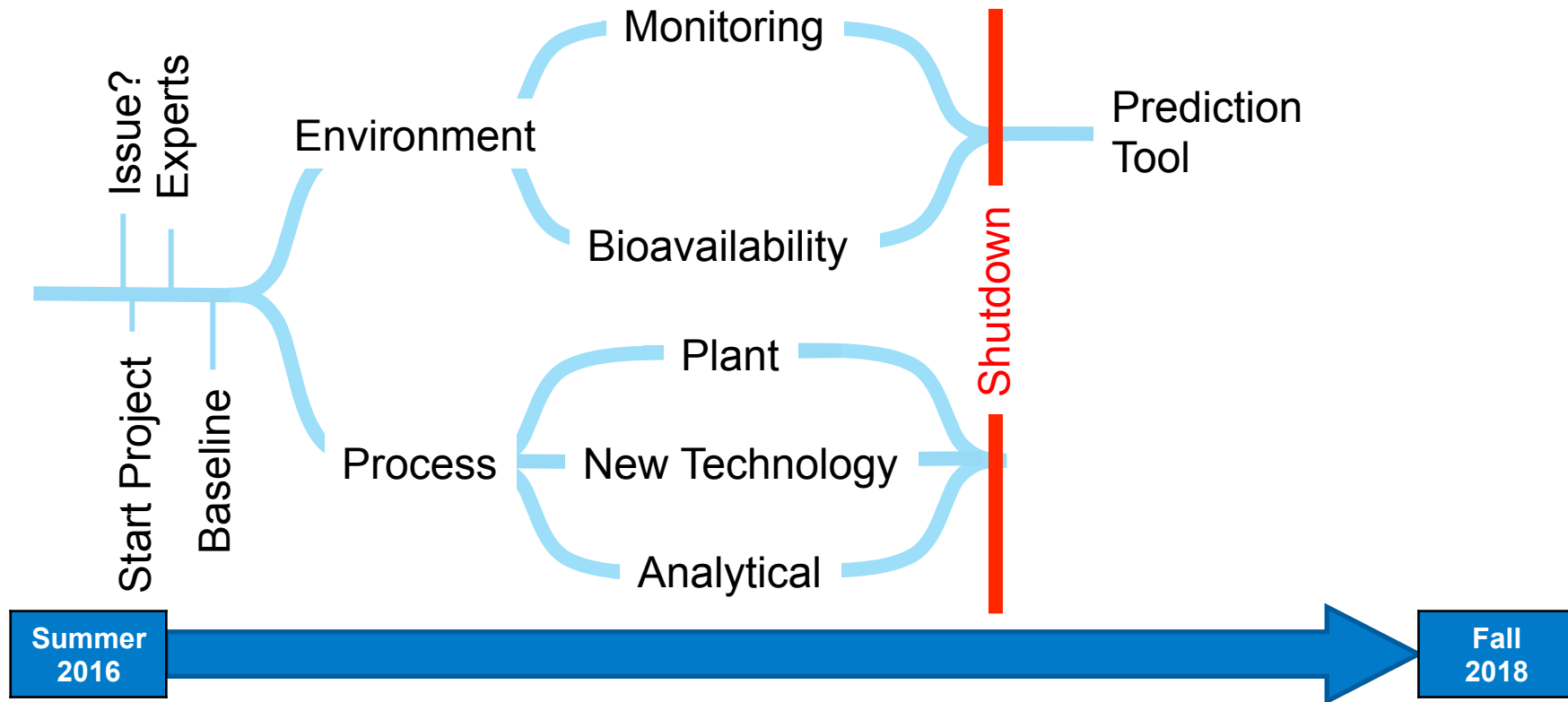
Pilot Feed Se Speciation



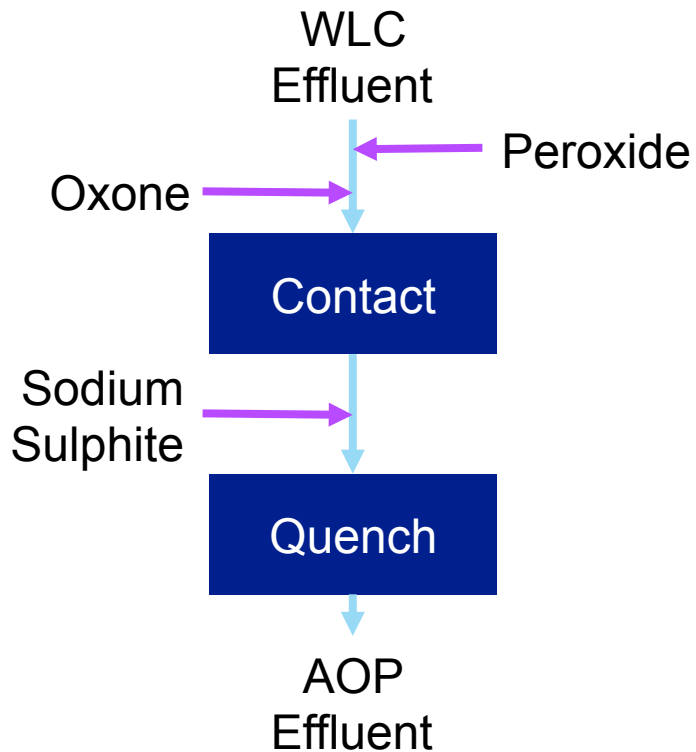
Pilot Effluent Se Speciation



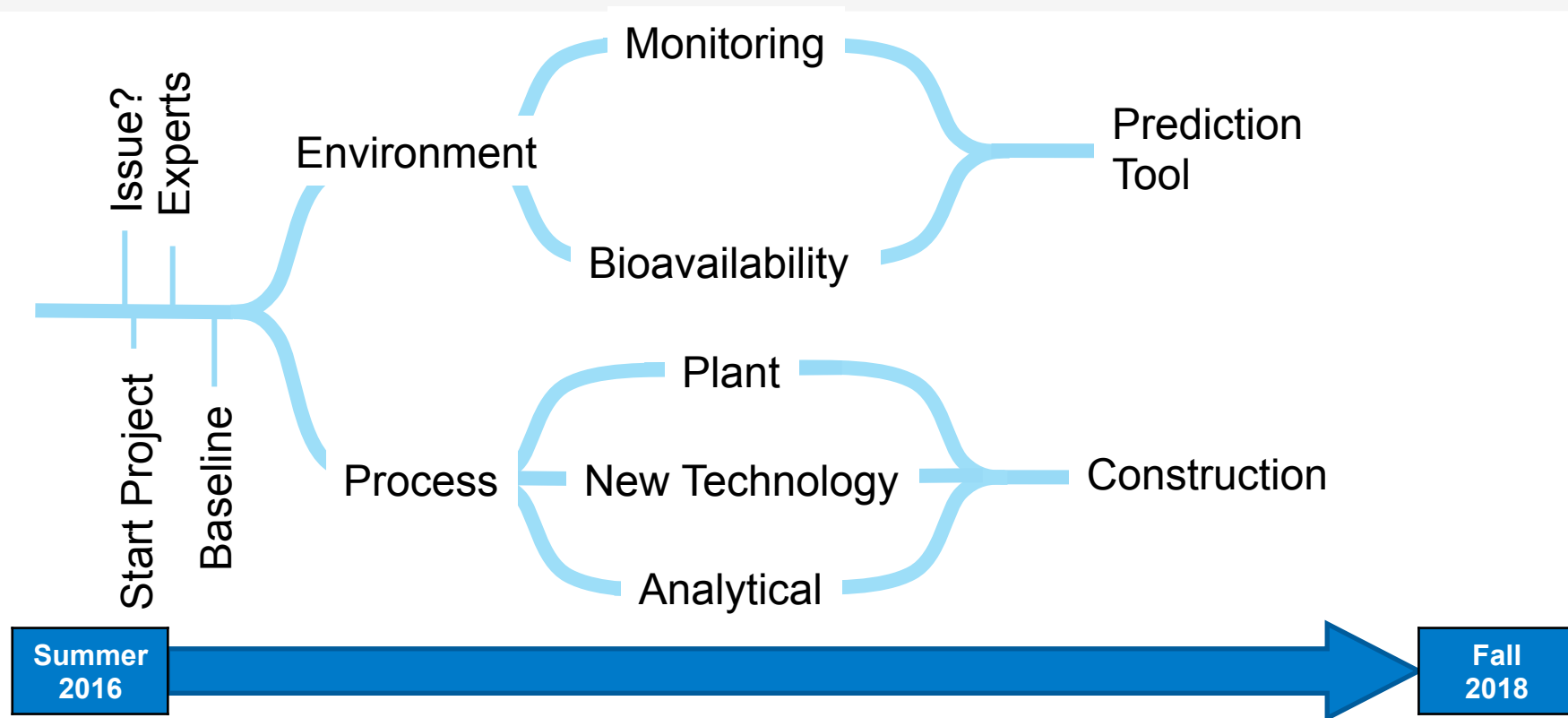
Decision to Shutdown



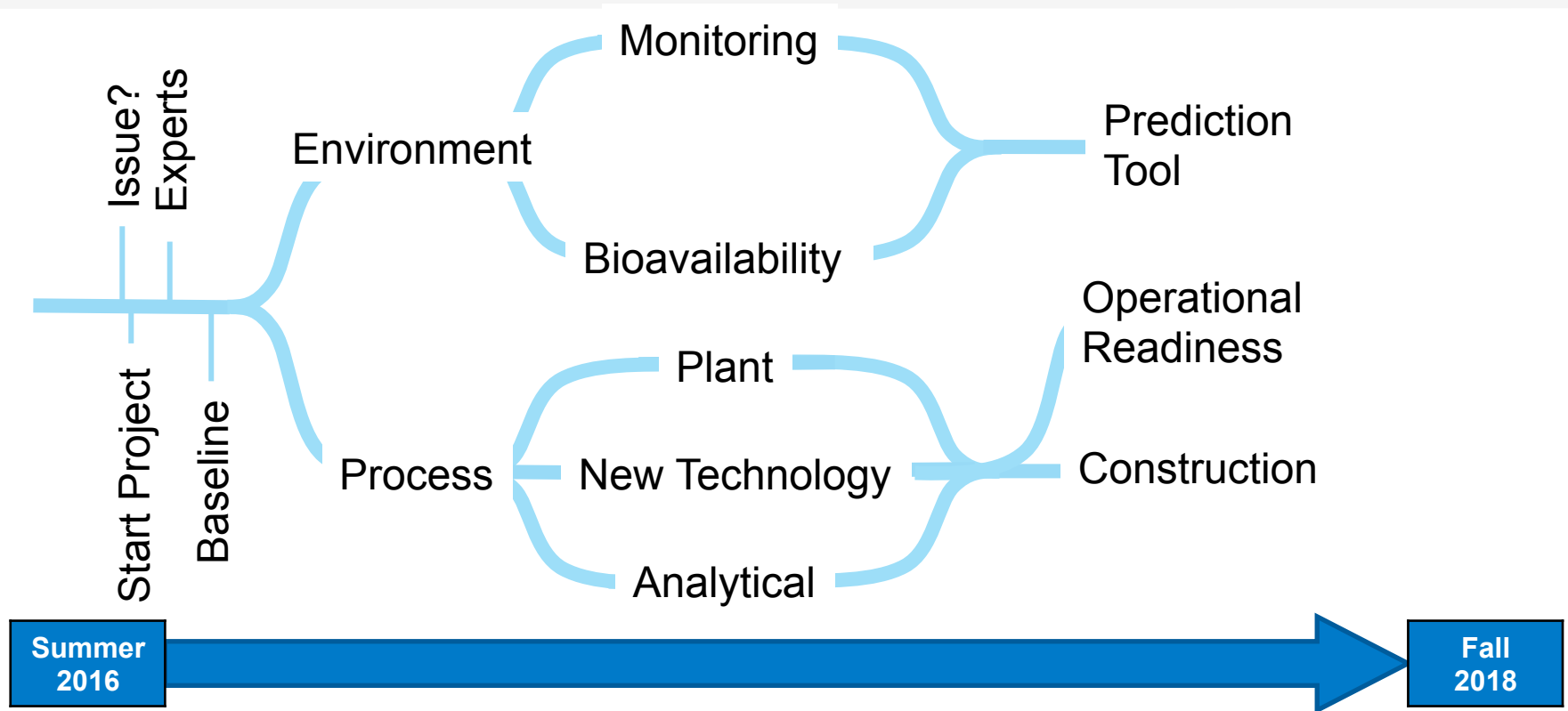
Design, Permit, and Build



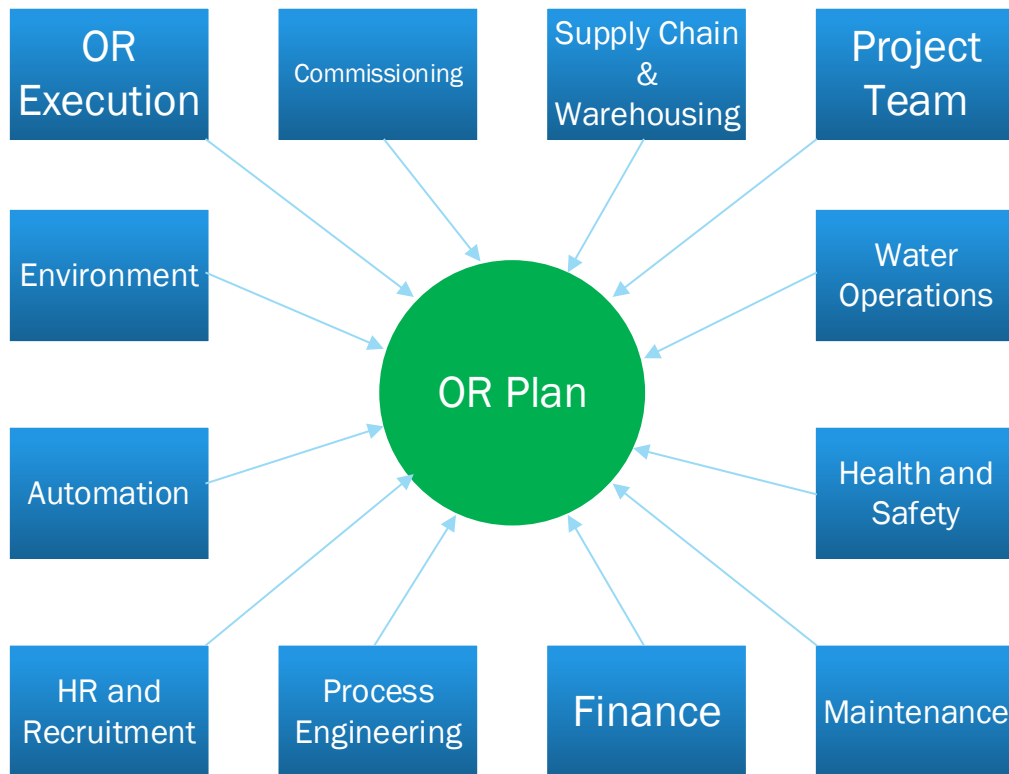
Need to Design and Build



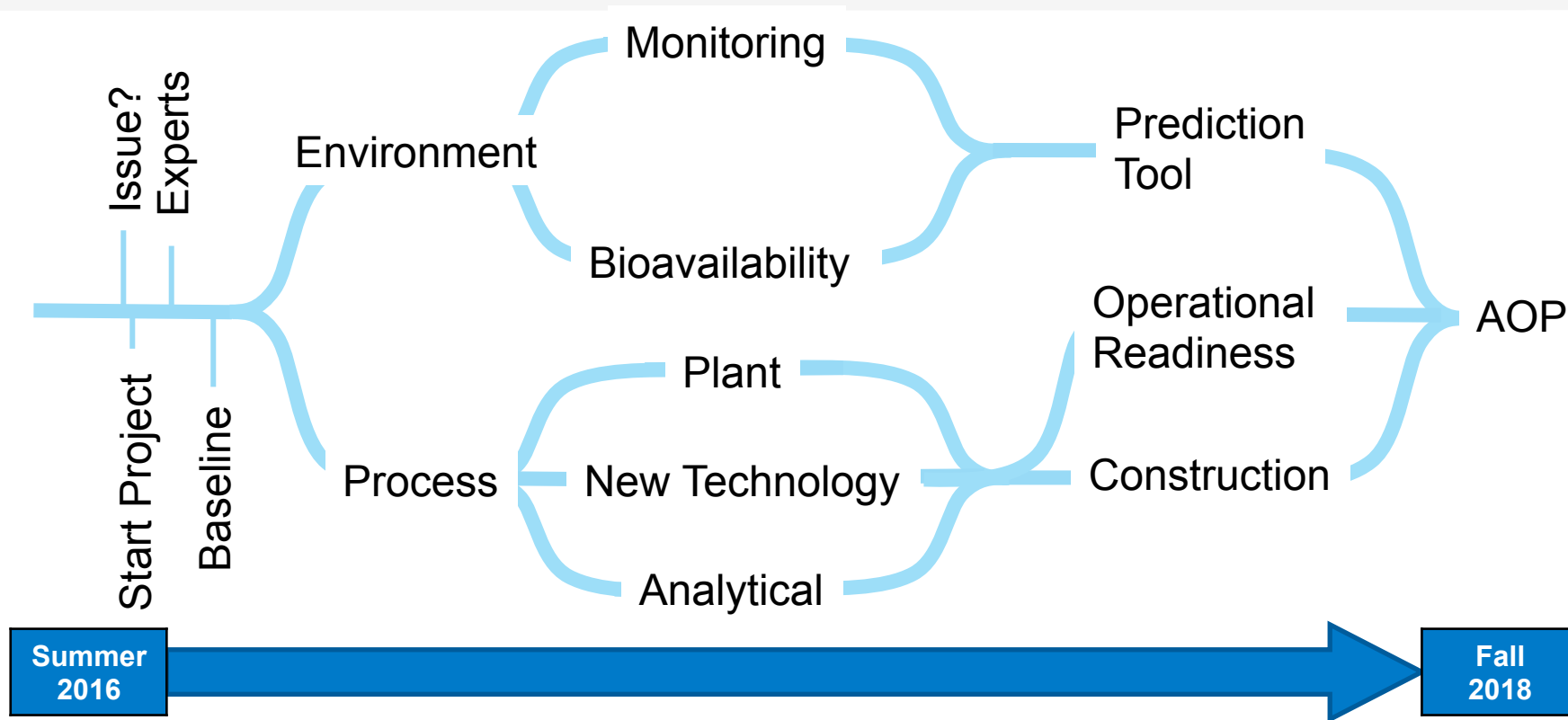
Everybody Forgets About Operations Readiness



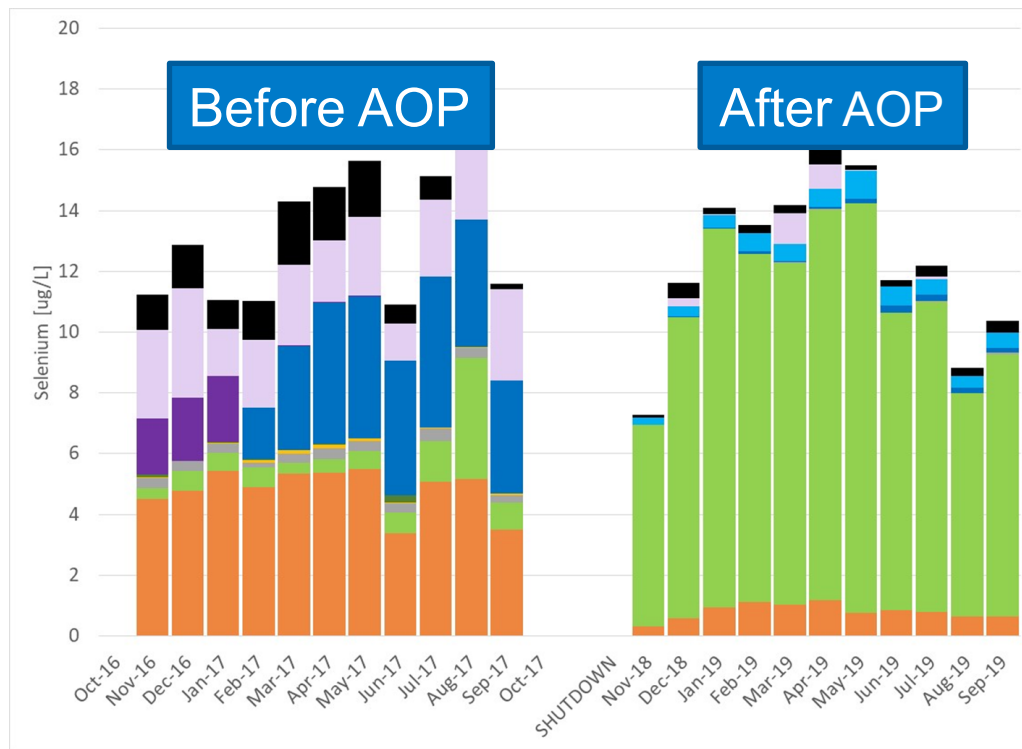
Operational Readiness is Project Management for Operations



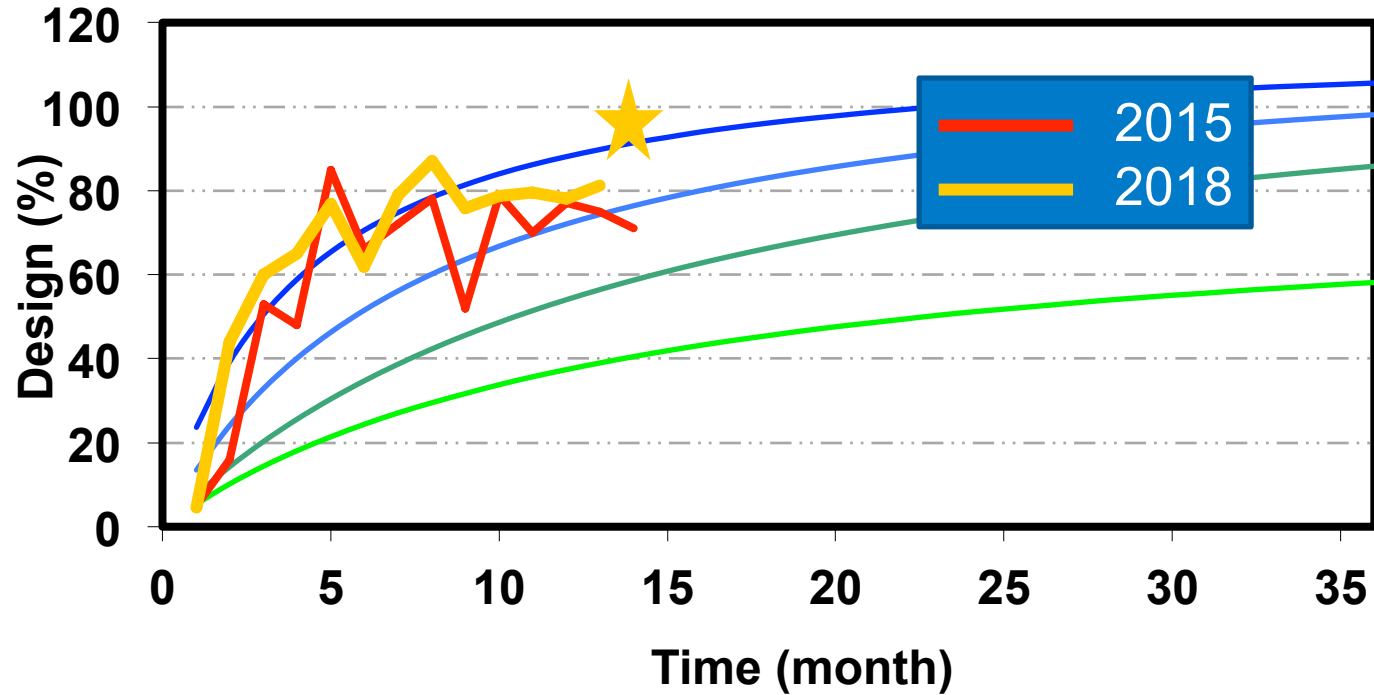
Put it All Together



Pre versus Post AOP



2018 AOP vs 2015 Start-Up



Why were we Successful?

Extensive and Robust Monitoring Program

Clear Goals

Broad Engagement

Opened up the black box

- Selenium Speciation Analytical Methods
- Bioavailability
- Bioreactors Operation



Thank you

