



# OLI technology focus process simulation

think simulation

getting the  
chemistry right

December 2018

# Discussion outline

Introductions

Simulation power: four specialty areas

Focus: process simulation

Working in the software

Services available for working with OLI simulation

# Individual and company introductions



## Individual introductions

Your group

Your simulation interest

## OLI Systems

- ✓ Global thought leader in electrolyte chemistry
- ✓ Simulation software for water chemistry processes
- ✓ 47 years specializing in electrolyte science
- ✓ Active in oil & gas, chemicals, power generation, & mining

# Simulation power

OLI<sup>s</sup>  
studio

OLI<sup>e</sup>  
engine

OLI<sup>t</sup>  
tools

## Focus laboratory and pilot plant tests

- ✓ Eliminate trial and error
- ✓ Determine likely targets
- ✓ Reduce cost

## Duplicate your physical process

- ✓ Use mathematics and chemistry to develop a digital twin

## Anticipate process changes before they occur

- ✓ Reduce process upsets and risk
- ✓ Increase yields
- ✓ Gain confidence with informed recommendations

# Simulation power: the OLI Engine

## Frameworks

- Three electrolyte thermodynamic frameworks available
- MSE No concentration limits, pressure 1500 bar, temperature up to 90% of the critical T of mixture
- MSE-SRK For upstream oil & gas: a variation of MSE using SRK for 2<sup>nd</sup> liquid to remove discontinuities
- AQ Legacy framework, excellent for many systems, good ability to extrapolate on new systems

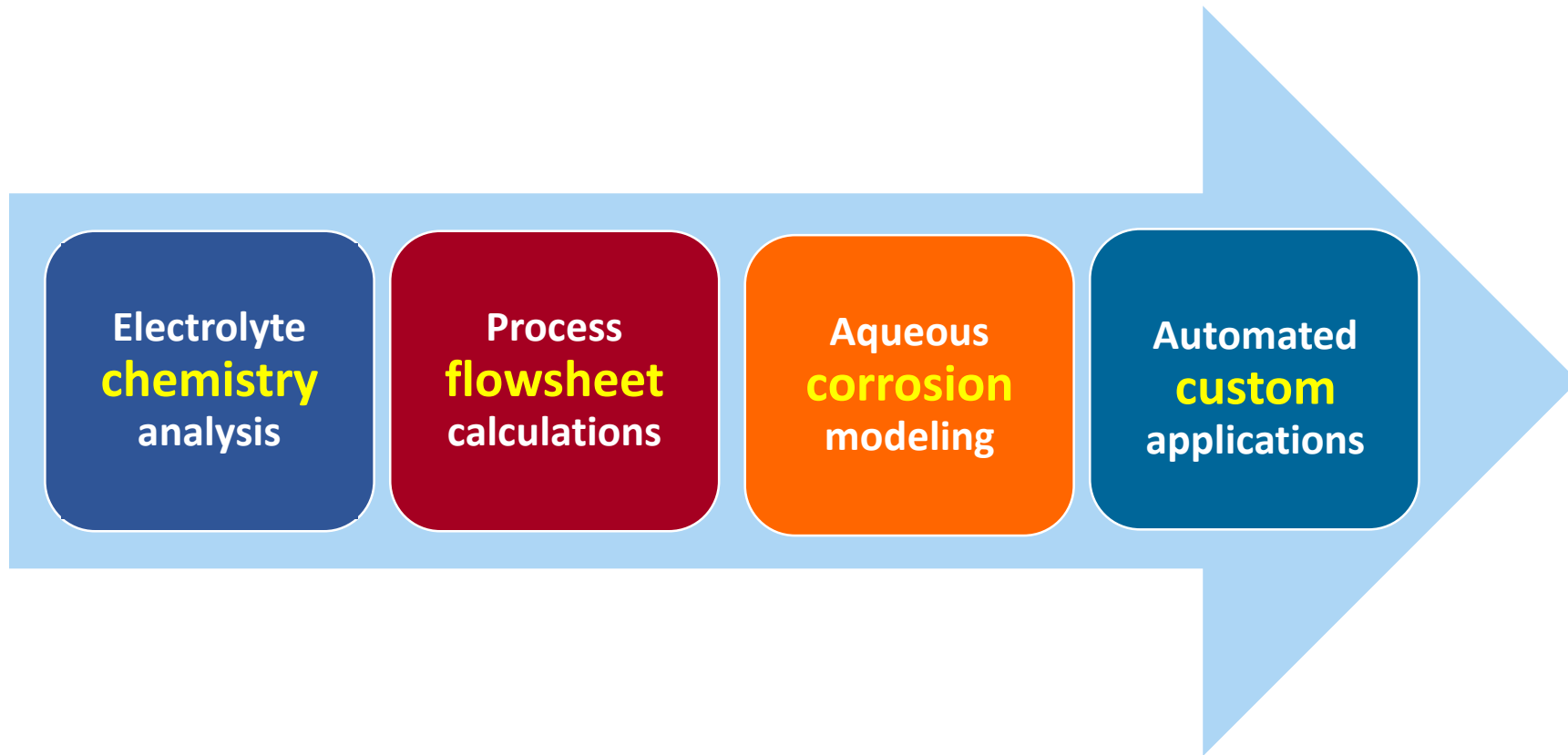
## Structure

- Equation of state (EOS) for the reference state properties **Helgeson-Kirkham-Flowers-Tanger EOS**
- Activity models for the excess properties **Minimization of Gibbs Free Energy**
- Equations for all models are published, many peer-reviewed papers

## Databases

- OLI databases = OLI's competitive edge
- 6000 species, 81+ elements of the periodic table
- Validation spreadsheets available for all MSE, MSE-SRK parameters
- 47 years of R&D in the science of electrolytes

# OLI technology brings competitive edge



# Electrolyte chemistry analysis

**OLI Studio:  
ScaleChem**

**OLI Studio:  
Stream  
Analyzer**

**Equilibrium based  
Solid-liquid-vapor-organic phase distribution**

**Multi-component systems  
Physical & chemical property calculations**

- Advanced mechanisms**
- Kinetics framework
  - Reduction / oxidation
  - Mass transfer
  - Surface reactions

- Advanced properties**
- ORP
  - Water activity
  - Transport properties
  - Osmotic pressure, etc.

# Electrolyte flowsheet simulation

**OLI  
Flowsheet  
ESP**

**OLI Engine in  
< >**

**When electrolytes are primary**

**OLI Flowsheet: ESP**

- **Multiple units, recycle**
- **Fullest implementation of OLI technology (kinetics, ion exchange)**
- **Reverse osmosis unit**
- **Target: industrial water treatment**

**When combining with other  
thermodynamic methods**

**OLI Engine in < >**

- **Alliance Partners with Aspen, SimSci, Honeywell, PSE, SysCAD, IDEAS**
- **Easier learning curve**
- **Remains an active OLI strategy**



# Automated custom applications

**OLI as a key  
element  
in IoT**

## **Data screening**

**An OLI API that facilitates screening of large amounts of data to flag potential scaling or corrosion problems**

## **Digital twins**

**OLI process simulation anticipates changes before they occur**

## **Custom modeling**

**OLI in your own simulator  
or ad-hoc calculations  
in Excel or Matlab**

## **OLI seeking partners**

**First pilot application  
underway**

# Aqueous corrosion simulation

## **OLI Studio: Corrosion Analyzer**

### **Thermodynamics of corrosion**

Real-solution Pourbaix diagrams, taking all ion-ion interactions into account

### **Uniform (general) corrosion rate**

Computer-generated polarization curves & underlying, diffusion limited anodic & cathodic reactions

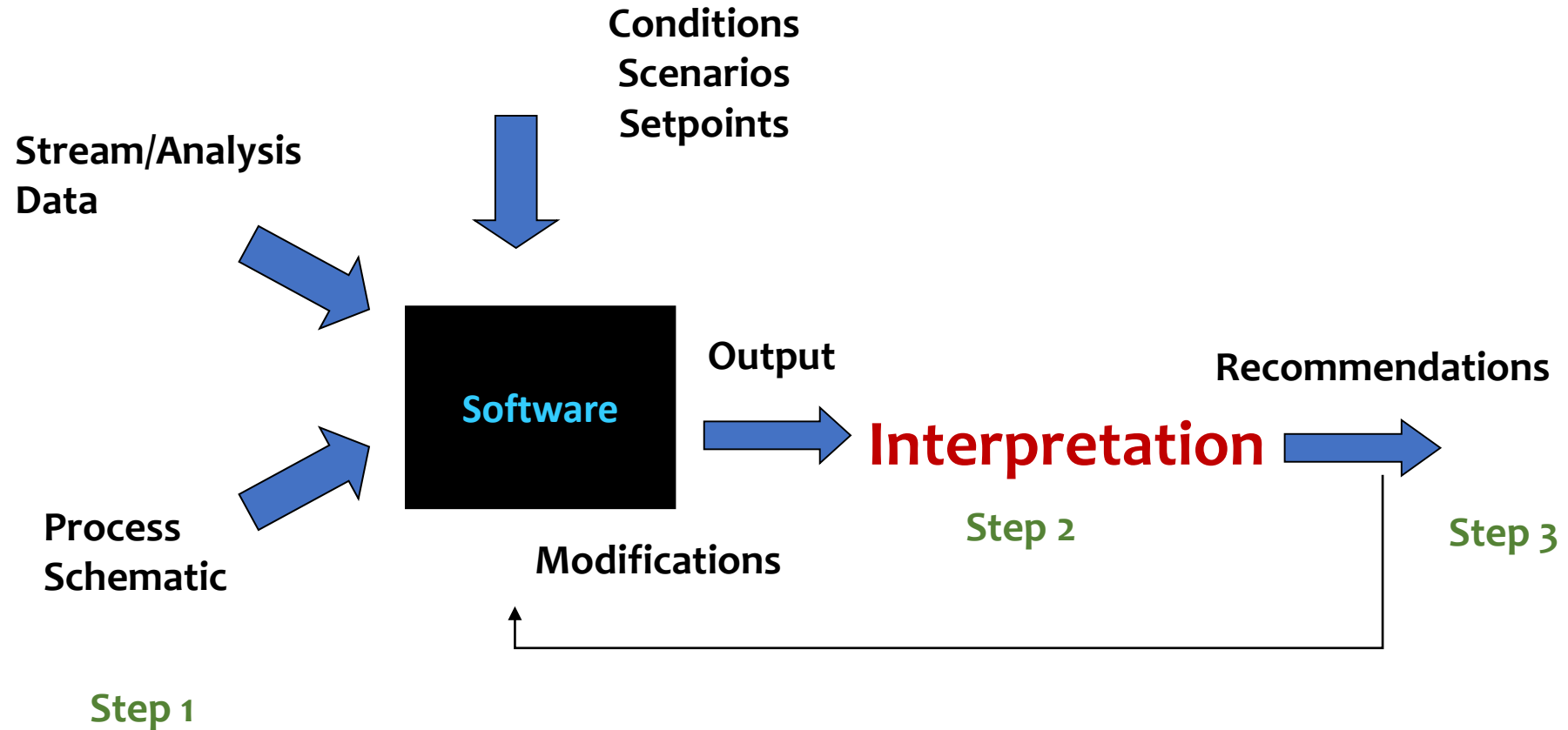
### **Localized corrosion**

Corrosion potential vs repassivation potential, calculating the worst-case pitting rate

### **Remaining asset life**

Given time, pit depth, area, a statistical model that calculates time to failure

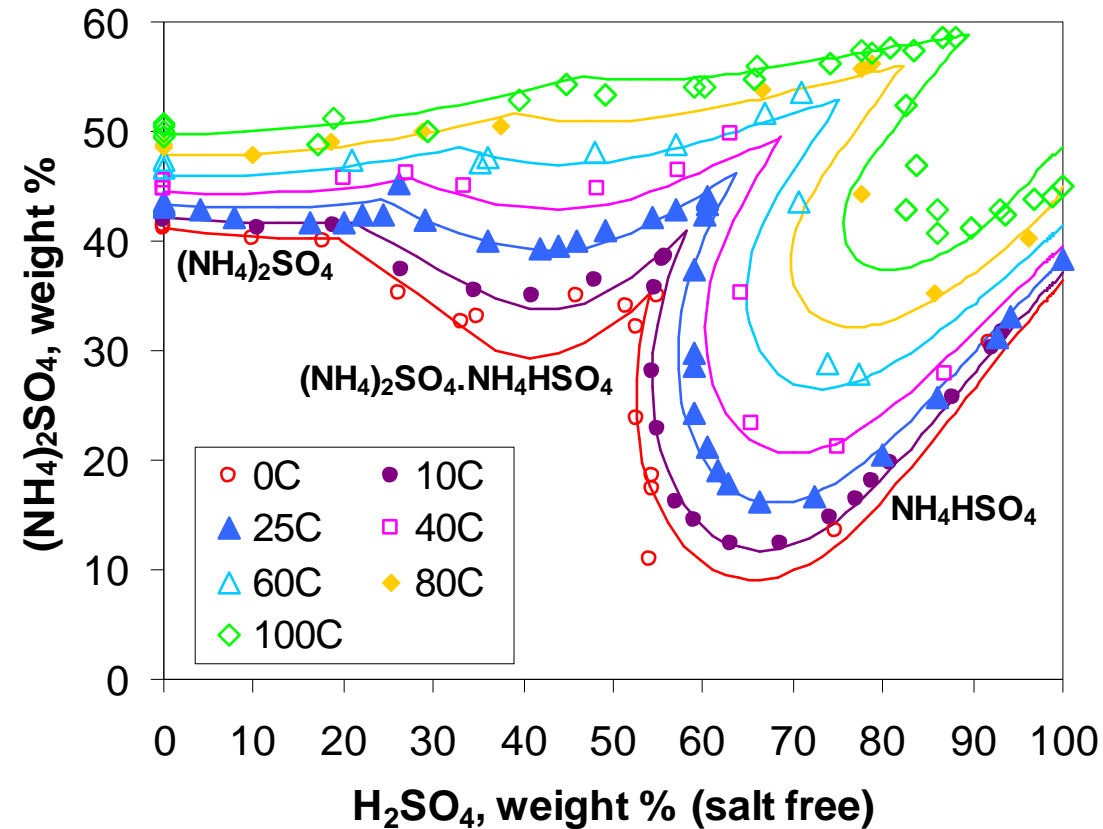
# Process simulation: Interpretation is key!



# Process simulation: OLI Validation Plots

**NH<sub>3</sub>, H<sub>2</sub>SO<sub>4</sub>, H<sub>2</sub>O**  
 100% water to 100% sulfuric

Symbols are experimental points  
 Curves are OLI predictions



# Let's hear from you! Some areas to discuss

## PROFILE

- Who (at each site) might use the software?
  - Which departments, groups, which products
- Any new users, new projects?
- Any current training needs?
- Any application building needs?

## FEEDBACK

- What is on your wish list?
  - Chemistry
  - Calculations
  - Features
  - Process of working with OLI
- Priorities at your company that are good to know
- Gaps in the software capability

## APPLICATIONS

- Would you like to use the software to:
  - Target lab experiments
  - Set operating conditions for equipment
  - Define best practices
  - Model processes
  - And / or ?

## OPPORTUNITIES

Where do you envision OLI having impact?

- Water treatment?
- Corrosion simulation?
- Process design or optimization?
- Lab work?
- Digital twin development? IoT?

# Into the software!

OLI<sup>s</sup>  
studio

OLI<sup>e</sup>  
engine

OLI<sup>t</sup>  
tools

Looking at your applications

# Working with OLI

OLI<sup>s</sup>  
studio

OLI<sup>e</sup>  
engine

OLI<sup>t</sup>  
tools

## Technical consultant check-ins

- ✓ What is working for you
- ✓ What would make OLI better?

## Tiered support service levels

- ✓ Access to OLI consultants
- ✓ Data validation service
- ✓ Moving to named users for service

# New tiered service support available

## BRONZE

### Basic service

- + Free installation assistance
- + Support via Linked In forum
- + 8 hours initial response to questions
- + Paid training / consulting

## SILVER

### Standard service

For building confidence in your electrolyte simulation work

- + Client support by phone, email
- + Some free applications consulting
- + Some free training via web
- + Ad/hoc questions answered
- + Data validation service for 3 systems
- + 6 hours initial response to questions

## GOLD

### Premium service



When you want and need mission-critical success in your work

- + Priority client support by phone, email
- + More free applications consulting
- + Technical consultant & training onsite
- + Ad/hoc questions answered
- + Unlimited data validation service
- + Target: 2 hour initial response



# Engage with OLI Systems on Social Media



OLI Systems, Inc. Persona	Title	LinkedIn 	Other Media 	Email
OLI Systems, Inc.	The Company	<a href="https://www.linkedin.com/company/oli-systems-inc/">https://www.linkedin.com/company/oli-systems-inc/</a>	<a href="https://twitter.com/OLISystems">https://twitter.com/OLISystems</a>	
Mike Kochevar All Inquiries	Sales & Success Leader	<a href="https://www.linkedin.com/in/mike-kochevar-pmp-7443258/">https://www.linkedin.com/in/mike-kochevar-pmp-7443258/</a>		<a href="mailto:Mike.Kochevar@olisystems.com">Mike.Kochevar@olisystems.com</a>
Pat McKenzie Sales	VP Sales & Marketing	<a href="https://www.linkedin.com/in/pat-mckenzie-b4241011/">https://www.linkedin.com/in/pat-mckenzie-b4241011/</a>		<a href="mailto:Pat.mckenzie@olisystems.com">Pat.mckenzie@olisystems.com</a>
Dr. AJ Gerbino Client Success	VP Client Success	<a href="https://www.linkedin.com/in/anthony-a-j-gerbino-49354a9/">https://www.linkedin.com/in/anthony-a-j-gerbino-49354a9/</a>		<a href="mailto:AJ.Gerbino@olisystems.com">AJ.Gerbino@olisystems.com</a>
James W. Berthold Client Support	VP Client Support	<a href="https://www.linkedin.com/in/james-berthold/">https://www.linkedin.com/in/james-berthold/</a>	<a href="https://twitter.com/JimBerthold_OLI">https://twitter.com/JimBerthold_OLI</a>	<a href="mailto:James.Berthold@olisystems.com">James.Berthold@olisystems.com</a>
Dr. Andre Anderko	Chief Technology Officer	<a href="https://www.linkedin.com/in/andre-anderko-a3518514b/">https://www.linkedin.com/in/andre-anderko-a3518514b/</a>	<a href="https://scholar.google.com/citations?user=auFtxeEAAAAJ&amp;hl=en">https://scholar.google.com/citations?user=auFtxeEAAAAJ&amp;hl=en</a>	
Vineeth Ram	Chief Revenue Officer	<a href="https://www.linkedin.com/in/vineeth-ram-96b6b54/">https://www.linkedin.com/in/vineeth-ram-96b6b54/</a>	<a href="https://twitter.com/VineethRam">https://twitter.com/VineethRam</a>	
Alice Parrish	Sales & Success Operations Leader	<a href="https://www.linkedin.com/in/alice-parrish-711908158/">https://www.linkedin.com/in/alice-parrish-711908158/</a>		
Rasika Nimkar Client Success	Client Success Consultant	<a href="https://www.linkedin.com/in/rasika-nimkar/">https://www.linkedin.com/in/rasika-nimkar/</a>	<a href="https://twitter.com/Rasika_OLI">https://twitter.com/Rasika_OLI</a>	<a href="mailto:Rasika.Nimkar@olisystems.com">Rasika.Nimkar@olisystems.com</a>
Dr. Diana Miller Client Support	Technical Support Consultant	<a href="https://www.linkedin.com/in/diana-salgado/">https://www.linkedin.com/in/diana-salgado/</a>		<a href="mailto:Diana.Miller@olisystems.com">Diana.Miller@olisystems.com</a>
Dira Silvera Training Program & Academic Licenses	Sales Operations Administrator	<a href="https://www.linkedin.com/in/dira-s-2a44062/">https://www.linkedin.com/in/dira-s-2a44062/</a>		<a href="mailto:Dira.Silvera@olisystems.com">Dira.Silvera@olisystems.com</a>
OLI Simulation Group	Support questions	<a href="https://www.linkedin.com/groups/12093538">https://www.linkedin.com/groups/12093538</a>		

[www.olisystems.com](http://www.olisystems.com)



Thanks for your attention!