

Nutrient Treatment Technology Symposium
October 21, 2013



The Innovation of Process. The Process of Innovation.

Denny Parker, PhD, PE, NAE

Degree of Risk



Why/How to Innovate in Our Industry?



**Basic
Research**



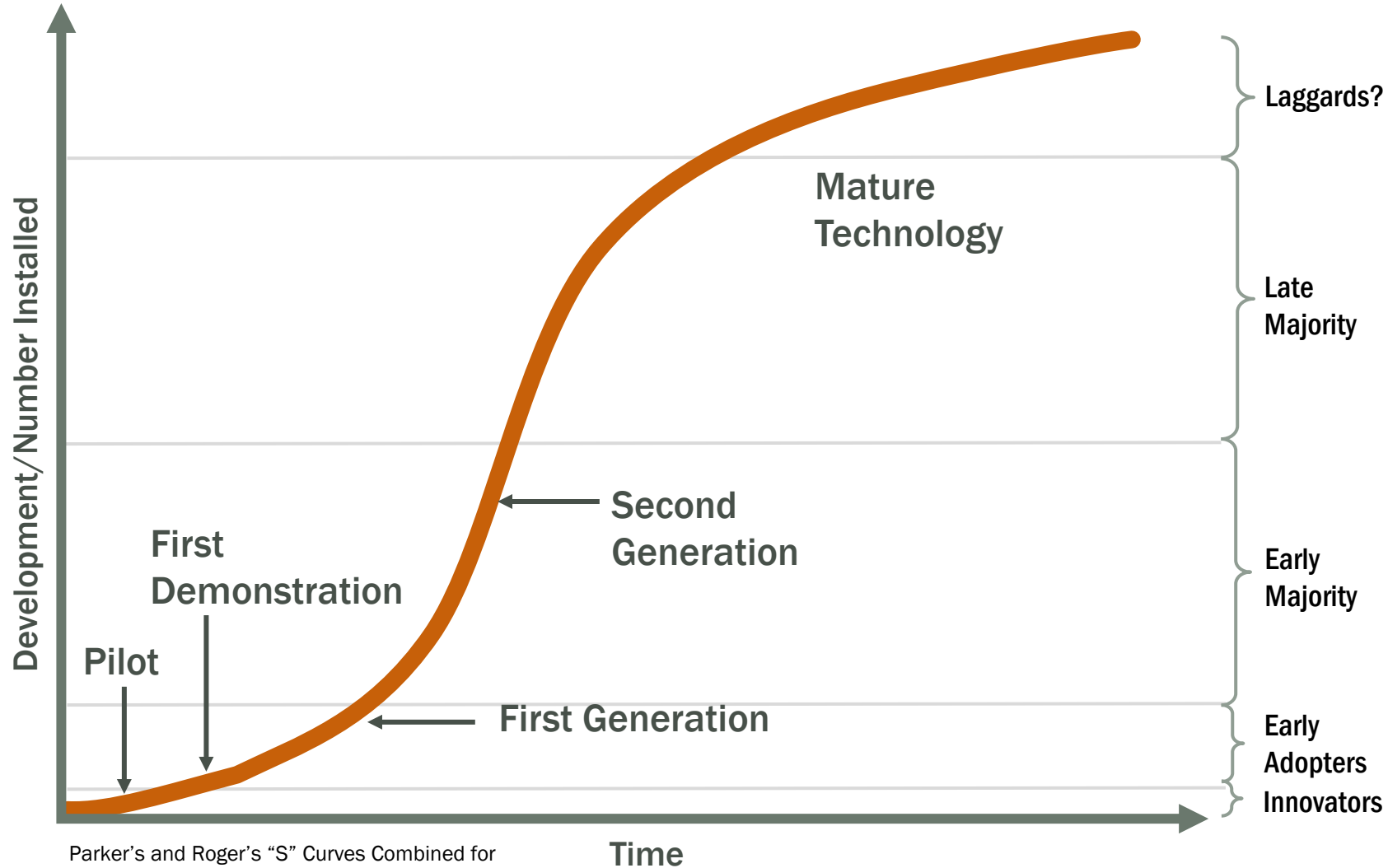
**Pilot-scale
Research**



**Demonstration-scale
Research**

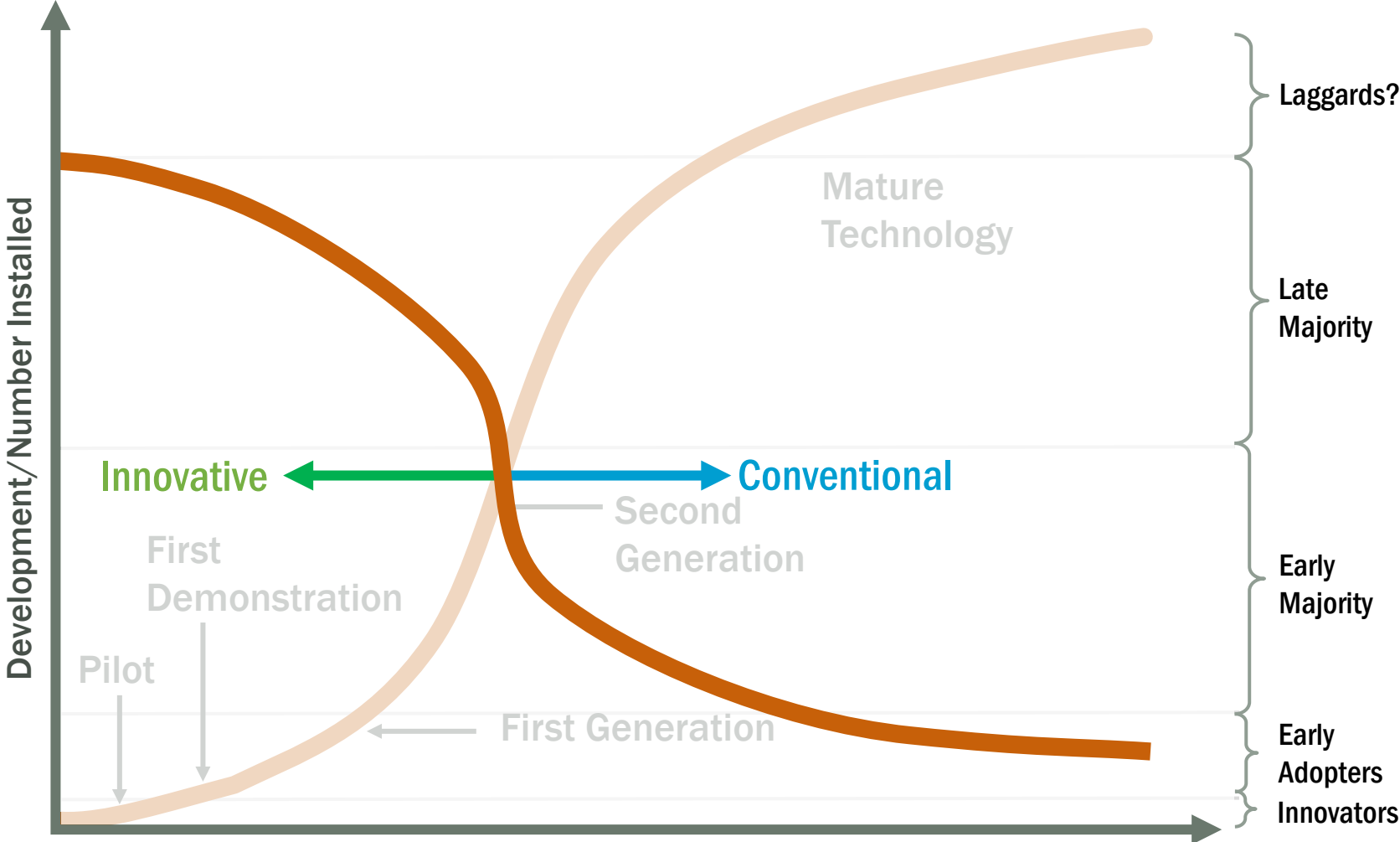


“S” Curve for Innovation



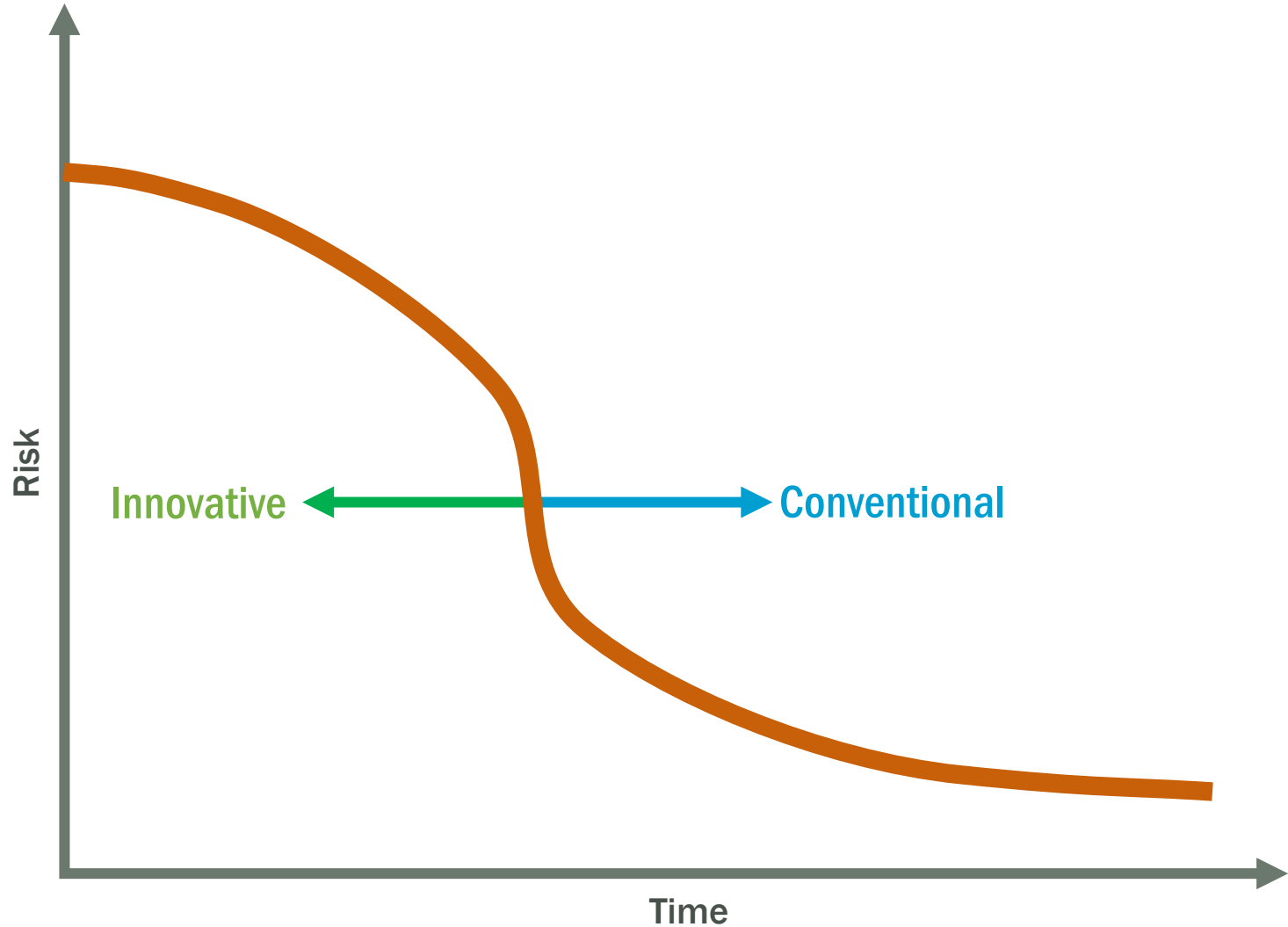
Parker's and Roger's "S" Curves Combined for Status of Technology and Type of Adopter

“S” Curve for Innovation

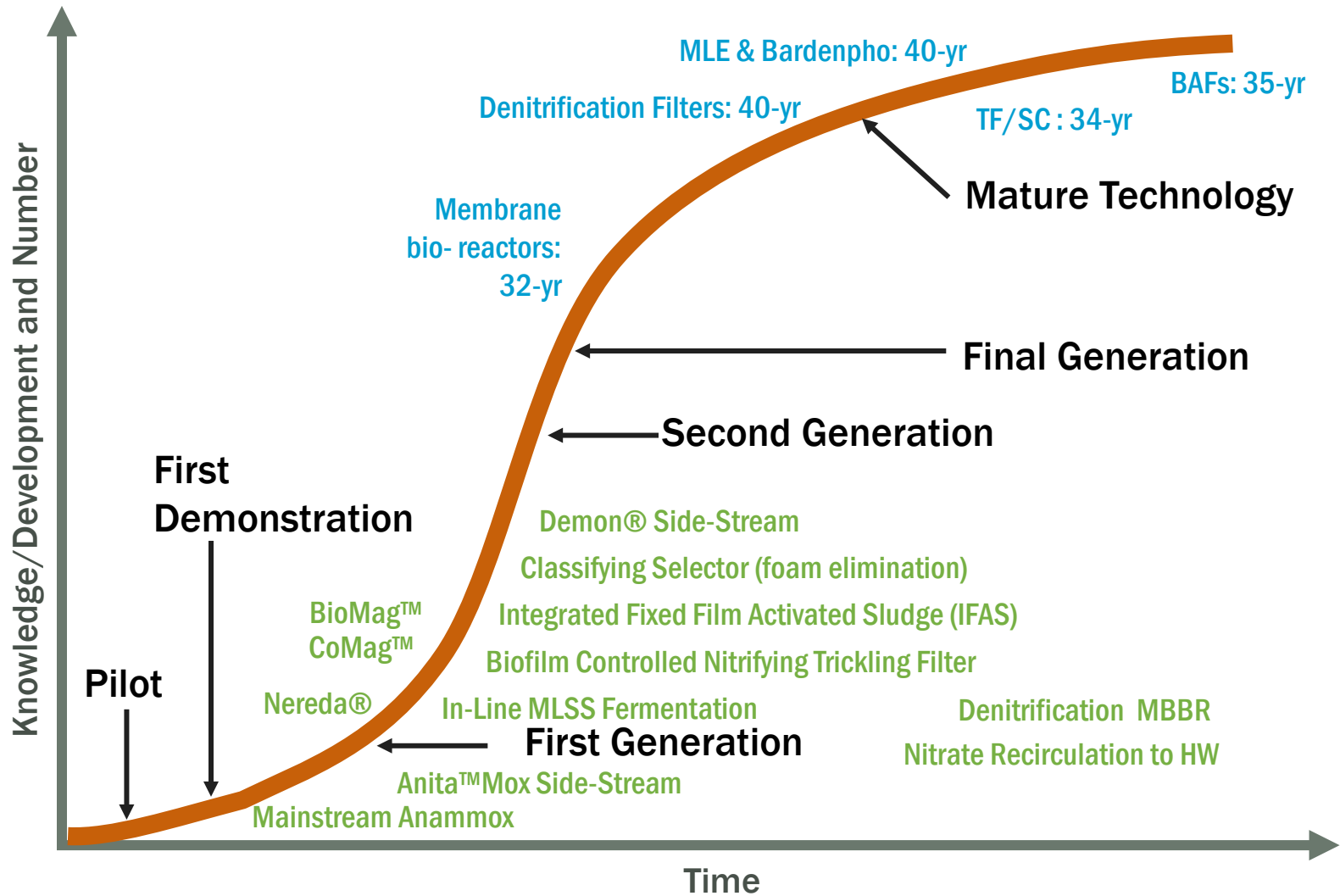


Parker's and Roger's "S" Curves Combined for Status of Technology and Type of Adopter

Risk in Nutrient Removal Technology Applications



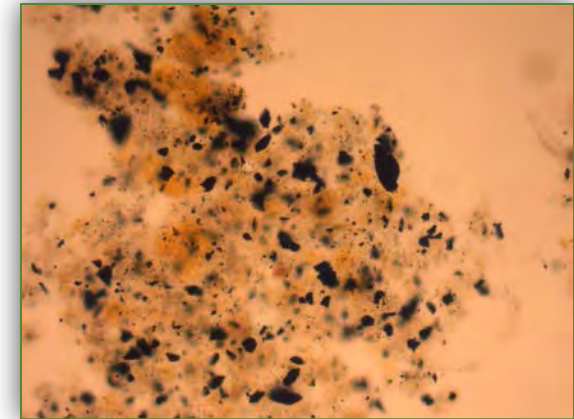
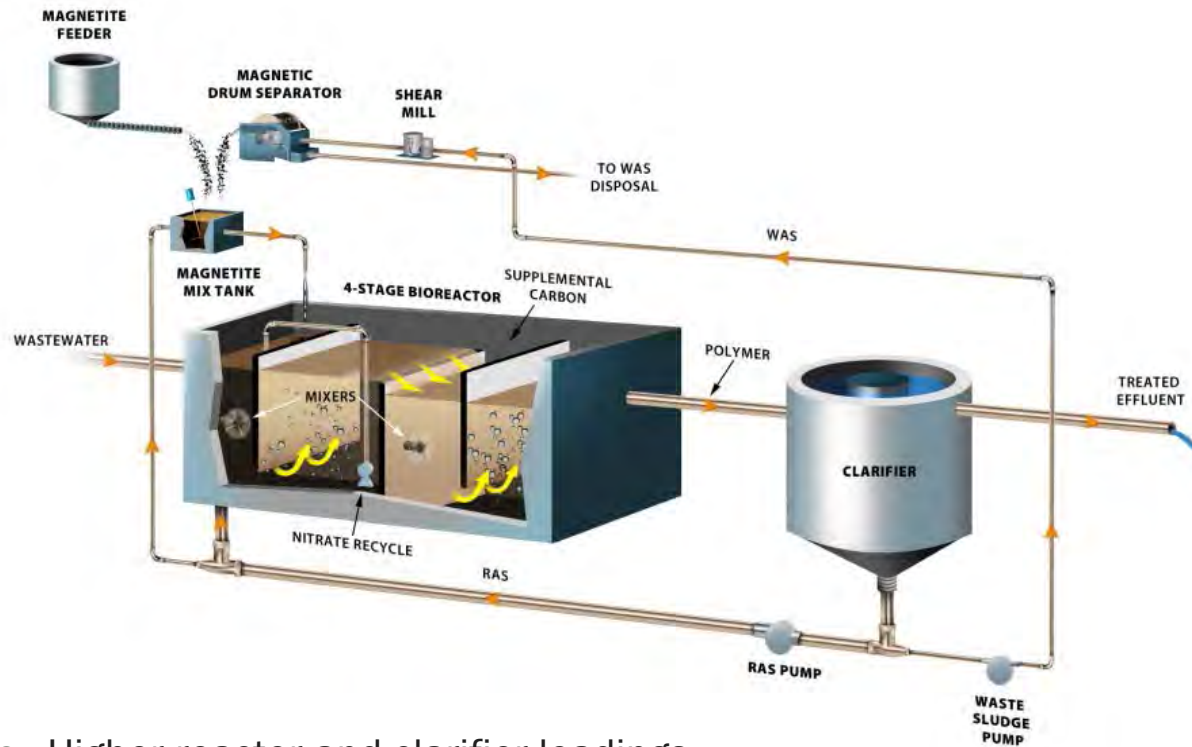
Where are Today's Technologies?



Two Examples

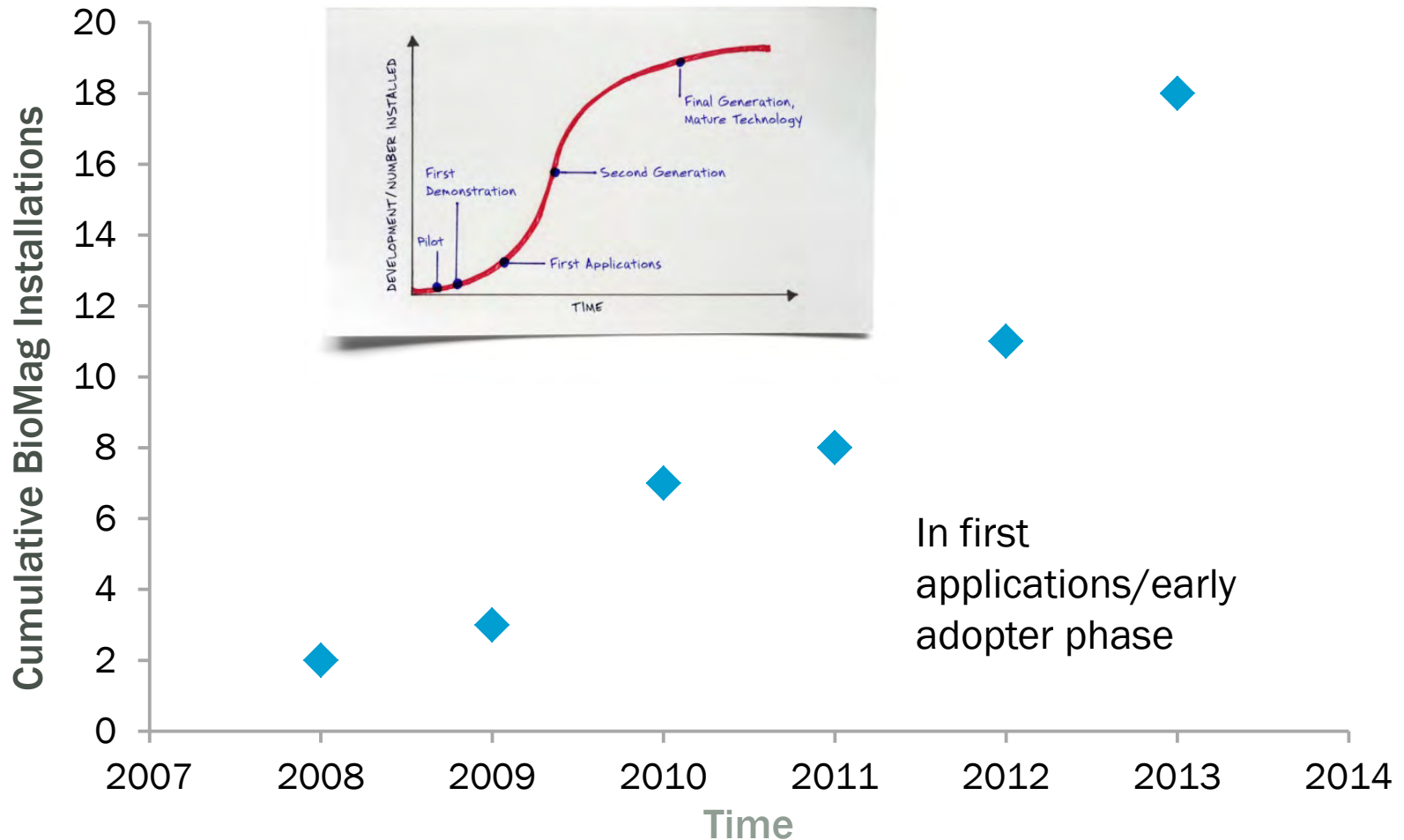
- Development Progressing: BioMag™ Process
- Development Stalled: IFAS Process

Case Study: BioMag™ Process

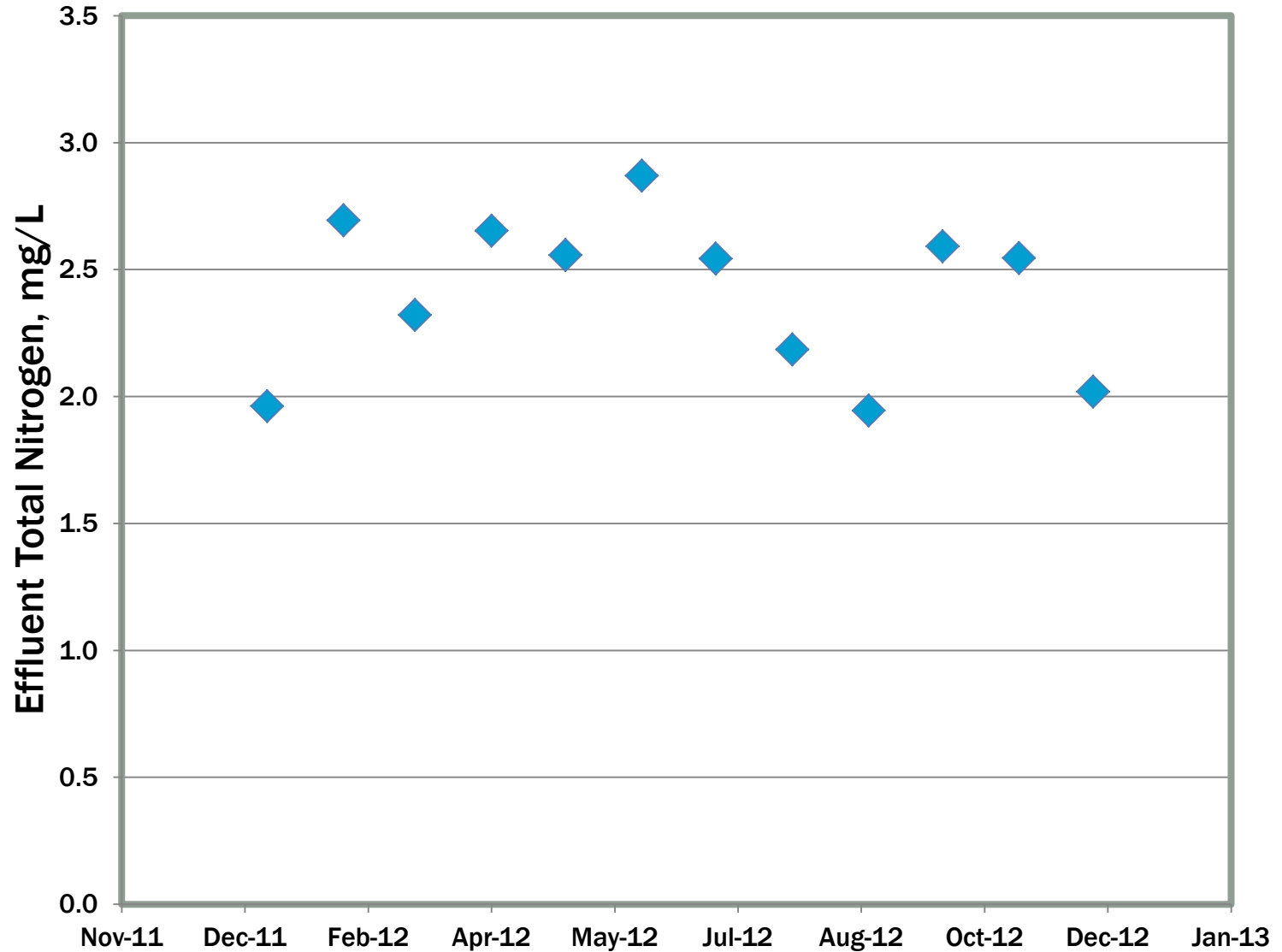


- Higher reactor and clarifier loadings
- Fit on smaller sites
- Low effluent TN (e.g., 3 mg/l) due to biofilm reactions on magnetite particles
- Floc settles like a rock

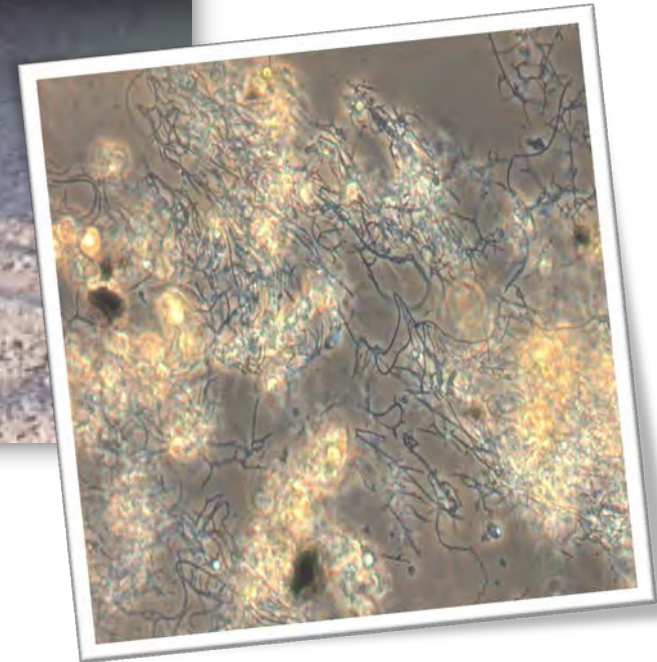
Managing Risk: BioMag™ Process



Sturbridge Data



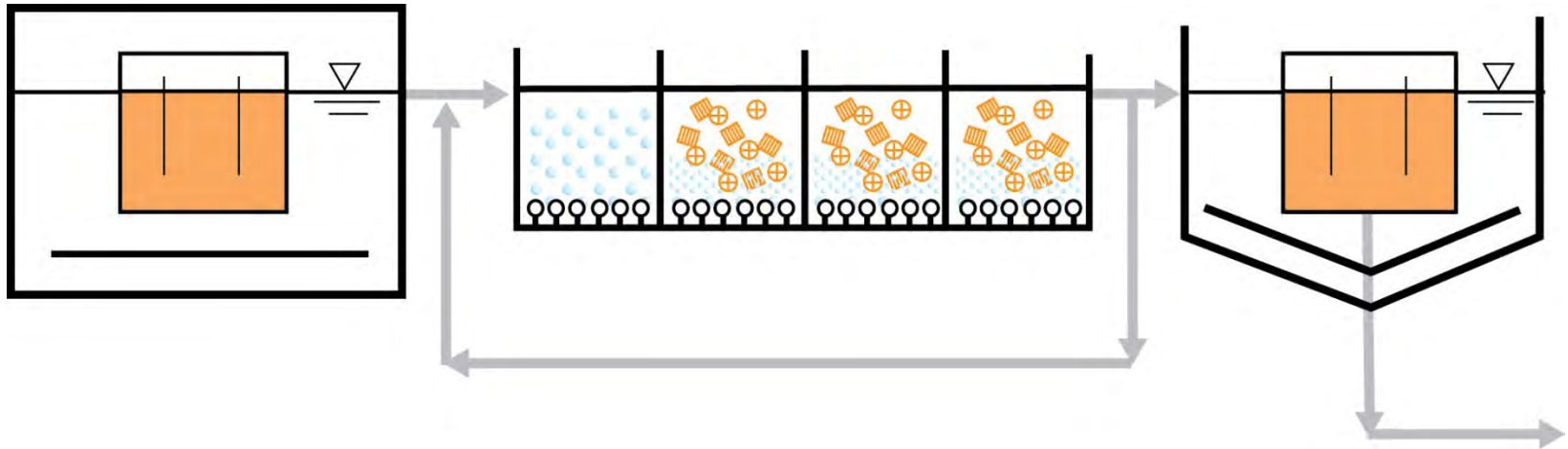
Selective Foam Wasting Didn't Work



Siemens' Automated Classifying Selector Station with No Level Sensor or Weir



Case Study: IFAS Process



Unresolved Risk: Capacity Loss due to foam trapping in 1st Generation IFAS System



Result: Half of the IFAS plants in a 2011 survey had severe foaming and bulking (50 percentile SVI values exceeding 160 mL/g)

Conclusions on Innovative Applications

Justification

- Can have a long-term benefit to the utility (cost and/or energy, space savings, or sustainability)
- Have meaningful discussions with decision makers and stakeholders about risk and risk management and benefits and costs

Implementation

- Follow the scientific method
 - Don't skip steps: lab>pilot>demonstration
 - Devise scalable demonstration testing (or take advantage of work at other sites)
 - Work through and resolve process issues
- Plan strategies for handling remaining risks

Presenter contact information

Denny Parker, Ph.D., P.E.

Member, National Academy of Engineering



201 North Civic Drive

Walnut Creek, CA 94596

925.210.2274

Email: dparker@brwnald.com

References

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Rogers, E .M. *Diffusion of Innovation*. Fifth Edition, Free Press, New York, 2003.