Dr. Regina Valluzzi, BS² '89
(3 and 21.6)
Partner, Teal Economy group

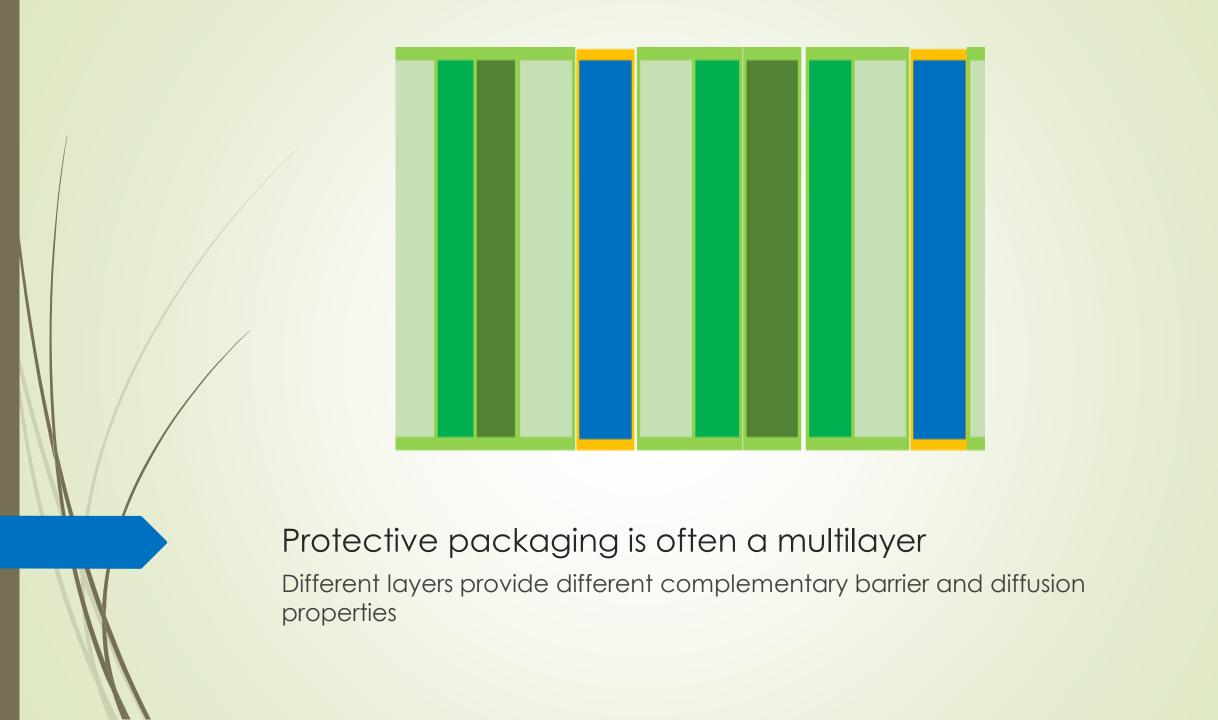
regina.valluzzi@tealeconomy.org

https://www.tealeconomy.org

My background and focus

- Data driven design tools for materials substitutions
- Currently focused on gas transport through multilayers
- Years of research in Biopolymers, Biomimetics, Bionano, and Green Chemistry and Materials
- Advising early stage start-ups in not-software

Let's solve challenges faced by innovators and get more Green tech developed!



Properties matter

- Either a good match or a straightforward engineer-around for differences
- Mechanical Properties
- Processability
- Chemical and transport properties
 - Modified by process history
 - HUGE factor in packaging, which also generates a big plastics problem

Next Generation Materials

- Replacement materials for current products
- New materials for new technologies
- Circular and fully degradable
- Environmentally friendly production
- Sourced "from Nature"
 - no new dinosaurs added to environment

Generation	Source Type	Typical Source	Recommendation
	Foodstuff carbohydrates	Corn and Sugarcane	Possible diversion of food production into packaging feedstock. Carefully assess.
	Biomass By-Products/ Ag Waste/ Cellulose	J	Currently preferred source of biomass
3		Algae, Carbon fixing bacteria	Technology may be the best for carbon reduction/capture. Not yet mature. Good area to support innovation!

Generalized Technology Development Pathway

R&D Lab, University or still within Employer lab Point of Entry for Sustainable Technologies

0,1 - Discovery

- Potentially Useful Observation
- Reproduce and develop
- Decide whether to License, Launch or set aside.
- Publication, IP filing, Internal Document

2,3 - POC Demo

- Devise POC test and format
- Identify Value Proposition and Industries, Write B-Plan and slide deck
- Determine and seek best Seed financing type
- Repeatable Samples and results

Incorporated and moving into space

4,5 - Prototyping and USE assessment

- Streamlined Bench scale fabrication process, SOP
- Develop Key Performance Indicators, Processing Guide and Performance Tests
- Secure significant financing

6,7 - Process Dev and Pilot Test

- Pilot Scale Development, Complete Pilot Test and Demonstrate Key Performance Indicators
- Alpha Test Plan Developed

Valley of Death. High Burn rate and value added milestones often difficult and not clearly articulated/supported

- 8,9 Alpha and Beta testing
- Alpha Tests completed. Key Performance Indicators and product stability demonstrated
- Sourcing and pilot production lot to lot variability well-controlled

10,11 - Soft Launch and Launch

- Manufacturing
- Technology is packaged, documented and market ready with positive feedback from testers.
- Implemented first phase of Supply Chain Resiliency

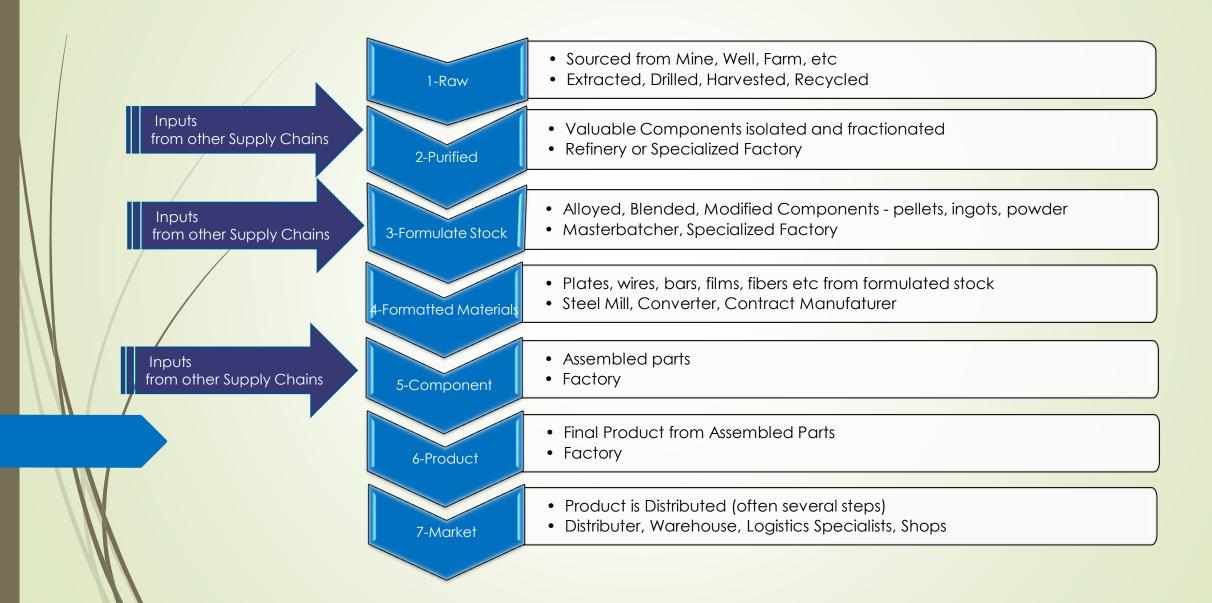
Good Point of Entry for Sustainable <u>Substitute</u> Sources

- 12 Market and Supply Chain Optimization
- Distribution, customer support and customer facing activities
- Applications Developed and documented

Complex Manufacturing is an Innovation Challenge

- Materials Science Innovations are often components of Complex Manufacturing Supply Chains
- Materials Innovations often require complex manufacturing
- Cycles of prototyping
- Design for Manufacturing,
 - but this can be an innovation straightjacket

Generalized Supply Chain



Next gen materials are Innovative Materials

How do they get into the Market?

- Where can they enter a partner supply chain?
- How do they get specified into a big manufacturers process?
- Into a Product?
- Where are the gaps and challenges that kill Innovations?
- How can we bridge these gaps and link together a supply chain?

Teal Economy Group

www.TealEconomy.org

Bringing the challenges for the Blue and Green economies

- Materials of the Future
- Resilient Supply Chains
- Robust Innovation Ecosystems