Industry/Academia Collaborations to Advance Green Chemistry:

Steelcase and UC Berkeley's Greener Solutions Program

April 13, 2017

GREEN CHEMISTRY & COMMERCE COUNCIL

Business Mainstreaming Green Chemistry

What is the GC3?

- Cross-sectoral, B2B network of over 100 companies and other organizations
- Formed in 2005
- Collaboratively advances green chemistry across sectors and supply chains

Over 100 Members, including:

GC3

Today's Speakers

Tom McKeag

Executive Director,
UC Berkeley Center for
Green Chemistry

Jon Smieja

Sustainable Design &
Development Leader,
Global Sustainability,
Steelcase Inc.

Mark Shapero

Graduate Student,
UC Berkeley

GC3 Innovators Roundtable

12th Annual GC3 Innovators Roundtable
Hosted by Steelcase Inc. in Grand Rapids, MI
April 25 – 27, 2017

Green & Bio-Based Chemistry Technology Showcase
Amway Grand Plaza Hotel, Grand Rapids, MI
April 24, 2017, 1:00 p.m. – 6:30 p.m. EST

Ground Rules

- Due to the number of participants in the webinar, all lines will be muted
- If you have a question or comment, please type it in the “Questions” box located in the control panel
- Questions will be answered at the end of the presentation

Industry/Academia Collaborations:
Steelcase and UC Berkeley's Greener Solutions Program

A GC3 Webinar
April 13, 2017

BERKELEY CENTER FOR GREEN CHEMISTRY

Steelcase

Mark Shapero Tom McKeag Jon Smieja

Steelcase and the value of academic partnerships

Jon Smieja, PhD

Sustainable Design & Development Leader

Steelcase

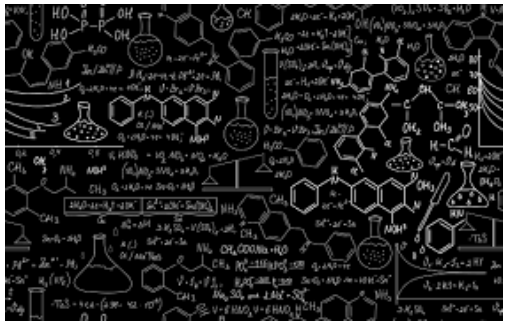
Steelcase: An Overview

For over 100 years, Steelcase Inc. has helped create great experiences for the world's leading organizations, across industries. We offer a comprehensive portfolio of architecture, furniture and technology products and services designed to unlock human promise and support social, economic and environmental sustainability.

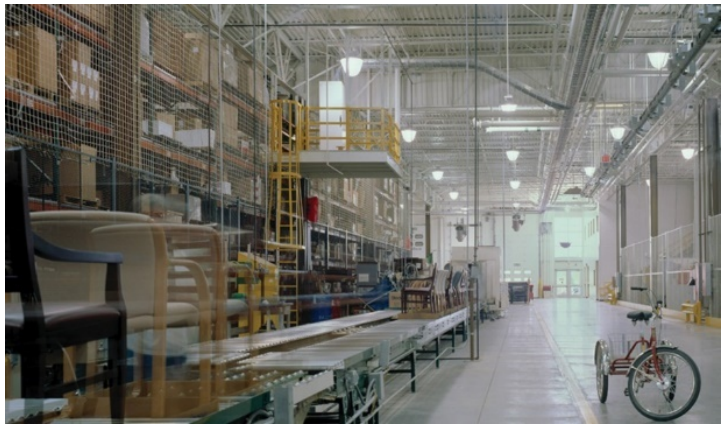
We are globally accessible through a network of channels, including over 800 dealer locations. Steelcase is a global, industry-leading and publicly traded company with an annual revenue of more than $3 billion. We demonstrate all this through our family of brands –
Steelcase, Coalesse, Designtex, PolyVision and turnstone.

My role at Steelcase

- Joined the Global Sustainability team in 2013 in the role of Environmental Chemist
- In that role, served to connect with suppliers, product development teams, and customers on all things chemistry, hazard and toxicity
- Have since transitioned to a Leader of Sustainable Design and Development role
- Now I lead our North American team responsible for product sustainability (chemistry/toxicity, life cycle assessments, recyclability, circular economy, etc.)



Our goal: Building a circular economy



Steelcase

Product → Facilities → Enterprise

Collaborations at three levels

OUTREACH

- Develop connections with organizations we believe in
- Sponsor and support their efforts
- Host events, develop content, etc.

APPLIED

- Experimental and hands-on
- Developing prototypes

OPPORTUNITY MAPPING

- Future-focused
- Real problems at the company are addressed
- Uses brain power on each side

Beyond Benign

- Worked with Beyond Benign to develop curricula for K-12 educators around green chemistry being used in industry
- Units on:
  - Sharklet
  - Ecovative
  - Cogent textiles
- For the past several years we have also hosted a full day workshop for high school teachers at our Grand Rapids, MI facility where they can learn the curricula first hand.

STEELCASE AND ACADEMIC PARTNERSHIPS

GVSU – Solar Desk

GRAND VALLEY STATE UNIVERSITY

- Research shows that we're more productive and better learners when we have access to natural light and views to the outside
- There's also a trend towards outdoor furniture and outdoor spaces where people can be productive
- One of our benching/desking applications, bivi, lends itself very well to modification for outdoor use and connecting accessories because of its versatile platform

Steelcase

BERKELEY CENTER FOR GREEN CHEMISTRY

UC Berkeley CGC

- Steelcase was excited to be invited to participate in the Greener Solutions course last Fall
- The problem, however, was that we didn't immediately have a challenge in queue to present to the organizers of the course
- The goal of Greener Solutions is for the students to collaborate with an industry partner on a specific green chemistry problem and come up with an opportunity map
- Steelcase took the long view on this challenge, rather than a problem that we need an immediate solution to

The Steelcase vision

- When we were asked to come up with a challenge for Greener Solutions, we thought (relatively) big and outside the box
- Our central question:

  Could we develop one polymer to fit most/all of our needs in products that could be safe, perpetually cyclable, and versatile?

- It seemed to us that the only way this could be feasible would be a series of safe additives that could modulate the properties of the polymer backbone
- We elected to start with color because it was a bit more exciting than an antistatic or UV stabilizer

The specific challenge

- Understanding this question was too large, we focused in a bit on color and how to impart it in a future where we did have one polymer to rule them all
- As an example, we chose our Node chair
- How could we impart a variety of vibrant colors on a chair like that without the use of additives that have hazards associated with them?

Challenges for Steelcase

The PROJECT

- Very future focused, making it hard to find precedent for what we were trying to do
- The polymer system in Node is very hard to functionalize in any way, so there was a barrier to creativity there
- The challenge you choose is very important. Might be important to think of it from the point of view of desired outcomes and the *why*

The PREPARATION and COLLABORATION

- We didn't always have all the answers for the team because of our position in the supply chain
- Important to have internal and supply chain experts lined up and on board before beginning
- Manufacturer representative needs to set time aside to discuss with team and research questions

Challenges and opportunities

OPPORTUNITIES:

- With a well thought out challenge, the expertise of UC Berkeley can be brought to bare to create a very useful opportunity map
- Connections can be made with other participants. In our case both Patagonia and Mango Materials also participated
- Inspires creativity and future thinking for both the students and the manufacturer

Love how you work.

Thank You

Steelcase

The Team

Mark Shapero
PhD in Physical Chemistry

Studying laser induced chemical reactions

Ceclia Han Springer
PhD in Energy and Resources Group

Studying energy policies in Asia

Previously worked at a climate and environmental policy consulting firm

Laura Armstrong
PhD in Science and Math Education

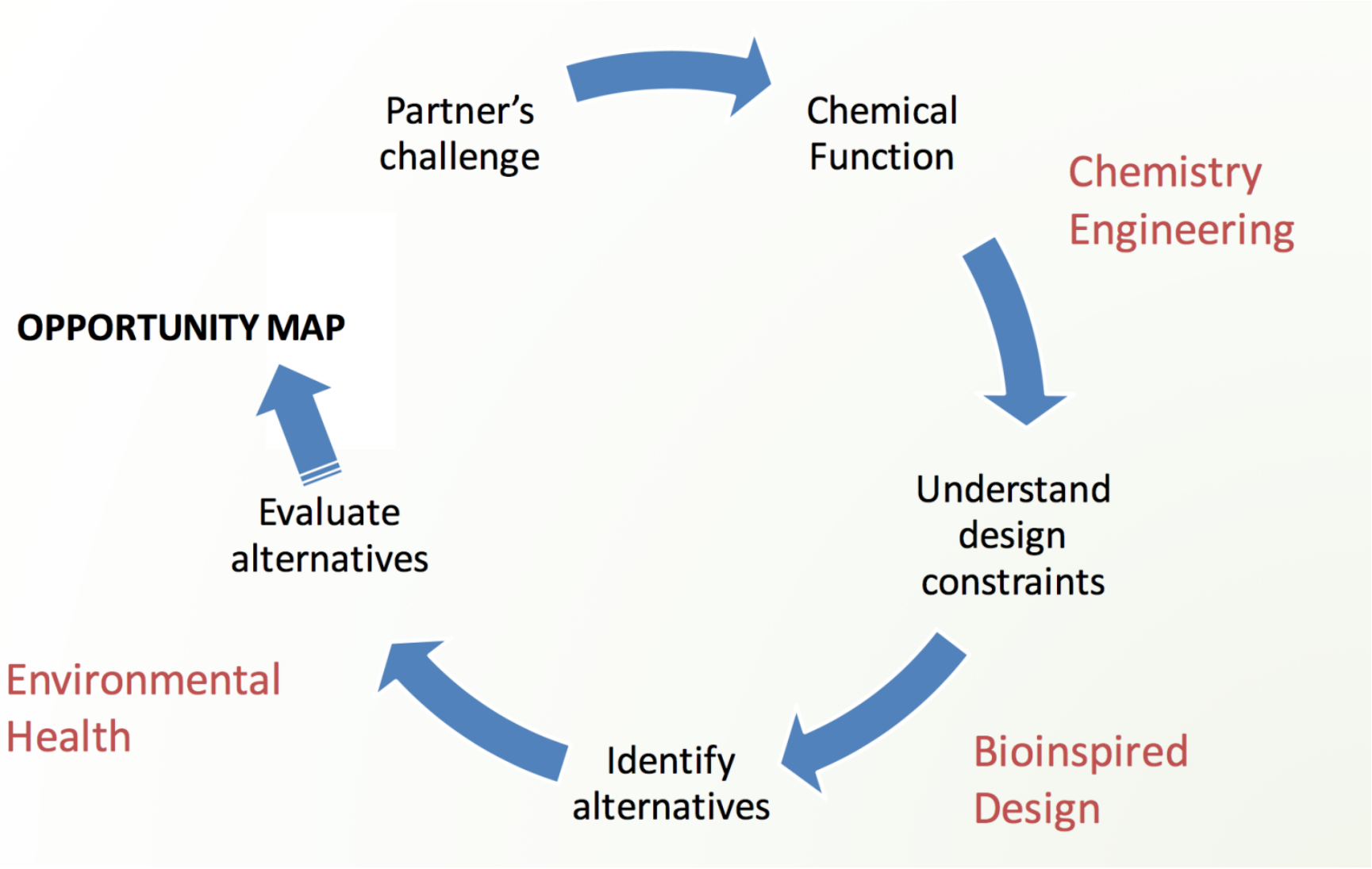
Developing green chemistry and toxicology lab curriculum

Interdisciplinary knowledge

I took this course because ...

- Personal Professional Development
  - Teamwork
  - Client relationship building
  - Technical communication
    - Written and Oral
- Exploring potential career pathways (not academia)
  - Social Responsibility
  - R & D
- Broadening Knowledge Set

Greener Solutions' Approach



Project Goal

Can color be imparted to a polymer without a free flowing additive?

Model system:
Node chair seat shell

Our Challenges

Identifying an achievable goal

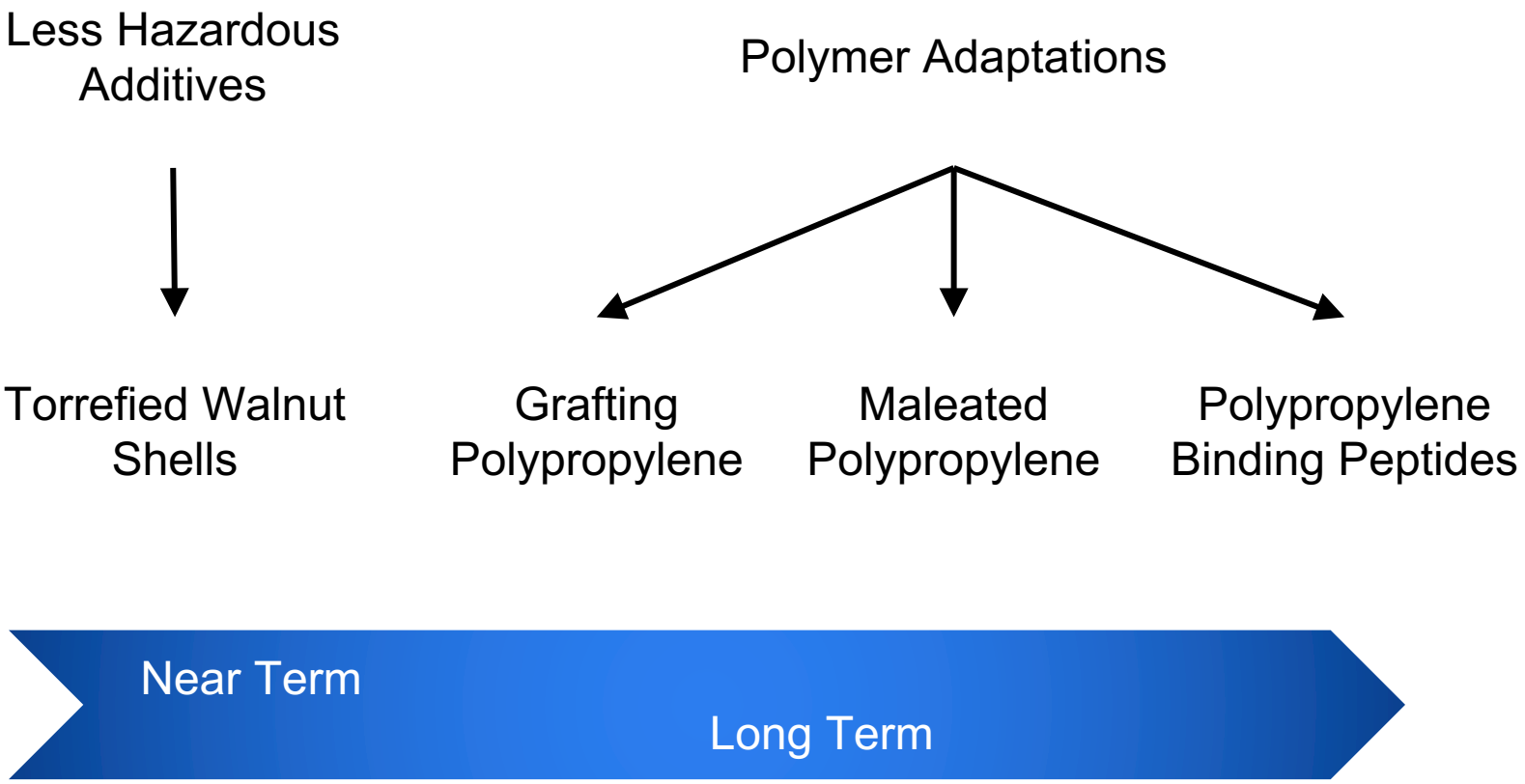
- Discerning the underlying motivation for Steelcase's vision
- Connecting Steelcase's broad vision with a problem we can attack
- Finding a goal that has merit

Learning necessary background

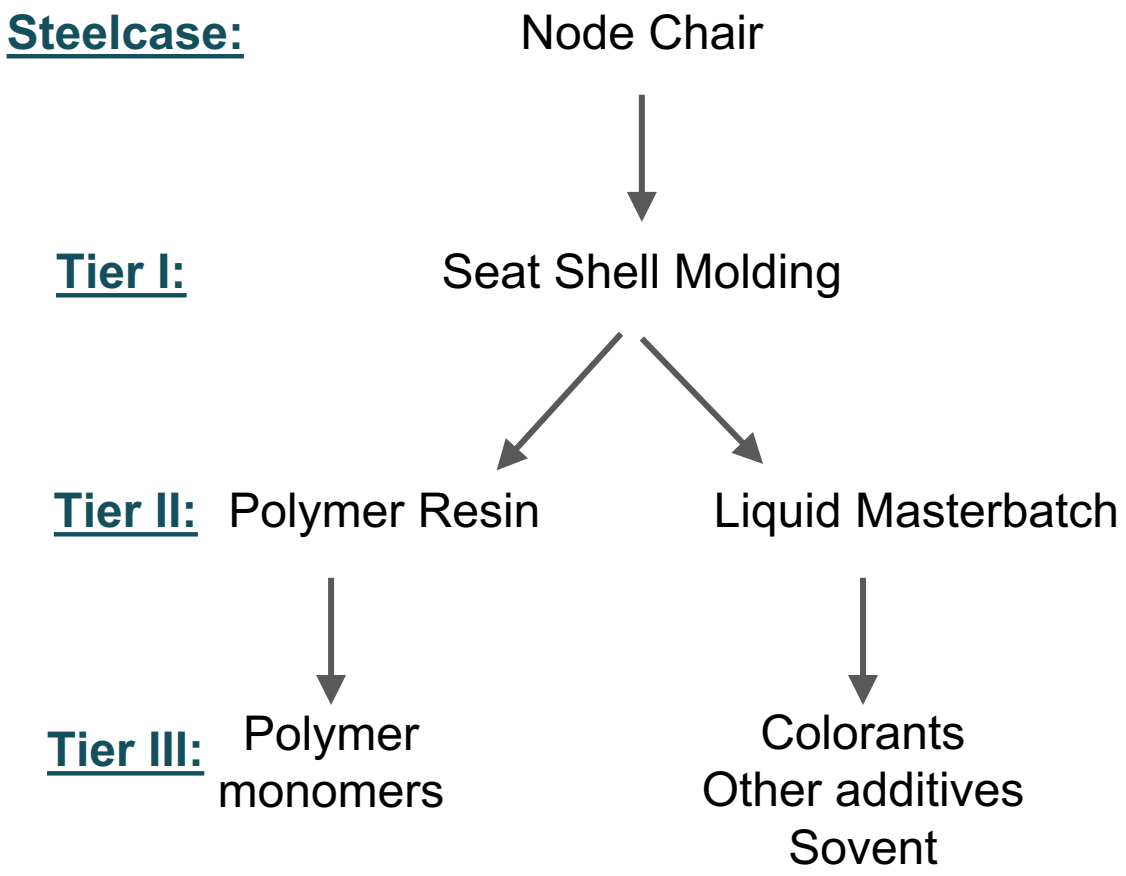
- Consulting with industry experts was difficult
  - Many topics to understand with a complicated supply chain
    - Polymers, Molding, Colorants
- Met a USDA scientist that is working on coloring polymers

➥ TIME

Summary of Strategies



Strategy Implementation



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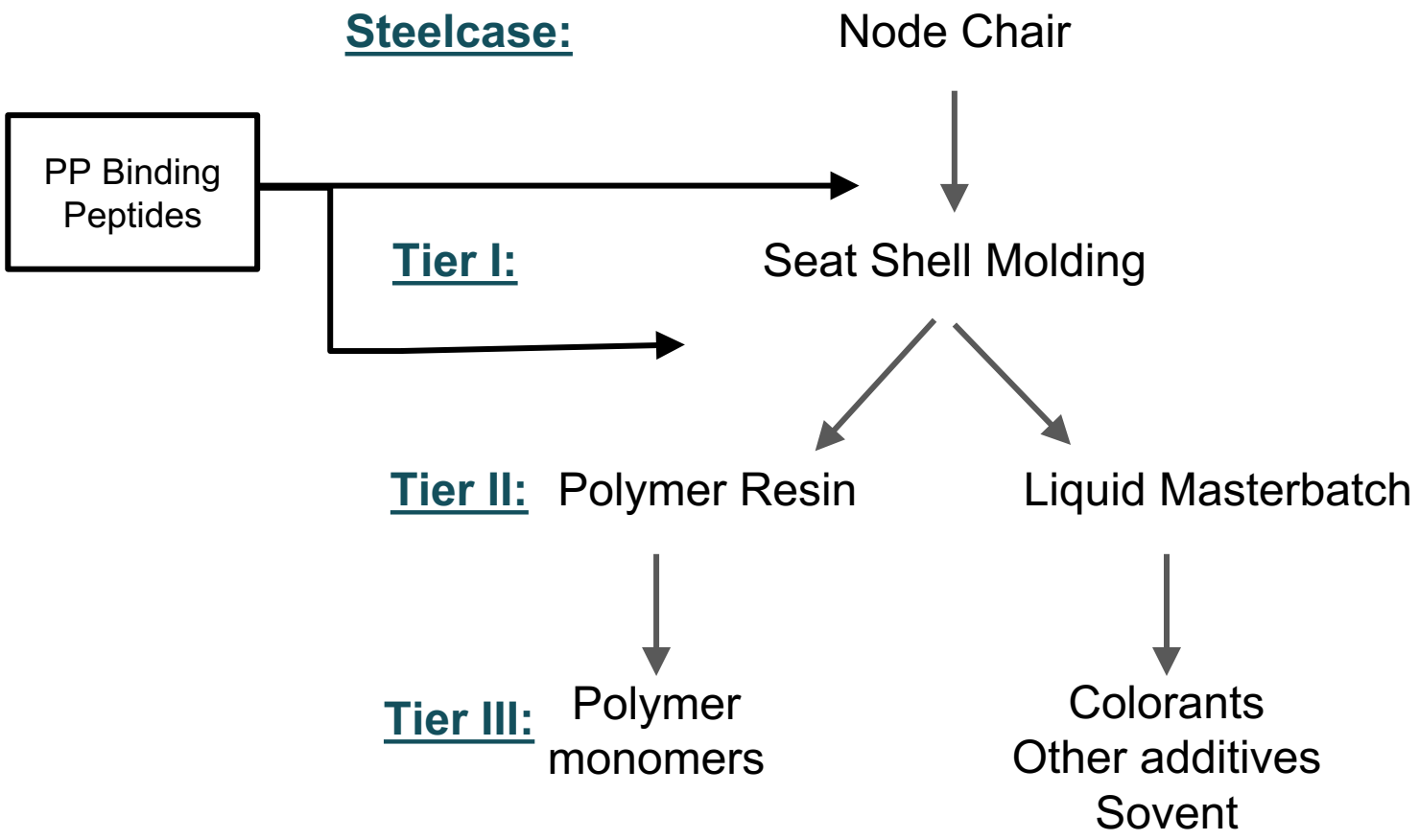

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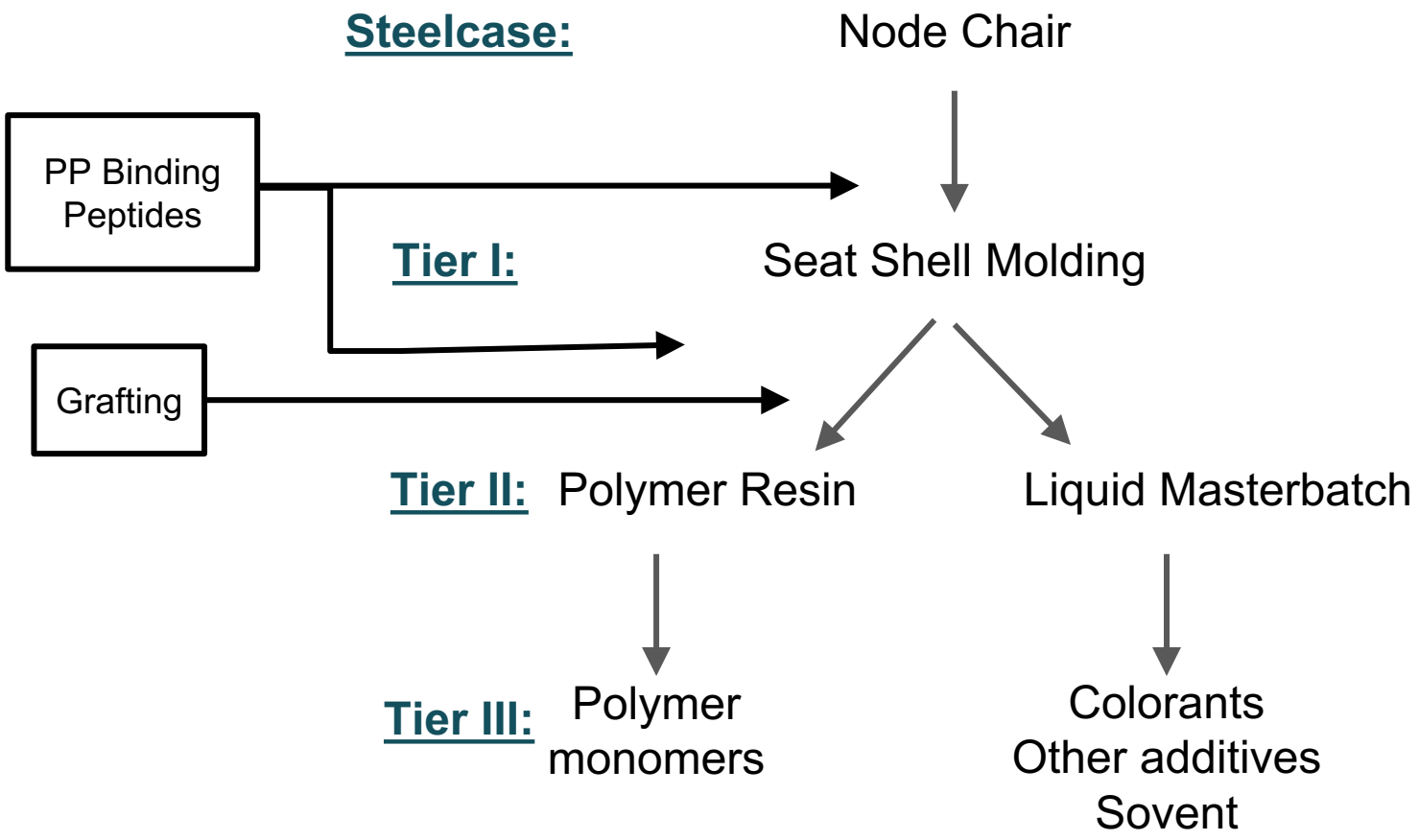

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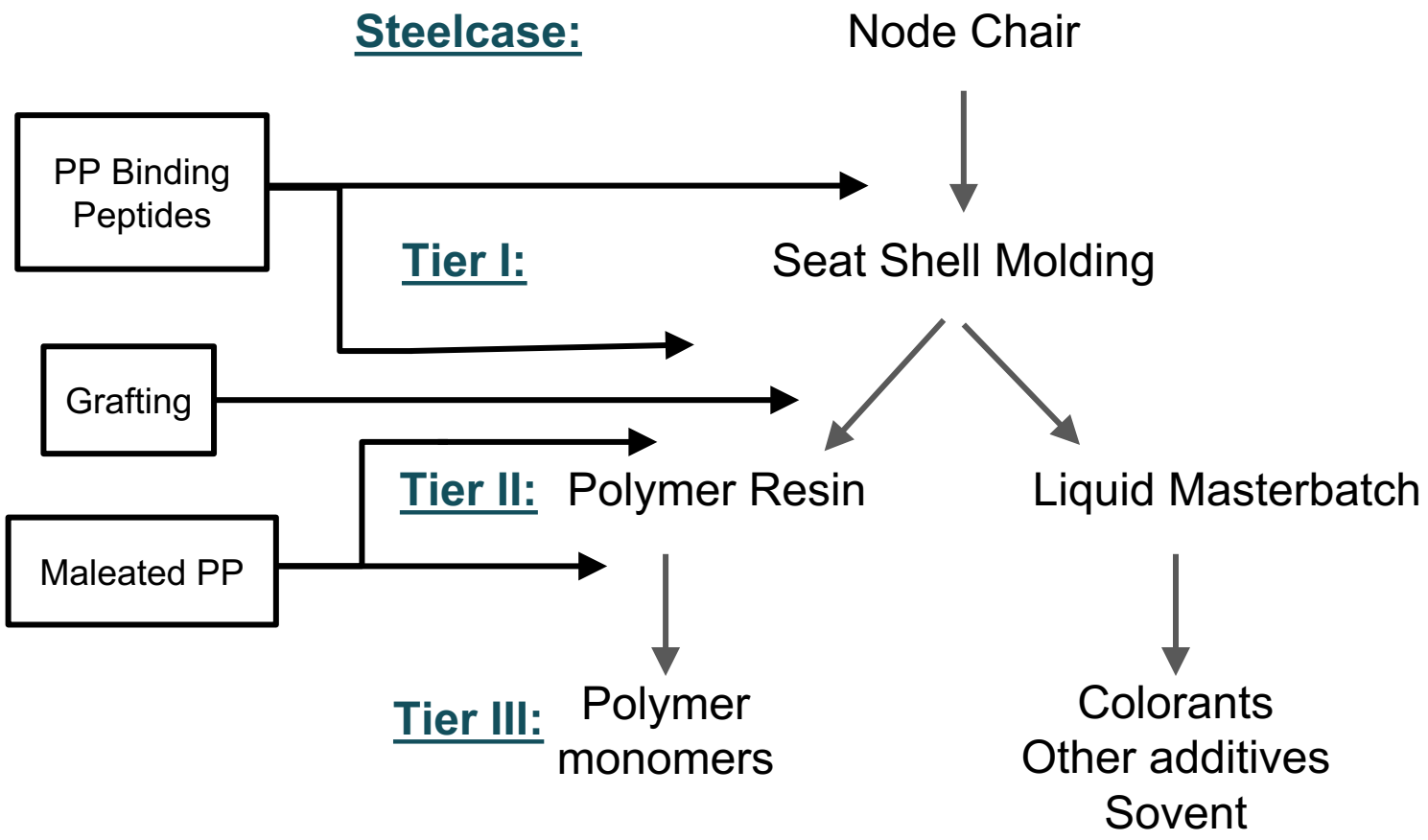

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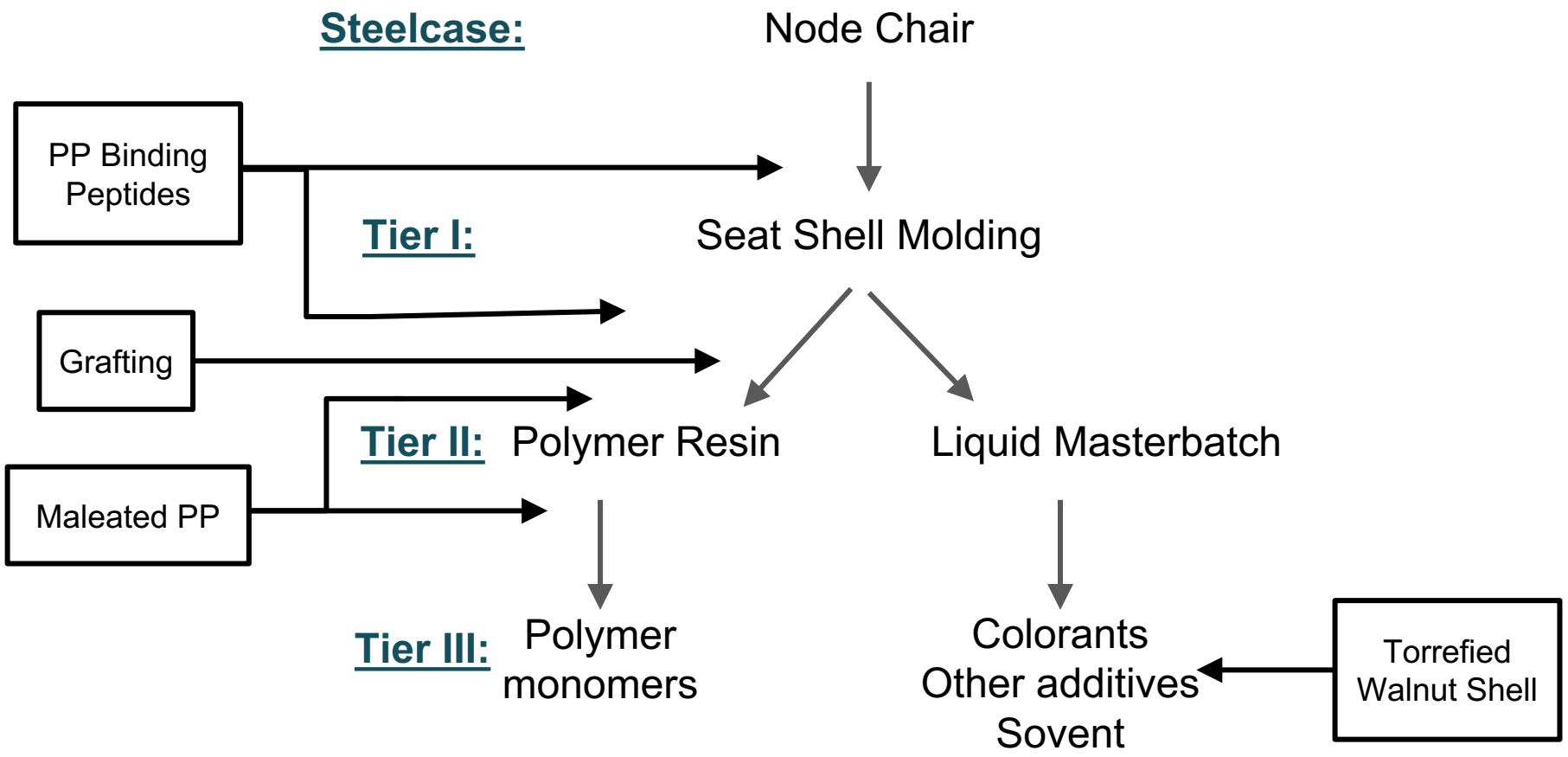

Opportunities for Improvement

For a Partner Challenge:

This course works really well for investigating less hazardous alternatives to hazardous chemicals within an industrial process

For Collaborating:

Face time with the partner is crucial. We were very lucky to be working with Jon! We had weekly meetings to get feedback.

For Supporting the work:

The structure of the course keeps the pace of work high. We could have used more background information at the onset.

Impacts

Feels good to have impact in real world problems

Connecting industry with isolated academic research

Meeting personal goals and gaining valuable experiences

Question & Answer

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Thanks for joining us!

For more information about the GC3:
www.greenchemistryandcommerce.org

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