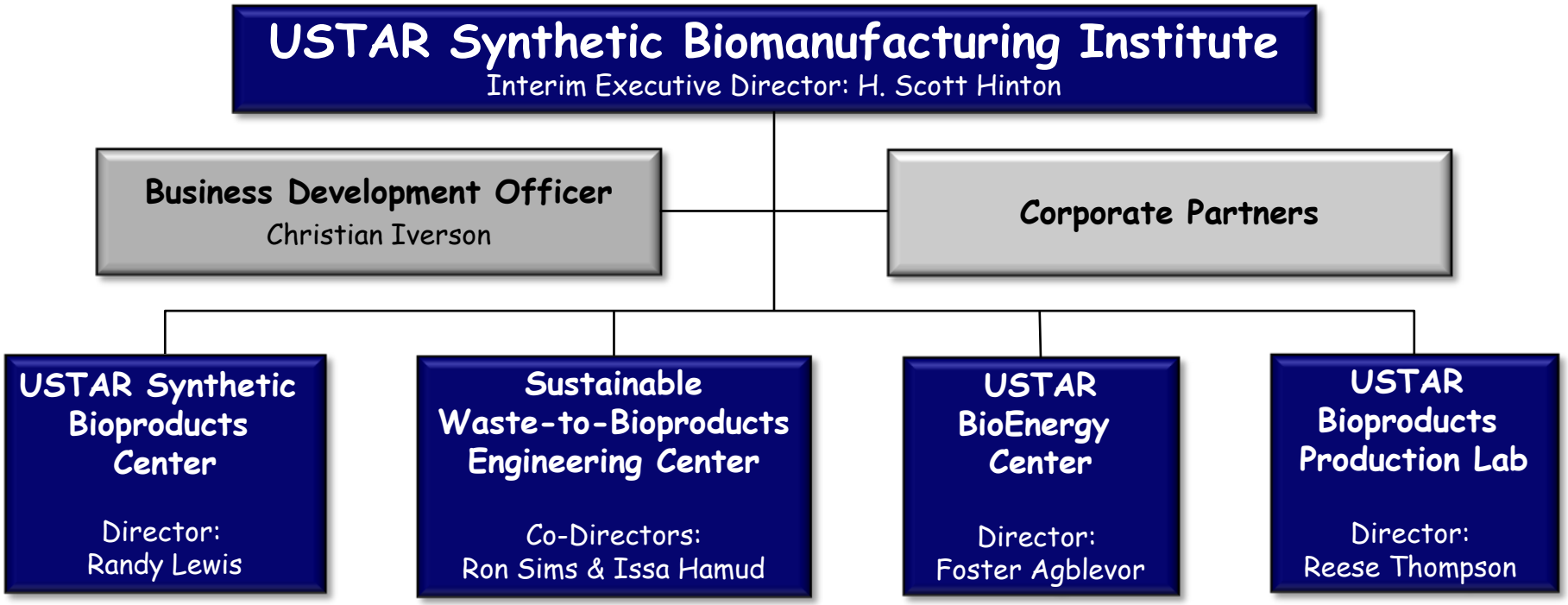
USTAR SYNTHETIC BIOMANUFACTURING INSTITUTE

Outline

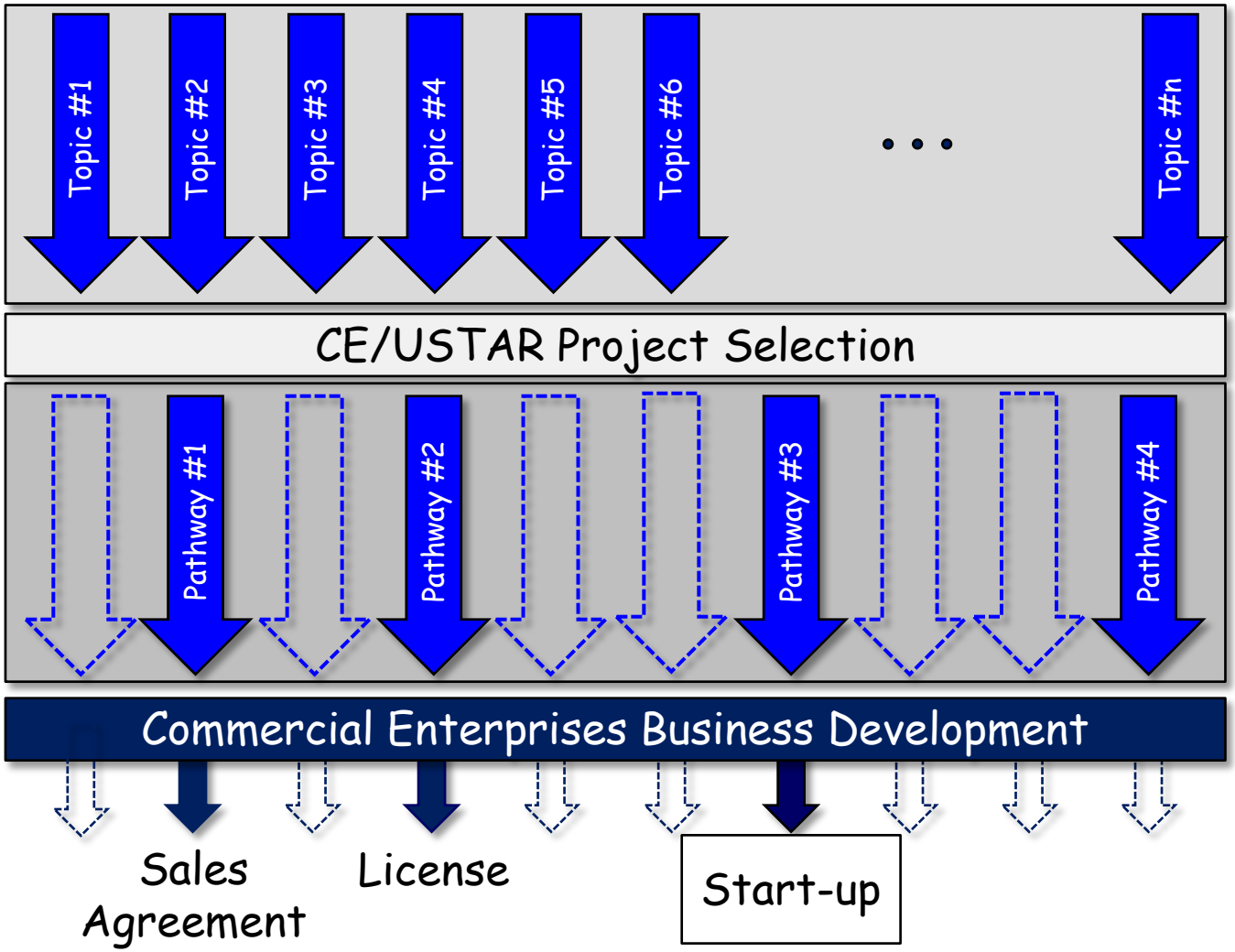
- Institute Overview
- USTAR Synthetic Bioproducts Center
- Sustainable Waste-to-Bioproducts Engineering Center
- USTAR BioEnergy Center
- USTAR Bioproduct Production Laboratory


USTAR Synthetic Biomanufacturing Institute
Interim Executive Director: H. Scott Hinton
Business Development Officer
Christian Iverson
Corporate Partners
USTAR Synthetic Bioproducts Center
Director:
Randy Lewis
Sustainable Waste-to-Bioproducts Engineering Center
Co-Directors:
Ron Sims & Issa Hamud
USTAR BioEnergy Center
Director:
Foster Agblevor
USTAR Bioproducts Production Lab
Director:
Reese Thompson

SBI Pathways to Products

Academic Research
(NSF, NIH, USDA, DOE, DOD, …)

Product Prototype Development
(USTAR, CE Group, Corporate Partners)



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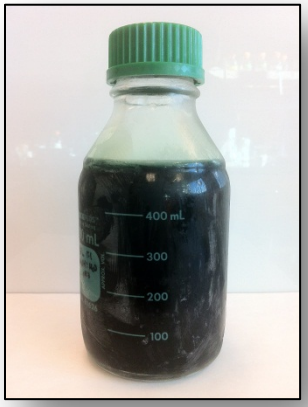
USTAR Synthetic Bioproducts Center

Driven by today's environmental, health and economic challenges, the goal of the Synthetic Bioproducts Center is to take advantage of the recent bio-scientific advances to enable living organisms (single-cell organisms, plants, and animals) to transform raw materials into environmentally friendly products such as low cost therapeutics, antimicrobials, biomaterials, and pharmaceuticals.

Spider on Spool of Synthetic Silk



Biliverdin

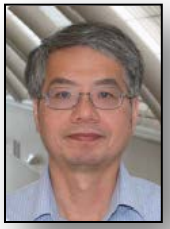
K20 Fungicide

Bioplastic

Spider Silk Protein

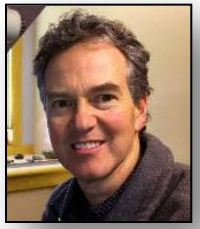
SBC Affiliated Faculty

Heng Ban
- MAE -



Tom Chang
- CB -

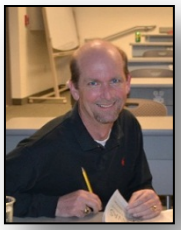
Yue Cui
- BE -



Nicholas Flann
- CS -

Scott Hinton
- ECE -

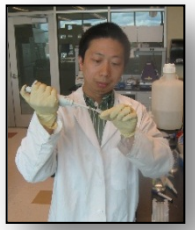
Randy Lewis
- Biology -



Charlie Miller
- BE -

Ron Sims
- BE -

Jon Takemoto
- Biology -

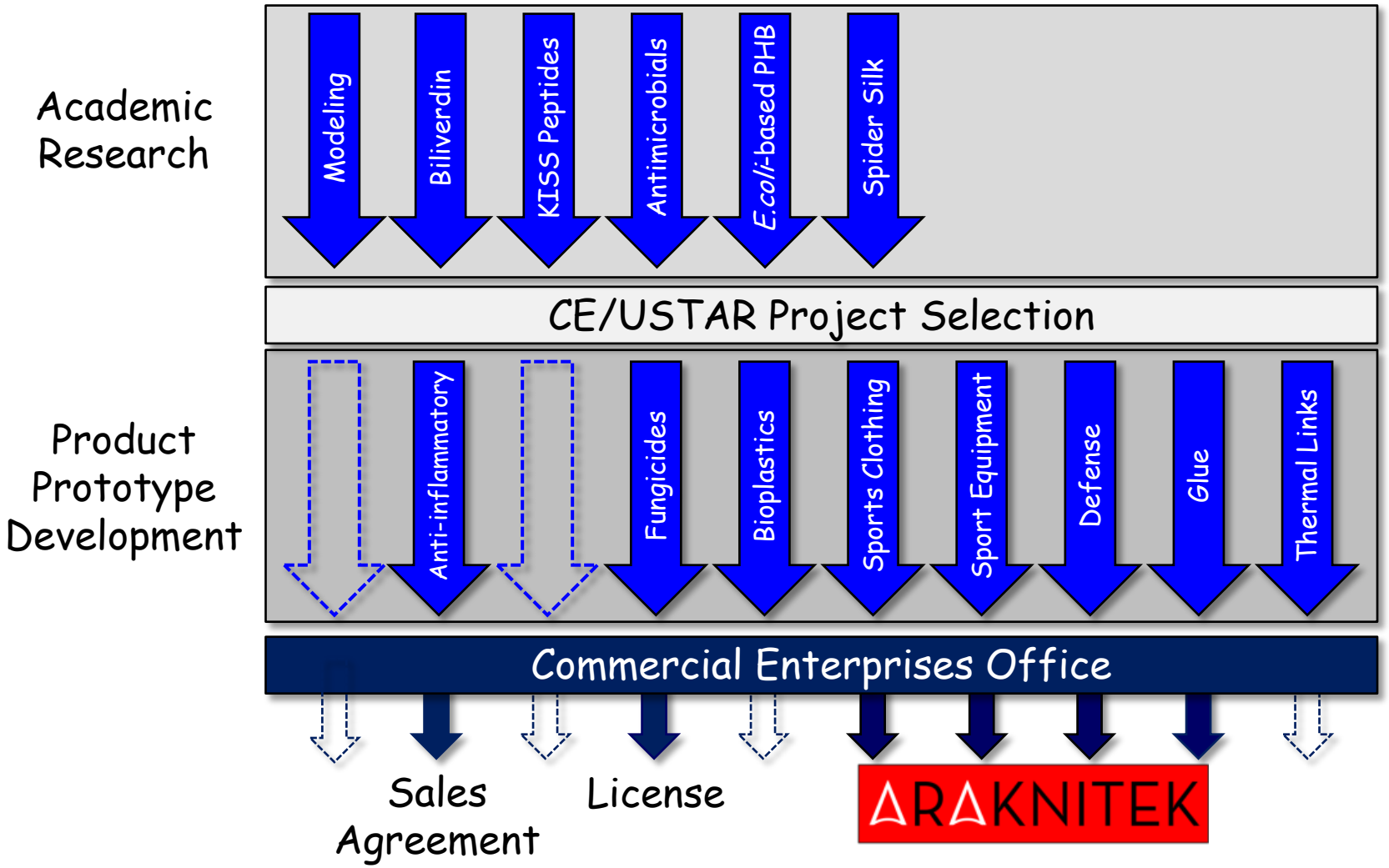


Jixun Zhan
- BE -

Number of funded students - ~21 (9G/12UG)

Number of funded staff - 3

Current SBC Project Pathways



International Genetically Engineered Machines (iGEM) Student Competition

2008: Bronze Medal

Efficient Systems for Monitoring Polyhydroxybutyrate (PHB) Production in Microorganisms

2009: Gold Medal

BioBricks without Borders

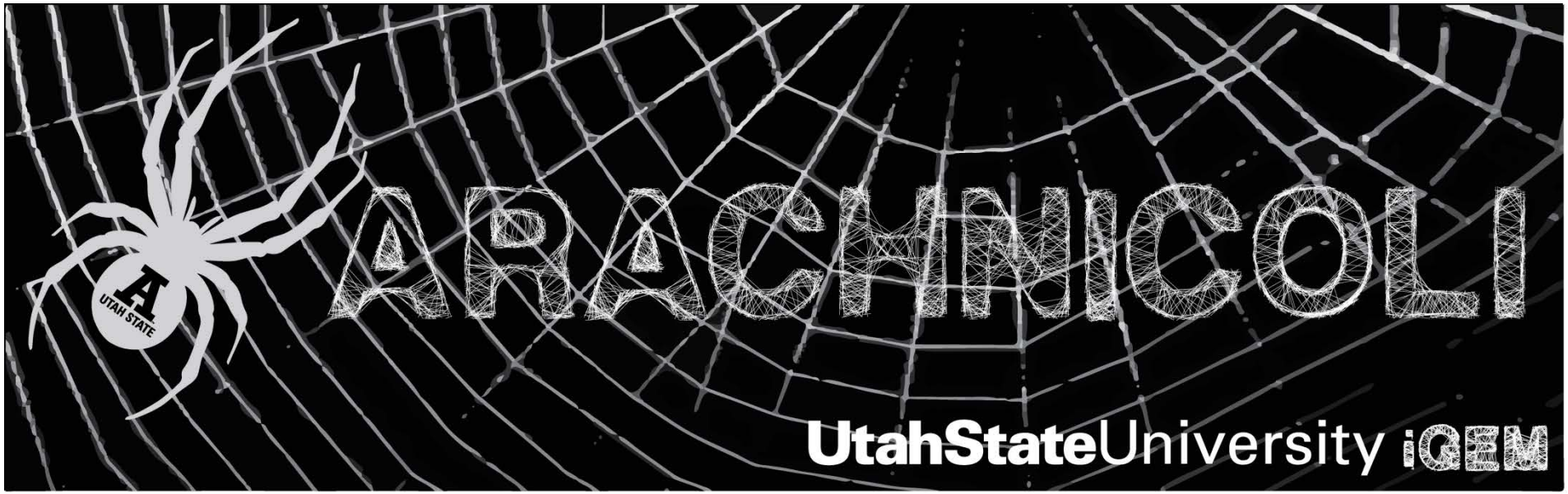
2010: Gold Medal

CyanoBricks - Developing Cyanobacteria as a Biological Engineering Platform

2011: Gold Medal

CyanoBricks - Expression Testing and Bioproduct Development

iGEM 2012 – October, 2012



- Arachnicoli, *Production and Purification of Spider Silk Proteins in Escherichia coli*
- Won gold medal, 4th year in a row
- Won *Best New BioBrick Device-Engineered* Award, Americas West Regional (Stanford)
- Won *Best Manufacturing Project* Award, World Championship (MIT)

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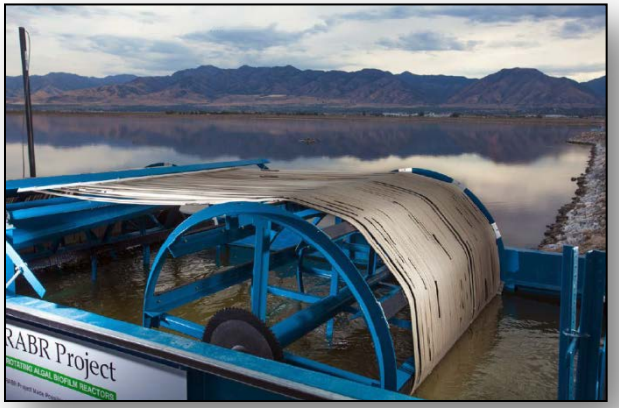
Sustainable Waste-to-Bioproducts Engineering Center (SWBEC)

The Sustainable Waste-to-Bioproduct Engineering Center converts society's wastes into valuable products to promote national energy independence, sustainable local production of bioproducts, new industries for new jobs and the protection of human health and the environment.



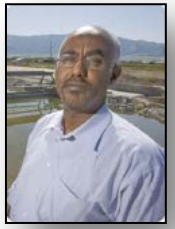
Algae Biofilm Growth

Logan Lagoons

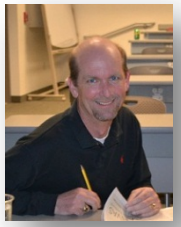
Algae to Biodiesel

SWBEC Affiliated Faculty

Ron Sims
- BE -



Issa Hamud
- BE -



Charlie Miller
- BE -

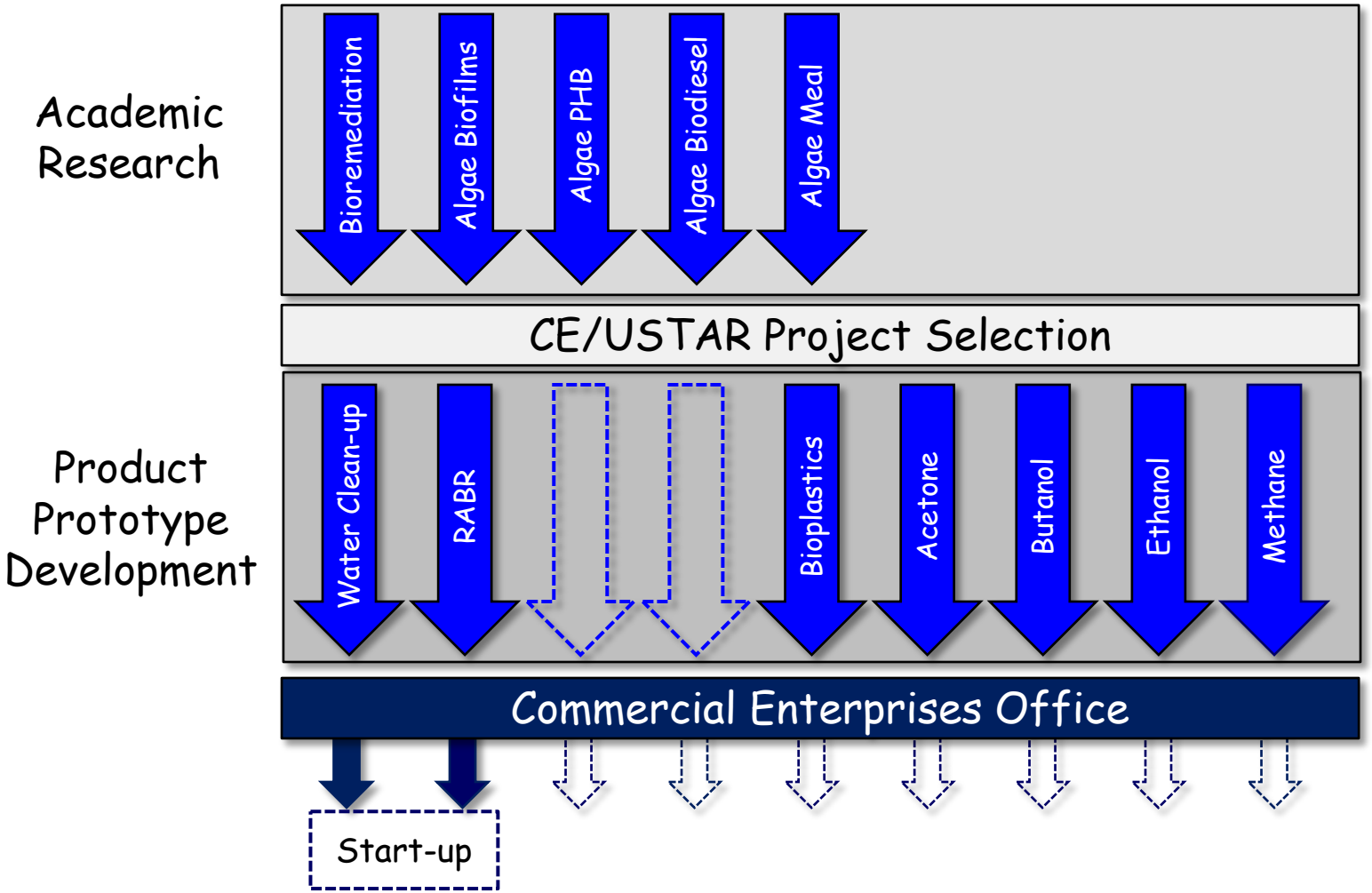
Jon Takemoto
- Biology -

Byard Wood
- MAE -

Number of funded students – ~20 (9G/11UG)

Number of funded staff - 2

Current SWBEC Project Pathways



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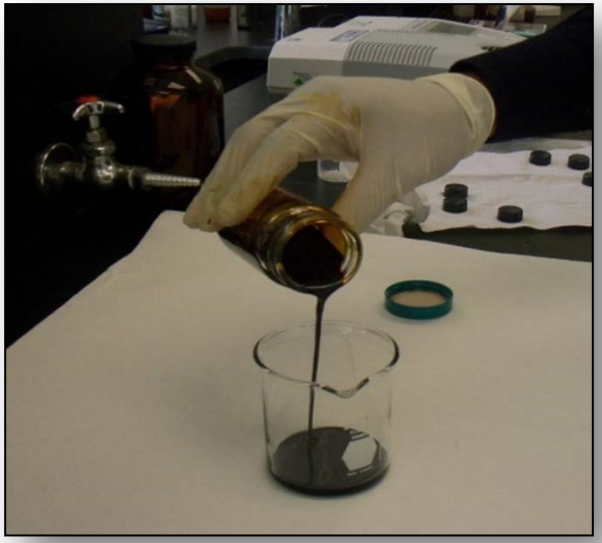
USTAR BioEnergy Center

Research at the BioEnergy Center focuses on lignocellulosic biofuel and biodiesel production, pyrolysis, algal strain selection, nutrient optimization and management by focusing specifically on the needs and resources of Utah and the Intermountain West.

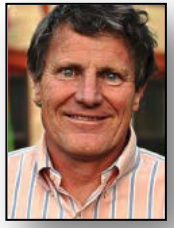


Hybrid poplar FCP oil

Pilot Plant for Fractional Catalytic Pyrolysis

BEC Affiliated Faculty

Foster Agblevor
- BE -



Bruce Bugby
- PSC -

Lance Sefeldt
- CB -

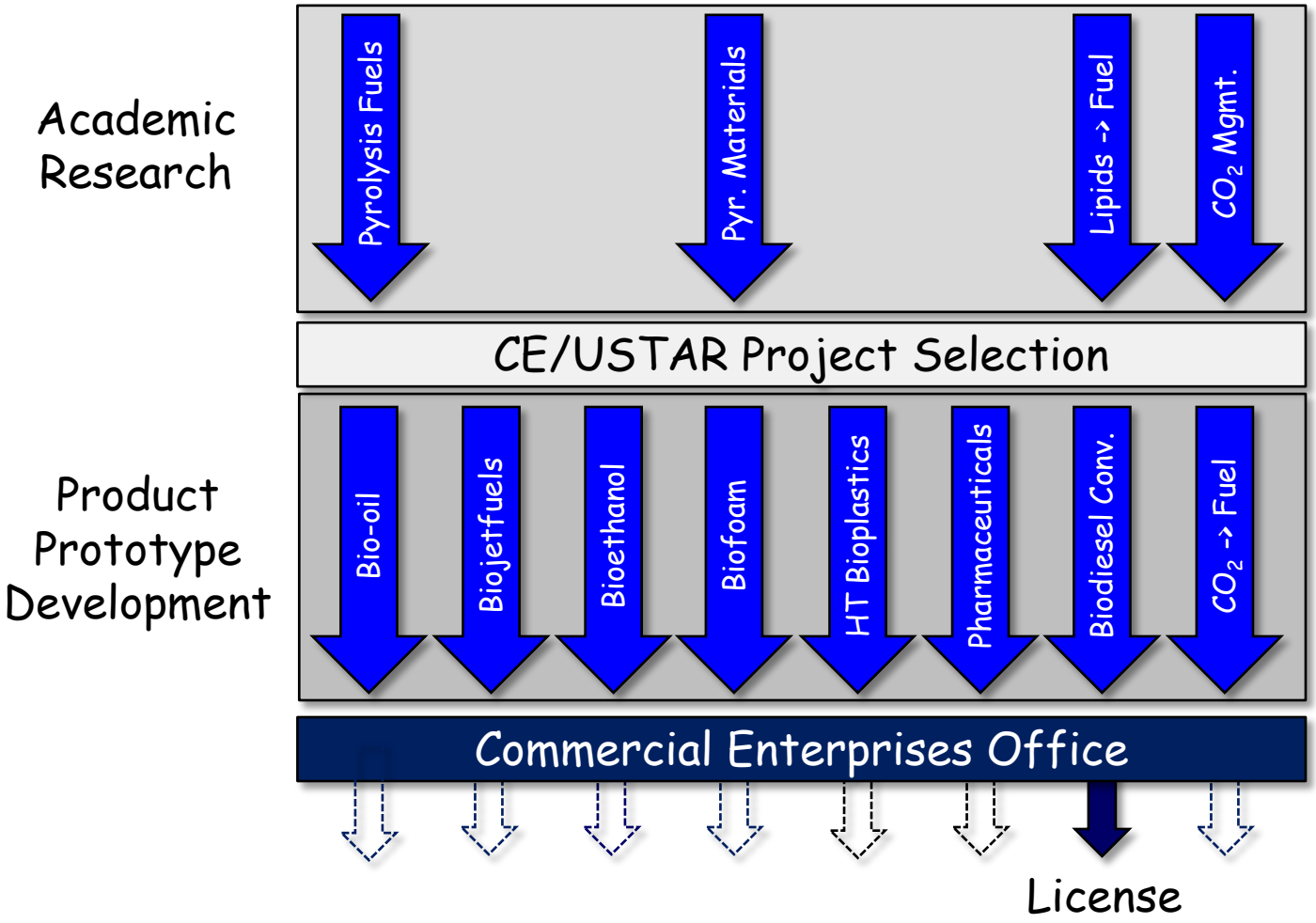
Ron Sims
- BE -

Byard Wood
- MAE -

Number of funded students - ~11 (7G/4UG)

Number of funded staff - 4

Current BEC Project Pathways



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USTAR Bioproducts Production Lab

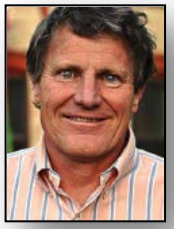
The Bioproducts Production Laboratory provides a multitude of shared resources and services to the SBI's research centers and corporate partners. The BPL's primary focus is to provide the prototyping and scale-up production capabilities for each of the Institute's centers as well as bioproduction contract services for industry.

USU Algae Processing and Products Facility

New Brunswick 125 L Fermentor

BPL Affiliated Faculty

Foster Agblevor
- BE -



Bruce Bugbee
- PSC -

Randy Lewis
- Biology -

Lance Sefeldt
- CB -

Ron Sims
- BE -

Jon Takemoto
- Biology -

Reese Thompson
- Director -

Byard Wood
- MAE -

Number of funded staff - 2

USTAR
Turning innovation into industry.

UtahState University
SYNTHETIC BIOMANUFACTURING INSTITUTE

USTAR Synthetic Biomanufacturing Institute

Interim Executive Director: H. Scott Hinton

Business Development Officer
Christian Iverson

Corporate Partners

USTAR Synthetic Bioproducts Center

Director:
Randy Lewis

- Pharmaceuticals
- Therapeutics
- Antimicrobials
- Cosmetics
- Biomaterials
- Specialty Chemicals

Sustainable Waste-to-Bioproducts Engineering Center

Co-Directors:
Ron Sims & Issa Hamud

- Waste water treatment
- Profitable bioremediation

USTAR BioEnergy Center

Director:
Foster Agblevor

- Bio-oil
- Bio-Jet Fuel
- Biofoam
- Bioplastics
- CO_2 -> Fuel
- Pharmaceuticals

USTAR Bioproducts Production Lab

Director:
Reese Thompson

- Large-scale Bioproduction
- Contract Services

Agenda

Welcome and Introduction – *Dean Scott Hinton*

Pyrolysis-based Bioproducts – *Dr. Foster Agblevor*

BioEnergy Research at USU – *Dr. Lance Seefeldt*

Break

Sustainable Waste-to-Bioproducts – *Dr. Ronald Sims*

iGEM 2012 – *Dr. Charles Miller*

Lunch & Poster Session

Biliverdin and Mesobiliverdin – *Dr. Jon Takemoto*

Antifungals – *Dr. Tom Chang*

Break

Pathway Pioneer – *Dr. Nick Flann*

Spider Silk – *Dr. Randy Lewis*

Commercialization at USU – *Dr. Rob Behunin and Curt Roberts*

Partners Roundtable

Lab Tours

Thank You