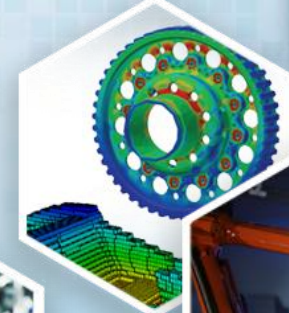


IACMI Future Mobility/Vehicles Technology Working Group

Ray Boeman, MSU

Hendrik Mainka, VW

June 30, 2022



Convene. Connect. Catalyze.

FM VT WG Steering Committee



Sid Asthana
Polymer24



Dan Coughlin
ORNL



Cliff Eberle
IACMI



Ginger Gardiner
CompositesWorld



Hendrik Mainka
Co-chair
Volkswagen



Ray Boeman
Co-chair
Michigan State University



Chris Griffen
KMG Designs



Eric Haiss
IDI Composites



Krishnan Iyer
ExxonMobil



William Henken
Volkswagen



Dale Brosius
Advisor
IACMI



Uday Vaidya
Advisor
IACMI



Brian Knouff
ORNL



Dana Lowell
Helicoid



Dana Miloaga
Johns Manville



Steve Nolet
TPI Composites

•October 2020 – Inaugural meeting (Virtual)

• October 2020 – Inaugural meeting (Virtual)

Scope, Trends, DOE-VTO Vision & Strategy



AUTONOMY

Advanced driver-assist safety technologies and other technological breakthroughs are helping to gradually reduce human drivers from controlling passenger vehicles.

CONNECTIVITY

Future vehicles will offer greater levels of connectivity and commercial drivers will rely less on vehicle comfort and convenience but also on safety considerations.

CIRCULARITY

Principles of a circular economy emphasize recovering materials at the end of their useful life, refurbishing and reusing materials to extend product lifetimes, and remanufacturing and recycling them in new products.

ELECTRIFICATION

Electric vehicle (EV) sales are accelerating and projected to represent between 50% and 70% of worldwide vehicle sales by 2040, up from just 1% of worldwide vehicle sales in 2016.

SHARED MOBILITY

Adoption of ride-sharing has grown from 0.1% of U.S. consumers having used ride-sharing in 2013 to at least an 8.5% of U.S. consumers in 2016, helping to reduce travel costs and environmental impact of passenger vehicles.

SUSTAINABILITY

Automakers are seeking to address sustainable automotive design that reduces environmental impacts and improves the efficiency of products throughout their lifecycles.

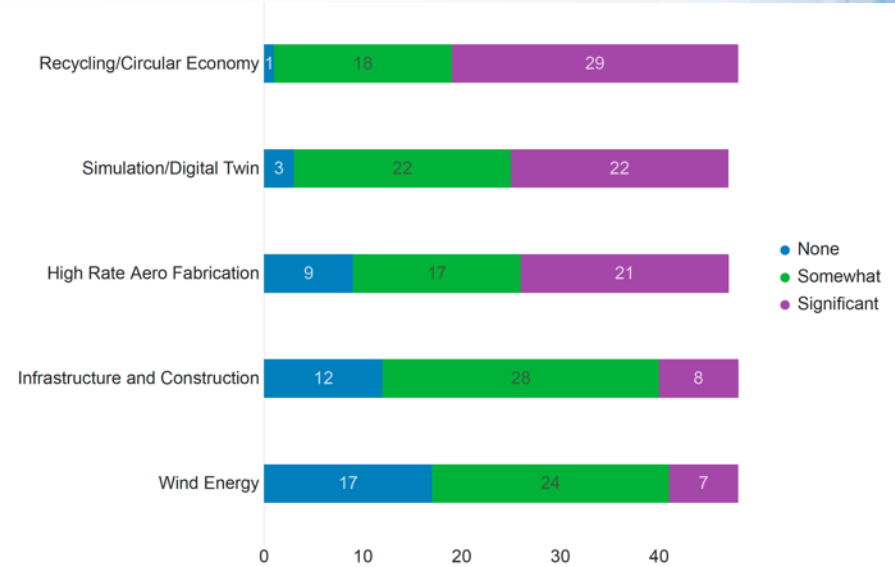
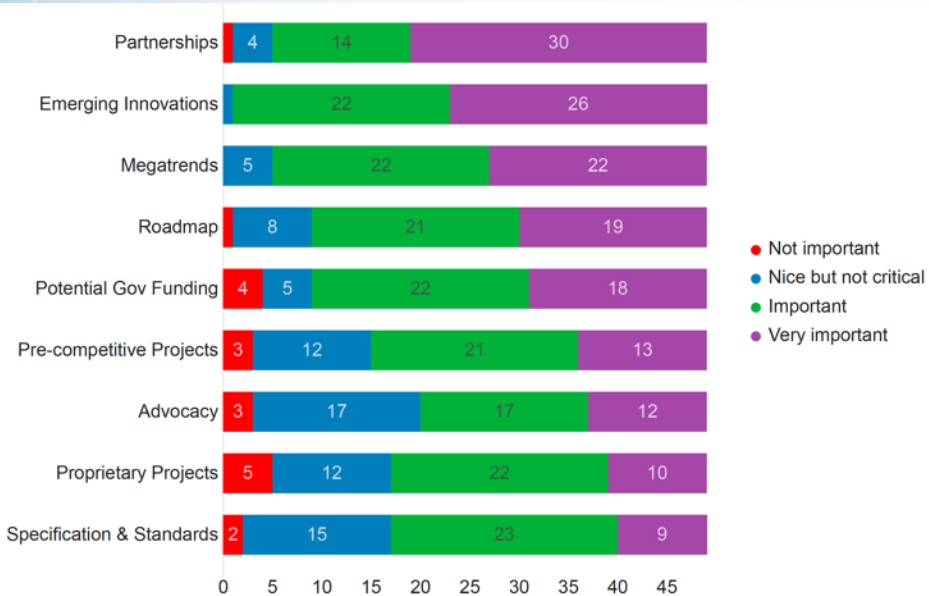
U.S. DEPARTMENT OF ENERGY
Office of ENERGY EFFICIENCY & RENEWABLE ENERGY

VTO Composites R&D – Vision and Strategy

May 8, 2019

- Felix Wu (presenter)
- Dave Howell
- Gurpreet Singh
- Sarah Kleinbaum
- Jerry Gibbs

February 2021 – Survey Results (Virtual)



May 2021 – Presentations (virtual)



**2021
MEP National Network
Overview**

Mark Schmit
Division Chief, Regional and State Partnerships

NIST
National Institute of
Standards and Technology
U.S. Department of Commerce

MEP - MANUFACTURING
EXTENSION PARTNERSHIP

**RESIN TECHNOLOGY FOR THE RAPID
MANUFACTURE OF HIGH-PERFORMANCE
FIBER REINFORCED COMPOSITES**

Henry A. Sodano, PhD
President
Trimer Technologies, LLC

trimer

IACMI Future Mobility Vehicles Technology Working Group Meeting - May 24th 2021

Core Product Lines

Waterjet Laser Router Aftermarket & Remote Service

Robotic Systems Assembly Material Handling Fixtures, Tooling & Rebuilds

**Shape Process
Automation**
www.shapeprocess.com

Christon Manzella

**Development of
Automotive Grade
Carbon Fiber
Composite
Performance
Standards**

Brian Knouff
May 24, 2021

ORNL is managed by UT-Battelle
for the US Department of Energy



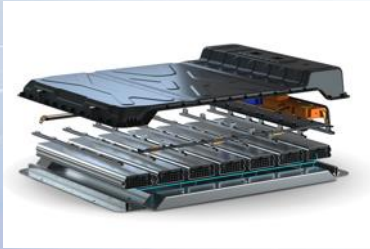
**MAI Carbon – IACMI Collaboration:
Machining of Composites**

<p>AMERICAN PROJECT GOALS Determination of cutting technologies regarding cutting speed and quality</p> <ul style="list-style-type: none"> - Waterjet cutting - Abrasive waterjet cutting - Wet machining - Laser beam cutting 	<p>GERMAN PROJECT GOALS Optimization of machining processes (machine tools/robots and processes)</p> <ul style="list-style-type: none"> - dry machining; chip and dust extraction technologies - wet machining; tools and process <p>Creation and execution of a benchmark test for 3D cutting technologies</p>
<p>COMMON PROJECT GOALS</p> <ul style="list-style-type: none"> - Creation of a knowledge base for 3D composite material cutting technologies - Fast choice of the best fitting technology - Estimation of quality, costs, productivity, emission, etc. 	

August 2021 – Sustainability (virtual)

*versus system perspective (e.g., mass transit, system efficiency, etc.)

Electrification



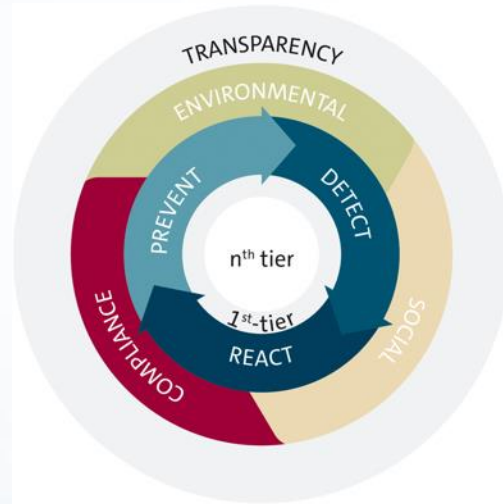
Source: www.compositesworld.com

Bio-based Materials



Source: cordis.europa.eu/

Circular Economy



LINEAR ECONOMY

RECYCLING
ECONOMY

CIRCULAR
ECONOMY



<https://zone.recycledevon.org/circular-economy-resource-box/>

October 2021 – Battery Enclosure Panel



Future Mobility/Vehicle Technology Working Group Meeting Panel Discussion – Composite Battery Enclosures



Venkat Aitharaju
Researcher/Principal Investigator
DOE project,
General Motors



Andrew Halonen
President,
Mayflower Consulting



Sandy Munro
Founder & CEO,
Munro & Associates



Todd Altman
Sr. Director Strategic Markets,
TPI Composites



Christoph Kuhn
Project Manager/Technical Project Lead
HV Battery, Engineering and Planning
Center
(EPC), Volkswagen Group of America



Mike Siwajek
Vice President of R&D,
Teijin Automotive Technologies



Mohammadreza Eftekhari
HV Battery Mechanical Engineer,
Ford Motor Co.



Ben Mousseau
Sr. Supplier Industrialization
Engineer,
Tesla



Key Technical Focus Areas

Digitalization

Circular Economy

Emerging Materials

Functional Integration

Skills Development

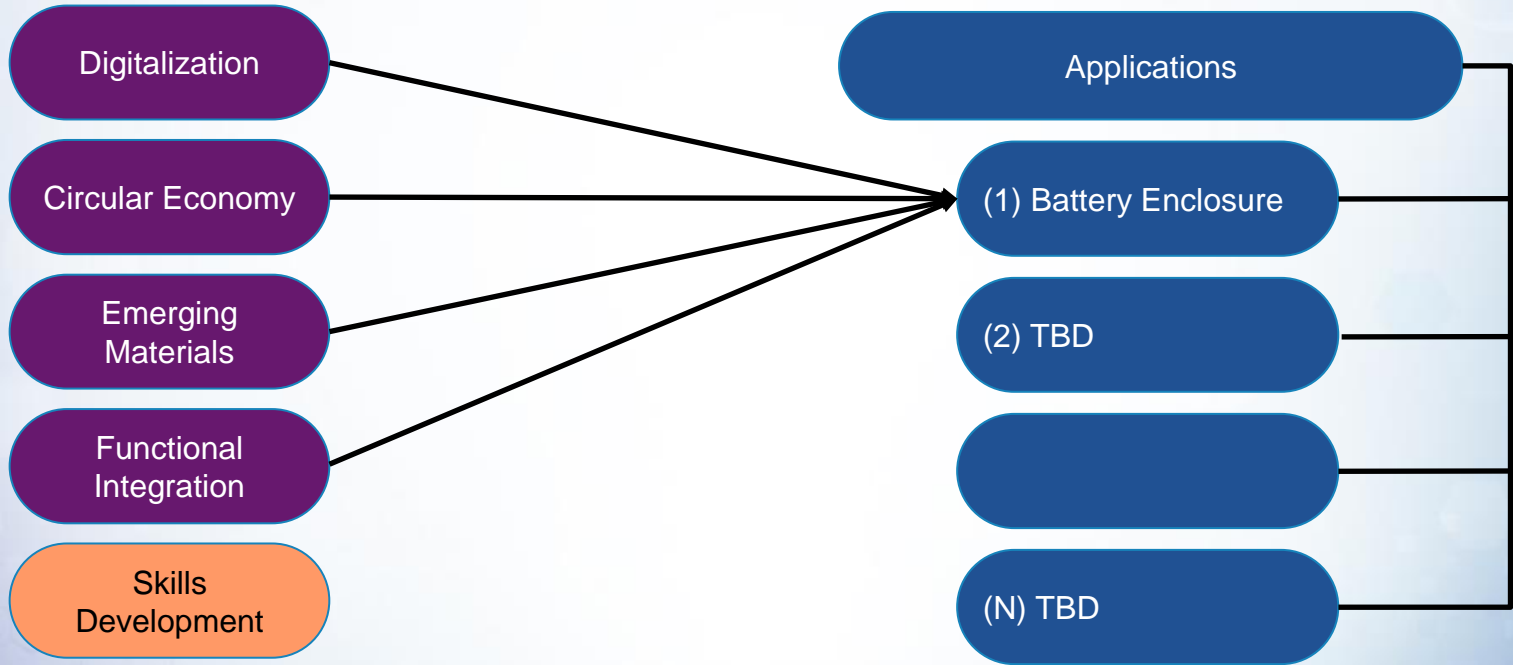
Compelling Demonstrations

Applications

(1) Battery Enclosure

(2) TBD

(N) TBD



FUTURE MOBILITY/VEHICLES TECHNOLOGY WG

Thursday, June 30 | 10:30 am- Noon



- ◆ Welcome & Introduction – Mainka/Boeman
- ◆ IACMI Preparation for Renewal – Brosius
- ◆ DOE-EERE-VTO Notice of Intent – Eberle
- ◆ Subgroup Discussions
 - ◆ Emerging Materials – Gardiner/Knouff
 - ◆ Forward Engineering – Adam Halsband
 - ◆ Montana State University – David Miller
 - ◆ Circular Economy – Mainka/Nolet/Eberle