

Thought-Starters for Projects

Doug Adams

Tech Fellow for NDE, IACMI / Vanderbilt University

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Where do projects come from?



Stork in the night, downloaded 1/21/2017, RGBStock free stock photos

Your ideas impact these key targets



2020 Targets



Cost

↓ 25%



Energy

↓ 50%



Recyclability

80%

2025 Targets



Cost

↓ 50%



Energy

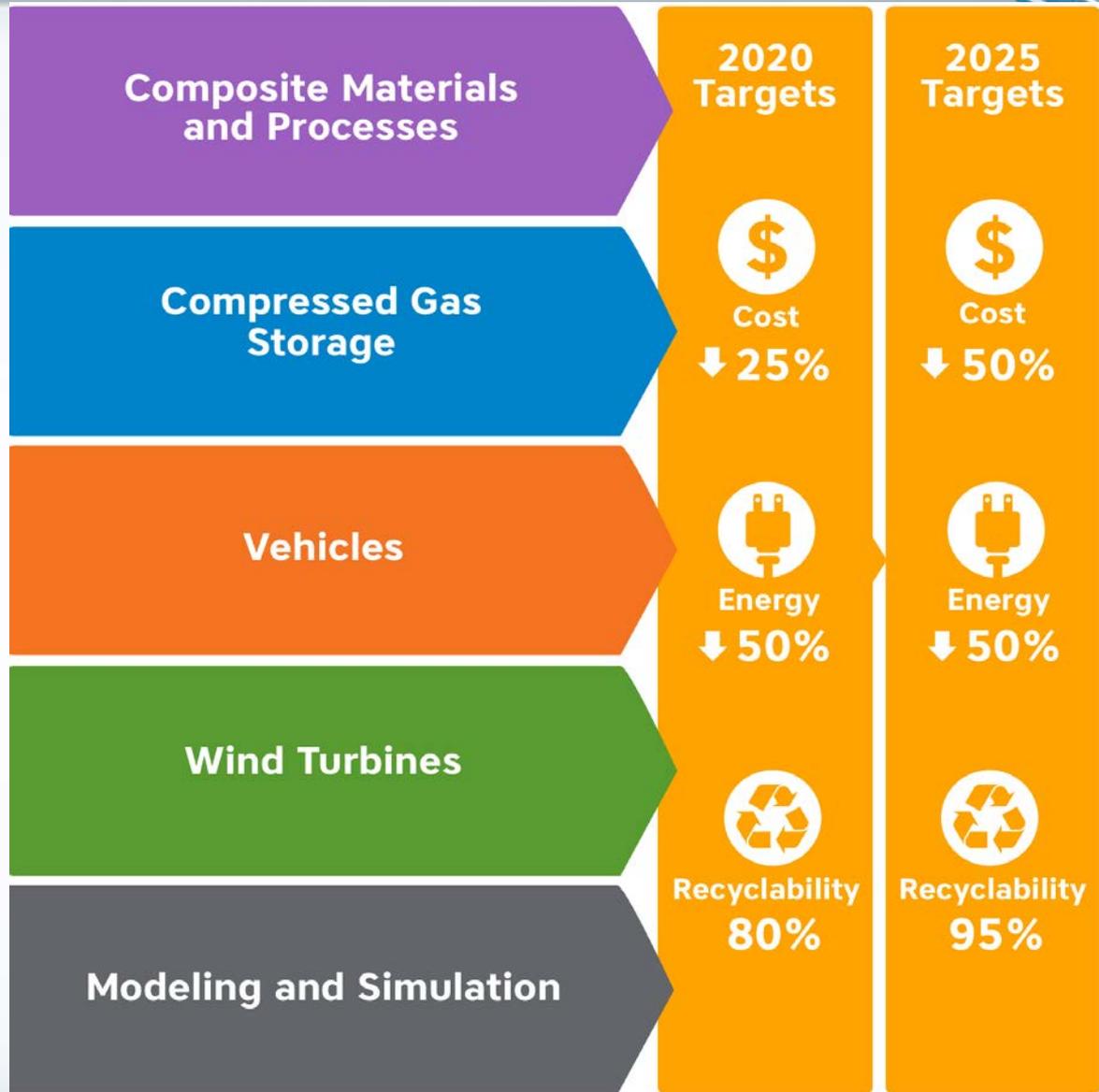
↓ 50%



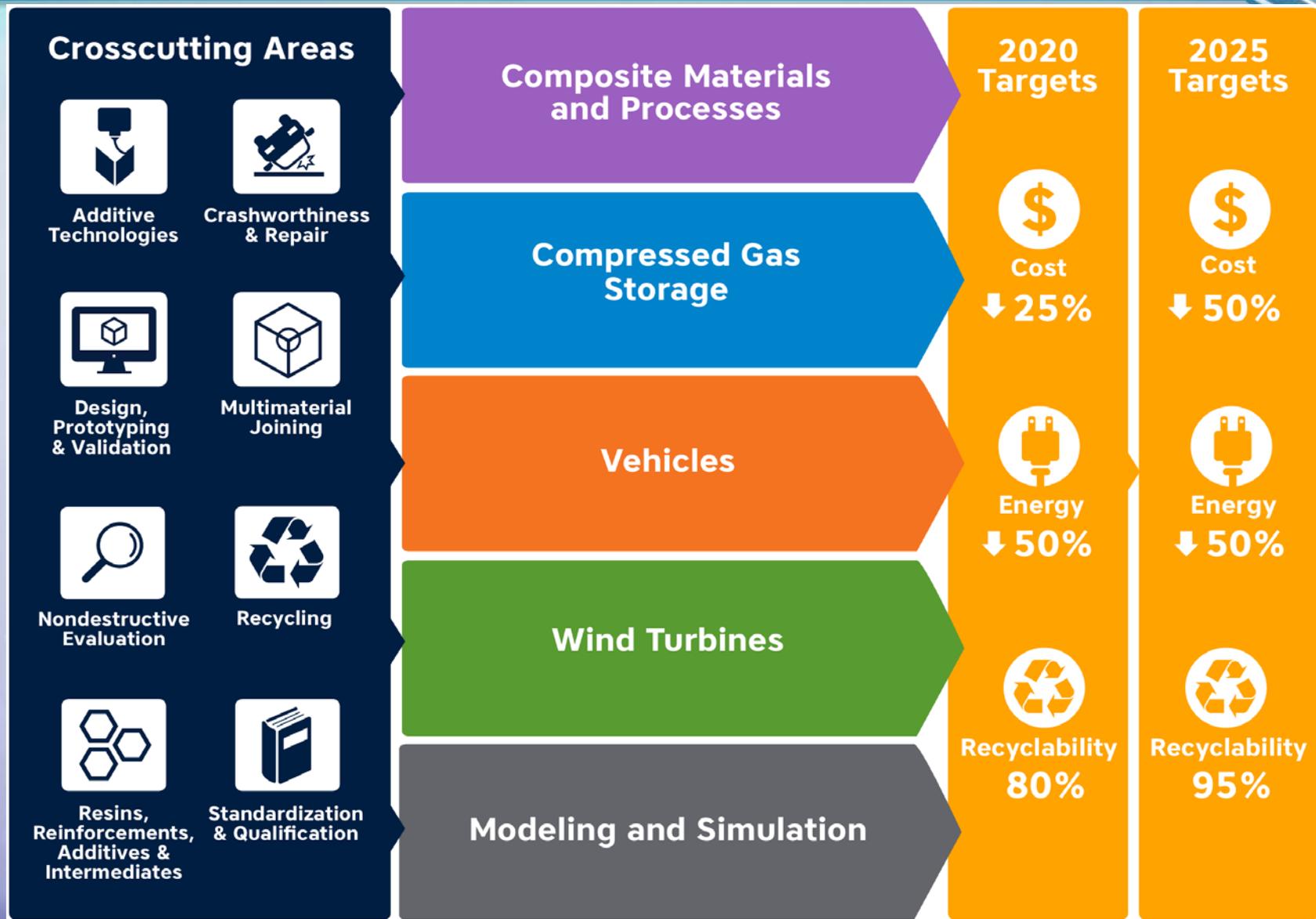
Recyclability

95%

Talk with our Technical Areas & Directors



Brainstorm to pull in IACMI capabilities



Quick audience poll...

Among these issues, what poses your biggest risk for flaws in composites manufacturing?

- Challenges with **ply placement**
- Challenges with **infusion process**
- Challenges with **curing process**

1

2

3



A thought-starter...process vision system



Suppose I am manufacturing a composite wind turbine blade:

- Reduce the time it takes to find flaws.
- Reduce the costly repairs to fix flaws.



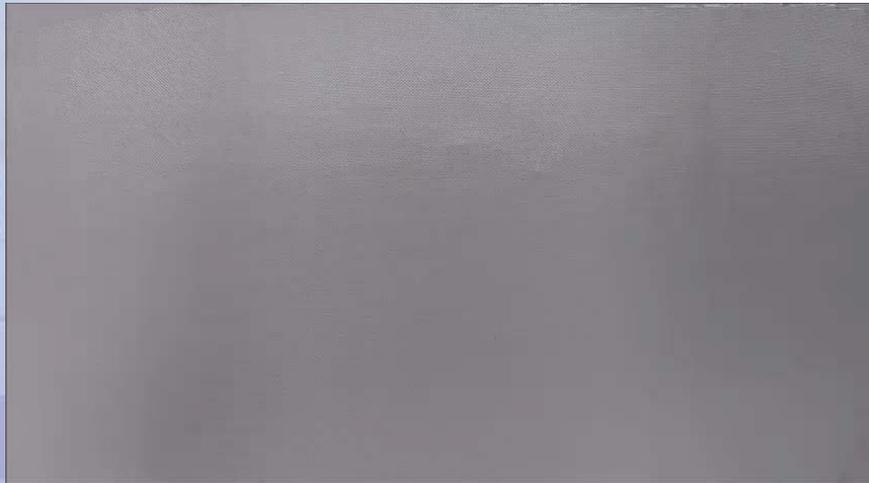
How can I rapidly find process quality issues in the plies?

- **Foreign objects**
 - **Wrinkling**
 - **Fiber pull out**
- Etc....



Vision system for process

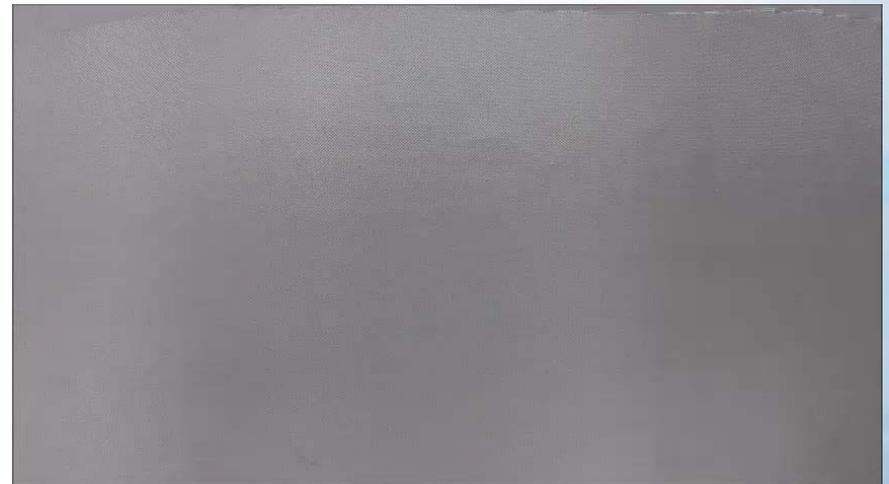
GoPro Video: 2 oz. plain weave
fiberglass fabric



Smooth Fabric



Fiber Pull Out



Wrinkling

How do I achieve these goals?

Option 1: Visually inspect all stages of ply placement for flaws.

- Time consuming and difficult to access entire blade as process unfolds.

Option 2: Develop “computer vision” to assist process engineer.

- Use digital cameras to acquire images or video of area.
- Apply filters and edge detection algorithms to inform decisions
(Is this layer acceptable? Etc.)

Flaws in lay-up process

ORIGINAL IMAGES

Foreign object



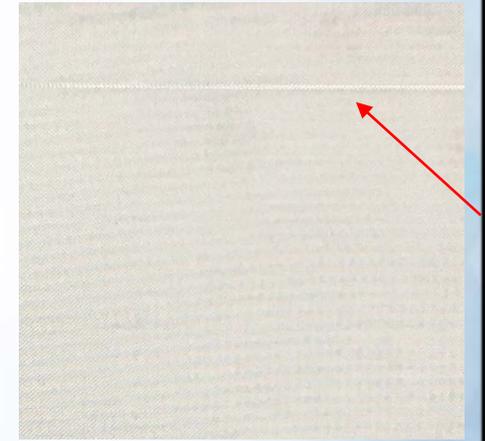
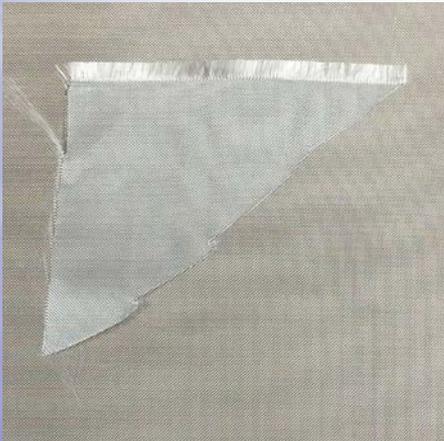
Wrinkles



Fiber pull out

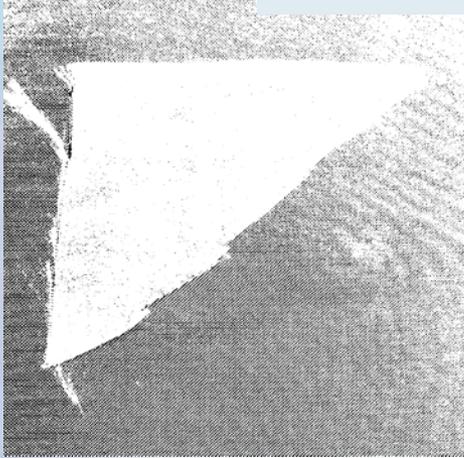


CROPPED IMAGES



Seeing the flaws

IMAGES CONVERTED TO BLACK AND WHITE IMAGES BASED ON A CHOSEN TOLERANCE



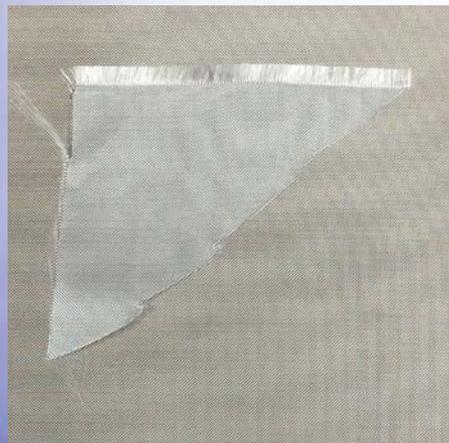
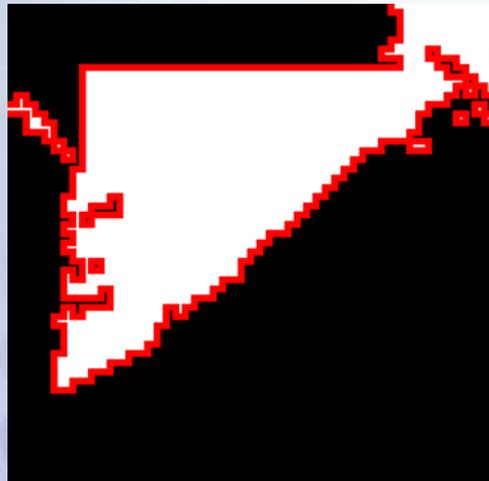
IMAGES AFTER SMOOTHING ALGORITHM HAS BEEN APPLIED



N/A

Isolating and detecting flaws

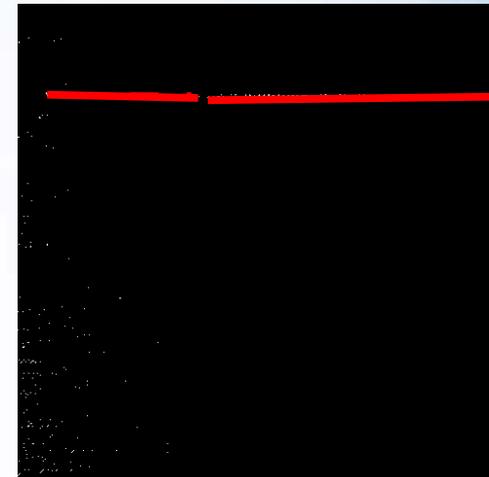
Edge detection applied to identify boundary of foreign object.



Edge detection applied to identify boundary of wrinkles.



Line detection applied to identify pulled fiber.



Realizing improvements in process quality & speed



Quality
Speed



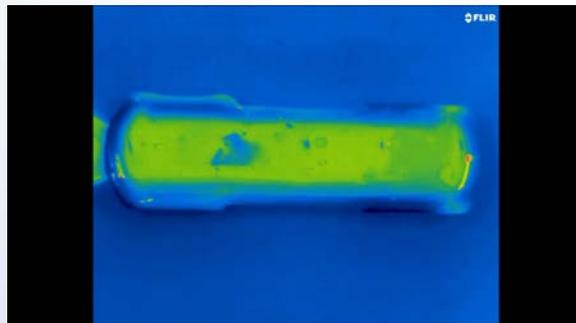
Edge detection analytics used for computer vision



*Image courtesy Derek Berry, NREL
Technical Area Director Wind Turbines*



Quality
Speed



*Video of infrared surface temperature
from two-part epoxy as it cures*

IACMI works with you on scaling up for production

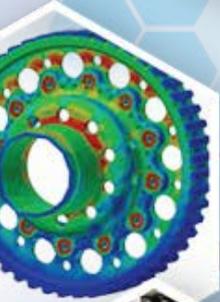


Laser profilometry used to detect tow fuzz and tow form in production of carbon fiber



Courtesy Cliff Eberle Oak Ridge National Laboratory

Let's Get this Project Started



Let's Get this Project Started

Erin Brophy

Project Controls Manager

February 1, 2017



Project Development Steps



**1. Develop*
Proposal**

**2. Proposal
Review**

3. Contracting

**4. Kickoff
Project!**

***Proposal lead must be IACMI member in good standing**

Step 1: Develop Proposal

Engage IACMI Technology Areas



- ✓ Identify the opportunity
- ✓ Work with IACMI Technology Areas, & IACMI Leadership
- ✓ Assemble your project team

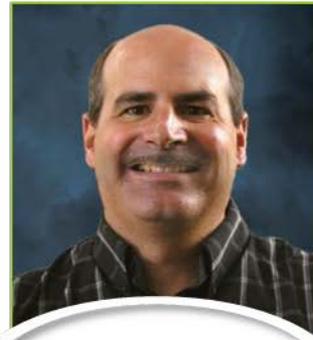
World Leading Resources in Composites Manufacturing



Lawrence Drzal
Vehicles



Derek Berry
Wind



Brian Rice
CGS



R. Byron Pipes
DM&S



Cliff Eberle
M&P

Step 1: Develop Proposal

Assemble Project Team

1.
Develop
Proposal

2.
Review

3.
Contracting*

4.
Kickoff



IACMI Resources

- ◆ Technology Area Directors
- ◆ IACMI Leadership Team
- ◆ IACMI HQ Project Team
- ◆ Board of Directors
- ◆ Technology Advisory Board

Connect & Collaborate

- ◆ Member Portal
- ◆ IACMI Events App
- ◆ Members Meeting
- ◆ IACMI Events
- ◆ IACMI Website



Step 1: Develop Proposal

Write & Submit the Proposal

1.
Develop
Proposal

2.
Review

3.
Contracting*

4.
Kickoff



Guidance: IACMI Website

Request for Proposal (V.2)/Templates/Instructions
(www.iacmi.org/projects)

Title Page

Work Plan

Project Description

Budget Summary



Work with IACMI Resources to develop Proposal!

Step 1: Develop Proposal

Define Project Type

1.
Develop
Proposal

2.
Review

3.
Contracting*

4.
Kickoff



Project Type	Maximum IACMI Funds	Duration	Proposal *
Enterprise	Unlimited	Up to 4 years	5 page proposal <i>(If approved develop full proposal)</i>
Technical Collaboration (TC)	\$300K	Up to 2 years	10 page proposal
Proof of Concept (TC-Phase 1)	\$75K	6 months	5 page proposal

*Proposal templates can be found at: www.iacmi.org/projects

Step 1: Develop Proposal

Define Project Type--Example

1.
Develop
Proposal

2.
Review

3.
Contracting*

4.
Kickoff



Technical Collaboration Project (up to \$300K IACMI Funds)

Budgets (Work to be performed):

IACMI Funds (→TA Partners)	\$100,000
Industry Partners (min)	\$100,000
• <i>Industry Cash (→TA Partners)</i>	<i>\$50,000</i>
• <i>Industry In Kind</i>	<i>\$50,000</i>

IACMI TA Partners	\$150,000
IACMI Funds	\$100,000
Industry Cash	\$50,000

Project Budget (min)	\$200,000
• <u>Extra Industry In Kind</u>	<u>\$260,000</u>

Total Project Budget **\$460,000**

Total Industry Contribution *\$360,000*

Review Criteria

Compliance: meets submission requirements

✓ Relevance and Impact (60%)

✓ Technical Merit (20%)

✓ Resources (20%)

*Review
Process*

*Project
Approved*



Step 3: Contracting

1.
Develop
Proposal

2.
Review

3.
Contracting*

4.
Kickoff



**Project Team
Partners**


Master Sub Award (MSA)

Project Partner \leftrightarrow IACMI

One time then **DONE**

Project Agreement (PA)

Project Partner \leftrightarrow Project Partner*
(All must be members by signing)

One per **PROJECT**

Step 3: Contracting

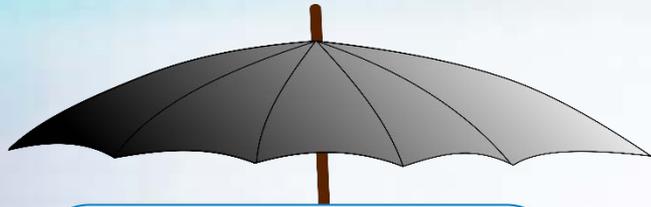
Example

1. Develop Proposal

2. Review

3. Contracting*

4. Kickoff



Master Sub Award (MSA)



ACME Corporation



Project Agreement (PA)
(Wayne Enterprises Project)

- IACMI TA
- IACMI TA
- Company ABC



Project Agreement (PA)
(Stark Industries Project)

- IACMI TA
- IACMI TA
- Company XYZ



Project Agreement (PA)
(Oscorp Industries Project)

- IACMI TA
- Company ABC
- Company 123



IACMI HQ Project Team Contacts



John Unser
Project Director
junser@iacmi.org
(865) 946-1586



Erin Brophy
Project Controls Manager
ebrophy@iacmi.org
(865) 946-1722



Lisa Fitzpatrick
Finance Coordinator
lfitzpatrick@iacmi.org
(865) 946-1748



Lisa Lee
Contract Manager
llee41@utk.edu
(865) 946-1498



Zack Gardner
Assistant General Counsel
zgardner@iacmi.org
(865) 946-1588

Step 4: Project Kickoff!

1.
Develop
Proposal

2.
Review

3.
Contracting*

4.
Kickoff

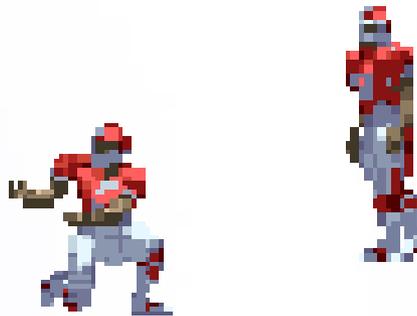


All Project Partners with Executed Master Sub Awards?



All Project Partners have signed the Project Agreement?

Project Kickoff!!!



Speaking of Kickoff...

1.
Develop
Proposal

2.
Review

3.
Contracting*

4.
Kickoff



Live Poll:



Who is going to win Super Bowl 2017:

[Link to Poll](#)



★ SUPERBOWL ★

LI

NRG Stadium ■ Houston, TX



Thank you!



Questions?

Erin Brophy

ebrophy@iacmi.org

(865) 946-1722

*You can also find the IACMI HQ Project Team
at our Information Table!*