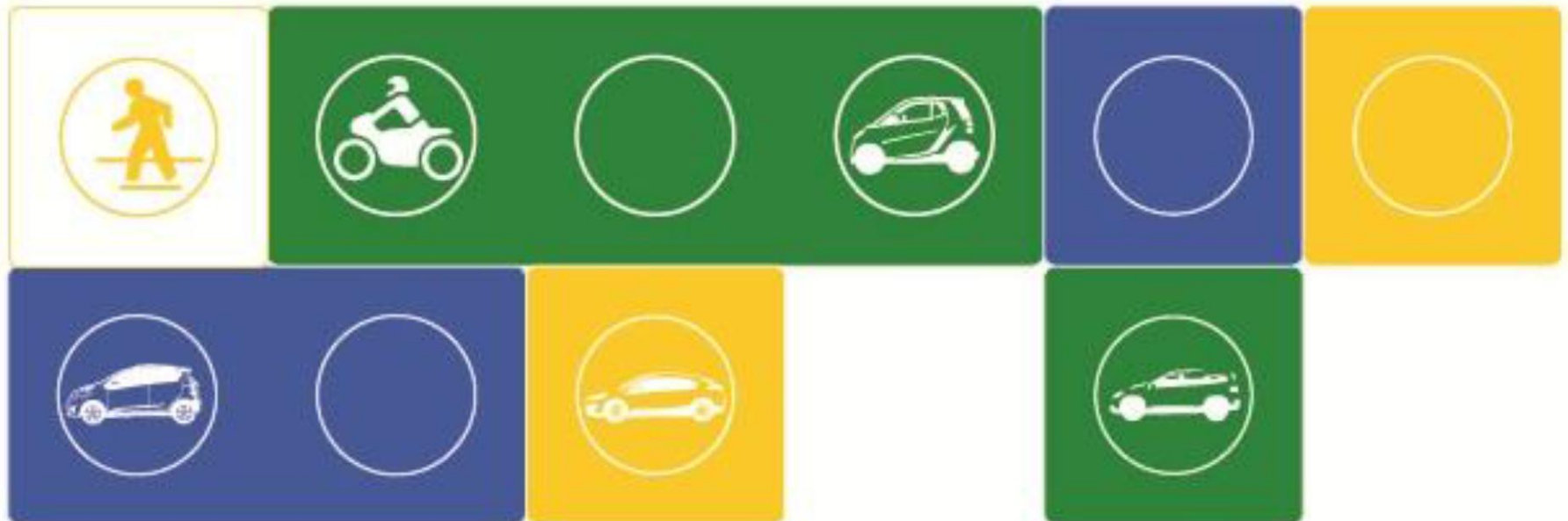


RSMS Team Webinar

Tuesday, 3rd November 2015

PACE Reconfigurable Shared-Use Mobility Systems Project Competition



Webinar Agenda

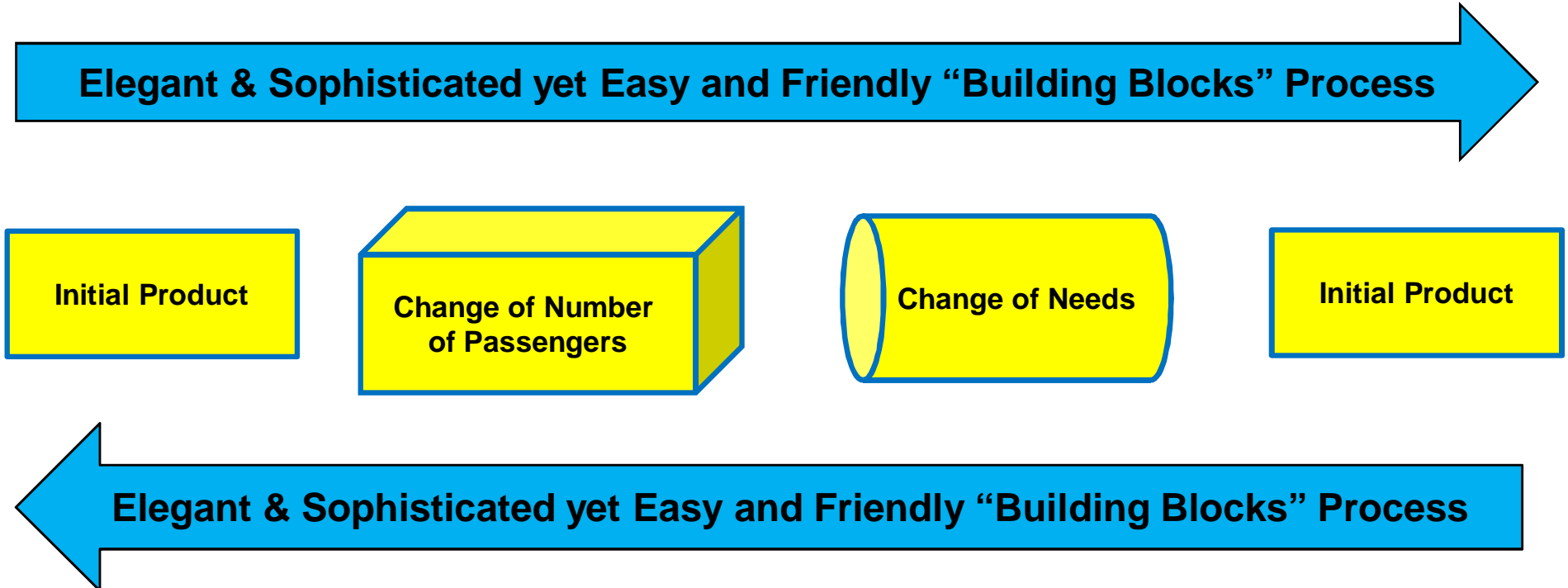
- Introductions – All (5 minutes)
 - Note: All callers will be muted during the webinar, until question time
- Year #2 RSMS Project Competition
 - Project Overview & Team Structure – Craig Brown (3 minutes)
 - Deliverables & Judging Criteria
 - Consumer Insight – Louise Stauffer (3 minutes)
 - Industrial Design – Sheryl Garrett (3 minutes)
 - Product Engineering – Craig Brown (3 minutes)
 - Manufacturing Engineering – Mo Omari (3 minutes)
- How to use the Year #1 feedback – Craig Brown (10 minutes)
- Collaborative Product Development: Design, Engineering & Manufacturing – Carrie Ketelhut & Craig Brown (40 minutes)
- Siemens PLM Software – Jerry Sarfati (5 minutes)
- Questions & Answers – Mo Omari (15 minutes)



Project Overview

Reconfigurable Shared-Use Mobility Systems (RSMS)

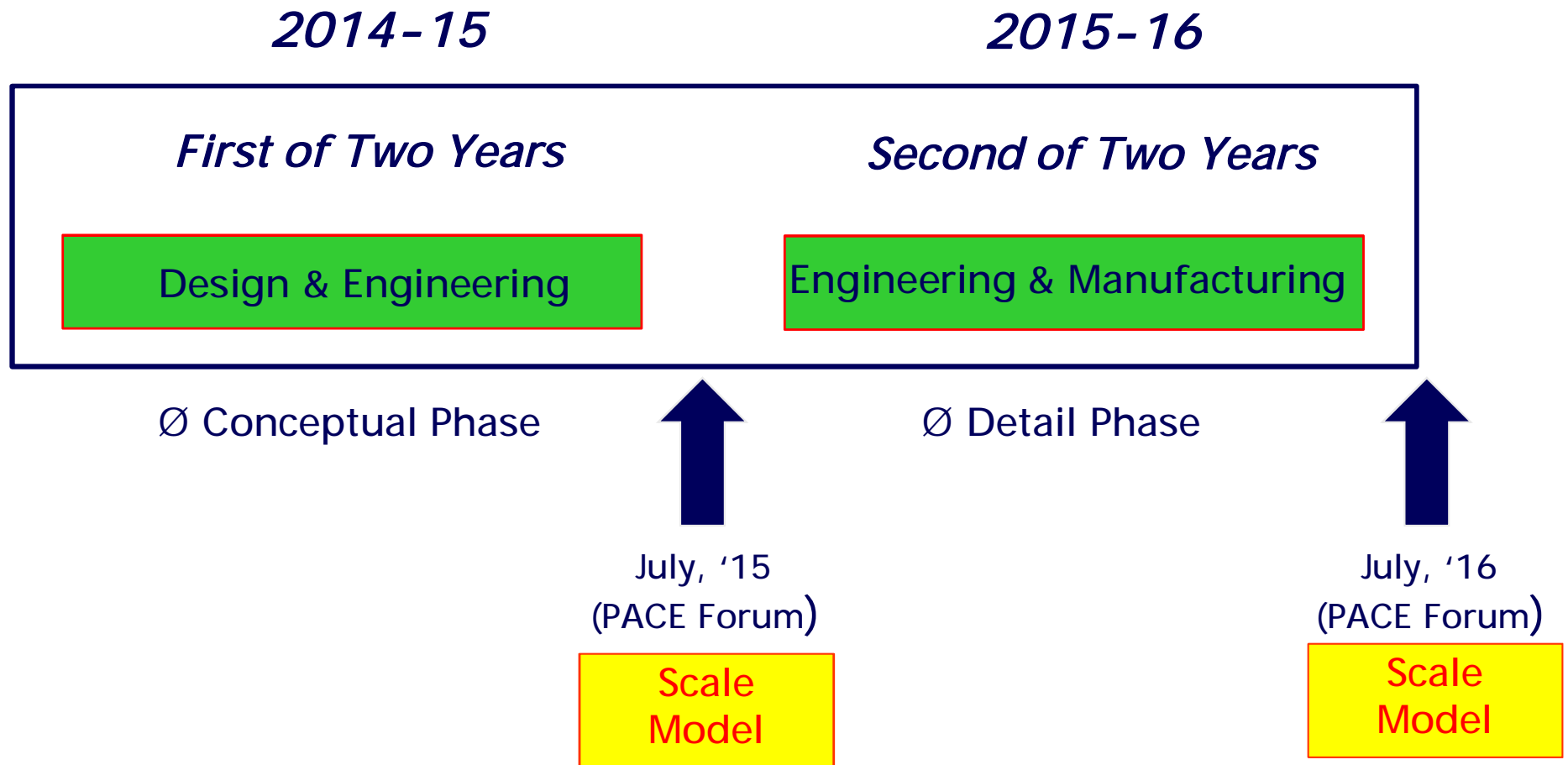
The project involves a system of “building blocks” components that can be efficiently reconfigured for a variety of passenger vehicle (1-5 passengers) and cargo delivery needs.



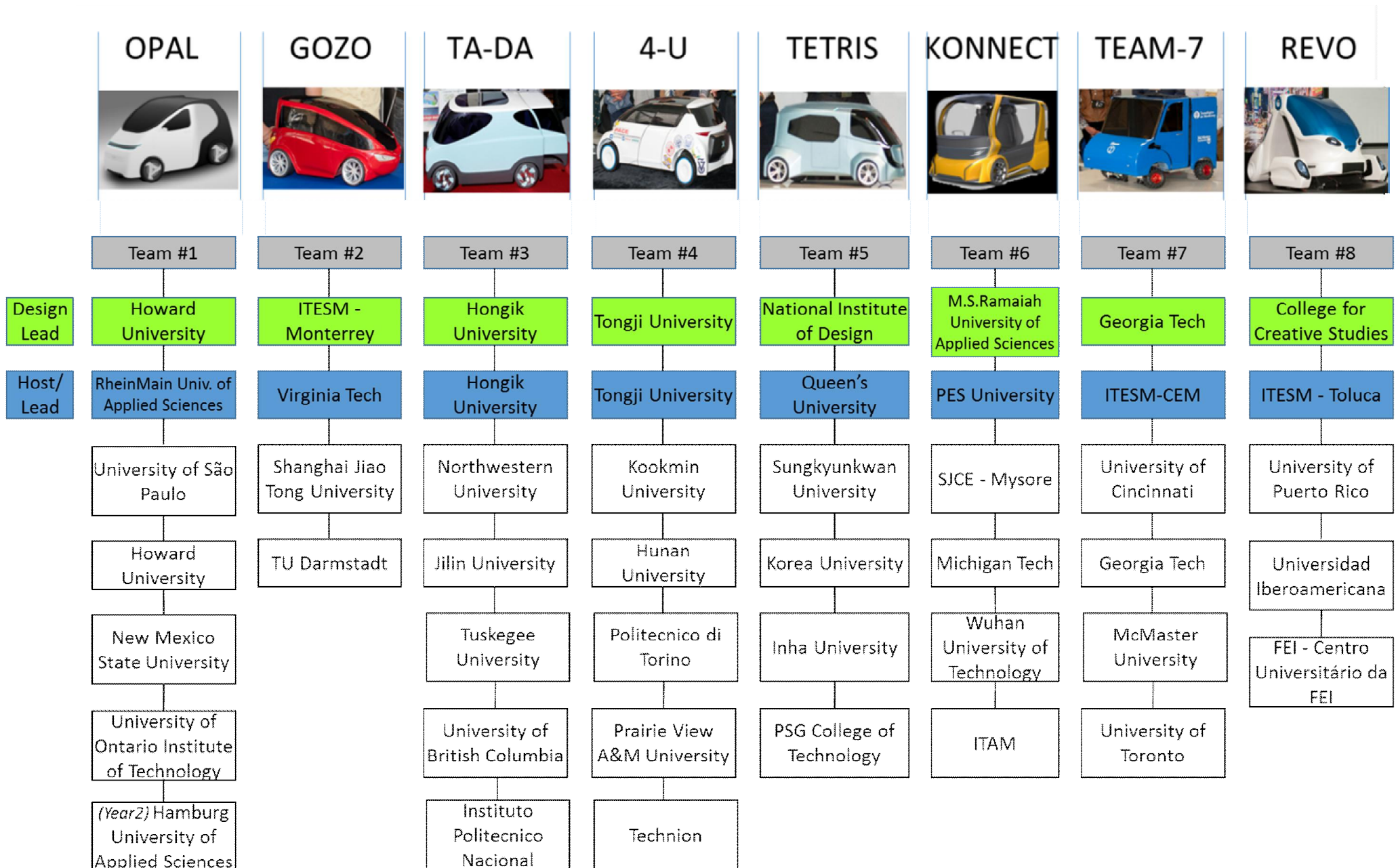
Project Duration: 2 Years
Team Makeup: One Industrial Design Institution (Lead)
One Manufacturing Lead Institution (Host)
Multiple Manufacturing/Engineering Institutions

- Teams will develop RSMS concepts including research, market assessment, design process, and one final design proposal as a non-running scale model
- Project deliverables shall be presented at the Annual PACE Forums
- This project will emphasize the build aspect (manufacturing)
- Vehicle shall be buildable, sustainable and theoretically produced for mass-production in 5 years.
- In the second year of this project, Industrial Design students are encouraged to collaborate with Manufacturing and Engineering students to develop and build:
 - Year #1: 1/3 size physical scale model; working physical scale models of mechanisms and subsystems
 - Year #2: **physical non-drivable static model of sufficient scale to demonstrate reconfigurability and shareability**








RSMS Schedule



Team Structure



Year #1 Competition Results - Recap

	OPAL	GOZO	TA-DA	4-U	TETRIS	KONNECT	TEAM-7	REVO
								
	Team #1	Team #2	Team #3	Team #4	Team #5	Team #6	Team #7	Team #8
Design Lead	Howard University	ITESM - Monterrey	Hongik University	Tongji University	National Institute of Design	M.S.Ramaiah University of Applied Sciences	Georgia Tech	College for Creative Studies
Host/Lead	RheinMain Univ. of Applied Sciences	Virginia Tech	Hongik University	Tongji University	Queen's University	PES University	ITESM-CEM	ITESM - Toluca
Consumers Insight	University of São Paulo 2	Shanghai Jiao Tong University	Northwestern University 1	Kookmin University	Sungkyunkwan University 3	SJCE - Mysore	University of Cincinnati	University of Puerto Rico
Design	Howard University	TU Darmstadt	Jilin University Best Interior	Hunan University Best Exterior	Korea University	Michigan Tech	Georgia Tech	Universidad Iberoamericana
	New Mexico State University		Tukeye University	Politecnico di Torino	Inha University	Wuhan University of Technology	McMaster University	FEI - Centro Universitário de Itajubá
Product Eng.	University of Ontario Institute of Technology 3		University of British Columbia 1	Prairie View A&M University	PSG College of Technology	ITAM	University of Toronto	2
Manufacturing Eng.	(Year2) Hamburg University of Applied Sciences		Instituto Tecnológico Nacional 1	Tecnológico de Monterrey 2				3
Overall								

Revised 16 February 2015

Year 2 Competition Details

- Part 1
 - Team written report due end of June
 - Team oral presentation at 2016 PACE Forum in Cincinnati
 - 30 minutes per team, including Q&A with judges
 - At least 1 student/team at the Forum to present team's work
 - 4x8 poster of the design concept (*vertical portrait format, JPG file needed by July 6th in order for GM to print*)
 - RSMS physical scale model (*see next slide*)
 - Judging panel will evaluate consumer insight, industrial design, product engineering, manufacturing engineering, and collaboration
 - Final scores are a combination of both oral and written
- Part 2
 - Demonstration of Reconfigurability Competition at 2016 PACE Forum in Cincinnati
 - More information to be shared at January webinar

Teams MUST use PACE software!

Project Brief – Summary of Revisions

- Scale of final model:

*“Industrial Design, Engineering and Manufacturing student(s) will continue to collaborate to build a **physical static model** of **sufficient scale to demonstrate the reconfigurability and shareability**, including visual diagrams that describe share-ability aspects. Industrial Designers will follow through with design input throughout the vehicle build process.”*

- Year #2 deliverables revised or expanded (*see next slides*)

Deliverables: Customer Insight

Louise

- Industrial Design, Engineering and Manufacturing are expected to collaborate and work closely together as an integrated team to develop all market research/customer insight deliverables.
- Confirm the Year 1 voice of the customer requirements.
- Develop, document and execute concept refinement research including at least 2 iterations of customer contact (refined concept and final concept).
- Clearly demonstrated link between customer feedback and final concept.
- Model requirement : sufficient size to demonstrate customer role in re-configurability and share-ability.

Judging Criteria: Customer Insight

Louise

User Needs Research Criteria	Points
Project Confirmation: Describe the research Goals and Methods used to confirm user needs have been met with selected concept.	20
Results Analysis & Insights: What did you learn from your confirmation research? What were the initial customer insights the team developed? What was retained & refined through YR2?	20
Voice of the Customer Requirements: Based on your research, analysis and insights, what customer needs did you choose to address? How did they impact the design / development?	20
Customer-centric Idea Generation, Prioritization & Selection: How does the concept you are developing meet the needs of the target customer? How does it improve their life (i.e. usage/usability/delight)? How is it better than existing alternatives?	20
Team Collaboration in User Needs Research: Who participated in the research, analysis, synthesis , ideation and application ? Explain the collaboration methods used & decisions impacted.	20

100

(page 4 of your feedback document)

Deliverables: Industrial Design

- Further develop the aesthetics of your concept design, while integrating the constraints of the manufacturing and engineering teams.
- The Design Judging team wishes to stay involved with the RSMS teams during year 2 as the Design schools further develop their aesthetics. Each RSMS team should schedule a virtual review with the Design Judging team to review design proposals for year 2.
- Industrial Design student(s) must follow through with design input throughout year 2 engineering refinement and model build process.

Judging Criteria: Industrial Design

Industrial Design Criteria	Points
Identified and defined a current or future design problem with need to solve utilizing Reconfigurable and/or Shared-Use solutions. Clearly articulated reconfigurable component in proposal.	20
Clearly portrayed how you translated your research into your final design solution and infrastructure.	20
Integrated clever packaging, functionality, and connectivity -- with focus on User Experience; HMI solutions; and environmental and societal impact of concept	20
Exterior Design Concept: 2D sketching; visual story telling; 3D translation; overall aesthetics and product persona	20
Interior Design Concept: 2D sketching; visual story telling; 3D translation; overall aesthetics and product persona	20
100	

Deliverables: Product Engineering

- Industrial Design, Engineering and Manufacturing student(s) will continue to collaborate to build a physical static model of sufficient scale to demonstrate the reconfigurability and shareability, including visual diagrams that describe share-ability aspects. Industrial Designers will follow through with design input throughout the vehicle build process.

Judging Criteria: Product Engineering

Engineering Criteria	Points
Project Framing (Scoping & Overall Product Development Timeline / Milestone Definition) & Project Management (Meeting Timelines & Deliverables)	10
Vehicle Technical Spec (VTS) - Broken to Subsystem Tech Specifications (SSTC) and Component Technical Specification (CTS)	15
CAD Models / Manufacturing Drawings	20
CAE Analyses	20
Validation Plan / Criteria Definition	5
Physical scale model, non-functional	10
Efficient Multi-Site Product Lifecycle Management (Including PDM - Data Share using Team Center)	10
Effective Team Collaboration (Engineering-Design-Manufacturing hand-shake including Application of Design for Manufacturability/ DFSS)	10

100

Deliverables: Manufacturing Engrg.

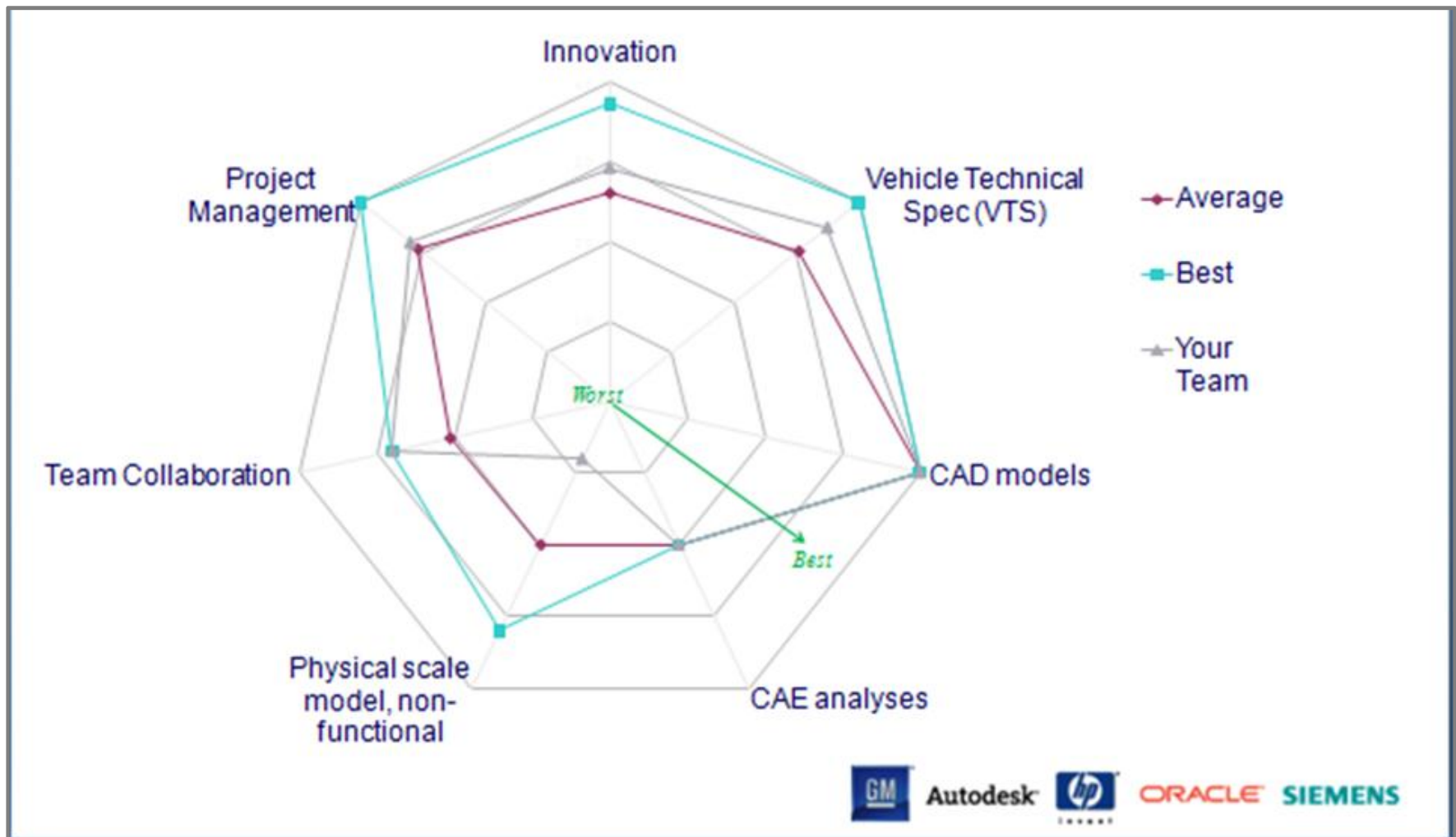
- Manufacturing student(s) will continue to collaborate with Design and Engineering to build a physical static model of sufficient scale to demonstrate reconfigurability and shareability.
- Develop analysis and show visual diagram of the build process for the vehicle mass production (process steps, plant layout, manufacturing simulation, product recyclability, plant safety, carbon footprint, ... etc.).
- Final Project Business Plan adjusted to actual prototype costs and a plan to get volume cost in-line with target product price for the market selected at the start of the project. Show adjustment needed from year 1 projections to year 2 analysis.

Judging Criteria: Manufacturing Engrg.

Manufacturing Engineering Criteria	Points
Affordability (unit cost for specific market)	10
CAD Model of plant layout (initial concept)	10
Math Data Sharing (Data sharing from engineering to manufacturing using PLM Tools (Teamcenter, TcVis, NX, etc.))	15
Early Manufacturing Analysis (Design for Manufacturability, Carbon Footprint, Recyclability)	25
Business Plan (unit cost, volume, ROI)	10
Built-in Safety Considerations (Mfg. related)	10
Physical scale model, non-functional	10
Team Collaboration	10
	100

Year #1 Feedback

Each chart illustrates the best, average, and worst performance among all the teams, so that you can see how your team rated relative to the other teams.



Past PACE Competitions: Year #1 vs Year #2

Year #1

Year #2

Portable Assisted Mobility Device PAMD



2013 Forum in Pasadena Team 1 “Stigo”

- Overall Collaboration
- 1st Place Engineering
- 1st Place Manufacturing

Team 2 “Cubo”

- 1st Place Design
- 1st Place Market Research

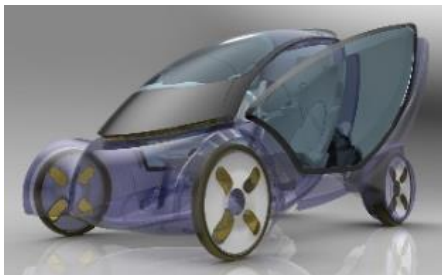
2014 Forum in Torino Team 5 “Go Sozo”

- 1st Place Approved for Production
- 1st Place Engineering
- 1st Place Manufacturing
- 1st Place Market Research

Team 7 “E-7 Trike”

- 1st Place Industrial Design
- 1st Place Road Test

Sustainable Urban Transport SUT



2011 Forum in Vancouver Team 3

- Best Collaboration
- 1st Place Design
- 1st Place Market Research

Team 5

- 1st Place Engineering

Team 6

- 1st Place Manufacturing

2012 Forum in Shanghai Team 2

- 1st Place Approved for Production

Team 3

- 2nd Place Approved for Production

Team 5

- 3rd Place Approved for Production

Team 1

- Most Ready for Production

Collaborative Product Development: How Design & Engineering Work Together

Carrie Ketelhut

Process Integration Engineer, GM Warren Tech Center

**Reconfigurable Shared-Use
Mobility Systems
(RSMS)**

November 2015

Collaborative Product Development: Vehicle Development Process

Craig Brown
PLM Leader, GM Warren Tech Center

VDP for PACE

Craig Brown
PLM Leader,
General Motors

Wrap-up: Future Webinars

- Team status report 1: Mid-January
- Team status report 2: End of March
- *Stay tuned for more information about*
 - Teamcenter pilot with Purdue University and Professor Nate Hartman
 - A new RSMS webpage
 - Your own team page
 - Blog or fb group with judges for ongoing Q&A
- ***Other topics upon request***
 - Jerry Sarfati, Siemens PLM Software (*see separate file for Jerry's slides*)

Questions Already sent to PACE Office

Engineering:

- Can we consider emerging technologies in our product? *Submitted by Felipe Gonçalves Marques, University of São Paulo, Team 1 OPAL*
- Response: Yes, but you need to manage the risk. For new technology, what is your plan to show it is robust.

Customer Insight:

- Need clarification on the criteria for the Customer Insights? *Submitted by Felipe Gonçalves Marques, University of São Paulo, Team 1 OPAL*
- Response: See the Customer Insight slides (10 & 11) shown today, because we revised to improve for clarification. Please follow-up via email if you have further questions.

Design:

- I'm writing to ask about the meeting with the judges that is specified within the Year 1 Feedback. Do we have to schedule a meeting to review the design, and when are the judges available? *Submitted by Isaac Ayala, ITESM-Toluca, Team 8 REVO*
- Response: One (1) representative from each Design sub-team for each of the 8 RSMS teams needs to send an email to Sheryl Garrett or Laura McCausland. They will be invited later this month to the Facebook group (private group) for the design reviews.
- How much can the design change from 1st year to 2nd year? *Submitted by Felipe Gonçalves Marques, University of São Paulo, Team 1 OPAL*
- Response: It depends on the team, some need more refinement than others. Please refer to your Design spider chart in your team's feedback, for now.

Questions Already sent to PACE Office

Manufacturing:

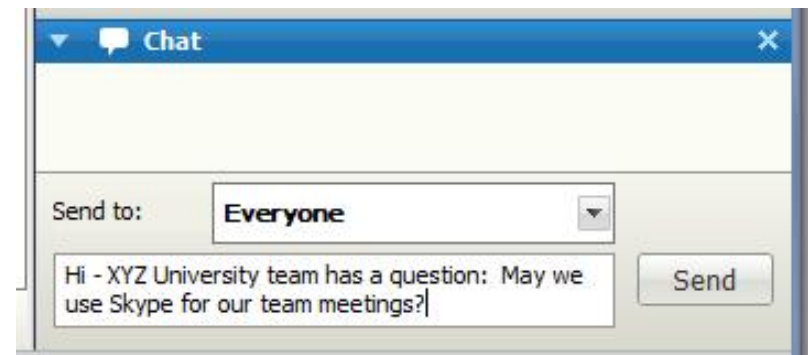
- Are there defined specifications for the prototype? *Submitted by Felipe Gonçalves Marques, University of São Paulo, Team 1 OPAL*
- Response: Please see slide 9. The prototype should be of sufficient scale to demonstrate reconfigurability & shareability. We will share more about this aspect of the competition at the January webinar, or earlier via email.
- What will be evaluated in the in the financial analysis? What data are the judges looking for? Is there a maximum or minimum for the total and initial investment in the business plan? Should we consider inflation along the years of service on our business plan? *Submitted by Felipe Gonçalves Marques, University of São Paulo, Team 1 OPAL*
- Response: Teams need to show that mass production can support/offset the investment. Don't worry about inflation, use current value in your calculations.

General:

- Will there be funding to the teams to build the next prototype? Will there be funding for student travel? *Submitted by Felipe Gonçalves Marques, University of São Paulo, Team 1 OPAL*
- Response: More information to be shared in March webinar. Funding was provided for the last two years, and we anticipate to be able to provide similar funding for RSMS year#2, although details are not available at this time.

Other Questions?

Please use the **Chat** feature to send additional questions to Laura McCausland during the Q&A portion of the meeting. We will address your question if time permits.



Additional Questions

Hello, we wanted to know if we can only consider existing parts. for example only battery dimensions that exist nowadays.or also those that are expected to exist by 2030? *Submitted by Jan Helge Bohn, Virginia Tech, Team 2 GoZo*

Response: No, you are not limited to existing parts. If you use new parts or technology, you need to show evidence (virtual or other) that it works. For new technology, what is your plan to show it is robust.

I would like to know when the facebook group will be created and what I have to do to participate to the group? *Submitted by Rodrigo Santillan, Student from Centro universitario da FEI, Team 8 REVO*

Response: Your faculty team leader (faculty) will receive an email with the instructions later this month. One (1) representative from each Design sub-team for each of the 8 RSMS teams will be invited later this month to the Facebook group (private group) for the design reviews.

Can only the leading team participate in the manufacturing? *Submitted by Umair, Politecnico di Torino, Team 4 "4-U"*

Response: If you have capability to assist in the manufacturing, propose to your team what role your school team can play. This is a team decision. The strength of each school on the team should be considered, and find a best solution for the entire team. You want your team to do well in the final competition, so it makes sense to take advantage of the abilities of the other schools. Your RSMS team will need to discuss this and agree on a plan. This is part of the team collaboration that is expected in the PACE competitions. There are many factors to take in consideration, including how to transport the model to the competition.

Additional Questions, *continued*

I have a question regarding the VTS, SSTS, and CTS. To what level of detail should this part of the written report must we develop it? Also, can you provide an example? *Submitted by Team 8 REVO*

Response: This is a very good question, faced by industry every day. You need sufficient detail to make decisions. Where you have a weakness or risk in your design, you need more details. Otherwise, high-level detail is sufficient. Apply the principals of six sigma to your design. We do not expect you to provide heavy detail in all areas. **We will find an example to share from a previous competition and a team that did well.**

Regarding Electrical Engineering, does PACE provide any software for design and validation? (circuit design, simulations, etc) *Submitted by UNKNOWN (?)*

Response: A new announcement will be made in the next 2 weeks, introducing Mentor Graphics as the newest PACE Contributor (Capital Suite tool). The PACE Executive Sponsor Council approved the addition of Mentor Graphics just last week.

Does the technology that we intend to use be available by 2030 or within 5 years? We are asking this question specifically with regards to advances in autonomous driving like the google car? *Submitted by Jan Helge Bohn, Virginia Tech, Team 2 GoZo*

Response: We want it to be produce-able in 5 years, as per the requirements. If this is not the case, you need a plan to address the risk. Be sure to do market research....you may find people doing autonomous already, to be available in 5 years.

Additional Questions, *continued*

It means that the manufacture can be done just by leader if we team decide that?

Submitted by Fan Li, Student from Tongji University, Team 4 "4-U"

Response: That is one option. The entire RSMS team should agree, take the best skills from the entire team. The team with the best skills should lead that area. We emphasize collaboration in the PACE projects, so it is important to ensure there is agreement within the team. There are many factors to take in consideration, including the capabilities and resources of each school. You will also need to transport the model to the competition, so may want to consider your US or Canada school for the final assembly.

Added note regarding final assembly for the competition in Cincinnati: Do **not** assume you will have space for final build/assembly at the Forum. Make a plan for where you will assemble and test your model – you may need to do so in your hotel or dorm room, or at your US/Canada team school location.

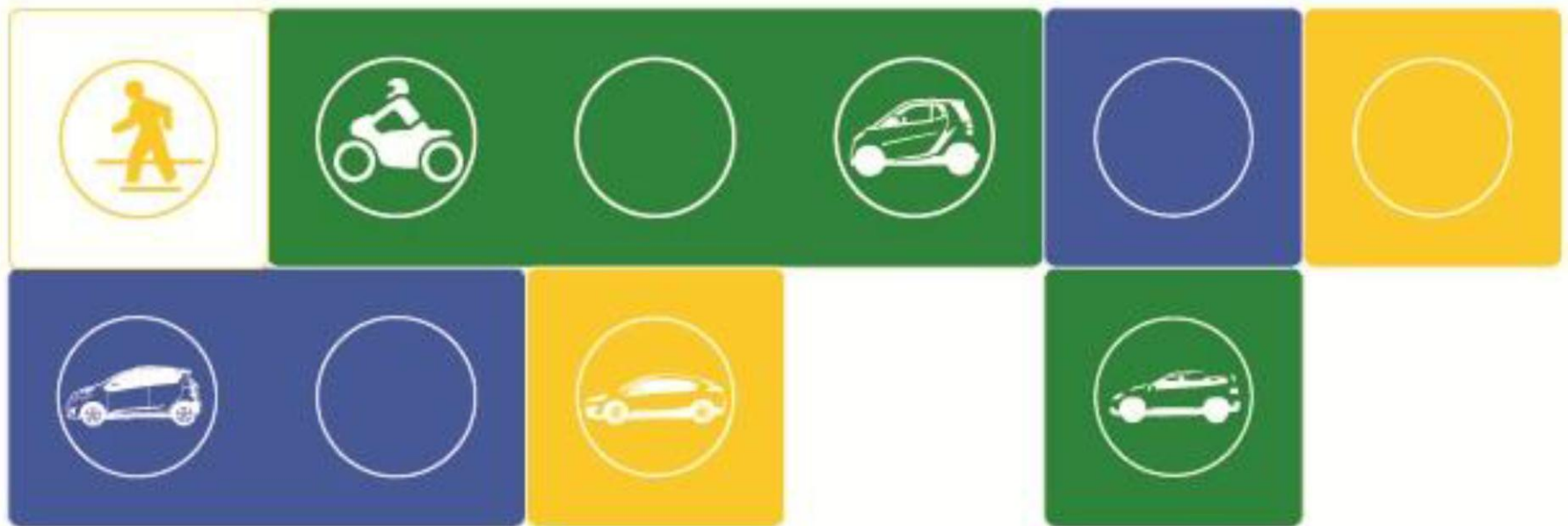
Thank you, RSMS Teams!

If your team has other questions, please email to laura.mccausland@gm.com . The judges will respond as time permits.

We will get a Facebook group started in the next few weeks to facilitate Q&A between judges and teams, and future communications. *(Separate from the Design review Facebook group.)* An email will be sent to the faculty single point of contact for your school for your RSMS team.

Thank you!

PACE Reconfigurable Shared-Use Mobility Systems Project Competition



Next meeting: Mid-January, Team Status Reports