

PROJECT: 2020 Solar Decathlon Middle East, *reACT reGENERATED*

reviewed and developed by: the reACT ThinkTank

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EXECUTIVE SUMMARY

Team Maryland was invited to the 2020 Solar Decathlon Middle East for the purpose and intention of bringing US representation to this particular International Solar Decathlon competition.¹ The *reACT* faculty leaders and their deans, were committed to seizing this opportunity to advance *sd2017 reACT* (as a *reincarnation* of sorts) to adapt to the Middle Eastern climate and cultural context, which would underscore the versatility of the foundational sustainability standards and principles it was built on. Our efforts to do just that, as you will see in the following sections, were well underway and, while we were greatly saddened by the request to withdraw from the competition itself, we were pleased that the University encouraged us to continue forward with reconstructing *reACT* and convert it to the University's first real Sustainability Laboratory and Living Building.

SDME 2020 VISION

Our vision for *reACT REGENERATED* is to both contribute meaningfully to the SDME 2020 Competition of advancing ideas and innovations *AND* to better prepare our original Sustainability Lab for a vigorous research agenda back at the University of Maryland campus after the Competition and International Exposition. It is the intention of Team Maryland to deepen and expand the significance of the numerous innovations first developed and advanced in 2017 in Denver, Colorado, USA, by improving and building upon those significant innovations, as well as adding and developing more sophisticated and relevant innovations. Team Maryland knows that the Middle East environment and climate are significantly different, as are the regional indigenous influences, worthy of careful attention and insight as a basis for further innovation. By studying and reflecting these new influences, the *reACT* Prototype can both demonstrate its original intended versatility and adaptability, as well as become an effective agent for further innovations to meet this new set of challenges.

Team Maryland would also like to use this regeneration potential to capture the educational and institutional benefits of involving the now, largely in the form of committed alumni, 2017 team enthusiasm and goodwill as effective new SDME team mentoring. Our first meeting, held to announce this regeneration effort, kindled extensive enthusiasm and expressions of commitment to participate, both from the alumni of *reACT* and new students at UMD who confessed coming to the University of Maryland explicitly to be able to be involved in projects like *reACT*, as well as share in the legacy of past successful Team Maryland efforts. The university itself sees its participation as an advantage to help strengthen its global reputation as an international leader in the sustainability arena. Furthermore, the original idea of *reACT* was to expand the data gathering and testing of its systems, into more diverse climates, seasons and cultural variables to build greater validity and relevance in sustainability disciplines and the industry. The original aspirations of Team Maryland 2017 were to further development of a kit-of-parts design and to focus on the multiple iterations of assembly and disassembling, which participating in the SDME 2020, and post competition accomodation on the College Park campus as a research lab, will require.

Team Maryland will continue pushing its objective of firmly establishing an ongoing University of Maryland Solar Decathlon program of research and experiential learning that engages students from freshman to post-docs, faculty from multiple disciplines centered on design-thinking, community engagement through industrial-university collaborations, educational outreach to pre-collegiate students and teachers, as well as engage the global population through its participation in the WorldEXPO 2020² in order to solve the most pressing and existential problem of our time, climate change. Maryland's prototype will demonstrate an integrated approach to physical, architectural design ideas and options, renewable energy, water conservation and waste recycling that works in partnership with the natural ecosystem.

¹ See invitation letter (Appendix Q) and competition application in (Appendix R)

² Now tentatively dated 2021.

PROGRAM PERIOD: 08/15/2019 – 04/03/2020

MILESTONES



*Team Photo 1
Taken at
December
SDME2020
Kickoff,
submitted
with
Deliverable 2*

*Photo:
Christine
Hinojosa*

- 08.26.19 Chris Hinojosa fields a call from SDME2020 Organizers about Team Maryland's interest in participation
- 08.2019 MaryAnn Ibezaiko, Energy & Engineering calls in her unit's support (financial & administrative)
- 09.02.19 Dr. Richard King email
- 09.17.19 Garth Rockcastle emails Organizers of UMD's intent to Submit a Proposal
- 09.20.19 Meeting with sd2017 Stakeholders: Interest in competing in SDME 2020, Rich Vogel from WhitingTurner attended, 20+ attendees
- 09.24.19 Garth Rockcastle, Patti Cossard teleconference with Organizers to discuss arrangements
- 09.30.20 First Team Huddle³
- 10.09.19 Deliverable 1: Schematic design submitted on time:
 - Project Manual #1
 - Project Drawings #1
 - Power Point #1 (5-slide presentation made by Students at the SDME2020 International Workshop #1 in Dubai U.A.E.)
 - AudioVisual Presentation #1 (one-minute Introduction to the Team video)
- 10.21-23 Professor Garth Rockcastle, Megan Gertmenian, and Isabella Hernandez attend the First SDME2020 International Workshop to represent Team Maryland and meet with the organizers
- 10.23.19 Solar Hai Lot Selection announced, SE corner, exposed on our two most important sides and allowing us to enter on our East if we want
- 12.01.2019 Budget Approved by Dean Darryll Pines & Dean Don Linebaugh
- 12.03.19 Inaugural Integrative Charette: Project Management, Outcome: Begin process to organize the leadership team

³ Huddle: 30 minute conference call with skeleton team to organize work of the week and develop design parameters of the project.



1st Construction Systems Group Walk-Through of Anacostia Site with Facilities Management, February 3, 2020

Kristy Long Leads

Two of Three reACT modules in background

Photo credit: Yehuda Katz

- 12.09.19 Official Kickoff program, see Appendix F & G, 75+ attendee
- 12.18.19 Deliverable 2: Design Development, delivered on time
 - Project Manual #2
 - Press Kit #1
 - Team Photo #1
 - Electrical Charts & Checklists #1
- 01.10.20 Dr. Stoltz introduces Bill Hubbard to the group, he hits the ground running
- 01.17.20 Pls are notified that MaryAnn Ibezaiko has left the University
- 01.22.20 Electrical Webinar with SDME2020 organizers, Ray Adomaitis and Bryan Quinn attend
- 01.23.20 Construction Workshop, see Appendix H for agenda, 15 attendees (webex & in person)
Kristy Long begins working with the Team, Facilities Management Operations & Maintenance signs off on contribution to the partnership
- 01.27.20 Cossard & Stoltz meet with Leanne Johnson, Director, International Risk Management, Office of International Affairs.
- 01.31.20 1st All Team meeting, agenda: see Appendix I, 75+ attendees. Peter May joins the Team! Dr. Stoltz polled students concerns: answer=credit hours
- 02.03.20 First Construction Group Walk-Through of Anacostia Site, cranes planned for mid-March
- 02.04.20 Library Management Group approves project partnership
- 02.14.20 System Groups convene weekly meetings: Engineering, Architecture, Living Systems, Communications, Education/Extension, Construction
- 03.7-8.20 OSHA Training, Instructor: Samuel Hatcher, Instructor, 30 attendees
- 03.16.2020 Kristy Long ready to award contracts in order to prep the site and reposition the house units so the students could start their work beginning spring

- 04.03.20 All expenditures were suspended on April 3, 2020 as the University announced a Governor mandated hiring freeze and reduction of the rate of expenditures
-

EVENTS/OUTREACH

- 10.19.19 MD Stem Festival at BSU: at the invitation of Othalene Lawrence, Environmental Scientist, EERE Senior Diversity and STEM Program Lead, Office of Energy Efficiency and Renewable Energy. DOE Team: EERE Programs and organizations have/are providing materials and resources: Advanced Manufacturing (Technical Expert 3D sample items, 3D video, handouts), Building: (Booklets, samples, resources), Bioenergy (Coloring Books, Bookmarks), Solar (STEM materials), STEM Rising (STEM materials, banner, selfie picture frame), Workforce Management Office (Student Career Opportunities Information), Strategic Program Office (Table Cloth, Pull Up Banner), University of Maryland (Solar Decathlon Pamphlets, iPad Demonstration and Walkthrough)
- Technical Experts Available to Speak with Students include:
 Helena Khazdozian - Science & Technology Policy AAAS Fellow
 Terrence Mosley – Building Technology Program Office AAAS FELLOW
 University of Maryland Solar Decathlon Representative/s
- 03.04.20 Class presentation: Stephanie Lansing, Department of Environmental Science and Technology requested a short presentation in her Ecological Design and Engineering Class (ENST481/ENST681) to give her students an idea of some of the living systems projects they might get involved in. A short powerpoint was developed by Bill Hubbard and presented to approximately 25 students. Several students expressed interest and a few were already involved in the project. They have projects like this due this semester and she thinks there could be some great connections.
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PROJECT DIRECTORY

MANAGING DEANS: Darryll Pines, Dean of the A James Clark School of Engineering & Donald Linebaugh, Dean of the School of Architecture, Planning, & Preservation

SUPPORTING UNITS & DEANS: College of Agriculture & Natural Resources, Dean Craig Beyrouthy, College of Education, Dean Jennifer Rice, University Libraries, Dean Adriene Lim, Facilities Management--Operations & Maintenance, Executive Director Kristy Long

PRINCIPAL INVESTIGATORS: Garth Rockcastle (ARCH), Ray Adomaitis (ENGR), Patti Cossard (LIBR), Angela Stoltz (EDUC), Hooman Koliji (AGNR) and William Hubbard (AGNR)

SUPPORTING FACULTY/STUDENTS/STAFF:

A James Clark School of Engineering: Bryan Quinn (Electrical & Computer Engineering), Yunho Wang (Mechanical Engineering)

Agriculture & Natural Resources: Peter May (Environmental Science & Technology)

Facilities Management: Blaze Buck, Megan Gertmenian, Isabella Hernandez (Energy & Engineering)

University Libraries: James Spring

KEY EXTERNAL STAKEHOLDERS

Rockcastle Architects, LLC, Wisconsin

Garth Rockcastle, FAIA, former Professor and now Emeritus Founding Principal of MSR design, has launched an independent consulting practice (post more strictly academic and design practice roles) to advance diverse innovations in design thinking, and it's attendant intellectual property, surrounding living buildings, new product innovations and alternative means and methods of construction.

CREO Green-Tech Innovation, San Francisco, California

Hooman Koliji, PhD is an Associate Clinical Professor at the University of Maryland (formerly a tenured professor). He is currently the CEO of CREO, a Green Technology Innovation Company based in San Francisco Bay Area, California. CREO's mission is to turn built environments into thriving ecological systems. CREO's works focus on intelligent living systems and their integration in built environments, which includes sensor IoT, precision growth, micro-hydroponics, smart grow platforms, machine learning, and plant sciences. These technologies are core to create self-regulating and autonomous living systems for the built environment. CREO is currently part of the Autodesk Inc Residency program where they develop their technologies at its Technology Center and work with engineers and experts to advance CREO's mission.

Beracah Homes, Inc. Greenwood, DE [see Appendix K]

As early as October 2017, Beracah Homes, Inc. has been interested in commercializing *reACT*. Beracah Homes, Inc. is an Energy Star Certified modular home sustainable manufacturer and construction company specializing in factory built custom designed homes and light commercial projects. Located in Greenwood, DE, Beracah meets our locality regenerative measure as a regional sustainable source for mass production. We were interested in cultivating this relationship because one of our design goals was to make a real impact on the housing industry in line with our land grant mission.

The reconstruction of *reACT*, *under any circumstances*, provides the university with agency to transfer technology to the industrial sector, indeed through licensing there is an income stream to be created. Our joint exploration of mass producing *reACT* DNA began in the Summer 2018. Dr. Angela Stoltz and Professor Garth Rockcastle cultivate this relationship. They met with Roger Collison at his factory site to continue increasing our mutual understanding. When the opportunity to compete in SDME2020 presented, we immediately invited him to be a mentor on the Construction Systems Group which he accepted. He attended a number of the meetings including the first AllTeam meeting in January 2020.⁴

WhitingTurner

Under the Presidency of Richard Vogel, Whiting-Turning has supported all of Team Maryland's Solar Decathlon projects. For sd2017 *reACT*, the Engineering Firm contributed mentoring and skilled labor both in College Park and in Denver. They have a substantial investment in *reACT* and its regeneration.

Katz, Katz & Choy

This Computer Development consultancy has hosted all Team Maryland websites on their server year.solarteam.org. [David J. Choy, PhD](#), was the [sd2007 Student Leader](#) for Software Development and Web Content Coordinator when he was an undergraduate in Mechanical Engineering. [Moshe M. Katz](#) and his twin brother, [Yehuda Katz](#), were the sd2011 Student Leaders developing the website for WaterShed, the sd2011 First Place winner, when they were undergraduates in Computer Science. Having graduated in 2011, [Yehuda](#) and [Moshe](#) are currently PhD students in the College of Computer, Math, & Natural Science.

⁴ See Appendix L for email

Potomac Valley Architecture Foundation (PVAF)

PVAF is the owner of sd2007 2nd place winner, [LEAFHouse](#), which is located on campus at the Anacostia site. The American Institute of Architects Potomac Valley ([AIAPV](#)) uses it as their headquarters. PVAF was a key sponsor of sd2017 *reACT*. As former sponsors of *reACT* and neighbor stakeholders of the Anacostia site, Dean Don Linebaugh and Facilities Management were developing Memorandum of Understandings (MOUs) between PVAF and the University. The MOUs concerned: Electrical Hookup from LEAFHouse, Access & Security Monitoring, and Post-Build Site Restoration.

Team Maryland 2017

Alumni are still vested and interested in serving as advisors/mentors, and key stakeholders for reconstruction of *reACT* (see Appendix I).

FINAL BUDGET

| | |
|----------------------|------------------------|
| APPROVED BUDGET: | \$820,326 |
| TOTAL EXPENSES: | \$ 19,819 ⁵ |
| TOTAL Paid by MAPP: | \$ 854 |
| TOTAL Paid by FM-E&E | \$ 3,572 |
| TOTAL OUTSTANDING: | \$ 15,391 ⁶ |

ORGANIZATIONAL STRUCTURE

Five overlapping disciplinary spheres, each with sub-teams related to specific tasks in that sphere.

RE-Construction (>90 students)

| | |
|--------------------|---|
| Site Operations: | Garth Rockcastle, ARCH, Faculty Lead* |
| | Kristy Long, FMOM, Professional/Administrative Lead |
| Health & Safety: | Garth Rockcastle, ARCH, Faculty Lead* |
| | Kristy Long, FMOM, Professional/Administrative Lead |
| OSHA Training | Sam Hubbard, Facilities Management |
| Campus H&S Officer | Glynnis Bowman, Facilities Management |

Engineering Systems (26 students):

| | |
|-----------------------------|--|
| SmartHouse & Sensors: | Ray Adomaitis, PhD, ENGR, Faculty Lead* ⁷ |
| Power/PV/Electrical System: | Bryan Quinn, ENGR, Professional Lead* |
| Comfort Systems: | Yunho Hwang, ENGR, Faculty Lead* |
| | Nehemiah Emaikwu (PhD student), ENGR, Student Lead |
| Logistics & Shipping | Ray Adomaitis, ENGR, Faculty Lead* |
| | Garth Rockcastle, ARCH, Faculty Lead* |

Architecture Systems (23 students):

| | |
|-------------------------|---------------------------------------|
| Exterior Skin/Envelope: | Garth Rockcastle, ARCH, Faculty Lead* |
|-------------------------|---------------------------------------|

⁵ See Appendix A for details.

⁶ Ibid.

⁷ Names with a * indicate a sd2017 Alumni - Team Maryland

Attic Clerestory Zone Enhancements⁸: Garth Rockcastle, ARCH, Faculty Lead*
 Flexible Furniture Task Force: Garth Rockcastle, ARCH, Faculty Lead*
 Architectural Scale Model: Alla Elmahadi, ARCH/MRED Alumni & Professional Lead*

Living Systems (21 students):

Coordination & Extension: William Hubbard, AGNR (UME), Faculty Lead
 Hydroponics: Jose-Luis Izursa, AGNR (ENST), Faculty Lead
 Plant IoT, Sensors, AI & Hydroponics: Hooman Koliji, AGNR/ARCH, Faculty Lead*
 Waste to Energy: Amro Hassanein, AGNR (ENST), Faculty Lead
 Water systems, Native Plants & Eco-tech: Peter May, AGNR (ENST), Faculty Lead*

Communication Systems (21 students):

Media/Press: Chris Hinojosa, ARCH, Professional Lead*
 Graphics/Identity: Emma Schrantz, ARCH/HISP Alumni & Professional Lead*
 Project Management: Patricia Cossard, LIBR, Faculty Lead*
 Siyue Huang, (MRED student), ARCH, Student Lead
 Client Relations/Culture: Patricia Cossard, LIBR, Faculty Lead*
 Information Technology: Patricia Cossard, LIBR, Faculty Lead*
 Yehuda Katz, (PhD student), CMNS, Student Lead**⁹
 STEM Teacher Education: Angela Stoltz, EDUC, Faculty Lead*
 Curriculum & Experiential Learning: Angela Stoltz, EDUC, Faculty Lead*
 Zach Bishop, BSOS, Student Lead*
 Land Grant Mission, Extension: Bill Hubbard, AGNR, Faculty Lead

SD ALUMNI:

Engineering: Tim Owoeye sd2017, Ellery Klein sd2017, Jamey Campbell sd2017, Alan Uy sd2017
 Architecture, Planning, Historic Preservation, Real Estate Dev: Alla Elmahadi sd2017, Emma Schrantz sd2017
 Agriculture & Natural Science: Matthew Lagomarsino, sd2017
 Computer, Math & Natural Science: Yehuda Katz, sd2011
 Behavioral and Social Sciences: Zachary Bishop, sd2017

ASPIRATIONAL PLAN OF ACTION

At the time we were asked to withdraw from SDME, the team had begun to do the difficult work of prioritizing a diverse and expansive set of aspirations to best leverage the necessarily limited funds secured for reGENERating *reACT*. Below is a categorized list of candidate challenges that grew out of both the limited successes, the failures, and the newly emerging interests that we were working to incorporate into reGEN for the SDME. In effect, these same items will seed the framework for the Sustainability LAB scheduled to be the instigation and catalyst on the UMD campus as early as this coming (20/21) academic year. The reGENERating process of experiments and testings, is expected to become the backbone of a continual process going forward,

⁸ dryer, preserver and slow cook ovens

⁹ Names with ** indicate a sd2011 Alumni - Team Maryland

so that *reACT* becomes the living sustainability laboratory often talked about on campus, but not yet realized.

I. Construction Systems Group

Construction Task Force

Temporary site reconstruction planned to commence the week after Spring Break

Contracts ready to execute for remobilization

- Long Fence, for fencing and bollards.
- Drenner Concrete, for site prep/ gravel/ slab.
- Johnson Crane for rigging/ lifting.
- Bobby's potties for port a johns.

Health & Safety Task Force

OSHA Training

- OSHA certification required by the competition and other associated standards,
- 30 team members complete certification,
- another workshop was scheduled the Saturday and Sunday prior to Spring Break, with 30 seats registered,
- Discussions were in process to schedule 1-2 more workshops

2. Engineering Systems Group

SmartHouse & Sensors Task Force

- Creation of the next-generation *reACT* sustainability simulation and home resource optimization software library

Comfort Systems Task Force

- Introductory lesson on heating, ventilation, and air conditioning systems with a focus on mini-splits.
- Simulated performance of building comfort systems for the Middle Eastern climate using National Renewable Energy Laboratory's Building Energy Optimization ([BEopt™](#)) tool. Introducing students to one of the main federal agencies that supports our work.
- Prepared student workshop on modeling with BEopt™ to give them the skills necessary to simulate building performance of comfort systems.

Power/PV/Electrical System Task Force

Modifying PV power plant to work with 220Vac, 50Hz grid. The original *reACT* power plant/electrical infrastructure was designed to work as a grid connected domicile in the United States. This required a 240Vac, 2 pole, 60Hz system. Dubai grid power specifications are for 220Vac, single pole, 50 Hz.

- Investigated Solutions
 - Modify existing electrical systems to meet SDME specifications. Most desirable method, however, we concluded that it was too risky to compete with [SolarEdge's](#), *reACT's* original system's manufacturer, unable to provide technical support.
 - Use of external equipment transformers and frequency converters whereby voltage could be transformed up from the house power plant to the local grid and down from the local grid to the house by means of a power transformer. Frequency conversion can be accomplished relatively easily in one direction, however a bidirectional frequency converter is rather difficult to accomplish. Discussions were held with both manufacturers and quotes with discounts were being put together.
 - *reACT's* original electrical infrastructure (appliances, lights, distribution, etc.) were investigated for their ability to work with SDME2020 electrical specifications. All electrical components on the existing *reACT* house were designed to work with US standards. While power consumption

will be the same all components ratings for the ME higher voltage was verified. Conclusion: a new electrical distribution panel would need to be purchased. Electrical wiring from the distribution panel does not need to be replaced. Receptacles need replacement, as well as, appropriate plugs or universally provide adaptors.

3. Architecture Systems Group

The Systems Group met twice as a group of faculty, mentors (from *reACT*) and (25 +/-) new architecture students. We shared what we learned in 2017 and discussed ideas that were spawned during and since then, that were not able to be incorporated or achieved then. Students were invited to join one or more task forces to reflect their particular interests, the preliminary indication was that all topic areas had a minimum of three students interested.

Interior/Exterior Skin/Envelope Task Force

- *reACT*'s laminated bamboo skin exterior surfaces proved to fail dramatically, not perform as claimed by the manufacturer's statements. The skins took on moisture and produced mold discoloring the exterior surfaces. However, the infrastructure of the exterior permits by design easy alternative trials of a wide range of materials. The Task Force planned to investigate several options, even at the same time on different sides to underscore its "living building" nature and future, validating the idea that exterior skins for homes might want to be thought of this way for sustainability reasons.
- Advantages/Disadvantages of Panelization. *reACT*'s endeavor to skin the interior entirely without GypBd proved to be more challenging, but wise just the same. It afforded access to repair technical problems during the competition, that other options would have limited or restricted. The Task Force was to find ways to improve on the ease of implementation and greater diversity of material choices so that the interior skin choices match the versatility of the exterior.

Attic Clerestory Zone Enhancements Task Force

- Unique E/W Solar Orientation (led to envisioning the use of bounced light from greenhouse glass area to the collector arrays, so we had conceptually designed dynamic E/W tracking "skins" or leaves that would bounce and filter the solar energy during daylight hours - to protect or minimize heat gain over the glazed greenhouse itself - and enhance or intensify the energy cast to the solar arrays on either side of it). It was also thought that these dynamic layers would add visual and rhythmic interest to the daily and seasonal fluctuations of reGEN's identity and reflect more of its evidential "Living Systems Character."
- Solar Thermal Mediation (shading, reduction and enhancement) Additional shading and thermal channeling of thermal properties was being explored for the greenhouse/courtyard itself, given it feeds the dryer and attic condensers so buffering and enhancing those functions would =need responsive functionality of these layers. in this zone.
- Solar Drying and Food Preservation (drying and dehumidifying) While in sd2017 *reACT* successfully realized both the clothes/food drying functions, no real testing, debugging, and enhancement of these two attic chambers was achieved. Slow cooking concepts were never tested. Reincarnated dryers can now be more refined and developed for reGEN and LAB phases. Dehumidifying these chambers and capturing the "wastewater" was to be developed for arid climate and water collection.

Flexible Furniture Task Force

- Multi-functional desk/table/counter units, five-function support & benefits. The vital success of the original components was the focus of further enhanced refinements of connections, and possible further dynamism including increasing vertical displacement, and indoor/outdoor functionality, e.g., adding complementary components to be used in the courtyard or out on the decks.

Scale Model Task Force

- Deliverable #3, due on March 17, included the transport and delivery of a scale model of *reACT* in order to be displayed at the Second International Workshop. A group of seven Architecture students worked with Rockcastle, Elmahadi and Cossard to identify *reACT* construction drawings, begin to scale them for model building, as well as design a crate for it to be shipped to the organizers Dubai. The students succeeded in submitting a budget and an itemized list of materials with sources to be purchased. Purchases were not made because of COVID-19 and cancelling Team Maryland's participation.¹⁰

4. Living Systems Group

The Systems Group held their first meeting February 21, 2020. The main outcome was to get oriented with *reACT*'s past, understand the challenges for SDME2020 and what task forces to organize to execute their work.

- Bill Hubbard provided a 15-minute overview and update on the project and discussed opportunities for AGNR-ENST faculty and student involvement at a faculty meeting. As a result, two faculty from ENST, new to the Solar Decathlon we recruited.
- The coordination of the Living Systems Group would be led by William Hubbard (UME)
- There are four Task Forces:
 - Water systems, Native Plants & Eco-tech Task Force, led by Peter May
 - Waste to Energy Task Force would be led by project-new faculty member, Amro Hassanein, AGNR (ENST)
 - Hooman Koliji would lead the Plant IoT, Sensors, AI & Hydroponics Task Force, working with students to make the *reACT* hydroponic system intelligent using IoT technology
 - Jose-Luis Izursa, another project-new faculty member would assist in hydroponic innovation
- Significant *reACT* technologies to review and innovate include:
 - Water capture and filtration, i.e., gray water to reusable water and even to potable water options.
 - Waste to Energy, in sd2017 the Swiss team (1st place) and Team Maryland (2nd place) were the only two prototypes utilizing a compost toilet. This was a big deal. This is about going 'back to the future' as 100 years ago pretty much all toilets were compost toilets until the 1910s.
 - Living systems components were the green walls, and horticulture landscapes inside and outside and bringing in native plants, etc.
 - Importance of indoor planting scenarios and the relationship to hydroponics.
- Everything needs to be focused on water reduction and reuse, but living systems will be really important as well. We need to be thinking about the desert environment...so xeriscaping should be included in our thought process.
- Hooman Koliji has secured technical in-kind support from Autodesk Inc Technology Center for manufacture structures and electronics of the living systems and vertical greens through CREO's current residency program with Autodesk.

5. Communication/outreach including Deliverables

Team website/social media Task Force

- Website Task Force: led by Yehuda Katz, PhD candidate (CMNS), the taskforce will develop the reGEN website. Using the 2011.solarteam.org as a model for content structure, we will adapt and upgrade the

¹⁰See Appendix R.

software platform and content to current technology/accessibility standards.¹¹

- Katz, Katx, and Choy will host the SDME2020 website. The URL is 2020me.solarteam.org.
- The Comm Systems group will focus on the following task forces: Team website/social media, Team identity/Graphic Design, Deliverable Audio-Visuals, Media/Sponsor relations, Image Metadata, Client Research, Finance. We will collaborate with the Sustainability Education & Outreach Task Force on establishing a *reGEN* Youtube channel and developing audiovisual postings, as well as performing Ethnographic Marketing Research.
- We will collaborate with the Architecture Systems Group to develop a *reGEN* visual identity that will extend from graphic design to team swag to internal house fittings. We will provide all *reGEN* system groups team stationary (electronic and print), presentation templates, metadata standards for photographic images, and results of our research on Client and UAE/Middle Eastern Culture as well as etiquette to ensure compliance with SDME2020 rules SDME conduct rules: Rule 3.4, SDME dress code: “To be aligned with the UAE culture, it is best to remain covered at least from shoulder to knees” and the Rule 3.5 for the use of the likeness, content and images.
- Travel Risk Assessment: Cossard & Stoltz met with Leanne Johnson, Director, International Risk Management, Office of International Affairs to understand the process for UMD Students to travel internationally on a UMD sponsored trip.
 - Johnson appreciated us getting in contact early, shared a number of documents in order to appropriately limit University Liability.
 - Furthermore, the faculty wanted to ensure student safety in a place with an indigenous ruling class that governs by Sharia Law, a justice system completely alien to many UMD students who have been privileged by Democratic civil liberties.
 - Johnson provided us with appropriate sources to understand the risks. She provided advice on transportation and medical arrangements.
 - Upon her recommendation, we planned to schedule an AllTeam meeting presenting a travel health clinic session with Cherone Wallace.

Client Relations/Culture Task Force:

- Task Force Deliverables:
 - Written marketing research report that will
 - Allteam Meeting/presentation on Cultural resources: including Pop-culture (movies, social media, magazines, videogames, pop-art, etc.)
 - Research methodology: EMR
 - Ethnographic Marketing Research (EMR)¹² a key component of this work will be for us to develop a deep understanding of the intended clients living in UAE (culture), and their environment (climate, resources, and human/ecological interactions) and how that applies to the understanding of *reGEN*'s sustainability systems and the ways they integrate with each other (all other Task Forces).
 - Focus group: Professor in Business (Stella will provide name), Zeinab Karake dubai resource, Alla Elmahadi, Hooman Koliji, Mrs. Koliji¹³

STEM Teacher Education/Curriculum & Experiential Learning Task Force (See the "Teaching Plans" section below)

¹¹ See Appendix T.

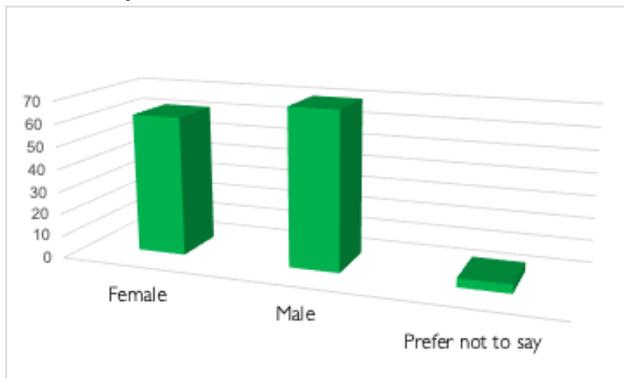
¹² Ethnographic market research (EMR) helps companies understand the consumer in terms of cultural trends, lifestyle factors, attitudes and how social context influences product selection and usage. Traditionally, when businesses want to determine how consumers feel about a product or service, they employ focus groups.

¹³ Professor Koliji's wife is a Landscape Architect whose firm has the contract to design the WorldExpo 2020 landscape.

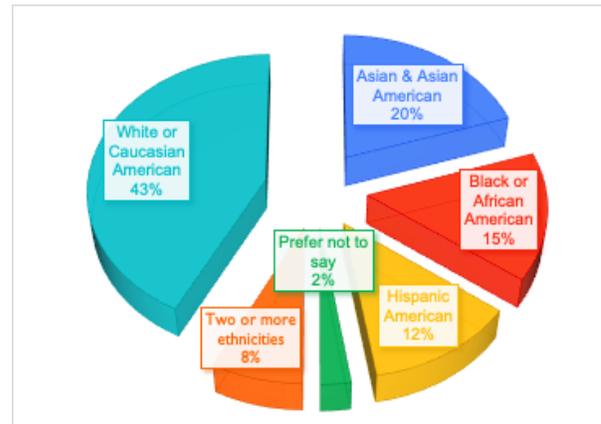
TEAM DEMOGRAPHICS:

Nearly 180 students expressed interest in joining SDME2020 either by attending an event or by filling out a registration form. 136 students have registered as members. 30 have completed the OSHA-10 certification¹⁴, with another 30 having had their workshop canceled due to campus closing.

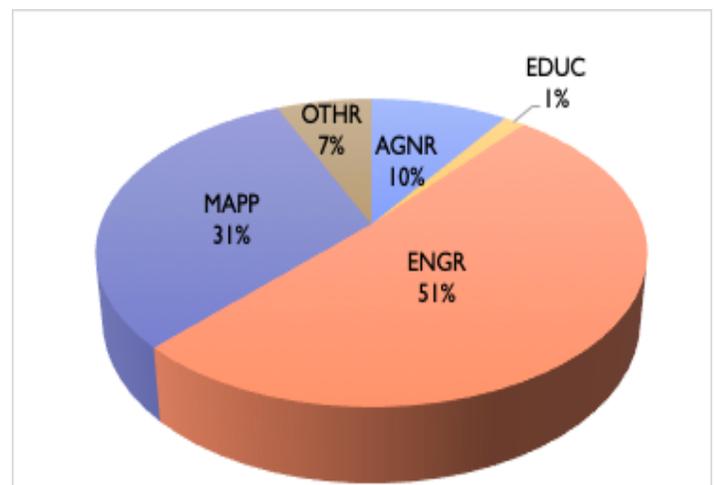
Students by Gender



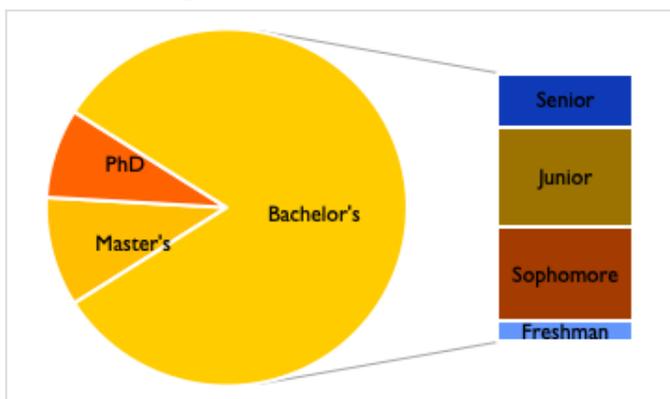
Students by Ethnicity



Students by Schools



Students by Degree Level



Of the Engineering students, more than half were from the Department of Mechanical Engineering. Chemical and Bioengineering, as well as, Civil and Environmental Engineering both had nearly 20% each share of the pie, while Aerospace and Electrical had representation.

¹⁴ March 7-8, 2020.

TEACHING PLANS

CHBE45 I/ENCH648L Solar Energy: Photovoltaics

This was one of the Clark School's first solar energy classes. The class integrates the spectral characteristics of sunlight, the geometry of our solar system, transient energy balances, semiconductor physics, PV cell optical and electrical characteristics, and PV device modeling and optimization. Ray Adomaitis developed all course material, which is currently in the form of a 140 page textbook (unpublished, but free to students). This class has been taught eleven times at UMCP with a total of nearly 300 undergraduate and graduate students and three times at Peking University to nearly 50 students.

ENGL 393: Technical Writing for Solar Decathlon Team Members (See Appendix L)

All undergraduates have the requirement to take an ENGL 39x class. Many undergraduates of this particular team are Sophomores and Juniors, and would need to fulfill this requirement anyway. In the WaterShed project, one section of ENGL 393 was dedicated to the Solar Decathlon. Important content for the website, 2011.solarteam.org, was developed through the assignments in this class. We did not include this strategy for the *reACT* 2017 website, to its detriment. So in keeping with our guiding principle to learn from our mistakes, we planned to include it for SDME2020.

At the first AllTeam meeting, Angela Stoltz, the education system faculty lead, polled student interest in a Solar Decathlon professional writing course. Many students responded that they would be interested in a professional writing course to get course credit for the Solar Decathlon. Course credit is reflective of student learning and an index to the progress toward degree. The Education Systems Group pursued a technical writing course tailored to the solar decathlon in recognition that the work to create articulate textual content involves significant learning opportunities for students.

Associate Professor of English, Scott Wible, had agreed to help the education taskforce develop and offer an online technical writing course for summer session 2020. This would enable Team Maryland 2020 students who would be constructing during the summer to process their accumulating experiential knowledge for the benefit of a strong website entry. Our agreement was that the course would be taught by a Professional/Technical Writing program instructor who was already trained on how to teach technical writing courses. The course would be changed from a normal technical writing course because the assignments due would be the website content and competition deliverables. The specifics of this technical writing course were not yet determined before the university went all online. This means a specific instructor has not yet been identified, and a syllabus was drafted, but not finalized.¹⁵

ENGL393 for the Solar Decathlon recognizes and demonstrates the experiential learning that takes place during the rigueur of the competition. It rewards student participation in the Solar Decathlon and encourages student engagement. Furthermore, it facilitates interdisciplinary collaboration since it is a required course for students of all majors. In other words, most upper level courses at the university are exclusively offered to majors in that one discipline; however, the technical writing course for the Solar Decathlon would be open to all upper level undergraduate students who participate on the project. This would provide a space for students from architecture, engineering, environmental science, and other disciplines to collaborate and learn from one another while integrating the knowledge of other disciplines with their own. Their assignments would enhance the skills of written communication, organizational methodologies, research strategies, and critical articulation,

¹⁵ See Appendix L for details.

which are essential to the leadership cultivation the Solar Decathlon states is its goal and contribution to the existential transition to a clean energy economy.

ARCH 478/678: Selected Topics in Architecture. Invited Seminar Proposal (See Appendix J)

(Alla Elmahadi)¹⁶

As with ENGL393, a 2 semester course in this *Selected Topics* series was used during the WaterShed project in order to teach Sustainable design. Director of the Architecture Program, Professor Brian Kelly, invited sd2017 alumni to develop a course to be taught this summer. The seminar class would have asked students to engage in critical and comprehensive research methodologies with regards to a key design, construction, engineering and communications area. As part of an 'experiential learning' approach, each topic covered in class will aim to provoke collaborative design development and innovative design practices. The seminar class will cover the integration of architectural design and building systems highlighting key areas of concentration for both New Construction and the adaptive reuse of Existing buildings.

The course was to examine responsive and regenerative design, with adaptive reuse as one of the facets to the course structure. The course will review the Solar Decathlon as a key sustainability design competition that highlights the central concepts of sustainable design practices. Students will engage in the study and development of prior UMD Design-Build examples – the integrations of building practice, technical skills and knowledge. (Under the right circumstances, a specific offering may include an actual Design-Build). Case studies and experiential design projects ranging in scale from test analysis on researched products to integrating design ideas into a living building structure will be covered in various means throughout the course. This will give students insight into the process by which architects work both individually and collaboratively to put disciplinary knowledge and expertise into practice.

Independent Study: "Preventing aeolian soil accumulation on Dubai desert solar panels"

In the UAE and many other parts of the world PV modules require cleaning to remove accumulated sand/soil which greatly impact the efficiency. An independent study for credit "*Preventing Aeolian Soil Accumulation on Dubai Desert Solar Panels*" was being conducted by William Jacob Mast under the supervision of Bryan Quinn continues through the Spring 2020 Semester. The purpose of this study is to determine a method to determine when there was an amount of sand/soil accumulated on the PV modules that decreased the efficiency and provide an automated method for mitigation.

Open Educational Resources (See Appendix M):

Organized as a series of modules to cover the *reACT* building technology systems.

1st Priority: Overview of the PV power system design process. Topics discussed will include load analysis, DC vs AC power, Energy Storage, DC to DC conversion, DC to AC inverter, Component specifications and selection, Grid connection. Future learning module topics will include Electrical Distribution, Microgrids and the economics of solar energy. This will include design animations, modelling and visualizations.

In addition to the electrical learning module, modules describing *reACT*'s innovative architectural, living, water, and technology systems were also outlined. These learning modules will describe the narrative and design vision of the various systems of *reACT*, as well as an in-depth look at how the systems work and interact with each other. Topics discussed in the architectural learning module will include the role of the green court, the structurally insulated panels, the solar oven, and how heat moves through the home. Topics discussed in the living system learning module will include the green wall, hydroponics system, and green court, as well as the multiple benefits of indoor plants. Topics discussed in the water learning module will include the water filtration

¹⁶ See Appendix J for syllabus.

system and water saving techniques within *reACT*. Topics discussed in the technology learning module will include a description of how the sensor array within *reACT* works, and methods of assessing embodied energy within the house. Each of these learning modules will also describe how the component systems interact with one another, and they will include additional resources for further reading.

RESEARCH/DESIGN CHALLENGES (see Appendix K)

Engineering Design

HVAC-Attic-shading automation, Solar appliances, Mechanical Systems, Electrical system, Sensor infrastructure, Sand management and mediation, Home renewable resource prediction, optimization, and planning

Architectural Design

Exterior envelope - relevant Skin to Middle East, Interior Skins, Roof & Solar Array performance (is it limited), Bounced and indirect solar capture, Sealing, Green courtyard

Ecological Design

Water capture, Applied Artificial Intelligence Hydroponics, Regenerative landscape, Solar appliances

Scholarly Communication Design and Student Literacies (see Appendix N)

Information, Data, Computer, Meta, creating a solar decathlon community in the Institutional Repository, following best practices developed for the sd2017 collection, see Appendix O.

Educational Design

“Teach the teachers” develop sustainability curriculum for K-12 Teachers.

Land Grant Mission/Extension Educational Design

Disseminate *reACT* embedded technology and technological knowledge for the good of the commons, promote the efficient production, marketing, distribution, and utilization of products of the farm as essential to the health and welfare of our people and to promote a sound and prosperous agriculture and life as indispensable to the maintenance of maximum employment and national prosperity and security. The role of educating and preparing the green workforce must include ecological technology and sustainable 21st century forms of Agriculture in the built environment, e.g., such as vertical farming at a micro-scale.

CURATION & INFORMATION SCIENCE

The Libraries are an essential part of Team Maryland’s success in Solar Decathlons. The Project information Scientist and Curator is responsible for the curricular, research, and information design efforts and protocols that will create a secure cyber-infrastructure for the born-digital documentary record including enhanced discoverability, mapping and interoperability by introducing National Institute for Standards and Technology protocols to enhance [Resilience](#) and [Technology Transfer](#) (Lab-to-Market Cross Agency Priority (CAP) Goal) in order to provide a return on investment (ROI) for the embedded R&D in *reACT*’s Technology.

Editorship, collecting, organizing by relevant classification standards, and authoring metadata for item deposit in the Institutional Repository ([DRUM](#)) allows the impact of intellectual and creative knowledge established by students’ and faculty’s Research & Development trackable and reportable. All art and technology developed for *reACT* is owned in part by the University of Maryland units that supported the R&D, the individual faculty and Team Maryland students (both individually and aggregate). The role of the curator is to articulate the individual- and multi-disciplinary research outputs in a way that protects all three stakeholders. Moreover, the curator plays an essential role in establishing authorized thesauri and placing output instances within ontologies and

classifications that promote a continuum of R&D, experiential learning, and the reputation of the University.

By participating in the design of the information-, data-, computer- and meta-literacy aspects of this multi-disciplinary design development, the curator provides access to and knowledge of industry, governmental, and research systems that are essential to future research funding and professional employment. Tasks that the curator leads are project data management (including web-archiving), digital-data curation, linked data for the semantic web, establishing the University's, individual faculty members' and students' creative and authorship rights through the appropriate scholarly communications models, including patents, licensing, stable URL's and Digital Object Identifiers (DOI), tracking impact, encouraging peer review, and articulating/disambiguating relational networks to ensure discovery and access of University output on the internet for future generations.

Outputs to be Archived

- Deliverables 1 + 2
- Kickoff Slides
- All-Team Meeting Slides
- Posters
- This report

Information Technology & Computer Science

GRANTS AWARDED

UMD Sustainability Grants

"Next Generation Technologies for Sensing, Actuation, and Control of *reACT*," Ray Adomaitis, 2018, award: \$47,500
"*reACT REGENERATED: 2020 Solar Decathlon Middle East*," Patti Cossard, Garth Rockcastle, Ray Adomaitis, 2019, award: \$60,000

BRIEF DESCRIPTION OF FUTURE PLANS¹⁷

ThinkTank's focus on resilient, sustainable, and regenerative post-Covid living is planting seeds to a deeper commitment to interdisciplinary study and technological production. This group strives to make *reACT* the site where important links between Industry, Education and Government happen.

Engineering

Installation of DC voltage bus to investigate direct DC power use for increased efficiencies. Photovoltaic Panels generate DC power, when possible using this DC power directly is more efficient than AC power as there is loss during the DC to AC inversion process. By installing a DC bus, we will be able to examine methods for use and distribution to electrical devices requiring various DC voltages.

An important factor in *reACT*'s success in the 2017 Solar Decathlon was [reACT virtual](#), a physically based dynamic simulation tool developed by the Automation Team to predict house performance based weather forecasts at the competition site for the upcoming day. The day's performance predictions are translated into four sustainability performance metrics to optimize the use of renewable resources over the day. Since SD2017, work on refining the simulation toolbox has continued, increasing the prediction horizon to one week for [SD](#)

¹⁷ Appendix I contains the Fundraising Proposal we developed during the 2018 Summer, authored by Ray Adomaitis; Appendix K "sd2017 areas for development and technology transfer"

[Africa in 2019](#). Current efforts focus on increasing the flexibility of the toolbox to allow a wider range of users and to place *reACT* virtual in Dubai.

OER, Building Technology Learning Modules--Next Steps

The next steps for the learning modules will be to engage the students to develop the modules in an online environment. Students within each subteam will synthesize information from the 2017 competition deliverables and from the UMD solar decathlon website: 2017.solarteam.org. This synthesized information will be structured into an engaging multimedia format for the modules including narrated slides, videos, and diagrams. They will be published in Canvas Commons under creative commons license. They will also be published on the Team Maryland 2017 youtube channel.

The learning modules are intended to achieve multiple goals. First, and most immediately, they will retain student interest in the project as the university remains closed and the reconstruction remains on hold. Once the learning modules are complete, they will be used for educational efforts both within and outside the university. Internally, the learning modules will support continued research efforts by providing background information on the innovations of *reACT* and by serving as a repository for lessons learned during the 2017 competition. The learning modules will also be used in educational outreach efforts to local schools and will support K-12 sustainability curriculum development.

Academic Records/Student Certifications

FIRE Program Model, Honors College, NSF Research Experiences for Undergraduates, etc.

Post-COVID19 Resilient Living: Principles & Practices of Innovation & Design in the Built Environment

Course Proposal (by Hooman Koliji)

This course is designed for a wide group of student backgrounds to be offered in two-semester sequences as a seminar series while engaging students in small-targeted community engagement and design entrepreneurship experimentations. The course will have guest speakers who are industry leaders and thought leaders internationally including (but not limited to): Autodesk Inc, Sidewalk Labs (an Alphabet Company), Business leaders from Silicon Valley, the World Bank, and thought leaders from Stanford University, MIT, and more.

This introduces the concept and fundamentals of self-reliant, resilient, and sustainable environments using case studies from across the globe. Then the notion of Self-reliance and suitability in the built-environment is introduced and critically re-examined in light of the Climate Change and health crises.

Among topics discussed in the course include: Sustainability in Buildings, Trends in Sustainable Design and Technologies in Built Environment, Sustainability in Landscape and Urban Environments, Health and Well-being in built environments: concepts, parameters, and practices, Smart homes, and smart cities: integrations of sensor IoT, applications and cloud processing power, Combining Minds: Interdisciplinary thinking is the way to go, The Role of Design, and Design Thinking as “Integrator” in the team to achieve sustainable solutions, The birth of the concept of “Resiliency”: What? How? Why?, The Urgency We face now: Strategies for Resilient Communities, Theories, and Practices of Resilient Design, Case Studies: U.S., Europe, Middle East, Asia; Case Studies: Historical Precedents

The course engages students in teamwork assignments with access to professional mentors with expertise in the subject matter, providing an opportunity for students to engage in a real-world educational experience.

Land Grant Mission / Extension Planning

(by Bill Hubbard)

Plans are to develop a statewide curriculum for Extension professionals in the area of sustainability and sustainable living based on the core principles of resiliency and regeneration, climate adaptability technologies and learning objectives for the good of the commons in the State of Maryland as identified in the project.

So many of our field-based faculty are living and working in communities where this is a very important topic and value, yet many of us are not well enough versed in the key aspects of sustainability. The plan is to use this multi-collegiate project to develop a statewide professional development program for county field Extension faculty ultimately leading to a certificate of completion. In this manner, our field faculty can communicate with various stakeholders in their communities including policy makers, youth, the next generation, young professionals, etc.

Appendix A: ITEMIZED EXPENDITURES

| | | | |
|---|--------------------------------|----------------------|--------------------------------|
| Event Refreshments | | | \$ 473 (paid) ¹⁸ |
| 01/23/20 | Lunches (Charrette) | \$ 183 | |
| 01/31/20 | Pizza (Inaugural All Team Mtg) | \$ 290 | |
| Travel | | | \$ 5,671 (\$1,718 outstanding) |
| October 2019, Workshop I, Dubai UAE | | | |
| Student (2) Expenses | | | \$ 3,572 (paid) ¹⁹ |
| Travel dates: 10/19/19-10/24/19 | | | |
| Air (2 roundtrip tickets) | | \$2,280 | |
| Lodging (1 room 4 nights @ \$150/night) | | \$ 440 | |
| Meals (\$56 per diem for 6 days) ²⁰ | | \$ 672 | |
| Ground Transportation | | \$ 180 | |
| Faculty (Garth Rockcastle) Expenses, dates | | | \$ 2,099 (\$1,718 outstanding) |
| Travel dates: 10/19/19-10/23/19 | | | |
| Air (1 roundtrip ticket) | | \$1,223 | |
| Lodging (1 room 3 nights @ \$150/night) | | \$ 440 ²¹ | |
| Meals (\$56 per diem for 5 days) | | \$ 336 | |
| Ground Transportation | | \$ 40 | |
| Parking | | \$ 60 | |
| Buy-out | | | |
| Prorated August 15, 2019 – April 3, 2020 | | | |
| Project Manager (Patricia Cossard), 10 hours/week | | | \$13,675 (outstanding) |
| Total | | | \$19,819 (\$15,393 tbp) |

¹⁸ Paid by the MAPP Travel Card, processed by Chris Hinojosa.

¹⁹ The students' trips were paid for by E&E; their meals and incidental charges were already reimbursed using money from E&E.

²⁰ Travel to Dubai UAE takes more than 24 hours.

²¹ Lodging was prepaid \$381 by MAPP KFS 111000

Appendix B: Letter of March 3, 2020



March 3, 2020

Dear Campus Community,

The University continues to actively monitor the novel coronavirus ("COVID-19") outbreak and provide regular updates to our community. In addition, university administrators are aware and taking into account the Centers for Disease Control and Prevention (CDC) **Interim Guidance for Administrators of US Institutions of Higher Education (IHE) to Plan, Prepare, and Respond to Coronavirus Disease 2019**, which was updated yesterday. **Currently there continues to be no confirmed cases of COVID-19 infection at UMD or in the State of Maryland.**

In the **last communication** on February 28, 2020, we notified our students studying abroad in Italy that the CDC alert level for that country had **upgraded to Warning Level 3** and that we were therefore suspending our study abroad programs in Italy. Students were asked to return home, rather than to the UMD campus, and to "self-monitor" and "self-isolate" for two weeks to reduce the risk of spread of infection upon return to the U.S.

New Guidance on Self-Isolation

The University System of Maryland has also **issued a statement** on self-isolation of students, faculty and staff returning from international study and personal travel due to COVID-19. The CDC **defines self-monitoring and self-isolation on its website.**

I must emphasize the importance of not returning to campus and refraining from non-essential contact with others during the two-week self-isolation period. Members of the campus community may want to visit friends on campus, but we insist that travelers from Level 3 countries avoid doing so for 14 days. We all need to work together to limit the possible spread of this infection.

New Announcements on Education Abroad

The CDC **issued new travel guidance** in light of the continued spread of COVID-19. It says that institutions of higher education "should consider asking current program participants to return to their home country." We continue to closely monitor the situation and are taking seriously the CDC's guidance. **Indeed, the University strongly suggests that any student abroad who has a chronic health condition or who is immunocompromised return home. Our Education Abroad staff stands ready and willing to assist. We are working with our education partners abroad to develop online learning solutions wherever possible should students wish to depart a program early.**

As stated in the last communication, we will take further action to close programs if warranted by an elevation of a country's travel warning status to Level 3. We rely on information provided by the CDC, the World Health Organization (WHO), the U.S. State Department, state and local health departments, and on-campus public health experts to guide decisions concerning locations around the world where our students are studying abroad. The University's Incident Response Team is actively involved in decision making.

The University System of Maryland has also **issued a statement** on self-isolation of students, faculty and staff returning from international study and personal travel due to COVID-19. The CDC **defines self-monitoring and self-isolation on its website.**

I must emphasize the importance of not returning to campus and refraining from non-essential contact with others during the two-week self-isolation period. Members of the campus community may want to visit friends on campus, but we insist that travelers from Level 3 countries avoid doing so for 14 days. We all need to work together to limit the possible spread of this infection.

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As stated in the last communication, we will take further action to close programs if warranted by an elevation of a country's travel warning status to Level 3. We rely on information provided by the CDC, the World Health Organization (WHO), the U.S. State Department, state and local health departments, and on-campus public health experts to guide decisions concerning locations around the world where our students are studying abroad. The University's Incident Response Team is actively involved in decision making.

I remind students studying abroad in countries with an **Alert Level 2** (currently our students in Japan) that they should check daily for notices from the UMD Education Abroad office, and they should be prepared to return to the U.S. should the alert level for that country increase to Warning Level 3.

We have decided to cancel all Education Abroad programs for spring break 2020 and for summer session 2020. You may contact the UMD Education Abroad Office for more details. The University is currently looking into other student-led international trips over spring break that are not organized through the Education Abroad office.

Limiting International Travel

We ask that all members of the University community limit non-essential international travel. The University is suspending authorization for travel using institutional funds to or from any country with a CDC Warning Level 3 status for COVID-19. Any exceptions must be approved by the Office of the Provost.

We Need The Cooperation of Every Member of Our Community

- We ask any UMD faculty member, staff member or student returning from a country currently at Warning Level 3 status to stay away from campus, **self-monitor and self-isolate** for two weeks post return.
- We continue to urge all members of our community at home and abroad to practice prevention behaviors and hold each other accountable in following safe and healthy practices. If you know of a fellow student, colleague or coworker who has traveled to a Warning Level 3 country, please discourage them from coming to campus.
- For the latest updates, visit umd.edu/virusinfo.

Our thoughts are with everyone in the UMD community who has been directly or indirectly affected by COVID-19.

Sincerely,

Mary Ann Rankin
Senior Vice President and Provost

Appendix C: Letter of March 10, 2020

UNIVERSITY OF MARYLAND

CORONAVIRUS UPDATES**March 10, 2020**

COVID-19 Update: Move to Online Environment

Dear University of Maryland community,
We continue to monitor closely the COVID-19 outbreak, commonly known as coronavirus, and to **provide updates** based on the latest information and guidance from the Centers for Disease Control and Prevention (CDC), World Health Organization (WHO), University System of Maryland (USM), and state and local public health officials.

Currently, there are no known COVID-19 cases on our campus. However, there are 19 confirmed cases in the D.C.-Maryland-Northern Virginia region, including three in Prince George's County. While the epidemiology of this virus is not yet fully known, public health experts have announced that community spread is occurring in parts of the United States. Therefore, we must implement policies now to mitigate the risk of transmission and minimize the chances of seeing cases on our campus.

Move to an online environment

Starting March 30, 2020 and continuing at least to April 10, 2020:

- All classroom instruction will be conducted virtually; and
- For functions that can be performed remotely, supervisors are encouraged to offer employees the option to telework. Guidance for employees and telework exceptions will be provided soon.

These temporary measures will be inconvenient, even disruptive. We will all have to operate in a different learning and working environment. We will manage the transition to online platforms with as minimal interruption as possible. I ask for your cooperation so that the health and safety of our community remains the top priority in this rapidly changing context.

March 16-22, 2020

Students should plan to depart for spring break and not return to campus until at least April 10, 2020. When preparing to leave for this break, please take all essential belongings, medications, and materials from the residence hall and/or work space.

We urge that you exercise caution and judgment if you are planning any domestic or international travel. Please take into account the possibilities of travel delays and required self-isolation upon return.

The University will be open for staff Wednesday, March 18 to Friday, March 20, 2020, as planned.

March 23-29, 2020

- The University will have reduced operations the week of March 23, 2020.
- Classes are cancelled this week and students should not return to campus following spring break. Of course, we will provide exceptions and accommodations for those who need it.
- Faculty training to prepare for the move to online instruction is already underway. In addition, faculty will also have this week to participate in further training sessions. The training will continue through March 27, 2020.
- Except for classes, the University will remain open. Staff are expected to report for work that can be performed either by telecommuting or in person, as agreed upon with their supervisor.
- Graduate students who work or conduct research on campus should consult with their supervisors on how they would conduct their work this week.

March 30, 2020 through at least April 10, 2020

As already indicated, all classroom instruction will be conducted online. Students will receive instructions on how to access their classes online.

Resources

Our goal is that students, faculty, and staff have the necessary equipment and skills to learn and work from home.

To this end, we have created a new resource for faculty, keepworking.umd.edu, which includes guidance, strategies, and resources to change from in-person instruction to virtual instruction. More information on training and resources will be forthcoming from Provost and Senior Vice President Mary Ann Rankin and the Division of Information Technology (under Vice President Jeff Hollingsworth).

All employees and supervisors should review the resources available at keepworking.umd.edu and determine what equipment, technology, and resources are needed to allow staff to be successful in working remotely and conducting meetings online.

The Division of Information Technology will soon send out a **technology survey** to students to understand any unmet needs students may have.

Additional information for supervisors about employee-leave management, essential employees, and related workplace issues will be available from the University Human Resources Office (under Assistant Vice President Jewel Washington) in the coming days.

Additional information about residence halls, dining services, disability services, the Health Center, libraries, recreational services, shuttle services, and other student resources on campus will be provided soon by the Vice President for Student Affairs Patty Perillo.

Additional information about the University's research activities will be shared as soon as possible by the Vice President for Research Laurie Locascio.

Events

The University strongly discourages hosting or attending any non-essential large gatherings. We do not recommend scheduling any new large events that would take place in the next 60 days.

As a reminder, social distancing is strongly encouraged in all settings. **As defined by CDC**, social distancing means avoiding mass gatherings and maintaining a distance of 6 feet from others. Events that do not allow for appropriate social distancing should be cancelled or moved to a larger facility. Social distancing takes into account both the size of the group and the size of the physical space.

I regret to announce that Maryland Day 2020 is cancelled. A decision on Spring Commencement (May 2020) is pending.

Inclusivity, safety, and respect

We continually strive for a campus community that is inclusive, safe, connected, respectful, and morally accountable. In this difficult time, I ask that we remind ourselves of the **guidance for community support** that has been shared by the Office of Diversity and Inclusion, led by Vice President for Diversity and Inclusion Georgina Dodge.

Coda

As the COVID-19 outbreak evolves, we will continue to keep you updated on any new developments and changes. Please check regularly umd.edu/virusinfo for the latest information.

I want to express my gratitude to the many UMD faculty, staff, and administrators who have worked tirelessly in recent weeks to ensure the health, safety, and well-being of our campus community.

And, a big THANK YOU to every member of our Terp family for your patience and cooperation. We have faced challenges before with care and calm, and I know that we will pull together again to care for each other.

Sincerely,



Wallace D. Loh
President, University of Maryland

Appendix D: Letter March 19, 2020



March 19, 2020

Dear University of Maryland community,

Amidst the uncertainty of an invisible and rapidly unfolding health crisis, I pray that you and your loved ones are safe and well.

Though we must keep our physical distance from each other, our resilience and actions are rooted in our obligations to each other. Our vulnerability connects us. This global emergency will demand much from us all, but our community is up to the challenge. Together we have the capacity to make it through, with determination and compassion.

Online education

Earlier today, Governor Hogan advised all University System of Maryland (USM) institutions to extend online education for the remainder of the semester. The USM Board of Regents this evening approved this guidance. Therefore, all UMD online

instruction, which had already been scheduled to start on March 30, 2020, will continue through the end of this academic year.

Our faculty has been preparing continuously and diligently for virtual education. Under the coordinated leadership of Provost Mary Ann Rankin and VP for IT Jeff Hollingsworth, the University has implemented secure online testing and assessment, such as new identity verification and proctoring software. For laboratory instruction, there are online simulations and video demonstrations, with resources for faculty available at keep-teaching.umd.edu. For performance and studio instruction, we have acquired the capacity for synchronous and asynchronous video production and video streaming. Teachers and department administrators will be developing individualized solutions for the courses during the coming week, before classes resume on March 30.

We are mindful of the **resources** needed for individuals with disabilities, so that they and their instructors have accessibility accommodations in online learning and teleworking.

In addition, the Division of IT has deployed new technology to ensure that there is sufficient capacity to support this massive shift to the online environment for learning and working.

Students in residence halls

With the extension of online education through the end of the academic year, residence halls will officially close for the semester on April 5, 2020. All residents will have to move out by this date. The Division of Student Affairs under VP Patty Perillo will soon release a detailed message to residents for an orderly move out of residence halls, in a process that ensures social distancing and the health and safety of our students.

VP Perillo and her staff will continue to work closely with students who have no alternatives and need housing. We will do everything in our power to take care of our students during this fraught time.

Teleworking

For all University personnel who can perform their job responsibilities remotely, telework remains in effect until at least April 10, 2020. How we do our work will change depending on the success of our efforts to slow the spread of this pandemic. We will follow the guidance of federal, state, and local agencies, and from the USM, regarding any changes in how we do our work. University Human Resources will communicate any important updates to all employees.

Commencement and forthcoming information

The measures that the University is taking, while necessary, create hardship and uncertainty for many in our community. These measures have to comport with directives and guidance issued by state agencies and the University System of Maryland. In the coming days, we will work on a fair adjustment of costs related to room and board.

Unfortunately, there will not be an in-person spring 2020 commencement. Our graduating students have worked so hard and I know that they, and their families, would want to celebrate this milestone. I invite you to share with me your thoughts on alternative and innovative ways to recognize this occasion, vibrantly and safely. You may email me at president@umd.edu.

Updates and resources

Please continue to check umd.edu/virusinfo and all University communications for updates about COVID-19. Please email healthconcerns@umd.edu for any non-medical coronavirus-related questions.

For mental health support for students, please call the Counseling Center at **301.314.7651**. Counselors are available to provide remote services Monday to Friday, 8:30 AM to 4:30 PM, and After Hours Crisis Support is available outside those hours and on weekends. Faculty and staff can contact the **Faculty Staff Assistance Program**.

Thank you

I want to thank all the hard-working faculty, staff, administrators, and students, and all the health-care providers in our University Health Center, for your dedication and service in this fraught time. And, as always, I thank our Police Department for their continued commitment to serve. So long as each of us continues to do our civic duty to help slow the transmission of the coronavirus, our normal life will be restored sooner rather than later.

I conclude by noting that this virus does not know how to discriminate between people on the basis of identity. This reminds us that we are all members of the same human family, and we all need to come together in mutual support.

Sincerely,

Appendix E: Letter, April 2, 2020



April 2, 2020

Dear University of Maryland faculty and staff,

Under the Governor's directive, all Maryland residents must now shelter at home, except to leave for "an essential job or for an essential reason, such as obtaining food or medicine ... or other necessary purpose." Over one-half of the states are under a similar order.

It is a reminder of our civic responsibility to keep ourselves and each other safe. Only then will we slow the spread of this pathogen that has upended our lives, shuttered wide swaths of the economy, and caused the number of unemployed workers to soar.

Our core missions: education and research

This week, the University offered all instruction remotely. I want to recognize the extraordinary effort by our faculty and staff that made this transition possible, despite the short lead time. Thank

you for enabling our students to continue their studies while they remain safe and well.

My appreciation to all the researchers who are carrying out their work in ways that minimize the possibility of spreading the disease in our campus community. Normally, thousands of experiments are performed daily in our laboratories and other research facilities, but now that number has been reduced to just over forty. The Vice President for Research Laurie Locascio had to announce severe restrictions and urge that some research activities be done remotely, such as data analysis and publications.

Impact of the pandemic on institutional finances

This invisible and ubiquitous virus has caused massive disruption to the lives of students, faculty, and staff, as well as to institutional operations and to institutional finances. I'm proud and appreciative of the resiliency, solidarity, and dedication to the common good that members of our University community have shown. Today, my focus is on the financial impacts of this virus on our University.

Adjustment of students' and employees' fees

The University System of Maryland (USM) Chancellor has announced that each USM institution will set "policies for the fair adjustment of a number of student fees, including the costs associated with room, board, parking, and athletics," and that these would be "calculated by each institution on a prorated basis."

In a separate letter to students, Vice President for Student Affairs Patty Perillo stated the policies that many University administrators and staff, with input from student leaders, have developed. I thank them for their work. Briefly, the University will issue credits on a prorated basis for the following student fees: parking and shuttle, athletics, recreation services, Stamp Student Union, performing arts and cultural centers, student facilities, and sustainability. Students in residence halls will also receive prorated credits and/or refunds for room and board. The University will inform students and families directly about the prorated amounts and how the credits will be issued.

There will not be any adjustments to library, technology, and health center fees, since these resources are essential to ongoing operations. Other academic fees will not be affected. Education is now delivered online and students will earn the credits for their degrees.

For employees, parking fees will no longer be deducted from their paychecks.

These fee adjustments by the University, totaling about \$39 million, help our students and employees with the financial impact of the pandemic.

Support for staff

The University refunds prorated room and board fees to students because, due to the need for social distancing, they can no longer live and eat on campus. However, closing residential and dining facilities does not save the University money. This is because the University continues to pay the salaries of the staff who work in these facilities. We care about their financial well-being, and that of their families, at a time of widespread unemployment.

Federal aid

Faced with the greatest crisis of our time, higher education needs financial relief on a scale that only the Federal Government can provide. It soothes the pain for awhile and keeps money flowing through parts of the inactive economy.

The Coronavirus Aid, Relief, and Economic Security (CARES) Act, signed into law last week, provides a \$2 trillion lifeline to businesses, non-profit organizations, state governments and the unemployed. The University expects to receive its share of CARES funds in a few weeks, which includes funds for emergency grants to students and funds for the institution to pay for pandemic-related costs.

Impact of the pandemic on the finances of UMD

The total estimated financial impact of the pandemic on the University, through this spring semester, is \$87 million. This figure includes all lost revenues (including the refund of fees), plus new increased costs (such as moving to online education and labor productivity loss - paying employees who are not working on campus and cannot telework), minus savings (no food purchases for dining halls; no travel costs). We appreciate the CARES funding, though we estimate that the amount the University will receive will be substantially less than the financial impact.

States have ordered many businesses to shut down as a social distancing action. It slows the spread of the virus, but it also causes unemployment. Therefore, states could be faced with revenue shortfalls from reduced taxes, and also with increased expenses from additional public health measures. The result could be state budget shortfalls, and state agencies could then be directed to cut their budgets. Therefore, it is only prudent that the University plan for possible budget reductions.

Suspension of all faculty and staff hiring

For the foregoing reason, I am announcing this suspension and it is effective immediately. Provost Rankin and the Office of Human Resources will follow-up shortly with information on how the suspension will be implemented and how requests for exceptions can be submitted and how they will be reviewed. Vice Presidents and their designees can respond to specific questions from their respective divisions.

Reduction in the rate of expenditures

I have also asked all Vice Presidents for plans to reduce the rate of expenditures within their divisions and to delay any expenditures that are not deemed absolutely critical. Details on the implementation of spending restrictions for the campus will be forthcoming from Provost Rankin and the Vice President for Administration and Finance Carlo Colella.

I regret the need to proceed with these fiscal measures. However, in times of adversity, we must plan for the worst, while we pray for the best. Thank you to all members of our community for doing your part for our collective safety and well-being, and for our fiscal health, while carrying on the important missions of the University.

With appreciation,



Wallace D. Loh
President, University of Maryland

Appendix F: Kickoff Program

| Event Request Intake Form | |
|-------------------------------|--|
| Requestor: Team Maryland 2020 | |
| Event | SDME2020 Student Recruitment Kickoff Event |
| Venue | Auditorium, Architecture Building, ground floor across from the Kibel Gallery |
| Date | 12/9/19 |
| Agenda | 6:00 Welcome, 1-minute video: Megan Gertmenian, Team Project Manager (5 min.) |
| | 6:05 Dean Don Linebaugh (5 min.) |
| | 6:10 Dean Darryll Pines (5 min.) |
| | 6:15 Team Introduction presentation: Megan Gertmenian, Isabella Hernandez (5 min.) |
| | 6:20 Adaptive Reuse, No Waste, and Regeneration: Garth Rockcastle (5 min.) |
| | 6:25 Net Positive, Climate Technology, Shipping Challenges: Ray Adomaitis (5 min.) |
| | 6:30 Public Ed, Teaching Teachers, Indigenous Sustainability Practices: Angela Stoltz (5 min.) |
| | 6:35 Living Systems, Water in the Middle East Context: Jamey Campbell (5 min.) |
| | 6:40 TimeLine/Milestones: Isabella Hernandez (5 min.) |
| | 6:45 Q&A: Garth Rockcastle (15 min.) |
| Talking Points | |
| | Kind congratulatory words recognizing the 2 nd place sd2017 win (<i>reACT</i>) |
| | Kind congratulatory words recognizing the 5 th place sda2019 win (Ray Adomaitis & Alan Uy for their continued work on the <i>reACT</i> SmartHouse system partnering with the Team Darnasol) |
| | Precedent setting that a former competing & winning house (<i>reACT</i>) is being resiliently adapted for new climate context |
| | Opportunity that exhibiting with the WorldExpo2020 provides |
| | Encouraging words to Team Maryland2020 |
| | Go Terps! |
| VIP Guests | Dean Jennifer Rice, College of Education |
| | Dr. Sullivan, College of Agriculture & Natural Resources, representing Dean Beyrouthy |
| | TBD, University Libraries, representing Dean Lim |
| | Alumni of former Solar Decathlon's especially <i>reACT</i> |
| Media Outlets | Diamond Back |
| | Maryland Today |
| Press Release | In process, will send when ready |
| Submitted by | Patricia Kosco Cossard |
| date submitted | 12.4.2019 |
| Approval date | |
| Special Arrangements | |

Appendix G: Kickoff Poster by MAPP Communications Office

Solar Decathlon Middle East 2020

Kickoff Meeting | December 9, 2019 | 6-7 pm
Architecture Building, Auditorium 0204

reACT – REGENERATED

Resilient | Adaptive | Climate | Technology

GRADUATE & UNDERGRADUATE STUDENTS: JOIN TEAM MARYLAND

Decathletes will compete globally as the team travels to Dubai in Fall 2020.
Entry will be displayed at the World Expo, October 2020 through April 2021.

You'll have opportunities to work on...

- | Adaptive reuse of reACT for Middle East culture and climate conditioning factors and architectural options for sustainable building lifecycles
- | Assembly and reassembly design for structural integrity
- | Climate technology design and construction or application of AI to SmartHouse and IoT to Hydroponic system
- | Zero waste, net-positive and water technologies
- | Applied Student Research

Join the hundreds of UMD green-industry alumni who have competed world-wide in 2002, 2005, 2007, 2011, 2017, 2018, 2019

Sign up here: go.umd.edu/sdme2020



Appendix H: Construction Workshop Agenda, January 2020

Agenda

- 11-12:30pm Review the project budget and responsibilities of each participating unit.
Goals: attain budget consensus, a clear understanding of roles, and draft a schedule of disbursements
- 11:30-noon Lunch delivery
- 12:30-1pm Broad discussion on the scope of the projected work.
Goals: prioritize additional opportunities for academic participation from the Business School, Ischool, Journalism, and ARHU/Middle Eastern and outline a networking strategy
- 1-3pm Construction Logistics.
Goals: review site logistics and the reconstruction schedule, including both re-assembly & modifications; mobilize and ready *reGEN* (*reACT* becomes *reGEN*); develop a schedule for each deliverable and distribute construction responsibilities for Facilities Management enactment

Appendix I: Fundraising Proposal by Ray Adomaitis

Reconstructing reACT



The University of Maryland's solar house reACT placed second overall in the [2017 U.S. DoE Solar Decathlon](#). This is the third time in the past decade that Team Maryland participated in the Decathlon, and all three times the Maryland house ranked first among U.S. teams. Now [Team Maryland](#) proposes creating a laboratory for sustainability studies that builds on this strong base of knowledge and innovation. The reACT house and LEAFHouse, Maryland's 2007 solar Decathlon entry, would be the centerpieces of this unique research resource.

The reACT house (**resilient Adaptive Climate Technology**) is a modular house that can adapt to an uncertain and changing environment. Built around a core that contains all of the home's primary electrical and mechanical systems, reACT always was intended to be a prototype for next-generation housing, with value that extends beyond the 2017 competition.



| Final Scores | | |
|--------------|-------------------------|---------|
| Rank | Team | Score |
| 1. | Swiss Team | 872.910 |
| 2. | Maryland | 822.683 |
| 3. | UC Berkeley/U of Denver | 807.875 |
| 4. | Missouri S&T | 758.315 |
| 5. | Team Alabama | 757.873 |
| 6. | Northwestern | 750.758 |
| 7. | Netherlands | 750.275 |

The Solar Decathlon success of reACT stems from the innovation created by the strong partnership developed between the architecture and engineering team members. The resiliency, adaptability, and overall efficiency of reACT resulted from the project design goals of maximizing the re-use of low-grade energy resources, tight integration of the home components in the face of a dynamic environment, and optimal allocation of high-value resources. By using model-based systems engineering approaches, Team Maryland developed a number of innovations for the reACT prototype. These include our Greencourt HVAC preheating/cooling system, green-walls and indoor hydroponic systems, solar thermal dryers and ovens, greywater filtration and reuse, and a [physically based simulator](#) of home performance used to optimize the performance of the PV electrical power and battery storage systems.

Education and outreach

At this time, reACT has returned from the Decathlon competition in Denver and is awaiting permanent installation near LEAFHouse, Maryland's 2007 entry to the Solar Decathlon. The co-location of the two houses together with a wind turbine, a DC micro-grid, and other shared renewable-energy resources would create a laboratory for sustainability studies on the north end of campus. This research facility

would be dedicated to the development and long-term evaluation of technologies for sustainable communities; it would be a unique resource among universities, and would have the ability to attract large-scale research grants.

Manufacturing

The reconstruction of reACT offers an opportunity to act on the lessons learned during the 2017 Solar Decathlon competition and to upgrade the mechanical, electrical, and automation subsystems of this prototype. Our objective is to continue to improve the adaptability and resiliency of the reACT prototype house as well as future generations of homes based on our design. Our team currently is in discussions with modular home manufacturer Beracah Home, Inc. to explore the mass production of our design.

Project timeline

| | |
|---------|---|
| 2018 | Foundation and reassembly of modules |
| 2019 | Greencourt/decks/utilities/automation, commercial design |
| 2020-29 | Commercial manufacturing, education/outreach programs, engineering/sustainability studies |
| 2030 | Sustainable decommissioning and recycling/disposal |

Budget summary

To achieve our research and educational goals, financial support is required for both the reconstruction of the reACT prototype house on the University of Maryland campus as well as for maintenance and upgrades over the project lifespan. As indicated in the project timeline, we envision reACT serving as a laboratory for sustainability technology development for a ten-year period. The anticipated level of support for this time period, including the potential for a graduate research assistant (GRA), is summarized below.

| Reconstruction | | Annual Maintenance | |
|------------------------------------|-------------|-----------------------------|-------------|
| Crawl space foundation | \$15,000.00 | Repairs | \$3,000.00 |
| Crane for 1 day | \$3,000.00 | Landscaping | \$2,500.00 |
| Greencourt floor materials | \$5,000.00 | Utilities | \$2,500.00 |
| Greencourt reconstruction | \$5,000.00 | Modifications/upgrades | \$10,000.00 |
| Rewiring/grid connect | \$5,000.00 | | |
| Plumbing and water storage/connect | \$12,000.00 | Graduate Research Assistant | \$31,000.00 |
| 500 sqft deck w/ rails & supports | \$12,000.00 | Tuition & benefits | \$15,000.00 |
| Landscaping | \$10,000.00 | | |
| 50' sidewalk | \$1,000.00 | | |
| HVAC reconstruction | \$2,000.00 | | |
| Roof repairs | \$5,000.00 | | |

| | | | | |
|-------------------------------|---------------------|--|-------------------|--------------------|
| Floor/roof insulation | \$8,000.00 | | | |
| Kitchen cabinet/floor repairs | \$9,000.00 | | | |
| Structural engineering | \$5,000.00 | | | |
| Misc repairs | \$5,000.00 | | | |
| | | | | |
| TOTAL | \$102,000.00 | | TOTAL | \$64,000.00 |
| plus UMd overhead | \$153,000.00 | | plus UMd overhead | \$96,000.00 |

Contact

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Last updated 13 July 2018

Appendix J: ARCH 478letter/678letter: Selected Topics in Architecture

School of Architecture, Planning, and Preservation University of Maryland

Architecture Program

Summer Session I 2020, Summer Session II 2020

ARCH 478letter/678letter: Selected Topics in Architecture

Summer Session I: June 1st, 2020 – July 10th 2020

Summer Session II: July 13th – August 21st

3 credits each

FACULTY: Alla Elmahadi, Teaching Fellow (Primary Instructor), Garth Rockcastle (Mentoring Faculty)

COURSE INFORMATION

Following the consistent success of UMD's entries into the Solar Decathlon, the course will engage students in assessing the overarching principles within the sustainable design agenda. The course will look at key factors that define the development of sustainable design, particularly in culture and environmental context.

The project for this semester is an adaptive reuse of a previous Solar Decathlon prototype that will become a multidisciplinary sustainability research, teaching, and outreach Laboratory. Adaptive reuse is one integral component of sustainability practice. We will follow a process similar to that used in architectural practice (iterative, tangible, reflective and speculative). Students will take on responsibilities associated with different scales and different complexities of sustainable design and adaptive reuse. The class project will focus on the key roles of future-proofing the built environment through cultural, site-specific, technical and material aspects of architectural design.

The class offers students the opportunity to collaborate in an inclusive environment that touches upon the importance of collaborative design between all disciplines involved in the design and construction industry. Incorporating key lessons from engineering, environmental design, communications and real estate development, the course will provide an opportunity for students to examine the many contributing factors that play a key role in the development of successful, sustainable design. With this approach, comes the expectation that each student, and the seminar as a whole, will be committed to a high level of performance and collegiality.

Catalogue Description

The course will examine responsive and regenerative design, with adaptive reuse as one of the facets to the course structure. The course will review the Solar Decathlon as a key sustainability design competition that highlights the central concepts of sustainable design practices. Students will engage in the study and development of prior UMD Design-Build examples – the integrations of building practice, technical skills and knowledge. (Under the right circumstances, a specific offering may include an actual Design-Build). Case studies and experiential design projects ranging in scale from test analysis on researched products to integrating design ideas into a living building structure will be covered in various means throughout the course. This will give students insight into the process by which architects work both individually and collaboratively to put disciplinary knowledge and expertise into practice.

LEARNING OUTCOMES

The National Architecture Accrediting Board (NAAB) states that each "accredited degree program must demonstrate that each graduate possesses the knowledge and skills defined by the [student performance criteria]. The knowledge and skills [described in the criteria] are minimum for meeting the demands of an

internship leading to registration for practice. (2009 NAAB Conditions for Accreditation).

Critical Thinking And Representation

- A.2 Design thinking
- A.4 Technical Documentation
- A.5 Investigative Skills
- A.7 Use of Precedents
- A.9 Historical Traditions and Global Culture
- A.10 Cultural Diversity
- A.11 Applied Research

Integrated Building Practices, Technical Skills And Knowledge

- B.2 Accessibility
- B.3 Sustainability
- B.5 Life Safety
- B.6 Comprehensive integrated design
- B.7 Financial Considerations
- B.8 Environmental Systems
- B.9 Structural Systems
- B.10 Building Envelope Systems
- B.11 Building Service Systems
- B.12 Building Materials and Assemblies

Leadership & Practice

- C.1 Collaboration
- C.2 Human Behaviour
- C.4 Project Management
- C.8 Ethics and Professional Judgement
- C.9 Community and Social Responsibility

Course Meeting Times and Location(s): TBD

Course Description

The seminar class will ask students to engage in critical and comprehensive research methodologies with regards to a key design, construction, engineering and communications area. As part of an 'experiential learning' approach, each topic covered in class will aim to provoke collaborative design development and innovative design practices. The seminar class will cover the integration of architectural design and building systems highlighting key areas of concentration for both New Construction and the adaptive reuse of Existing buildings.

Course Methodology

Architecture by nature is referential: that is, it refers directly or indirectly to work that has come before. There is a vast amount of information on Solar Decathlons available today, and each student will undertake to gather and study resources that will be useful in developing a design concept. As a seminar, it is important to learn from each other and to share our resources and references. There are several methods we will use to facilitate this exchange.

Each class will have a time set aside for discussion of new information and resources. Everyone is expected to contribute to these discussions. Copies of articles, information, analysis, etc. will be available to all members of

the seminar on the shared drive. Design reviews and critiques. Informal discussions among students.

Course Structure and Techniques

The course will include active onsite learning at the decathlon house, followed by Lectures by Instructor and Guests; Class Discussions; Student Research Project Area's and Presentations.^[1] Key focus area of study and research to present as part of final examination - this can be an adaptive reuse of a existing building or a new construction project. Preparation of material needed to present key themes examined during the course and apply to a final project. Presentation accounts to potential lesson plans for educating younger generations about the Decathlon and Sustainable design.

Sources/Readings

Stoltz, Angela Christine; Cossard, Patricia Kosco; Owoeye, Oluwadara; Kerlin, Lauren (2018). *reACT: resilient Adaptive Climate Technology: preprint*. <https://doi.org/10.13016/dq1h-zhhs>

University of Maryland (College Park, Md.). School of Architecture, Planning, and Preservation, and U.S. Department of Energy Solar Decathlon (2011 : Washington, D.C.). 2012. *Inspired Innovation : Watershed at the University of Maryland : U.S. Department of Energy Solar Decathlon 2011, West Potomac Park, Washington, Dc, September 23 - October 2, 2011*. College Park, MD: Office of the Dean, School of Architecture, Planning and Preservation, University of Maryland.

University of Maryland at College Park, and U.S. Department of Energy Solar Decathlon (3rd : 2007). 2010. *Leafhouse at the University of Maryland*. College Park: University of Maryland, School of Architecture, Planning and Preservation.

Courtney, Chris (2018). *From the Solar Decathlon to Sustainable Communities*. Thesis, University of Maryland (College Park, Md.). <https://doi.org/10.13016/M2513V03G>

Final Project: Presentation, Research Paper, Construction Participation

SUMMER SESSION I : *June 1st, 2020 – July 10th 2020: Overarching themes of Solar Decathlon Competitions and Sustainable Design*

WEEK ONE: Introduction to Course

Introduction to course structure, aim, objective; Analysis of the Solar Decathlon & past UMD housing designs

WEEK TWO: Cultural Identity

Communication and Social Awareness; Market Appeal

WEEK THREE: Climate and Technology

Solar Orientation Interrogation – Climatic Technology: Green Court Design and Enhancing Performance; Attic Regeneration

WEEK FOUR: Environmental Enclosure : *Exterior Skin*

Sustainability; Longevity and Life Cycle Considerations; Adaptability

WEEK FIVE: Environmental Enclosure: *Interior Skin*

Comfort and Flexibility; Furnishings; Aesthetic Appeal; Longevity and Durability

WEEK SIX: Final project presentations

SUMMER SESSION II : *July 13th 2020 – August 21st*

WEEK SEVEN: Introduction to Course

Introduction to course structure, aims and objective; Break down of the Solar Decathlon, and UMD housing designs; Sustainable design - New buildings vs Existing buildings vs Adaptive reuse

WEEK EIGHT: Designing and Making

Develop and test hypothesis; Innovation and Construction

WEEK EIGHT: Systems and Systems Integration

Electrical Systems; Solar Panel Orientation; Water Systems; Net positive design system; Living Systems; Agricultural landscape integration

WEEK NINE: Construction Site laboratory (*Given the re-construction of the UMD Solar Decathlon house, this will be partially an active, hand on experience that follows in the footsteps of the competition assessments*)

Assessing building performance (comfort ability, temperature, environmental aspects, blower door test)- tested on the *reACT* house at UMD; Assess Electrical design components and functionality; Assess Water systems integration

WEEK TEN: Financial Modelling

Understanding the process to developing and understanding the financial assessment of a construction project: Components of building a financial model; land costs vs building cost vs contingency; Forecasting costs (risk assessment)

WEEK ELEVEN: Introduction to Construction Management - from design to build to completion

Key Concepts; Management: Construction Management tasks; Scheduling Process - Gantt Chart and Critical Path; Safety

WEEK TWELVE: Final project presentations

^[1] Angela Stoltz commented: I'm biased, but I would LOVE if they presented what they learned by developing a middle school math or science lesson. I am working on partnering with College Park Academy where we could easily have college students co-teach their Solar Decathlon lessons to the students in CPA. This is a great opportunity for research that would be interesting to funders as well.

Appendix K: Promoting *reACT*'s Innovation-based Commercialization (December 2017)

reACT faculty meet with Office of Technology Commercialization

1. VRF system reallocates waste heat from the interior and from the Greencourt to improve the efficiency of the heating comfort system and water heating. -- Hwang Group
2. Greywater Treatment System recycles waste water for irrigation and greywater filtering to potable standards and quality.²²
3. Windroponic system: Closed-loop Smart Vertical Hydroponic Garden set in a window. -- Hooman Koliji
4. Architectural Variations: *sd2017 reACT*'s essential "DNA" was rooted in the idea that, at its heart, there are systems and components that are efficiently configured to serve and support its regenerative agenda, and easily respond to expansion, update and reassembly as needed. While *sd2017 reACT* utilizes the Court DNA, two other DNA's have been envisioned as complimentary companions; the Cluster DNA (where aggregations of homes and their attendant land) achieves compounding benefits), and the Compact DNA. (where condensed and incrementally expanded versions of the essential ingredients are strategically envisioned so *reACT* could grow, flex and even shrink as needed by owners/users) --Rockcastle Architects, LLC
5. Modular Furniture: Kitchen Island, Dining Table and Desks. The dining table and kitchen island are made of identical, smaller components that can be raised or lowered, or assembled in diverse ways to serve a small family of four at a smaller dining or game table, or two (elevated and end to end) to serve as a kitchen island, as well as accommodating a dinner party of six, eight or twelve, and when adding the bedroom desks to the configuration (linked together to form one table and accommodate a large "family style" gathering), hosting a gathering of up to 16. All the kitchen/dining and desk furnishings are not only movable on lockable casters, but are adjustable in height from 28" to 42" above the floor and able to lock together. --Rockcastle Architects, LLC
6. Open Source *sd2017 reACT* SmartHouse control system, simulations of the house to optimize performance and resource utilization, such as power and water.²³ -- Adomaitis' Group
7. Solar Driers: A VersaLift storage "elevator" has been adaptively reused from its original limited storage function to one that can transport food or clothes up into *reACT*'s solar exposed attic zone, where solar heat and humidification can both dry clothes, or dry/preserve fruit and vegetables or even slow-cook meals using simply passive solar thermal energy.--Rockcastle Architects, LLC
8. Factory Construction: Kit of Parts, the modular components of *sd2017 reACT* - Bath, Kitchen & Mechanical Room, Solar Attic, Bedroom Wing, Living / Dining Wing, and Greencourt – are designed to be discrete modules which can be built in the factory, with all systems, wiring, plumbing and ducting included, and shipped to the building site for integration with the rest of the house. Components and materials may be customized for different climate conditions and resident preferences so that in a given community or subdivision, personal and site variations will contribute to a rich diversity of alternatives. The individual Core modules are sized for easy transportation by truck or train. Each module, in turn, is comprised of components that can be mass produced in factories, efficiently transported to the building site and assembled by local labor. Structural Insulated Panels (SIPs) were a natural choice for the walls and roof. They can be rapidly fabricated under controlled factory conditions using a variety of materials, both natural and industrial. Materials may therefore be selected based on locally/regionally available materials to enhance sustainability and affordability, and to promote local industry. Many components

²² This was not advanced in the SDME2020 *reACT REGENERATED*, but remains a design challenge.

²³ This was redesigned by Ray Adomaitis and his research group for the Team Sol sda2019. It continues under R&D. See Adomaitis' Kickoff Slides for details about *Supervisory House Resource Allocation Control System* (SHRACS)

can be flat-packed and transported via flatbed truck or train. Final assembly of the components can be accomplished using local labor, with homes enclosed in as little as a week, with relatively little specialized training. This also promotes local industry and owner assisted “sweat equity” opportunities that can reduce construction costs and enhance owner meaning by underscoring housing as a “verb,” or activity as much as it is a “noun,” or commodity. -- *reACT* ThinkTank, Rockcastle Architects & Beracah Homes

9. Human waste reuse system: Our composting toilet and drum composter will convert organic waste into nutrients used in our garden, greenwalls and hydroponic systems to grow food and other useful plants.--TBD
10. Sustainability Park²⁴: As part of a long-term vision for branding the University as a world leader in sustainability education, the University plans to make *sd2017 reACT* part of campus in proximity to *sd2007 LEAFHouse*, and allow them to become anchors for the development of a leading-edge research park. -- FM, MAPP, ENGR, AGNR, EDUC, LIBR -- cluster

Benefits include:

- Actualized Face of sustainability education at the University of Maryland.
- Living Lab: a learning tool to teach about sustainability, as well as a demonstration site for designers, contractors, policy makers, and researchers.
- Solar Village anchored by Solar Decathlon buildings that would continue to be monitored and studied, providing long-term performance data for the University community, and ample opportunity for undergraduate, graduate, and doctoral level projects, providing a vital and versatile space for investigations via grants. For instance, *sd2017 reACT* is being proposed as the locus for a behavioral research lab in a \$1.5M NSF STEM Curricular Design Research Grant, “Fostering STEM Identities and Dispositions among Native American Children and Families through the Convergence of Indigenous Knowledge Systems and Sustainable Technologies.”
- Facilitate *sd2017 reACT*'s commercialization and technology transfer to markets, this park has the potential to be a partnership platform between research and market ready, environmentally sensitive, and cost effective commercially available products. Companies could use the site to test and showcase leading-edge technologies, and as funding sites for major collaborative initiatives.

²⁴ This vision is dated and has been revised and refined during 2019 and 2020.

Appendix L: Beracah Homes



Patricia Kosco Cossard <pcossard@umd.edu>

Re: Notes from today

1 message

Roger Collison <roger@beracahhomes.com> Mon, Feb 3, 2020 at 7:19 PM

To: Angela Christine Stoltz <astoltz@umd.edu>

Cc: Garth Carl Rockcastle <gcr@umd.edu>, Patricia Kosco Cossard <pcossard@umd.edu>, Hooman Koliji <koliji@umd.edu>, "Raymond A. Adomaitis" <adomaiti@umd.edu>, William Gary Hubbard <whubbard@umd.edu>, Christine Cestello Hinojosa <hinojosa@umd.edu>, "Richard B. Nickels" <nickels@umd.edu>, Kristy Ann Long <kalong@umd.edu>, "Donald W. Linebaugh" <dwline@umd.edu>, Bryan Stephen Quinn <bquinn@umd.edu>, "Christopher M. O'Dea" <codea1@umd.edu>, Peter Ian May <pimay@umd.edu>, Blaze Mary Buck <bbuck@umd.edu>, thecarlsgroup@gmail.com

Regarding the following items:

1a. The equipment used are often supplied by the crane company, such as cabling, spreader bars and hooks. The "set crew" usually bring cable winch pullers (commonly referred to as "come alongs") to pull the modules tight together before the crane takes all the pressure off the lifting cables, crow bars, hammers and nails, sawsalls etc. The crane can hoist the modules to a staging location and place them on temporary wooden cribbing, which Beracah Homes can supply for the set, and then depending on how far the final temporary foundation is, they may be able to move the crane and pick and place the units on the foundation. If the distance is too great where they are now, a truck and trailer will need to be employed. Moving the crane multiple times is time consuming and crane bills by the hour at several hundred dollars per hour, usually. Hard hats are required by anyone working near the crane and set up site.

1b. I don't believe jacks would be safe in this instance.

1d. I'm not aware of any inflatable rollers that would help us, but if anyone knows of one, I'd be interested to know more.

3. Is then entire 60'x60' footprint going to be gravel? or will a portion be concrete and the rest gravel?

5. I might recommend that instead of temporary wooden cribbing being used, that concrete blocks with poured cores be used on small poured footers to ensure the units are flush and level. Blocks are very inexpensive... a pressure treated sill plate would rest on top of the blocks perhaps. This is what we do when we place houses temporarily at the Delaware State Fair.

6. Beracah would be willing to send a couple employees to supervise the re-assembly... but Whiting-Turner might have better contacts in that area for a crane.

Hope that's helpful.

Roger Collison

CEO Beracah Homes, Inc.

9590 Nanticoke Business Park Dr., Greenwood, DE 19950

302-245-9413 cell 302-349-4561 office

Roger@BeracahHomes.com www.BeracahHomes.com

Appendix M: *reACT* Open Education Resource (OER), drafted and developed by Zach Bishop, '20

Building Science Learning Module Ideas

Modules as a communications material for fundraising and proposal writing (Patti Cossard, Garth Rockcastle)

- Target audience: ThinkTank use for funding proposals and Public Relations
- Potential Mediums: Pamphlet; White paper; Website; Video; Narrated/Animated Slide stack
- Content:
 - a. Introduction: Solar decathlon competition and its purpose; Introduce *reACT* and the design philosophy; Concepts, guiding principles; Innovative features
 - b. Main body:
 - adaptive reuse as a permanent sustainability lab and living building situated next to the architecture building on campus
 - Opportunities the lab can bring & interconnected benefits
 - Learning site for architecture / engineering / agriculture / information science / education
 - Place of ongoing research in building science, sustainability, and resilience
 - c. Conclusion: reiteration of *reACT*'s guiding principles, articulating the alignment with sustainability standards in the past and resiliency standards in the future.

Modules for UMD Agricultural extension outreach and/or for K - 12 education (Angela Stoltz, Bill Hubbard)

- Target Audience: Workforce development, College Prep STEAM Education
- Medium: Multiple videos; Website with videos and text; Supplemental infographics for statistics
- Content: topics and innovations within *reACT* that a lesson can be designed around

Water systems (Peter May, Bill Hubbard, Ray Adomaitis)

Water use within a household: Typical american house; *reACT* water use is less than 20 gal/person/day; Strategies to reduce water demand: Water efficient appliances; Strategies to increase water supply through reuse; Rainwater capture and filtration; In depth look at how water filtration works in the context of a home; Water quality standards, i.e., what quality water can be used for drinking, washing, irrigation, or not used at all; Explanation of how the *reACT* water filter works; Water recirculation within a building; Greywater vs Blackwater; Water reuse without filtration (eg. greywater for irrigation)

Vegetation systems (Hooman Koliji, Peter May, Bill Hubbard)

Concepts: regenerative living to drive narrative; Functional landscapes/techno ecosystems; Benefits for climate, nature and humanity; Integration of beauty and function; Relation to Chesapeake Bay landscape certificate?

- Hydroponic system: how hydroponics work; Water/energy requirements and benefits of the system; use of IoT
- Benefits of indoor vegetation: Air quality, Stress reduction; Productivity improvement, Thermal benefits, domestic food source
- Designs to cultivate plants indoors: Greencourt adaptively used as greenhouse; Green Walls; Living system "ecosystem" around and within house
- Examples of how other technologies in the house relate and integrate in a resilient manner (infographic?): Food grown indoors can be dried in solar oven (living system x arch/thermal system); Nitrogen out of rainwater to be used as fertilizer for living systems (living system x water system)

Power, Energy & Electric Systems (Ray Adomaitis, Bryan Quinn)

- Solar Panels, Power Plant, Electric Grid; Batteries; PV orientation and reflection; Power design within *reACT*

Architecture and Thermal Systems (Garth Rockcastle, Nehemiah Emaikwu, Ray Adomaitis)

- Concept of Thermal Mass; How heat moves through a home; role of insulation, shading, solar attic; Structurally insulated panels (SIPs), R-Value, Energy savings; Role sealing; Innovations within thermal system, e.g., Solar oven

Questions to Resolve

- I. How will we use the *reACT REGENERATED* project as a tool for sustainability education outreach?
 - a. What does outreach look like?
 - i. Inviting students to tour *reACT REGENERATED* as part of a field trip
 - ii. Developing online education materials that students can learn from
 - iii. Developing in person lesson plans that teachers can use
 - b. Does College Park Academy, or other organizations we are targeting for outreach have suggestions on what outreach strategy would work best?
2. To Research:
 - a. Are there examples of other K-12 Building Science curriculums that we can use as a model?

Appendix N: Project Information Scientist & Curator Knowledge, Skills, Abilities (KSAs)

I. Library Faculty

- a. Information Science
 - i. Structuring data
 - ii. Ontologies and Taxonomies
 - iii. Expert Searchers
 - iv. Content/Knowledge Management
- b. Instructors:
 - i. Research Strategy Consultation
 - ii. Research Instruction
 - iii. Disciplinary Reference Tools
 - iv. Sourcing of Materials
 - v. Disciplinary/technical writing
 - vi. Accessing information/data/
 - vii. Literature Reviews and impact tracking
 - viii. Sustainable archiving practices
 - ix. Organizing information for discovery
 - x. Disciplinary publication trends
- c. Scholarly Communication & Data Literacy
 - i. Licensing, Creative Commons, Open source/access
 - ii. Research metrics, Impact tracking and archiving
 - iii. Citation Management, Bibliographies, literature reviews
 - iv. Data Management
 - v. Privacy, Intellectual/Creative Property
 - vi. Domain Repositories
 - vii. Record Preservation
- d. Computer Literacy
 - i. Interoperability/cyberinfrastructure
 - ii. Building databases
 - iii. Organizing Information
- e. Collections, Publishing, and Purchasing
- f. Web design, User testing

Appendix O: 2020.09.29 Digital Repository (DRUM) Announcement of sd2017 reACT

University of Maryland, College Park Mail - Announcement of Solar Decathlon Community on DRUM



Patricia Kosco Cossard <pcossard@umd.edu>

Announcement of Solar Decathlon Community on DRUM

1 message

Patricia Kosco Cossard <pcossard@umd.edu>

Sun, Sep 29, 2019 at 12:55 PM

To: "SDME2020STAKEHLDRS@listserv.umd.edu" <SDME2020STAKEHLDRS@listserv.umd.edu>

Cc: Mary Ann Rankin <mrarkin@umd.edu>, "Wallace D. Loh" <wdloh@umd.edu>

All,

I am pleased to announce that Solar Decathlon Team Maryland <<http://hdl.handle.net/1903/24706>> has been added to the Digital Repository for the University of Maryland (DRUM). Currently, final competition deliverables from the 2017 Team reACT <<http://hdl.handle.net/1903/24707>> have been added. Records submitted to DRUM are discoverable in Google Scholar and DRUM provides download counts and DOIs. This allows us to continue to track the impact of Team Maryland's work.

I would like to thank David Durden and Michael Molyneaux-Francis for their collaboration in getting this published. I would also like to thank Kate Dohe and Babak Hamidzadeh for their support.

In the future, we will be adding other collections for the years Team Maryland has competed in the Solar Decathlon, as well as inter-competition R&D. Furthermore, David Durden, Michael Molyneaux-Francis, and I will be publishing a Data Management Standard and Best Practices for international dissemination to all teams and agencies, past, present and future.

Currently, there are 58 records in DRUM related to the Solar Decathlon: this collection (36), UMD Theses and Dissertations (18), Library Research Works (1), Library Research & Innovative Practice Forum (1), Gemstone Team Research (1), and Mechanical Engineering Research Works (1).

Sincerely,
Patricia Kosco Cossard

Patricia Kosco Cossard, M.A., M.L.S.
Art/Sociology Librarian, Research and Academic Services
Art/Sociology Library
3834 Campus Drive
Room 2213A
University of Maryland
College Park, MD 20742
301.405.9065 TEL
pcossard@umd.edu
<https://orcid.org/0000-0003-1425-0070>

Appendix P: 2017.12.14 Meeting with the Office of Technology Commercialization



Patricia Kosco Cossard <pcossard@umd.edu>

Re: Reminder: Meeting today! Promoting reACT's innovation-based economic development

1 message

Patricia Kosco Cossard <pcossard@umd.edu>

Thu, Dec 14, 2017 at 11:23 PM

To: Raymond Adomaitis <adomaiti@isr.umd.edu>

Cc: Susan Pesce <spesce@umd.edu>, Garth Carl Rockcastle <gcr@umd.edu>, Felicia Metz <fametz@umd.edu>, "Mary E. Dulaney" <mdulaney@umd.edu>, "Julie C. Lenzer" <jlenzer@umd.edu>, Kennedy Anderson <kennedi@umd.edu>

Hello Everyone,

Thank you for today's meeting!

Present: Rau Adomaitis (P.I. Engineering), Garth Rockcastle (P.I. Architecture), Patti Cossard (co-P.I. Libraries), Mary Dulaney (Libraries), Felicia Metz (OTC), Piotr Kuczakowicz (OTC), and Alla McCoy (OTC)

Notes:

1. Introductions, interest sharing, and what we hope to gain from the meeting:

- understanding overall of the roles on campus concerning IP and Technology Transfer.
- review the nine potential technology transfer opportunities coming out of Solar Decathlon 2017, see document "Future Plans for reACT" [attached]
- questions
- recommendations
- next steps

2. The Library is very interested in expanding its research cycle support mission into data management/curation and collaborating in a strategic plan to keep, track, and make available raw data as a university asset.

3. Solar Decathlon has had a significant impact in Higher Education and sustainability markets: over 500 books, theses, peer reviewed articles and technical reports, for impact on markets and commercialization see U.S. National Renewable Energy Lab (NREL), *Insights on Technology Innovation -- A Review of the U.S. Department of Energy Solar Decathlon Competition Entries, 2002-2015* (Simon, 2017) [attached]

4. Using Dr. Hooman Koliji's Hydroponic system as an example we discussed what guidelines there are for intellectual property ownership, for faculty and students. In this specific case a contract with the libraries, delineating intellectual property rights and licensing/royalties, is recommended.

5. A toolkit for faculty entrepreneurs from OTC (Alla) is currently being developed. All agreed that this would be a great strategic development. We recommended including contract templates (as discussed above). Perhaps enhancing IRROC with a technology transfer module <https://irroc.umd.edu/>

6. Next Steps:

- Felicia will open communications with Dr. Koliji concerning his expectations for his design/invention and will bring in the Libraries (Mary, lead, and Patti) to discuss royalties if any, and the role/classification of students in the intellectual property. The Libraries will wait until these discussions have happened and a contract has been drafted and approved.
- Garth, Ray, Patti will update and expand Patti's *Future of reACT* document, identifying reACT intellectual property owners for potential discussion with Office of Technology Commercialization (OTC). The revised draft will be shared February 15.
- A meeting will be convened at the end of February to move forward.

Appendix Q: Invitation from Dr. Richard King

Solar Decathlon Middle East

1 message

rkingsd@gmail.com <rkingsd@gmail.com>
To: hinojosa@umd.edu

Mon, Sep 2, 2019 at 11:17 AM

You are invited to enter an amazing design competition! My name is Richard King, creator and director of the U.S. Department of Energy Solar Decathlon. In 2015, I worked with the Dubai government to hold two SD competitions in the U.A.E., in 2018 and 2020. I am now retired from the Department of Energy and helping to organize the SDME 2020 in Dubai.

Here is the Web site to find more information and to register. The Dubai organizers are holding a couple last entry slots for an American team. They have extended the deadline for applications until the end of September.
<https://www.solardecathlonme.com/>

Please see the attached set of photos from the SDME 2018 competition in Dubai. The site is the best in the world. The facilities are fantastic.

Furthermore, the SDME 2020 will be held in November/December 2020 during the World EXPO 2020 Dubai!

<https://www.expo2020dubai.com/en> There will be a pavilion in the EXPO showcasing the SDME and all the participating teams. This is your opportunity to be part of the World EXPO – a six month event that attracts five to ten million visitors.

I think the DEWA staff have already reached out to you. Please let me know if you have any questions or need support. I am happy to speak directly with you.

Best regards,

Richard King
Senior Advisor SD Middle East
1-434-218-9515
rkingsd@gmail.com

Appendix R: Material Order for Scale Model to be made by the Architecture Systems Group

| Supplies for reGEN scale Model | Dimension | Quan | Price | Source | Model # | Link |
|--|-----------------------|------|------------------|--------------------|------------|---|
| Basswood | 1/8"x12"x24" | 10 | \$ 86.37 | Blick Art Supplies | 33300-1103 | https://www.dickblick.com/items/33300-1103 |
| Basswood | 3/32"x8"x24" | 10 | \$ 75.81 | Blick Art Supplies | 33300-1102 | https://www.dickblick.com/items/33300-1102 |
| Basswood Dowel | 3/32"x3/32"x24" | 60 | \$ 18.41 | Blick Art Supplies | 33300-2032 | https://www.dickblick.com/items/33300-2032 |
| PlexiGlass | 1/8"x18"x24" | 1 | \$ 18.00 | Artist & Craftsman | | https://www.artistcraftsman.com/store-art-supplies-college-park-hyattsville-md |
| Acrylic Sheet | 0.22"x48"x96" | 2 | \$ 380.10 | Home Depot | 220958 | https://www.homedepot.com/p/Plexiglas-48-in-x-96-in-x-0-220-in-Acrylic-sheet-220958/206792289 |
| Subtotal | | | \$ 578.69 | | | |
| Supplies for box of Model | | | | | | |
| Closing Latch | 2-5/16"x15/16" | 10 | \$ 10.00 | McMaster-Carr | 1767A14 | https://www.mcmaster.com/1767a14 |
| Folding Pull Handle (Style 1, Sinc Plated Steel, Polished) | 3/4"x 3 3/8" x 1/1 | 4 | \$ 17.16 | McMaster-Carr | 1647A42 | https://www.mcmaster.com/pull-handles |
| Steel Tie Plate | 5"x.04"x1.8" | 4 | \$ 3.96 | Ace Hardware | 5608054 | https://www.acehardware.com/departments/hardware/angles-braces-and-brackets/metal-plates/5608054 |
| Steel Mending Plate | 2" x 5/8" | 2 | \$ 0.84 | Grainger | 1WDG9 | https://www.grainger.com/product/GRAINGER-APPROVED-2-x-5-8-Steel-Mending-Plate-1WDG9 |
| Subtotal | | | \$ 31.96 | | | |
| Additional wood for box of | | | | | | |
| Sande Plywood | Category x 4 ft. | 6 | \$ 215.70 | Home Depot | 454532 | https://www.homedepot.com/p/12mm-Sande-Plywood-1-2-in-Category-x-4-ft-x-8-ft-Actual-0- |
| Furring Strip Board | 2 in. x 2 in. x 8 ft. | 2 | \$ 3.96 | Home Depot | 165360 | https://www.homedepot.com/p/2-in-x-2-in-x-8-ft-Furring-Strip-Board-165360/202076422 |
| Subtotal | | | \$ 219.66 | | | |
| Total | | | \$ 830.31 | | | |

Appendix S: UMD Non-Credit or Risk Managed Only Program Information Form

UMD Non-Credit or Risk Managed Only Program Information Form**Examples****Typical daily schedule example (Program details, question #5)**

| Date/Days | Time | Activity | Location |
|-------------------------------------|------------------------|---|--|
| Sunday, July 30, 2017 | 9:00 a.m. | Group arrives at CDG | CDG airport, Paris, France |
| | 10:00 a.m. | Eurolines shuttle transports group to Hotel Ares Paris | 7 rue du General de Larminat, 75015 Paris, France |
| Monday – Friday 7/30/17 to 12/15/17 | 8:00 a.m. to 4:30 p.m. | Students fulfill internship responsibilities at Sanofi. | 54-56 Rue La Boétie, 75008 Paris, France |
| Thursday nights | 7:00 p.m. | Group dinner; progress reports and debrief | Hotel Ares Paris; Room 312 |
| Sunday, 8/6 | 9:00 p.m. | Cultural excursion to Louvre | Rue de Rivoli, 75001 Paris, France |
| Monday, 10/23/17 | 9:00 a.m. | Eurolines shuttle transports group to Sanofi Pasteur | 1, avenue Pierre Brossolette 91385 Chilly Mazarin Cedex France |

Security risk mitigation (Health & Safety question #3)

| Risk issue | Risk mitigation |
|---|---|
| State of emergency extended nationwide due to heightened risk of terrorist attacks. | Program related excursions to popular sites will be scheduled as much as possible during off-peak hours. Students will be advised to avoid mass public gatherings if French and/or U.S. authorities publicize any potential threats. Students will be advised to carry proper identification at all times, and a passport if passing international borders – even between Schengen countries. |
| | |

Appendix T: Outline of Website Design

Navigation will be organized around the five *reGEN* systems (Architecture, Engineering, Living Systems, Sustainability Education, and Teamwork)

- Content will be focused on Sustainability measures (quantifiable and qualitative) and how *reGEN* will excel in those goals
- Content extent will be modelled after 2011.solarteam.org
- Move from Wordpress to Drupal
- Features to be included:
 - Photograph repository for posting, adaptation, metadata, and
 - Blog for publishing Interviews and news updates
 - Video streaming
 - [SponsorMap](#)
 - Permissions based Social Media publishing