

Developing an Inclusive Promotional Strategy for Solar Decathlon AFRICA in Morocco



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Developing an Inclusive Promotional Strategy for Solar Decathlon AFRICA in Morocco

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Abstract

This project involved collaboration with IRESEN in implementing and assessing an inclusive promotional strategy for Solar Decathlon AFRICA, scheduled for September 2019 in Morocco. The project team interviewed past Solar Decathlon participants about their experiences and surveyed students from four Moroccan universities following an informative project team presentation on Solar Decathlon AFRICA. Finally, the team improved the official competition website and kept track of visitor statistics. After the presentations, the website experienced a sustained increase in daily number of visitors. The project team recommended continuing in-person university presentations and adapting the competition to make it feasible for universities around the world to participate in this unique opportunity.

Executive Summary

Countries around the world have identified solar power as one of the most promising methods of clean energy. In an effort to promote innovative solar technology, the United States Department of Energy (DOE) has organized and sponsored a series of international competitions titled “Solar Decathlon.” During these events, teams from international universities compete to design the best net-zero energy house. Net-zero energy buildings produce and consume the same amount of energy; essentially, a net-zero house can operate independently of the energy grid. Since 2002, 141 collegiate teams from six continents have participated in Solar Decathlons (U.S. DOE Solar Decathlon, 2017).

Accomplishments such as the Noor Power Station in Ouarzazate and the 22nd Conference of the Parties (COP22) in Marrakech demonstrate that Morocco is emerging as a global leader in solar energy. Towards this end, the DOE partnered with Institut de Recherché en Energie Solaire et Energies Nouvelles (IRESEN) to host the first Solar Decathlon AFRICA in 2019. In 2011, the Moroccan Ministry of Energy, Mining, Water and Environment founded the research institute. While focusing on solar power, IRESEN dedicates funding, facilities, time, and expertise toward researching and developing all alternative energy sources. Their mission to develop cutting-edge technology while adapting the projects to “national context” distinguishes IRESEN as the perfect host for Solar Decathlon AFRICA (IRESEN, 2017).

While the basic format of the Solar Decathlon will remain the same, IRESEN must adapt a communication strategy to promote the event specifically to the continent. Additionally, IRESEN is responsible for persuading teams to participate in the Solar Decathlon.

In collaboration with IRESEN, our team’s goal was to implement and assess an inclusive promotional strategy for Solar Decathlon AFRICA. In order to achieve this goal, we established the following three objectives:

1. Identify the advantages of participation in the Solar Decathlon from the perspective of the participants
2. Gauge current interest of potential participants in Solar Decathlon AFRICA
3. Evaluate and modify the online platform for potential participants to express interest in and obtain information about Solar Decathlon AFRICA.

In order to accomplish these objectives, our team used archival research, interviews, and surveys to obtain feedback from both past and potential participants in the Solar Decathlon (see Figure 0-1, below).

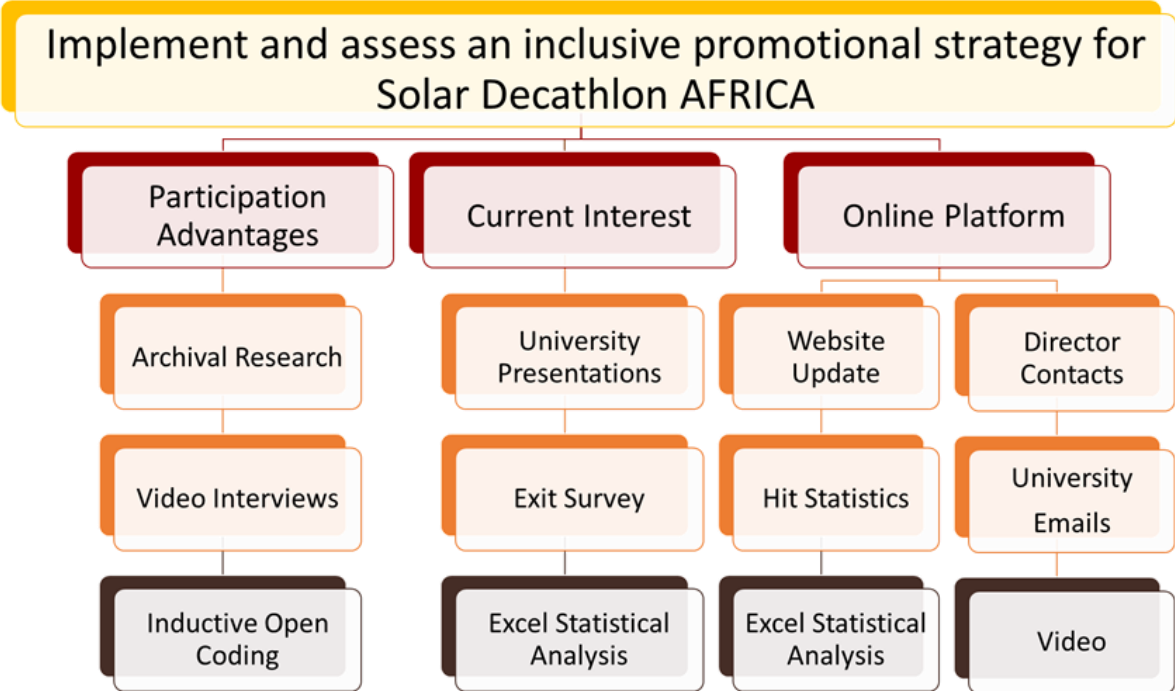


Figure 0-1: Flowchart of the project team's goal, objectives, methodology, and analysis or deliverable

The team conducted archival research first by obtaining several personal anecdotes from team blogs and videos as well as an impact report created by Lockheed Martin on behalf of the United States Department of Energy. Following this initial research, the team conducted eight interviews with past participants about their Solar Decathlon experience. The project team asked questions such as “What interdisciplinary skills did you learn from the Solar Decathlon?”, “Has your Solar Decathlon experience impacted your professional career?”, and “Has your Solar Decathlon experience impacted your view of the world?” To analyze both the personal anecdotes and interview transcripts, the team used inductive open coding in order to establish common themes in the responses. Table 0-1, below, displays the three most prevalent topics from the coding analysis.

Table 0-1: Sample interview responses summarized by inductive open coding

Category	Comments about Solar Decathlon experience	Citation Count
Learning/ Skills	<ul style="list-style-type: none"> • Learned project management and teamwork skills • Learned how to build practically 	23
Career Influence	<ul style="list-style-type: none"> • Played a key role in career path • Used experience as talking point in interviews 	13
Worldview	<ul style="list-style-type: none"> • Learned to communicate with people from different cultures • Discovered different perspectives and ways of doing things 	14

The Lockheed Martin report confirmed these positive results with statistics from past participants concerning the impact of their Solar Decathlon experience on their education and career. For example, 94% of a sample of 250 Solar Decathletes claimed that they learned more about clean energy from the Solar Decathlon than in a classroom. In addition, 92% of past participants who held a job in the clean-energy field claimed their Solar Decathlon experience helped them get that job.

The project team gave a presentation promoting Solar Decathlon AFRICA at four universities in Morocco: Ecole Nationale Supérieure d'Arts et Métiers (ENSAM) in Meknes, École Supérieure des Industries du Textile et de l'Habillement (ESITH) in Casablanca, Mundiapolis University in Casablanca, and Institute National D'aménagement Et D'urbanisme (INAU) in Rabat. The presentation contained information from the archival research and quotes from the interviews. Two team members delivered the 15-minute presentation to groups of 20 to 110 students. Following each formal presentation, the other two team members held an informal question and answer period.

During this period, the project team handed out an exit survey to all students in attendance. This exit survey contained questions such as “Have you heard about Solar Decathlon AFRICA before today?” and “Are you personally interested in participating?” Additionally, the team asked questions concerning the student demographics specifically field of study and year in school.

The project team entered all exit survey results into an Excel spreadsheet to perform statistical analysis. The analysis of these results showed that the university presentation generated significant interest in Solar Decathlon AFRICA. Before the presentation, 89% of the attendees had not heard about the Solar Decathlon (see Figure 0-2, below). After the presentation, 87% reported that they were personally interested in participating in Solar Decathlon AFRICA (see Figure 0-3, below).

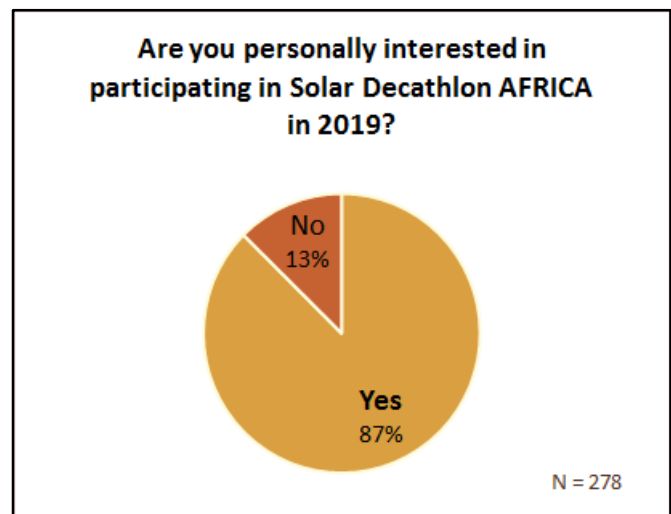
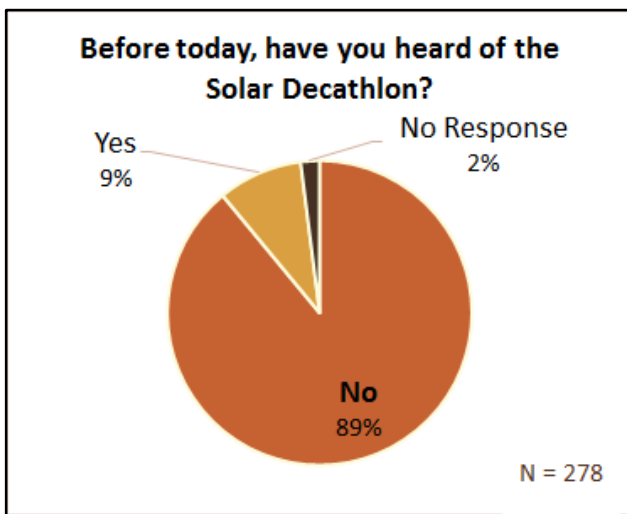


Figure 0-2 (left) and Figure 0-3 (right): Two survey question responses from university visits

Beyond this quantitative evidence of success, the project team observed enthusiastic audience reactions following each presentation. University students engaged the team in lively question and answer sessions that lasted up to 30 minutes. Many students and faculty members asked about how to create a team and how to submit a proposal; these questions indicated a high amount of interest in participation. Additionally, the team continued to receive students’ questions about the Solar Decathlon AFRICA via email for a week after presentations.

In order to achieve our third objective, the team worked with IRESEN to adapt the competition’s website to reflect the aspects that make this iteration of the competition unique. To accomplish this, the project team modified the color scheme to better represent Africa and restructured several pages. The team also added a new website page covering the unique African architectural styles from which teams should draw their inspiration (see Figure 0-4, below). The team tracked the number of visitors to the website and the number of pages opened to assess the progress of the competition’s promotion (see Graph 0-1, below).

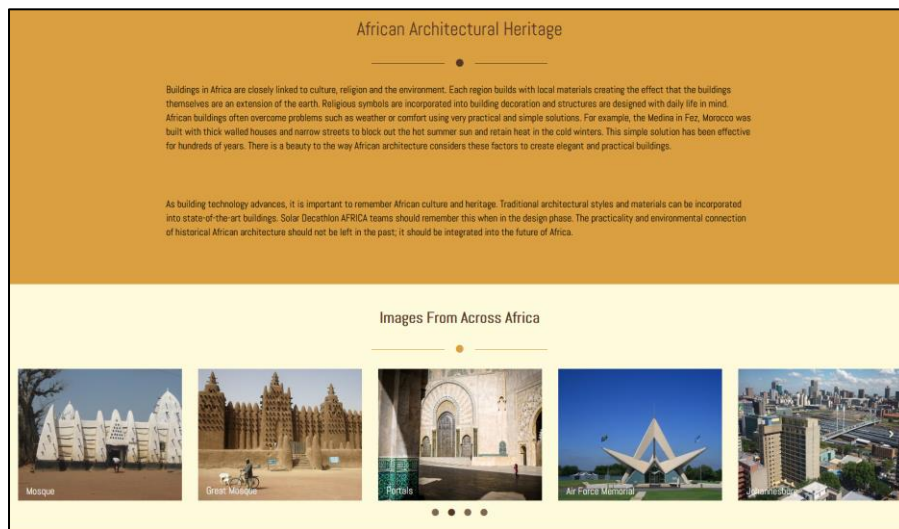
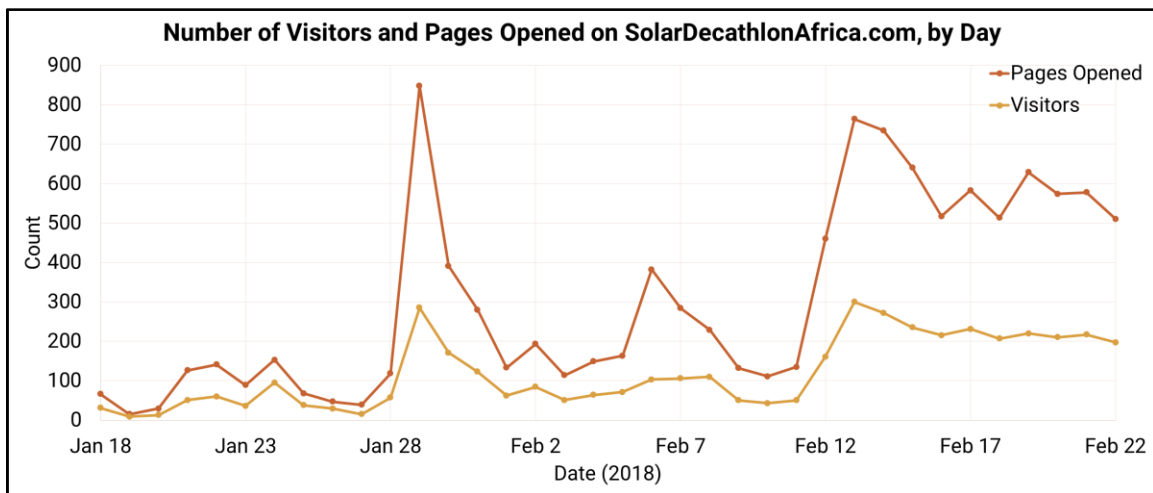


Figure 0-4: Screenshot of the Architecture page on the official Solar Decathlon AFRICA website



Graph 0-1: Traffic on the official Solar Decathlon AFRICA website

Peaks on January 29th and February 6th coincide with IRESEN and the project team sending emails to administrators at various international universities. The peak from February 12th to February 15th corresponds with the four university presentations. There is a sustained increase in visitors after the university presentations, indicating the effectiveness of in-person visits.

The project team's deliverables included several recommendations and a promotional video. The promotional video contains much of the same information included in the university presentation. The video is a vehicle for Solar Decathlon AFRICA organizers to deliver the same content of a presentation via email or online platform; this is an effective alternative when in-person visits are not practical.

The project team recommends prioritizing in-person visits to advertise the competition. The analysis of the exit survey results and the website tracking information serve as strong evidence supporting the claim that the university presentation was an effective technique to generate interest in Solar Decathlon AFRICA. Sending mass emails was effective in informing people about Solar Decathlon AFRICA, as shown by the corresponding spikes in website traffic. However, the team believes that in-person presentations were valuable in both informing and generating sustained interest. The cultural differences in Morocco likely play a role in the effectiveness of in-person versus email outreach; the project team witnessed that persuasive exchanges in Morocco take time, conversation, and of course, mint tea.

In learning from the archival research of the Lockheed Martin impact report and past participants of the Solar Decathlon, the team identified advantages to advertise to potential participants as well as challenges to anticipate for Solar Decathlon AFRICA. Our team believes that the advantages of enhanced learning, career preparation, and world experiences are strong selling points for participation in the competition. However, the project team realizes that the challenges of limited time and financial resources are the factors most likely to deter participants.

The organizers of Solar Decathlon AFRICA must communicate these advantages and challenges of participation effectively, either in person or with an online presentation such as the promotional video. The organizers also have the unique opportunity to adapt the competition to make participation feasible for African countries as well as countries around the world. Successful promotion and execution of Solar Decathlon AFRICA will showcase Morocco as a world leader in green energy reform, and bring the countries of Africa together for the future of our planet.

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1. Introduction

Climate change is forcing communities and governments around the globe to take action. As a result, sustainable technologies and renewable energies are becoming more prominent. Buildings consume a majority of the world's energy and are therefore one of the primary targets for sustainability reform (Jelle, 2011). Currently, the international push towards sustainable building design has widespread appeal, and governments are the main supporters of energy-efficient initiatives (Government funding drives uptake, 2014).

Countries around the world have identified solar power as one of the most promising methods of clean energy. In an effort to promote innovative solar technology, the United States Department of Energy (DOE) has organized and sponsored a series of international competitions titled "Solar Decathlon." During these events, teams from international universities compete to design the best net-zero energy house. Net-zero energy buildings produce and consume the same amount of energy; essentially, a net-zero house can operate independently of the energy grid. Since 2002, 141 collegiate teams from six continents have participated in Solar Decathlons (U.S. DOE Solar Decathlon, 2017).

Accomplishments such as the Noor Power Station in Ouarzazate and the 22nd Conference of the Parties in Marrakech demonstrate that Morocco is emerging as a global leader in solar energy. Towards this end, the DOE will partner with Institut de Recherche en Energie Solaire et Energies Nouvelles (IRESEN) to host the first Solar Decathlon AFRICA in 2019. In 2011, the Moroccan Ministry of Energy, Mining, Water and Environment founded the research institute. While focusing on solar power, IRESEN dedicates funding, facilities, time, and expertise toward researching and developing all alternative energy sources. Across two locations in Morocco (with three more in progress), IRESEN supports 540 researchers involved in 37 projects (IRESEN, 2017). Their mission to develop cutting-edge technology while adapting the projects to "national context" distinguishes IRESEN as the perfect host for Solar Decathlon AFRICA (IRESEN, 2017).

Even with these qualifications, hosting an international competition for the first time on the African continent poses many challenges. While the basic format of the Solar Decathlon will

remain the same, IRESEN must adapt a communication strategy to promote the event specifically to the continent. Additionally, IRESEN is responsible for persuading teams to participate in Solar Decathlon AFRICA. Components of a successful competition include the number of university teams competing, adequate corporate sponsorship, qualified and impartial judges, a well-prepared site, and careful collaboration with the local residents affected by the event.

In collaboration with IRESEN, our team's goal was to implement and assess an inclusive promotional strategy for Solar Decathlon AFRICA. In order to achieve this goal, we established the following three objectives:

1. Identify the advantages of participation in the Solar Decathlon from the perspective of the participants
2. Gauge current interest of potential participants in Solar Decathlon AFRICA
3. Evaluate and modify the online platform for potential participants to express interest in and obtain information about Solar Decathlon AFRICA.

In order to accomplish these objectives, our team used archival research, interviews, presentations, and surveys to obtain feedback from both past and potential participants in the Solar Decathlon. Involvement in the competition gives students a global perspective and prepares them to enter the workforce as energy-conscious members of society. Our team used these findings as a way to advertise the benefits of the competition to universities that had not been previously involved. To spread the word about Solar Decathlon AFRICA, our team created an informative presentation to give at Moroccan universities. A survey accompanied the in-person presentation in order to assess its effectiveness. To increase distribution of the material, the team created a promotional video including much of the same information as the presentation. Competition organizers can distribute this video to international universities and share it over social media platforms. Furthermore, the team modified the official competition website, www.solardecathlonafrica.com, to better represent Africa. The project team also added a new website page covering the unique African architectural styles from which teams should draw their inspiration. Finally, the team placed a hit tracker on this website to count the quantity of visits. Using the results of the survey from Moroccan universities alongside our archival

research and website hit data, the project team developed suggestions for future advertising and adjustments to the Solar Decathlon AFRICA format.

In the following chapters, we present a literature review of relevant background information and a methodology for data collection. The final chapters of the paper discuss results from interviews and surveys, and finally conclusions and future recommendations for Solar Decathlon AFRICA.

2. Literature Review

The first section of this chapter presents a brief history of the Solar Decathlon. This background illustrates the purpose of the Solar Decathlon competition as a whole and provides the foundation for discussing future competitions. The next section focuses on the specifics and the cultural context of Solar Decathlon AFRICA 2019. This chapter also considers the broader socio-political climate regarding the role the competition may play in Africa's energy development. The fourth section identifies the interests of stakeholders, and the Solar Decathlon's potential impact on them. Finally, the background touches on two case studies that highlight important lessons from technological demonstrations in alternative energy.

2.1 History of the Solar Decathlon

The Solar Decathlon has evolved to include 141 collegiate teams and over 18,000 participants since the first competition held in 2002. There have been thirteen completed competitions and seven more are currently in progress (U.S. DOE Solar Decathlon, 2017). These decathlons have impacted perceptions on sustainable energy design on a global scale. Overall, the Solar Decathlon has “educated the public about the benefits, affordability, and availability of clean energy solutions by generating widespread media coverage and harnessing digital tools to reach millions of people” (U.S. DOE Solar Decathlon, 2017). In particular, the competition has influenced the United States due to the involvement of the U.S. Department of Energy (DOE).

The U.S. DOE tasks college students to “design and build full-size, solar-powered houses” (U.S. DOE Solar Decathlon, 2017). The first competition, held on the National Mall in Washington DC, consisted of 14 teams from United States universities. The DOE planned to continue the Solar Decathlon as a biannual event in the United States. Since then, it has become an international competition with teams from different nations, and in 2010 the decathlon was held for the first time outside the United States in Madrid, Spain. Currently the competition spans four continents and involves multinational teams. There are five decathlons planned for 2018 and 2019: Dezhou China, August 2018; Dubai, United Arab Emirates, November 2018;

Szentendre, Hungary, July 2019; Ben Guerir, Morocco September 2019; and Cali, Colombia, December 2019.

2.1.1 Solar Decathlon Competition Format

The scope of the decathlon involves considerable planning to ensure a fair and comprehensive process. First, the DOE and international organizers sign a Memorandum of Understanding (MOU) announcing the competition. Two to three years before the competition occurs, the call for proposals explains the specifications for the particular decathlon and usually includes the rule book. Universities make their own teams or partner with other universities and submit design proposals (U.S. DOE Solar Decathlon, 2017). After the teams submit their proposals, the hosting organization selects the teams that will compete; each decathlon has approximately 16 to 22 teams.

Through the following 20 to 24 months, the teams submit deliverables, including a schematic design summary, digital project representation, and public exhibit materials (U.S. DOE Solar Decathlon 2017 Rules, 2017). With each successful deliverable, the teams receive a portion of the funding to offset financial costs (El-Korchi, personal communication, November 3, 2017). About one month before the competition occurs, each team ships their house in parts to the venue and constructs the house in ten days (WPI team finishes strongly, 2013). During the next ten days, judges score each building, and members of the public can visit each submission (U.S. DOE Solar Decathlon, 2017).

In the 2017 Solar Decathlon, judges evaluated each contestant's house based on the following ten categories: architecture, market potential, engineering, communications, innovation, water, health and comfort, appliances, home life, and energy (see Figure 2-1, below) (U.S. DOE Solar Decathlon 2017 Rules, 2017).

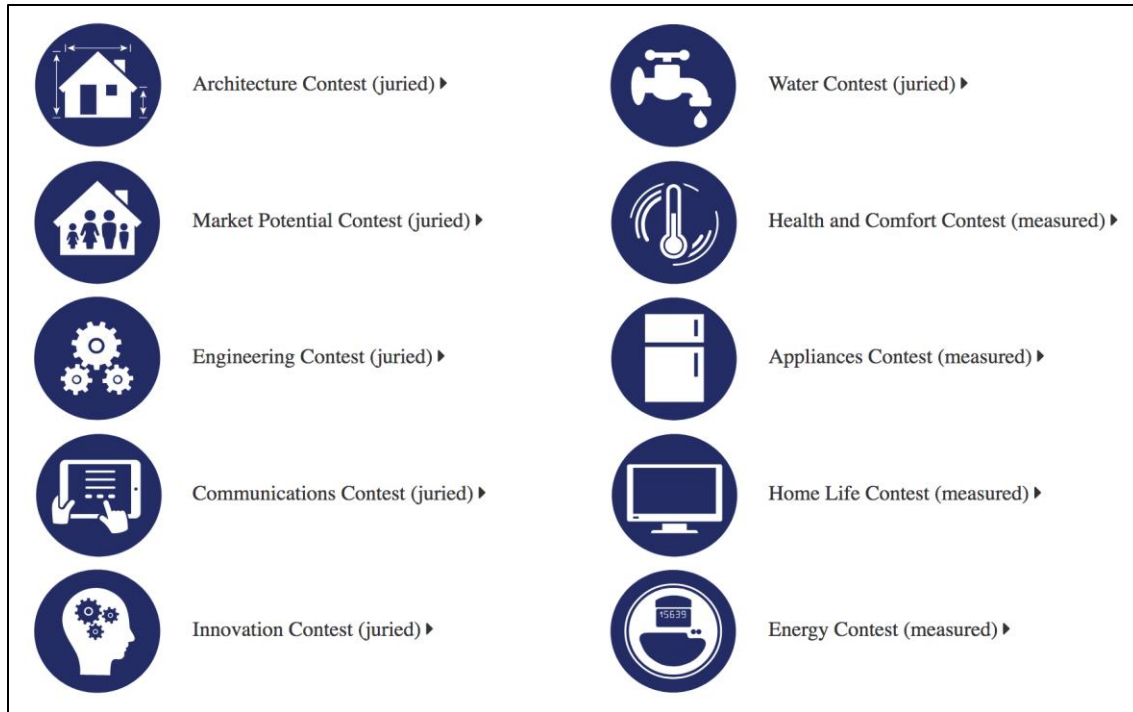


Figure 2-1: List of contests in Solar Decathlon 2017 held in Denver, Colorado and how the juries scored the teams. (U.S. DOE Solar Decathlon 2017 Rules, 2017)

Each contest is either objectively measured or scored by a jury, consisting of a panel of experts in their respective fields. For example, the jury scores the architecture contest based on the environmentally-friendly design and integration into the final product. The jury scores market appeal based upon the building's overall attractiveness to the team's target market. The jury evaluates communication based on the team's final website, personal tours and presentations to the general public (Solar Decathlon China 2013 Rules, 2013). After the competition, the teams are responsible for taking the house back with them or selling it. This is the basic outline of the Solar Decathlon; however, the specifics of the competition can change as solar technology evolves and the location of competition varies.

2.2 Solar Decathlon AFRICA 2019

The DOE posted the first announcement of Solar Decathlon AFRICA on their website in 2016 which reads as follows:

On November 15, 2016, the Moroccan Ministry of Energy, Mines, Water, and the Environment (MEMEE); the Moroccan Research Institute in Solar Energy and New Energies (IRESEN); and the U.S. Department of Energy signed a memorandum of understanding to collaborate on the development of Solar Decathlon AFRICA, a competition that will integrate unique local and regional characteristics while following the philosophy, principles, and model of the U.S. Department of Energy Solar Decathlon. The competition is expected to take place in 2019 (U.S. DOE Solar Decathlon, 2017).

IRESEN, as the host, has the opportunity to adapt Solar Decathlon AFRICA from the U.S. model to the African context. First, all universities will need to “design highly energy-efficient, solar-powered and affordable homes adapted to our African climate and location” (Solar Decathlon AFRICA Request for Proposals, 2017, p. 3). Teams from all nations must design and construct a house inspired by an African region of their choice. Additionally, the houses should cater to a specific market within Africa. The organizers have illustrated this focus on African culture in the official logo of the competition (see Figure 2-2, below).



Figure 2-2: Official logo of Solar Decathlon AFRICA 2019 (Solar Decathlon Africa, 2018)

The adapted ten contests are as follows: architecture, engineering and construction, market appeal, communications and social awareness, appliances, home life and entertainment, sustainability, comfort conditions, electrical energy balance, and innovation (Solar Decathlon AFRICA Request for Proposals, 2017). These contests differ slightly from the 2017 Solar Decathlon held in Denver, Colorado; IRESEN added the sustainability contest in place of water. Sustainability is a measure of the use of natural resources and long-range impacts of architecture, engineering and construction, communication and social awareness, and market appeal (Solar Decathlon AFRICA Rules, 2017). All of these decisions fall under the jurisdiction of the host, IRESEN.

2.2.1 Partner Profile: IRESEN

The project team worked directly with the Institut de Recherche en Energie Solaire et en Energies Nouvelles (IRESEN) in the effort to promote interest in Solar Decathlon AFRICA. “The Ministry of Energy, Mining, Water and Environment, with the participation of several key players of the energy sector in Morocco” founded IRESEN in 2011 (IRESEN, 2017). IRESEN’s goal is to research solar technology and educate Moroccans about the potential of solar as a primary energy source by continuously revolutionizing the Moroccan energy source landscape (IRESEN, 2017).

IRESEN receives funding from its many partner organizations and uses those funds to support research projects (Idrissi, personal communication, December 5, 2017). IRESEN sends out calls for proposals, from which it selects the most promising or significant projects to fund. Once IRESEN selects a project, the institute provides up to 5 million dirhams to accomplish the project’s goals. As of November 2017, IRESEN has sent out ten calls for proposals and is currently working on 37 different projects. These projects have an underlying goal of obtaining “a process, a service or a product 100% Moroccan that can be valued on the market” (IRESEN, 2017).

With the research institute primarily focused on solar energy sources, the majority of IRESEN’s projects involve photovoltaics. For example, the SOLEIL project worked on the “optimization of a photovoltaic power plant integrated to the network and highly integrated locally” (IRESEN, 2017). However, these projects apply to all facets of life in Morocco, not just as an energy source for the national grid. The Dessalemt project worked on using solar energy

to desalinate water for human consumption, and the FrigoSolaire project developed a solar refrigerator capable of being transported by a delivery tricycle (IRESEN, 2017).

IRESEN supports research into sustainable energy through several satellite locations throughout Morocco (see Figure 2-3, below).



Figure 2-3: Map of IRESEN’s planned satellite locations (IRESEN, 2017)

The Green Energy Park in Ben Guerir is currently the only completed research location. Researchers at IRESEN use this site for testing and researching renewable energy (IRESEN, 2017). IRESEN is also working on developing three other locations, each focused on a specific facet of sustainable living. The Blue Water Park will specialize in water desalination both for human consumption and irrigation, and the Bio Energy Park will deal primarily with the use of organic substances as a source of energy. The Green (& Smart) Building Park, the site of Solar Decathlon AFRICA, focuses on “integrating renewable energies in the building sector” (IRESEN, 2017). This constant work integrating sustainable living into Moroccans’ daily lives makes IRESEN the perfect candidate to host the Solar Decathlon AFRICA.

2.2.2 Competition Site: Ben Guerir

Solar Decathlon AFRICA will be held at the Green & Smart Building Park in the town of Ben Guerir, 60 km north of Marrakech and 180 km south of Casablanca (see Figure 2-4, below) (Google, n.d.).



Figure 2-4: Location of Ben Guerir with respect to Casablanca and Marrakech (left), and a zoomed-in map of Ben Guerir (right) (modified Google, n.d.)

With a population of 88,626, Ben Guerir is significantly smaller than either of these two major Moroccan cities (Ben Guerir Population, 2014). However, the proximity to major tourist cities and being a stop on Morocco's rail network allows for convenient additional housing space. Ben Guerir is an ideal site for Solar Decathlon AFRICA because it is the home of IRESEN's new facilities and the prestigious Mohammed VI Polytechnic University.

2.2.3 Incorporating African Architecture and Heritage

Solar Decathlon AFRICA is a unique approach to the general Solar Decathlon competition. The wide scope of the competition, which permits teams to design a house for any region of Africa, allows for many possibilities. The African continent is rich with a wide variety of cultures, arts, and religions. There are also a variety of climates and environments, each of which contains different natural resources and requires a unique approach to sustainable design.

Incorporating cultures, arts and local resources into the competition will show that sustainable buildings are not only possible, but demonstrate that they can also seamlessly integrate with the local African cultures. Teams competing in Solar Decathlon AFRICA should draw on these various heritages and cultures when in the design stages of the competition.

Buildings in Africa are closely linked to culture, religion and the environment. Inhabitants historically constructed buildings with local materials evoking a feeling of harmony between the buildings and the surrounding environment. Africans tend to incorporate religious symbols into their building decoration while also considering daily life in building designs (African architecture, 2016). African buildings often prevail in harsh weather by using very practical and simple solutions. For example, the medina in Fez, Morocco has thick walled houses and narrow streets to block out the hot summer sun and retain heat in the cold winters (See Figure 2-5, below). This simple solution has been effective for hundreds of years. There is a beauty to the way African architecture considers these factors to create elegant and practical buildings.



Figure 2-5: Narrow streets of Fez medina

The architecture and heritage of the continent is a mixture of three cultures: indigenous, western, and Islamic. Ali A. Mazrui created the term “triple heritage” in 1986 to describe the blending of these three cultures in Africa. The indigenous style is sometimes marginalized as primitive by those who prefer the more monumental architecture in Egypt and Islamic architecture in the North. However, much of the architectural style in Egypt and the north flowed out of ancient Saharan cultures. In the 2nd century, Romans brought the first Western Architecture to Africa. European explorers brought more Western Architecture to Africa in the 15th century. The colonization of Africa further spread European architecture and culture to the continent. In localized pockets across the continent, the people adopted Christianity. By the seventh century, Islam had spread into Egypt and then further across North Africa. Islam led to the construction of religious buildings such as The Great Mosque of Kairouan in Tunisia (The "triple heritage" architectural concept, n.d.) (see Figure 2-6, below). It is impossible to break down the architecture of Africa into just three categories, but the triple heritage approach helps give a further understanding about the origins of these styles and cultures. Additional factors such as local building materials and climate also influence much of the art and building style of a region (African architecture, 2016).



Figure 2-6: Courtyard of the Great Mosque of Kairouan (Ed Kirby, 2010)

As building technology advances, it is important to remember African culture and heritage. Even state of the art buildings can incorporate traditional architectural styles and materials. Solar Decathlon AFRICA has the potential to be a celebration of the variety of African architectures, arts, and cultures. Future generations should not leave the practicality and environmental connection of historical African architecture in the past; instead they should integrate it into the future of Africa.

2.3 Morocco as a Hub for African Inclusivity

The U.S. Department of Energy made the decision to title the competition hosted by IRESEN “Solar Decathlon AFRICA.” While there have been more specific regions within the titles such as “Solar Decathlon China,” the DOE has named other decathlons after much broader regions: for example, “Solar Decathlon Europe” and “Solar Decathlon Middle East”. Rather than “Solar Decathlon Morocco” or “Solar Decathlon Northern Africa,” the DOE decided that this Solar Decathlon would take the name of the continent. This choice illustrates an overarching theme of unity in Africa.

The sustainability trends of the continent indicate the challenge of presenting a unified Africa. The United Nations projects that by 2100, the African population will increase from 1.2 billion to 4.3 billion people (United Nations Population Division, 2015). This is the largest projected increase in the world (see Figure 2-7, below).

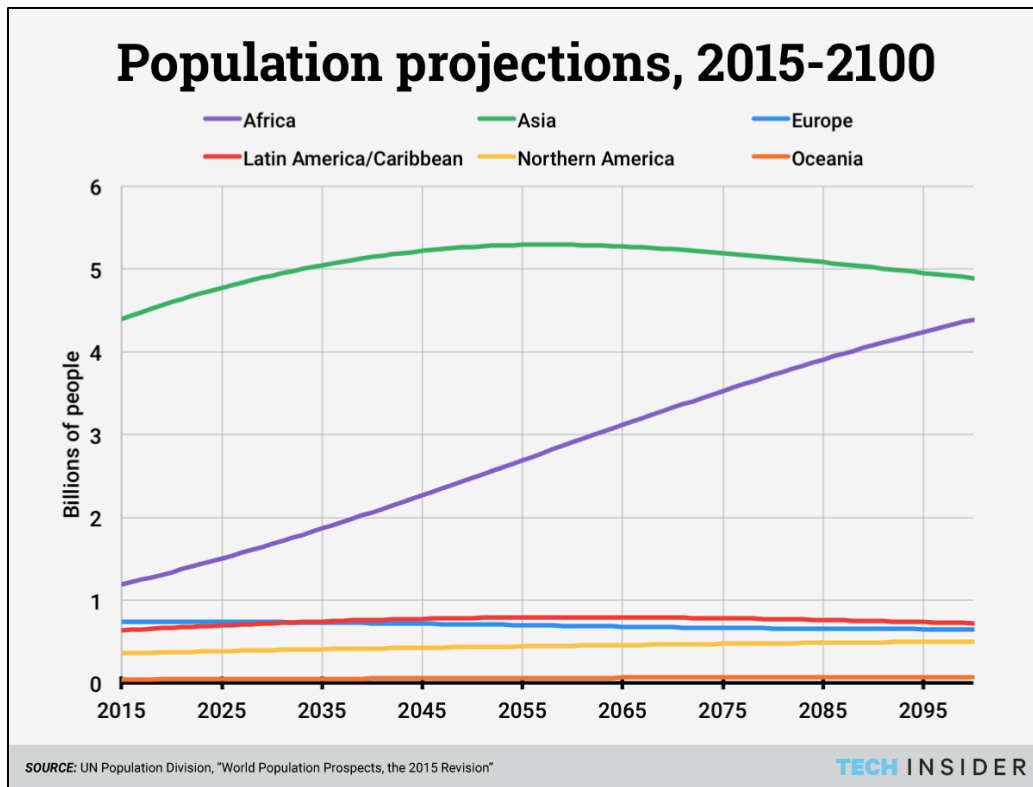


Figure 2-7: World population projections from 2015 to 2100 by continent (United Nations Population Division, 2015)

Reasons for this population boom in Africa include high fertility rates (average number of children per woman), gains in life expectancy, and decreases in child mortality rates (Baer, 2015). As a result of population growth, the energy demands of the continent are increasing. In 2014, a World Energy Outlook report claimed that 620 million people in Africa lived “without access to electricity” (Al-Saffar et al., 2014). This disparity reveals the potential for African countries to adopt clean, renewable, and abundant energies as a method to provide electricity to its citizens. Hosting a Solar Decathlon competition in Africa presents the continent with a unique opportunity to respond to these challenges on a world stage.

Although political and social complexity throughout African countries raise diplomatic issues (Armstrong, 2017), Solar Decathlon AFRICA is also an opportunity for these countries to present a face of unity toward the goal of energy sustainability. These countries will be able to engage in meaningful dialogue regarding the prioritization of adapting to sustainable energy.

Morocco possesses experience in facilitating these type of discussions, most notably hosting the 22nd Conference of the Parties in Marrakech in 2016. Beginning in 1994, the United

Nations Framework Convention on Climate Change (UNFCCC) commissioned meetings called Conference of the Parties (COP) to have countries come together in the effort to mitigate global warming (Matthews, 2012). The UNFCCC has held a conference every year since 1994, and COP21 held in Paris in 2015 captured the world’s attention with the Paris Agreement. This bold initiative aims to limit greenhouse gases and the global temperature increase to under two degrees Celsius, particularly by holding developed countries responsible for reducing their emissions and providing funding for developing countries (Raouf, 2016). Therefore, the steps taken at COP22 were vital to the public’s view towards the feasibility of the Paris Agreement. By successfully hosting the conference, nicknamed the “Action and Implementation” conference, Morocco confirmed their role as a global leader in the climate change arena (Elcano Royal Institute, 2016).

Geographically, Morocco has great potential for success in converting to renewable energy - specifically solar energy. The World Data Center for Meteorology estimates that the global average of annual sunshine hours is 2334 hours (Osborn, 2017), yet many regions of Morocco record around 3000 hours (see Figure 2-8, below).

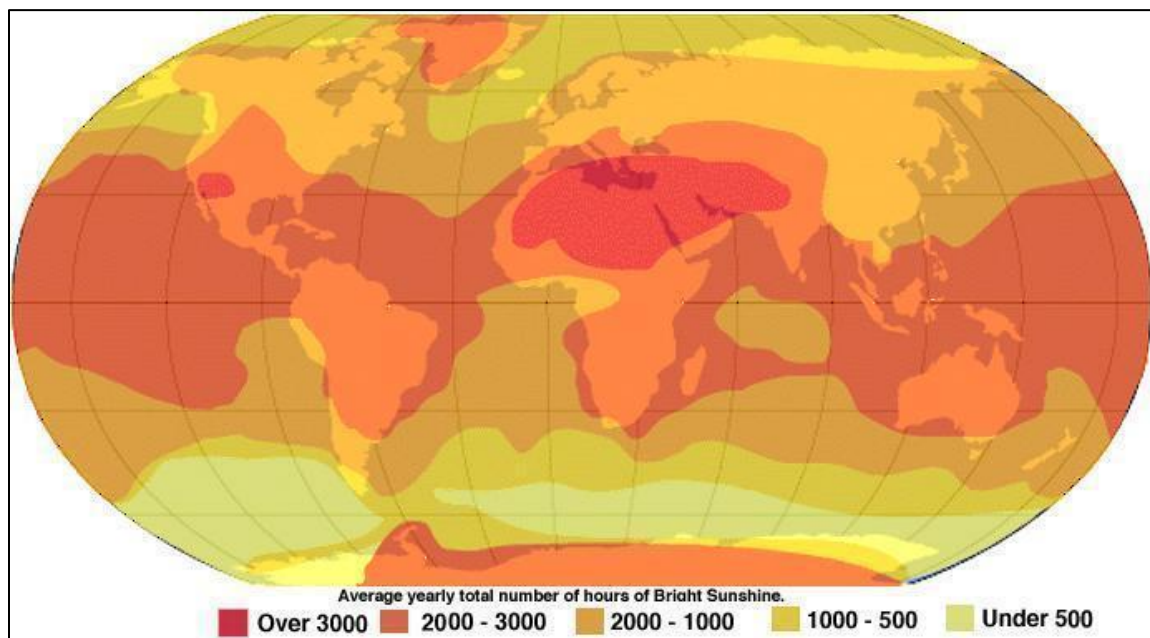


Figure 2-8: World map of annual sunshine hours (Houston Museum of Natural Science, n.d.)

Most notably, the city of Ouarzazate receives an average of 3416 hours of sunshine annually (UNdata, 2010). This level of solar irradiation allows for large energy yield from photovoltaic technology such as expansive solar panel plants. Beyond the logistic feasibility of solar power in Morocco, political and economic factors also contribute to its potential as a global leader in renewable energy.

The Kingdom of Morocco is a constitutional monarchy, and King Mohammed VI is a self-proclaimed leader of reform and social progress. At the young age of 35, he inherited the throne following the death in 1999 of his more rigid father, former King Hassan II (Maghraoui, 2001). King Mohammed VI is particularly enthusiastic about presenting Morocco as a global example for the implementation of renewable energy. The country’s overarching goal is to convert 42% of power resources to renewable energy by 2020, and 52% by 2030 (Gruber et al., 2017). Morocco’s energy infrastructure is conducive to this advancement.

A major distinction between Morocco and other countries in the Middle East and North Africa (MENA) region is that Morocco is “labor abundant” and a “net oil-importer” (see Figure 2-9, below) (Griffiths, 2017).

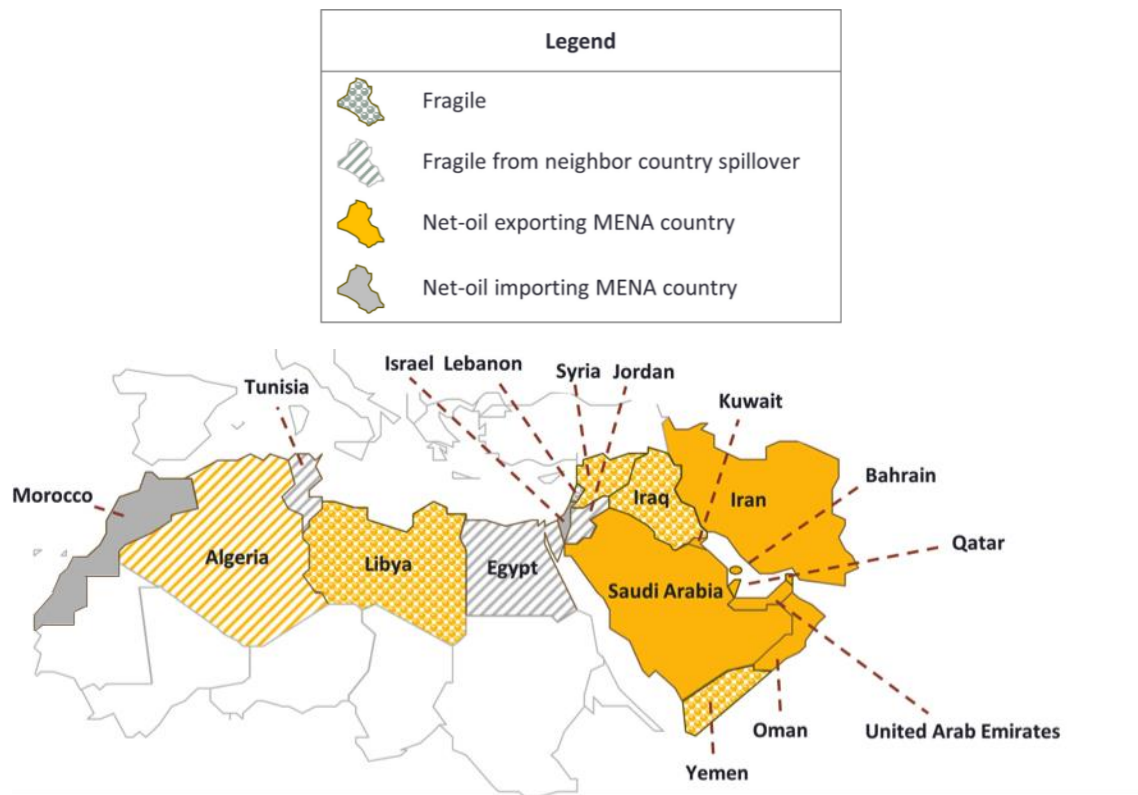


Figure 2-9: Map of some MENA countries displaying oil trade and stability (Griffiths, 2017)

In a 2015 interview with *The Guardian*, Dr. Hakima el-Haite, Moroccan Minister Delegate in Charge of the Environment, explains that 94% of Morocco’s imported energy consists of fossil fuels. This overwhelming dependence on imports results in vulnerability to volatile fossil fuel prices, especially considering the increasing energy demand as population grows (Steinbacher, 2015). One Moroccan official from the Ministry of Energy, Water, and the Environment (MEMEE) claimed, “The energy transition is not a choice, it’s a necessity” (Steinbacher, 2015). Morocco, at the government level, considers moving away from this foreign energy dependence as the number one driving force of renewable energy development.

Morocco demonstrates ideological commitment to the transition to renewable energy, but the country is also making tangible accomplishments toward this effort. The best example is the Noor Power Station in Ouarzazate, which when completed will be the world’s largest concentrated solar power plant (Neslen, 2015). A World Bank Report from June 2017 confirmed that the project is on track financially, and the plant is successfully supplying energy to the Moroccan grid. Eventually, as production rates increase even further, Morocco plans to outsource this energy to areas throughout Europe and the Mediterranean (Moore, 2013). King Mohammed VI’s ultimate goal is to provide renewable energy to Mecca (Neslen, 2016).

These opinions and accomplishments regarding renewable energy are only representative of Morocco at the government level; on-site research was necessary to further analyze the perspectives of Moroccan citizens - their awareness, concerns, and hopes for solar power.

2.4 Stakeholders, Beneficiaries, and Social Relevance

Solar Decathlon events involve large casts of stakeholders. This section identifies the stakeholders of this project and their respective relationship with Solar Decathlon AFRICA 2019. These stakeholders include university students, university faculty, government agencies, and potential industry sponsors. When working on an event of this caliber, it is necessary to consider the effect of the decathlon on the stakeholders. All parties have many opportunities to benefit, including learning experiences, political change catalysts, and local area upbuilding. The following table lists the stakeholders of the Solar Decathlon that are relevant to this project (see Table 2-1, below).

Table 2-1: Identified stakeholders for Solar Decathlon AFRICA 2019

Stakeholder Group	Interest	Assets
University Students	Gaining education and first-hand project experience	Ideas, knowledge, labor
University Faculty/ Administration	Using the Solar Decathlon to bolster curriculum and compliment student work. May also receive grant or research money.	Industry connections, leadership, knowledge
Government Agencies	Supporting solar energy and pushing Morocco toward energy goals	Money, power to change laws and policy, far-reaching communication, expansive networks
Potential Industry Sponsors	Learning more about sustainable technologies, opportunity to advertise and test products, recruit students for employment	Money, connections, power to shape future industry

In the case of the Solar Decathlon AFRICA, university students and faculty on Solar Decathlon teams are the innovators. These innovators aim to make positive advancements in the solar technology and sustainable design fields. Students benefit through their participation by gaining valuable project experience, and the faculty can utilize the involvement to improve curriculum for students (U.S. DOE Solar Decathlon, 2017).

IRESEN needs investors to provide support for niches: markets for sustainable technologies which sponsors subsidize to encourage growth and innovation (Heiskanen, Nissilä, & Lovio, 2015). For the Solar Decathlon AFRICA, the government will be a key player. Government agencies and companies can give funding to demonstrations such as the Solar Decathlon. The Solar Decathlon is an opportunity for the government to further support solar technology development (Griffiths, 2017). Investors may include energy companies, construction and architectural firms, banks, and realtors (Moore & Higgins, 2016). A successful demonstration can promote and legitimize the new technology.

The purpose of the Solar Decathlon is to promote solar technologies and to gain exposure for regional strategies that local communities can adopt. The hope is that public engagement with the models will serve as pilots for new markets (U.S. DOE Solar Decathlon, 2017). Strategic Niche Management (SNM) is a unique approach to the development and incorporation of technologies. The basic principle of SNM is to create a safe space or community to test and run trials on new technologies. Investors are often uncomfortable investing in or exploring a new

technology; the technology needs time to develop and prove itself before investment. Niches provide a collaboration space where innovators feel comfortable making mistakes and trying new strategies to advance the technology (Heiskanen, Nissilä, & Lovio, 2015). For example, to further develop and flourish in the global energy industry, a larger network needs to witness the viability and value of solar technology.

Solar Decathlons provide a platform for showcasing innovative solar technologies. The students drive the competition, the faculty guide the students, and the industry provides the resources to make it all possible. Communicating the objectives and benefits of the Solar Decathlon to these stakeholders is vital to the success of Solar Decathlon AFRICA.

2.4.1 Potential University Involvement

The Solar Decathlon is an international competition, and thus involves universities from many nations and continents. However, since Solar Decathlon AFRICA focuses specifically on the culture and architecture of Africa, involving more African universities will strengthen the competition. Times Higher Education ranked 11 Moroccan universities in the top 200 African universities, showing great potential for Moroccan involvement in the competition (2018). Additionally, Morocco has 332 higher education institutes which include universities and professional training institutes (Morroccodemia, 2016; CA Global Headhunters, 2016). The Moroccan education system operates as follows:

On completion of the secondary school program (baccalaureate/higher secondary certificate), students can pursue their studies in many open-access higher education institutions. They are, however, required to have high baccalaureate grades and take an entrance exam to attend limited-access institutions. Higher schools (*grandes écoles*) require a further two years of preparatory classes, on top of a secondary-school diploma, for admission. As for private and privately-run higher education institutions, students may be required to sit for an entrance exam/interview, as well as pay registration and scholarship fees. (Morroccodemia, 2016).

These institutes and universities are broken into eight categories (see Table 2, below) (Morroccodemia, 2016).

Table 2-2: Details on higher education institutes in Morocco (modified from Moroccodemia, 2016)

Number in Morocco	Type of Institute	Controlling Department	Penetration Level
12	Public Universities	Ministry of Higher Education	Open + Limited Access
1	Public Universities	Run by Other Ministries	Limited Access
53	Public Faculties, Schools and Institutes	Ministry of Higher Education	Open Access
37	Public Faculties, Schools and Institutes	Ministry of Higher Education	Limited Access
26	Public Faculties, Schools and Institutes	Run by Other Ministries	Limited Access
2	Privately-run Universities	Private	Private Access
5	Private Universities	Private	Private Access
196	Private Faculties, Schools and Institutes	Private	Private Access

The Solar Decathlon does not limit participation to a type or discipline of institute or university (Solar Decathlon AFRICA Request for Proposals, 2018). For example, Middlebury College, a private liberal arts college located in Middlebury, Vermont, USA competed in Solar Decathlon 2011 and 2013. In 2011, Middlebury placed 4th overall and first in three of the contest categories (U.S. DOE Solar Decathlon, 2017). All centers for education can take a part in Solar Decathlon AFRICA.

2.5 Relevant Case Studies

To better understand how to best develop a promotional strategy and increase the impact of the Solar Decathlon in Morocco, the project team evaluated two case studies that featured some of the lessons learned from hosting global events. First, the team compared two building

demonstration projects to explore which factors led to greater success. Second, the team investigated promotional strategies used at the Solar Decathlon China in 2013.

Case 1. Technology Demonstration Projects

Luuku House

In 2010, a Finnish university team designed the Luukku house to compete in the Solar Decathlon Europe. The team needed money for the material and construction costs of the project, so they turned to public funding bodies. A public funding body is a public entity with resources that a group can utilize to assist in developing their entry. A Finnish Innovation Fund, Sitra, was one of the major funding bodies that assisted the team. Sitra became actively engaged in the project and learned about the possibilities of solar technology. After the house ranked first in the Architecture category of the Solar Decathlon, Sitra witnessed firsthand the incredibly positive media attention that the house attracted both to itself and to all of Finland. After the Solar Decathlon, Sitra decided to launch its own project with the aim of tearing down legal and market barriers currently inhibiting solar energy in Finland (Heiskanen, Nissilä, & Lovio, 2015). This example showcases how a successful demonstration can engage and teach its stakeholders the value of a new technology. A university team alone cannot change the entire energy industry, but several affluent organizations working together can begin to create change.

Nicholson Development

If a demonstration project fails to advertise to key stakeholders, it may have little impact on the uptake of new technologies into the mainstream industry. The Nicholson development in Melbourne Australia is an innovative apartment and retail complex built in 2011. The development has a very high energy efficiency rating, incorporates solar technology, and maintains a below market-average cost.

At the time of its construction, the developers imagined that this project would serve as a model for the industry. While the physical Nicholson development was certainly a success, the envisioned impact on the building industry seemed to fall short (Moore & Higgins, 2016). A study by Trivess Moore and David Higgins gathered opinions on the Nicholson project from 14 key industry stakeholders in and around Melbourne. Most of the stakeholders agreed that environmental sustainability was the morally right direction to pursue. However, they also

believed the market did not value sustainability and therefore pursuing sustainability was not always the best decision economically. Some stakeholders noted that if the value of environmental sustainability increases in the eyes of the market and consumers, then it will be easier for industry investors to pursue new environmental technologies (Moore & Higgins, 2016). Most stakeholders were unaware that the Nicholson development was able to maintain competitive pricing while incorporating many new sustainable technologies. These interview results show that the developers of the Nicholson project did not effectively communicate the successes of the project to most stakeholders. As a result, the Nicholson project had a small impact on the Australian building industry's impressions of sustainable design.

The Luuku project was more successful because the team contacted and engaged interested companies in the project early on. The Nicholson development was an innovative building, but the project leaders did not inform relevant stakeholders of the project's novel ideas. Stakeholder communication proved to directly influence the level of impact each project had. When participants directly involved in the Luuku project conveyed the project outcomes to the entire community, there was a larger effect on the building industry. These outcomes from the Luuku house helped to prove and legitimize new technologies. The project showcased tangible evidence of successful net-zero energy operation to a large audience. In the Luuku project, the government played a large role in assisting with the spread of information and also provided additional support after the completion of the project (Heiskanen, Nissilä, & Lovio, 2015). These two case studies showcase the importance of communication on large scale demonstration projects.

Case 2. Solar Decathlon China 2013

The city of Datong hosted China's first Solar Decathlon from August 2-13, 2013. The event hosted "37 universities and more than 1,000 university students from 13 countries [taking] part in the integral design and manufacturing process," including a team of Worcester Polytechnic Institute (WPI) students (Solar Decathlon China, 2016a). Despite 90°F temperatures during the opening weekend, the Solar Decathlon China had double the attendance of any previous U.S. and European Solar Decathlons, attracting 54,000 visitors (U.S. DOE Solar Decathlon, 2017).

Solar Decathlon China achieved record-breaking attendance through vigorous advertising. The organizers of the competition placed advertisements on television, radio, and banners around the local area (Van Dessel, personal communication, November 6, 2017). This increased the public awareness of the competition, thus increasing the number of potential visitors. To further encourage public attendance, the city created four new bus lines dedicated specifically to bringing people to the competition location (Solar Decathlon China, 2016b).

To get the 37 participating universities involved, the organizers primarily used online promotional material. The official Solar Decathlon website, hosted by the U.S. Department of Energy, has a page dedicated to each of the competitions located abroad. On this page the organizers laid out general information about where and when the competition would be taking place, as well as a link to their own website for more information. This separate website contained all details pertaining to the competition for both participants and the general public. WPI initially learned about the 2013 competition from these websites. The information provided on the website encouraged WPI to create a team and submit a proposal. After the host selected the WPI team, the website was critical in staying up to date with requirements and deadlines throughout the competition (Van Dessel, personal communication, November 6, 2017). Although our project team believes additional factors led to this success, the organizers of Solar Decathlon China removed the main website that typically contains this information.

China's preparation and extensive promotional strategies for Solar Decathlon China in 2013 resulted in record breaking attendance and a positive experience for the WPI team (Van Dessel, personal communication, November 6, 2017; U.S. DOE Solar Decathlon, 2017). The promotional strategy of this competition can serve as a model for future decathlons, including Solar Decathlon AFRICA.

2.6 Literature Review Summary

In summary, the current literature reveals five key points that have informed our work in Morocco. First, detailed documentation exists regarding past Solar Decathlons. Sifting through this information was vital in understanding the scope of a Solar Decathlon competition. The sponsor profile of IRESEN revealed a pre-existing network of industry and government contacts and previous experience in sustainable energy development. Background regarding the geopolitical context of Morocco and Africa demonstrated a unique opportunity for Africa to come

together under the leadership of Morocco. The stakeholder analysis explored the relationships between all relevant parties and the benefits of participation. The case studies highlighted the importance of communication, organization, and advertising. This literature review aimed to further the project team's understanding of these issues. The project team used the findings to assist IRESEN in the design and development of a communication strategy. The next section outlines in detail the team's process of implementing and assessing this strategy.

3. Methodology

The goal of our project was to implement and assess an inclusive promotional strategy for Solar Decathlon AFRICA. To complete our goal, our three objectives were as follows:

1. Identify the advantages of participation in the Solar Decathlon from the perspective of past participants
2. Gauge current interest of potential participants in Solar Decathlon AFRICA
3. Evaluate and modify the online platform for potential participants to express interest in and obtain information about Solar Decathlon AFRICA.

To accomplish these objectives, we collected data utilizing archival research, interviews, presentations, and surveys. We gathered information from a sample of past and potential participants including university students and faculty. The flowchart below shows the project team’s goal, objectives, methodologies and analysis or deliverable (see Figure 3-1, below).

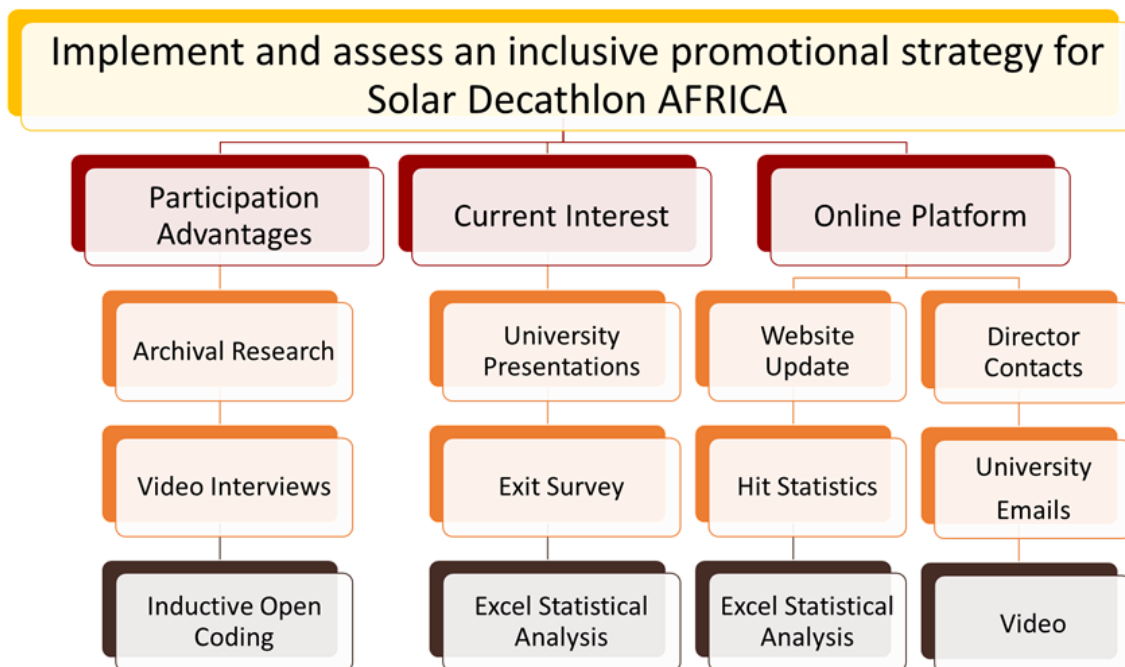


Figure 3-1: Flowchart of the project team’s goal, objectives, methodologies, and analysis or deliverable

This chapter outlines the strategies for each objective in detail.

3.1 Identifying Participation Advantages

The first objective was to identify the advantages of participation in the Solar Decathlon from the perspective of past participants. The team used archival research and interviews to collect data and used open inductive coding to analysis the data.

3.1.1 Archival Research – Blogs and Impact Report

The project team first conducted archival research of existing sources which discuss the impacts of the Solar Decathlon on past participants. Solar Decathlon teams often create blogs for the competition to document their project experiences. Using these blogs as primary sources, the team research identified both challenging and rewarding moments for the participants.

This investigation also utilized secondary sources which provided information regarding the impacts of the Solar Decathlon. In 2012, the DOE commissioned Lockheed Martin to conduct the “Impact Evaluation of the U.S. DOE’s Solar Decathlon Program.” This report contains extensive data comparing 334 former Decathletes with groups of non-Decathlete students (Barnes, 2012). The report considered points such as “learning from the Solar Decathlon compared to regular coursework,” “preparation of Decathletes to enter the clean-energy workforce,” and “impact of participation in a Solar Decathlon on getting a job in the clean-energy workforce” (Barnes, 2012). The in-depth analysis of this data, combined with rigorous statistical methods, is a comprehensive summary of the impacts of Solar Decathlon participation.

3.1.2 Past Participant Interviews

To supplement the research from these sources, the project team conducted eight semi-structured video interviews with participants of prior Solar Decathlons. Before arriving in Morocco, the project team only planned to interview members from the BEMANY team who competed in 2013 Solar Decathlon China. The BEMANY team consisted of students and advisors from Ghent University in Belgium, New York University Polytechnic Institute and Worcester Polytechnic Institute (WPI team finishes strongly, 2013). This was a convenience sample of all past participants of the Solar Decathlon. Professor Van Dessel from WPI provided a list of team members, and we contacted all of these past participants requesting a 15-minute

video interview. After arriving in Morocco, the team sent out requests for interviews to the lead advisors of the Solar Decathlon 2017 competition teams. Four advisors responded to this email and the team was able to conduct three additional interviews. During each interview, the team asked questions regarding how the past Solar Decathletes got involved in the competition, what their main motivations for participating were, and how involvement in the Solar Decathlon has impacted their life - both professionally and culturally. The interviewers also asked about the time commitment involved in participating, as this is an important point of consideration for potential participants. During the semi-structured format, the interviewees were able to expand on any answers and talk open-endedly about the experiences they felt had the most impact (see Appendix A).

3.1.3 Inductive Open Coding

In order to summarize the archival research and interview responses, the team executed inductive open coding. Inductive open coding is a method of coding in which the investigator identifies key topics based on the content of the responses following an interview. From the topics, the investigator is able to identify recurring trends in responses that develop a final grounded theory of the study (Fade & Smith, 2011).

First, the project team transcribed the eight interviews verbatim and combined these transcripts with dialogue from past Solar Decathlon blog posts. Reading through all of the raw text, the team determined nine categories that encompassed all responses: learning/skills, career influences, worldview/cultural influence, sustainability influence, praise, suggestions, exposure, motivation, and travel. The team assigned a color to each category and highlighted the compiled document of interview transcript such that each response matched the appropriate category (see Appendix D and Appendix E). If responses fell into multiple categories, the project team sectioned each sentence into the appropriate category. The team created an Excel spreadsheet to organize the data (see Appendix G). The spreadsheet contained one sheet for each category with the relevant text from each participant. Next, the project team summarized each section of text in a few words or short phrases. Comparing the summaries side-by-side, the team considered similarities and differences in all of the responses for each category. Ideas that were similar across all respondents emphasized certain aspects of participation and allowed the investigators to draw conclusions from the interviews. Differences between interviewee responses indicated

some uncertainty and inconclusiveness regarding those subjects, and the team could not draw conclusions from those ideas.

This information was helpful for the development of the Solar Decathlon AFRICA website and university presentations (the next two sections of the methodology outline these two components of the project). The results from these methodologies provided insight concerning how to advertise the competition, and helped our team determine which aspects of the Solar Decathlon are the most appealing to potential participants. Other general information from the archival researched was useful during question and answer portions of university presentations.

3.2 Gauging Current Interest

The second objective was to gauge the current interest of potential participants in Solar Decathlon AFRICA. The team assessed Moroccan students' reactions following a presentation about Solar Decathlon AFRICA to accomplish this objective.

3.2.1 University Presentations

In order to gauge interest directly from Moroccan students, the project team designed and delivered four presentations about Solar Decathlon AFRICA at various universities around the country. The team designed the presentation by incorporating the archival research as well as the interview responses from the 2013 and 2017 participant responses. Including audio and video clips of these past Solar Decathletes speaking of their experience provided students with powerful first-hand accounts of participation. The presentation also included basic information about Solar Decathlon AFRICA such as the emphasis on African architecture and local materials. The goal of the presentation was to answer the following five questions for students:

1. What is the Solar Decathlon?
2. Why is it interesting?
3. How does it work?
4. What is unique about Solar Decathlon AFRICA?
5. Why should I participate?

To select which universities to visit, the team collaborated with IRESEN and WPI Professor Tahar El-Korchi to take a convenience sample of all of the universities in Morocco. The project team initially attempted to choose universities based on strong engineering or architecture departments and previously expressed interest, but ultimately the project team, with the assistance of IRESEN and Professor El-Korchi (WPI), determined the most feasible one-week travel schedule. The project team scheduled visits with the relevant department heads at each university, and these faculty members became responsible for inviting students to the event.

In order to gauge the interest level of the students at these presentations, the investigators first queried the faculty members about the number of invitees and then recorded the number of actual attendees. Following the presentation, the team administered an exit survey (in French and English) to every student to assess their subject of study, year at university, prior knowledge of Solar Decathlon AFRICA, and level of interest after seeing the presentation (see Appendix B). To accurately collect this data while simultaneously delivering the presentation, two team members presented to the students while the other two recorded attendance and noted audience reactions. After the presentation, the pair that delivered the presentation passed out the exit surveys, while the other pair addressed questions from the audience. One team member took notes of student questions and reactions during the question-and-answer period. The same two members delivered all of the presentations and used the same script for all presentations; this method allowed for consistency in the delivery of the presentation.

3.2.2 Analyzing Survey Results

Since the exit survey consisted of multiple choice and fill-in questions, the responses yielded primarily quantitative data. The project team entered the results of each exit survey into an Excel sheet such that each row corresponded with one student and each column corresponded with one survey question (See Appendix H). In order to analyze the qualitative data such as the student's major, the project team translated French responses into English. The results chapter illustrates the students' levels of interest across different demographics utilizing multiple-bar graphs and pie charts.

3.3 Evaluating and Modifying the Online Platform

The third objective of the project was to evaluate and modify the online platform for Solar Decathlon AFRICA.

3.3.1 Modifying the Official Website

IRESEN initially launched the official website on December 29th, 2017 with the release of the Request for Proposals, but organizers of Solar Decathlon AFRICA felt that the website did not accurately represent the heritage of the continent - specifically the logo and the color theme of the website (see Figure 3-2, below).



Figure 3-2: Old Solar Decathlon AFRICA logo

The project team collaborated with IRESEN in editing the competition website to better represent the heritage and architecture of Africa. The new colors and images on the website include more African aesthetics and the modified layout aims for a cleaner feel for the user. In addition to these changes, the project team added an architecture page on the website that discusses the incorporation of African architecture and cultural heritage into the houses for Solar Decathlon AFRICA.

3.3.2 Analyzing Website Traffic Trends

Lastly, the website modification included installing a hit counter on the website to monitor visitor traffic in the weeks leading up to the registration deadline. The team utilized the “WP Statistics” plugin on WordPress in order to track the number of unique visitors, the countries they came from, and the number of webpage visits each day. Monitoring the number of visitors each day identified trends in activity. All data collected on the website was from the WP Statistics WordPress plugin and entirely quantitative. The team entered both the number of visitors and the number of pages opened for each day into an Excel spreadsheet, and created a line graph illustrating the general traffic trends over the measured period. This information gauges the effectiveness of the project team’s efforts to promote the competition both online and via presentations. Using this data, the team also created a line graph illustrating the average number of pages opened by each visitor per day. The project team used this metric to assess the interest level of website visitors in the competition. The team’s hypothesis was that a visitor who was more interested would open more pages to learn about Solar Decathlon AFRICA.

3.4 Data Management

The project team did not require translators for the past participant interviews. Most IRESEN employees and university members speak English. However, since English is not the first language of many students, the project team translated the presentation slides and exit survey into French. Available professors at the four universities assisted with translation during the question-and-answer portion of the presentation. The team spoke slowly, enunciated clearly, and tried to avoid slang during all interviews and presentations. Additionally, the presentations included as many visuals as possible to increase audience understanding.

3.5 Gantt Chart

The team kept an updated calendar of the eight weeks in Morocco that kept the data collection and analysis on schedule (Project Management Research, 2016) (see Table 3-1, below).

Table 3-1: Gantt chart

Calendar	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8
	1/7-1/13	1/14-1/20	1/21-1/27	1/28-2/3	2/4-2/10	2/11-2/17	2/18-2/24	2/25-3/3
Archival Research		■	■	■	■	■		
Update Website		■						
Past Participant Interviews		■	■	■	■		■	■
Prepare University Presentation				■	■	■	■	
Presentation with Exit Survey						■	■	
Video Creation					■	■	■	■
Analysis & Final Report					■	■	■	■

4. Data and Analysis

The project team analyzed data collected from archival research, interviews, and surveys in order to implement and assess an inclusive promotional strategy for Solar Decathlon AFRICA.

4.1 Advantages in Participation

The first three weeks of the project involved identifying the advantages of participation in the Solar Decathlon utilizing archival research and past participant interviews.

4.1.1 Team Website and Blog Findings

The team identified two key online sources that provide a comprehensive picture of the impact of participation for past Solar Decathletes: team blog posts and an impact evaluation report of the Solar Decathlon.

As one component of the Solar Decathlon competition, the market appeal contest requires participating teams to launch a website dedicated to their house and building process. This development of an online platform falls under the communications contest and is utilized by the teams to “engage online audiences” (U.S. D.O.E. Solar Decathlon, 2017). The project team used these websites from past Solar Decathlon teams to gather qualitative data about their journeys. The team found quotes from the following four sources (see Table 4-1, below):

Table 4-1: Archival research sources

Name	Team Name, Competition
Malin Kempe Svensson, Malin Kjellberg	HALO, Solar Decathlon China 2013
Dan Brouillette, Linda Silverman	(Organizers), Denver 2017 Opening Ceremony
Tom Nelson	Virginia, DOE Solar Decathlon 2002
Pablo Moyano	Wash U, DOE Solar Decathlon 2017

Section 4.1.3 discusses the coding results of the quotes in these sources. For the full sources, see Appendix E.

4.1.2 Lockheed Martin Impact Evaluation Report Findings

The other major source of information detailing the impact of participation for past Solar Decathletes was the report commissioned by Lockheed Martin titled “Impact Evaluation of the U.S. Department of Energy’s Solar Decathlon Program.” The goal of this report was to determine if the Solar Decathlon program is successfully carrying out their stated objectives for the competition. The report focuses on the objectives involving homeowners representing “energy end users” stakeholders and past Solar Decathletes representing university stakeholders (Barnes, 2012). For the purpose of this project, the team focused solely on the evaluation of the following Solar Decathlete objectives:

1. “Educate participating students about the many cost-saving opportunities presented by clean-energy products”
2. “Provide participating students with training that prepares them to enter the nation’s clean-energy workforce” (U.S. D.O.E. Solar Decathlon, 2017).

To quantitatively measure the success of these objectives, the investigators developed surveys for a sample of 250 past Solar Decathletes from 2002-2009 (Barnes, 2012). The project team agreed that these metrics of participation impact would successfully identify advantages that could be attractive to potential students.

The first self-reported measure of participation impact compared the learning experience of the Solar Decathlon with standard classwork regarding solar energy and energy efficiency. Investigators asked past Solar Decathletes to “Please rate how much more you learned about using solar energy and energy efficiency for homes from your Solar Decathlon experience than you would have learned just from taking your regular college courses” (Barnes, 2012). They chose from five responses shown in the following graph from the report (see Figure 4-1, below):

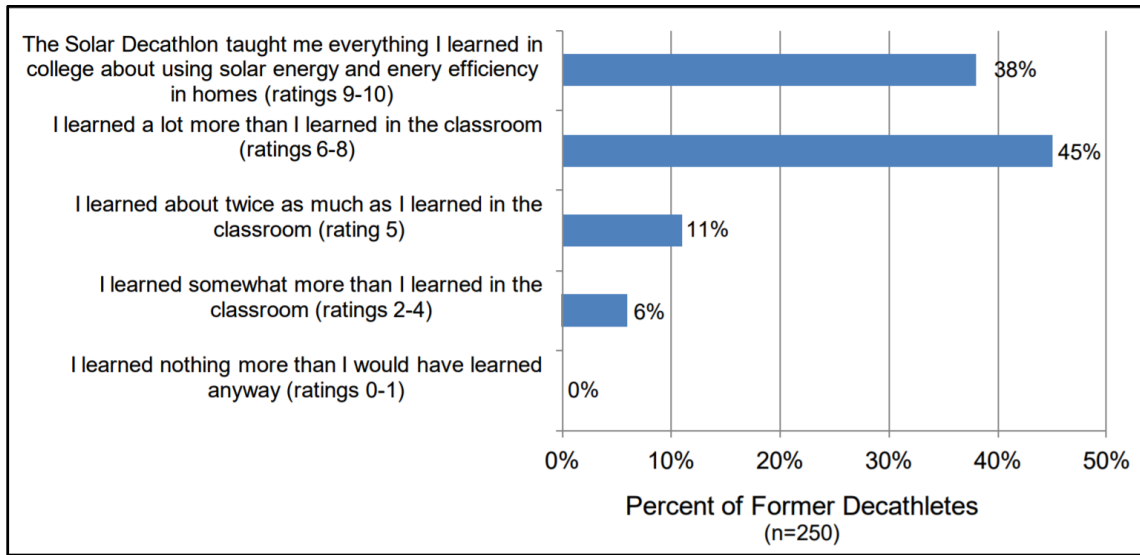


Figure 4-1: Graph taken from the Lockheed Martin report depicting the responses from 250 past Solar Decathletes when asked how their Solar Decathlon experience compared to standard classroom learning (Barnes, 2012)

As can be seen in the graph, past Solar Decathletes most frequently answered “I learned a lot more than I learned in the classroom,” followed by “The Solar Decathlon taught me everything I learned in college about using solar energy and energy efficiency in homes.” The main result is that 94% of past Solar Decathletes believe that they learned more about energy efficiency from participating in the Solar Decathlon than from standard classroom learning (Barnes, 2012).

Another metric that the team felt potential participants would consider significant was the impact that the Solar Decathlon experience had on the participants’ careers. The investigators of the report measured this impact in the survey by asking past Solar Decathletes to “Please rate how much your Solar Decathlon experience helped you get a job after graduation” (Barnes, 2012). In order to eliminate possible bias in this question, the Lockheed Martin investigators divided the past Solar Decathletes into two groups: those who held a job in the clean-energy field and those who held a job in a non-clean-energy field. The following graphs show their respective responses (see Figure 4-2 and Figure 4-3, below):

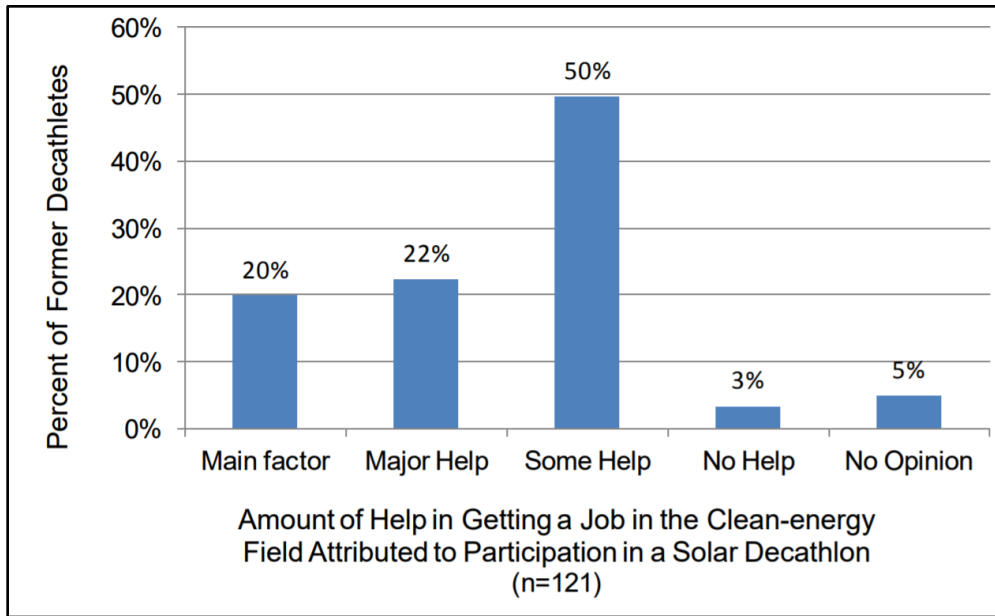


Figure 4-2: Graph depicting the responses of 121 past Solar Decathletes with jobs in the clean-energy field when asked how much help their Solar Decathlon experience helped them get that job (Barnes, 2012)

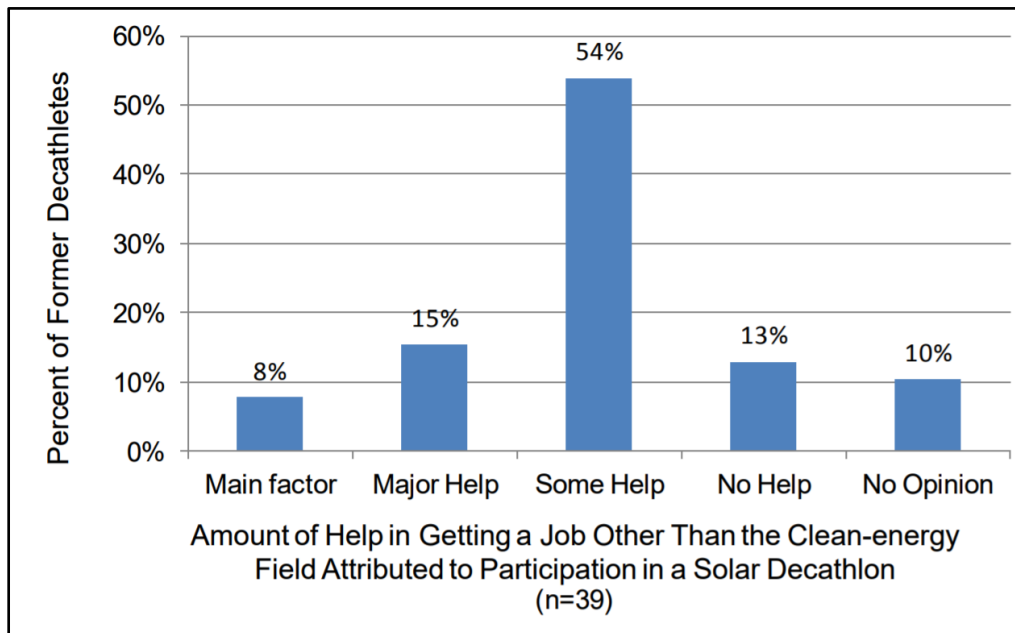


Figure 4-3: Graph depicting the responses of 39 past Solar Decathletes with jobs in non-clean-energy field when asked how much help their Solar Decathlon experience helped them get that job (Barnes, 2012)

Within both clean-energy and non-clean-energy fields, the majority of past Solar Decathletes believe that their experience in the competition helped them get a job. The graphs

demonstrate that 92% of past participants holding a job in the clean-energy field, and 77% of past participants in a non-clean energy field, claimed that their experience helped them get that job.

The conclusion of the impact evaluation report declares that the Solar Decathlon program has been successful in achieving its proposed objectives: 43 of the 49 metrics used to test the objectives confirmed success, and the remaining 6 were inconclusive (Barnes, 2012). While this conclusion does not specifically speak of advantages for participants, it is grounded evidence that the general model of the Solar Decathlon is successful.

4.1.3 Past Participant Interview Results

The project team initially contacted the 15 members of Team BEMANY (19 total provided by Professor Van Dessel) that were available on Facebook. Of these 15, eight responded, and five members were able to schedule interviews or answer our questions via email. Due to this non-response rate, the team decided to also contact the lead members of the 11 teams from the most recent Solar Decathlon held in Denver in 2017. The project team received three responses and the team scheduled an interview with one faculty member. Overall, the project team conducted interviews with eight past participants of a Solar Decathlon competition (see Table 4-2, below):

Table 4-2: Past Solar Decathlon participant interviewee list

Name	Interview Type	Solar Decathlon	Team, University
Tim Van Parys	Video	China 2013	BEMANY, UGhent
Briana Wiesberger	Video	China 2013	BEMANY, WPI
Rebecca Eaker	Email	China 2013	BEMANY, NYU Poly
Melody Wang	Video	China 2013	BEMANY, WPI
Dick Co	Audio	Denver 2017	Enable, Northwestern
Charlot Tanghe	Email	China 2013	BEMANY, UGhent
Margarita Espinos	Email	Denver 2017	Swiss Team, unknown
Margaux Peltier	Email	Denver 2017	Swiss Team, unknown

The full transcript is in Appendix D. The following table displays the inductive open coding results for the interview responses as well as quotes from the blogs discussed in section 4.1.1 (see Table 4-3, below):

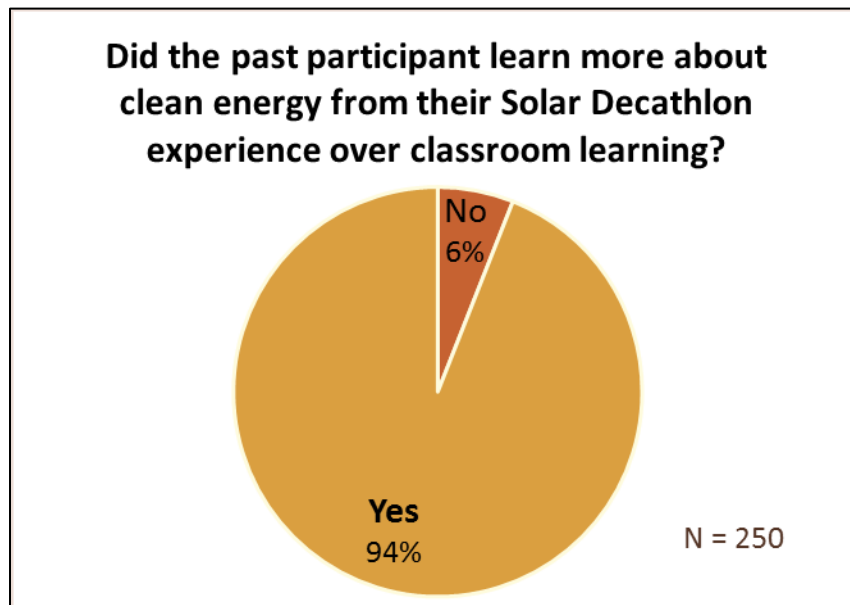
Table 4-3: Interview responses summarized by inductive open coding

Category	Comments about Solar Decathlon experience	Number of Citations
Learning/ Skills	<ul style="list-style-type: none"> ● Learned project management and organization ● Learned about social skills ● Learned how to build practically ● Learned collaboration and teamwork skills ● Learned how to stay flexible 	23
Relationships	<ul style="list-style-type: none"> ● Created international friendships ● Learned about different cultures 	9
Career Influence	<ul style="list-style-type: none"> ● Helped me get my job ● Played a key role in career path ● Used experience as talking point in interviews 	13
Worldview/ Cultural Influences	<ul style="list-style-type: none"> ● Learned to communicate with people from different cultures ● Discovered different perspectives and ways of doing things 	14
Sustainability Influence	<ul style="list-style-type: none"> ● Influenced to integrate sustainability into future homes ● Helped understand sustainable design as achievable 	13
Suggestions	<ul style="list-style-type: none"> ● Make people understand what the Solar Decathlon is ● Keep team members constant ● Work to understand local culture ● Address lack of time/funds by modifying traditional structure ● Have only one/two teams actually build houses, first competition is just designs 	20
Exposure	<ul style="list-style-type: none"> ● Driven by professor ● Worked physically next to the team ● Heard from industry networks 	16
Motivation	<ul style="list-style-type: none"> ● Attracted by tangible, hands on project 	10
Travel	<ul style="list-style-type: none"> ● Major selling point of participation is traveling 	8

4.1.4 Summary of Key Advantages

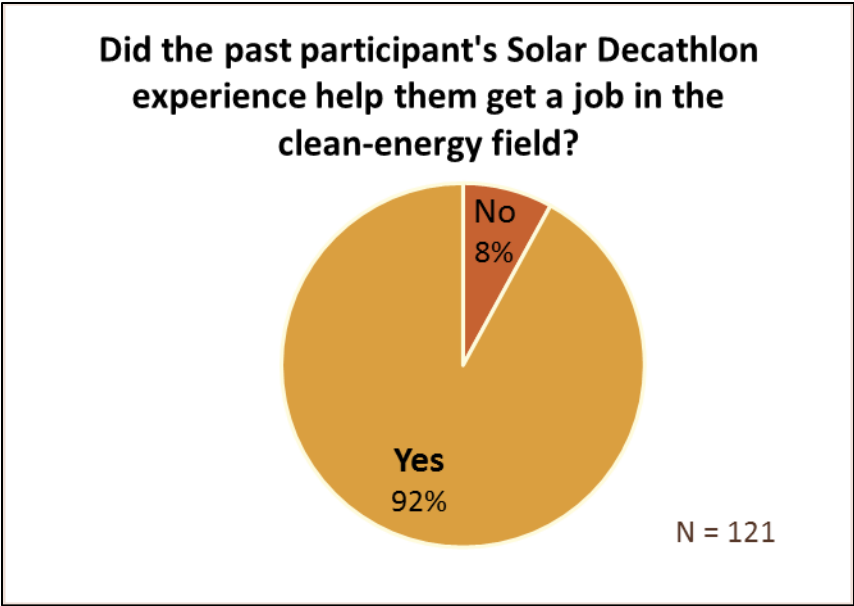
Benefit categories commonly cited by past participants were learning/skills and career influence. Every comment made by participants in these categories was positive. Therefore, these results demonstrate that participating in the Solar Decathlon has a positive impact on education and career development - two points of focus for college students. In addition to the coding, there were some poignant quotes from the interviews which the project team chose to use in the university presentation. Rebecca Eaker said “it is the best learning tool I have ever found in school... this experience is a once in a lifetime experience” and Briana Weisgerber said “...it’s doable, and I think that it totally changes your perspective, cause you’re like ‘whoa, why do I pay energy bills?’”

The team subsequently focused on the following statistics from the archival research. Using the Lockheed Martin Impact Report, the team found the following statistics (see Graph 4-1, below):

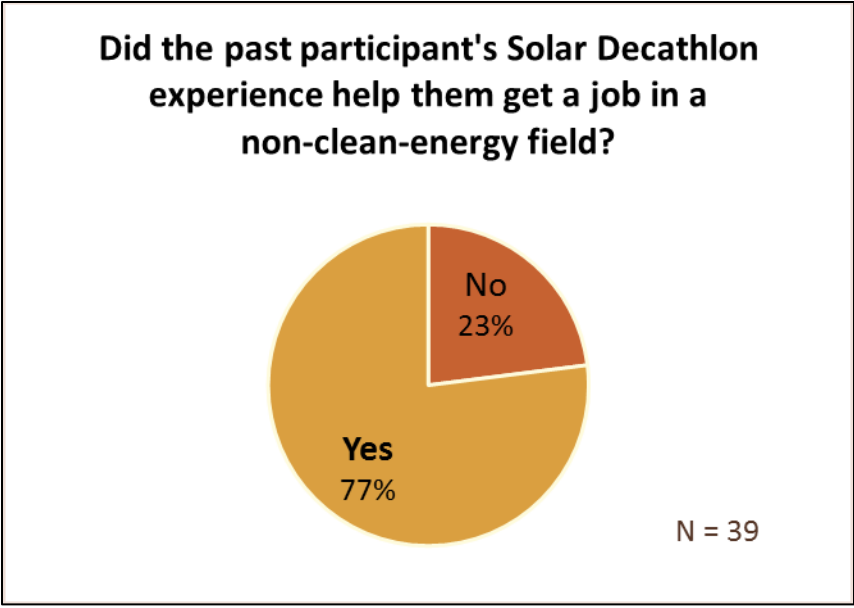


Graph 4-1: Pie chart describing the percentage of past participants that claim they learned more from their Solar Decathlon experience than regular classroom learning (modified from Barnes, 2012)

Presenting this result to potential participants of Solar Decathlon AFRICA relayed the idea that the Solar Decathlon experience significantly advances student learning beyond the classroom (see Graph 4-2 and Graph 4-3, below).



Graph 4-2: Pie chart describing the percentage of past participants that claim their Solar Decathlon experience helped them get a job in the clean-energy field (modified from Barnes, 2012)



Graph 4-3: Pie chart describing the percentage of past participants that claim their Solar Decathlon experience helped them get a job in a non-clean-energy field (modified from Barnes, 2012)

Considering the challenge of unemployment in Morocco, the team believes that the positive career statistics presented in the previous two figures were particularly significant for Moroccan college students looking to enter the workforce (Da Silva, 2017).

4.1.5 Key Challenges

Throughout the course of the project research about past Solar Decathlons and participants, the team identified several key challenges that most often deter competition teams from participating or succeeding. Most of these challenges stem from a lack of time and financial resources. Of all previous Solar Decathlons and of those in planning, Solar Decathlon AFRICA has the shortest timeline from team selection to final competition by six months (U.S. DOE Solar Decathlon, 2017). Additionally, each team will receive 50,000 USD in Solar Decathlon AFRICA. For reference, in Solar Decathlon Denver 2017, the organizers granted each university team 100,000 USD and only 11 of the 14 chosen teams were able to complete their house for the competition (U.S. DOE Solar Decathlon 2017 Rules, 2017). Lastly, the team expects that the five Solar Decathlons planned in the next two years reduces the number of universities available for Solar Decathlon AFRICA.

4.2 Assessing Current Interest using University Presentations

During the sixth week of the project, the project team delivered university presentations, administered in-person exit surveys, and sent a video presentation to international universities. Sample slides from the university presentation are displayed below (see Figure 4-4 and Figure 4-5, below). Appendix F contains the full presentation with speaker notes.



Figure 4-4: A sample slide from the university presentation

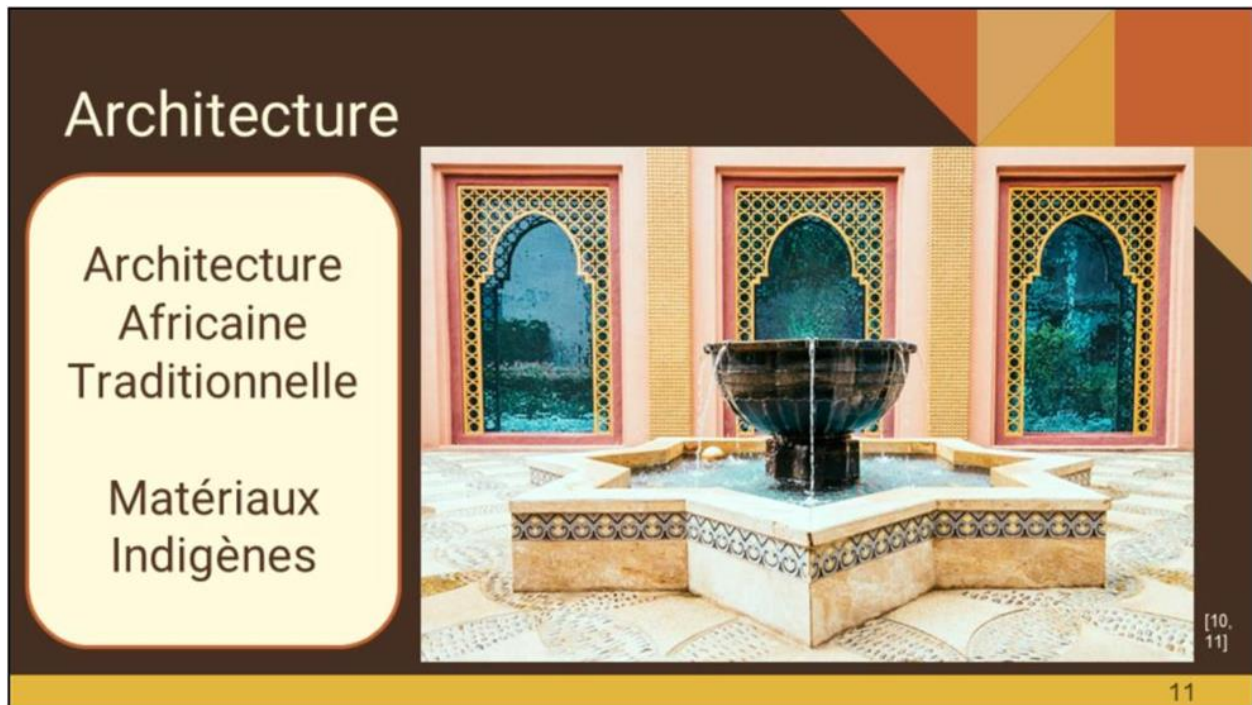


Figure 4-5: A second sample slide which explains the architecture contest

The itinerary of the university visits was as follows (see Table 4-4, below):

Table 4-4: University presentation itinerary

Abbreviation	University	Location	Date
ENSAM	Ecole Nationale Supérieure d'Arts et Métiers	Meknes	Mon, 12 Feb 2018
ESITH	École Supérieure des Industries du Textile et de l'Habillement	Casablanca	Tues, 13 Feb 2018
Mundiapolis	Mundiapolis University	Casablanca	Tues, 13 Feb 2018
INAU	Institute National D'aménagement Et D'urbanisme	Rabat	Thurs, 15 Feb 2018

4.2.1 ENSAM, Meknes

On February 12, the project team traveled to Meknes to visit ENSAM - Ecole Nationale Supérieure d'Arts et Métiers, or in English, the National School of Arts and Crafts. ENSAM is one of the schools that make up the University of Moulay Ismail. In talking to the Dean and other faculty at the school, the team learned that ENSAM is an extremely prestigious engineering school with an acceptance rate of 2% (approximately 15,000 applicants and 300 accepted students). The faculty also informed the team that students first complete two years of general education (mostly math and physics) and then begin a three-year engineering cycle. Professor Ibrahim Salhi conducted a tour of the school, and he informed ENSAM students of the upcoming presentation by allowing the project team to introduce themselves at three classes in session. Subsequently, the team presented to approximately 80 students and 20 faculty in the school's large conference room (see Figure 4-6 and 4-7, below).



Figure 4-6: The project team presenting at ENSAM in Meknes, photo taken by Fatima Benattou



Figure 4-7: Students from ENSAM that attended the presentation, photo taken by Fatima Benattou

Although every ENSAM student must take English courses, Professor Salhi informed the project team that students and faculty feel more comfortable speaking technically in French. Therefore, an English professor from the school was available to translate the question-and-answer session following the presentation. The faculty members were particularly engaged and one even questioned the morality of the competition considering many renewable energy technologies contain toxic materials. The team explained that the competition is an opportunity for universities to present solutions to this toxicity issue, and the jury will either reward or penalize competition teams depending on how they address it. The project team feels that the presence of engaged faculty at these presentations bodes well for the school’s likelihood of participating. Many of the students expressed explicit interest in participating, and their questions concerned the specifics of signing up for the competition. The team had the opportunity to speak to students in an English class after the presentation, and the students said the presentation was clear and the French slides were helpful.

To understand the demographics of the students attending the presentation, the project team presented an exit survey that included the students’ area of discipline and year of study. The following tables present the results for the 80 ENSAM students (see Table 4-5 and Table 4-6, below).

Table 4-5: Breakdown of the attending students’ majors at ENSAM

Area of Study	Count
Civil Engineering	44
Industrial Thermal Engineering and Renewable Energies	19
Engineering	3
Industrialization of Products and Processes	2
Materials Engineering	2
Communication Corporate	1
Electromechanical and Industrial Systems	1
No Response	8
Total	80

Table 4-6: Distribution of the attending students' year of study at ENSAM

Year of Study	Count
First Year	8
Second Year	9
Third Year	22
Masters	33
PhD	1
Other	5
No Response	2
Total	80

Since the project team did not invite all of the students from the school to the presentation, the study cannot claim to represent all of ENSAM. However, since the sample is approximately 27% of the population, the sample size is statistically significant.

4.2.2 ESITH, Casablanca

The next school the team visited was École Supérieure des Industries du Textile et de l'Habillement (ESITH), or the National School of Textile and Clothing Industry, in Casablanca on February 13. ESITH is a public engineering school in Morocco. The team's contact at the school was Professor Majda Mazri, and she informed her students of the presentation the day before. As a result, the team had the opportunity to present to approximately 70 of these students (see Figure 4-8, below).



Figure 4-8: Two team members presenting to Professor Mazri's students from ESITH

Following the presentation, the students asked questions in English and did not require a translator. The questions concerned their personal eligibility to be on a team; i.e. “If I only work with solar panels, can I still be on a team?” The project team assured the students that combinations of different areas of specialization and diverse universities form successful Solar Decathlon teams. The students also asked questions that indicated they were looking to participate, such as “What is the first step?” and “How do I sign up?” When one student asked how the universities get materials for construction, the project team explained the how Solar Decathlon teams typically partner with industry sponsors to provide donations.

The following tables show the student demographics of ESITH students that attended the presentation (see Table 4-7 and Table 4-8, below):

Table 4-7: Breakdown of the attending students' majors at ESITH

Area of Study	Count
Industrial Engineering	24
Computer Science and Systems Management	17
E-logistics	17
Distribution and Merchandising	4
No Response	6
Total	68

Table 4-8: Distribution of attending students' year of study at ESITH

Year of Study	Count
First Year	9
Second Year	14
Third Year	1
Masters	24
PhD	0
Other	15
No Response	5
Total	68

The team identified three main groups from this distribution: second year industrial engineering, Master's E-logistics, and first year computer science and systems management. We believe these three groups correspond to three of the classes Professor Mazri teaches. There were also four Master's students studying distribution and merchandising; they could have been from another class or with a group of friends who came. Therefore, the study cannot claim to represent the entire population of ESITH.

4.2.3 Mundiapolis University, Casablanca

Later in the day on February 13, the team visited Mundiapolis University, also in Casablanca. This university is a liberal arts school with majors in Engineering, Business, Education, Health, and Law. Its variety in available fields of study encouraged a larger diversity in student population, leading it to resemble a liberal arts school in the United States. Over 100 students attended the presentation in the university's amphitheater (see Figure 4-9, below).



Figure 4-9: Two team members delivering the presentation at Mundiapolis University

The contact for the university, Professor Samar Mouchawrab, introduced the presentation in French and also provided translation for the question-answer session when necessary. Following the presentation, many students expressed their immediate interest in signing up for Solar Decathlon AFRICA. One student asked if the decathlon rules require specific appliances for the house since the prevalence of certain technologies differs across countries of Africa. The team explained that there are no specific requirements for appliances in the house, and the competition team has the opportunity to design a house that is representative of any region of Africa. One faculty member also asked if there were size requirements for the house, and if a professional checks the competition team's design plans. Again, this faculty engagement is an

encouraging indicator for the university's potential participation.

The following tables show the demographics of the students who attended the presentation at Mundiapolis (see Table 4-9 and Table 4-10, below).

Table 4-9: Breakdown of the attending students' majors at Mundiapolis

Area of Study	Count
Engineering	50
Industrial Engineering	16
Computer Engineering	8
Aeronautical Logistics Engineering	8
Management Logistics and Purchasing	5
Accounting-Finance	3
Logistics Systems Engineering	2
Marketing	2
Energy Engineering and Electric Systems	1
Law	1
No Response	16
Total	111

Table 4-10: Distribution of the attending students' year of study at Mundiapolis

Year of Study	Count
First Year	44
Second Year	11
Third Year	14
Masters	41
PhD	1
Other	0
No Response	0
Total	111

4.2.4 INAU, Rabat

On February 15, the project team delivered the presentation at Institute National D'aménagement Et D'urbanisme (INAU), or the National Institute of Urban Planning. Faculty from the school and the project team discussed this presentation in a meeting on February 9 with the Director of INAU, Mr. Abdelaziz Adidi; Professor El-Korchi; and Professor Touria Idrissi who acted as translator. At this meeting, the project members presented an outline of the presentation and informed the faculty of Solar Decathlon AFRICA.

Given this prior introduction, Professor Idrissi and Director Adidi were able to introduce and summarize the presentation in French to the students before the team delivered the presentation in English. Professor Idrissi invited all third-year urban planning students to the presentation at the school's conference room (see Figure 4-10, below):



Figure 4-10: Two team members answering questions after the presentation at INAU

INAU has 27 third-year, urban planning students. Of the 27 students invited, 19 attended the presentation. The following tables show the demographics of those students (see Table 4-11 and 4-12, below):

Table 4-11: Breakdown of the attending students' majors at INAU

Study	Count
Territorial and Urban Planning	17
No Response	2
Total	19

Table 4-12: Distribution of the attending students' year of study at INAU

Year of Study	Count
First Year	0
Second Year	0
Third Year	19
Masters	0
PhD	0
Other	0
No Response	0
Total	19

4.2.5 Common Qualitative Themes at University Presentations

In order to gauge interest level of the students at these universities, the team collected qualitative data about the visits as outlined above for each university. In general, the team members noticed several common themes across ENSAM, ESITH, Mundiapolis, and INAU. First, students at all of the universities asked these same questions:

- “Can you use other technologies besides solar?”
- “How big can the teams be?”
- “Do we actually have to build the houses?”
- “How do we sign up?”

The team also noticed that most of the students were very attentive during the project team’s presentations. They were not on laptops, and generally did not pull out their phones until the team introduced the website. Another common reaction to the presentation across all universities occurred when the “50 000 USD financement par maison” slide appeared: students began murmuring excitedly with the people around them. The team expects that the students felt

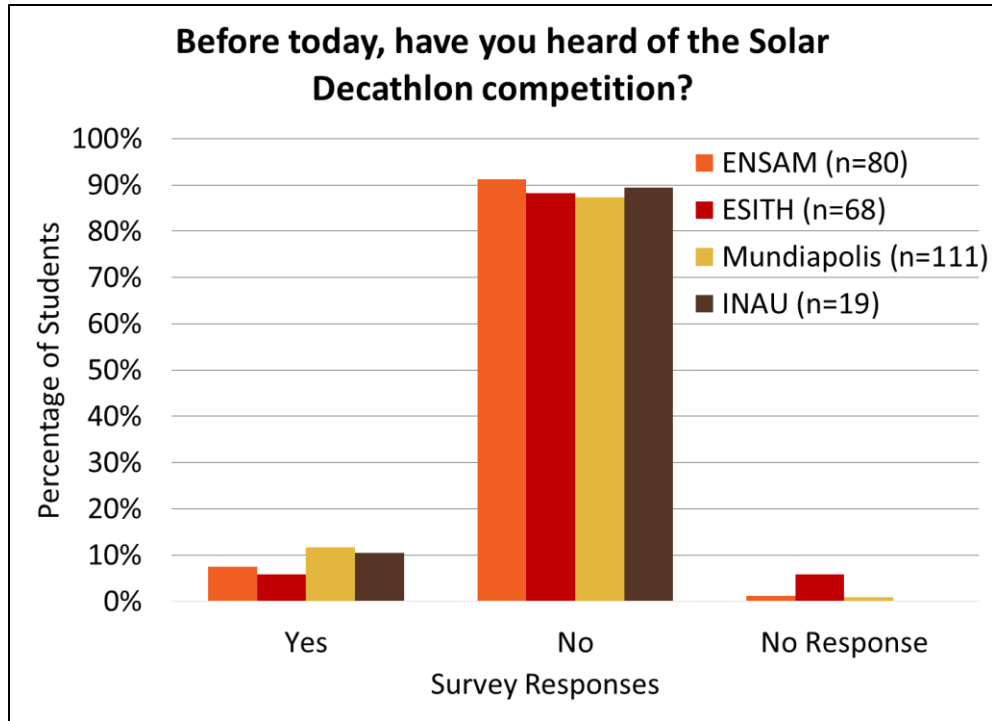
this was a large sum of money, and they were encouraged by the compensation. Additionally, when the team described that industry sponsor donations are a main source for additional funds, neither students nor faculty expressed doubts of feasibility. This does not necessarily mean they will not have doubts in the future, but the observation indicates that the presentation was successful in presenting successful competition participation as an attainable goal.

4.2.6 Exit Survey Results

In order to analyze the data from the in-person exit surveys (with questions in both French and English), the team first input all of the responses into an Excel spreadsheet (see Appendix H.1). This involved the team translating some responses from French to English and categorizing the different majors from the short answer responses (see Appendix H.2). The project team then created a series of bar graphs that displayed the responses for each question organized by demographic of university and year of study.

The graphs also show the effectiveness of presentations as a method to promote the competition, and the results will inform future promotions. The graphs also indicate overall interest levels, revealing the amount of additional promotion needed for success.

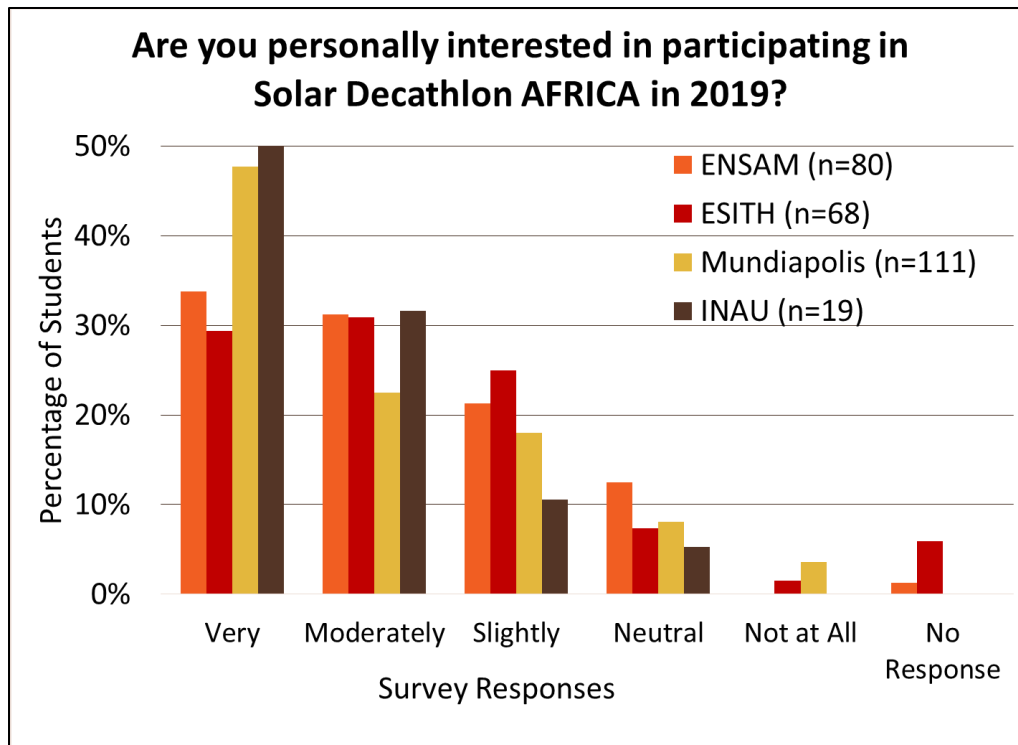
In the exit survey, all students were asked “Before today, have you heard of the Solar Decathlon competition?” and results were calculated depending on the university (see Graph 4-4, below). In order to normalize the data for different sample sizes, the graphs plot the percentage of students that chose each response rather than total count.



Graph 4-4: Student previous exposure about Solar Decathlon before presentation by school

From the analysis, the project team found that in total, 89% of respondents had not heard about the Solar Decathlon before our presentation (See Graph 4-4, above). Some of the respondents who selected “yes” to this question clarified that they first heard about the Solar Decathlon when their professors invited them to the presentation. Even though the team was looking to identify exposure before the project’s intervention, the team still categorized these responses as “yes.” Some of the collected surveys had no response to one or multiple questions; the study still included these surveys in analysis.

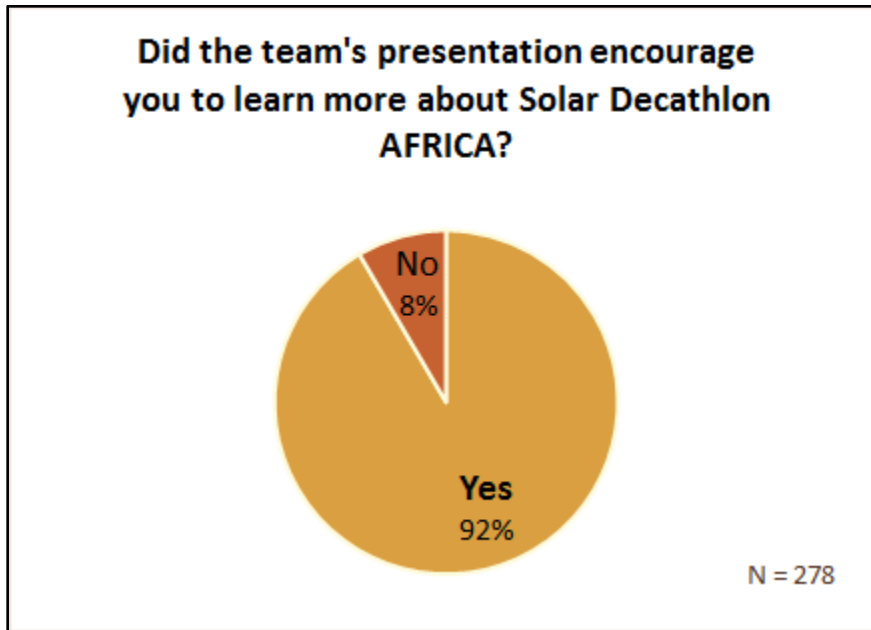
The same exit survey asked the question “Are you personally interested in participating in Solar Decathlon AFRICA in 2019?” and the team grouped responses by university (see Graph 4-5, below). In order to normalize the data for different sample sizes, the graphs plot the percentage of students that chose each response rather than total count.



Graph 4-5: Student interest levels about personally participating in Solar Decathlon AFRICA categorized by school

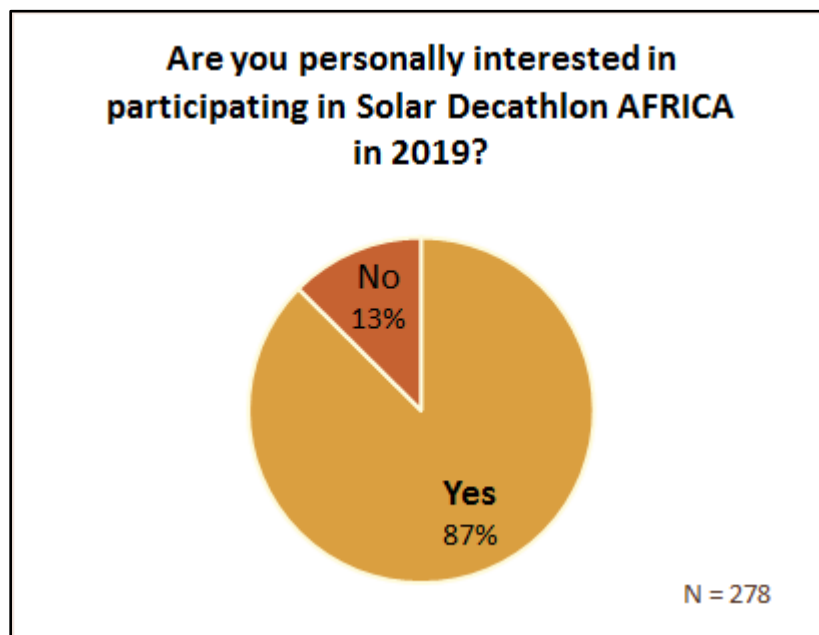
Including all four universities, 87% of the total respondents replied they were either very, moderately, or slightly interested in personally participating. At Mundiapolis and INAU, 48% and 53% of students, respectively, were very interested in personally participating. The “no response” category includes blank surveys as well as responses that the project team was unable to decipher. The team anticipated this high level of interest given the initial positive reactions.

In addition to finding personal interest in participating, the project team wanted to know the amount that students wanted to learn more after the presentation. The survey asked respondents “Did today’s presentation encourage you to learn more about the Solar Decathlon AFRICA?” Graph 4-6 below summarizes all responses. The team considered those that responded with very, moderately, or slightly as “yes” and those that responded neutral, not at all, or did not respond as “no”.



Graph 4-6: Survey responses to the team’s presentation encouraging to learn more about Solar Decathlon AFRICA

In order to compare presentation interest with personal interest in participating, the team analyzed the following question in the same manner. Responses of very, moderately or slightly were grouped into “yes” and responses neutral, not at all, or no response as “no.” The graph below shows percentages of respondents personally interested in participating (see Graph 4-7, below).



Graph 4-7: Survey responses to interest in personally participating in Solar Decathlon AFRICA

The two charts above illustrate that 87% of presentation viewers were interested in participating in the competition in 2019, and 92% were interested in learning more about the Solar Decathlon. This statistic is especially profound considering that 89% of students had never heard about the Solar Decathlon prior to the team's presentation. The team initially hoped to correlate particular majors with levels of interests, but the faculty did not invite all majors from each school to the presentations. Therefore, the study cannot make any conclusions about these correlations.

4.3 Online Platform

While IRESEN published the website on December 29th, 2017, the project team did not begin tracking website statistics until after arriving in Rabat. Thus, all data recorded by the WordPress Statistics plugin is from January 18th until February 22nd.

4.3.1 Countries of Visitors

Due to the fact that Solar Decathlon AFRICA is an international competition, organizers needed to connect with universities in geographically diverse countries. The WordPress statistics plugin determined the location of each visitor by their IP, and listed each source country along with the respective number of unique visitors. If the plugin was unable to determine the country of origin, it categorized the visitor as coming from "Unknown" (see Figure 4-11, below).

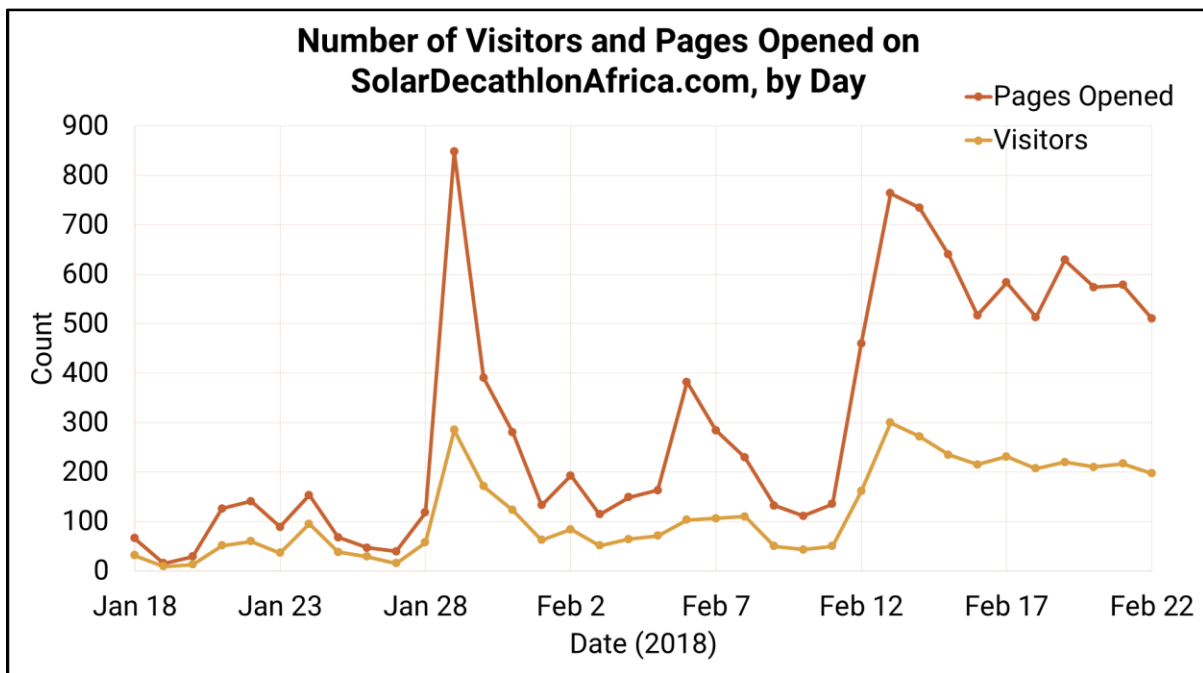
Top 10 Countries			
Rank	Flag	Country	Visitor Count
1		Morocco	1,216
2		United States	606
3		France	212
4		Unknown	189
5		Germany	175
6		India	151
7		China	97
8		Italy	86
9		Brazil	74
10		Philippines	71

Figure 4-11: WordPress statistics depicting the countries with the highest number of unique visitors

It is evident from this table that current interest in the competition is primarily from universities located in Morocco, the United States, and France. Since Morocco and the United States were the two countries to sign the Memorandum of Understanding, it is reasonable to expect that they would be the two countries with the most website visits. The top three countries on this list have hosted a Solar Decathlon in the past, so there is already established interest in the competition within those countries. Additionally, other Solar Decathlon websites posted the link to the Solar Decathlon AFRICA website. The project team believes that Germany has the fifth most websites visits because Samir Idrissi, an employee of IRESEN, spent a week in Germany promoting Solar Decathlon AFRICA to potential participants. Samir Idrissi served as the project team’s main liaison with IRESEN and worked alongside the team to update the website.

4.3.2 Number of Visits and Visitors

The project team measured traffic on the website using two metrics: the number of visitors, and the number of visits. The plug-in determines a unique visitor by their IP address. The WordPress plugin only counts each address once, making this metric a reasonably accurate estimation of unique people visiting the site. The plugin counts a visit whenever any page is loaded, regardless of the visitor, which is useful for determining the average number of pages each visitor visited. The team graphed the number of visits and the number of visitors to the website over the five-week tracking period (see Graph 4-8, below).



Graph 4-8: Website traffic on SolarDecathlonAfrica.com by Day

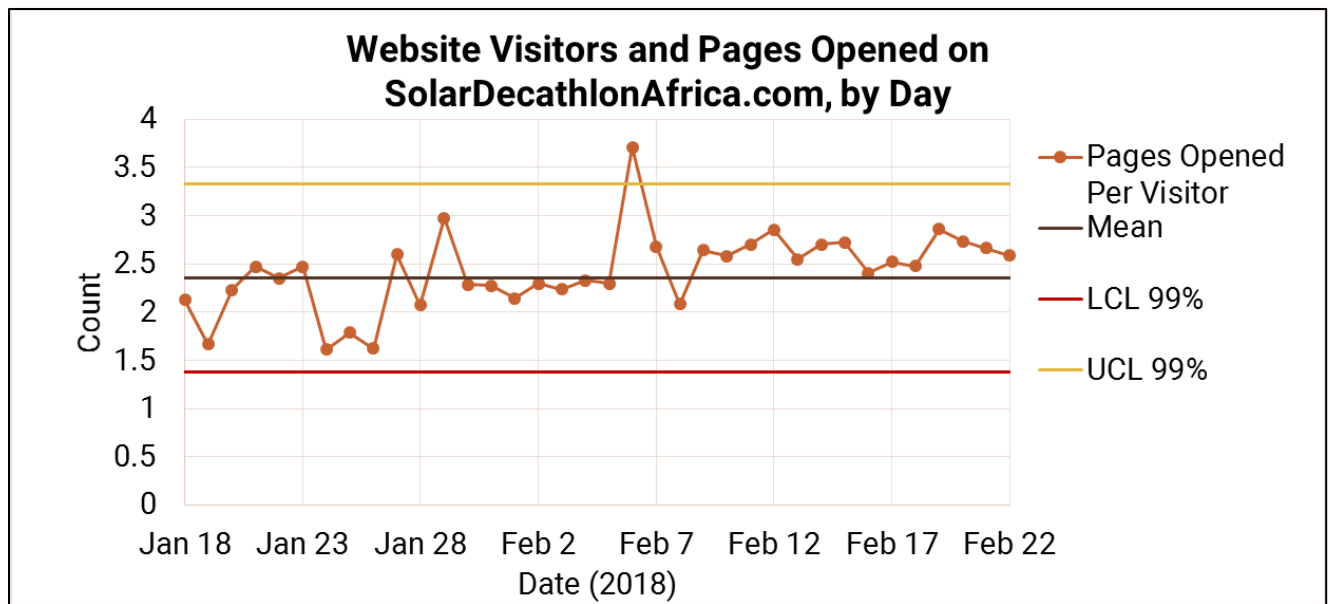
The project team believes the spike on January 29th is a result of Samir Idrissi from IRESEN sending out a large quantity of emails. The second spike on February 6th occurred when the project team sent 150 emails to Deans at universities located in the U.S., Europe, and the Middle East (see Appendix C and Appendix I). The third spike beginning on February 12th aligns with our university presentations on February 12th, February 13th, and February 15th.

4.3.3 Interest Levels

In order to measure the interest of visitors in the website, the team calculated average pages opened per visitor each day. This metric determined how long the visitors were on the website, and theoretically acts as a gauge of their interest level in the competition. The project team created a mean control chart to graphically represent this measurement (see Graph 4-9, below). The team calculated the pages opened per visitor by day by dividing the number of pages opened by the number of unique visitors that day. The mean is the average number of pages opened per visitor over the entire measurement period. The graph includes lower-level control limit (LCL) and upper-level control limits (UCL) across 99% of the range, or three standard deviations above and below the mean (see Figure 4-12, below). These limits identified the outliers in the data (see Graph 4-9, below).

$$\bar{X} = (\sum_{i=1}^k X_i) / k \quad LCL_{99\%} = \bar{X} - 3\sigma \quad UCL_{99\%} = \bar{X} + 3\sigma$$

Figure 4-12: Equations for the mean, lower control limit, and upper control limit respectively in which X is the mean number of pages, k is the number of days, and σ is the standard deviation



Graph 4-9: Average Pages Opened per Visitor, by Day

February 6th shows a spike surpassing the upper control limit, coinciding with the project team sending 150 emails to university Deans of architecture and civil engineering programs.

4.3.4 Solar Decathlon AFRICA Video

In addition to modifying the pre-existing website for Solar Decathlon AFRICA, the project team also created a three-minute video promoting the competition. This video is a shortened version of the university presentation with engaging visuals and voiceovers from two team members. The goal of the video was to create a brief media segment that informed and interested potential participants in a succinct manner. The team initially created the video in order to reach out to universities that they could not visit in person, but IRESEN can utilize this piece of promotional material on their website or any social media platform.

The full video can be found [here](#).

5. Conclusion and Future Recommendations

This project has been a rewarding journey full of surprises, twists and turns. Through archival research, interviews, presentations and surveys, the project team gained extensive insight into the Solar Decathlon competition as a whole and, more specifically, Solar Decathlon AFRICA. Ultimately, the project was a success; the team was able to implement and then assess a promotional strategy. Our data analysis indicates the presentations created a significant amount of interest in Solar Decathlon AFRICA.

The team concluded that the Solar Decathlon model works. Archival research and interview responses showed that the competition enhances student education, furthers careers, and expands worldview. Although there were recommendations for improvement, the overwhelming results of the team's research show the extensive positive impacts of the Solar Decathlon.

While positive reviews of the competition are reassuring, the more important takeaway from the interview analysis was the discovery of common challenges of competing. The challenges interviewees cited most during interviews were: lack of time, lack of financial resources, and lack of consistency in team members. Knowledge of these challenges now enables Solar Decathlon AFRICA organizers to address them before they become major issues for teams or deter students from participating.

The university presentation, which the project team delivered at four universities in Morocco, was successful in informing potential participants about Solar Decathlon AFRICA and motivating them to get involved. After watching the presentation, 87% of students reported that they were interested in personally participating in Solar Decathlon AFRICA and 89% reported they had never heard about the Solar Decathlon prior to the presentation. In addition to exit survey results, the team noticed a large increase in website traffic immediately following presentations. The project team concludes that the university presentation is a successful method of promotion for Solar Decathlon AFRICA. These visits also confirmed that faculty members at universities spearhead participation (a key idea past participants brought up during interviews), and organizers should target the faculty for promotion. The team believes it would be beneficial for IRESEN to continue giving these presentations to universities. To supplement these

universities, the project team created a concise and persuasive video which contains much of the same information as the university presentation. The team suggests that IRESEN use the video for advertisement when personal visits are not possible. IRESEN could also place the video on the official competition website to supplement the existing information.

Sending targeted emails out to lead university administrators also proved to be a successful method of promotion. While the team found presentations to be much more successful in getting potential participants motivated to join the competition, there was a limit to the number of universities the team could visit. The email sent out, though brief, allowed the project team to spread the information to a far greater quantity of people. The team concluded that utilizing both methods would be key to successfully promote the competition.

The efforts of IRESEN and the project team were effective in increasing awareness and interest about Solar Decathlon AFRICA. Despite this positive result, an underlying realization emerged amidst the team's extensive research about Solar Decathlons around the world and the constraints of Solar Decathlon AFRICA: the timeline of the competition poses a serious challenge to teams. Time has always been a concern for Solar Decathlon teams, and the shortened timeline of Solar Decathlon AFRICA will be a difficult obstacle for teams to overcome.

Through our interviews and research, the team compiled several possible adaptations for the competition to address these challenges. The first idea is for IRESEN to encourage affordable building design in order to minimize the cost of construction. This would make the produced houses more feasible for the teams to fund, and also broaden the target market of the houses. Another idea that addresses both the limited time and financial challenges is to completely replace the construction of the houses with virtual reality models. Rather than a physical village, visitors to the competition site would be able to take a virtual reality tour. This idea would allow teams to showcase their houses without needing to commit the funds required to fully construct them.

One additional suggestion, made by Professor Dick Co, a team faculty advisor in Solar Decathlon Denver 2017, was to change format of Solar Decathlon AFRICA. Professor Co suggested scaling back the size of the competition and focusing more on the design stage. Twenty teams would submit designs for the competition, and the organizers would select the top two or three designs. IRESEN could then concentrate their funding and support on just a few

physical houses. With extra assistance and financial support, these few teams would be more likely to succeed. This option reduces the financial burden on teams and reduces the risk of teams dropping out or failing to complete a house before the competition. Although this would be a smaller scale event, it would still showcase renewable energies and accomplish many of the same goals as the Solar Decathlon.

The organizers of Solar Decathlon AFRICA must communicate the advantages and challenges of participation effectively, either in person or with an online presentation such as the promotional video. The organizers also have the unique opportunity to adapt the competition to make participation feasible for African countries as well as countries around the world. Successful promotion and execution of Solar Decathlon AFRICA will showcase Morocco as a world leader in green energy reform, and bring the countries of Africa together for the future of our planet.

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Appendices

Appendix A: Participation Advantage Video Interview

Interview Contact Message (WPI)

Hi ____!

My name is ____ and I am a WPI Undergrad working to complete my IQP in Morocco. Our project aims to promote Solar Decathlon AFRICA in 2019 and we were hoping to find out a little more about your experience in the 2013 Solar Decathlon China. Professor Steven Van Dessel gave us your contact information and suggested that we ask the members of team BEMANY some questions. Would you be willing to do a short Skype interview sometime in the coming weeks? If you would prefer to communicate via WhatsApp or email, please contact me at 603-801-5411 (user narogers) or email my team at IRESEN18@wpi.edu. Thanks!

Interview Contact Message (Other)

Hi __!

My name is Nathan Rogers and I am a WPI Undergrad working to complete my Junior Year Interdisciplinary Project in Morocco. My project aims to promote Solar Decathlon AFRICA in 2019 and we were hoping to hear more personal stories from participants of past Solar Decathlons. We hope to conduct several Skype interviews with team members in the coming weeks. Would you or any of the members of your team be willing to speak with us? We would appreciate if you would forward this email to the rest of the team! If you would prefer to communicate via WhatsApp please contact me at 603-801-5411 (user narogers). My team can be reached at IRESEN18@wpi.edu. Thanks!

Entrance of Interview:

“We are interested in understanding the advantages of participation in the Solar Decathlon. You will be asked to answer some questions about your experience. The study should take around fifteen minutes to complete. Your participation in this research is voluntary. You have the right to withdraw at any point during the study, for any reason, and without any prejudice. By starting the video interview, you acknowledge that your participation in the study is voluntary, you are 18 years of age, and that you are aware that you may choose to terminate your participation in the study at any time and for any reason.” (modified from Qualtrics)

Do we have your permission to audio record you?

Do we have your permission to video record you?

Interview Questions:

1. How did you initially hear about the Solar Decathlon?
2. How did you get involved in the competition?
3. What was your initial motivation for participating?
4. Can you describe the commitment necessary for participating in the competition? (in terms of time, courses, money, etc.)
5. What interdisciplinary skills did you learn from the Solar Decathlon?
6. Has your Solar Decathlon experience impacted your professional career? If yes, briefly explain how.
7. Has your Solar Decathlon experience impacted your view of the world? If yes, briefly explain how.
8. Has your Solar Decathlon experience impacted your perspective on sustainable energy? If yes, briefly explain how.
9. Is there anything else you would like to share about your Solar Decathlon experience?
10. Do you have any suggestions to help us engage more people in Solar Decathlon AFRICA and increase participation?

Do we have your permission to post the video and audio recording online?

Appendix B: Post-Presentation University Exit Survey

Solar Decathlon AFRICA Exit Survey

Your participation in this research is voluntary. You have the right to withdraw at any point during the study, for any reason, and without any prejudice. Please be assured that your responses will be kept completely anonymous. (*Votre participation à cette recherche est volontaire. Vous avez le droit de vous retirer à tout moment durant l'étude, pour quelque raison que ce soit et sans préjudice. Soyez assuré que vos réponses resteront complètement anonymes.*)

What do you study at university? (*Qu'est-ce que tu étudies à l'université?*)

What year of university are you in? (*En quelle année d'université êtes-vous?*)

First Year
(*Première*
année)

Second Year
(*Deuxième*
année)

Third Year
(*Troisième*
année)

Masters
(*maîtrise*)

PhD
(*doctorat*)

Other (*Autre*): _____

Before today, have you heard of the Solar Decathlon competition?

(*Avant aujourd'hui, avez-vous entendu parler du concours Solar Decathlon?*)

No

Yes

If yes, please explain how. (*Si oui, veuillez expliquer comment.*)

Did today's presentation encourage you to learn more about Solar Decathlon AFRICA?

(*La présentation d'aujourd'hui vous a encouragé à en apprendre davantage sur Solar Decathlon AFRICA?*)

Not at All
(*Pas du Tout*)

Neutral
(*Neutre*)

Slightly
(*Légèrement*)

Moderately
(*Modérément*)

Very
(*Très*)

Are you personally interested in participating in Solar Decathlon AFRICA in 2019?

(*Etes vous personnellement intéressé à participer à Solar Decathlon AFRICA en 2019?*)

Not at All
(*Pas du Tout*)

Neutral
(*Neutre*)

Slightly
(*Légèrement*)

Moderately
(*Modérément*)

Very
(*Très*)

Would you be interested in learning more? (*Seriez-vous intéressé à en savoir plus?*)

Name & Email:

Thank you for taking the time to complete this survey. Please return it when completed. Feel free to put additional comments below or on the back of this paper. (*Merci d'avoir pris le temps de remplir ce sondage. Renvoyez-le s'il vous plaît. N'hésitez pas à ajouter des commentaires ci-dessous ou au verso de ce document.*)

Appendix C: Email Sent



Dear [professor/contact name],

IRESEN (Moroccan Research Institute for Solar Energy and New Energies) & UM6P (MOHAMMED VI POLYTECHNIC UNIVERSITY) invites universities and major players in the renewables, green buildings & energy efficiency sectors to participate in the international collegiate competition **Solar Decathlon AFRICA**. This competition challenges teams of university students to design and build a net-zero energy house. While we are targeting architectural and civil engineering programs, teams can include members of all disciplines for marketing, communications, and interior design aspects of the house. The competition provides a diverse and enriching environment for students to engage and learn. The organizers will provide hands-on experimental learning and showcase the potential of solar and energy efficiency technologies to ensure a sustainable healthy environment for Africa and beyond.

Solar Decathlon AFRICA has launched the Request for Proposals (RFP) to select the 20 participating teams. Be the first to enter this pioneering competition in Africa.

Each selected team will receive \$50,000 seed funding in addition to competition prizes and awards. **Solar Decathlon AFRICA** is an educational opportunity of a lifetime. Participation helps you, your school, your country and the world.

We want [university name] to be a part of this unique experience!

The official RFP and the Rules for **Solar Decathlon AFRICA** are available at the official website : www.solardecathlonafrica.com

For more information, please contact us at sda@iresen.org.

Appendix D: Interviews with Past Participants

D.1 Video Interview with Tim Van Parys

Interviewee: Tim Van Parys (Solar Decathlon China 2013 Participant of Team BEMANY)

Interview Date: 19 Jan 2018 at 11:30 UTC

Interviewers: Lily Olsen and Nathan Rogers

Translators: None

Location: Facebook Video Chat

Purpose: To collect more information about previous participation experiences

Permission Statement:

1. May we please use audio and video recording for this interview?

Yes

2. May we please post a section of this audio and video recording online to engage future participants?

Yes, as long as I approve the section first.

Previous Solar Decathlon Experience:

1. How did you initially hear about the Solar Decathlon?

I think - how old are you guys now? (Nate: we're juniors so third year) third year - okay yeah so I think me and my team members, we were a bit older but so I think it was about 4 year ago. We were 24/25 and we were doing our masters dissertation for school for we were in our last year of civil engineering master program as called in Europe. and we had to choose a subject and to all subjects everything was really boring about concrete, steel and there was this one small mention of a decathlon. Nobody actually took the time to investigate it, we did. And we had a Skype call with Steve Van Dessel and then I think it was after three days it was already pointed out that we were the guys to who were so lucky to find it. So we just got lucky. (Nate: So it ended up being like a final project for you?) Yeah, final project you have to complete your study you have to have one final project, dissertation thesis so that's what we did. There were also two other girls who also met with Van Dessel so we were four Belgium's.

2. Can you describe the commitment necessary for participating? How much time, money or courses you have to do?

I think money, that shouldn't be an issue. Because I think cold flat, all lodging, food was mostly paid for by the universities. Combined funding of universities. The only expenses you have are the personal expenses. Which would be your trips, you have some time off as well, so a lot of money goes to that side of it as well. Time commitments, we made ourselves available during our holidays. So we went to China for two months and also two months we stayed at Worcester during school so during classes so we had to take the time to catch up with it. But other than that, yeah.

3. What interdisciplinary skills did you learn from the Solar Decathlon, all the prep and everything?

Mostly because we were the oldest ones and had a bit more experience, we had a lot of project management. So we designed, so Thomas [another student on BEMANY team from Ghent University] and I, we checked the structure, validated the structure for earthquakes, snowing stuff. So we had knowledge of the whole structural parts so we kind of managed the build up. So we knew this needs to go in first, then that and that. So it was that together with Steve Van Dessel since he knew the building pretty well.

4. Has your Solar Decathlon experience impacted your professional career?

Well after my studies, well actually after the Solar Decathlon I still had some courses to take for a half year. But I noticed then that steel and concrete weren't my cup of tea even though I had six years of studies in it. Yeah so I looked for a job at "Altran", it's a consulting company but what we did there was energy studies of office buildings. So it was kind of new, for me it was, it was fun but eventually after one year and a half I quitted [sic] there. So I got in there because I said I had done a lot of research in Solar Decathlon with energy consumption and stuff, which wasn't actually quite - wasn't actually true but anyhow. And just for your information, now I work in Janssen-Fritsen, it's a firm that makes gymnastic equipment, if you've seen the Olympic games or gymnastic events, then all the insulation is Janssen-Fritsen, "Porshkis" [inaudible] maybe you know the basketball backstops as well.

5. Has your Solar Decathlon experience impacted your view of the world?

Well you get to know a lot of people, if you're open to it, you can make a lot of friends. I made a lot of contacts, lot of contacts with British people and Australians, and among the Australians I

still know 4 to 5 of them. I went on a visit two years ago, perhaps “they’ll visit me next”. So you make friends, but the vision of the world, it’s you get to know a lot of different cultures. Mostly the host land. Like for us with China, there was complete new way of thinking about, about in my field of study it was interesting to see how all buildings and common places were designed to gain as much... [inaudible] You could use it for a huge amount of people. Perhaps if you were in America and Europe we are not that used to it. So vision on the world, I don’t have, I don’t think about it actually. I’m a day to day person and with practical stuff, I don’t think about “heatings” [inaudible] or stuff.

6. Has your Solar Decathlon experience impacted your perspective on sustainable energy?

Yeah [pause] I think when I would build a house now or I could design my own house better yet, I would definitely take things into account to make it as sustainable as possible. But I should make a side note as well, that although the Solar Decathlon house from WPI was quite performing. We used a lot of materials which we doubted that were very eco friendly. So yes we produced a house that was really energy efficient, but if you were to look at the carbon dioxide that went into it, with the production of it, or the transport, by sea-crate. The complete picture - you can always zoom in on the details and it will be, it will look fine but if you have the complete picture, then suddenly it’s less neat. It’s like with Teslas as well, as Tesla is the electric car and it has no exhaust fumes but it’s the electricity somewhere is produced and also the batteries with the lithium in them, are not that eco friendly.

7. Is there anything else you would like to share about your Solar Decathlon experience?

Some tips maybe is you will have a very large team and there will be a lot of people coming and going. To me, if I had the ability to redo it, I would suggest that the teams stay a bit constant, that to keep the same people on them because knowledge gets lost somebody designs something and another one will look over it and then it will get incompatible - stuff like that happens because it is a design project of three years or so [inaudible] Definitely have some team members that are less capable and missing interactions and I think you should really talk to them and try to involve them just to be sure they don’t make mistakes or perhaps “avoid them” because if they doesn’t talk to you will have miscommunications and you will end up with problems on site. But I think never say no to something if they say we need to go to this country or we need to do one month of tripping [sic] to this country or that country, I will always do it. You know for the dissertation we had, first opening phrase, like a statement or quote, which we said “we traveled around the

world twice to make this dissertation.” Just to say how many kilometers we had. I think there's a lot of possibilities even out of your scope, if you're doing the energy thing why not think with other people that do the water supply system - there's always some synergies to find.

Upcoming Solar Decathlon AFRICA:

1. Do you have any suggestions for us to help us engage more people, get more people involved in the Solar Decathlon?

Do you mean students or do you mean commercially?

I guess both.

Well what we did was, the marketing was done by somebody else so we didn't have a need to do it. But I think every budget that you could make available is always good so identify and contract building partners or something. We did it with carpenters, they made the walls, everything, the wood they made it. Eventually they went with us to China to help us build everything as well. And I think a couple of relationships came out of it.

2. Do you have anything specific about students participation - engaging them?

I think if you can make people understand what the Solar Decathlon is, like what the benefits are, that you get to travel around the world. Already a lot of people will be persuaded. But I think you can find a lot of items on the house that you could actually make somebody responsible for. Like for instance during the game, everyone is designing and thinking about the house. But what we missed was someone like a game leader— like during those 10 days that the game is on, we missed like who's going to do this. Who is... [computer froze - reconnected] I think a game leader during those ten days of the decathlon would be a wise choice. Somebody who knows the complete playbook, whose able to play by the rules or perhaps bend the rules a bit to gain as much fun as possible, it's important. I think you should just think about the whole project, beginning design to competition to even what after to when this is composed a lot of my friends at that time just decided to move around for the month after. If you're there why not just add an additional month to it.

Thank you so much, this has been very valuable.

D.2 Video Interview with Briana Weisgerber

Interviewee: Briana Weisgerber (Solar Decathlon China 2013 Participant of Team BEMANY)

Interview Date: 23 Jan 2018 at 3:00 UTC

Interviewers: Erin Morrisette and Karsten Roberts

Translators: None

Location: Facebook Video Chat

Purpose: To collect more information about previous participation experiences

Permission Statement:

1. May we please use audio and video recording for this interview?

Yes

2. May we please post a section of this audio and video recording online to engage future participants?

Yes, but want to see it before posted.

Previous Solar Decathlon Experience:

1. How did you initially hear about the Solar Decathlon?

So my mom was a judge for a competition, I'm not going to have the date right but I think I was in seventh grade, so 2007 maybe, in DC and she like drove me around and I got to go to all the houses. At the time I had wanted to be an engineer but didn't really know what I wanted to do. And I was like I don't know what this is but it's really cool and I want to do this someday. And then we didn't have a team at WPI but I talked about it all the time because I was like there's this really cool thing we did and I really want to do it. And then someone was like 'Hey I heard they're doing that thing you always talk about' and I was like Oh My God let's do that [inaudible] So Yeah.

2. How did you get involved in the competition? I guess you already answered that but was it more professor driven or student driven?

Professor driven. So I got- I joined a little bit later, they had already started the whole processes. But yeah, it was when they were starting to get the architecture program up and running at WPI. I don't know if any of you are civils (Erin: Nate is in architectural engineer.) Ah perfect okay. Yeah so they were trying to get that up and running. And I think Van Dessel was pretty much

spearheading the whole thing. By the time I had joined, a lots of decisions had been made already.

3. What was your initial motivation for participating? Apart from the personal experience you had within the past.

Yeah I think the motivation is the cutting edge point component of it, the idea of that you can create a house that's totally self sufficient. I've seen some of them, like there's Duke University has one that they use like have open for tours and promotional stuff. They also like use to entice students to live in. Like they say if you come to this university, you can live in it. And like, that whole idea of understanding how you can live, you know, not necessarily off the grid, but like how you can be self sustaining I think is, needs to be a higher profile and more talked about so that was kind of a cool thing to understand the inner workings of making a house zero emissions.

4. Can you describe the commitment necessary for participating? How much time, money or courses you have to do?

Yeah, so, we were really fortunate and I didn't really have to pay for anything out of pocket. We had enough supporters through donations and whatnot, but I think timewise, I probably put in about the same amount that you'd put in for like a smaller class, maybe like a half credit class, not necessarily, it wasn't necessarily full commitment for me, but I wasn't doing an IQP or a capstone or anything off of it I was just doing it sort of as a partial credit volunteer type thing.

So there was a range of time commitment based off your position?

Yeah I mean I think the heavy lifting was kind of the construction in [Seattle?]. A lot of the design I hadn't been involved in but when it came to construction I was more involved in that. And sometimes I'd be at the house, like we had a, I don't know how much they explained but we had the house in a warehouse and so like I'd be at the warehouse maybe a couple days a week working on the house.

5. What interdisciplinary skills did you learn from the Solar Decathlon, all the prep and everything?

Construction [laugh] I was civil, but I had a focus on infrastructure and so then learning about, like, one was materials, we had unique materials involved in our house, and so I learned a lot about what fiberglass does when it gets on your skin... Yeah, but it was interesting because we had to figure out how to not compromise the structural integrity of the house while also being

able to run wires through the walls, and different things like that, so I think materials was a big piece, and then also, I mean, construction skills, really.

6. Has your Solar Decathlon experience impacted your professional career?

Hmm. Interesting. I don't know if it's impacted my professional career exactly, I would say the one thing it did teach me, because we had such an international team, was how to, and your IQP does this too I think a little bit, is it teaches you how to interact with people from other cultures because americans communicate one way, but we had to communicate with Belgians, and I mean our team was multicultural even though it was american anyways so...and then also communicating with staff and everyone at the competition ... we found some challenges at times because the way that chinese people communicate especially in conflicts and how you navigate that so I think that something I've brought to my professional experience not that I interact too much with different cultures but knowing that I can, if need be, and how those cultures interact just bringing that to our daily interactions.

7. Has your Solar Decathlon experience impacted your view of the world?

Oooh, loaded, I'm like the least professional person you could interview ... So we had a really international, like the chinese competition about half the teams were chinese, and half of them were international, so like from all over the world, so like we would be hanging out all of us and you'd have like, I mean I think it covered almost every continent, except South America, didn't have South America, but I mean we had Australians, we had Asians, we had people from Europe, I mean we had everyone, and so it was really kind of cool to just like hang out and just like talk about the little things but then also sometimes some politics would come up or whatever, which is an experience I think you also get from maybe your IQP or MQP but because this was very much less formal, like not formal at all, it opened up a lot of communication that I hadn't really intended, and also made me realize that what I had thought is oh I have to live and work in the US my whole life, isn't necessarily true, I mean I'm currently doing my masters in Scotland, so obviously it impacted me a little bit. But yeah, seeing how people were sort of like crossing boundaries just to further their education, or to work on jobs or whatever, I think that opens up sort of a lot of doors when you realize that.

8. Has your Solar Decathlon experience impacted your perspective on sustainable energy?

Yeah, I think it makes you realize it's possible, which maybe you guys, like I know you're not the ones constructing the house, but in your research, like, it's really cool. You build and make it

totally self sustaining, but I mean sometimes it's expensive sometimes it's not, I mean a lot things we were trying to do in the competition were innovative in more than just the self sustaining way, but if you're just looking at self sustaining it's not a hard concept, and it's doable, and I think that yeah it totally changes your perspective, cause you're like woah, why do I pay energy bills you know? ...

9. Is there anything else you would like to share about your Solar Decathlon experience?

... Wait, can I ask who else you talked to?

We just, so far we've talked to Tim Van Parys from Ghent.

Oh I just saw him a couple months ago. I went to Belgium, before I went to school here, so I guess I saw him in August, yeah I was with Tim, Thomas, Tina, and Charlotte... I don't know I guess what else you'd be looking for that would go into an IQP, we had, I mean, I don't know if they talked about at all like the experience with China, they kind of had looked to make this like a big event to change the perspective of the city. I don't know how much you guys know about this.

Yeah, and to make it like a village, right?

Yeah, so they like had, I want to say like four or six stadiums, but like *big* stadiums, like your looking at like 10 to 20 thousand people that they had started constructing behind like where the houses were gonna be, but they had gotten a new mayor before they had finished the construction and the mayor decided he didn't want to do this anymore, so we were kind of like this row of houses and then there were just four partially constructed huge stadiums behind us, and the building we stayed in wasn't totally constructed by the time we got there, like imagine like Sochi... so I don't know if any of this is going to go in your IQP, this might not be what you want, but ...It was weird, it was like well in China sometimes things were covered up a little bit and they try to, you know, save face, so we didn't always know what was going on, but there were some things weird about that, and it kind of felt like we were living in this ghost village, since there was like these huge abandoned structures. I don't know, it was weird. It was, like, still fun. I think we had put a lot more weight on it then it ultimately was.

Upcoming Solar Decathlon AFRICA:

- 1. Do you have any suggestions for us to help us engage more people, get more people involved in the Solar Decathlon?**

For universities to participate?

Yes.

Yeah, so I think, I mean from our experience, we were interdisciplinary, we had multiple schools, which were international, which was kind of cool, but even like, I mean it doesn't have to be intercontinental like we were, it could just be international, so you know if you have different African universities working together, I mean I can imagine like almost like politically and diplomatically that that could have, you know, impacts I can't imagine, yeah, I don't, I don't know if there's, I yeah, I maybe I don't know if you can play to, I mean, the off the grid concept in that you know in places where you might not have access and you know we were Belgian and Americans from New York, Boston, so like we sort of always have access to things like running water and stuff like that. I don't know which countries you're working with exactly but if you're talking about areas where you might not have access to, you know, electricity certainly, learning how to create buildings that are self sustaining as an appeal.

Thank you so much, this has been very valuable.

D.3 Written Response from Rebecca Eaker

Respondee: Rebecca Eaker (Solar Decathlon China 2013 Participant of Team BEMANY)

Response Date: 29 January 2018

Location: Email

Purpose: To collect more information about previous participation experiences

Previous Solar Decathlon Experience:

1. How did you initially hear about the Solar Decathlon?

I was working in a common space lab for the ASCE Steel Bridge Competition and the group of students that was doing SD needed help building some of the pieces for the house, so I volunteered my time. After a few days the leader of the group asked if I would like to join them in going to China. Of course I had to say yes!

2. How did you get involved in the competition?

See question 1 – We made special tiles that got cold when its warm and got warm when its cold.

3. What was your initial motivation for participating?

I just wanted to help the team out because they seemed short staffed. 2nd motivation was going to China for an amazing experience!

4. Can you describe the commitment necessary for participating in the competition? (in terms of time, courses, money, etc.)

I think we were there for about 6 weeks in the Summer so that was a large commitment in itself especially because it was difficult to do any type of internship. From what I know now though, this competition blows any internship or class way out of the water! The amount one learns and experiences is just tremendous. Except for the RT cost for the flight, everything I paid for in China was out of pocket. I kept all the receipts and a running list of everything I purchased (because all the receipts were in Chinese) and I received full reimbursement when I was back in school. Non of my courses were affected due to this competition.

5. What interdisciplinary skills did you learn from the Solar Decathlon?

1. Social skills was an enormous skill that I learned. The language barrier was vast, but we still had to be able to socialize with the local community. Hailing a taxi and communicating where we wanted to go was nearly impossible! But we were able to learn some key words and the locals loved us so that helped.

2. Self-Discipline is also something that we all had to figure out. Essentially 20 colleges are placed in one building with minimal supervision so it is similar to a giant party for 6 weeks. We had to learn to go to bed “early” so we could wake up in time (and not hungover) to build the house or give tours to the public.
3. The physical requirements to actually build a house
4. We were given the opportunity to visit the other houses and go on the tours of the competition and that in itself was a useful resource. Seeing what each team brought to the table is absolutely useful for future competitions. The Australian team did an amazing job with not having any waste. Their water came from a rain pond that had fish and plants that assisted it in being semi hygienic and it went into the toilet system. I am still friends with a guy I met from that team and I am sure he would be happy to give some tips as well. The Swiss team did a great job in utilizing every inch of their house as either living or storage space. Other teams had great interior design, or function and it stood out in their designs.

6. Has your Solar Decathlon experience impacted your professional career? If yes, briefly explain how.

Yes absolutely. I have work experience that I otherwise would never have, SD is such a big thing on the resume because it is so unique that it really stands out and when the interviewer hears one speak about it, with passion and excitement, they can see how excited one is about the work they are doing. Also I can socialize with coworkers about trips around the world, I had never been out of the country before this trip.

7. Has your Solar Decathlon experience impacted your view of the world? If yes, briefly explain how.

100% it has. This was the first trip I have ever taken outside of the country and I have never seen conditions like it was in China. The rural farm people, working in sandals and shorts on a construction site, living at construction sites because the commute was too expensive, it was incredible. It allowed me to see how really good we have it in the states and also let me see that we can be happy even if we don't have the best of the best. It made me want to travel more and experience new cultures, not just ritzy places that are publicized about, but the real world places that aren't so glamourized.

Meeting all the people from the other schools and countries was a great too because I now have

friends all over the world, and learning about their lives showed me how similar yet different we are. And it is amazing that some people know 4 languages just because of where they live and inspired me to learn another language.

8. Has your Solar Decathlon experience impacted your perspective on sustainable energy?

If yes, briefly explain how.

Yes it has. I have a better respect for the amount of energy it takes to turn on a light bulb, do a load of laundry, even just opening the refrigerator door. I want to put solar panels on my house and would love to see wind energy used all over the country.

9. Is there anything else you would like to share about your Solar Decathlon experience?

It is the best learning tool I have ever found in school. Please also remember to have fun whiles you're there and indulge in the native culture.

Upcoming Solar Decathlon AFRICA:

10. Do you have any suggestions to help us engage more people in Solar Decathlon

AFRICA and increase participation?

My school (NY Polytechnic) was pretty quiet about it, so none of the students or professors actually knew about it. So if you are trying to recruit, just make sure to spread the word. If students try to give an excuse, remind them that even though it may take up some of their time that they have to devote to studying or homework, that this experience is a once in a life time experience. They won't remember that really tough exam they spent a week studying for, but they will remember everything from this trip. I will NEVER forget my experiences in my SD trip. And I will forever be happy that I skipped an internship to do this.

D.4 Video Interview with Melody Wang

Interviewee: Melody Wang (Solar Decathlon China 2013 Participant of Team BEMANY)

Interview Date: 29 January 2018 at 05:00PM UTC

Interviewers: Lily Olsen and Nathan Rogers

Translators: None

Location: Skype Video Chat

Purpose: To collect more information about previous participation experiences

Permission Statement:

1. May we please use audio and video recording for this interview?

Yes

Previous Solar Decathlon Experience:

1. How did you initially hear about the Solar Decathlon?

I heard it from the architecture engineering professor, professor Roberto Pietroforte, I was in his intro to architecture class and he proposed this plan and he was trying to assemble a team from the new majors, and that's how I heard about

2. How did you get involved personally?

I was involved from the very beginning, I worked with drafting, looking for sponsors, before we had an open plan we had this idea of having an illumination partition, but that plan was shut down because of budgeting concerns, so I spent some time working on that and when we went to China for the actual construction competition I worked with the logistics because I do speak Chinese and English. I worked with the contractor team locally and crane operators in China to help them communicate with each other

3. Thank you, so what was your initial motivation for participating?

Well, I just joined the architecture engineering major, and since at the time it was a brand new major, I wanted to know more about what it's about, what's the daily involvement, sorry I got a phone call.. I thought being involved in a project would really help with that sort of understanding for what I was studying and future career options

4. Awesome, can you describe the commitment necessary for participating in the competition?

Yes, I think it varies from what your task is, if you're a media/social media marketing personnel then your responsibility will be involved with the PR in the very beginning, and with the website building with later sponsor portfolios but you would have lighter involvement with the actual construction either locally in Worcester at school and then the actual competition. I think everybody had to take more than we can have on their plate due to budgeting and personnel issues at times so a lot of people just learn along the way. One of my teammates got a 20 hour OSHA certification and learned how to operate a forklift, and I was not really involved. Just kind of pick up what falls in your lap along the way and that's kind of a great part about the project too

5. So what interdisciplinary skills do you learn from the Solar Decathlon?

I learned about AUTO CAD, I learned about writing specifications, and those skills are really real-life practical, and I did carry it on to my career.

6. That actually goes perfectly into our next question, which is how has the Solar Decathlon, your experience, impacted your professional career?

I think it's something always so dear and near to my heart because the duration was almost three years, and you spend all those time with your team and going through all the struggles just like a real-life construction project you see how much community involvement has been with WPI community, with the local Worcester community, and with alumnis and when you go to China you see how excited the local visitors are to learn about solar energy house. I think every day when I work on building for my career I think about the Solar Decathlon was what initially got me there and it definitely made me more comfortable to talk with different disciplinary people because I had the experience to do that when I was working on the project. I did help with the University of Florida team as a volunteer consultant engineer. Unfortunately they didn't, they failed to bring their house to California because of fundraising and budgeting issues but they did have the house constructed locally and they were planning on selling it to a local family. So I think that kind of experience definitely carried me on to the passion of me in the building construction community, and I think it's a great badge of memory that I have in the back of my head, I have coworkers that are Solar Decathletes and one thing that immediately bounded us together was this experience [inaudible].

7. Has your Solar Decathlon experience impacted your view of the world?

Yes, I think so. When I was in China, we have a local Massachusetts carpenter and we have a Chinese crane lift driver and I guess as a stereotypical trade personality they are very opinionated and they have a very almost out-of-date view of the world and how it works, so at first they were pretty distant with each other because they hold prejudices against each other's country and how it operates and how theirs was better than the other but later on they became great friends because they shared the same trade skills and they both liked to ride motorcycles and the Chinese crane driver offered to take the carpenter on a ride – just those kind of friendships that made me think if you really get to know somebody, the world will really tie closer to each other and I'm really grateful to see such culture bridge happening right during the competition.

8. Has your Solar Decathlon experience impacted your perspective on sustainable energy?

Yes, I think a lot of the sustainability practice that SD has implicated really, is really cutting knowledge even right now in the big consulting company in industry, and I think the reason for that is the strong tie with the academic world and how the professors has been researching on those materials, for example for our house we used a phase-changing concrete even before it was introduced to the market, it was just a professor did experiment in his lab or basement and we used an OLED light which at the time the OLED was pretty much a brand new thing and OLED was just in- [cut out] Sorry was I disconnecting?

We got you back now.

Oh ok, did you hear-?

We got up to OLED.

Right and it's been introduced just recently and so I think it's a good opportunity for the people who are interested in sustainability and innovation to see what is possible and it's also good for people who are skeptical in my industry because a lot of people in my industry are menist people who like to do things a certain way for 40 years and it's good to have them see an actual house with function, not just on a 20 page academic paper that this product would work for you. So I think it made that wonderful bridge between theory and practice.

9. Is there anything else you would like to share about your Solar Decathlon experience?

I didn't know, well because I was born in China, I thought for me it's less of a travel adventure, but going to Daitong with my American university friends and we have a team members from Belgium, it's definitely eye opening even in the country that I was born and called home. I think that's the perk of an international competition experiences, versus Solar Decathlon domestically,

because I think in the past few years the domestic competition has been around the Californian area because that's where the solar energy will get better performance, so you're kind of limited and it does get old when it's ten years, twenty years, but if you explore new locations and new possibilities and adding the culture adventure portion into it, I think it's a great experience. I still kept in contact with some other universities, Solar Decathletes, and it's interesting to see how the competition has inspired them and take them on to life. I think it's great that you guys are doing this IQP surrounding this competition.

Upcoming Solar Decathlon AFRICA:

10. So last question for you, do you have any suggestions to help us engage more people in the Solar Decathlon AFRICA and increase participation?

More people from WPI, or more people in general from all the universities?

Just in general from around the world, how to get more people involved and excited about this.

I think it's great to radiate it locally so you have the excitement from the hosting cities or hosting country where you have a good blend of local universities versus international universities. I know for SD China, for the first year I attended, they had a good mix between experienced schools, so the schools sent Solar Decathletes for multiple years versus newcomer schools like WPI. So I think a good diversity between nations and schools that are more experienced than others would help people to improve because if you just compete with the same schools every year you lose the excitement to it, and I don't know how the local funding would work but we got a lot of help from the Worcester regional donors and Professor El-Korchi was extremely involved with the whole process and he was like, I don't know – is he your team member too?

He, actually, he was the one who set up this project.

Oh, ok, I see.

He's actually back at WPI still.

Ok, I see. So he's a very diplomatic person and he did a great job involving with the donors to the competition, getting everybody excited, team building and all that good stuff. So, well, it's definitely not – like, he used to say 'It takes a village to build a solar house.' And I think it definitely takes a lot of people's involvement and commitment and passion to make it possible.

Thank you so much for your time. Do we have permission to post this video online if we send it to you first?

Yes

D.5 Audio Interview with Dick Co

Interviewee: Dick Co (Northwestern HOUSE team, US Solar Decathlon 2017)

Interview Date: 31 Jan 2018 at 4:00 PM UTC

Interviewers: Erin Morissette and Karsten Roberts

Translators: None

Location: Skype Audio Call

Purpose: To collect more information about previous participation experiences

Permission Statement:

1. Do we have permission to audio record this interview?

Yes, you do.

Previous Solar Decathlon Experience:

1. Which Solar Decathlons have you participated in?

I have only participated in the last one, the 2017 U.S. Solar Decathlon. I personally visited the 2015 one, if that matters.

2. How did you initially hear about the Solar Decathlon?

I heard about it from architects saying that my background as a chemistry professor wanting to be able to focus on solar research and wanted to get into the built environment. I was talking to a bunch of architects and they were like yeah, there's this solar decathlon that is exciting and get's a lot of attention, why don't you guys look into it?

So that was in more of an industry networking setting?

Yeah, I would say industry networking.

3. How did you personally get involved in the competition?

I was the faculty director, so I brought together the internal team at Northwestern University and also the external partners. This was probably almost 3 years ago now, so 2015 we applied to participate in the 2017 decathlon. So then I wrote the proposal and recruited students through our engineering student clubs.

What kind of clubs were there?

There were mainly two that I recruited from, one was engineers for a sustainable world, actually that was the main club I recruited out of.

4. What was your initial motivation for participating?

I think the motivation, if I had to list just one, is having a hands on project that's tangible that people can see so that we can talk about and understand renewable energy and the use of it in a high performing house. So my goals were to motivate and excite the university...[lost connection]...sustainability is a big deal... [lost connection] (Erin: Dick?)...so it's a beautiful representation of energy efficiency... (Erin: Can you hear us Dick? I'm sorry you cut out.) No I can hear you fine, can you still hear me? (Erin: Yeah)

5. Can you describe the commitment necessary for participating in the competition? In terms of time, course level or money

Mhmm. Yeah I think every team is diverse but I think from the faculty advisor you, and all start from there, at least 50% of his or her time dedicated to this project. And the next level, I think having a full time project manager, it may be a student, but you know for our team we had Maggie and she was a staff that was full time on the Solar Decathlon team. I think that was critical, because there's just so many pieces. And for us, that was important too because we don't have an architecture program at Northwestern, so this wasn't anyone's thesis or capstone project it was really...so for us to have that kind of continuity, it was important to have full time staff on it. And then from the students we needed a core team, I would say that fluctuated from 2 to 4 that really spent that time, easily 40 hours a week on it, in addition to classes so then it's really getting it all done, getting the drawings done. So that was not to say student clubs didn't show up every once and a while, and we had students that participated at that level but but we really absolutely needed a core team that had more time to put in and was more passionate about it.

6. Has your Solar Decathlon experience impacted your professional career?

For me, the Solar Decathlon experience and the network we built and the lessons we learned has completely transformed my career, even as a professor at the university. I, again I'm a chemistry professor, before working mostly on solar materials. Now I mostly pivoted away from that world and I'm working on urban sustainability and also built environments. So there are a couple projects that we are teeing up right now that just about have nothing to do with chemistry in the traditional sense. So it helped me realize that there are huge needs within this world of real estate development, construction that we need more attention and more innovation. And locally I think there's more action that can be done as well from building high performing, affordable housing. So yeah, I have, I would say, shifted my career focus a little bit because of the Solar Decathlon.

7. Has your Solar Decathlon experience impacted your view of the world?

Yes, and it has. The world is a really broad term but it made me realize that there's a lot that can be done locally. We competed in Denver, we wanted the world to see our house but when we came back home, we realized that there's so much more that can be done in our little city around our university. And I think every single city can likely say the same. Every university has an opportunity to do more in building high-performing, energy efficient and ideal affordable housing. I think that's the change in my view, in the sense that, it's not just an abstract concept that ways let's mitigate climate change, let's reduce our carbon footprint big picture but I think what it comes down to is building houses whether they're single family or multi-family units. I think that it has motivated us here at Northwestern to maybe shrink the world a little bit and just start locally more.

In the context of Solar Decathlon AFRICA we are looking at the cultural international part of it, but I get that it was not necessarily a focus there.

Yeah and I think about Solar Decathlon AFRICA and, again I'm pretty new to the Solar Decathlon, you've probably spoken to people who have done it 5 or 6 times, but I think it's really important to work with the local culture and really understanding the construction industry, all the way down to who is building the actual houses. Related to the question, one thing I learned, after the Solar Decathlon I got connected with the rocky mountain institute and a lot of people who are trying to rebuild the caribbean nations after the hurricanes and in that process I learned that local culture matters a lot. It's not just about technology or about building codes. I learned in many parts of the world building code is one thing but it comes down to who is building it and how they perceive change and how they can embrace that change, or they'll fight it. So I think long term, if you want the impact to be more than a very exciting event and more how you change the culture and how you change the way people build houses and view climate change, I think working with the locals, understanding the local culture down to the nitty-gritty details is important. Where often, you're more likely to have that long lasting effect...

8. Has your Solar Decathlon experience impacted your perspective on sustainable energy?

Yeah, and I think it has, and we see that trend overall. I think sustainable energy is not yet... we can all look at the numbers and see why we need to embrace solar or wind or any other source because of climate change, because of greenhouse gas emissions. But I think what I learned is all

that almost doesn't matter at a consumer level. At the consumer level what really matters is functionality and aesthetics. But we know how to deliver that and performance and have sustainable products. So I think it's really changing the narrative and instead of saying that your house is energy efficient, say your house has better indoor air quality, that your house that the lights don't go out or you have a residential battery and you can be self sustaining because you're solar powered. I think all of those things is what we learned in this process.

9. Is there anything else you would like to share about your Solar Decathlon experience?

No, I think every team approaches it differently. I would like to hear more about your planning for Solar Decathlon AFRICA and so your involvement so the team and yourself. But I think overall every team approaches it differently. The struggle is always fundraising, no matter what team you are. And the struggles are also just logistics, you know, how do you ship a house to a place and back. That part, the organizers can find clever ways to address those things, just, the teams build the houses on site and then just leave them there and turn it into a village or expo type. Or people move in. I think there are all kinds of ways to structure it, one so that there's more funding up front for the teams and two, you save a lot of money by not having to shift the houses. So those are sort of the high level feedback I'd give and I'm sure you've heard the same from many teams.

Yeah, we have been hearing those similar themes throughout.

Upcoming Solar Decathlon AFRICA:

1. Do you have any suggestions for us to help us engage more people in Solar Decathlon AFRICA and how to increase participation?

Why don't you answer that question with a little more information about Solar Decathlon AFRICA? This is the first time I'm really hearing about it, what time do you guys want to do it? What is this plan? Where will it be?

Currently the plan is to hold it in December 2019 in a town called Ben Guerir which is between Marrakech and Casablanca, the two major cities, so it's about an hour away from Marrakech and it's located right next to UMP6 which is kind of a prestigious technical university in Morocco. It'll have the help of that. The building park is being constructed by IRESEN, who is also the host. And IRESEN is a research institute focusing on sustainable energy, specifically solar energies. And they are being partially funded by the government,

so the King of Morocco is very supportive of this new solar power green energy drive, particularly for Morocco because it has a lot of sun exposure. And so the plan for IRESEN is to hold the competition of about 20 teams, which we know a few competitions in the last few years have been struggling to get that, but we're hoping to reach that number. And our goal right now is to kind of drum up interest and get a bunch of universities from Africa specifically but then also internationally to kind of bring everyone together and design houses that are specific to African cultures. So that's a large part of this project, to promote Africa as a center for sustainable energy using traditional methods but also integrating then these new sustainable technologies.

So you're saying it's in December 2019?

Yep. It's gonna be a tight schedule. That's definitely the number one problem right now. We are aware of this and IRESEN is aware of this and the universities are already pushing back because it's not enough time.

Yeah that's sort of my first reaction too. I don't think that's enough time.

We foresee it being pushed out to either 2020 or 2021, but it's kind of a sensitive topic around here.

Yeah but then 2020 you have the Dubai one then potentially and likely the US one if it's still around.

There's about 5 competitions in 2 years.

That said, I think depending on the higher powers that be, let's say it is fixed December 2019. I doubt you'd be able to recruit 20 teams to design build, with those desires, and fundraise and get the house to the site. I still don't think that's even possible. Because I think teams, even in the past Solar Decathlon, we had 16 teams, you know they wanted 20, I think only 16 teams applied, as you all know. 4 dropped out and one dropped out like 2 weeks before. So it's really tough to commit millions of dollars when you add it all up, even with a lot of donated stuff. So I think in the next weeks or months, **check with the organizers and really figure out can do it differently. Maybe we test the water by having a design competition but really only one or two teams build it on site. And you sort of pull it in so that it's really a showcase for the one that's coming in 2 years. And getting people excited, again just thinking out loud, but i think that mitigates some of the risks you might have. So how do you find 20 schools that can all commit to this and deliver?**

They might commit now, but they likely will drop out in a year, when they say “yeah I can’t pull this off.”

That’s a really interesting thought, that’s a good suggestion.

And I think that could be a more grass roots as opposed to well we all care about solar and this is the house you want but we’re gonna spend the next year and a half, just say what would this local place design, with all the bells and whistles that don’t seem like a quantum leap from where they live right now. I think we want the local builders to be excited about new technology and at the same time they might say yeah well my customer would never want to build this, this is what they want. So I think that could be one way to gauge, coming back to answer your question. I think you have Solar Decathlon, you have the built up reputation as the place to go for builders and people in construction and design and architecture to go and see well what are these university students coming up with and can I take that into my own practice at home whether it’s Denver or Seattle or wherever they may come from. I don’t think Starting a decathlon in Africa would immediately have a reputation. I don’t think builders would fly in from all over Africa to see what can they bring home, immediately. But I think, well I’ve been hearing about this for 12 months and these three universities in africa worked with their communities and we had some support from big multinationals like Schneider electric or others. This is really the home of the future but designed by our people, meets our building codes. That could give you a longer time to engage and I think that is important too. And that would be my answer to your question of what would I recommend to engage would be to really start small but find pieces that the people really care about. At the visitors level and the home builder do they care about solar and mitigating climate change or do they really care about energy security that they have a lot of blackouts or brownouts and having a residential battery changes all of that. And having an energy efficient home changes how long they can go without electricity or having solar power. I think those are the kinds of things that one could only learn by working with the local people, builders, designers, architects. And I think to me that timeline feels more aligned with the way I think of a decathlon. You have a whole solar village, everything comes in, 20 houses show up, tens of thousands of visitors, I think that would be hard to pull off.

We agree with you.

But that doesn't mean we should just keep planning for 3 more years or 5 years, by December 2019 let's really get all of our resources and maybe build 2 houses...[lost connection]...(Erin: Hello?)...does that help at all?

Yeah absolutely! This has been really really great, thank you so much for answering our questions here.

Sure. And I think one thing we learned about the solar decathlon, and you know, one of the competitions or one of the contests is communication. So your last question is related to that and I think my biggest fear with the way it's...you know we won first place in communications, we worked really hard to do it. And ultimately we want all the teams to be that good in communicating and understand why they're telling the story and how they're telling it. So I think as you engage people, more from the organizers side, think about how do you help these teams sell their process, their technology, their product, think about that. Because it helps the organizer to have 20 amazing teams telling 20 amazing stories, everyone is blown away by them. As opposed to one or two or three who did a good job and the rest are just well we're happy we built a house and here's some flyers. I think the organizers, and again I'm not suggesting that communication should be a competition, or sorry a contest but I think more support or step by step can be helpful to the teams and to the overall competition.

Okay, so more emphasis on communications maybe?

Yeah, because I think in the end that piece often gets chopped off. We had journalist students on our team who worked on it but a lot of schools, whether they're architecture or engineering schools don't have that resource on campus and they're run by engineering professors and it wasn't a key part. But in the end it depends on what your goals are but I really think that piece, no matter how different teams do it, the better they are at doing it, the higher the quality of the overall competition. There's engineering or other things and different ways to approach it but at the end of the day someone is in charge of how would that apply to a residential home or how would that apply to Chicago or Denver or Casablanca or whatever it is. But communication is pretty simple: how successful were people at telling their story and what did tourists and visitors get out of it after touring the house. And I think that can use a little bit more support from the organizers.

That's great. Just another formality thing, if we send it to you first, do we have your permission to post quotes online?

Yes you do.

Thank you so much, this has been very valuable.

D.6 Written Response from Charlot Tanghe

Respondee: Charlot Tanghe (Solar Decathlon China 2013 Participant of Team BEMANY)

Response Date: 15 February 2018

Location: Email

Purpose: To collect more information about previous participation experiences

Previous Solar Decathlon Experience:

1. How did you initially hear about the Solar Decathlon?

During my first master, we had to choose the subject for our Master's Thesis. Solar Decathlon was one of the subjects.

2. How did you get involved in the competition?

There were 2 Master's Thesis' subjects for the Solar Decathlon. Each Thesis involved two people. My friend Tine and I decided to subscribe together. Thomas and Tim subscribed as well as a team. And the four of us were selected.

3. What was your initial motivation for participating?

The idea of an international competition was very appealing. Joining the SD China in team BEMANY would also give us the chance to travel several times to the US. The traveling, the new environment (US university system and European are difficult to compare!), the forecast of meeting a lot of new people with very different interest...

4. Can you describe the commitment necessary for participating in the competition? (in terms of time, courses, money, etc.)

For the Belgian students the necessary commitment looked a bit different than for the students of WPI. We travelled to the US three times and stayed more or less three weeks. While we were in the US, the courses at our University kept continuing, meaning that we had a lot of catching up to do when we returned. Knowing that a semester in Belgium takes 12 weeks, we were out for one fourth of the time.

The subject of the Master's Thesis of Tine and I was about the type of sandwich panels used in the construction of the SD house. We had to investigate the structural characteristics of this type of panels. When we were in the US we could do some tests on the panels, but most of the work on our Master's Thesis was done in Belgium, since we had no time to work on it in the US. Our time in the US was mainly spent at contributing to the trial-build of the house.

So for us, the necessary commitment was mainly in 'sacrificing' a lot of time, study time and free time.

For the WPI students, I think the commitment was as well in rescheduling their activities so that they could spend enough time in contributing to the competition. I never completely understood how their involvement was related to their study (did they get marks on their contribution, was the Solar Decathlon an optional course... ?) but not all of them were very motivated to skip some courses to spend time in the competition.

If I remember completely, our travels were paid by the organisation or by our university. So we didn't make commitment in terms of money, except for the money we spent on food, travel... while we were in the US. But that's not relevant for this competition now.

5. What interdisciplinary skills did you learn from the Solar Decathlon?

I think the main thing you learn is how to work together with people with different interests, talents, age and background, and mainly characters. You could not ask anyone to do anything...

6. Has your Solar Decathlon experience impacted your professional career? If yes, briefly explain how.

I am currently working for an environmental company who does soil and groundwater remediation. In that sense, SD China did not contribute to my professional career. Maybe it was an indication to the company that I like challenges, am open for new things or so, but I'm not sure about that.

7. Has your Solar Decathlon experience impacted your view of the world? If yes, briefly explain how.

Not really... The best thing about SD China is the international character of the competition and the many nationalities that you get to know during the competition. But before the competition I was involved with voluntary work with international groups, so the competition didn't change too much for me.

8. Has your Solar Decathlon experience impacted your perspective on sustainable energy? If yes, briefly explain how.

Yes and No. No: What I missed in the Solar Decathlon is the real added value created by the groups towards sustainable energy innovation. The house that we built, was in my opinion not the most environmental friendly house. Also some competitions within the competition did not embrace what sustainable energy for me is about. One of the small competitions was to wash and

dry towels. The mass before and after the process were weighted. This is only functionality of your machines, not what is necessary in a house based on sustainable energy.

Also the complete lifetime of the houses was not considered. For me the competition would have been more useful, if you had to make a complete life-cycle assessment. e.g. the manufacture of the sandwich panels is in my opinion not an environmental friendly material, but the isolation characteristics were good, so we could use it in the competition...

Yes: it did make me more aware of the impact of a house on the environment and it motivated me in my choice of buying a house. We are about to renovate our small house (a deliberate choice) now, and we do keep our impact well in mind.

9. Is there anything else you would like to share about your Solar Decathlon experience?

The design of our house was not well-considered enough. I can not imagine that the materials and the chosen design would be used on large scale in the US, nor in Belgium. The houses of the winners of SD China (Australia 1st, Sweden 2nd) were based on real situations in their country. The Australian team took a traditional style of housing in Australia, and tried to make this as sustainable possible. I sincerely believe that the results of their effort and study would be used on large scale. Sweden chose to make a house for students. I do think in university cities this design could be useful. In a next Solar Decathlon, you should really think not only about the competition, but as well as how it would be useful in your city/region/...

Upcoming Solar Decathlon AFRICA:

10. Do you have any suggestions to help us engage more people in Solar Decathlon AFRICA and increase participation?

What was not clear enough during our participation was the role of the different team members. Everyone was helping out, but the responsibilities were not clear enough. There was for example a student 'responsible' for communication, but I don't think she ever really did something for this. Or if she did, her efforts were not shared with the team.

Clear responsibilities and function descriptions could increase the involvement of the students. Also the competition was not well known on the campus. I think you should make a bigger fuzz about the participation in the competition, e.g. with an exhibition once the design is finished, a tour in the house after the first trial-build. Before the design, you could do a survey between the students on what they believe is important in an sustainable house.

You could also make a real innovation project of it for some technical students, where they really have to come up with some new technique on sustainable energy that is then used in the house. This could give you a lot of press attention.

D.7 Written Response from Margarita Espinos

Respondee: Margarita Espinos (Swiss team, US Solar Decathlon 2017)

Response Date: 20 February 2018

Location: Email

Purpose: To collect more information about previous participation experiences

Previous Solar Decathlon Experience:

1. How did you initially hear about the Solar Decathlon?

I come from the architecture school in Barcelona ETSAB. I had the chance to study at the EPFL in Lausanne for my exchange year. Each semester we had to choose between different architecture studios working on different projects, and one of them was working on the Solar Decathlon project. I was not in that studio but one of my best friends was. She was very excited with the project and was telling me all about it all the time. She showed me what she was working on, and I found the orientation of her studio super interesting.

2. How did you get involved in the competition?

When the semester ended, this friend told me there was going to be an open workshop for all students in the summer, so there I had the opportunity to sign in. It was great chance to join that group of people that were already working on the competition. I had a multidisciplinary team work experience from which I learned a lot and that motivated me to continue until the end.

3. What was your initial motivation for participating?

Before enrolling, everything my friend was telling me about her own experience. Once I joined and worked on it, the fact that we were many students from very different and complementary disciplines working together on a single project made me learn a lot. Not only about their fields, but also about teamwork.

However, beyond all of this, the fact that it was a building that was going to be built and tested for real was for me a guarantee that, no matter how successful it would be, I would learn a lot from it.

4. Can you describe the commitment necessary for participating in the competition? (in terms of time, courses, money, etc.)

It depends on the responsibility you take in the project, of course. From my point of view I was one of the students working on the architecture work package. There were intensive workshops

in which we had to participate as much as we could in summer and winter holidays for two, three or four weeks in a row. In addition to this, during the last year of development of the project we had to commit ourselves to work on our own a minimum of 200h/ year and had weekly meetings with the whole group to share our progresses. In fact it was an indicative amount of time as a way to demonstrate that we were taking the project seriously.

In terms of money I have to say that everything was very well organized. As we were schools from different cities in Switzerland, workshops were not always in our hometown- so extra costs for accommodation, meals and transport was always comprised by the association. So working on the project meant a great effort for us in terms of work but it was always pleasant and enjoyable as the association was always caring for us.

5. What interdisciplinary skills did you learn from the Solar Decathlon?

- teamwork
- a lot of discipline and organization in order to be able to do my masters in architecture together with the solar decathlon competition
- more deep knowledge on the utilization of current technological systems and specially innovative ways to integrate them to the architecture
- how and what environmentally friendly systems we integrated in our project work depending on environmental circumstances
- a lot about water management (probably one of the topics I knew the least about)
- ongoing innovative technologies such as Graetzel panels
- communication skills
- Swiss urban configuration of the territory
- building materials
- all I could learn from construction professionals during construction and all requirements for every step of the process including our big challenge of transport
- a lot about organization and timing to be able to develop a project like this in all its phases

6. Has your Solar Decathlon experience impacted your professional career? If yes, briefly explain how.

Yes, and I learned in many different ways. As an experience from a masters student point of view it has been kind of a start for my professional career, because it has been the first time I have contributed to build a real building- this means it has been the first time I have treated with

the kind of professionals I will have to treat with during my whole future professional career. I learned a lot about real life and how things work in this field

Regarding knowledge, it opened my mind a lot, which is helping me to clarify what are my interests for the future. Which scopes I want to continue to study and investigate in order to deepen my knowledge. Also, many fields and ongoing systems I did not know about and that, as an architect, I will consider from now on for my own coming projects.

7. Has your Solar Decathlon experience impacted your view of the world? If yes, briefly explain how.

Yes. In becoming aware of how important education and social relationships are. Any kind of development we want to achieve rely completely upon them.

8. Has your Solar Decathlon experience impacted your perspective on sustainable energy? If yes, briefly explain how.

Yes. In becoming aware of how important it is to both reduce consumption and evolve to a more sustainable and social way of life. After having proved the many new ideas that have been developed by the competitors I now believe this evolution is possible and stands on the education of the community. The more innovative ideas I learn about, the more I realize there are still many more to come.

9. Is there anything else you would like to share about your Solar Decathlon experience?

It is an extraordinary experience as, in addition to everything I previously mentioned, it is also a great opportunity to make new good friends that will last forever, meet people you might work or collaborate with in the future, and get to widen your professional network more than you could imagine.

Upcoming Solar Decathlon AFRICA:

10. Do you have any suggestions to help us engage more people in Solar Decathlon AFRICA and increase participation?

I think the best way is to interact with and share real personal experiences of people that have already participated in one of the Solar Decathlons through pictures, videos or interviews. For this reason, I am open to plan a video call or whatever if needed.

D.8 Written Response from Margaux Peltier

Respondee: Margaux Peltier (Swiss team, US Solar Decathlon 2017)

Response Date: 20 February 2018

Location: Email

Purpose: To collect more information about previous participation experiences

Previous Solar Decathlon Experience:

1. How did you initially hear about the Solar Decathlon?

By the University, our university was planning to compete and informed us about the competition.

2. How did you get involved in the competition?

After the information session organised by our university, I applied for a first workshop and kept involved till the end.

3. What was your initial motivation for participating?

I'm interested in sustainable housing and it was the opportunity to apply and enlarge my knowledge in that domain, in a real project.

4. Can you describe the commitment necessary for participating in the competition? (in terms of time, courses, money, etc.)

Around 5 to 15 hours per week depending on the project timescale.

5. What interdisciplinary skills did you learn from the Solar Decathlon?

I'm a civil engineer student, and I especially learned interdisciplinary skills in architecture, integrated design of technique and architecture.

6. Has your Solar Decathlon experience impacted your professional career? If yes, briefly explain how.

I don't know yet, but I hope so.

7. Has your Solar Decathlon experience impacted your view of the world? If yes, briefly explain how.

(No response)

8. Has your Solar Decathlon experience impacted your perspective on sustainable energy? If yes, briefly explain how.

Yes, this experience allowed me to learn a quantity of new ways to integrate sustainable energy in a project.

9. Is there anything else you would like to share about your Solar Decathlon experience?

The experience was fantastic ! I strongly recommend ! Not only I've enlarge my skills, but I also made new friends. The competition was one of the best experience, meeting new people, explaining to visitors, get people involved in this topic...

Upcoming Solar Decathlon AFRICA:

10. Do you have any suggestions to help us engage more people in Solar Decathlon AFRICA and increase participation?

(No response)

Appendix E: Blogs of Past Participants

E.1 Video Blog from HALO, Team Sweden

<https://vimeo.com/66813358>

MALIN KEMPE SVENSSON - Student, Structural Engineering & Building Technology

What I think that I can learn architects is to see it in a practical way, so it's doable, the solution, and what I have learned, now, working on this project from the architects is that not everything has to be dull and boring, so you can like spice things up and make it a bit more fun.

MALIN KJELLBERG - Senior Lecturer at Chalmers, Project Manager for Team Sweden

The uniqueness I think lies within that you follow a concept from blank piece of paper to a finished product. We have small project classes where we can do design and we can do prototypes and paper and wood, but to be able to build something in full scale and test different aspects of it is unique.

E.2 Video Blog from Denver Opening Ceremony

<https://vimeo.com/236975572>

DAN BROUILLETTE - Deputy Secretary of Energy US DOE

The competitions train the spotlight on two increasingly important elements in today's energy world, and that is energy efficiency and renewable energy. Energy efficiency supports domestic energy by ensuring that we are good stewards of America's abundant energy supply. As for renewable energy, the rise of new technologies have made it an increasingly affordable part of America's portfolio. ... more than just a student competition focused on workforce development, it provides a live demonstration of the innovative energy saving, energy creating, available to consumers that are based on DOE investments over the years.

LINDA SILVERMAN - Solar Decathlon Director

We want to provide a really unique workforce development experience for students because we want the best and brightest in the energy industry. You guys have done a great job, you've overcome all these obstacles. You are problem solvers, and you are our future. So anybody here who's looking for employees who are incredibly smart and dedicated and can get the job done, they're right out there.

E.3 Blog from member of Virginia Team 2002

<http://wdmarchitects.com/2015/10/a-cool-day-in-the-sun-reflections-from-a-solar-decathlete/>

TOM NELSON, AIA, LEED AP - Past competitor in SD 2002 & Sustainability Architect

I had the privilege of participating in the inaugural Solar Decathlon in 2002 as part of the University of Virginia team. My undergraduate degree is in Mechanical Engineering, so my main area of work was on the plumbing and HVAC systems on our house, affectionately known as the Trojan Goat.

After countless hours of design and redesign, and then countless more hours spent actually building the system and testing it, we finally managed to settle on a layout that minimized wasted energy and maximized the utility of the system; we created secondary and tertiary uses for the energy collected from the sun. If we were not able to use the energy to heat the primary domestic hot water tank, then we used it to heat up the backup tank or the water supply for the radiant floor, which provided heat for the house. And even if we didn't need any more heat for any of these systems, we were able to dump it into a massive hand-built storage tank where we could save it for a time when we needed it.

As the sun came up on the first day of the competition, I watched the temperature of the water rise as it exited the domestic hot water solar panels. That showed that the system was actually functioning and creating hot water solely from the energy of the sun. For me, that was one of the competition's biggest highlights.

To my delight, we won the Design and Livability competition. None other than Glenn Murcutt, noted architect and competition juror, gushed, "The design of solar homes must be as poetic as it is rational. The Virginia team fully considered building materials, insulation, ventilation, and the use of light – whole building, sustainable design. There was little question that Virginia had the most inspired house."

There is no doubt that I found the house and the process inspiring as well; it was a key catalyst in my decision to go to graduate school and get a Master's Degree in Architecture!

The lessons gained from this process were innumerable. I learned that things are never going to work out quite how you expect them to, so it is best to stay as flexible as possible and never lose sight of the big picture. Also, the more details you can work out beforehand, the better off you'll be in the long run. The thrill of finally getting the systems pressurized and working how we envisioned, and then reflecting on all of the blood, sweat, and tears that it took to reach

that point, was one of the most satisfying feelings that I have ever experienced. This project required a constant give-and-take between the architects and the engineers on the project. And this process, spread out over an entire year, helped me to understand where the architects were coming from, and made me realize how intriguing I found their point of view.

E.4 Video Blog from Washington University in St. Louis

<https://www.youtube.com/watch?v=WvKqpBmZNEY>

PABLO MOYANO - Faculty Project Architect

One of the requirements of the competition indeed has to be run by students. The role of faculty typically is support, so that what we been doing in this entire process. For particularly this project, we, because it's the first time Washington University is competing in this solar decathlon competition, we have, especially (inaudible) and I, from the very beginning we have a very strong commitment, and we really encourage students to take a leap, and that happens on and off.

So one of the reasons is every semester, we have to switch the group of students, because of the curriculum of the school, so students, very few students can take two studies in a row, regarding solar decathlon, so it's a challenge, for us, because we have to make sure that we transmit what happens in prior semesters and we have to make students engage and take ownership of the next steps. I think overall we were pretty successful, we students really it took like a few weeks to understand and digest what happened before, but they were able in all cases, in all four semesters to fully engage what has been done before and take the idea on keep on working on that.

So it's important to point out that these three components, three main let's say characters in this process, one is the students, which is definitely the most important one. Then we have the faculty, which is the support and guidance for the students. But then the third element here is the industry. We have a lot of companies and different manufacturers, that are very very involved in the whole process. So this is really a three part components that are working together towards this house. And I think all three of them, students, faculty, and manufacturers, were fully involved and engaged during the entire process. So even though students are kind of the soul of this, faculty and manufacturers are also very important part of this whole process. And it was really, in all three I mean especially in the last two or even three semesters, it was really interactive. We have meetings constantly, with faculty students and manufacturers, with site visits to different [inaudible] companies, we did a lot of also visits to all manufacturers, we visited window manufacturers, [inaudible] steel, of course many other materials involved in the project, we have students reaching out to different manufacturers and different suppliers, and that was a constant back and forth. We had meetings held in studio, also in other companies, places,

all the time, so it was really really interactive between the three members, the three components that I mentioned before.

Appendix F: University Presentations



Thank you so much for having us here. We are a team of university students from the United States working on a project to share information about Solar Decathlon AFRICA taking place in Benguirer in 2019. We will be giving a 15 minute presentation. At the end, there will be a time for questions and answers as well as a brief exit survey. If you have clarification questions, feel free to raise your hand at any time.

(Presenter 1)



This video is a net zero energy house built by 43 university students from 4 universities in Switzerland. This is the design plan they created for their house called the “neighbor hub” and presented at Solar Decathlon 2017 in Denver, Colorado in the United States.

(Presenter 1)



This is the completed house that the Swiss team presented at the competition in Denver for Solar Decathlon 2017.

(Presenter 1)

Qu'est-ce que le Solar Decathlon?



Maisons à
consommation
énergétique
nette zéro

[4]

4

What is the Solar Decathlon? The Solar Decathlon is an international collegiate competition that challenges teams to design, build and operate grid-connected, attractive and net-zero-energy houses.

(Presenter 1)

English: What is the Solar Decathlon? net- zero energy houses



This is the timelapse from the construction phase of the 11 houses at Solar Decathlon 2017. Here you can see how design plans like the one we showed in the beginning come to life.

(Presenter 1)



The Solar Decathlon has had 18,000 participants. As you can see from the pins on the map, the Solar Decathlon has taken place all over the world through 13 competitions, and every team has created houses with net zero energy. YOU could be a part of Solar Decathlon AFRICA held in Morocco in 2019.

(Presenter 1)

English: 18,000 Participants; 13 Competitions; 0 Energy Consumption

Mémorandum d'accord



SOLAR DECATHLON
AFRICA MOROCCO 2019



[7]

[1]

7

In November 2016 during COP22, the Moroccan Ministry of Energy, Mines and Sustainable Development, the U.S. Department of Energy, and the Moroccan Research Institute in Solar Energy and New Energies, known as IRESEN, signed a Memorandum Of Understanding to collaborate on the development of Solar Decathlon AFRICA.

(Presenter 2)

English: Memorandum Of Understanding

IRESEN

Institut de Recherche en Energie Solaire et Energies Nouvelles

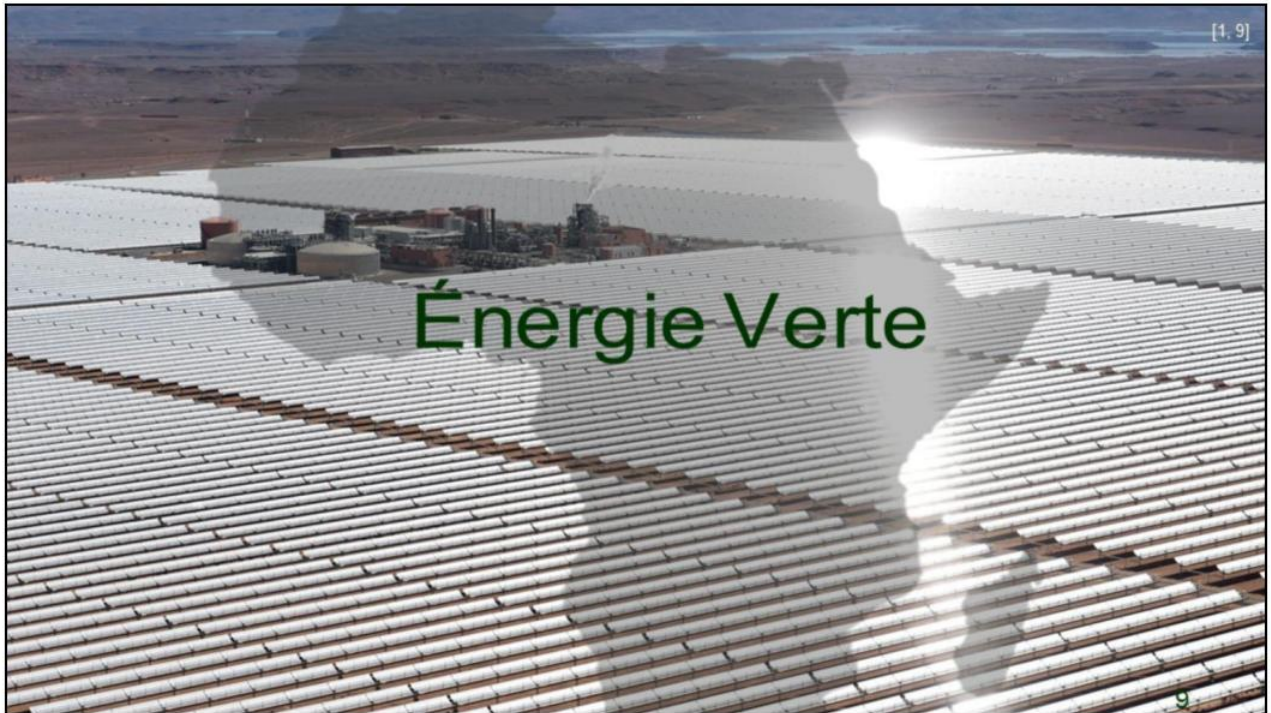
[1]



8

We are a group working with IRESEN to get people involved and excited about Solar Decathlon AFRICA. IRESEN and Mohammed VI Polytechnic University are the two organizers for Solar Decathlon AFRICA. The first step of participation is to make your own team which can consist of multiple universities.

(Presenter 2)



Solar Decathlon AFRICA is a unique opportunity for the countries of Africa to come together moving toward green energy. Solar Decathlon AFRICA demonstrates that highly energy-efficient and solar-powered houses are attainable, practical and affordable.

(Presenter 2)

English: Green Energy



The goal of the Solar Decathlon is to create a fully, functional house. These houses are then judged during the 3 week competition period. Now we will go through the 10 contests that are measured and judged in the competition.

(Presenter 2)



The goal of the Solar Decathlon is to create a fully, functional house. These houses are then judged during the 3 week competition period. Now we will go through the 10 contests that are measured and judged in the competition.

(Presenter 2)

Architecture



11

The architecture contest is based on how well teams incorporate traditional African heritage and use indigenous materials from any region of Africa throughout the house.

(Presenter 2)

English: Traditional African Architecture, Indigenous Materials

Architecture

Architecture
Africaine
Traditionnelle

Matériaux
Indigènes



[10,
11]

11

The architecture contest is based on how well teams incorporate traditional African heritage and use indigenous materials from any region of Africa throughout the house.

(Presenter 2)

English: Traditional African Architecture, Indigenous Materials

Architecture

Architecture
Africaine
Traditionnelle

Matériaux
Indigènes



[10,
11]

11

The architecture contest is based on how well teams incorporate traditional African heritage and use indigenous materials from any region of Africa throughout the house.

(Presenter 2)

English: Traditional African Architecture, Indigenous Materials

Ingénierie et Construction



12

The engineering and construction evaluates the structural design and code compliance.

(Presenter 2)

English: Structural Design, Code Compliance

Ingénierie et Construction



[3]

Design
Structurel

Conformité
au Code

12

The engineering and construction evaluates the structural design and code compliance.

(Presenter 2)

English: Structural Design, Code Compliance

Appel du Marché



13

Market appeal is scored on the design's attractiveness to the team-defined target market and market impact potential. For example...

(Presenter 2)

English: Identify & justify the target market of the house

Appel du Marché

Identifier et justifier le marché cible de la maison



13

Market appeal is scored on the design's attractiveness to the team-defined target market and market impact potential. For example...

(Presenter 2)

English: Identify & justify the target market of the house



This picture is the interior of SILO, the competition house by Missouri University of Science and Technology. The house was made for elderly people as the house's system relies on voice commands. The ease-of-access creates a comfortable and efficient living space for the homeowner.

(Presenter 2)

Conditions de Confort



15

The comfort condition contests assesses the capacity for providing interior comfort of the house through the control of temperature, humidity and lighting intensity.

(Presenter 2)

English: Control Temperature, Humidity, Lighting

Conditions de Confort



[4]

Contrôlez la
Température,
L'humidité,
L'éclairage

15

The comfort condition contests assesses the capacity for providing interior comfort of the house through the control of temperature, humidity and lighting intensity.

(Presenter 2)

English: Control Temperature, Humidity, Lighting

Appareils Électroménagers



16

The appliances contest tests the performance of everyday tasks by reproducing the average energy used in a modern home such as the refrigerator, oven, dishwasher, and clothes washer. For example...

(Presenter 2)

English: Refrigerator & Freezer, Oven, Clothes Washer

Appareils Électroménagers

Réfrigérateur
et congélateur

Four

Lave-linge



16

The appliances contest tests the performance of everyday tasks by reproducing the average energy used in a modern home such as the refrigerator, oven, dishwasher, and clothes washer. For example...

(Presenter 2)

English: Refrigerator & Freezer, Oven, Clothes Washer



This can be shown through dinner parties that each team has to host for other teams. All food is prepared using the kitchen appliances in the house.

(Presenter 2)

English: Dinner Party

Durabilité



18

The sustainability contest encourages the use of reusable materials, as well as long lasting and energy self sufficient practices.

(Presenter 1)

English: Reusable Materials, Withstand Time

Durabilité



Matériaux
réutilisables

Résister à
temps

[4]

18

The sustainability contest encourages the use of reusable materials, as well as long lasting and energy self sufficient practices.

(Presenter 1)

English: Reusable Materials, Withstand Time

Accueil Vie et Divertissement



19

The home life and entertainment contest simulates the demanding standards of present day society. Teams should showcase comfort and a positive home life experience while making adjustments to save energy. For example...

(Presenter 1)

English: Comfort, Productive space

Accueil Vie et Divertissement

Confort

Espace
productif



[3]

19

The home life and entertainment contest simulates the demanding standards of present day society. Teams should showcase comfort and a positive home life experience while making adjustments to save energy. For example...

(Presenter 1)

English: Comfort, Productive space



To assess home life and entertainment, teams host movie nights for other teams. They invite over members and show off their entertainment systems.

(Presenter 1)

English: Movie Night

Communication et Sensibilisation Sociale



21

The communication & social awareness contest measures how well the team educates, informs, and interests the public, through their website, social media and house tours. For example...

(Presenter 1)

English: Website, Social Media, House Tours

Communication et Sensibilisation Sociale



Site Internet

Des médias sociaux

Tours de maison

21

The communication & social awareness contest measures how well the team educates, informs, and interests the public, through their website, social media and house tours. For example...

(Presenter 1)

English: Website, Social Media, House Tours



Here a team member from University of Nevada, Las Vegas is giving a tour of the Sinatra Living competition house.

(Presenter 1)

Énergie Électrique et Équilibre



23 [3]

The electrical energy and balance contest evaluates the houses' self-sufficient electricity provided by active solar technology.

(Presenter 1)

English: Energy Performance

Énergie Électrique et Équilibre

Performance
énergétique



23

[3]

The electrical energy and balance contest evaluates the houses' self-sufficient electricity provided by active solar technology.

(Presenter 1)

English: Energy Performance

Innovation



24

Finally, the innovation contest is judged by industry professionals based on the team's innovation in concept, approach, research, design, implementation, and execution. For example...

(Presenter 1)

English: Creative Initiatives

Innovation



[3]

Initiatives
créatives

24

Finally, the innovation contest is judged by industry professionals based on the team's innovation in concept, approach, research, design, implementation, and execution. For example...

(Presenter 1)

English: Creative Initiatives



This is the reACT house by University of Maryland. This team demonstrated their innovative solar food dehydrator which is a barrel composter that turns food scraps into nutrients.

(Presenter 1



Technologie
Innovation
Développement

In addition to these ten contests, there are opportunities for teams to develop unique, innovative technologies that you can be a part of in Solar Decathlon AFRICA.

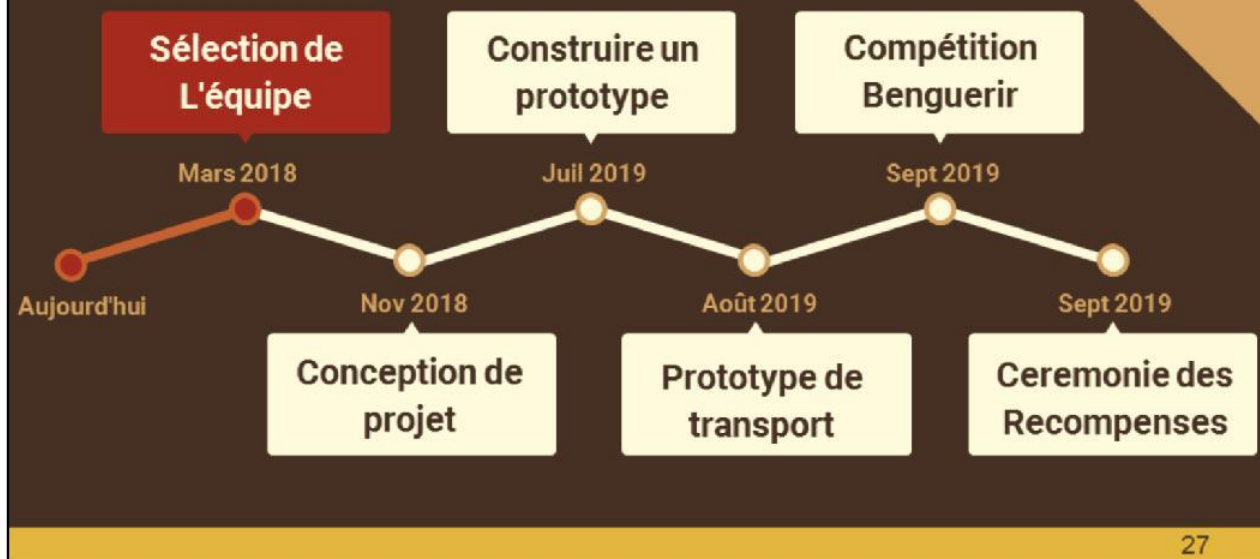
(Presenter 1)



In addition to these ten contests, there are opportunities for teams to develop unique, innovative technologies that you can be a part of in Solar Decathlon AFRICA.

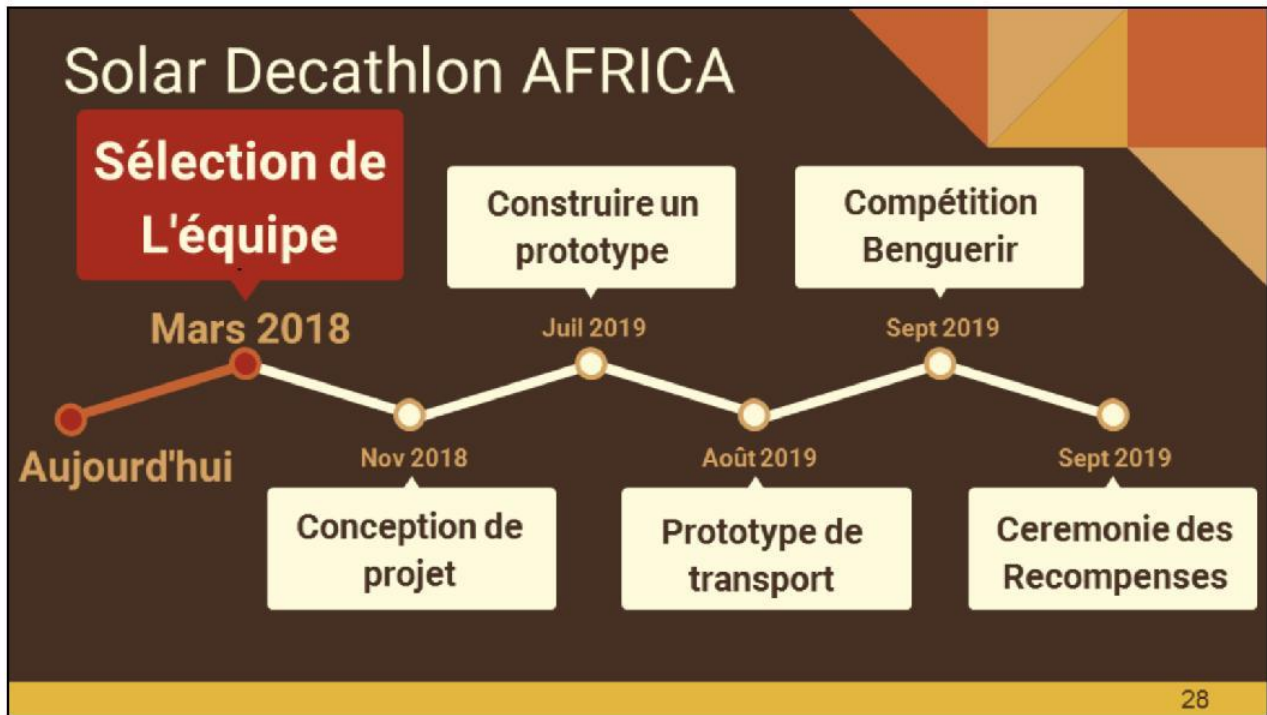
(Presenter 1)

Solar Decathlon AFRICA



Here is the timeline for the competition Solar Decathlon AFRICA.

(Presenter 2)



Selection of the twenty participating teams is happening now through March.

(Presenter 2)



Plusieurs Universités



WPI



NYU·poly
POLYTECHNIC INSTITUTE OF NEW YORK UNIVERSITY

Équipes Internationales



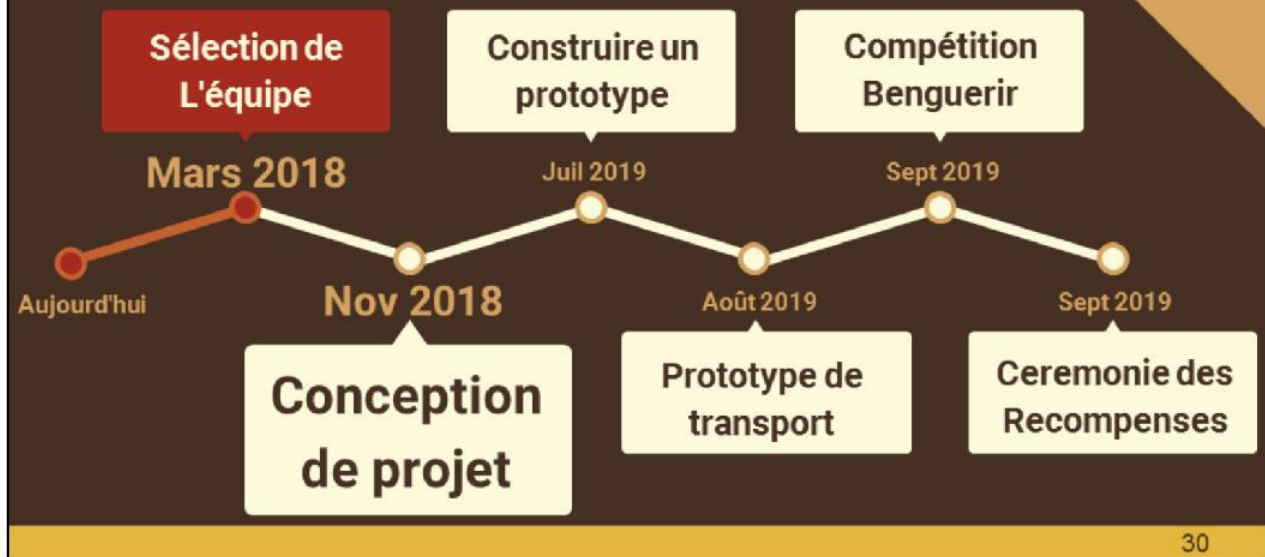
29

Having multiple universities on one team helps create a team that has the necessary skills. For example, one team consisted of students from WPI in the United States, University of Ghent in Belgium and NYU Poly from the United States who came together to compete in Solar Decathlon China. Having multiple universities allows for a well balanced team. For example if you have a strong engineering program, you can match with a school who specializes in communication.

(Presenter 2)

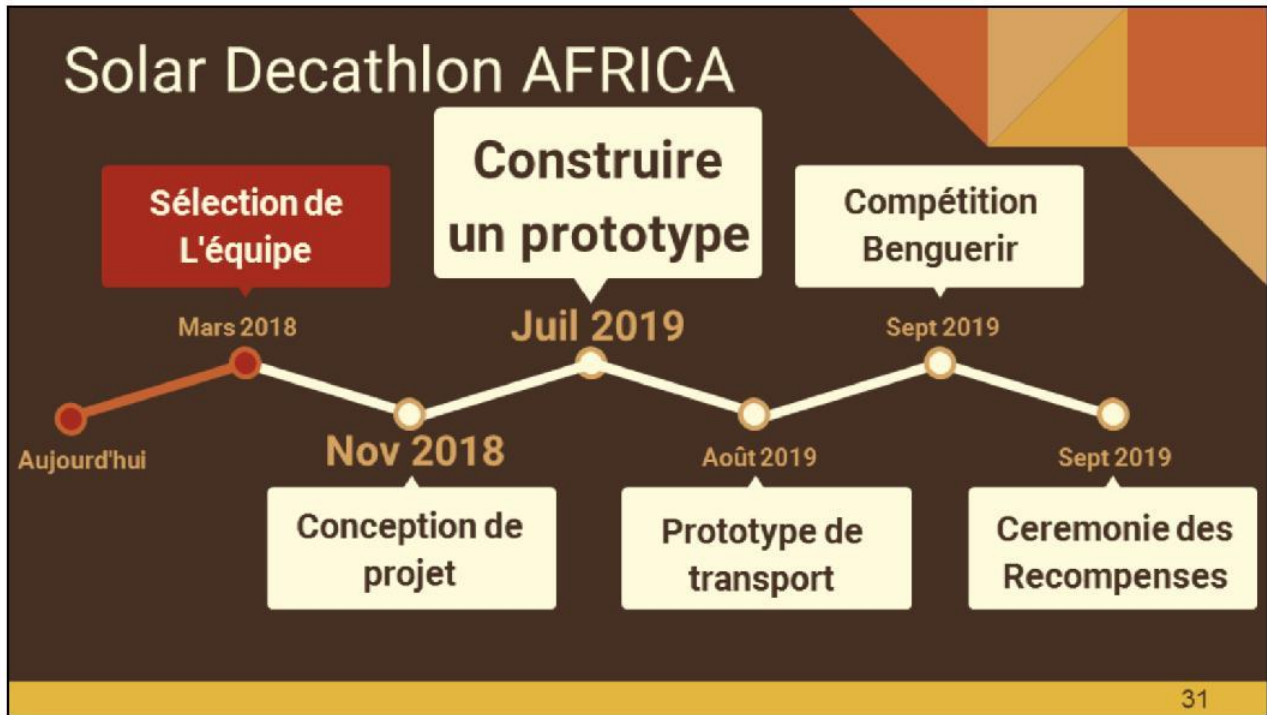
English: Multiple Universities, International Teams

Solar Decathlon AFRICA



The design process of the competition houses will take place over the following 10 months.

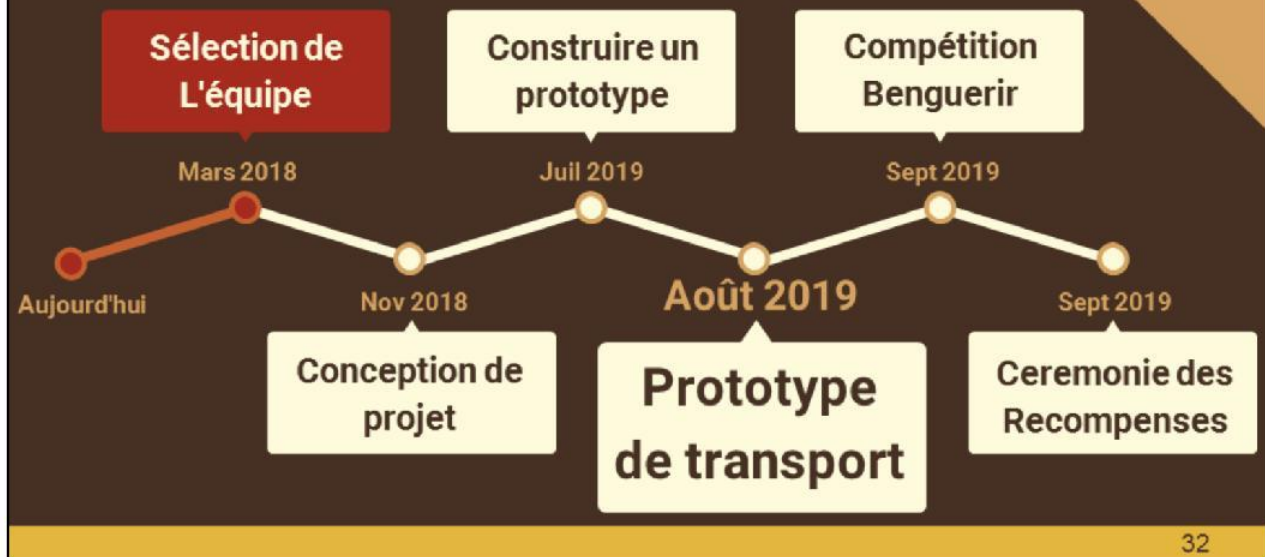
(Presenter 2)



The construction of the components of the competition houses will take place November 2018 to July 2019.

(Presenter 2)

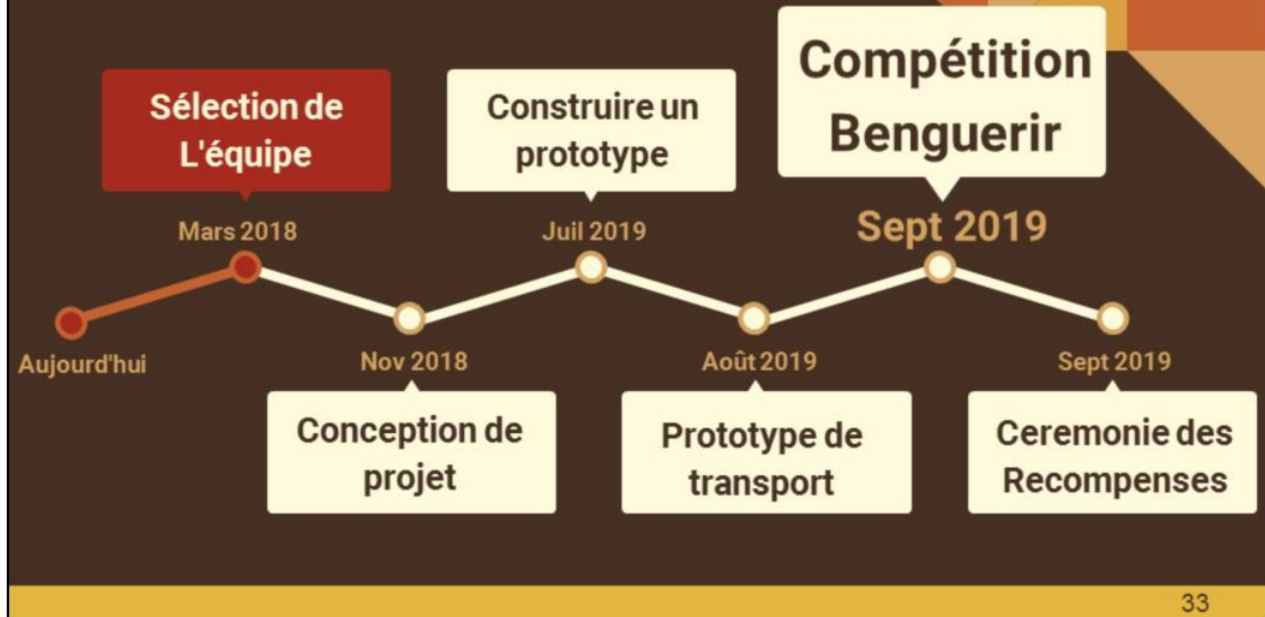
Solar Decathlon AFRICA



In August 2019 the competition houses will be shipped to the solar village in BenGuerir.

(Presenter 2)

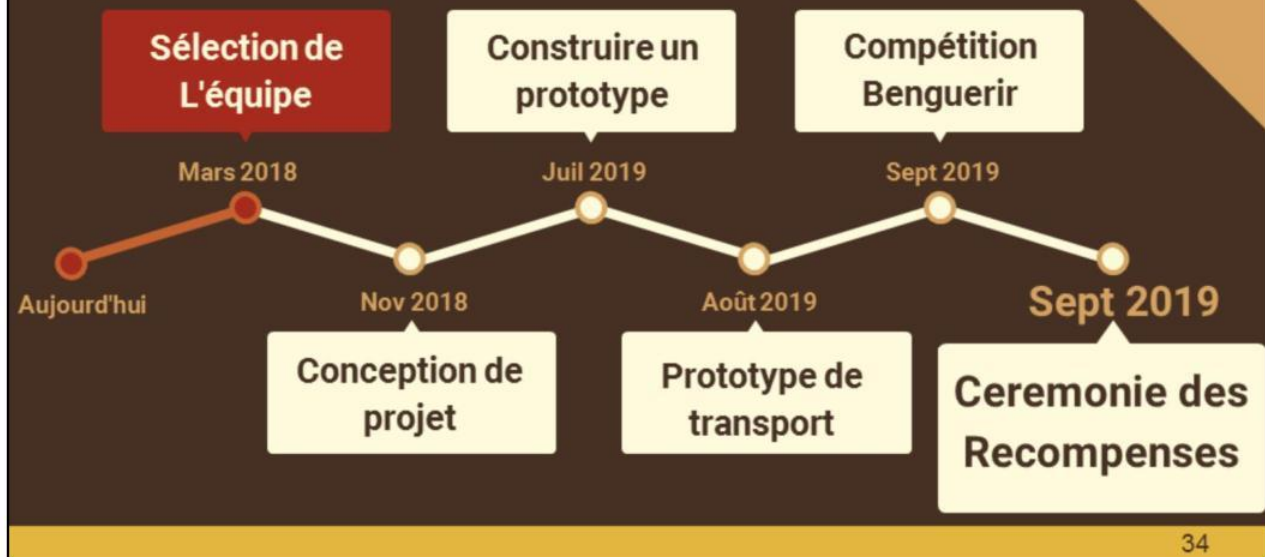
Solar Decathlon AFRICA



In September 2019, the competition will take place over three-weeks in which the houses will be monitored and scored.

(Presenter 2)

Solar Decathlon AFRICA



Lastly, there is a big celebration of all the hard work.

(Presenter 2)

50 000 USD

financement par maison

0 USD

coût par participant

35

Throughout the deadlines of the competition process, each house will be given a total of 50 thousand U.S. dollars. But to cover additional costs, industry companies become invested in the project and donate to teams. In the past Solar Decathlons, participants have only spent money on personal expenses.

(Presenter 2)

English: 50,000 USD dollars per house; 0 USD cost per participant



University students like you have gained knowledge, experience and insight into renewable energy from competing in the Solar Decathlon. But don't just hear it from us... This is a quote from a participant in Solar Decathlon China 2013

(Presenter 1)

Briana
Weisberger,
team BEMANY,
SD China 2013



“mais si vous cherchez juste à être énergiquement indépendants, ce n'est pas un concept difficile, et c'est faisable,

[4]

37

English: “it’s doable, and I think that it totally changes your perspective, cause you’re like ‘woah, why do I pay energy bills?’”



[4]

et je pense que ça change complètement votre perspective,

37

English: "it's doable, and I think that it totally changes your perspective, cause you're like 'woah, why do I pay energy bills?'"



[4]

parce que vous êtes comme woah, pourquoi je paye des factures d'énergie?"

37

English: "it's doable, and I think that it totally changes your perspective, cause you're like 'woah, why do I pay energy bills?'"

Avantages de participation

92%

Des participants travaillant dans le domaine de l'énergie propre affirment que leur expérience Solar Decathlon les a aidés à trouver un emploi.

94%

Les participants disent qu'ils ont appris davantage sur l'énergie solaire et la conception éconergétique dans la compétition que dans une salle de classe.

[12]


38

Advantages of participant are:

92% of participants working in the clean-energy field say their Solar Decathlon experience helped them get a job.

94% of participants say they learned more about solar-power and energy efficient design in the competition than in a classroom

(Presenter 1)



“It is the best learning tool I have ever found in school...this experience is a once in a lifetime experience.”

-Rebecca Eaker, team BEMANY, SD China 2013

[13]

39

A quote from Solar Decathlon participant, Rebecca Eaker: “It is the best learning tool I have ever found in school... this experience is a once in a lifetime experience”

(Presenter 1)

Supported By:

KINGDOM OF MOROCCO



*MINISTRY OF ENERGY,
MINES, AND SUSTAINABLE
DEVELOPMENT*



جامعة محمد السادس
متعددة التخصصات التقنية
MOHAMMED VI
POLYTECHNIC
UNIVERSITY

[1]

40

Solar Decathlon AFRICA is supported by Moroccan Ministry of Energy, Mines and Sustainable Development, the Moroccan Research Institute in Solar Energy and New Energies, Mohammed VI Polytechnic University, and we would like to thank Professor _____ for inviting us to speak here today and all of you for your time.

(Presenter 1)

www.solardecathlonafrika.com



We will now be passing out a brief survey and the screen will show past Solar Decathlon houses. Does anyone have any questions?

(Presenter 1)

www.solardecathlonafrica.com



Sinatra Living - University of Las Vegas, Nevada (SD U.S. 2017)

[3]

42

www.solardecathlonafrica.com



Team reACT - University of Maryland (SD U.S. 2017)

[3]

43

www.solardecathlonafrika.com



Team Montréal - École de Technologie Supérieure, Université de Montréal, McGill University (SD U.S. 2007)

[3]

44

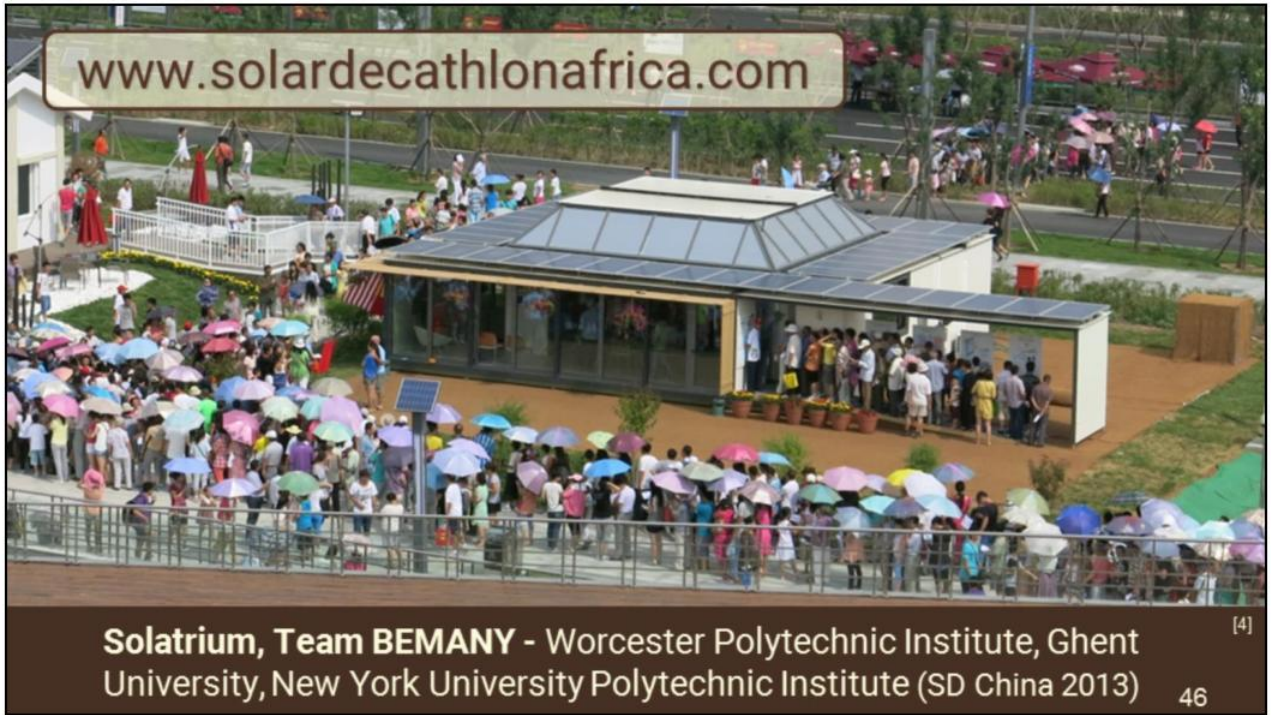
www.solardecathlonafrika.com



unSOLAR - Universidad Nacional de Colombia
(SD Latin America and Caribbean 2015)

[16]

45



www.solardecathlonafrica.com



Team Ikaros - University of Applied Sciences Rosenheim, Germany
(SD Europe 2010)

[17]

47

www.solardecathlonofafrica.com



Fab Lab House - Instituto de Arquitectura Avanzada de Catalunya, España ^[18]
(SD Europe 2010)

48

www.solardecathlonafrica.com



(e)co Team - Universidad Politécnica de Cataluña, Spain
(SD Europe 2012)

[8]

49

www.solardecathlonafrica.com



FOLD - Technical University of Denmark (SD Europe 2012)

[19]

50

www.solardecathlonafrica.com



Des questions?

Thank you - Merci - شكرا

[1]

51

(Nate)

Solar Decathlon AFRICA Exit Survey

Your participation in this research is voluntary. You have the right to withdraw at any point during the study, for any reason, and without any prejudice. Please be assured that your responses will be kept completely anonymous. (Votre participation à cette recherche est volontaire. Vous avez le droit de vous retirer à tout moment durant l'étude, pour quelque raison que ce soit et sans préjudice. Soyez assuré que vos réponses resteront complètement anonymes.)

What do you study at university? (Qu'est-ce que tu étudies à l'université?)

What year of university are you in? (En quelle année d'université êtes-vous?)

First Year (Première année) Second Year (Deuxième année) Third Year (Troisième année) Masters (maîtrise) PhD (doctorat) Other (Autre): _____

Before today, have you heard of the Solar Decathlon competition?

(Avant aujourd'hui, avez-vous entendu parler du concours Solar Decathlon?)
 No Yes If yes, please explain how. (Si oui, veuillez expliquer comment.)

Did today's presentation encourage you to learn more about Solar Decathlon AFRICA?

(La présentation d'aujourd'hui vous a encouragé à en apprendre davantage sur Solar Decathlon AFRICA?)

Not at All (Pas du Tout) Neutral (Neutre) Slightly (Légèrement) Moderately (Modérément) Very (Très)

Are you personally interested in participating in Solar Decathlon AFRICA in 2019?

(Êtes-vous personnellement intéressé à participer à Solar Decathlon AFRICA en 2019?)

Not at All (Pas du Tout) Neutral (Neutre) Slightly (Légèrement) Moderately (Modérément) Very (Très)

Would you be interested in learning more? (Seriez-vous intéressé à en savoir plus?)

Name & Email: _____

Thank you for taking the time to complete this survey. Please return it when completed. Feel free to put additional comments below or on the back of this paper. (Merci d'avoir pris le temps de remplir ce sondage. Renvoyez-le s'il vous plaît. N'hésitez pas à ajouter des commentaires ci-dessous ou au verso de ce document.)

Sources

- [1] <https://www.solardecathlonafrica.com>
- [2] <https://youtu.be/lpPTiw6eQrU?t=10s>
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- [8] <https://www.flickr.com/photos/sdeurope/>
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Appendix G: Interview Coding

If the link does not work, the data file should be in the same folder as this report.



Appendix G.xlsx

Appendix H: Exit Survey Data

H.1 Survey Responses

If the link does not work, the data file should be in the same folder as this report.



Appendix H.1.xlsx

H.2 Survey Responses Analyzed

If the link does not work, the data file should be in the same folder as this report.



Appendix H.2.xlsx

Appendix I: International Email Contacts

If the link does not work, the data file should be in the same folder as this report.



Appendix I.xlsx