



29 and 30 APRIL 2016

Details, Schedule and Challenges

STEAM Overview

The STEAM Innovation Challenge is a one of a kind, two-day intensive weekend ideation event held in KAUST on the 29th and 30th of April. It will involve KAUST students working in mixed, interdisciplinary teams alongside students from partnering Saudi Universities. The objective is for the teams to develop & present well-defined solutions to three major real world challenges.

The STEAM sponsor, the Islamic Development Bank (IDB), has helped us to outline the relevant challenges. The students chosen for this elite activity will have a background or expertise in Science, Technology, Engineering, Arts and Mathematics. It will be a key part of the KAUST *Enrichment in the Spring* Program.

The STEAM Challenge is designed and managed by the KAUST Entrepreneurship Center, part of KAUST Innovation and Economic Development, in association with the student-led Entrepreneurship, Business and Innovation Group (eBIG). The STEAM Challenge is also in partnership with key Saudi higher education partners: King Abdulaziz University, the University of Business and Technology (UBT), Effat University and Umm al-Qura University.

Challenges

The STEAM challenges are based on the strategic objectives of the Islamic Development Bank, with inputs from other global challenges that have been identified including water security, food security and urban development needs. These issues are local, regional and global. Therefore the STEAM challenges are poised with a particular emphasis on the needs of the Kingdom of Saudi Arabia, but the ability of the solutions to be scaled beyond the Kingdom should be a factor in the ideation by any teams.

About the Islamic Development Bank

The Islamic Development Bank is an international financial institution established in pursuance of the Declaration of Intent issued by the Conference of Finance Ministers of Muslim Countries held in Jeddah in Dhul Q'adah 1393H, corresponding to December 1973. The purpose of the Bank is to foster the economic development and social progress of member countries and Muslim communities individually as well as

jointly in accordance with the principles of Shari'ah i.e., Islamic Law. The functions of the Bank are to participate in equity capital and grant loans for productive projects and enterprises besides providing financial assistance to member countries in other forms for economic and social development. The present membership of the Bank consists of fifty-six countries and is headquartered in Jeddah, Saudi Arabia.

Managing the Challenges

Students will be pre-selected by the organizers into small mixed teams. It is up to each group to manage itself through the process, though mentors will be on hand to offer advice and help. Each team will be given one of the three main challenges to work on. Each challenge has three sub-themes. The team can decide on which sub-theme to pick and that can include a solution that tackles one or more of the sub-sections (which depends on the kind of solution being chosen through the ideation process). At least one of the sub-themes needs to be the basis of the solution each team comes up with. The challenges are listed further on.

Crafting a Solution

The objectives of the STEAM challenge is to come up with a proposed solution:

- That offers a solution for some or all of the overall theme including at least one of the sub-themes
- Is realistic while also being innovative
- Where the value proposition of the solution can be clearly defined, articulated and communicated in the pitches that take place on Saturday afternoon
- Can specifically reference how the solution can be delivered with specific reference to the Kingdom of Saudi Arabia, but also suggest how it might be scaled or implemented in other countries where IDB operates.

STEAM Process

The key elements of the STEAM Innovation Challenge:

- It is a short-timed challenge, started and completed over a 48 hour intensive time period.

- It is a team building exercise amongst mixed students from a number of chosen universities in the Jeddah area.
- Teams will be selected into small mixed groups of participants, with an attempt to mix competencies, genders and universities within the teams.
- Each team will have one of the three challenges randomly chosen for them to work on.
- Each challenge topic (3 in total) will have a semi-final on the second day with one winner in each category, who will then go on to compete against each other for the grand prize.

Key Notes for Participants:

Please take special note of these points, as they are critical to the running of this very large experimental innovation challenge. Please note this event follows normal KAUST procedures, and will take place in English. Please ensure you come to main security at the main KAUST entrance.

Teams & Challenges

1. Participant students will be assigned by the organizers to a team in one of the three rooms on the third floor of Building 19 in KAUST. Registration will be by room name, and each room will secretly be designated with one of the three challenges. The three rooms are coded as:
 - Ibtikar (Innovation)
 - Ebda'a (Creativity)
 - Riyada (Entrepreneurship)
2. Once the event starts, student teams will be told which of the challenges you have been assigned to, with each room designated one challenge.
3. Each team will have a table designated by number in each room, where you and your fellow team members will work on the assigned challenge of that room. You will be notified which room/table number your team is based at.

4. There will be no exceptions or changing of teams/rooms. If you don't know which team or room, these details will also be listed at various points at the event.
5. Please note that the teams will be mixed in terms of participating students from different universities and also mixed in terms of gender. You will not be able to choose which **team** you are in, as the organizers will randomly select these.
6. You will not be able to choose which **challenge** you will be doing, this will be chosen for you.
7. Each participant will receive a Certification of Completion from KAUST at the end of the event. The winning team will also be awarded with an additional certificate.
8. Every team will present on Saturday afternoon in a semi-final in each room/per challenge (approximately 10 teams per room).
9. Pitches will be 5 minutes long plus 5-8 minutes for key questions from the panel of judges.

We understand you may have knowledge or interest in one or other areas, but part of the idea of STEAM is that we have people with mixed backgrounds looking at the challenges with 'new eyes' rather than just their own backgrounds or experience.

It is also vital that if you have signed up to attend STEAM but change your mind or are unable to attend, you must let us know in advance as that will effect the make-up of your team.

Judging Criteria

The organizers, sponsors and/or their representatives, plus selected experts invited by the sponsors will serve as judges for the competition. The decision of the judging panel is final. Judges reserve the right to alter prize amounts.

The various judges will assess the quality of the solutions to the challenges and the final pitches in terms of its uniqueness, innovation level, potential viability, size of impact, ability to scale and the level to which it offers a sustainable solution to the challenge that the team was

given. The quality of the pitches and ability to communicate the idea will also be judged. A full set of judging criteria will be made available at the event.

Prizes

1. Prizes: The Islamic Development Bank has kindly offered the winning team prize of \$10,000, which will be shared equally amongst the team members.
2. The second prize is sponsored by *Innovation and Economic Development* at KAUST and each team member will receive \$1,000 each.
3. The third prize is sponsored by the KAUST *Entrepreneurship Center* and each team member will receive \$500 each.

Please note that prize monies will not be given out on the day. Each team winner will need to leave contact details to ensure that the payments can be made directly some time after the event.

Logistics, Registration and Security Passes

1. **Two buses will run from the Habitat Hotel in Jeddah on Friday (6.00 am) and Saturday morning (6.30 am) and back again on Friday and Saturday night, please check the schedule below.**
2. There is an early and late bus back on Friday night, in case some team members want to keep working on their ideas.
3. It is critical that you ensure you have given the right information needed for passing security at KAUST.

Important: All Visitor(s) to KAUST must go through security at the main entrance and have to have the following on arrival at the Visitor Center:

- Original and valid governmental ID (National ID, Iqama, or Passport). The same ID that you used to register.
- Valid driving license.
- Valid vehicle registration. (if driving)

Important: A visit might be rejected if visitor(s) fail to meet the above requirements.

4. It is critical that you arrive at security between 7-8 am or earlier on Friday morning, to ensure that you can get through security in time for the event to take place according to the schedule below.
5. Please note it is not possible for non-KAUST students to stay on campus during the event, therefore the buses or personal cars must be used to and from KAUST on both days.
6. Please ensure that you bring a laptop with you.

If you have any issues with security/access to KAUST during the two days of the event please contact:

Mr. Omar Kutbi Mobile: 054 4701533

Mr. Abdulrahman AlJiffry Mobile: 054 4701693

A member of the team, Mr Jerry Faldas, will be based at the KAUST visitor center from 7 am until 10 am on Friday morning.

Please note that if information for processing entry to KAUST has not been completed correctly or in time, there may be a possibility that entry into KAUST is not possible. This includes none registered cars or taxis.

Semi-Final Judges

Water Challenge

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|-----------------------|--------------------------|
| 1. Mr. Sami Faruqi | Islamic Development Bank |
| 2. Dr. Torove Leiknes | KAUST |
| 3. Mr. Tristan Walker | KAUST |

Food Challenge

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| 1. Mr. Bashir Jama | Islamic Development Bank |
| 2. Professor Mark Tester | KAUST |
| 3. Mr. Hani Ashqar | KAUST |

Urban Development Challenge

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| 1. Mr. Sohail Mitha | Islamic Development Bank |
| 2. Professor Charlotte Hauser | KAUST |
| 3. Mr. Serry Bakarman | KAUST |

STEAM Challenge Final

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|----------------------------|--------------------------|
| 1. Mr. Abdunnasser Minkara | Islamic Development Bank |
| 2. Professor Mark Tester | KAUST |
| 3. Mr. Tristan Walker | KAUST |
| 4. Mr. Hani Ashqar | KAUST |

STEAM Challenge Event Schedule

Friday 29th April 2016 – Building 19, third floor, KAUST

Time	Lead	Activity
06.00		Buses leave from Habitat Hotel, Jeddah
07.30 - 08.30		REGISTRATION & BREAKFAST
08.30 - 09.15	Teams	Team Mixer & Introductions
09.15 - 09.30	EC/IDB	Overview & STEAM Challenges Unveiling
09.30 - 10.00	EC	Empathy & General Design
10.00 - 12.15	Teams	Breakout Session: Ideate Solutions
12.15 - 13.45	Teams	Prayers/Work on Solutions (<i>Food provided at 1 pm</i>)
13.45 - 14.15	EC	Developing & Framing Your Solution
14.15 - 15.45	Teams	Breakout Session: Framing Your Solution
15.45 - 16.00	Rooms	STOP – Sanity Check
16.00 - 17.00	Teams	Breakout: Impacts of Your Solution
17.00 - 17.15	EC	Example: Pitch Video - Template
17.15 - 19.45	Teams	Frame Your Solution for Communication
18.00 - 19.00	Teams	<i>WORKING BUFFET DINNER</i>
20.00		<i>Early buses leave for Jeddah</i>
19.00 - 22.00	Teams	<i>Teams are encouraged to keep working – snacks and beverages to be provided</i>
22.15		<i>FINAL BUSES LEAVE FOR JEDDAH</i>

Saturday 30th April 2016 – Building 19, third floor, KAUST

Time	Lead	Activity
06.30		Buses leave from Habitat Hotel, Jeddah
08.00 - 08.50		Breakfast
08.50 - 09.00	EC	Welcome to Day 2
09.00 - 09.20	EC	How to Pitch
09.20 - 13.00	Teams	<i>Revise Pitch Document/ Finalize (Food provided at 12 pm)</i>
13.00 – 15.00	Teams	Semi-Finals – 10 teams per each of three Challenges
15.00 – 15.30	Judges	Judging and one finalist chosen per Challenge/room
15.30 – 15.45	Judges	Announce Finalists
15.45 – 16.30		3 Finalists revise pitches based on feedback
16.30 – 17.15	Teams	Final Presentations – 3 Challenge Finalists
17.15 – 17.45	Judges	Judges Deliberation
17.45 – 18.10	IDB	Winners Announced / Photos
18.10 – 18.20	EC/SEP	Farewell and Thanks – End of Program
18.30		Buses Leave for Jeddah

Three judges are assigned to each of the three challenge semi-finals, including one judge in each room that will then be one of the three judges for the finals. Assigned mentors will be available during all the Breakout sessions.

2016 KSA STEAM Challenges

In the kingdom of Saudi Arabia, having more than 82 percent of the population living in urban cities, major challenges are encountered that require innovative thought provoking solutions. The percentage is expected to drastically increase in the coming years making the urban development one of the Kingdom’s top priorities. This is not just a challenge for the Kingdom but is a global issue for most countries.

In general, rapid urbanization is exerting pressure on a range of key areas, leading to issues around security and scarcity of key supplies (water, food) and the provision of necessary infrastructure for the increasing urban population.

It is with these local and global issues and the objectives of the STEAM partner Islamic Development Bank, as well as the lead STEAM Challenge university (KAUST) and partner universities missions, that these three challenges were developed.

We expect teams to come up with solutions that are technically feasible, financially sound, economically viable and environmentally friendly to secure sustainable and affordable urban living in an efficient and timely manner.

1. Water Challenge

“Water, water everywhere...in it’s right place”

1.a Flooding Challenge

This challenge in part deals with the results of climate change and the increased threat of flooding here in the Kingdom of Saudi Arabia. Similar to an increasing number of countries the coastline of the Kingdom, and in particular the Jeddah area, is subject to various threats caused by the natural phenomenon as well as by the human interventions. Indeed, floods in Jeddah become recurrent events causing human and property loss. In addition, the climate change impacts are inevitable in the near future including but not limited to sea level rise and climate variability that may result in more floods and natural disasters. This could include climate change & environmental impacts.

Factors that are important to consider include:

- New methods of constructing low cost and/or efficient coastal protection.
- Management and protection from floods; storm water flows and drainage systems.
- Technologies that can manage the potential impact of sea level rise on aquifer.

For this challenge teams are expected to come out with innovation that would protect coastlines and cities such as Jeddah from flooding related threats. Specifically, the team shall endeavor to identify various stakeholders and propose innovative short and long term solutions that are simple, sustainable and implementable economically.

2.b Water Security Challenge

This challenge is about managing natural water supplies from storm and rainwater. As climate change takes hold, there are increasing changes to the weather pattern. In many cases this will lead to water security and scarcity issues across the globe but can also lead to unexpected extremes in weather conditions. In the Kingdom, this has led to in some cases even more rain fall albeit in a sporadic fashion. The challenge for teams is to design innovative solutions that would allow for the Kingdom to manager scarce water resources.

Factors that are important to consider include:

- Efficient methods of long-term harvesting of occasional rainfall.
- Developing methods for supporting water management.
- Developing innovative but low cost technology solutions for water collection, management or development.

For this challenge teams are expected to think laterally about new innovative methods, potentially low cost actions that can be scaled across large regions, particularly in under-developed parts of the world, as well as in the Kingdom. This is about the management of ‘much’ relative to the majority times of ‘little’, which is of particular interest to the Kingdom which faces drought most of the year, but also sporadic and heavy rain falls.

3.c. Water Pollution Challenge

This challenge is about managing pollution particularly in wastewater from consumers and industry. Pollution of the coastal area is increasing due to economic and development activities. Moreover, the economic activities and social norms in growing cities like Jeddah are generating large amounts of industrial waste and wastewater, which are causing increased pollution and environment hazard to the coastal life. There is a need to identify various facets of the problems and their causes that lead to potential solutions.

Factors that are important to consider include:

- Mitigation of the impact of wastewater discharge on marine life.

- Managing the sources of desalination water intakes from Industrial Waste water or domestic sewer water.
- Managing pollution issues for increasing ferocity of storms and the wind, rainwater damage effects.

For this challenge teams are expected to come out with innovation that would manage the challenge of human pollution and related manmade threats. Specifically, the team shall endeavor to identify various stakeholders and propose innovative short and long term solutions that are simple, sustainable and implementable economically.

2. Food Challenge

“Making Every Calorie Count”

2.a How to support food security through urban farming

Urban agriculture has the potential to contribute to food security of the rapidly growing global population – estimated to be 9 billion by 2050 from 7 billion now. This would include the ability to identify alternative urban farming solutions to the existing and widespread solutions such as hydroponics, or at least radically improve on them.

Factors that are important to consider include:

- Developing innovations that allow large numbers of urban dwellers, to use and grow their own food through innovative applications of unused space.
- Novel use of new technologies such as mobile or internet of things to support, grow, manage, measure and communicate these potential new markets to and from a wide audience.
- Creating solutions that allow this new form of city agriculture to grow, by smart uses or replacement of the agricultural usage of water.

For this challenge, teams should take into account the potential to use waste water for example there is plenty of waste in urban areas,

including Muslim cities and mosques where ablution contribute a lot to it.

Also worth taking into account are the relevant cost to procure, operate and maintain different production systems, what the resultant yield of crops produced versus the cost in time/resources and how this might contribute to national and international food and nutritional security

2.b How to manage food waste from consumers and industry

Despite the issues that exist in the world regarding people who cannot get enough to eat each day, there is shocking waste of food (uneaten, thrown away) in the developed and increasingly the developing world. For example it was estimated that in 2013 half of all food produced was wasted worldwide, according to the British Institution of Mechanical Engineers (IME).

Factors that are important to consider include:

- New innovative methods that make food waste for other uses that can be scaled across urban areas.
- Innovative usage of technology to manage the harvest-to-plate value chain in modern food delivery systems.
- New forms of food containment and storage that is more climate-efficient and/or can help manage food delivery to consumers.

For this challenge, teams should also take into account the other effects of food waste, not least on climate change. For example in the USA, organic waste is the second highest component of landfills, which are the largest source of methane emissions.

A recent study from the Potsdam Institute for Climate Impact Research revealed that up to 14 percent of greenhouse gas emissions coming from agriculture could be avoided if food were more efficiently used and distributed.

2.c Improving the food industry value chain.

This challenge seeks innovations that support the major elements of the entire food value chain: from field-to-plate. This could include farming, packaging, transportation and packaging elements of the food industry.

Factors that are important to consider include:

- The first place to look for food waste solutions is in where the food originates from: the farm. For example what innovations can teams come up with for better use of farming space, crop data, market prices, energy needs, water needs or storage.
- What technologies can be adapted to any or all parts of the value chain such as for more efficient transportation, packaging systems that food producers use to make more sustainable, better use of packaging and 'smart' systems.
- Where food waste is imminent, how can we best adapt innovation to ensure that food is taken out of the value chain at the right moments, and sold or donated to those most needy in society?

3. Urban Development

“Better Living in Our Cities”

3.a How to support and develop new large urban populations

As cities continue to grow, with new citizens moving from rural to urban areas, there are increasing challenges of how best to support these new city migrants. In many cases these people can constitute what is considered new urban poor.

Factors to consider include:

- The ability to connect these groups with retraining, upskilling and personal development programs beyond what is already on offer, in a cost effective manner.
- The potential to use new technologies such as mobile platforms to connect these groups to the job market in an efficient way.
- The opportunity to use technology to identify means of identifying and promoting existing successes in one geographic areas, that can be promoted as solutions to other areas.

For this challenge teams are asked to consider the ability to create sustained and skilled workforce, form solutions that lead to higher employment rates and increased productivity and seek impacts for economic growth influencing prosperity, poverty reduction and stability.

3.b Supporting the development of social and affordable housing

Due to the rapid growth of cities in the past decades, and in particular the rapid increase of cities in the Kingdom, there is an urgent need for affordable social housing for different groups including working class families and migrant workers.

Factors that are important to consider include:

- Housing that is socially acceptable to different user groups and their needs.
- Housing that is cost effective and efficient in terms of speed of build, flexibility of design.
- Particularly housing that adheres to smart and sustainable/green objectives.

For this challenge teams are asked to 'go beyond the norm' in terms of traditional housing units, to see out new concepts and partake in existing or new innovations, in their efforts to present new housing systems that can be scaled in an effective, modular and efficient way.

3.c Helping to develop better health and wellbeing for city dwellers

One of the knock-on effects of modern life, and in particular of city living are the health issues involved. No longer in a rural setting, humans tend to lose many of the pluses of living in the countryside including effects on diet, exercise levels, and many of the psychological disorders that come with fast-paced city living.

Factors that are important to consider include:

- Issues around the increasing global issues of obesity, which itself is associated with a higher incidence of a number of diseases, including diabetes, cardiovascular disease, and cancer.

- Consumption of fast food, trans fatty acids (TFAs), and fructose—combined with increasing portion sizes and decreased physical activity—has been implicated as a potential contributing factor in health crisis.
- Using new technologies to mitigate, communicate and measure, and ultimately effect user behaviour.

For this challenge teams are asked to identify culturally appropriate and acceptable approach to modify risk factors related to such health issues obesity which may include wellness activities and programs, personalized health behavior change and other innovations that can help urban populations to empower themselves with the information, systems and choices to make decisions for their health and lifestyle.

Background Reading

Even though you will not know which challenge you will be working on until Friday, you can at least start to learn critical processes.

Business Planning for Social Impact

<http://www.rootcause.org/resources2/business-planning-for-enduring-social-impact-a-how-to-guide>

Solving Complex Social Problems – A Primer

<http://publicservice.berkeley.edu/faculty/video-solving-problems>

The Human-Centered Design Toolkit

<http://www.designkit.org>

Value Chain Example: Starbucks

<http://www.investopedia.com/articles/investing/103114/starbucks-example-value-chain-model.asp>

Industry Example of Value Chain Analysis for Social Reasons:

https://www.unido.org/fileadmin/user_media/Services/Agro-Industries/Pro-poor_value_chain_development_2011.pdf

Perfecting Your Pitch

<http://www.fastcompany.com/73046/perfecting-your-pitch-part-one-assume-short-buildings>

Additional resources are listed at the end of the document.

MAP to Building 19, KAUST



Challenge Information Links

Water Challenge

Global Water Partnership:

<http://www.gwp.org/>

Water and Sanitation

<http://www.unicef.org/wash/>

<http://water.org/>

<http://www.unep.org/gemswater/>

<http://www.unwater.org/topics/water-related-hazards/en/>

Water Use Industry

http://ec.europa.eu/eurostat/statistics-explained/index.php/Water_use_in_industry

Food Security Challenge

<http://www.foodfirstnl.ca/what-is-food-security>

<https://www.ifpri.org/topic>

Obesity challenge (under Urban Challenge)

<http://www.hsph.harvard.edu/obesity-prevention-source/resources-and-links/>

http://www.naeyc.org/childhood_obesity_resources

<http://www.cdc.gov/obesity/resources/strategies-guidelines.html>

[http://militaryfamilies.psu.edu/programs/find-programs?field_topic\[\]=Obesity](http://militaryfamilies.psu.edu/programs/find-programs?field_topic[]=Obesity)

<http://www.obesitycenter.edu.sa/Patients---Public/Obesity-in-saudi-Arabia.aspx>

Additional Resources for Teams

Business Model Generation: Book excerpt

<http://businessmodelgeneration.com/book>

Social Business Model Canvas

<http://www.socialbusinessmodelcanvas.com/wp-content/uploads/Social-Business-Model-Canvas.png>

Customer Development Process

<http://ecorner.stanford.edu/videos/2058/The-Customer-Development-Process>