USER 1: Farah

My idea is: The world's first Fab Lab in a refugee camp

Description: Inspiring space to crowdsource and co-create innovative solutions for basic needs provision: a platform for moonshot humanitarian innovation

Name: Farah

Age: 32

Key characteristics: She is a mother of three children and is caring for them alone, as her husband is fighting against the Syrian regime in Daraa. She lives every day with the fear that he will be killed.

Describe what is happening: Farah struggles to care for her children, two of whom are not in school as they are working in small shops in the camp to generate income for the family. Farah was a tailor in Syria, but she lacks the resources to buy a sewing machine, and even if she did, she lacks access to reliable electricity.

1. **Awareness:** Farah learns about the Fab Lab and its services as an open-source vehicle designed and built in the lab traverses the camp, and the lab's Community Managers inform people of the new facility with flyers and verbal accounts of the lab's offerings.
2. **Transportation:** The next week, Farah and her children take the vehicle to the lab, located on the perimeter of the camp. The facility has different operating hours for men and women, to accommodate social norms.
3. **Introduction:** Farah arrives to see an inspiring building unlike anything that exists in the camp. Designed by an award-winning humanitarian architect, the building has sculptured walls, a courtyard, diffused light and a gallery for the community's art and inventions. She and her children take a tour of the facility and then her children enter a separate educational day care facility (away from any dangerous machines), while she takes a mandatory safety and basic usage course on the machines in the lab.
4. **Training & Education:** Farah takes intermediate and advanced courses on the industrial sewing and digital embroidery machines, and she uses them to make products that she sells in the camp at her cousin's store. Meanwhile, her children learn basic programming skills and introductory 3D modeling. They even get to build a wall-avoiding robot, made with an open-source Arduino computer, 3D printer and ultrasonic sensors.
5. **Expanded Skill Set:** Farah learns completely new skills and machines that she didn't know existed, such as 3D design software, 3D printing, and the use of a laser cutter. The laser cutter allows her to expand the scope of her creative expression and to engrave her designs on leather, wood and metal surfaces. She now makes and sells leather shoes with her designs engraved

into them. Farah is confident that with her new income, she will be able to support her family and that her kids will be able to return to school.

6. **Informal knowledge exchange:** Farah enjoys the collaborative co-working space in the lab. She meets other women who are making jewelry with the 3D printer and CNC milling machine. They teach her how to make jewelry, and she teaches them advanced tailoring skills.

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Name: Asinat

Age: 28

Key characteristics: She is illiterate and a mother of four small children. One of her daughters lost both legs in a barrel bomb attack, and her husband lost one leg and most of his arm. They are amongst the most vulnerable segments of the population in the camp.

Describe what is happening: Asinat's caravan was damaged in a recent storm, and having someone come to her home to fix it will cost 60-75 JDs ($85-$106).

1. **Awareness:** Asinat learns about the Fab Lab and its services from a team of young women and men, the lab's Community Managers, who are coordinating with street leaders and community advocates to inform the most vulnerable segments of the population about the facility and its services.
2. **Transportation:** For cultural reasons, women cannot use bicycles in the camp, and transportation would cost 4 JD ($6). She is happy that the lab has a vehicle to transport her to the camp and amazed that members of her community built the vehicle in the lab itself.
3. **Introduction:** Asinat arrives with one of her neighbors, and they get a tour of the beautiful and inspiring facility. Asinat learns that by volunteering at the child day care center, she can get her repairs done for free.
4. **Services:** The service center in the facility fixes Asinat's door handle and makes a new shelf for her to replace the one that broke. Asinat is impressed by the speed with which the computer-controlled machine, which they call a CNC router, makes a new shelf for her in the exact dimensions she gives.
5. **Educational Day Care:** While volunteering at the day care center, Asinat learns that a Jordanian mechanical designer on the Fab Lab team built a robotic camera connected to a virtual reality device. The camera was placed on one girl and the virtual reality device on another girl confined to a wheelchair. Through a choreographed dance, the girl in the wheelchair could experience what it's like to dance. She decides to bring her own daughter to the facility.
6. **Psychological Treatment:** Asinat's daughter, a double below-knee amputee, dreams of being a ballerina. She tries the virtual reality device and is inspired in ways that she hasn't experienced since her injury. Formerly withdrawn, depressed and uncommunicative, she begins to engage with other children and learns how to use a 3D printer and how to make interactive wearable electronics.

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Name: Wissam

Age: 40

Key characteristics: Wissam has an electrical engineering degree from the University of Damascus. He is highly skilled in electronics, carpentry and blacksmithing, yet he is depressed because is idle, unemployed and suffering the loss of his wife and small daughter. His wife told him they should flee, but he said there was nowhere to go. Two days later, a bomb hit their house and half of his family was killed.

Describe what is happening: Wissam lacks access to reliable electricity and tools. Moreover, Wissam is caring for his son, who was never able to finish secondary school. Wissam worries about his son's future. Without educational and vocational opportunities, he wonders, how can he keep his son from drifting toward extremist thought?

1. **Awareness:** Wissam learns about the Fab Lab from a banner and fliers that are distributed by Community Managers before the public launch of the facility. He learns from a neighbor that there will be family gatherings in his district about the Fab Lab, and he decides to attend. When he tells the Fab Lab staff at the gathering about his education and skill set, they recruit him to be a supervisor in the facility and to help set up the lab during the "soft-launch."
2. **Establishing the Lab:** Wissam receives a cash-for-work position at the facility and works with the team to make the furniture for the lab using the lab's machines and open-source furniture designs. Additionally, he works with a team of refugees, Jordanian staff members and international experts to design and produce an open-source vehicle that can transport both freight and passengers within the camp.
3. **Advanced Training:** Wissam quickly distinguishes himself as one of the community experts in the lab. He is chosen to attend a 5-month Fab Academy training course offered at a parallel lab in Amman (1.5 hours drive), conducted by MIT and Fab Lab Barcelona.
4. **Co-Creation:** Wissam leads a team of refugees and experts from IAAC, a leading architecture school in Barcelona, MIT and Caltech to design smart shelters and to expand access to information in the camp. The conceive of two systems to test. The first is a wireless mesh network that leverages open-source Arduinos, low-cost sensors and internet of things communications protocols to enable two-day data transfer to dwellings. The second is the outernet, free data transferred from space, using the open-source Raspberry Pi and existing personal satellite dishes in the camp. Although it is a one-way

data transfer, the outernet allows refugees to get critical information from the UNHCR and other agencies via wifi-enabled devices (at least 35% of refugees in Za'atari have smart phones). After four months of collaboration and rapid prototyping, the team develop solutions that are ready to be tested in the field.

5. **Youth Employment:** Meanwhile, Wissam's son sees the incredible work his father is doing at the lab and takes an interest in advanced manufacturing tools. He learns how to use the CNC router, milling machine, 3D printer, laser cutter and vinyl cutter. He gets employed by the lab to set up a small shop to make 3D printer filament out of recycled materials, such as plastic bottles. Furthermore, he joins the connectivity project with his father, learns how to code a Raspberry Pi and gets mentored by an Egyptian Ph.D. student at IAAC who is developing open-source Minibuilders, small scale robots that 3D print large scale buildings. Formerly suspended in time, Wissam once again feels connected to the future, inspired by the possibilities of rebuilding the shattered world around him.