CAMBRIDGE-YEREVAN SISTER CITY ASSOCIATION HOSTS PANEL

3D Printing Discussion Draws Local Audience

As one of its most active sister cities, the Cambridge Yerevan Sister City Association (CYSCA) participates in the City of Cambridge, MA Science Festival annually with current emerging technologies of interest to both sister cities, Cambridge, MA and Yerevan, Republic of Armenia. This year CYSCA presented a panel discussion on the emerging technology of 3D printing. As usual each year CYSCA invites a scientific expert from Armenia and matches the person with local experts who engage in a panel discussion open to the public. This year's event was held at the Armenian Cultural Foundation in Arlington, MA on April 19, 2018. CYSCA organized the event which was co-sponsored by the National Association of Armenian Studies and Research (NAASR).

A full house of attendees came to learn about this "wave of the future" technological revolution. The panel included local 3D printing experts in research/development, education and manufacturing . The moderator was Berge Ayvazian, local Senior Analyst/Consultant at Wireless 20/20. Panelists included Jack Keverian, 3D printing visionary and Professor Emeritus, Drexel University; Hrayr Azizbekyan, Scientific Associate at the Institute of Physical Research of the Academy of Science in Armenia; A.J. Perez, General Manager, NVBOTS; Jennifer Milne, Product Manager, Formlabs; Chris Templeton, Program Manager, Microsoft Garage Makerspace (NERD); and Adam Green, Operations Manager, Einstein's Workshop.

CYSCA President Alisa Stepanian welcomed the guests and gave a broad overview of CYSCA, its formation and its over 30 years of community service to the citizens and communities of Cambridge and Yerevan with numerous training and educational programs, cultural exchanges and philanthropy.

Professor Jack Keverian

Jack Keverian told about his passion for this new technology and gave a historical overview of the emergence of 3D printing. Said Dr. Keverian, "3D is a game changer which will revolutionize so many facets of our lives, enabling us to do things that we could not do before". He referred to the technology as "additive manufacturing" using a technology called "stereolithography" which began as early as 1983. Due to patent protection, the technology was not able to "take off", but in the last twelve or so years, it has found its place in parts manufacturing, medicine, construction, etc. Advantages include not only very low cost and rapid manufacturing, but also doing the impossible. In the future, 3D printing will be done in one's one home. Keverian showed a video of 3D printing technology making a part that in his opinion would have been impossible to fabricate with other techniques. Dr. Keverian said, "If I were younger and not approaching a 90th birthday, I would promote this technology to help build housing in Armenia".

Hrayr Azizbekyan, Armenia's 3D Printing Expert

Hrayr holds a Ph.D. from the University of Lorraine. He commented on the use of multi types of materials in Armenia for deposition of the 3D layers, for example, plastic, powder, liquid resin, powdered metal, and even chocolate. Also, together with a colleague originally from Armenia, but now in Ottawa, Canada , they are developing a whole-body scanner. Advantages of 3D printing according to Hrayr are: ability to customize, rapid design/manufacturing, cost effective for small and large batch production, and ease of redesign. Problems for Armenia are: small market size, lack of material resources (dependency on import), and a centralized economy in and around the capital city of Yerevan. He cited threats such as rapid change of the technology, needing to break down the conventional mindset, lack of legislative support, endangering the existing labor market, and lack of government support. However, he pointed out that on the plus side there are already many noteworthy international organizations that have established a presence in Armenia as well as many NGO's that are helping to spread advances in technology, especially in the IT area. 3D printing applications have proven effective in the following areas, namely dental, jewelry, modeling, architecture, medical automotive, homes, construction and others. He commented that a 3D printing promotional strategy needs to be developed in Armenia with the creation of a success story and community building.

Jennifer Milne, Product Manager, FormLabs

Jennifer Milne spoke about FormLabs, a local Somerville, MA based company that produces low cost 3D printers with facilities in Somerville, Germany and China. They have 400 employees and produce printers ranging from desktop "affordable" printers starting at $2,500 and ranging up to a future goal of $100,000 for larger units. They collaborate on research and development with educational institutions such as Harvard University, the University of Michigan and Duke University on materials research. They do metal printing for aerospace and engineering, as well as dental and parts manufacturing. A new material they are now using is ceramics.

AJ Perez, General Manager for NVBOTS, Division of Cincinnati Milling Machine

AJ Perez is the founder and CEO of a 3D printing company which he sold to the large industrial equipment manufacturer Cincinnati Milling Machine Co. He is currently General Manager of their 3D printing division. They produce two types of 3D printers - the small area machine (SAM) with prices starting at $10,000 and the big area machine (BAM) with prices ranging from $100,000 to $1M. An exclusive feature of their printers is the automatic ejection of the printed part. Their large printers have been used to produce aircraft wings (Boeing), aircraft turbine blades (GE), cars, military Jeeps, and submarines (no metal and in 30 days!).

Adam Green, Operations Manager, Einstein's Workshop

Adam Green spoke about his workshop for young students beginning with kindergarten to 8th grade. This workshop teaches them about 3D printing as a "tool" using a "ground floor" basic training program. Adam mentioned the pitfalls in teaching a new technology to young students and listed some "do and don'ts", such as:

- Budget for an instructor. Teaching 3D printing is not an add-on job
- Don't print premade models
- Budget for preventative maintenance, as printers will last longer
- Support modelling not printing
- Get free software online such as "TINKER KAD" or "Blocks CAD"

Chris Templeman,

Program Manager, Microsoft Garage Makerspace (NERD)

This is one of seven Microsoft facilities operated as a "makerspace". They have roughly 400 employees who work on developing software with a focus on design prototyping. They are working on lowering the cost of 3D printing. Chris considers it an exciting experience to participate in the development of 3D printing applications.

Q and A

A Q &A session followed:

Question: What countries are leaders in 3D printing?

Answer: Professor Jack Keverian felt USA was the leader, but AJ Perez, although he agreed USA is a leader, thought Germany has the lead and China is also a player in low cost printers.

Question: What can you say about the quality of the final product?

Answer: Professor Keverian believes as with any new product or methodology there will be failures, but we will learn from them and make improvements.

Question: Are the materials used in 3d printers toxic?

Answer: Hrayr said no, but AJ Perez was more cautious, saying that there could be toxic elements in some of the resins in the materials used, but as there has not been testing for toxicity, we cannot be sure.

Question: What are some of the biological applications present or potential?

Answer: Hrayr said they are doing a lot of research in this field in Armenia and it is showing promise. For example, actual body organ replacements have been produced. Jennifer said that FormLabs is also doing research in the biomedical field.

In all, the audience went home with a new vision of 3d printing as an exciting "wave of the future" and its potential for becoming a serious game-changer which as Professor Keverian says, "will revolutionize many facets of our lives".

CYSCA, the sponsor of this program, was formed in 1987 by a group of concerned citizens of Cambridge, members of the Cambridge Peace Commission, who believed that a partnership with a Soviet City would promote world peace. They believed that people can build bridges of friendship, goodwill and cooperation on shared values, that often governments cannot. In the over 30 years since formation, many activities have taken place, including citizens exchanges in diverse fields, such as education, economics, environment, music, art, culture, public health, social work, and other community based services; youth exchanges; as well as financial aid to needy schools.

Jack Medzorian, Winchester, MA