ENGAGING THE NEXT GENERATION OF THE CANADIAN STEAM WORKFORCE USING SPACE SCIENCE – THROUGH A PANDEMIC. B. Shankar[1], [1]Indus Space Inc. (Sheridan EDGE, B290 - 4226 Duke of York Blvd, Mississauga ON, Canada L5B 0G5, bshankar@indusspace.ca).

Introduction: We submitted an abstract this time last year to emphasize the value of engaging the next generation in space exploration and STEAM broadly within Canada [1]. The need is higher for including youth from underrepresented, and immigrant communities, which make up ~52% in Toronto (Indus Space is headquartered in the Greater Toronto Area) [2]. While we were starting to make advancement interacting with several age groups in the K-12 sector in 2019/early 2020, the sudden and quick closure of in-person engagement due to the current COVID-19 pandemic has resulted in embarking on new approaches that we summarize here.

Recapping our original vision: Indus Space Inc. is a social enterprise organization that raises the profile around space exploration and its connections to Science, Technology, Engineering, Arts, and Mathematics (STEAM) sectors. Our target audience are youth (K-12), educators, and the public**.** We reach our audiences through events, workshops, after-school programming, camps, and custom products. In this process, audiences get to meet several professionals from both the Space and STEAM sectors and gain hands-on current learning resources that are specifically space themed.

Our organizational initiatives are designed to follow several Sustainable Development Goals [3] outlined by the United Nations including: quality education (Goal 4); gender equality (Goal 5); good jobs and economic growth (Goal 8); and reduced inequalities (Goal 10).

Immediate impacts of a global pandemic: It is safe to assume no one predicted how this pandemic led to everyday society grounding to a halt in a matter of days. The impact was swift with no moment to process the long-term effects of changes at the time. As in-person events stopped immediately, many of us regardless of our sector (education, small-business, private lives) had to assess how best to move forward while staying safe. For us at Indus Space, original in-person events quickly transitioned to a virtual platform within the first month (April). Ten months into the pandemic, we have observed and incorporated several new methods to continue our mandate to engage underserved communities.

New approaches to STEAM and space exploration engagement during this time: Following public health service guidelines, we moved all our original in-person offerings virtually using a combination of Zoom, Microsoft Teams, or Google Meet depending on the community needs. We spent significant time in late spring training our team in facilitating events virtually and ensuring our own team could work together remotely. As we moved onto summer, we strategized ways to continue synchronous programming while ensuring we were conscious about the amount of screen time youth can manage. We summarize key events we organized, and what worked given these changes.

Facilitating Ongoing Space Themed Challenge Events: (i) The Canadian Space Agency's Junior Astronaut Challenge [4] had immense interest and engagement even prior to the pandemic. Between Nov. 2019 and March 2020, we collaborated with several community organizations and hosted 10 events where nearly 300 youth in Grs. 6-8 attempted several challenges along the themes of science and technology, fitness and nutrition, and communication. Several more iterations of facilitating the main challenge continued in a virtual mode once pandemic closures were active.

(ii) NASA Space Apps Challenge: We were invited by SEDS Canada-Toronto chapter (a student led national post-secondary organization that supports post-secondary students explore the Canadian space sector) to organize a youth-specific (K-12) edition of this popular global weekend long hackathon challenge [5]. While youth-focused events were organized in previous years in Toronto, they were add-on events for youth to immerse in space content for a day and not exclusively meant to participate in the main challenge. Our 2020 event was designed for youth (under 18) to work on the challenges just like main participants, but youth had access to several mentors. These mentors had a range of backgrounds that were from a combination of business, hackathon, and space sectors and were equally eager to engage with youth and encourage their efforts. To help youth acclimatize to the fast weekend paced event, we organized a pre-hackathon week-long event "Blast Off to HackerSpace" where registered youth worked on a unique aspect of the hackathon process each day, and on challenges that were independent of the main event. The virtual nature of the events meant youth from across Ontario participated, with 7 teams submitting solutions and 80+ youth registered between both events.

Content access to low-income families: We created "Astronomy in a shoebox" activity kits and donated these to several local food banks, in efforts to provide family-friendly activities with all necessary supplies. This was designed to support low-income families that have challenges accessing digital content and internet access during COVID-19. This was possible through funding support provided by the IAU Office for Astronomy Research [6].

Providing recent graduates opportunities to gain relevant work experiences: We hired four employees during the summer (2020) through the federally funded Canada Summer Jobs programs. Our employees were youth between the ages of 18 – 30, and allowed recent high school graduates, and post-secondary students to apply and join our team. We hired an undergraduate student who is in an aerospace (STEAM) engineering program at a local academic institution. This enabled us to work on specific space engineering themed content to facilitate in subsequent events.

Providing high school students opportunities to gain relevant work experiences: The pandemic has resulted in local school boards offering both in-class and remote learning, with more than 75% of families opting for the remote style. During the current province-wide lockdown since before the Christmas holidays, co-op placement programs (Grade 11) looked for virtual placements for students to gain some work experience. Indus Space is working with co-op programs during the current quadmester (10 weeks) currently has three students working on short projects. In a virtual platform, each student is working on a different aspect of a space themed project. This includes researching biology themed experiments onboard the International Space Station (as the student has an interest in pursuing biology following graduation). Another student is compiling space themed calendar events and using their creative interests to design media content suitable for social media. The third student is assisting us translate much of our English ready content to other official languages (currently French). Each week, students give the team at Indus Space updates on their individual projects which provides an opportunity for everyone to meet and interact with each other. Additionally, the core content creation team meets with each student individually on a weekly basis to provide feedback and address any questions students may have.

Early lessons learned: While the pandemic had sudden and unexpected impact on the approach to our programming, it has nonetheless provided our team more options and opportunities to expand our focus and outreach efforts to audiences beyond our core region around Toronto. Facilitating national level programs collaborating with community organizations helped us continue our mission to provide engaging content to youth. We collaborated with several local organizations that independently cater to girls in STEAM, and several youth from visible minority communities. K-8 youth are thrilled when they meet STEAM and space professionals and are very keen in trying challenges that are close to real life scenarios. Similarly, space professionals are equally thrilled to interact with youth during these programs.

Access to technology has worked reasonably well given the quick transition. While internet connectivity strengths could waver with large audiences, we were able to facilitate and complete our programming. However, Zoom (virtual) fatigue is real for both facilitators and attendees and needs to be factored.

Support through the federally funded programs allowed us to provide youth and new graduates opportunities to gain relevant work, and STEAM skills which benefited both us as a start-up venture and youth seeking experience. Similarly, co-op placements have worked well for both the students and our team. In all instances, youth indicated that our area of program facilitations and the topic of space exploration was something of interest and offered them an opportunity to learn more about space (space science is last taught in Grade 9 in the Ontario curriculum).

Future Work: We continue to explore offering both synchronous and asynchronous learning options. We recognize the value in combining both screen and non screen related content. High school students are looking for the real-life experience opportunities to help them decide on a potential post-secondary journey and career. Recent graduates also seek hands-on direct experience in what they train for. While the pandemic impact is sure to last well into 2021, we look forward to exploring various avenues to hire young professionals and provide a range of science-communication opportunities.

References: [1] Shankar, B. and Du, C. (2020) *LPSC LI, Abstract #3036.* [2] Statistics Canada. (2017). *Focus on Geography Series, 2016 Census*. Statistics Canada Catalogue no. 98-404-X2016001. Ottawa, Ontario. Data products, 2016 Census. Author E. F. et al. (1997) *Meteoritics & Planet. Sci., 32*, A74. [3] U.N. SDGs https://bit.ly/3nEfdpo. [4] Junior Astronaut Challenge (2019), Canadian Space Agency, https://bit.ly/3sladcT. [5] NASA Space Apps Challenge (2020), https://www.spaceappschallenge.org/. [6] Office of Astronomy for Development (2020), http://www.astro4dev.org/call-for-covid-19-related-proposals/.