

Air Force Association

STELLARXPLOREERS

THE NATIONAL HIGH SCHOOL SPACE CHALLENGE

Alumni Survey

July 20, 2020



Space is inherently exciting. Many students often miss the interesting engineering opportunities space provides due to a lack of exposure. Participating in StellarXplorers has been a great experience for our students. It has provided a structure for learning along with the motivation to solve challenging problems in a competitive environment.

Team Director Nick Elefther, Bergen County Technical Schools

**STLX VI Champions
Bergen County Tech. HS, Teterboro, NJ
Rocket Men Team**

*Shoot for the moon; even if you miss,
you will land among the stars!*



Welcome

This is *StellarXplorers'* third Alumni Survey. The program was created and produced by the Air Force Association (AFA) beginning in September 2014, triggered by an inquiry from the Air Force asking if AFA would consider a space version of our highly successful STEM program, *CyberPatriot*. From our Proof of Concept in April 2015 with five Colorado High Schools, we have grown to over 200 teams competing in "STLX VI." *StellarXplorers*, the National High School Space Challenge, is designed to inspire and motivate students to pursue education and careers in science, technology, engineering, and mathematics (STEM). The Program is building a pipeline of STEM talent for the future of government and industry to supplement and succeed an aging STEM workforce. High school-aged teams compete through qualification rounds from their home locations for a chance to earn an all-expense-paid trip to the National Finals. Students gain space knowledge and confidence in problem solving, as well as analytical skills, improved teamwork, and leadership lessons of lifelong value.

Space is a great venue to introduce STEM disciplines and aerospace engineering to more students, including under-represented minorities. Consistently, roughly half of our participants are of minority ethnicity and nearly a third are female. Accessing this talent pool greatly expands critical skills for our future workforce. More importantly, many of these students are introduced to an alternative future of which they may not have believed themselves capable and provided hope for a better future for themselves and their families.

This is our first survey with over thirty per cent high school graduates actually pursuing their education/careers among the respondents. While statistically significant conclusions are still not possible, 85% those alumni are enrolled in a four-year college program, with 80% in a STEM discipline; moreover, 90% of all respondents credited StellarXplorers as influencing their education and career choices somewhat or a great deal! The results you will see here clearly indicate that the program is on track to make a significant positive impact on U.S. competitiveness and national security.

We owe a large debt of gratitude to our sponsors: Air Force STEM (InterStellar level), L3Harris (Platinum level), Aerojet Rocketdyne (Gold level), and SpaceX and RocketLab (Silver level). Additionally, we could not conduct a program of this quality, for so many, within available resources without our Education Alliance Partners: Analytical Graphics, Inc.; Coyote Enterprises, Inc.; and the Space Foundation.

The STLX Finals in April 2020 were planned to be held at Space Center Houston and Johnson Space Center, but we were greatly disappointed that the pandemic made in-person finals impossible. Next year's competition will culminate again in Colorado Springs and registration is open now until 13 October 2020. To register or for more information, visit our website at <www.stellarxplorers.org>.

Stephen K. Gourley,
StellarXplorers Program Director

SURVEY METHODOLOGY. The 27-question survey was successfully emailed to 1647 previous StellarXplorers participants, with a response period from 21 May to 17 June 2020. Nearly 12% of those contacted responded (195 total). Most of the questions required Likert-type forced answers that yielded interval (vs. continuous) data. The reference to averages in comparing responses is used for convenience and not as a rigorous statistical claim.



Program/Respondent Demographics

The survey received a greater response rate from females than our 30% all-participant data. We do not believe this difference affected the “Attitudes Toward Females” question or any of the other responses, since replies to all questions were fairly gender neutral. The overall 48% [Survey] and 54% [all participants] White/non-Hispanic compares to the most recent U.S Census data of 61% White/non-Hispanic demonstrates that the program is successful in reaching under-represented populations, a feature of which we are particularly proud.

	Gender (Survey)	
Male	107	58.8%
Female	72	39.6%
N/R	3	1.6%
Total	182	100.0%

	Gender (STLX III-VI)	
Male	1422	68.9%
Female	621	30.1%
N/R	20	1.0%
Total	2063	100.0%

Ethnicity (Survey)	
Nat.Am./AK	0%
Asian/Pac. Is.	26.4%
Black (non-His)	4.4%
Hispanic	10.4%
Two + races	6.6%
White (non-His)	48.3%
No Response	3.8%

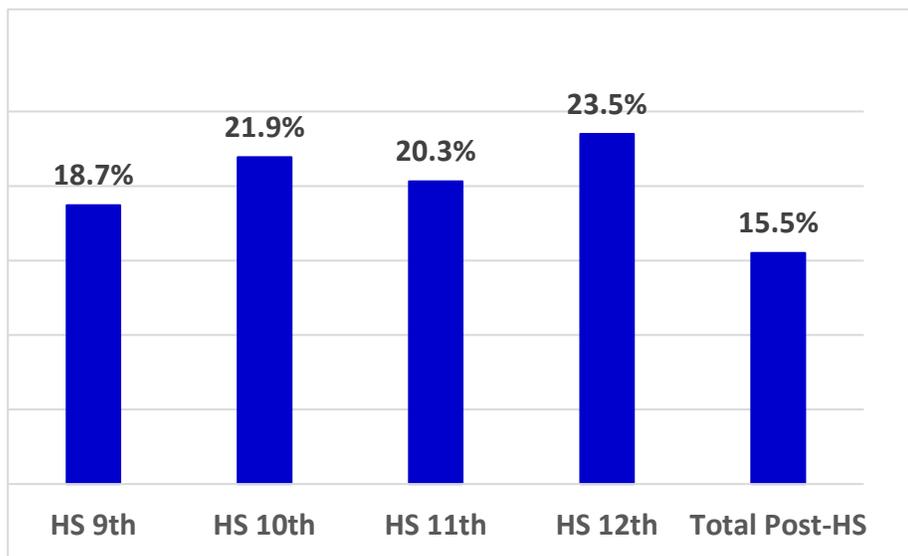
n = 182

Ethnicity (STLX III-VI)	
Nat.Am./AK	0.5%
Asian/Pac. Is.	14.8%
Black (non-His)	5.1%
Hispanic	15.6%
Two + races	9.0%
White (non-His)	54.2%
No Response	3.0%

n = 1998

Ethnicity (US 2018)	
Nat.Am./AK	0.7%
Asian/Pac. Is.	5.7%
Black (non-His)	12.3%
Hispanic	18.1%
Two + races	2.4%
White (non-His)	60.6%

Highest Grade Level Attained



n = 187

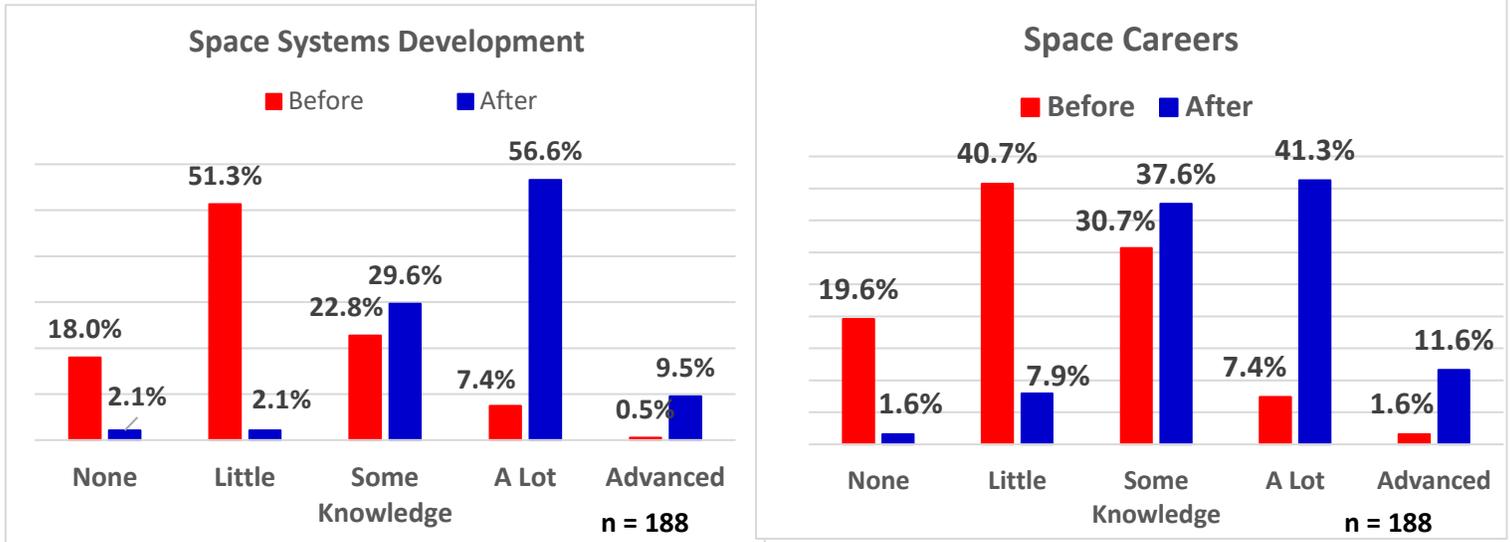
Survey responses for highest grade level attained are consistent with our all-participant data from team population registrations. Due to the timing of the survey, with 75% of all respondents completing the form before Memorial Day, six per cent of the “HS 12th” group reported their education/career status with the “not-yet-graduated” cohort. 61 (32%) respondents self-reported as “graduated from High School.”

It is worth noting that 78% of all teams that ever participated in StellarXplorers did so in the past three seasons.



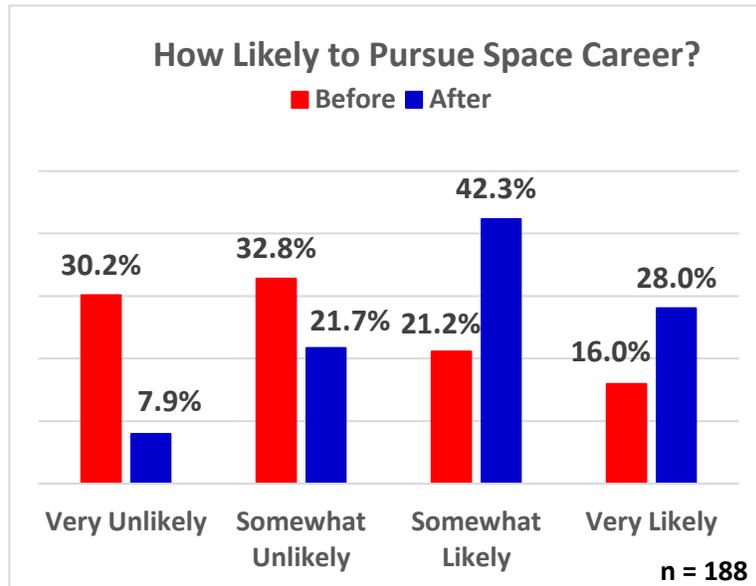
“Before/After” Questions

At What Level Do You Rate Your Space Systems/Space Careers Knowledge?

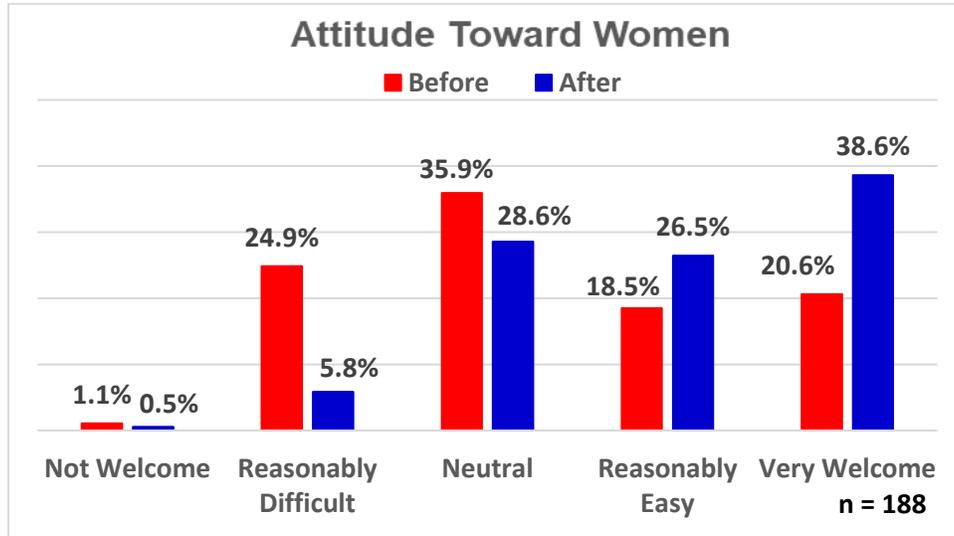


The survey results for before/after knowledge for space systems development and space career opportunities both show positive shifts for these critical program objectives. Reported weighted averages increased 68% for systems development knowledge and 52% for career knowledge.

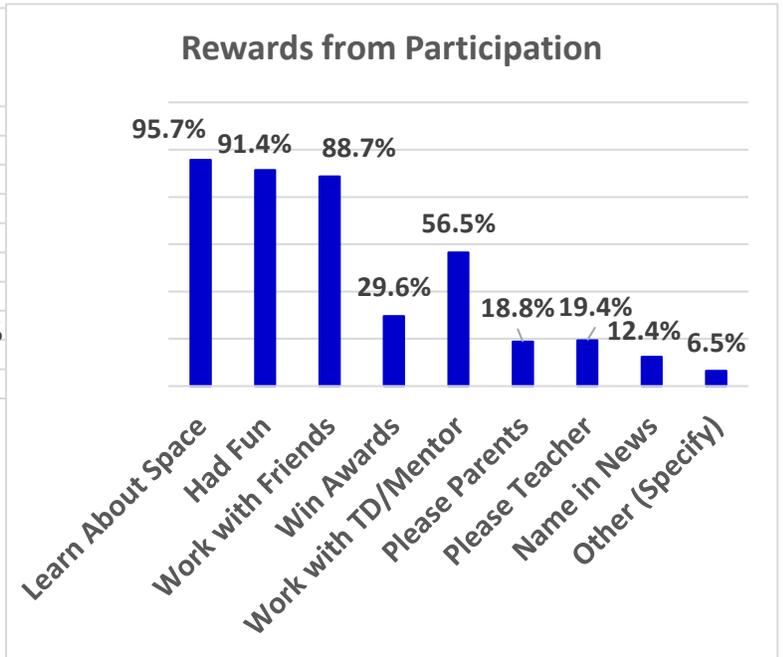
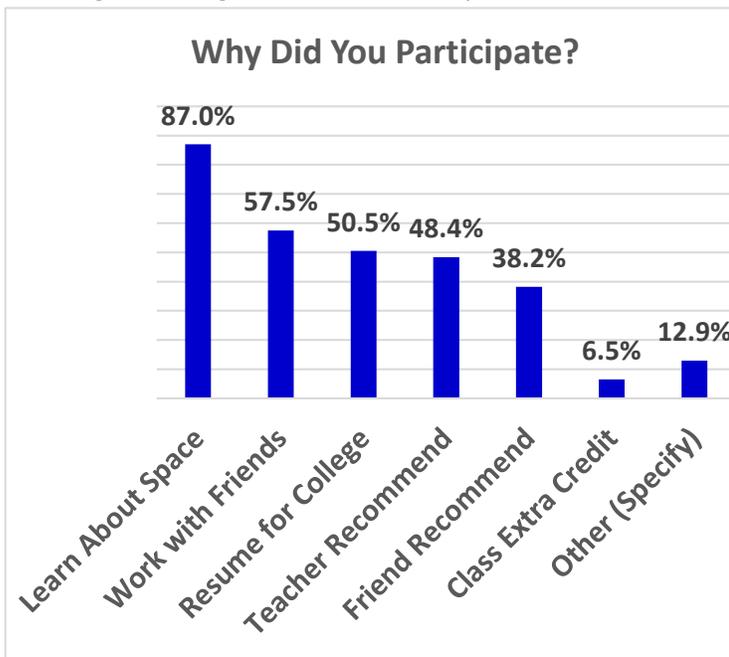
What Is Your Likelihood of Pursuing ...



Revealing almost a reversal of attitudes, the StellarXplorers experience as reported by the respondents, produced participants much more likely to consider a space career. This, we believe, is the result of the program’s realistic challenges; using industry standard tools; and their succeeding in a well-structured competition – they now know they *can* do it!

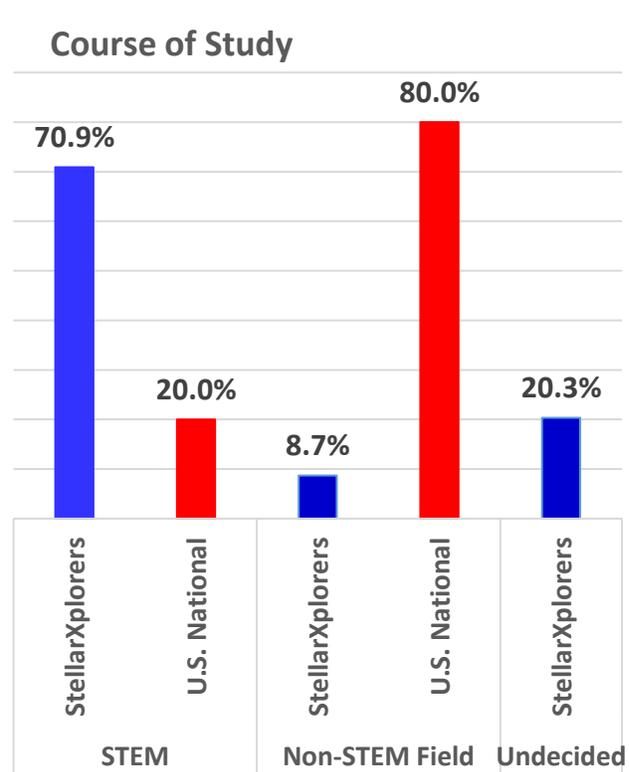
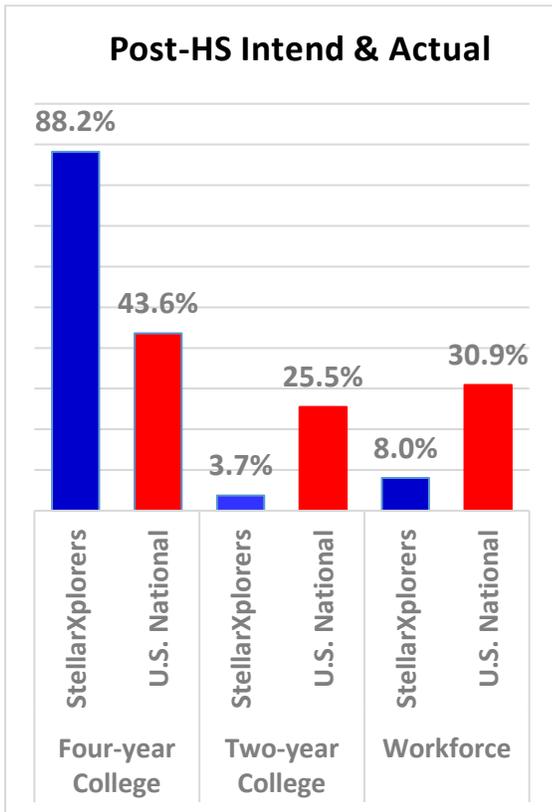


For all participants it seems, to paraphrase the old saying, ‘familiarity breeds confidence’! From our conversations with competitors and Team Directors, we believe the competition builds confidence in competitors’ ability to comprehend and solve complex engineering problems. This confidence includes enhanced ability to work with others. Even before the StellarXplorers experience, respondents of both genders reported a relatively neutral position on whether space was a career for women, but after the competition, the belief that women belonged was increased in both genders, but to a greater degree from female respondents.

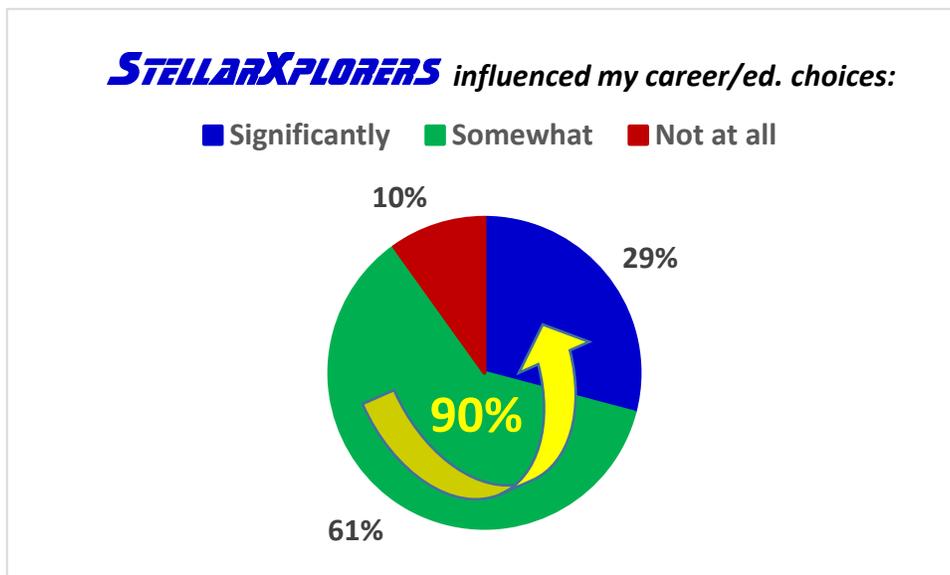


Why did they play? Responses were almost identical with last year’s survey, but ‘learning about space’ was a relatively stronger motive than last year. Rewards they obtained from the competition were strongest for learning about space, working with friends, and very gratifying for us, they had fun! We asked, ‘how much fun was it?’ 84% said ‘very/most’ fun, with 27% saying: **‘the most of all my activities!’**

Our favorite write-in comment was: *‘Even though we didn’t win, my team made it to semifinals in the competition. I was really proud of our hard work leading up to that moment. It was a really fun experience and not only did we learn about space, but we grew closer as a team and learned to function really well and even enjoy each other’s company in the competition environment even though we would never have fun together outside of StellarXplorers.’*



For respondents still in high school, we asked about their plans for after graduation. We asked the high school graduates what they were *actually* doing. As expected, most of our respondents have not yet graduated from high school. Only 61 respondents have graduated – of those, five 2019 grads are attempting to find a job and two have. Of the remaining 54 graduates, all but 2 are enrolled in four-year colleges, 43 majoring in Astronautical Engineering or another STEM discipline, 7 in non-STEM fields, and 4 undecided. We realize correlation is not causation, but we did ask all respondents the degree to which StellarXplorers influenced their choices ...





CONCLUSION

We are proud of this relatively new STEM program that joins AFA’s other flagship STEM program, CyberPatriot, The National Youth Cyber Education Program. We have already seen noteworthy gains in our participants’ knowledge and motivation to pursue STEM education and space careers. Perhaps as important, we have watched them become more confident of their own abilities and increase their leadership, teamwork, and communication skills. We close with some vignettes of just a few of our amazing participants.



2020 marked the second consecutive year Title I Buena Park High School qualified for the Finals, this year with two teams. Team Captain Thwe New Han (front center in photo at left) wrote: *“StellarXplorers program opened new doors in our high school careers ..., we improved our logical thinking and problem-solving skills taking them to a new level. Moreover, as individuals we discovered the talents that we never knew we had. When our team overcame the challenges throughout the competitions, we grew in perseverance, patience, and dedication as a team. The StellarXplorers competition gave us the opportunity to learn how to utilize our teamwork skills, gain confidence, and build intelligence while overcoming all the obstacles.”*

Aurora Composite Squadron, Civil Air Patrol, from Aurora, OR, earned their third trip to the Finals in 2020, this time earning their first trophy as Runner-Up. Their Captain Rhett Miller (third from left in picture) reported: *“Being on a StellarXplorers team has given me a place to use my love for math and science in a way that I can see the future. ... I really didn’t know how to answer the question adults would ask: “What are you going to do for a career?” Now with Stellars, I know for sure that building, launching and finding orbits is my dream career!”*



For the School of Engineering & Biomedical Sciences at Pueblo County High School, Colorado, 2020 was also their best result in several years of competition – they placed third in the competition. Team Captain Luke Hawkins (third from left) said: *“My involvement in StellarXplorers the past four years has opened my eyes to the aerospace industry. As a result, I will be pursuing electrical engineering with a special interest in aerospace engineering. I have learned how to analyze problems, budget time, and work efficiently within a team to produce a solution. StellarXplorers opened up numerous opportunities that have benefited my education, my career path, and my life. Thank you.”*

Those of us who produce StellarXplorers are proud of the maturity the program has achieved in a relatively short time. Each year the program has improved, the challenges have become more complex, and the talented students who compete in the Program surprise us with their ingenuity. We can’t wait to see the Finals next year!



AFA THANKS OUR SPONSORS

**WITHOUT WHOM
THIS PROGRAM COULD NOT EXIST!**

