

## **ExoTerra, a Revolutionary Approach to Space Launch Research and Development**

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**Abstract:** Exoterra is a non-profit corporation devoted to raising funds to advance truly breakthrough technologies, methods, and products in the effort to drastically lower the cost of space access. Overcoming high launch costs is a key, common goal of dozens of other organizations, entrepreneurs and individuals. ExoTerra is focusing on our common desire for cheap space access and offering a non-exclusive, easy way to cooperate in large numbers and thereby effect real change. The principle funding source for the R&D program is the ExoTerra credit card, which will provide 0.5% of all card charges as income to ExoTerra. A key discriminator of our program is the fact that research grants are awarded based on the periodic vote of all ExoTerra card members. This system provides for tremendous positive feedback and growth potential.

### Overview



ExoTerra is like no other research organization on Earth. We have a unique method of raising funds to support the research efforts of others and a revolutionary way of administering those funds, which holds the promise of changing the entire landscape of space research.

ExoTerra is a non-profit corporation (Tax ID# 16-1661466) devoted to raising funds to advance truly breakthrough technologies, methods, and products in the effort to drastically lower the cost of space launch. High launch costs remain the principal barrier to a flood of space projects that offer the promise of revolutionizing our world.

Overcoming this initial barrier is a key, common goal of hundreds of other organizations, entrepreneurs and individuals. Rather than compete for support of any one particular view of research direction, we are harnessing our common desire for cheap space access and offering a non-exclusive, easy way to cooperate in large numbers and thereby effect real change.

ExoTerra is raising funds through a variety of methods, but the crux of our efforts is the offering of a no-fee ExoTerra credit card in cooperation with a leading financial institution. The proceeds will fund other new and existing outside organizations to do the actual technical work. Prospective funding recipients will submit very short (1 page, hyperlinked) grant proposals, and be required to comply with an absolute minimum of bureaucracy. In addition, ExoTerra will not have any rights to the products of the research: those rights remain completely in the hands of the grant

awardees: the developers and researchers. The patrons of ExoTerra, those who hold the credit card, will vote directly on which grants to fund. Funding will be awarded in direct proportion to the number of votes received by the particular proposals. In this way, the patrons of ExoTerra will control the destiny of their own space program.

The implications of this system are enormous. For the first time, the frustrated legions of space enthusiasts will have direct control of where research dollars are spent. They are in charge. All the power, and it costs them nothing. By simply using their ExoTerra credit card, they fund the organization and they decide which projects they will support. Now developers of new launch systems have an easy, painless method to financially engage their supporters and well wishers at no cost to any of the parties. And, in a paradigm shift for the developers, the more competition there is, the larger their potential funding base.

ExoTerra is a modern creation. We make full use of the Internet for all activities. Specifically, the proposal and grant selection process is web-enabled. Proposals are submitted online, posted for review by the patrons (all our card holders) on our website, and the voting process is via secure web server. In addition, progress reports by the grant recipients and final reports (all very brief) will be posted on our site. On-line chat and forum areas are provided to facilitate discussion of proposals and proposers are encouraged to participate in these to sway voters. Our website is at [www.ExoTerra.org](http://www.ExoTerra.org).

The future of launch research is starting now. We are negotiating with several potential ExoTerra credit card suppliers as of the time of this writing and features are continually being added to the website. We

will begin accepting proposals this fall, with voting and grant awards at the end of the calendar year. While our initial funding base will start modestly, we expect growth to be explosive.



**Figure 1 - Launch Vehicle Concept by XCOR, One of the X-Prize Competitors**

We encourage launch vehicle developers and other researchers to start gathering their supporters now and plan to submit proposals early to establish their constituency and secure their funding base. Incumbents who are familiar to our voters will surely enjoy an advantage in later votes as the funding pool increases. We invite everyone to join us in cooperatively taking charge of our own destiny in space.

The membership of Exoterra, those who hold the credit card, vote annually on which grants to fund. Grant funding is awarded in direct proportion to the number of votes received. By allowing the membership to directly decide which projects to fund, we are offering a unique way for the average person to be the critical link in one of the most exciting human endeavors. This method of decision making, direct democracy, incentivises those who are proposing projects for grants to encourage their supporters to sign up with Exoterra, thereby increasing both the proposer's

voting bloc and the size of the overall funding pool.

### **Objectives**

ExoTerra, as a non-profit corporation, is not in this for the money. We are motivated by a desire to radically improve the human condition by opening space for true exploitation and exploration. We are specifically motivated by a desire to offer an alternative to the big business, big government and military sponsors of space currently existent. These entities, while making great technological strides forward, have been singularly ineffective at reducing the cost of space access.

By focusing on space access first, and doing so in a way that makes the public the critical decisive and empowering element, we are striving to return hope and enthusiasm for space to the general population. If people can see that there is an easy way for them to rekindle their childhood space dreams and be an active part in shaping those dreams into reality, then we can make space an exciting, enthusiastic endeavor with the power to motivate the masses.

To enable people to dream about getting into space themselves, we need to focus on ways to reduce the cost of getting into LEO to about \$100/lb. This is about 1% of current launch costs, which have been remarkably stagnant the last few decades. To achieve this by conventional, traditional methods would likely take several decades more. Therefore, to have the potential to pay off much sooner, riskier, non-traditional methods must be employed. Hence, we restrict research dollars to small businesses, individuals, and other non-governmental non-profit organizations.

By freeing these organizations from the responsibility of answering to governmental

review boards and the associated paperwork and bureaucracy we hope to catalyze more independent, innovative, and advanced solutions. Most of these efforts will undoubtedly fail to bear fruit, but promoting an environment where true experimentation is actually encouraged is necessary to hasten the arrival of the first idea which will work.

ExoTerra may eventually propose its own internal project on an equal competitive footing with all the other grant ideas (the membership votes to support it or not). The directors would manage this project. Establishing its own research effort is not a primary goal of the organization, however. The primary objective is to catalyze the genesis of an affordable launch service so that ExoTerra and the rest of the world can then make use of the resulting service to take the next steps out into space. So in the end, it doesn't matter on whose vehicles we get there, as long as we create the means to do so.

Exactly which step follows the realization of \$100/lb space access will be a topic of much lively debate when the time draws near. It may be that ExoTerra will focus on the next leg of transportation into deep space, or on creating working and living spaces in orbit, or gaining access to in-space resources. It may be a combination of these or other efforts to build an infrastructure that supports the exploration and exploitation of space. In any case, the organization will continue to evolve its focus as needed to remove the barriers to broad public use of space.

### **The Credit Card**

ExoTerra is raising funds through a variety of methods, but the keystone is the establishment of the ExoTerra no-fee credit card in cooperation with a major financial institution with an existing track record of



support for non-profits. Groups such as the NAACP, major universities, and even the National Space

Society are already using such programs to enhance their funding base.

So-called “affinity” credit card programs for non-profits typically yield revenue equal to 0.5% of all credit card charges accumulated by the card holders. This may sound small, but think about an average person’s credit card usage, then multiply this by the number of people wishing to see space opened to public and private enterprise, and this constitutes a very large fundraising base indeed.

ExoTerra is currently negotiating with several potential suppliers of the card, but in each case we are pursuing a strategy of no initial fee/no annual fee vehicles to make sure that the card holders have no barriers to entry.

One might wonder if this is such a great fundraising tool, why haven’t all the space societies already arranged for their own card? One answer is that most credit card companies are only willing to deal with organizations that have at least a 50,000 membership mailing list so that the solicitation pool is large enough to justify their capital costs in setting up a new program.

This is both good and bad news for ExoTerra. It is bad in the sense that ExoTerra as an organization does not have this size membership itself yet, however, we have successfully convinced companies that we can easily exceed this requirement if we consider the combined membership of

multiple societies. We can acquire those membership lists either by outright rental, which would require about a \$5000 cash outlay, or by negotiation with the societies for other considerations. The good news in all of this is that this barrier keeps most of the other societies from entering the market and competing for the affections of our most likely pool of early adopters in this effort.

While we negotiate with the financial institutions, we are actively debating the merits of negotiating special consideration for some of the other societies to get access to their membership lists. The key item is that the other societies are most interested in being allowed to propose a non-space access related program to the grant process so that they can address their more immediate goals.

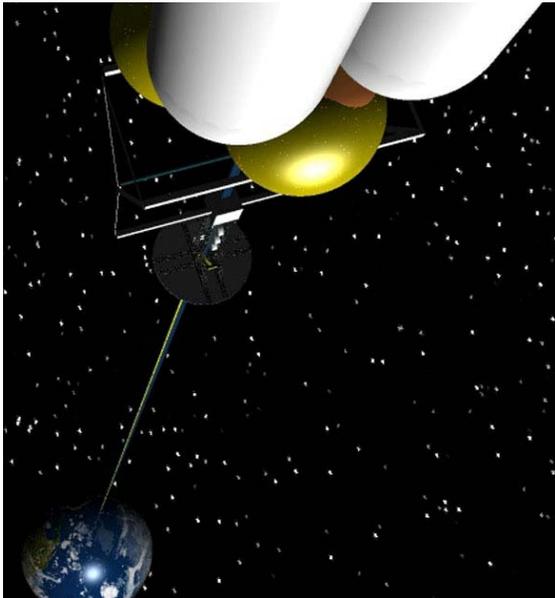
While these projects would undoubtedly be of interest to many potential card holders, the BOD of ExoTerra is concerned that this option would dilute the focus of our organization which could make achieving our primary goal much more difficult in the long run. On the other hand, allowing the other societies to propose their favorite project would motivate them much more to campaign for their members to sign up with our card, which might yield a much more rapid early rise in card holders and a stronger negotiating position with the financial institutions offering cards.

One compromise under consideration by the BOD is allowing a limited number of societies to join as initial sponsors who would then enjoy the ability to propose any project they wished, but to only guarantee this privilege for a few years. After the initial period, the general card holders of ExoTerra would be able to vote to continue extending the benefit to the initial sponsors

or not. In this way we can gain the initial benefits both parties desire while still remaining true to the ideal of having the card holders be in charge of the research direction.

As the preceding example illustrates, possession of the credit card is the key which allows participation in the decision making process. Only card holders will vote on which proposals to fund and only card holders will vote on which individuals will make up the ExoTerra Board of Directors (BOD). Since the Board of Directors act as arbiters of the grant process and select the executive officers of the corporation, the card holders have all the ultimate authority and responsibility. If you are a card holder, ExoTerra is your space program.

### **Research Grant Proposals**



**Figure 2 - Space Elevator Concept from “The Space Elevator Comes Closer to Reality” by Leonard David Posted on Space.com, March 27, 2002.**

Proposals will be accepted from individuals, small companies with less than 200 employees, and non-governmental non-

profit entities including educational institutions. Entities proposing for grants may only submit one proposal each per voting period. Individuals who work for companies proposing for grants, or are members of other organizations proposing for grants, may only submit individual grant proposals which differ substantially from those of their employers or parent organization. Proposals for grants must be in the form of a single page description of the specific work to be performed under the grant (submitted via e-mail in MS Word in 12 pt Arial font, Letter Size, with 1 inch margins). All proposals should be submitted in at least an English version, but submitters are encouraged to supply translations to all of the languages supported on our mirror sites. Embedded graphics are allowed. Proposals may (and are encouraged to) contain hyperlinks to other locations for further information.

All proposals must include plans for either the development and/or test of hardware of some nature. Paper-only or theoretical studies are not eligible. To be eligible for subsequent grants, all grant recipients must prepare a one page summary of work accomplished at the end of the grant year. This summary must be suitable for public dissemination, i.e. they should contain NO proprietary data. Other than this condition, the grants are NOT contingent upon any “success” criteria, nor is any other reporting required, although it is suggested that the smart grant recipients will volunteer other data via ExoTerra’s website to keep their voters happy and encouraged throughout the performance of the grant work. The BOD will have the sole power to determine if a grant proposal meets the minimum requirements or not.

As a condition of the grant, the recipients must agree to allow any member of the

board of directors to personally inspect the work being performed under the grant, provided that the board member agrees to be bound by a standard non-disclosure agreement, which does not preclude the board member from recommending continued funding or not based on their inspection.

### **Selection Process**

To limit the number of proposals to be evaluated, there is a referendum process whereby the proposals must receive a minimum number of “electronic signatures of voting patrons of ExoTerra” to be placed on the ballot. The BOD will determine the number of signatures needed prior to the July acceptance opening for proposals. In setting the number, the BOD will strive to make it likely that the maximum number of proposals are promoted to the ballot just prior to the ballot finalization. The first such period is in November of 2003. The maximum number of proposals is also set by the BOD. Once the maximum number of proposals have been promoted to the ballot, that period’s ballot is full and no further proposals will be considered for that vote. The referendum area of the website will list proposals in the order in which they were received. Proposals will be listed with the author, organization, and title, plus a link to the full text of the proposal.

All proposals on the ballot will be reviewed by the BOD members who will each make a non-binding “yes”, “no” or “neutral” recommendation and be allowed a few lines of text to explain their rating. Any BOD members with potential conflicts of interest with any proposals will reclude themselves from recommendations associated with those proposals.

In this manner ultimate authority can reside with the card holder but the BOD can

exercise its ideally impartial judgment to steer funds toward efforts that it believes have the greatest chance of success. The recommendations and short formats also allow the voters and the proposers to participate with a minimum of effort, while the hyperlinks and chat areas provide a venue for more in depth evaluation by those card holders who wish to be more thorough or who have greater enthusiasm and time.

### **Synergies**

The ExoTerra fundraising and activity concepts are being deliberately designed to maximize the positive feedback leading to growth of the funding base. Every aspect of the program is being planned so that rather than requiring a large marketing staff, the system, once begun, grows itself. By this we mean that the more ExoTerra grows, the more incentive there is for new card holders to join.

One of the principle tenets which enables this growth is that the system is designed such that competition actually increases an individual organization’s funding potential. It may be counterintuitive, but from an existing participant’s viewpoint it makes sense.

As a new organization joins the competition, the overall funding base increases. At the same time there is now a new choice in the voting so the individual slices of the funding pie get relatively smaller. If each member were 100% loyal to their own organization, then there would be no net impact to the existing organizations.

Fortunately, this will never be the case. The new organization, entering without a proven track record of performance, is at a competitive disadvantage. Therefore, the less-than-fanatically-loyal card holders, and those who are not aligned with any

organization will favor the proposals from the proven source. In the final analysis, existing participants will be rewarded by encouraging their competitors to participate.

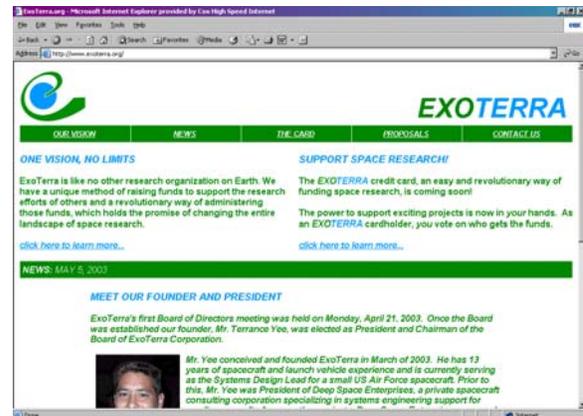
The net effect is a weak, though perfectly legal, pyramid effect, such as the kind used in multi-level marketing endeavors. While ExoTerra does not intend to be the Amway of space, we certainly intend to adapt successful modern marketing strategies where appropriate. The net result does not have to be incredibly strong to be effective, just strong enough to convince participating organizations to do a little legwork to sell the program to their traditional competitors. The beneficial side to the new organization is clear though: they receive no-strings funding and all they have to do to get started is prepare a very simple proposal and encourage their existing membership to participate as card holders.

Beyond the strategic organizational recruiting, prospective grant recipients will benefit greatly by recruiting their own voting blocks from the ranks of their own supporters. In particular, they will greatly magnify their support base by encouraging their members to solicit the members friends and family as well. Since the credit card is a no-cost process, such solicitation should have much more success than a typical request for monetary support. In this way, the proposing organizations do much of the “selling” of the concept for ExoTerra.

The final major synergy of the system is that the more people participate, the more funds become available, the more frequently awards can be made, and the more exciting the entire venture becomes. Additionally, with a larger membership, the message boards are more active, more proposals will be received with more interesting ideas and the more web content and web traffic is

generated which in turn attracts more participants. As more participation is realized, a greater variety of funding sources become viable including website advertising, affiliation programs, merchandizing, sponsored events, tours, etc.

## Website



**Figure 3 - Screen Capture from ExoTerra's Website**

www.ExoTerra.org is a pivotal resource for our organization. Due to the relatively diffuse revenue stream envisioned and the desire to keep the organization's overhead as low as possible, we maximize our efficiency by conducting a large variety of our work across the Internet. In addition to the standard recruitment/marketing purpose for a website, many of the most dramatic features of our program exist only online.

All aspects of the grant selection process happen over the website. The process starts with a researcher downloading the proposal guidelines from the site and accessing the standard announcement of opportunity information. When ready, the proposal is uploaded to our server from another page on our site. At this point, the proposal summary with a hyperlink to the full text is loaded onto the referendum page where it will compete for enough electronic

signatures of card holders to be placed on the ballot.

Once promoted to the ballot, the proposal moves to the ballot page and the BOD add their reviews and recommendations. During the voting period card holders can browse through all the proposals under consideration and access hyperlinks to past reports from that group while recording their votes in a form of secure shopping cart. Once the card holder has finished voting they can “check out” using their ExoTerra ID # and password (which is completely unrelated to their credit card information for liability reasons). Answering a random identity verification question completes the online voting process and helps protect against vote fraud.

Because of the potential for fraud and abuse, ExoTerra takes network security very seriously. The secure voting feature is supported by a separate infrastructure which is being professionally constructed and maintained to the highest standards technically achievable. To support these efforts, we have chosen the head of network security for a Fortune 50 company to be one of the BOD members. We won't be disclosing the technical details of our security arrangements, but with as much potential funding at stake as this, one can be assured that we are aware of the risks and planning accordingly.

In addition to the pages supporting the voting process, there are other pages which archive old proposals, periodic and annual reports of grant winners as well as a full set of organizational documents including minutes of the meetings of the BOD and results of past votes. Full financial information for ExoTerra is also available on the website so that card holders can be sure that funds are spent appropriately.

Another important feature of the website is the message board. This area offers a venue for card holders and others to discuss current research proposals, active grants, organizational politics of ExoTerra, and other topics supporting our primary area of research. This area provides a forum where everyone can get directly involved in asking questions of grant proposers and BOD members and ExoTerra officers.

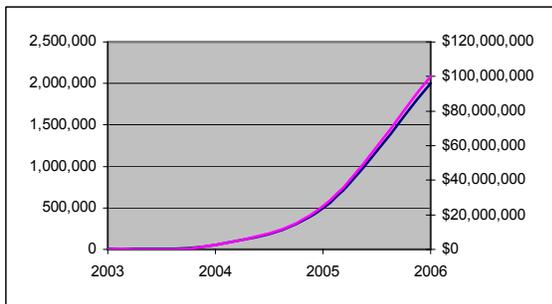
The website also includes a section on the purpose of the organization and our vision for making this happen. There is a FAQ page and an archive of public information and links regarding the variety of methods of achieving orbit. In the archive, there is also a public knowledge base of “lessons learned” organized by subject to allow researchers to draw on the wisdom gleaned from mistakes of the past. This area also serves as a primer to educate the card holder in some of the technical details which concern many of the proposals so they can make more informed choices. In some cases details must be omitted to avoid violating ITAR restrictions regarding exportation of sensitive technology.

Although English is the only language supported on the website currently, we plan to add Spanish, German, Japanese, French, and Russian language sites as our membership base expands.

### **Projections**

The credit card program yields revenue equal to 0.5% of all credit card charges accumulated by the card holders. This may sound small, but think about an average person's credit card usage, then multiply this by the number of people wishing to see space opened to public and private enterprise, and this constitutes a very large fundraising base indeed.

We aim to have 5,000 card holders by the end of the year; 50,000 by the end of 2004, 500,000 by the close of 2005, and 2,000,000 by the end of 2006. At 0.5% of credit card purchases, and using an average \$10,000 volume per capita per annum these assumptions yield a \$25 million budget in just our second full year and \$100 million in year three. While this is small in comparison to the budgets of NASA and the US Air Force, it is more than sufficient to fully fund dozens of worthy small teams who will be working much more efficiently than a typical government contractor who has to battle decades of entrenched ideology and thousands of pages of government regulations and standards.



**Figure 4 - ExoTerra Growth Projections**

While these numbers may sound overly optimistic at first, one must consider such statistics as the 400,000 world wide members of the various space advocacy groups who have already shown themselves willing to spend at least an annual membership fee to support their passion. How much more willing would they be to do so in an endeavor that is both free and offers them a direct voice in deciding how their dreams materialize? One must also consider that for each enthusiast who signs up for the card there is a strong potential for this individual to evangelize the program to their own circle of friends and relatives who are not currently members of a space advocacy group.

We are also looking to capture international participation to further increase our cooperation base. And since the potential grant recipients are encouraged to build their voting blocks (and the fundraising base) by recruiting new ExoTerra card holders, we expect that the positive feedback built into the system will easily attain or surpass these growth estimates. We encourage everyone to join now and be part of something truly phenomenal and meaningful.

**Status**

ExoTerra was incorporated as a non-profit corporation in the State of Colorado on March 11 of 2003. The initial BOD has been selected and consists of five members from Seattle, San Francisco, Denver, Vermont, and Moscow. The corporation bylaws were adopted and officers elected on April 21, 2003. The ExoTerra concept was presented to great interest at the Space Access Society Annual Meeting on April 26, 2003.

Discussions have been held with officials from both the Space Frontier Foundation and the Mars Society about potential cooperation. Additional discussion with these and other societies are planned by the time of the SmallSat conference.

The initial version of the ExoTerra website was launched on May 4, 2003. As of the time of this writing many of the website features described are still in the planning and implementation phase. By the time of the SmallSat conference many of these features should be in place.

The IRS 501(c)(3) application for recognition of federal non-profit status is being completed. A decision should be pending at the time of the conference. The credit card negotiations with various

financial institutions is ongoing and should be concluded well in advance of the SmallSat conference. The corporation's bank account was established with an initial donation on May 11, 2003.

Word has begun to spread regarding our plans and activities and active marketing has begun. Recruiting for the credit card is expected to commence in July. Many potential grant recipients have already been contacted and have shown an interest in applying. Efforts are under way on several other fronts as well and momentum continues to build.

### **Conclusions**

ExoTerra is a truly new approach to the decades old problem of getting cheaper access to space. The concept of a direct democracy dispersing millions of research dollars is a completely new way to engage the public in this cause. The convergence of the new credit card programs, secure web-based communications, and widespread dissatisfaction with the status quo have set the stage. Our organizational concept is designed to have broad public appeal and to encourage rapid, self-sustaining growth through a number of synergies built into the system. That positive feedback and the wide appeal of the cause in general constitute an explosive growth potential. Whether the concept will live up to the potential or not remains to be seen, but the initial public and organizational responses have been highly encouraging and enthusiastic. Space exploration is primed for true transformation. Putting the means to achieve that transformation into the public trust could be the fuse that ignites the revolution.