Incredible Adventures / Spaceport Associates
Space Tourism Survey

THE ADVENTURERS' SURVEY

Full Report

November 2006

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1. Introduction

It was in October 2002 when the most comprehensive, statistically valid, and realistically-based survey of space tourism demand to date was issued as the findings of the report known as the Futron/Zogby study (Ref 1). The findings formed part of the testimony to the President's Commission on the Future of the US Aerospace Industry (Ref 2) and enabled "public space travel" to become part of that Commission's recommendations. Since that time four years of developments have taken place, and the intervening period has been perhaps the most dramatic and significant, at least so far as the general public is concerned, with regard to awareness and comprehension of space tourism in its various forms.

This of course has been due to such events as the X-Prize and the SpaceShipOne flights during 2004, The X-Prize Cup competitions conducted each year, and the launch of Bigelow's space hotel precursor prototype Genesis 1 this year. The government, via Congress and the FAA, has played its part in creating a regulatory framework to enable the new industry to emerge. Also during this period, new spaceports have been emerging in a number of US states, and elsewhere around the globe, with an explicitly stated purpose of supporting space tourism activities. Major new players, like Sir Richard Branson of Virgin Galactic, have declared their intention of providing space tourism to large numbers of private citizens. It seems therefore that there may well have been some changes in public perception of, and/or willingness to take, space adventures since the earlier survey was conducted. That is one reason why the present survey has been undertaken.

Another reason for the new work is that, because the industry has moved on during the intervening four years, another set of questions has emerged that would benefit from a public viewpoint. Many of these questions were not asked in the original survey. In some ways these new questions are of a more detailed nature than those reported on in the Futron/Zogby study. They have been asked in order to provide the industry with some feedback on public perceptions of key elements of space tourism packages soon to be marketed. This should assist hardware manufacturers, service providers and space tourism travel agents to refine their offerings to be more in line with customer preferences and expectations. Reference 7 provides a framework for developing the questionnaire.

An important caveat must be declared, however, at the outset. The Futron/Zogby study derived its rigor and credibility from a very expensive process involving one-to-one interviews with 450 millionaires, the number being designed statistically to provide results within a +/- 5% variation of the millionaire population in general. This current survey makes no such claims to statistical validity. It has been performed specifically to provide a biased sample – those interviewed are *a priori* known to be interested in adventurous vacations. That is why the findings are being called The Adventurers' Survey (but note that the sample size of 998 is large enough to ensure that the results are representative of the views of all the Adventurers who access the web site –see Appendix A). This means that the collected opinions (on such aspects as design features of the tourist spacecraft) represent the views of folks who already understand the nature of adventure vacations, and which therefore in some respects have special importance to those designing the future space tourism experiences.

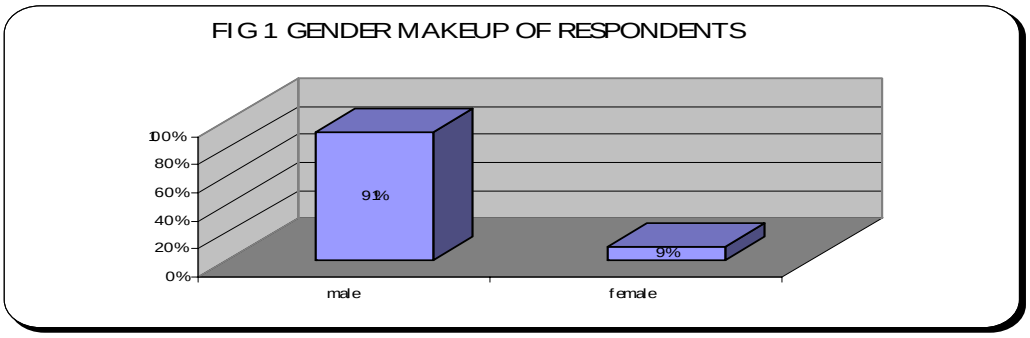
The detailed methodology and questionnaires used for the Adventurers' Survey is provided as Appendices A, B and C of this report. However, at this point it is sufficient to note that the responses were obtained by use of web survey techniques, during the months of August and September in 2006, targeting the client list of the Incredible Adventures agency. In addition, Appendix D provides some flavor by presenting the comments of respondents, submitted as they completed the questionnaire. It should also be noted that, while rigor was built into the Futron/Zogby survey by asking the same question several times in different ways, this was not done in the case of this short survey. The analysis therefore of necessity assumes that the respondents have provided honest answers to the questions. No obvious violation of that trust has nevertheless been discerned through the subsequent analysis.

2. The Adventurers

So, who are these folks who make regular use of the Incredible Adventures web site, and who agreed to provide the information requested in The Adventurers' Survey? It has already been noted that they do not fit into any regular demographic, yet they have in common an interest in exciting adventure vacations. The survey instrument asked specific questions to help us understand the characteristics of those providing the responses to the survey. This is what we learned.

2.1 Survey Population

The questionnaire went live at the start of August 2006, and during the next 6 weeks, a total of 998 completed responses were obtained. Fig 1(derived from response to Q 24 of the survey) shows how they were distributed. With only 9% of the responses being female, there is an obvious male bias in this sample. Most of the analysis uses the combined results, but a check for gender-based differences in the responses, which prove to be rather significant, is included in Section 10. For comparison, the corresponding demographic in the Futron/Zogby study was a 70/30 split, where a special effort had been made in the sampling to mirror the known gender makeup of the millionaire population as a whole.



2.2 Sample Characteristics

What else could be determined about the survey respondents?
Fig 2 (derived from response to Q 21 of the survey) provides an insight into where they come from. We should compare this breakdown to what we know about the distribution of wealthy populations around the world. 63% of this sample is from the US, whereas a truly normalized distribution of wealthy individuals would be split rather equally between US, Europe and Asia. The majority of the analysis is based on the combined responses, although regional differences in responses to the survey are addressed in Section 11 of this report, where it will be seen that the differences can be significant. Note that the survey questionnaire, although in English, made special provisions for respondents from different countries, by providing conversion tables for height, weight and currencies, where required.

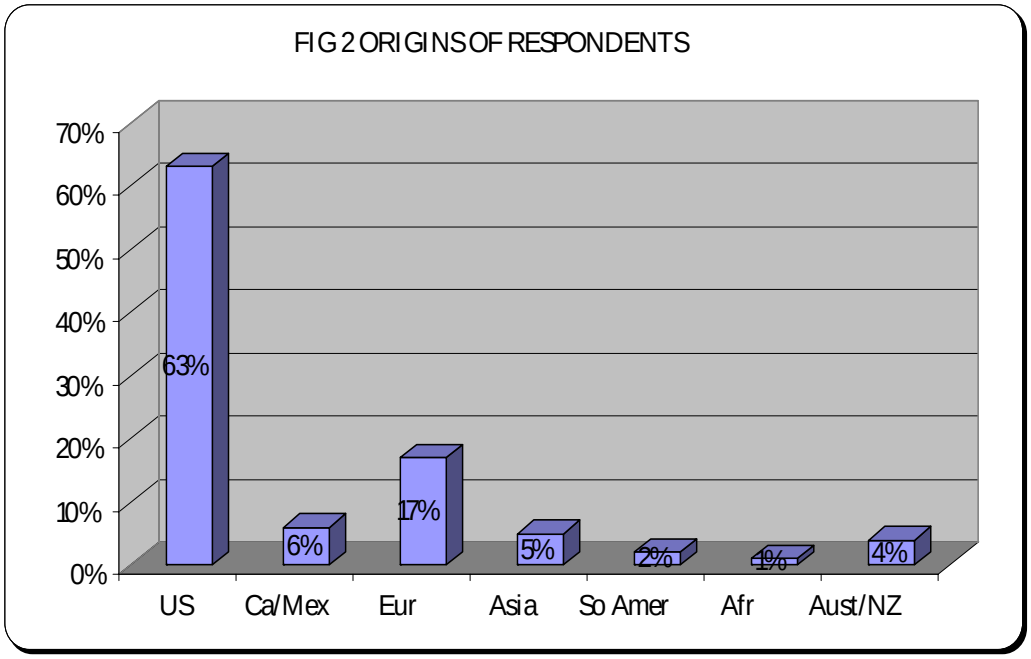


Fig 3 (derived from response to Q22 of the survey) indicates the age breakdown of the respondents, and we note that 78% of respondents are aged between 21 and 60, with only 6% being above 60. In the case of the Futron/Zogby survey, 22% of the (millionaire) respondents were above age 65, so this less-wealthy and more adventurous sample population tends to a lower age distribution. Section 12 addresses the implications of this distribution.

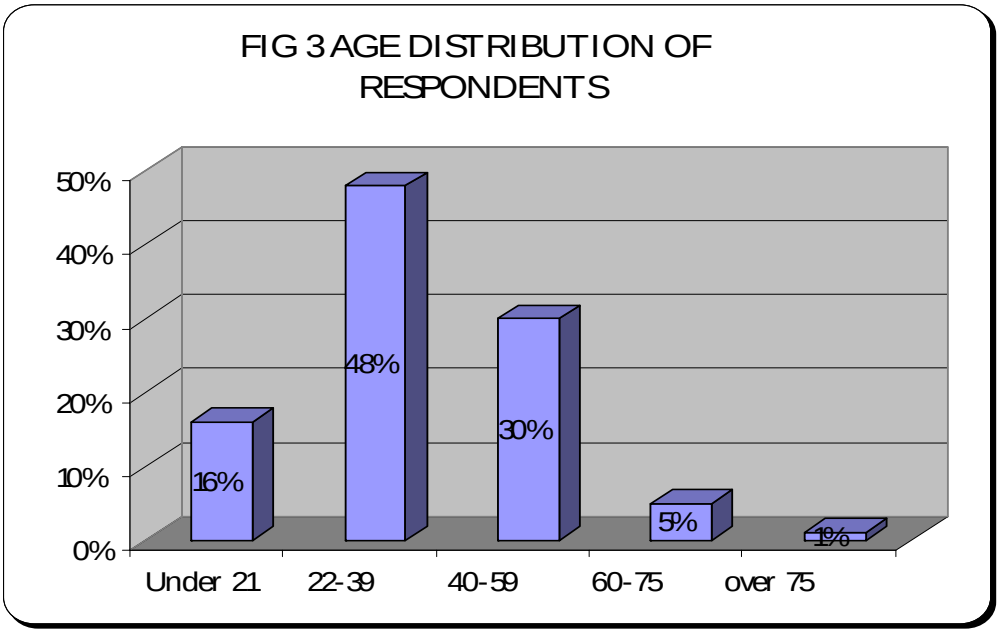
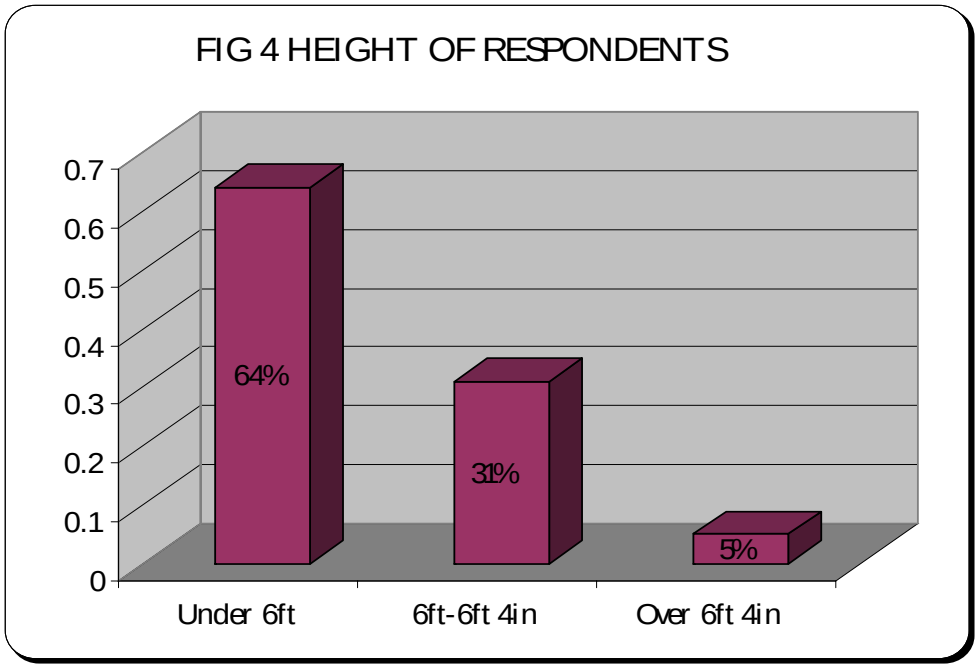
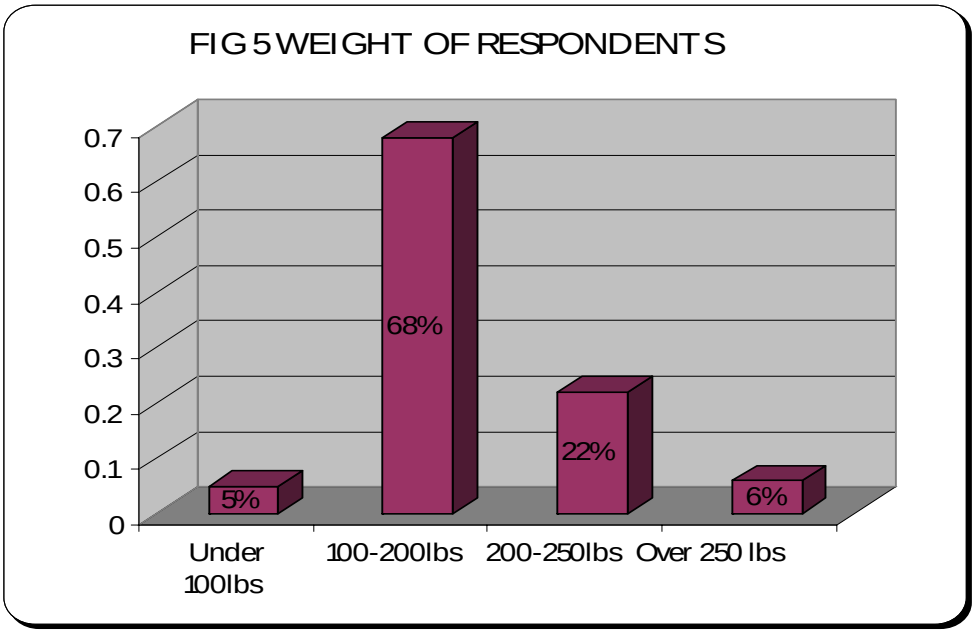
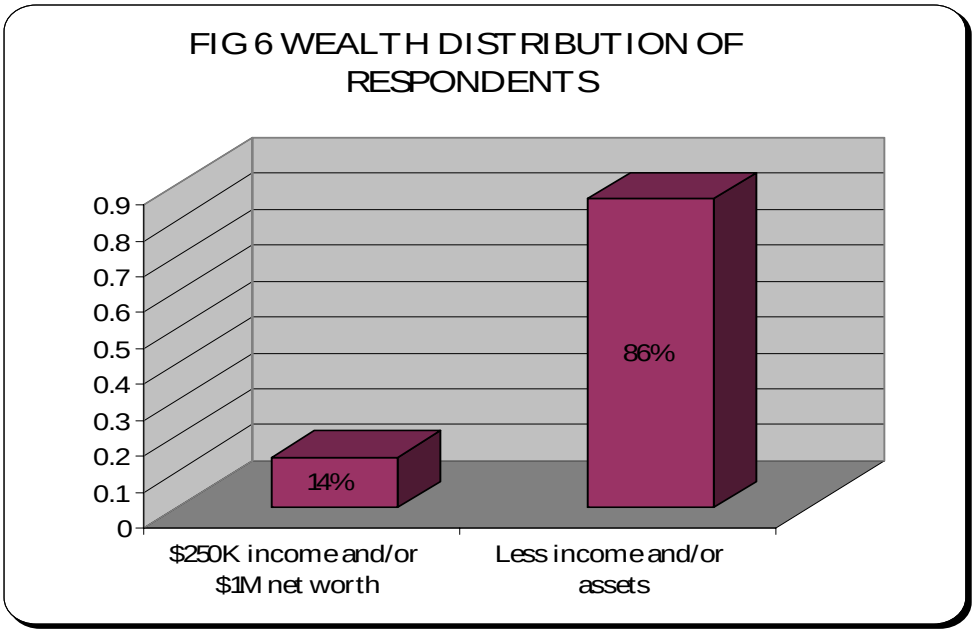


Fig 4 and Fig 5 (derived from response to Q 23 of the survey) give some useful information about the size of potential space tourists, and this could be useful for spacecraft designers. We note that as many as 36% are greater than 6 feet in height, which may be a problem for some proposed spacecraft internal layouts, especially when associated with 28% who weigh over 200 lbs. Adventurers, it would seem, tend to be rather large and bulky individuals.





The next piece of information was requested in order to make some cross-correlations with the Futron/Zogby work. We found (see Fig 6 – derived from response to Q 25 of the survey) that only 14% of the respondents belonged in the wealth category used for the earlier survey, i.e. they had an income of at least $250,000 and/or a net worth of at least $1M. A separate analysis has been carried out on this subset in Section 13 to see if the level of wealth affects the response pattern, and it is shown that indeed it does for some key questions.



2.3 Acceptance of Risk

We already knew that the respondents would not all fit into the "millionaire" category that had been used in Futron/Zogby, but we expected to find an interesting attitude to risk in the respondents to The Adventurers' Survey. This is what we found.

Fig 7 (derived from response to Q26 of the survey) shows that the respondents had indeed already taken part in some risky leisure activities. We note that 7% had already obtained Zero-g flight experience, and as many as 30% had done mountain climbing. Many of the respondents had done more than one of the adventures. We note, furthermore, that Appendix D-3 contains a list of multiple other adventures previously undertaken by the respondents to the survey. These people know about risk.

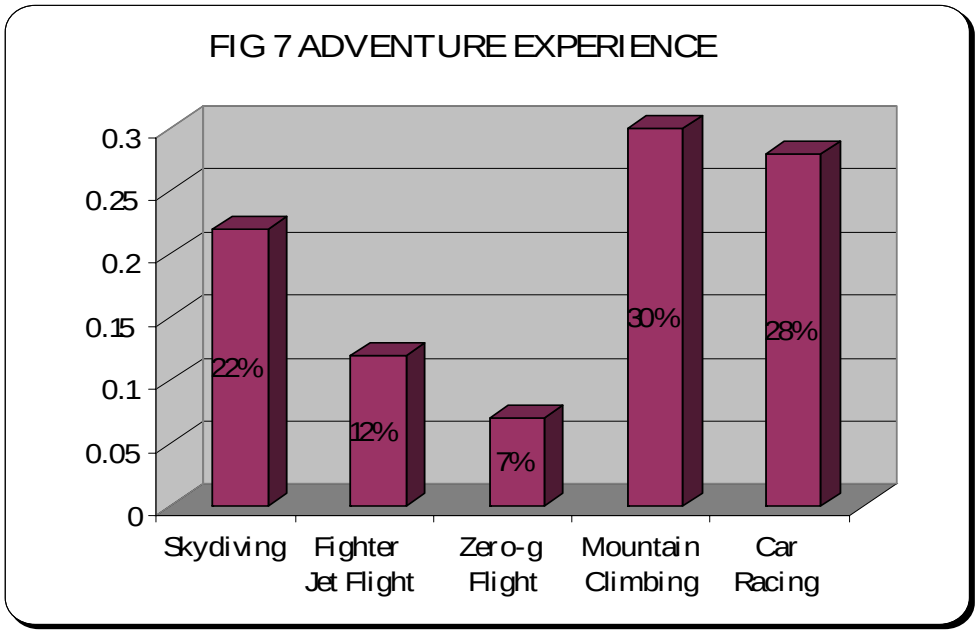
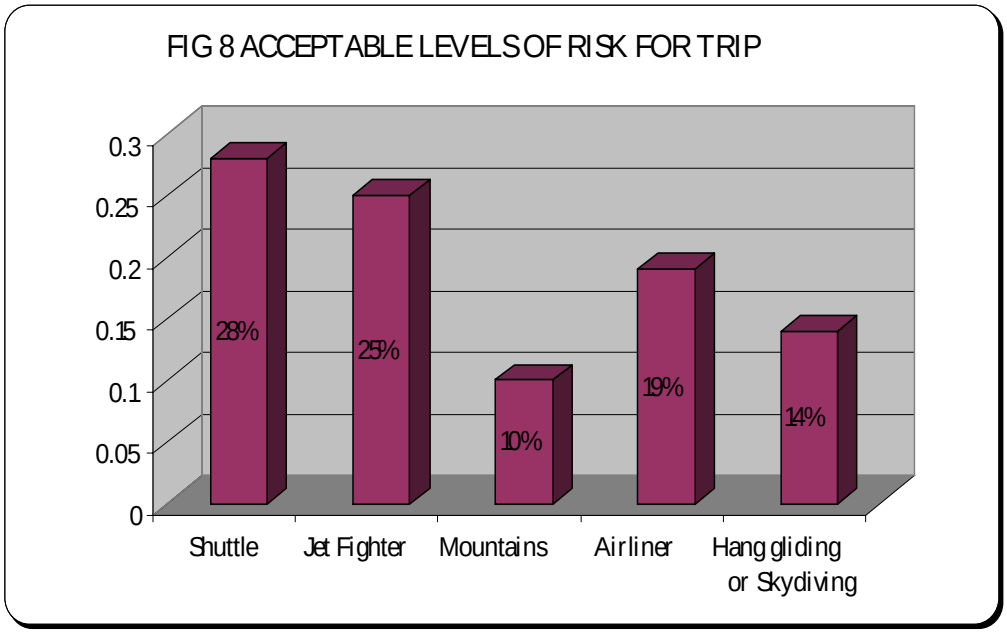


Fig 8 (derived from the response to Q4 of the survey) gives the feedback about the degree of risk that these respondents would find acceptable for a space adventure. They were asked "How safe would a spaceflight need to be before you'd take one?" This was a question about *perception* of risk. No data was provided to the respondents about how risky the offered comparative activities *really are* before they gave their responses, and the offered comparisons were provided in random order. We learn that *for most of these Adventurer respondents, they are prepared to undertake the experience, provided it is only as safe as a Space Shuttle flight, or a jet fighter flight. 19% would prefer to wa it, however, until it is perceived to be as safe as an airliner flight.*



3. Demand for Space Tourism

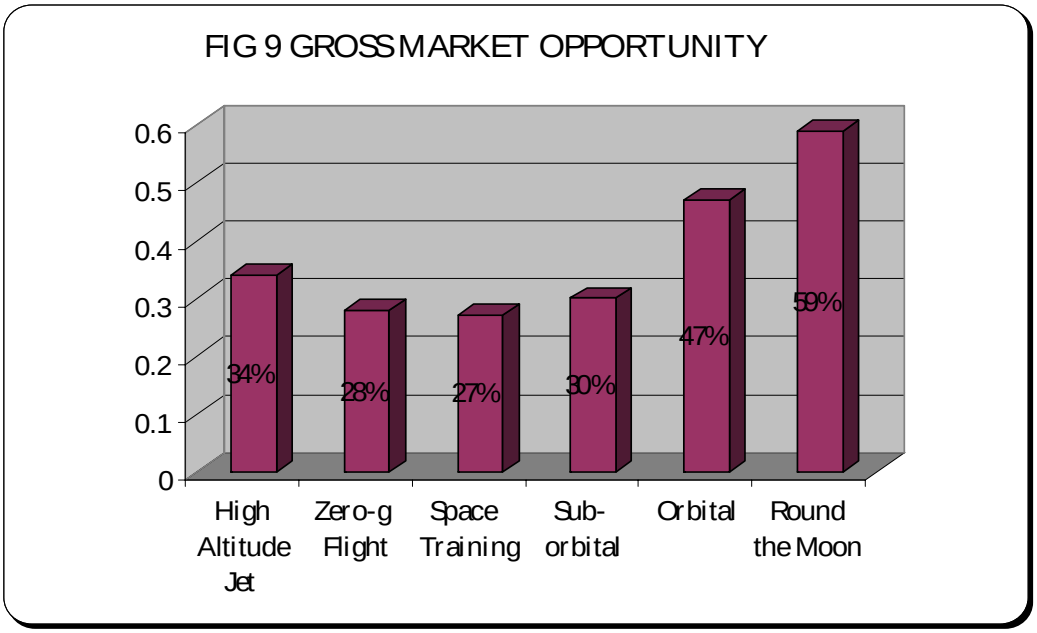
Now that we have established who our respondents are, we can determine what they think about the prospects for taking an adventure into space. We approached this question in a number of discreet steps, so that we could get an insight into the gross market opportunity, before such factors as price would enter into the equation.

3.1 Size of Market

It was decided to expand the scope of the survey from the basic suborbital and orbital space tourism offerings considered under Futron/Zogby. So the respondents were asked about several kinds of private spaceflight opportunities, and their level of interest, before pricing considerations were introduced. The result is shown in Fig 9 (derived from response to Q1 of the survey).

This gives us an indication of the size of the gross market for space tourism, at least among this group of Adventurers. We note that, in this "zero cost" scenario, about a third of the members of the group want to do the "entry level" public space activities (i.e. either: high-altitude jet, Zero-g flight, spaceflight training, or even a suborbital experience).

But this number increases to 47% for orbital and 59% for going the round-the-Moon. In explanation, one respondent indicated "If you are going to all the effort and time to get trained, you might as well go for gold!"



Having established this general level of interest, we explored what the respondents would consider to be fair prices for these ventures, and the results are shown in Fig 10 (A thru F), (derived from response to Q2 of the survey). These findings are rather hopeful for some parts of the industry, because in these cases they show a general agreement with the currently accepted pricing policies, with some upside scope for early adopter premium customers in some cases.

However, it is not so encouraging to report that this group (having been given no a priori price indicator in the survey materials) indicate a view that the "fair price" for suborbital flights should be $50K or below. They also indicate a perception that a "fair price" for an orbital flight would be $1M or below, while Moon trip pricing can be anywhere between $1M and $100M. Of course, there is no guarantee that a business plan could produce a cost structure that would support the price levels indicated. These are merely customer perceptions

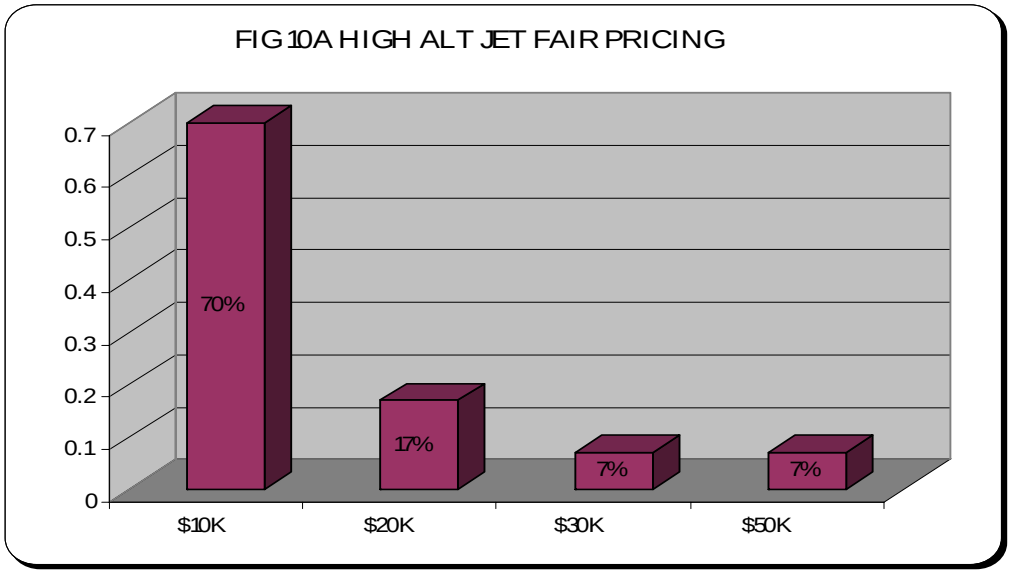


FIG 10A HIGH ALT JET FAIR PRICING
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
70%
17%
7%
7%
$10K
$20K
$30K
$50K

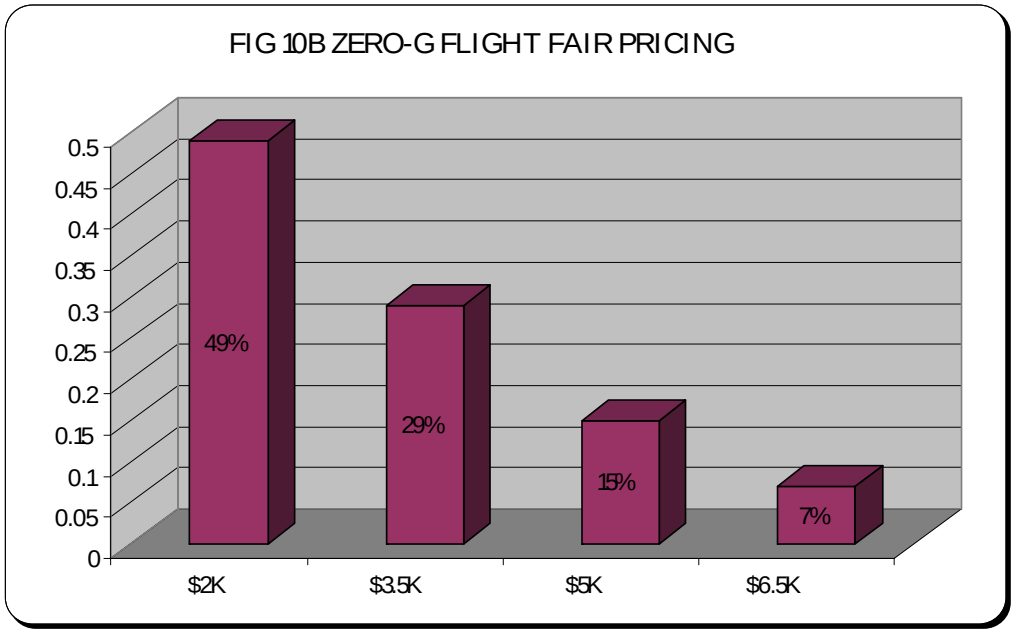


FIG 10B ZERO-G FLIGHT FAIR PRICING
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
49%
29%
15%
7%
$2K
$3.5K
$5K
$6.5K

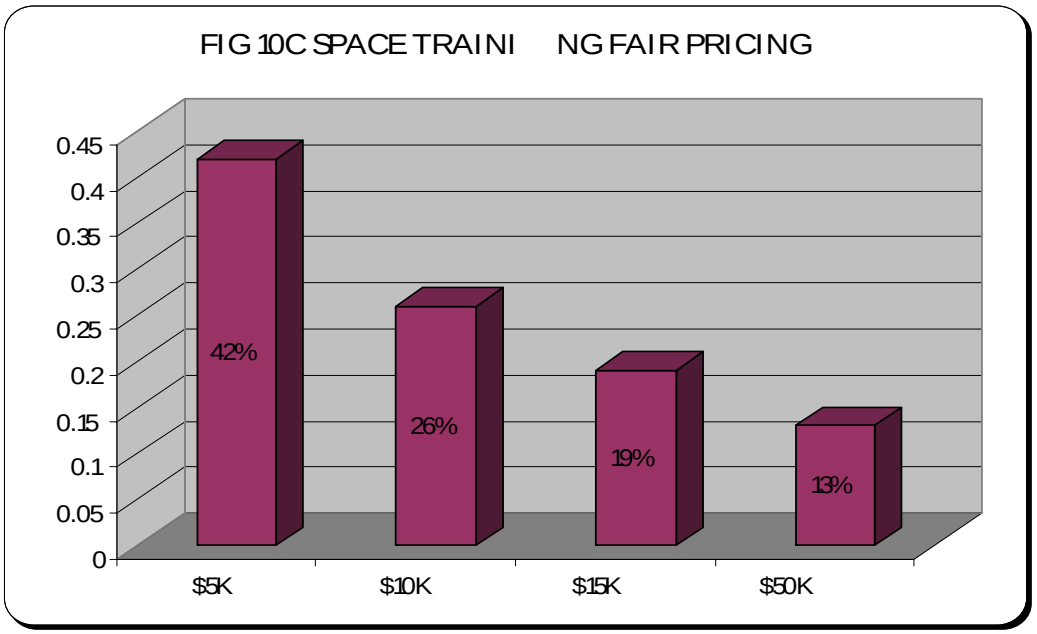


FIG 10C SPACE TRAINING FAIR PRICING
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
42%
26%
19%
13%
$5K
$10K
$15K
$50K

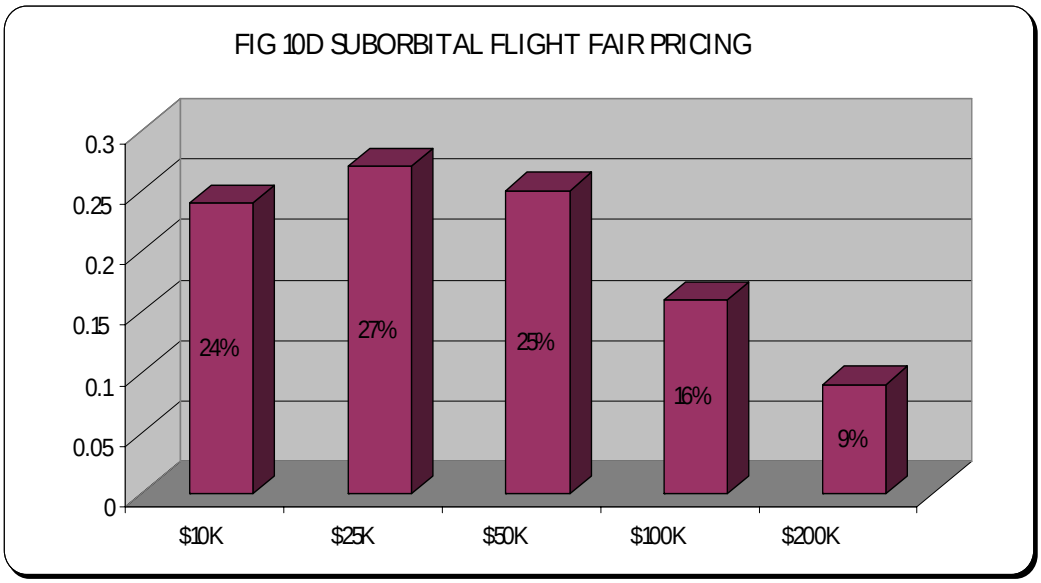
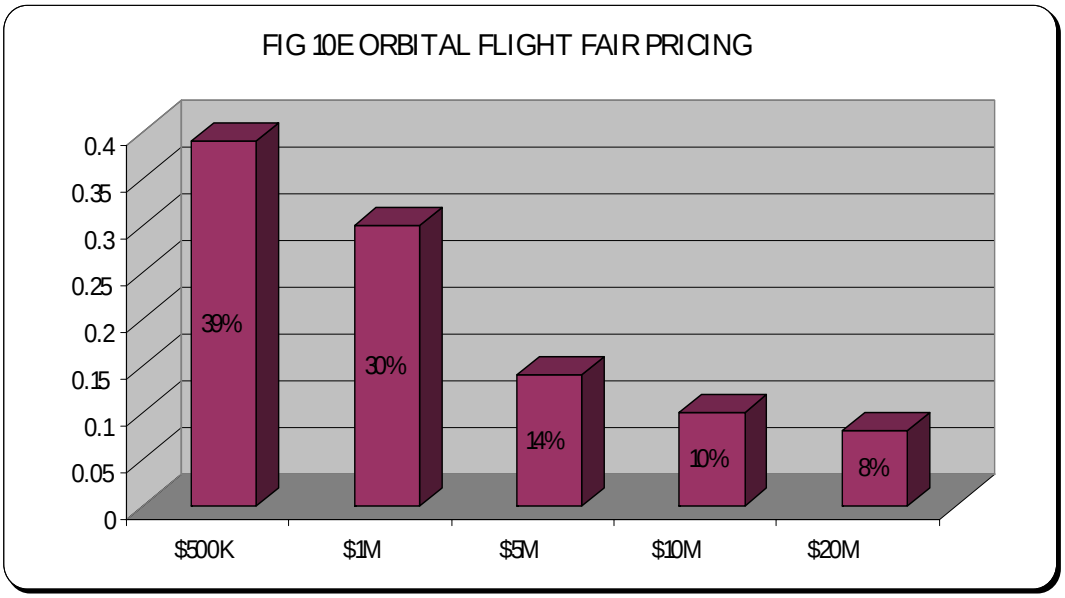
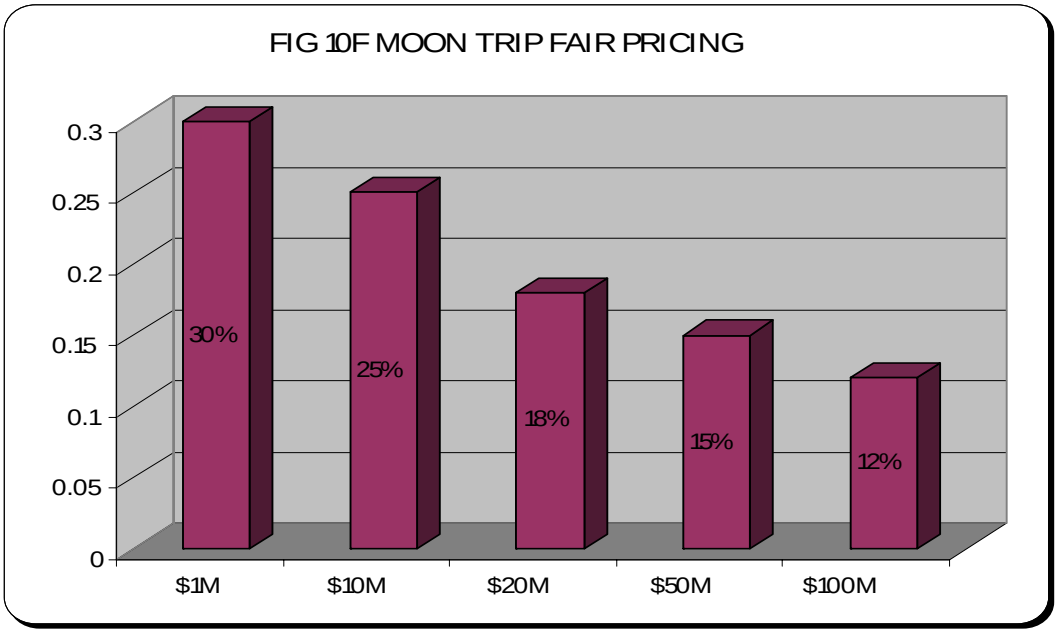


FIG 10D SUBORBITAL FLIGHT FAIR PRICING
0.3
0.25
0.2
0.15
0.1
0.05
0
24%
27%
25%
16%
9%
$10K
$25K
$50K
$100K
$200K

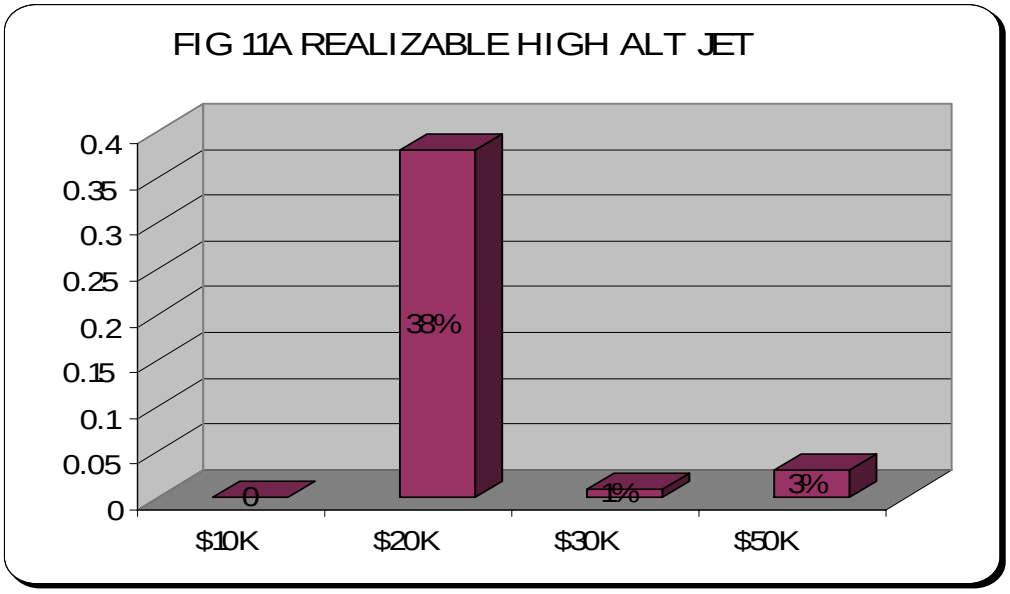




The next related question that was asked of the respondents was aimed at determining *the realizable market* for this group of Adventurers (remembering that only 14% of them are as wealthy as the respondents to the Futron/Zogby survey). Respondents were asked "Which of the following adventures do you see yourself *actually doing some day…* (and) select the amount you both *could and would* pay".

The findings are given in Fig 11 (A thru E) (derived from responses to Q 3 of the survey). We note that 38% of the respondents report positively on the high-altitude jet experience at $20K, 33% want to do the Zero-g experience at $2K, and that 25% indicate an interest in space training at $5K. For the suborbital flights, only 7% of this group say they will undertake flights at the current prices of $100K and above, whereas 36% would opt at prices around $25K and down to $10K. The message for orbital operations is that only 4% of these respondents would go at current price levels of $10M to $20M , but as prices are reduced, there is a distinct "kink" in the curve at price levels below $1M, with 25% agreeing to proceed if prices could reach $500K.

Regarding the Moon flights, the "kink" occurs below $10M, with almost 20% being interested at $1M.



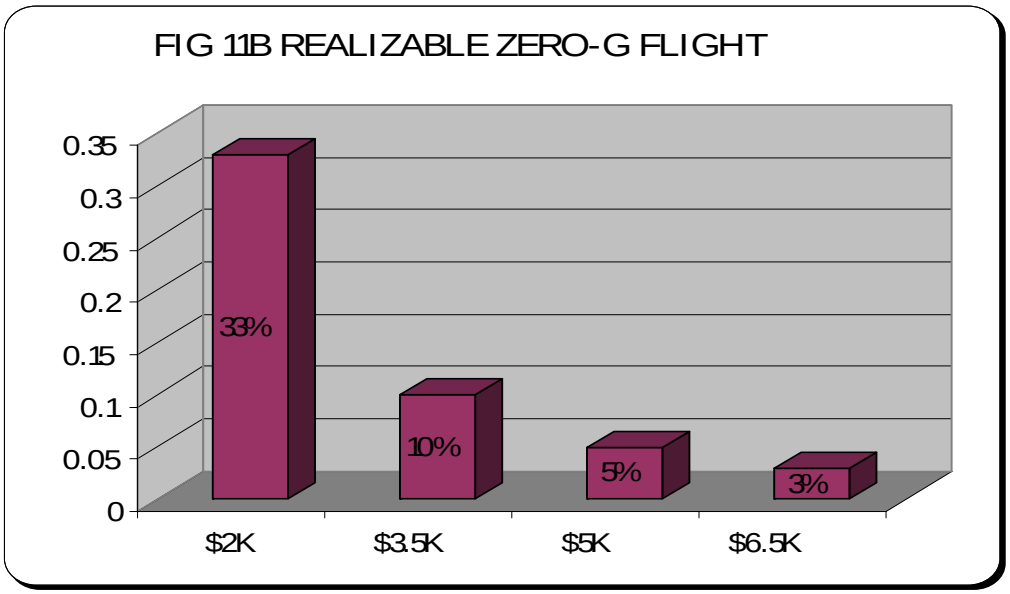


FIG 11B REALIZABLE ZERO-G FLIGHT
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
33%
10%
5%
3%
$2K
$3.5K
$5K
$6.5K

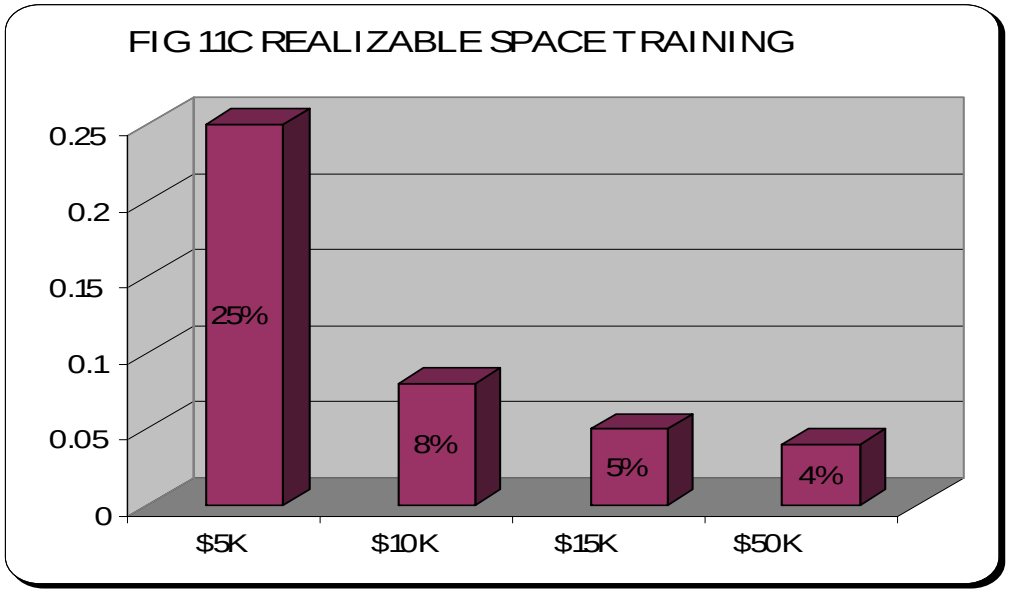


FIG 11C REALIZABLE SPACE TRAINING
0.25
0.2
0.15
0.1
0.05
0
25%
8%
5%
4%
$5K
$10K
$15K
$50K

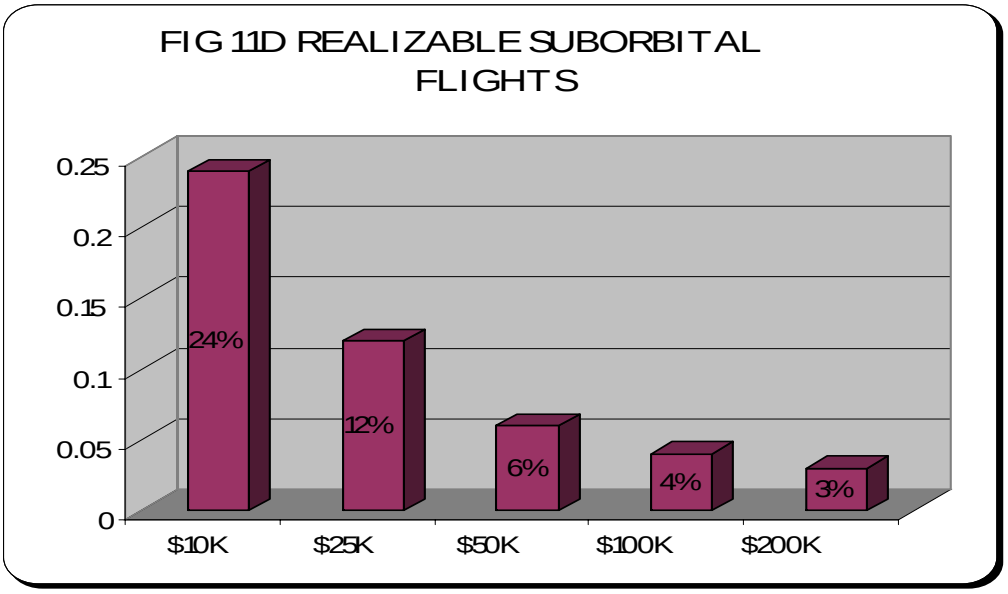


FIG 11D REALIZABLE SUBORBITAL FLIGHTS
0.25
0.2
0.15
0.1
0.05
0
24%
12%
6%
4%
3%
$10K
$25K
$50K
$100K
$200K

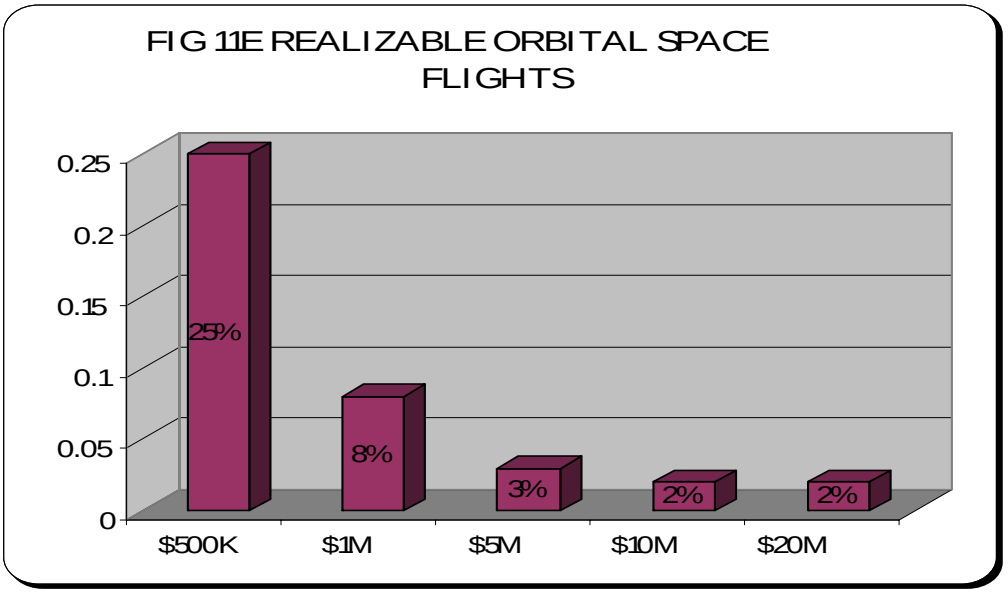
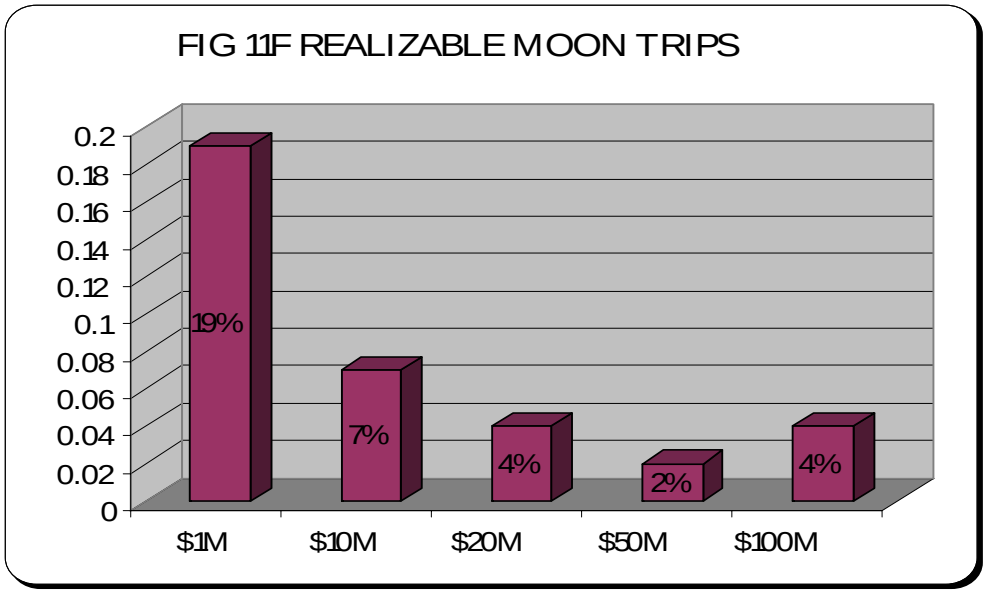
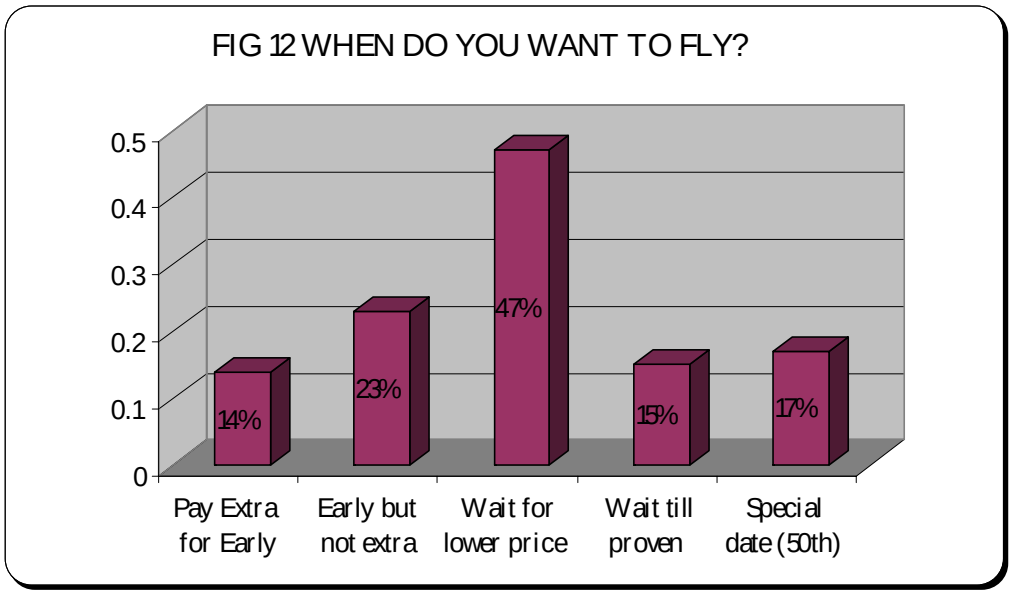


FIG 11E REALIZABLE ORBITAL SPACE FLIGHTS
0.25
0.2
0.15
0.1
0.05
0
25%
8%
3%
2%
2%
$500K
$1M
$5M
$10M
$20M



3.2 Growth Curve

The next major forecasting variable that needs some calibration is the rate at which the industry is expected to "take off". A discussion of this is included in Ref 3 (Table 1). A question was therefore asked to give some insight into this issue. Respondents were asked "Let's assume you're planning to buy a spaceflight. When would you want to go?" The findings are presented in Fig 12 (derived from response to Q5 of the survey). We note from this response that only 14% of the respondents truly care about pioneering, and 47% will wait for the price levels to drop (to the levels indicated in the Fig 11 charts).



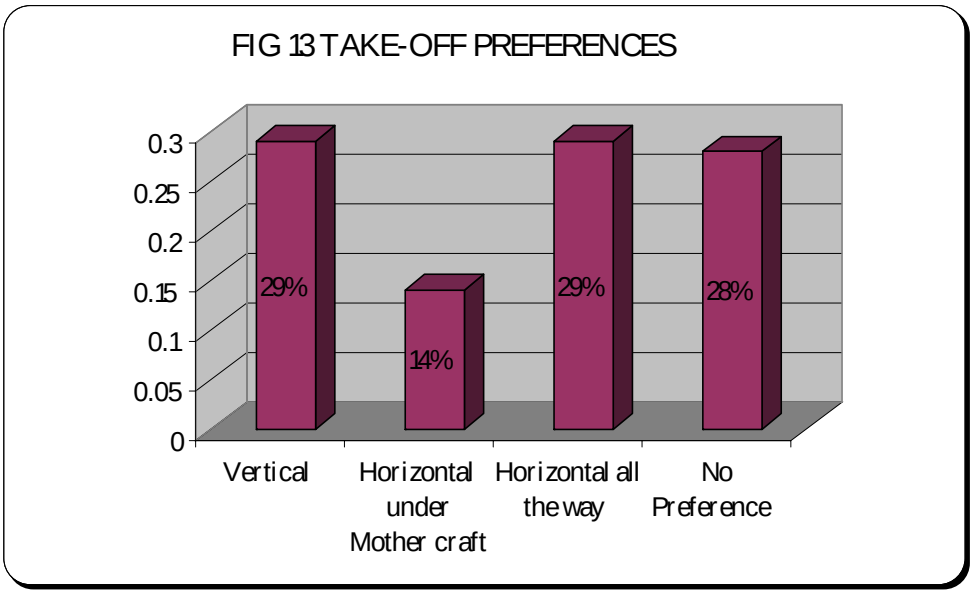
4. Choice of Spaceship Design

There are many constraints imposed on spacecraft designers in determining the main elements of the architectures of their chosen space tourism vehicle. After all, we are talking about rocket science, and there have to be compromises in order to make the trip possible at all. Spacecraft for human spaceflight must traverse a series of punishing engineering environments associated with the extremely high speeds needed. A discussion of architectures is included in Ref 6.

One consequence of this is that the earliest tourist vehicles will probably not be ideal (just consider the designs of the earliest passenger aircraft compared with those of today. In fact the first aircraft passengers sat out on the wing alongside Wilbur or Orville Wright, the pilot!). Nevertheless, it is surely helpful to at least know *what the future passengers would prefer*, if possible, for the main design elements of their chosen ride. To obtain this input, the questions were posed in two parts: methods of take-off, followed by methods of landing.

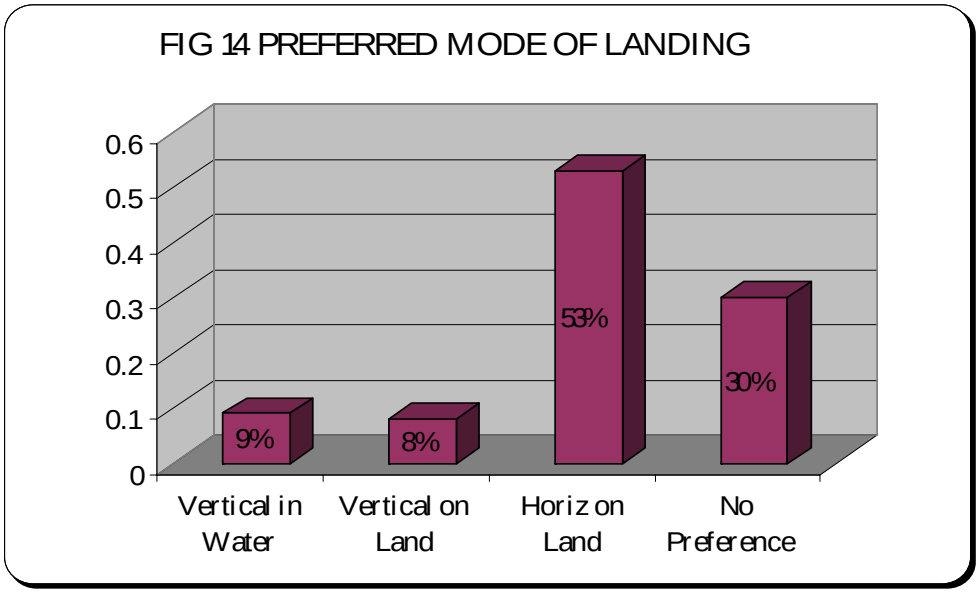
4.1 Going Up

In order for the respondents to make an informed choice about methods of take-off, they were presented with summaries shown in Appendix C. They were asked about their ranked order of preference between three alternatives described as: "You can blast straight up in a rocket. You can hitch a ride on another craft up to a certain altitude and then launch horizontally from the sky. Or, you can take off horizontally in an aircraft that goes all the way to space". Fig 13 provides the findings with regard to the preferred method of take-off, (derived from response to Q6 of the survey). We note that a rather significant 28% have no particular preference. However, amongst those who do have a preference, *there was twice as much interest (at 29%) in a true vertical takeoff, or a horizontal spacecraft takeoff, than in a takeoff in a spacecraft suspended under a mother craft (14%)*. It is not at all clear why the respondents answered in this way. The response appears counter-intuitive, given that the only experience of suborbital flight that they will possibly have seen would have been the SpaceShipOne flights in 2004. One possible explanation is that these Adventurers may be atypical of a more general public in wanting a more continuous rocket experience into space.



4.2 Coming Down

Similar questions were posed with regard to methods of descent. The architectural options offered to the respondents were two kinds of vertical landing (both assumed to be by parachute with the tourists remaining within the capsule) and one of horizontal landing. Of course, there will likely be other variants offered in practice, but this gives at least some indication of a possible range of options. Fig 14 gives the results regarding the preferred method of landing, (being derived from response to Q7 of the survey). We note from this that, again, 30% of respondents have no particular architectural preference. However, amongst those who did express a view, there is a six-fold preference for a horizontal landing on dry land (at 53%), versus either of the vertical landings (illustrated as parachute landings in the survey descriptors) which come in at only 9%. This is a very clear finding, although we did not ascertain why the respondents felt so strongly about it. Clearly, the parachute landing approach would currently be a major disincentive to a wide acceptance of public space travel, and therefore those operators who are designing potential orbital space tourism vehicles will need to take this finding into account in order for their business to be successful.

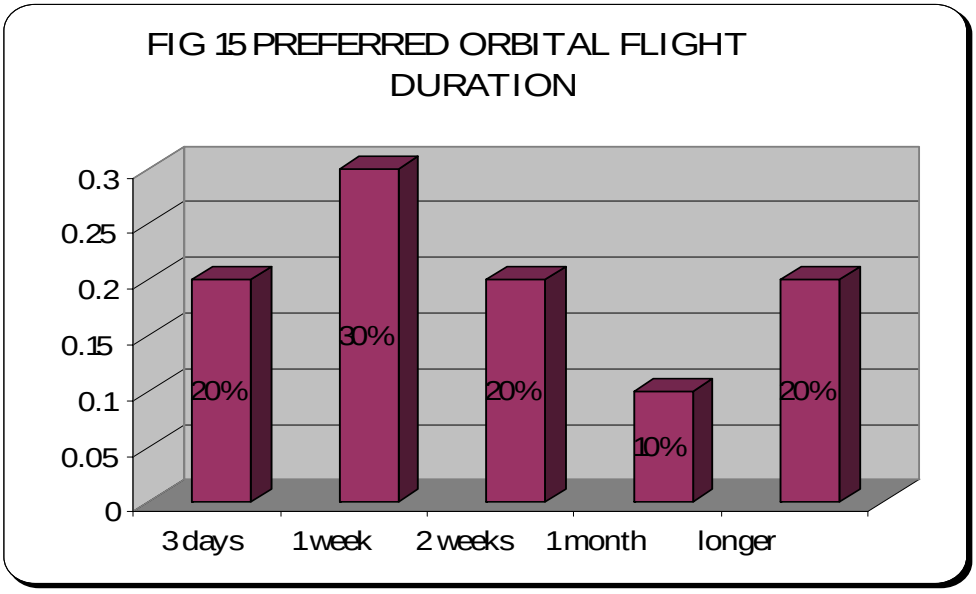


5. Orbital Spaceflight Options

There are a few aspects of the spaceflight experience that are of particular relevance to those planning to offer orbital space tourism opportunities, and for which it would be helpful to know what the customers would prefer.

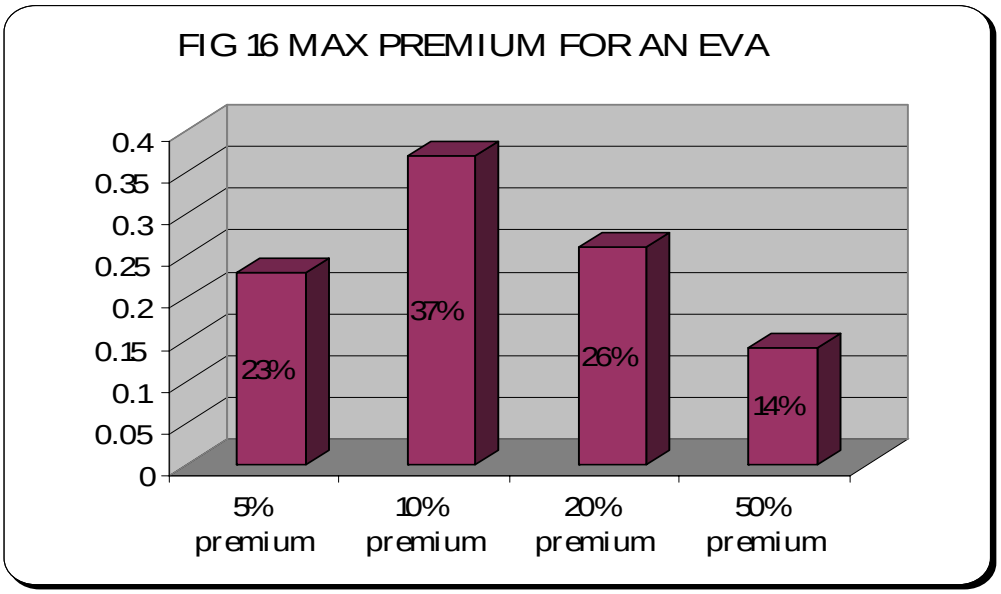
5.1 Duration

The most basic is the **duration** of the orbital space flight experience. Clearly there are limitations from the point of view of the spacecraft designer imposed by the amount of consumables that can be carried. And there may well prove to be other limitations as a result of medical considerations, once space tourism develops to the point where sufficient examples are available (see Ref 6 for a discussion). However, the purpose of this question was to determine if there are any clear **customer preferences** on this matter, quite regardless of externally imposed limitations. After all, even the most enjoyable experience comes to an end. Fig 15 (derived from response to Q8 of the survey) presents the findings on this question, and we see that **70% will be happy with two weeks or less for an orbital spaceflight experience**, while 30% would want a month or longer. Note that the respondents were given no indication of any price differential for longer flights. This finding will be encouraging to potential orbital space tourism operators. One implication is that an incremental premium could be offered for tourists opting for trips lasting more than two weeks in orbit.



5.2 Spacewalking (EVA)

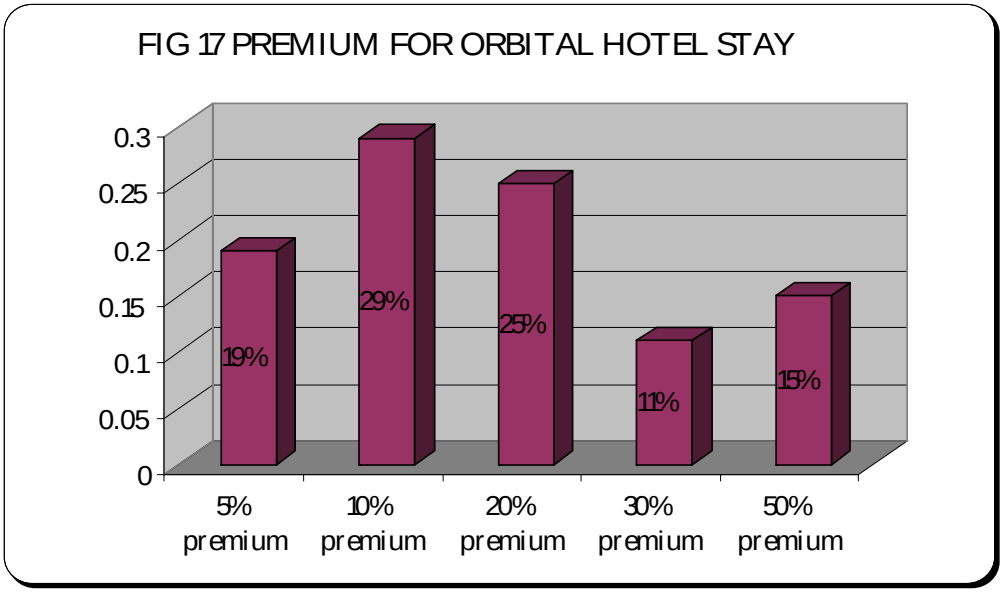
Another question for orbiting tourists is to ascertain whether they would want to do a spacewalk outside of the spacecraft, if that were possible, and if so how much they would be willing to pay for the experience (in addition to the initial orbital spaceflight cost). Fig 16 (derived from response to Q 10 of the survey) provides the findings on this question, and we learn that, of the 88% who were interested in EVA (from Q 9), 85% would pay an incremental premium on the trip price of up to 20%, with only 14% being willing to pay a 50% premium. Note that the survey material did not give any indication to respondents about the possibility of increased training time for this option. When this question was addressed in the Futron/Zogby survey four years ago, it was assumed that EVA training would add another year to the overall training schedule; however since then, the assessment has come down considerably, based on information from sources such as the scuba industry.



5.3 Hotels

Another matter of some concern is the availability of orbital hotel facilities. The question posed here does not go into much detail about the kind of facilities, but is aimed rather at finding how much people would be willing to pay for having an orbital destination. It was not felt possible at this stage to differentiate in the mind of respondents between a genuine commercial orbiting hotel and a space station like the ISS. So the exact language of the question used was: "How important is a stop at a space hotel or space station? In other words, is a destination in space important or are you happy staying in a spacecraft the whole mission?" Fig 17 (derived from response to Q13 of the survey) provides the findings.

We note initially that, rather surprisingly 79% indicated that they did not need the "hotel" option (from Q 12). Of the 21% who did indicate that a "hotel" would be important, 73% of them would pay up to a 20% premium on the trip price, while the remainder would pay up to a 50% incremental premium. It could be that these Adventurers are used to undertaking experiences where comfort is not regarded as a matter of prime consideration, and for durations of a week or less they do not see the need to use a space hotel or space station. There is clearly a need for those operators who are planning to offer space hotels to include in their plans more efforts to educate the prospective public space travelers in some detail about the benefits that their operation will provide.

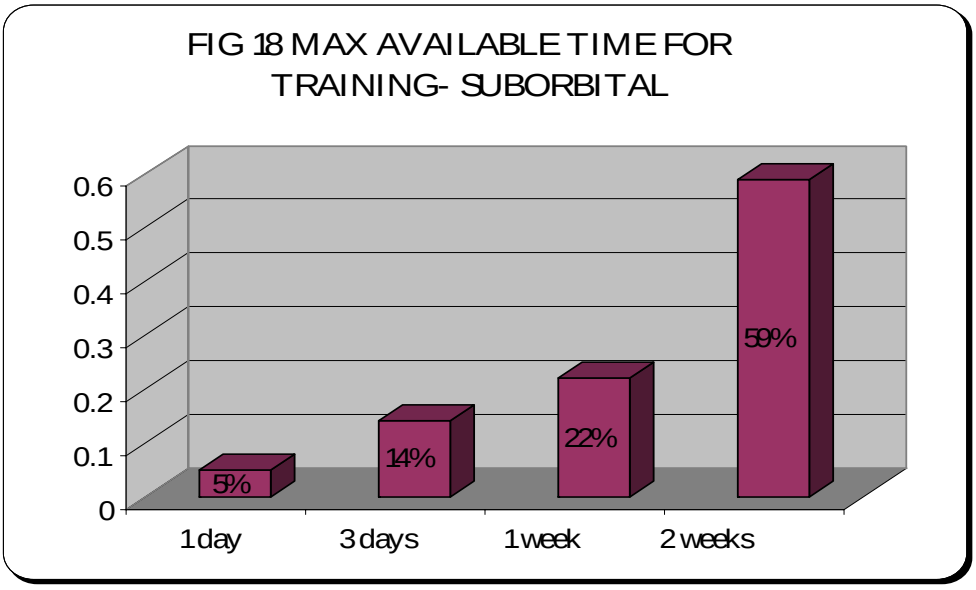


6. Training

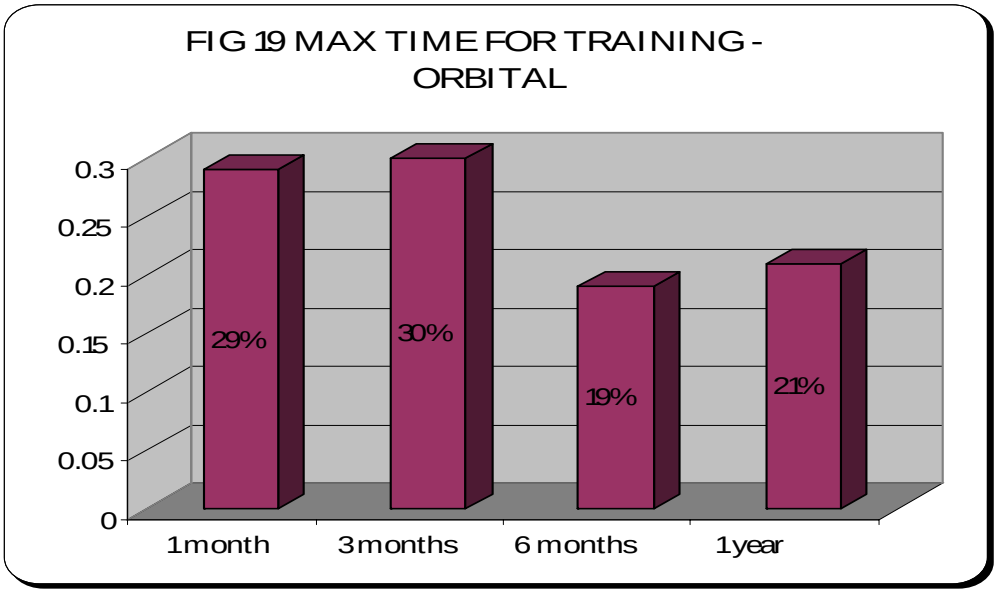
Three questions were aimed at understanding the public's attitude to training. Two were deliberately focused on the duration that potential space travelers would be willing to spend in preparation for a mission, and one was seeking a response to a currently available training course at a stated price range. There is a discussion about training for public space travel in Ref 5 and Ref 6.

6.1 Available Time

There is clearly going to be a different amount of time required for preparing for a suborbital and an orbital space adventure. Therefore the question was asked for each of these trips in turn. Fig 18 (derived from response to Q15 of the survey) contains the response for the suborbital experience, where the question was: "What's the most amount of time you'd be willing to devote to a suborbital space adventure, including all pre-flight training?" We note of course that one day of this is required for the flight itself. The findings suggest that there is likely to be no problem with public willingness to undergo training, with **59% even being willing to spend 2 weeks training for the one suborbital flight opportunity.** This finding opens up opportunities for some extensive training service providers.

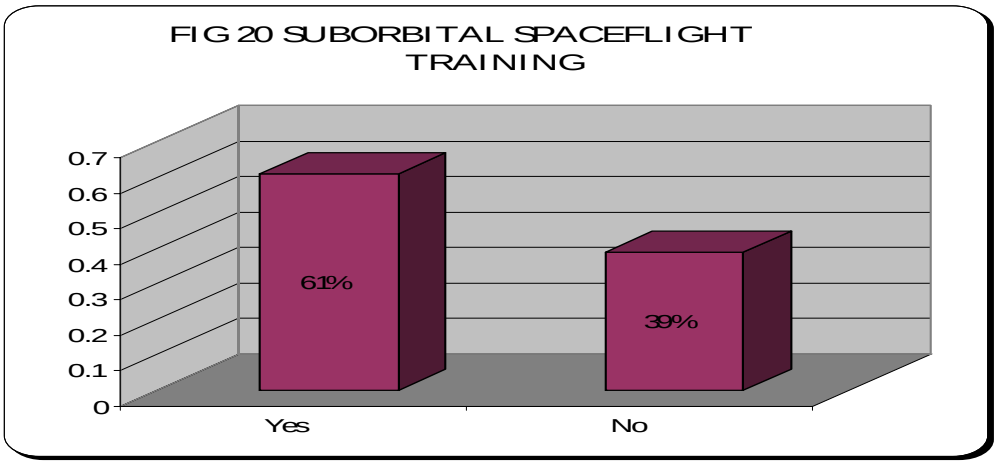


For the orbital experience, the question asked was: "What's the most amount of time you'd be willing to devote to preparing for and completing an orbital space mission, including medical checks, training and the flight itself?" Here of course, in order to extract the amount of pre-flight training time, we would need to subtract the mission duration using the data from Fig 15. The findings are presented in Fig 19 (derived from the response to Q16 of the survey), and we see that **59% indicate a maximum acceptable duration of 3 months for training**, with 41% willing to undergo the current period of 6 months or more. The conclusions of Ref 5 are relevant here, where "Less than 3 months" is recommended as a target for the training period for orbital public space flight participants. There is clearly a difference between professional astronauts and public space travelers in the amount of time they have available to prepare for their space flight experience.



6.2 Training Now

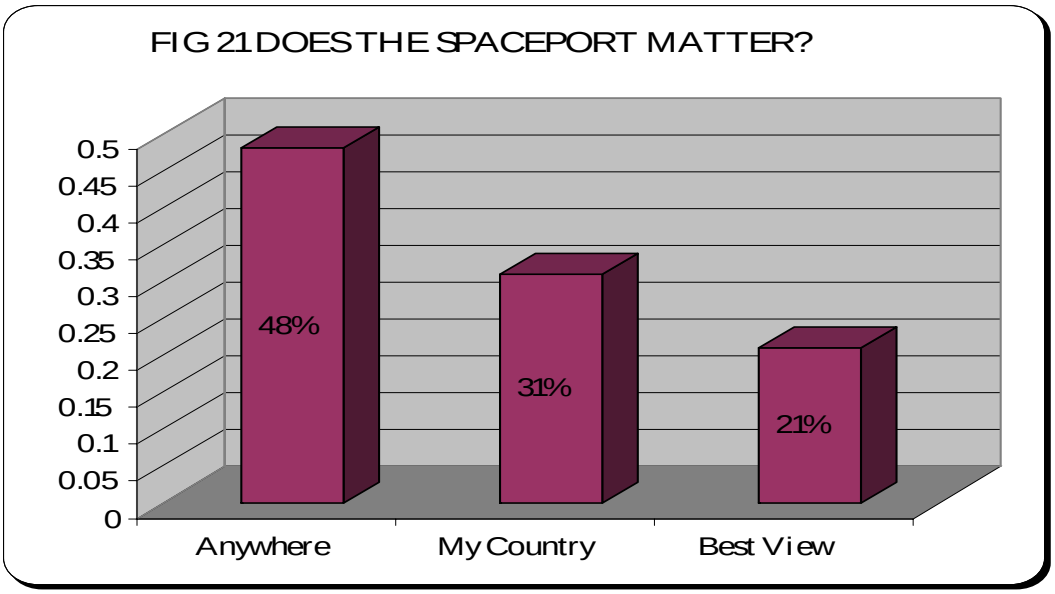
A simple question was asked to determine whether folks would be interested in any preliminary training, perhaps to see if they could handle and enjoy the high-g environments before committing to a full spaceflight experience. The exact question asked was: "If you could start training for a suborbital spaceflight today, would you do so (assuming the cost would be in the $10,000 to $35,000 range)?" The answer is provided in Fig 20 (derived from response to Q20 of the survey), from which we conclude that 61% expressed an interest. This finding ties in very well with the conclusion of the Fig 18 responses discussed above, where 59% would be prepared to do 2 weeks training for a sub-orbital flight. The suborbital spaceflight experience needs to be packaged and marketed as a full several-day-long series of events that culminates in the actual flight. The build-up is an important part of the overall experience.



7. Spaceports

At the time of writing this report, a number of US states are proposing building spaceports to take advantage of the new growth industry of space tourism. There will be a number of different reasons why some of these proposals will result in successful ventures, while others will not. A major factor will be the decision of which spaceports are chosen by which space tourism operators as their base. Ref 4 provides a discussion of this. However, there could be other reasons in addition, that are more in the preserve of the perceptions of the space tourists themselves. We chose to focus the question on suborbital flights. This is because they are going to be the first to happen in quantity, and moreover for a suborbital experience, the location can have a major impact on the view obtained from space. The exact question (Q14 of the survey) asked was: "Does the location of a suborbital spaceport matter?"

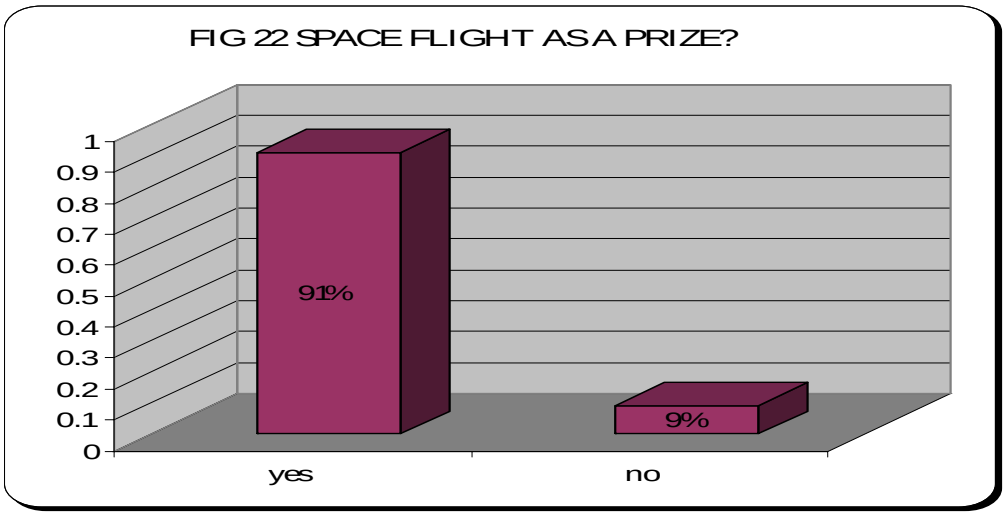
The findings are presented in Fig 21, from which we learn that for 48% of the respondents, they would be prepared to go anywhere for their flight. Only 21% stated an interest in the "best view", and it is possible that they have not yet fully thought about the big difference that the location of the launch site makes to the experience. At the time of the survey, suborbital flights are not considered as point-to-point services, but merely as parabolic trajectories into space, returning back to the point of departure.

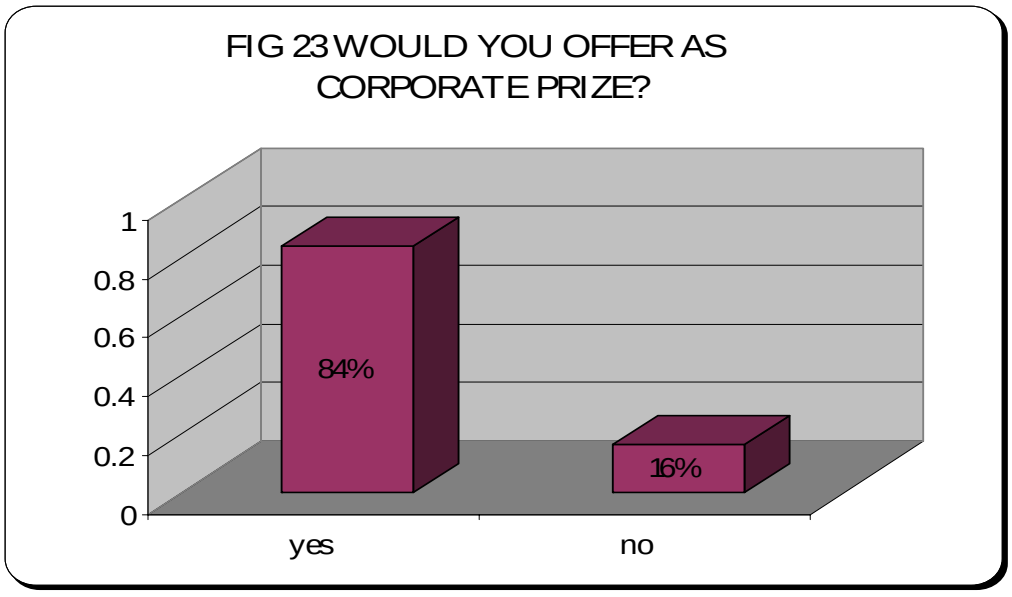


As competition amongst spaceports begins to develop, then there may be a change in public perceptions about the importance of this particular element of choice in maximizing the benefits of their spaceflight experience.

8. Corporate Tourists

Another matter that was not addressed at all in the Futron/Zogby study was the differentiation between different kinds of space tourists. Fig 22 and Fig 23 (derived from responses to Q17 and Q18 respectively of the survey) show the results of asking a question about corporate-sponsored space tourism flights from two different points of view. First, we see in Fig 22 that, unsurprisingly, an overwhelming majority of respondents (91%) "…would want the chance to win a spaceflight, or to earn one through sales performance, etc". Then, in Fig 23, we see the same issue from the viewpoint of corporate management. Of course, we must re-state that these respondents are a biased sample in that they belong to our "Adventurers" grouping. Nevertheless, Figure 23 shows the findings when respondents were asked if they, as the person in charge in their companies, would "consider offering a spaceflight" as a sales incentive, or reward for performance. We note from the response that there is a difference, with now an increase from 9% to 16% declining, based on stated concerns about putting high performance employees at risk, and losing them for the duration of the training period (some of these concerns are captured in Appendix D, Section 2).

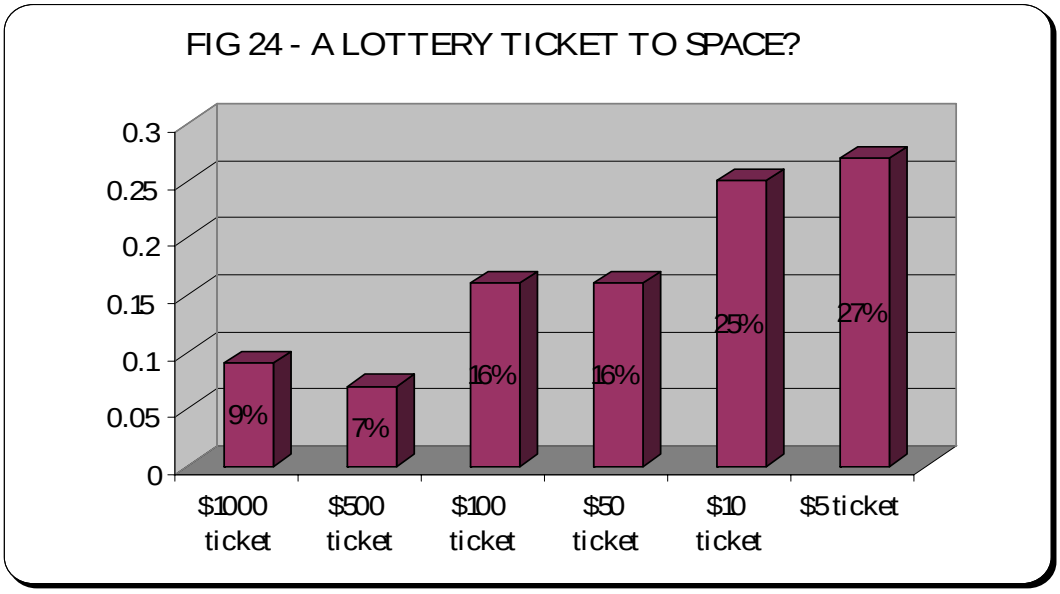




It seems that there could be a number of obstacles to be negotiated before this aspect of space tourism could become a major contributor to the sales projections.

9. Lotteries

Another category of question is related to the possibility of space tourism lotteries. It is difficult to ask a very detailed question on this topic at this stage of the development of the business, so the result may have limited value, but it does give some indication of whether this approach to getting the less wealthy public up into space might be successful. Since the specific question asked of the respondent was about how much they would pay for a space lottery ticket, it is important to notice the precise language of the question: "Since the cost of an orbital flight is expected to be $10 million or more……if the grand prize (of a spaceflight lottery) was a two week orbital adventure….how much would you pay for a lottery ticket? …..assume the odds would be about the same as that of winning a local state lottery…..but assume you won't have to pay the taxes associated with winning..". The result appears in Fig 24 (derived from response to Q19 of the survey), from which we can conclude that a surprisingly high percentage (31%) would pay as much as $100 or more for a ticket.

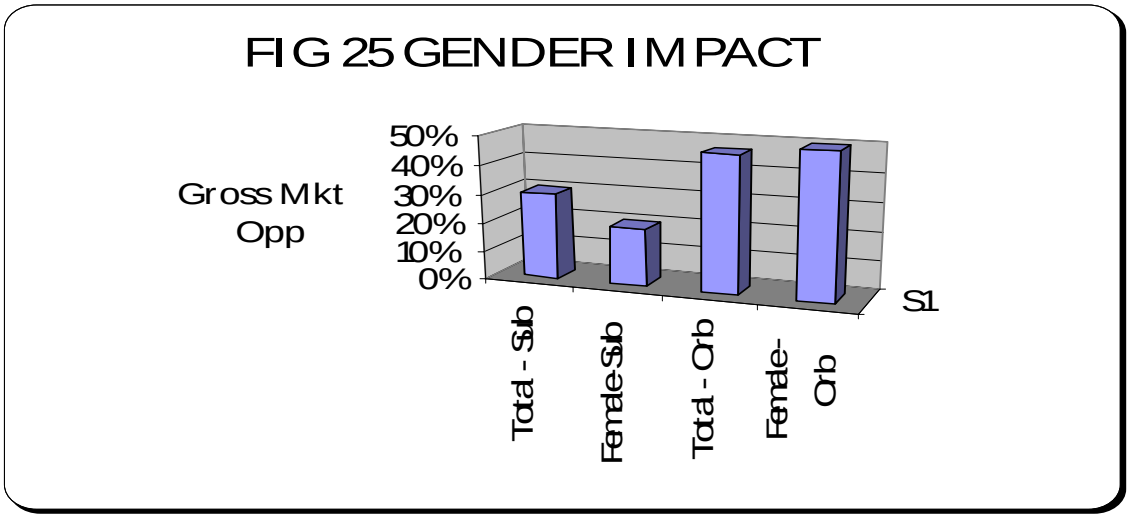


There could well be similar issues in running a space lottery to those associated with corporate space tourism. These would be issues related to risk and insurance and perceptions. However, if these can be overcome, then the market would be there.

10. Gender Variations

Sections 10 thru 13 address the extent to which the survey respondent pool was homogeneous in its attitudes to space tourism opportunities, and whether some minority segments had markedly different perceptions from those of the majority of the respondents. For comparison purposes, standard data points were selected for each of these sections. These were the gross market opportunity for suborbital and orbital spaceflight, as described in Fig 9 for the entire survey database. The criteria were chosen because they offered perhaps the most useful and most immediate impact measurements.

In the case of gender variations, Fig 25 shows how the responses from the 9% of female respondents differ from the results provided by the whole pool. In particular we note that the female respondents have significantly less interest in suborbital missions (only 20% compared to the overall 30%), in favor of a slightly increased interest in the orbital opportunity (50% compared with the overall value of 47%). One must recognize, of course, that the sample size for the female sub-section of respondents is rather small, at around 90, and so we cannot draw too many numerical conclusions. However, it does seem that there is enough of a difference to be able to assert that, at the gross market opportunity level, **suborbital spaceflight appeals more strongly to the males in this pool of Adventurer respondents.** A similar result was found in the survey of Ref 8.



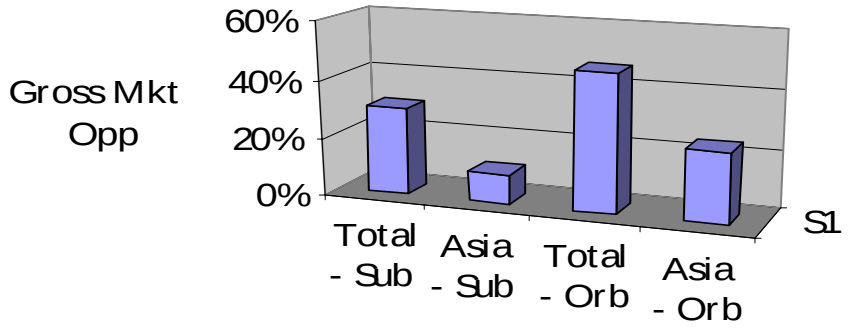
It was not possible to assess from the responses the reason for this finding. It seems that females as a group either do not appreciate the thrills of the suborbital experience to the same extent as their male counterparts, or maybe they do not see the cost/benefit equation in quite the same way. Some careful marketing efforts by the new suborbital operators will be needed to address these perceptions amongst potential female space tourists.

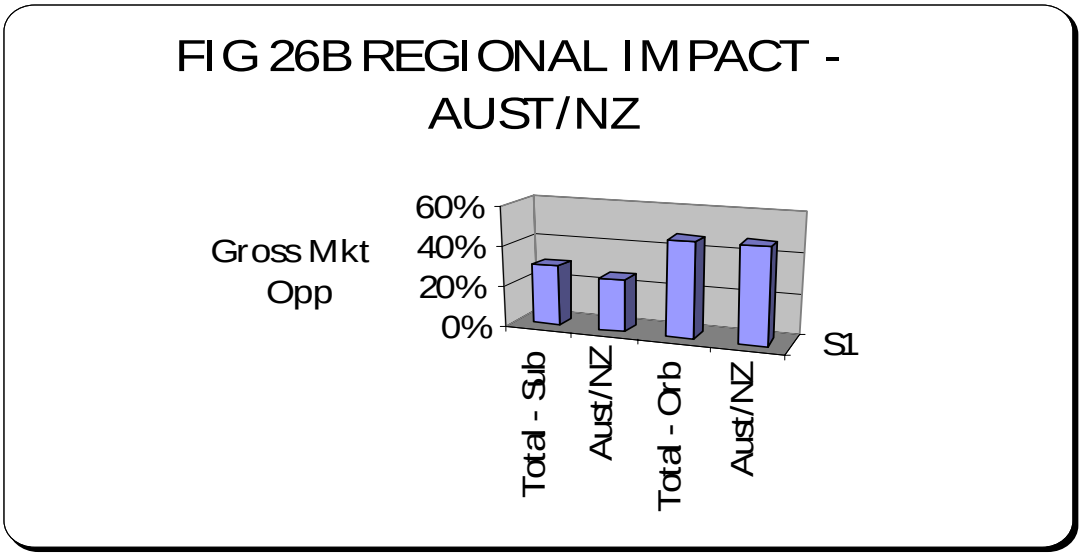
11. Regional Variations

The findings of the Futron/Zogby survey were based on the feedback from a database consisting entirely of US respondents. One objective of the present survey was to try to assess whether perceptions about space tourism varied with region. In attempting to determine whether, and to what extent, the regional place of origin of the respondents had an impact, data was collected in the Adventurers' Survey in seven main regional groupings, as reported in Fig 2. Given the total sample size of 998, the implications of Fig 2 are that for South America and Africa the sub-samples are too small to be of value. Clearly, the majority of the overall findings of the survey are a consequence of the US and European regions, and therefore to identify any regional differences we need to look at outliers.

Since a third of the world's millionaires come from Asia, it seemed important to look at the perceptions from that region. Fig 26A shows the rather dramatic results. Even though the sample size is only 51, the changes from the norm are too great to be caused just by sampling. It seems clear that, at least regarding gross market opportunities, the level of interest in both suborbital and orbital spaceflight is much lower in Asia than in the survey in general. The 30% level of interest in suborbital reduces to only 10% for the Asian respondents, and the 47% level of interest in orbital spaceflight is reduced to only 24%. If these findings prove to be statistically valid, then they have important consequences for business planning of space tourism companies, particularly because of the wealth that is held in the region.

FIG 26A REGIONAL IMPACT - ASIA

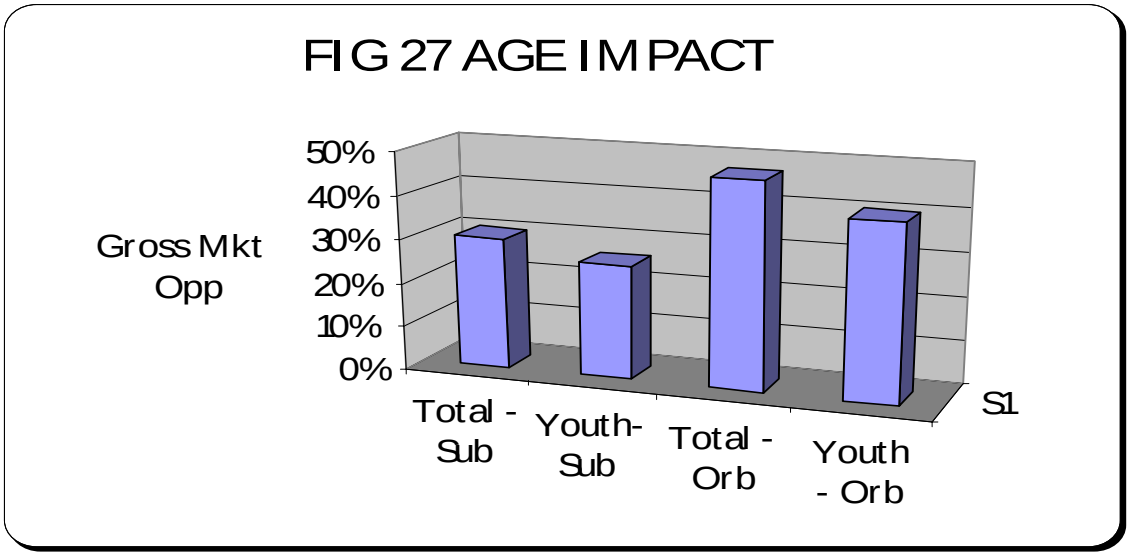




12. Age Variations

In the case of seeking the possible impact of the age of the respondents, Fig 27 shows a comparison of the responses of those aged "21 and under" to the population as a whole. Fig 3 shows that there are effectively two outliers to the population data where age is concerned, namely the old (60 and above), and the young (21 and under). The ages between 21 and 60 are very well represented in the overall findings. It was decided to look at the young for two main reasons: first of all they represent the future (and it is anticipated it will take at least 20 years to develop the new industry), and secondly there are sufficient data sheets to make the analysis worthwhile (16% is equivalent to about 160 responses). In making this decision, it was recognized that there is no lower age limit in the survey process, and therefore there may be some responses from very young children amongst the data. A manual check of the responses did not show up any obvious evidence that this was in fact the case.

The result of the analysis is rather surprising, and possibly worrying for the future of the industry. To the extent that the findings are statistically significant (and this is not totally the case for samples as small as 160) it seems that, even at the gross market opportunity level, *the young have less interest in space tourism than the Adventurer population at large*. It is worth pointing out as a reminder that the analysis refers to responses to Q 1, which explicitly removes consideration of pricing from the decision-making. Respondents merely indicate what they would like to experience, assuming that money is no object. Fig 27 indicates that the youth response to suborbital opportunities is only 26% compared to 30% for the whole sample, and only 40% for the orbital opportunity, compared to 47% for the whole sample. We can therefore state, by extrapolation, that the responses for those whose age is above 60 must be *above* the values for the overall population.



Two other side checks were conducted at this time, although it is acknowledged that the sample sizes are too small to be used for any serious extrapolation. First of all, it was determined that there were 17% females within this youth group, which is very close to the overall sample population representation of 16% (see Fig 3). Therefore there is no difference in the age distribution of females versus that of the overall population. Secondly, the female subset of the young respondents was separately analyzed, and the findings were that 14% indicated an interest for the suborbital, and 43% for the orbital opportunities. This finding is in keeping with the overall female response described in Section 10, i.e. females are less interested in suborbital spaceflight than males, and more interested in orbital. For this youth sector, the female response for suborbital was 14% compared with 26% for males, and was 43% for orbital compared with 40% for the males. It should be mentioned that this result was not found to be the case amongst Australian young people, as reported in Ref 8. Some more work is needed that is statistically valid and looks at demand around the world in different age groups.

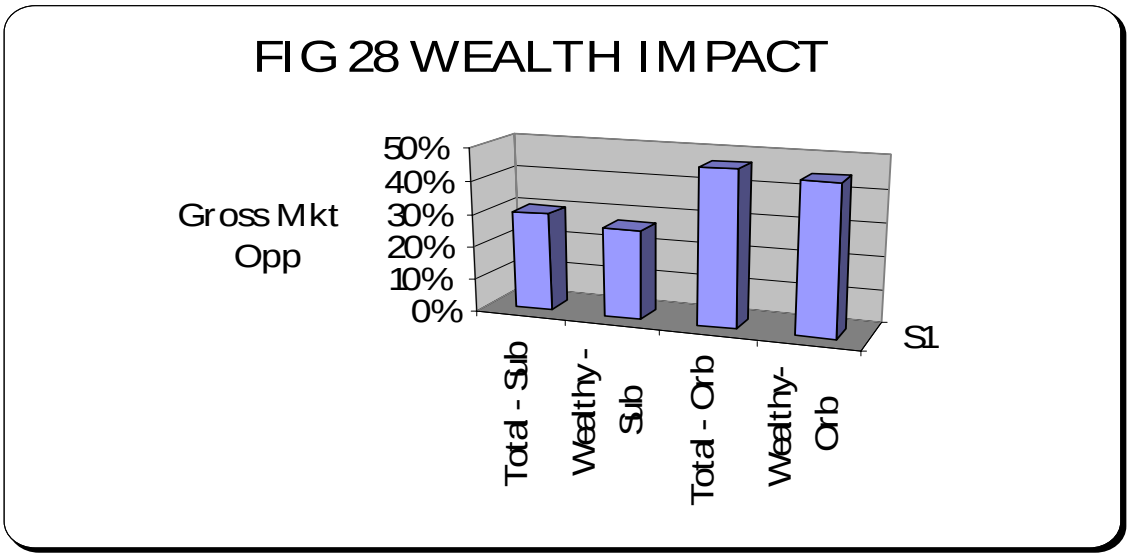
Therefore we have confirmation that the gender response reported in Section 10 is independent of age. It also confirms that female youth have a similar lack of interest in spaceflight in general than is the case for their elders. We must remember, however, that we are dealing with very small sample sizes in this sub-category of a) youth and b) female gender. In fact, only 14 completed forms could be thus cross-correlated.

It seems clear that a great deal of work remains to be done to educate the youth about the possibilities of public space travel that are emerging.

13. Wealth Variations

In considering the impact of wealth, we make use of the subset of respondents referred to in Fig 6, and who have indicated that they earn at least $250,000 and/or have a net worth of at least $1million. They make this assertion in responding to Question 25. Since overall 14% of respondents make this claim, the quantities are sufficient to make a comparative analysis worthwhile.

The main conclusion, represented in Fig 28, and derived from responses to Q1 D and Q1E of the survey, is that **with respect to the gross market perceptions, there is no really significant difference in the findings between the total sample population and that segment that is relatively wealthy.** The gross market opportunity for suborbital spaceflight is 27% for the rich Adventurers compared to the 30% figure for the total population. For the orbital spaceflight, the comparative figures are 45% for the rich Adventures compared with 47% for the total population. Both these small differences fall within the error range with sample sizes of around 140. This finding should not perhaps be surprising, since at the level of gross market perceptions, price is not an issue.



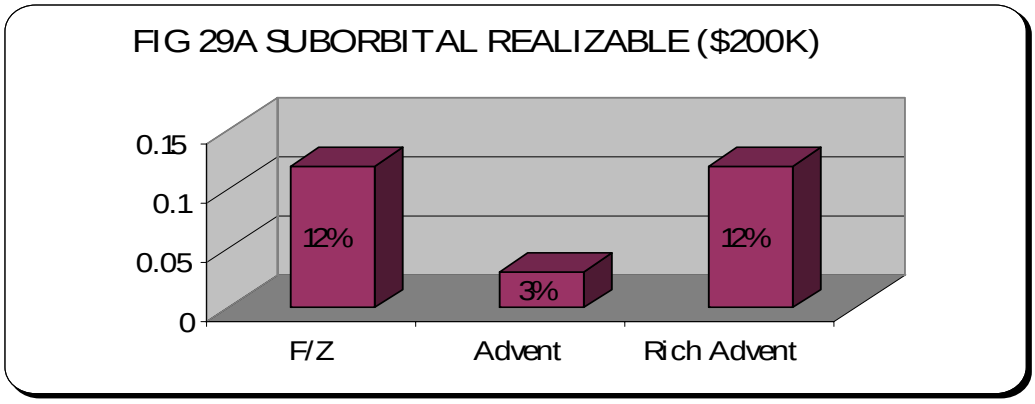
Some further cross-checks were carried out, but here the sample sizes that emerged from the cross-correlations were far too small to allow for numerical extrapolation. Nevertheless they confirm the trends exhibited elsewhere in the sample database. For instance, there were about 20 respondents that were both rich and under 21. For this small segment, the suborbital gross market opportunity was 20% (compared with the 27% figure for all the rich respondents), and the orbital value was 35% (compared with the 45% figure for all rich respondents). This reinforces the findings of Section 12 that the youth have less interest than the overall population. There were not enough rich female respondents (only 9) to allow for any meaningful numerical comparison to be carried out. A cross-check on location found that 11% of the rich Adventurers came from Asia, compared to 5% for the overall population as shown in Fig 2. This is particularly significant bearing in mind the findings of Section 11 above, where it was reported that Asians responding to this survey are much less likely to be interested in either suborbital or orbital spaceflight experiences than is the case for the overall population surveyed.

The formulation for defining the rich segment of the Adventurer respondents was chosen to be the same as that used for the entire sample of the Futron/Zogby survey, so that allows some comparisons that are described in the next section. It should be restated here, however, that this Adventurers' Survey was not performed with the same rigorous sampling approach as the former study, and in particular we know that the Adventurers providing their responses in this survey have self-selected themselves to be interested in adventure activities and the possibilities of space tourism. In the Futron/Zogby survey, by contrast, the respondents were selected by a random sampling process, with the only criterion for their inclusion in the survey being their level of wealth. It is to the next section that we need to turn to look for differences in the realizable market responses.

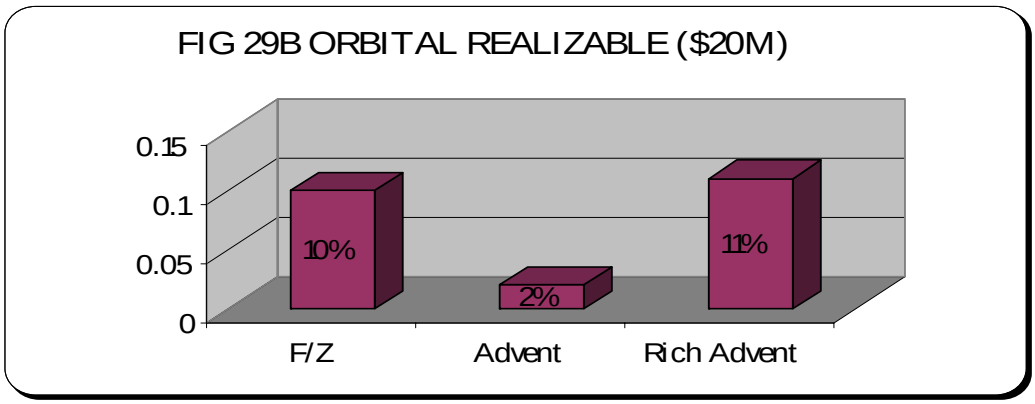
14. Comparison with the Futron/Zogby Survey

As has been made clear above, an exact quantitative comparison with the Futron/Zogby survey results is not possible. However, certain trends and indicators are nevertheless discernible. We have already noted in Fig 28 that with regard to the gross opportunity perceptions, where price is not an issue, there is no significant difference between the general population of Adventurers, and that small subset of 14% who indicate that they have wealth levels that coincide with the sample interviewed for the Futron/Zogby study of Reference 1. There is no direct comparison, however, in the Futron/Zogby study for this gross opportunity indicator, since responses in that study were obtained on a five-point gradual scale from "Definitely likely" to "Definitely not likely".

Perhaps a better comparison can be made with the realizable market findings of both studies, when we use a comparable price level for the experience. The common values that are most useful for the comparison are $200K for the suborbital experience and $20M for the orbital spaceflight. For the suborbital opportunity, a figure of 12% was obtained from the "Definitely Likely" category of Figure 2 of the Futron/Zogby survey report. Fig 29A below shows this result compared with two findings from the present survey. The 3% figure comes from the $200K result in Fig 11D of this report. The 12% figure is derived from the small subset of rich Adventurers who were part of this survey, and their responses to Q3D and Q3E. The sample size is of course small, but 14 out of the total 125 in the subset indicated a positive response to the realizable question (Q 3) in the survey. As a reminder, the precise language is "It's time to get real. Which of the following adventures do you see yourself actually doing someday….and select the amount you both could and would pay."



A similar comparison for the orbital realizable market is provided in Fig 29B, with the same associated caveats about sample size and the lack of an exact comparator. For this chart, the orbital value of 10% from the Futron/Zogby study was taken from Figure 9 of that study report, again using the "Definitely Likely" category. The Adventurers' Survey value of 2% comes from Fig 11 E of this report, at the $20M level, and the "Rich Adventurers" value of 11% comes from the responses to Q3D and Q3E from the small sub-sample of 125 respondents who indicated "Yes" to Q 25. So, 13 of this sub-sample indicated they were "willing and able" to undertake the orbital experience "someday", at a price of $20M, which they had selected from a possible price range that went as low as $1/2 M.



It is perhaps not surprising that **the overall population of the Adventurers' Survey report lower realizable take-up compared to the all-millionaire respondents of the Futron/Zogby survey**, given the high price levels currently on offer. Despite the small sample sizes, it does seem, however, that **the richer respondents to the Adventurers' Survey do provide similar responses to those of the earlier survey** for realizable take-up.

There are a few other points of comparison between the surveys worth noting. They are summarized below in Fig 29C, (where the "Comment" column refers to this Adventurers' Survey). We note similarities concerning space hotels and training periods, but more of the Adventurers' group wanted to take on the challenge of EVA. Clearly the F/Z group was older and richer; the Adventurers' group was younger and riskier.

FIG 29C COMPARISONS OF FUTRON /ZOGBY AND ADVENTURERS' SURVEY

ITEM	Futron/Zogby Survey	ADVENTURERS'	COMMENTS
Sample Size	450	998	Not random
Male/Female Distribution	70/30%	91/9% Fig 1	
Origins	All US	63% US Fig 2	
Age Distribution	76% aged 30-65	78% aged 20-60 Fig 3	
Wealth Distribution	100% millionaires	14% millionaires	Section 13
Adventure Experience	Mountain 16% Skydiving 2%	Mountain 30% Fig 7 Skydiving 22% Fig 7	
EVA	41% "more likely"	88%	Section 5.2
Hotels	20% "much more likely"	21%	Section 5.3
Training (Orbital)	50% "more likely" < 3mths	59% < 3mths	Section 6.1
Spaceports	60% want "in US"	31% want "my country"	Fig 21

Thus, we note in general that there are recurring trends, but with due account being taken of the caveats introduced into the Adventurers' Survey through the analysis of sub-categories related to age, origin and gender.

15. Conclusions

This Adventurers' Survey has explored current thinking on behalf of part of the public with regards to their interest in space tourism. It has done more. It has used the fact that respondents already have some experience of adventure travels to get some valuable insights into how potential space tourists view some of the floating variables of the space experience package. At a sample size of 998 responses, many with associated commentary, the findings provide a significant contribution to understanding public perceptions about the new industry. We need to remind readers, however, that those who gave their responses via this survey instrument were not selected by a truly random process. Rather, they were self-selected to be interested in adventure experiences. Thus it is not possible to gross-up the findings of the survey to produce forecasts representative of the general population. The following conclusions result.

General Market Interest and Trends

(i) It has been four years since the previous major study, the Futron/Zogby survey. What do we find about any changes that have taken place in perceptions of space tourism during the intervening time? Generally speaking, we find that the original findings of the Futron/Zogby survey are still valid. There is still a market interest for space tourism, and no obvious diverging trends are discernible over the last four years with regard to public perceptions. We have found that space tourism now takes its place among other adventure packages for consideration when funds will allow. Spaceflight is regarded as the "ultimate" adventure experience, however.

(ii) If price were not an issue, over a third of respondents want to go into space, and twice as many would even go to the Moon if they could afford it. For these respondents, however, prices are generally too high at present. The gross market level of interest for suborbital spaceflight amongst these survey respondents is 30%, with this figure falling to a realizable level of interest of 7% at current price levels of $100K and above. For the orbital spaceflight experience, the comparable figures are 47% at the gross market level falling to 4% at today's realistic price levels of $10M and above.

(iii) The respondents have provided useful input on what price levels would be required to open up the space tourism markets generally. Half of them indicated that they will be willing to wait until prices approach $25K for the suborbital experience, or $1M for the orbital experience. Detailed equivalent figures were included for the other adventure options also, i.e. High Altitude Jet, Zero-g Flight, Space Training, and Around-the-Moon adventures.

Specific Options

Some useful data was obtained regarding specific detailed options associated with the space tourism experience.

(iv) Regarding training, these respondents are willing to spend as much as 2 weeks in preparation for even a suborbital space adventure, and spend up to $35K in doing so, a finding that opens up opportunities for some extensive training service providers. For an orbital spaceflight, however, these respondents would require training reduced to 3 months or less from the currently accepted training regimens. Work will be needed in order to develop a training process that will work within these customer requirements.

(v) Regarding spaceports, the respondents do not see this as an important part of the decision process for their space adventure, and they would go anywhere within their country to do it. Only 21% currently considered that it might be important for the views in the suborbital experience, although it is likely that this finding could change as competition heats up among rival spaceports.

(vi) The significant majority (70%) of potential space tourists would be satisfied with an orbital duration of 2 weeks or less, a fact that will help potential service providers plan their operations.

(vii) Extra Vehicular Activity is a very attractive offering to this pool of adventurous respondents, and 88% would want to try EVA. They are prepared to pay a premium for this, and the detailed price elasticity data is in the report.

(viii) More work will be required, however, to interest the public in the benefits and/or need for space hotels. Only 21% currently see space hotels as necessary for their orbital experience. Price elasticity data is in the report for those respondents who do see the need to pay an incremental amount for the use of a space hotel facility. There would be merit in presenting the public with a more detailed rationale of the pros and cons of having a space hotel, and describing what kinds of facilities and services they would provide.

(ix) A note of warning was sounded by respondents about the possibilities of developing a corporate space tourism concept. Respondents highlighted various aspects that would need more work before it would be feasible, generally related to insurance and training duration. A space lottery looks an attractive idea, however, and 31% of these respondents would pay $100 for a ticket for an orbital flight.

Architectural Design Options

(x) What do we now know about the wish list of future potential space tourists about the kind of experience they would seek? A large proportion of them have not yet formulated a firm idea about their preferred design of the tourism spacecraft. But of those Adventurers who stated an opinion, they did not favor the take-off technique with the spacecraft suspended below a mother craft, and they were not attracted to vertical (parachute) landings on either water or land.

These findings were not marginal, it must be said. The preferences were very clear. In fact, there was only half as much interest in the SpaceShipOne mode of take-off as in its alternatives, and there was a preference for a horizontal landing versus a vertical, parachute, approach that was stronger by a factor of six. There are implications of these findings not only in spacecraft system design, but also in marketing of the experiences. It may be that these responses are a unique characteristic of this grouping of respondents having an adventurous spirit, and that different findings would result from investigating other sample populations, but this might be a dangerous assumption to make.

Who are the Travelers?

This survey has provided some valuable insight into various sub-segments within the potential space tourist database. Some of them were surprises.

(xi) First of all, we note that these previous adventure tourists physically are rather large and bulky ; something that spacecraft designers need to take into account.

(xii) We found big differences between genders to attitudes to space tourism. Females are much less interested in suborbital space tourism , as described, than males. The actual percentages were 30% less for females compared to the largely male population as a whole. It is not clear why this is the case, and what it is about the suborbital flight experience that appeals more to males. But, certainly, this information should be an important input to the marketing campaigns for suborbital space tourism operators.

(xiii) A warning note is sounded by the responses to this survey with regards to the age breakdown analysis. We found that the young had much less interest in space tourism than the overall population. Clearly this is not good news for the future of the industry, and steps are needed to address the causes of this result. It was found that the result was not affected by either the gender of the respondent or their country of origin. This is a universal finding.

16. References

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X-Prize dawn at Mojave Spaceport, September 29th, 2004 Photo: Derek Webber

APPENDIX A – Methodology

The Adventurers' Survey was conducted using an online data collection process. The Survey Questionnaire shown in Appendix B was developed and placed online during August and September 2006. It was estimated that about 15 minutes was needed in order for respondents to complete the survey. It was made clear to potential respondents that the survey would be conducted on an anonymous basis. In this way, the company Incredible Adventures maintained the confidentiality of their client list.

Visitors to the Incredible Adventures web site: www.incredible-adventures.com were invited to respond online. As an incentive, they were offered an opportunity to win a free flying adventure offered by the company. Arrangements were made to operate this free adventure drawing while preserving the confidentiality of the survey findings (by keeping a separate file of email addresses of those wishing to be entered into the drawing).

During the period of the survey collection, 998 responses were received, and they came from people who were located in a range of countries. This response rate is large enough to provide a representative sample of the views of Adventurers who use the web site. To check this, a series of interim analyses were conducted when the number of responses reached about 100, 200, 300, 400 etc , and by the time the database reached 998, the variations in results had stabilized on a pattern where aggregate values did not change more than about a percentage point. Refer to Fig 30 A, Fig 30 B, Fig 30 C to see how the responses for gross market opportunity stabilized as the number of respondents increased, and became large enough to be a fairly representative sample for visitors to the Incredible Adventures' web site. The first three data points were collected thru August 2006, and the last four refer to the accumulating total through September 2006. When the sample numbers were small, it appears that the most enthusiastic people were the first to respond. As the total sample size approached 1,000 returns, the variations had settled down to lower values and a change of only 1 or 2 percentage points. The values at data point #8 represent the responses for the total population of 998 as evaluated for this survey report.

FIG 30A SUBORBITAL TREND

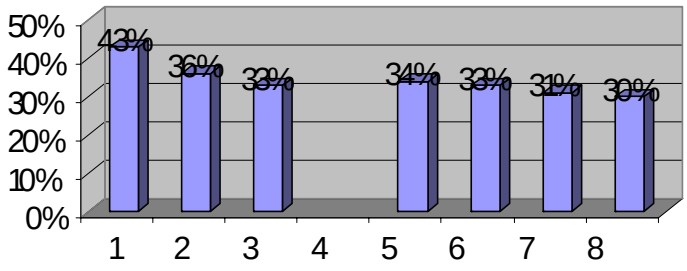


FIG 30B ORBITAL TREND

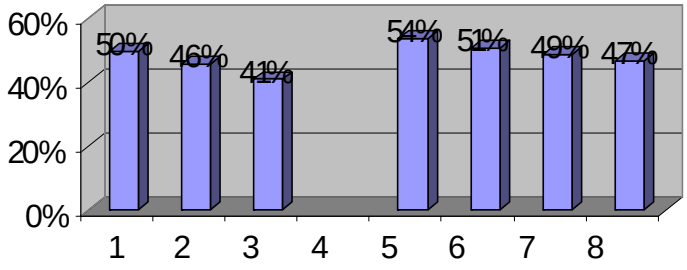
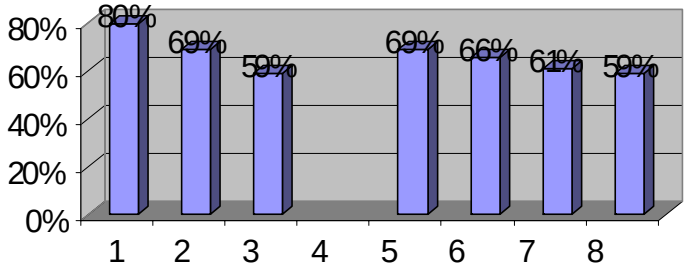


FIG 30C ROUND THE MOON TREND



In order to ensure that the respondents had a clear idea of some of the concepts involved, some more detailed back-up information and illustrations were provided. This information was accessible via "pop-ups" which could be accessed by "clicking" on a button during the completion process using the on-line survey form. Appendix C shows all of this back-up information in the form that it was made available to the respondents. An attempt was made to ensure that the descriptions were "value neutral" so as not to bias the responses.

The data in the completed forms was accumulated throughout the months of August and September 2006, and when the total had reached 998, the findings were assembled into this report. The Executive Summary was published in September 2006, and its findings were made freely available to the press and via the Spaceport Associates web site: www.SpaceportAssociates.com.

It should be noted, for comparison, that this methodology differed substantially from that used by the Futron/Zogby survey of 2002. In the former survey, the respondents were interviewed one-on-one via telephone and the process took 30 minutes per respondent. More importantly, the former survey was conducted only amongst randomly selected wealthy individuals with no prior bias towards spaceflight or adventure holidays. This meant that it was possible in the 2002 survey to gross-up the survey findings to represent the total millionaire population, and therefore to derive forecasts with an *a priori* knowable range of error. This is not possible with the Adventurers' Survey.

The present survey does, however, lead to some advantages over the former one. The main advantages of this survey are:

(i) It is current. Attitudes have had an opportunity to change in the four years since Futron/Zogby.

(ii) Another benefit is that the present survey, unlike Futron/Zogby, does not consist only of US respondents. In fact 37% came from abroad, and so there is the possibility to compare perceptions of space tourism around the world.

APPENDIX B – Survey Questionnaire

The following document is the format of the survey form that was used to solicit the responses reported in this report as The Adventurers' Survey. Note that the pop-up backups that are described in Appendix C were associated with:

- The prize description in the preamble.
- The alternative space adventures listed in Question 1; and
- The architectural modes of takeoff and landing listed in Questions 6 and 7.

Note also that there was provision for the following areas of free comment, described in Appendix D:

- Choice of space adventure, as part of Question 1.
- Corporate space tourism, as part of Question 17; and
- A final opportunity was afforded for free comment, as part of Question 26, regarding adventures previously undertaken.

INCREDIBLE ADVENTURES

Life is either an incredible adventure...or nothing at all

Space: The Next Incredible Adventure
A Survey of Adventurers

We already know you're interested in adventure. That's why you've visited our website and/or signed up to receive our newsletter. In fact, there's a good chance you've already completed one or more of our adventures or bought one for a relative.

What We Don't Know is How You Feel about Space

Would you buy a flight on a suborbital space plane if you could afford one? Do you even know what a suborbital flight is? Do you think "tourists" belong on the International Space Station? What sort of space adventures would you like to see us (or someone else) offer?

You can help us tremendously by answering these types of questions and more. The answers you give will help us, and our friends in the space community, design better space adventures.

Help Us Give You What You Want

The following survey will take about 15 minutes of your time. Complete the survey and you'll be entered in a drawing to win a **free flying adventure** in California. *Prize description*

Something You Should Know

In over 12 years of business, we've never sold a name or email address and we don't plan to start now. We value your privacy and have designed our survey so your responses are **anonymous**.

CHOOSE YOUR SPACE ADVENTURE

Question 1 Pretend money doesn't matter. Either you have lots and lots of it or someone else is buying. Which of the following adventures would you like to experience?

- ☐ a. High Altitude Jet Flight - *definition*
- ☐ b. Zero-G Flight - *definition*
- ☐ c. Space Training - *definition*
- ☐ d. Suborbital Flight - *definition*
- ☐ e. Orbital Space Flight *definition*
- ☐ f. Round the Moon Flight *definition*
- ☐ g. None of the Above

Care to comment?

Question 2 Now, pretend you have lots and lots of money and you **want** to do everything below. Please indicate the highest amount you'd pay for each of the following. (In other words,

what do you think is a **fair price** for each program?)

A. High Altitude Jet Flight (select one)
○ $10,000 ○ $ 20,000 ○ $ 30,000 ○ 50,000

B. Zero-G Flight (select one)
○ $2000 ○ $ 3500 ○ $ 5000 ○ $ 6500

C. Space Training (select one)
○ $5000 ○ $10,000 ○ $15,000 ○ $50,000

D. Suborbital Flight (select one)
○ $10,000 ○ $25,000 ○ $50,000 ○ $100,000 ○ $200,000

E. Orbital Space Flight (select one)
○ $500,000 ○ $1M ○ $5M ○ $10M ○ $20M

F Round the Moon Flight (select one)
○ $ 1M ○ $10 M ○ $20M ○ $50M ○ $100M

Question 3 OK, now it's time to get real. Which of the following adventures do you see yourself **actually doing** someday...even if you don't win the lottery or get a big inheritance from some long lost relative? Please check only those, if any, and then select the amount you both **could and would** pay. (This is our subtle way of discovering what you both want to do and can afford to do.)

A. High Altitude Jet Flight. How much would you pay? (select one)
○ $10,000 ○ $ 20,000 ○ $ 30,000 ○ 50,000

B. Zero-G Flight. How much would you pay? (select one)
○ $2000 ○ $ 3500 ○ $ 5000 ○ $ 6500

C. Space Training. How much would you pay? (select one)
○ $5000 ○ $10,000 ○ $15,000 ○ $50,000

D. Suborbital Flight. How much would you pay? (select one)
○ $10,000 ○ $25,000 ○ $50,000 ○ $100,000 ○ _$200,000

E. Orbital Space Flight. How much would you pay? (select one)
○ $500,000 ○ at $1M ○ $5M ○ $10M ○ $20 M

F. Round the Moon Flight. How much would you pay? (select one)
○ $ 1M ○ $10 M ○ $20M ○ $50M ○ $100M

G. ☐ None of the above

HOW BRAVE ARE YOU?

Question 4 How safe would a space flight need to be before you'd take one? (please click all that apply)

☐ a) As safe as the Space Shuttle
☐ b) As safe as a fighter plane
☐ c) As safe as mountaineering
☐ d) As safe as commercial aviation
☐ e) As safe as hang gliding or skydiving
☐ f) I'm not going no matter how safe it is

SCHEDULING YOUR SPACE FLIGHT

Question 5 Let's assume you're planning to buy a space flight. When would you want to go? (click all that apply)

☐ a) I want to be among the first civilians to fly to space and am willing to pay extra for the privilege.
☐ b) I want to be among the first to fly but not enough to pay extra.

☐ c) I will wait a few years and hope the price comes down.
☐ d) I will wait until a lot of flights have happened so I know it's safe.
☐ e) I'd want to fly on a special date, like my 50th birthday.

TAKEOFF AND LANDING - WHAT'S YOUR PREFERENCE?

There are essentially three ways you can leave the planet. You can blast straight up in a rocket. You can hitch a ride on another craft up to a certain altitude and then launch horizontally from the sky. Or, you can take off horizontally in an aircraft that goes all the way to space. There are also different ways of landing. Please let us know what you'd like best by ranking the choices in the order of preference.

Question 6 Takeoff

A. Vertical takeoff *definition*
This would be my ○ 1st choice ○ 2nd choice ○ 3rd choice

B. Horizontal takeoff suspended under a mother craft *definition*
This would be my ○ 1st choice ○ 2nd choice ○ 3rd choice

C. Horizontal takeoff in an aircraft that goes all the way to space *definition*
This would be my ○ 1st choice ○ 2nd choice ○ 3rd choice

D. ☐ I honestly don't care how you get me there, I just want to go

Question 7 Landing

Which of the following modes of **landing** would you prefer (for either sub-orbital or orbital space tourist flights)?

A. Vertical landing in water *definition*
This would be my ○ 1st choice ○ 2nd choice ○ 3rd choice

B. Vertical landing on land *definition*
This would be my ○ 1st choice ○ 2nd choice ○ 3rd choice

C. Horizontal landing on land *definition*
This would be my ○ 1st choice ○ 2nd choice ○ 3rd choice

D. ☐ I honestly don't care as long as you get me back OK

GOING ROUND AND ROUND - THREE ORBITAL FLIGHT QUESTIONS

These questions relate to the orbital flights which we hope will be available in the future.

Question 8 How long would you want to be in orbit? (please click on the maximum amount of time you'd want to be in space)

○ 3 days ○ 1 week ○ 2 weeks ○ 1 month ○ Longer

EVA (Extra Vehicular Activity)
That's astronaut talk for "Going outside the spacecraft to move around."

Question 9 Would you like an opportunity to float freely in space outside the spacecraft?

○ Yes ○ No

Question 10 If you said "Yes" to Question 9, how much more would you pay, on top of the flight cost, to take a space walk? (please click on the maximum amount)
○ 5% ○ 10% ○ 20% ○ 50%

HOTELS

Question 11 How important is a stop at a space hotel or space station? In other words, is a destination in space important or are you happy staying in a spacecraft the whole mission? (Check the answer that best matches your opinion.)

○ A. I don't care if I stop anywhere.
○ B. I'm not going unless I can visit a hotel or space station.

Question 12 Are you willing to pay more than the regular flight cost to be able to go to a space hotel or space station?

○ Yes ○ No

Question 13 If yes, how much more? (please click on the maximum amount)

○ 5% ○ 10% ○ 20% ○ 30% ○ 50%

SPACEPORTS - HOW MUCH DO THEY MATTER?

Question 14 Does the location of a suborbital spaceport matter? Spaceports are the locations where space flights will begin and end. (please click all that apply)

○ A. Not important. I'll go anywhere I need to go.
○ B. I want it in my country.
○ C. I'll go wherever I'd get the best view

THE TIME FACTOR

Question 15 What's the most amount of time you'd be willing to devote to a Suborbital space adventure, including all pre-flight training?

○ 1 Day ○ 3 Days ○ 7 Days ○ 2 Weeks

Question 16 What's the most amount of time you'd be willing to devote to preparing for and completing an Orbital Space Mission, including medical checks, training and the flight itself?

○ One Year ○ 6 months ○ 3 months ○ 1 month

IS SPACE A GREAT PRIZE?

Question 17 It is expected that companies will consider offering civilian space flights (suborbital or orbital) as sales incentives, rewards for performance or sweepstakes prizes. Would you want the chance to win a space flight or to earn one through sales performance, credit card points, frequent flyer miles, etc.?

○ yes ○ no

Question 18 OK, let's say you're the person in charge who gets to decide what sort of prizes or incentives your company offers. Would you consider offering a space flight?

○ yes ○ no

Care to Comment?

PLAYING THE SPACE LOTTERY

Question 19 Since the cost of an orbital flight is expected to be $10 million or more, some people have suggested creating a space flight lottery. If the grand prize was a two week orbital adventure, with a retail value of about $10 million, how much would you pay for a lottery ticket? (And yes, we know your odds of winning might play a role in your decision, so assume they'd

be about the same as that of winning a local state lottery. But assume you won't have to pay the taxes associated with winning a $10 million prize...that's too scary to think about.)

I would be prepared to pay (choose one):
○ $1000 ○ $500 ○ $100 ○ $50 ○ $10 ○ $5

SPACEFLIGHT TRAINING

Question 20 If you could start training for a suborbital space flight today, would you do so (assuming the cost would be in the $10,000 to $35,000 range)?

○ yes ○ no

OK...HERE'S WHERE WE GET PERSONAL AND ASK YOU A LITTLE ABOUT YOURSELF

Question 21 Where do you live? (Please click one option)

○ US
○ Canada/Mexico
○ Europe
○ Asia (Japan/China/Hong Kong, etc)
○ South America
○ Africa
○ Australia/New Zealand
○ Other

Question 22 How many years have you been on earth?

○ Under 21 years ○ 22-39 years ○ 40 - 59 years ○ 60-75 years ○ Over 75 years

Question 23 What size are you? (We warned you we were getting personal. This information will be given to the engineers who are designing space planes. It will help them design plane interiors that fit real people.)

Please be honest here. Remember, you're anonymous and the safety of people's knees is at stake.

When it comes to height, I'm: ○ Under 6 ft tall ○ Over 6 ft tall ○ Over 6'4"

When it comes to weight, I'm:

○ Under 100 lbs ○ 100 - 200 pounds ○ 200-250 pounds ○ Over 250 pounds

Question 24 I am ○ male ○ female

Question 25 We know it's not polite to ask, but in order to compare the results of our survey with the Futron/Zogby study done previously, we have to do it. Do you make at least $250,000 and/or have a net wealth of at least $1 million?

○ Yes ○ Not Yet

HOW ADVENTUROUS ARE YOU?

Question 26 What types of adventures or adventure sports have you participated in already? (check any that apply)

☐ Skydiving ☐ Fighter Jet Flight ☐ Zero Gravity Flight
☐ Mountain Climbing ☐ Car Racing
Other: _____

Submit Reset

We'd like to thank you for taking the time to answer our questions. Compiling the results of this survey will be the job of our friend Derek Webber of Spaceport Associates. Derek was the study director for the well-known Futron/Zogby space tourism study, so he knows just what to do with important data. Your answers will help determine what has changed in the four years since the Futron/Zogby study was published.

Jane Reifert, President

APPENDIX C – Descriptions of Experiences

The following back-up information was provided in the form of pop-ups during the on-line survey.

1 The Prize Description

2. The Alternative Space Adventures

Example: Russian MiG-25 flight

High Altitude Jet Flight

This adventure is carried out in the cockpit of a two-seater high performance jet fighter plane. The pilot takes the adventurer as high as it is possible to go without rocket motors, and although it does not quite reach space, the sky gets to be a very dark blue at the peak of the climb.

CLOSE WINDOW


Example: Zero-G Flights in Florida

Zero-G Flight

This is an adventure which uses a specially converted aircraft that flies like a roller coaster to provide a zero-g experience to its passengers. You float freely inside and are encouraged to try various zero-g games such as tumbling. The aircraft provides a series of zero-g experiences. This is one of the training techniques used by NASA for its astronauts, now everyone can join in the fun!

CLOSE WINDOW


Example: Training at Star City, Russia

Space Training

Space training is a specialized program designed to help prepare you for the physical and mental conditions of space. This could be a program involving the use of simulators, like those at the Yuri Gagarin Astronaut Training Center in Russia. Or, it could be centrifuge training or a flight in a zero-gravity plane. It could also be the type of fast jet training NASA gives to its mission specialists or training for weightlessness in an underwater facility.

CLOSE WINDOW

Example: Rocketplane XP

Suborbital Flight

This is an adventure where you go straight up into space (ie above 60 miles high), spend about 5 minutes in zero-g, then descend straight back again. The flight takes about an hour in total, but time in space is limited to about 5 minutes. You see the black sky, the curvature of the Earth's horizon, and the view for hundreds of miles in every direction. This flight is like the first American spaceflight by Alan Shepard.

CLOSE WINDOW

Orbital Flight

This is an adventure where you go into orbit and keep circling the Earth every 90 minutes. You will see all the countries and oceans below you, and will experience a sunrise and sunset 16 times each day, and be in zero-g the whole time. This flight gives you the same views and experiences as today's Shuttle astronauts. In some of the flights, there will be a docking with a space hotel. In others, you will remain in the spaceship that brought you!

CLOSE WINDOW

Round the Moon

This adventure takes you away from Earth on a 3-day journey to the Moon. After going round the Moon six times (ie 12 hours) you will fly the 3-day return journey back to Earth. This will be an experience just like the early Apollo missions, but will n ot include a landing on the Moon.

CLOSE WINDOW

3. The Architectural modes of Takeoff and Landing

Vertical Takeoff

This technique is like a standard rocket launch, and was used historically by all US astronauts starting with Mercury and Apollo and including Shuttle flyers today.

CLOSE WINDOW

Horizontal Takeoff Suspended under a Mother Craft

This technique was used historically by early flyers like Chuck Yeager in the X-1 and more recently by the SpaceShipOne team when they won the X-Prize in 2004.

CLOSE WINDOW

Horizontal Takeoff in an aircraft that goes all the way to space

This technique has not yet been demonstrated, but it is being developed by the Rocketplane company in Oklahoma. The aircraft takes off using conventional jet engines, and transitions to rocket engines when it reaches altitude.

CLOSE WINDOW