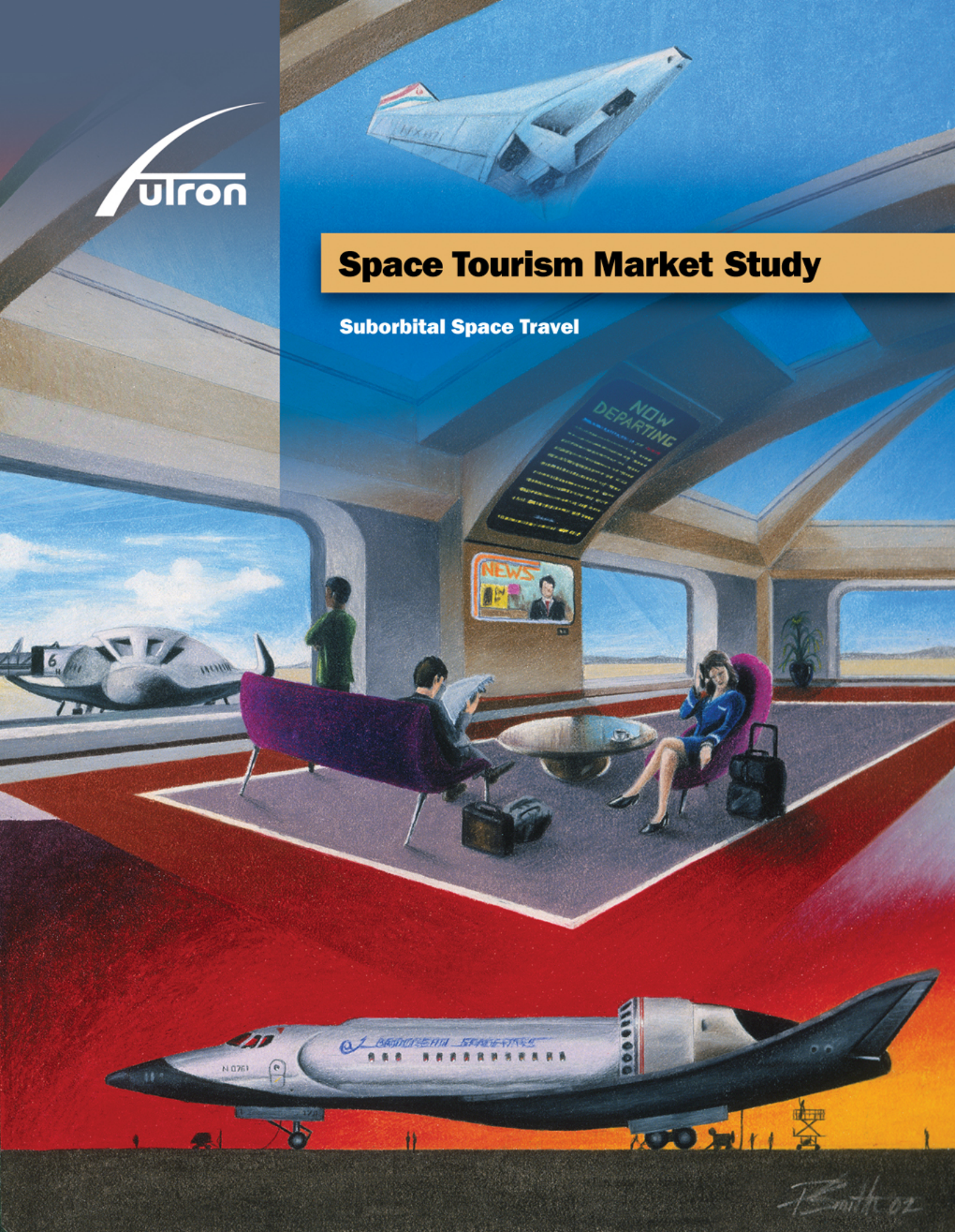


# Space Tourism Market Study

## Suborbital Space Travel


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suborbital space travel

october 2002

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## Table of Contents

## Table of Figures


*Artwork by Phil Smith.*

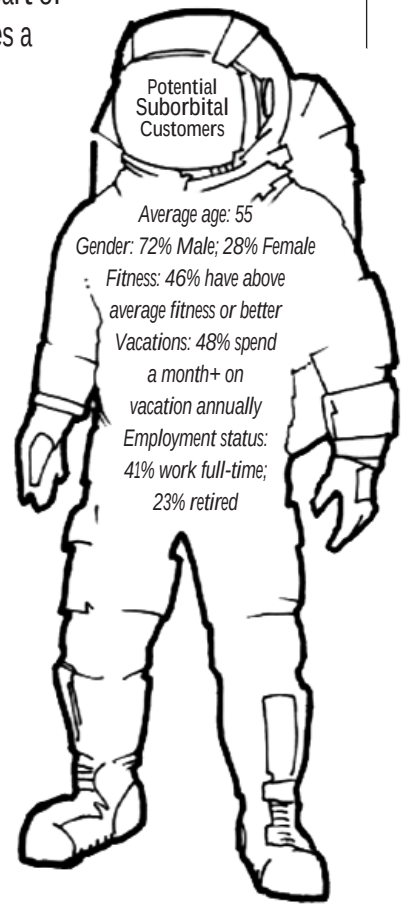
## Executive Summary

In this report, Futron Corporation, the industry leader in forecasting space-related markets, provides powerful insight into the public space travel (space tourism) market. The insight is provided via the presentation of an objective and quantitative picture of the current and future demand for the suborbital space travel market.

As neither an advocate for, nor a participant in, the development of space tourism, Futron was able to maintain a balanced and objective viewpoint on the future of this industry. Consequently, Futron conducted a new survey to examine the demand for space tourism with a stronger emphasis on realism than previous surveys . The Futron/Zogby survey presented a realistic portrayal of spaceflight to its respondents and selected a respondent population that could potentially afford to pay the current and future prices for the service.

**"...Futron was able to maintain a balanced and objective viewpoint on the future of this industry."**

The current picture of the demand for suborbital public space travel is presented in the first part of this report (Sections 2,3, and 4) and includes a discussion of the current state of suborbital public space travel and the presentation of the results and analysis of the Futron/ Zogby Survey on Public Space Travel. Highlights of part one include:




- Who are the customers? — The group of respondents interested in and willing to pay for suborbital flights is demographically distinct from the group as a whole.

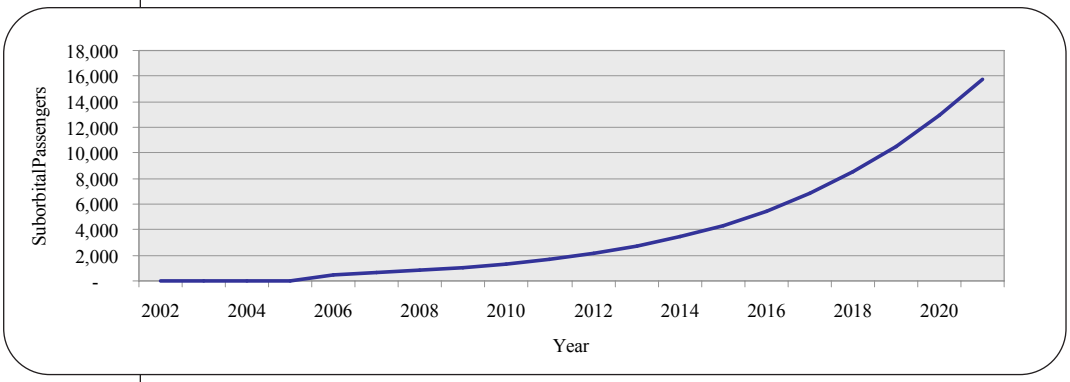
- There's no place like home — Of all the attractive features associated with a flight into space, viewing the Earth from space rated highest, with 63% of respondents indicating that the opportunity to do so was "very important" as an aspect of suborbital flight.

- People just want to have fun — When asked about their discretionary spending, nearly one-third of survey respondents indicated that they spend the largest amount of their discretionary income on traveling and vacations. This was almost three times higher than the next largest item — a new car.

- Private or government vehicle? — People were more or less indifferent to flying on a privately developed vehicle with limited flight history, 52% said it made no difference in their decision to purchase a suborbital flight.

The future picture of demand for public space travel is presented in the second part of the report (Section 5) and includes Futron forecasts for suborbital travel and a discussion of the forecast methodology. Highlights from part two include:

- Suborbital space travel is a promising market — Futron's forecast for suborbital space travel projects that by 2021, over 15,000 passengers could be flying annually, representing revenues in excess of US$700 million.



# 1 Introduction

Yuri Gagarin blasted off into space and into the history books over forty years ago when he became the first person to orbit Earth. Alan Shepard followed one month later with a 15-minute suborbital Mercury ride in May 1961. Today, we are witnessing the natural evolution of those early events — space travel for members of the general public.

Despite this clear evolution, a number of factors have constrained the development of the market for public space travel. One of those constraints is the lack of knowledge about the potential market size for this emerging market. Futron Corporation, the industry leader in forecasting space-related markets, decided to address this constraint by objectively assessing the current interest in public space travel, and quantifying and forecasting the future demand for this service.

Futron earnestly endeavored to provide an accurate picture of the size and characteristics of the potential public space travel market via objective, thorough research, analysis, and Futron's extensive experience in forecasting space-related markets. Therefore, the findings of this report should be of value to those involved in space transportation, tourism, investing, insurance, and banking, as well as government policy, commerce, and regulatory organizations.

Futron's objective was to assess the potential size and characteristics of this new business. This report will give the reader an understanding of today's current demand for public space travel, as well as a 20-year forecast of the demand for suborbital trips. Included are details on the methods used to quantify the current and future demand, accompanied by demographic insights into those people potentially demanding public space travel.

**"...a number of factors have constrained the development of the market for public space travel."**

# 2 Public Space Travel — the Current Picture

Tourists desiring unique, challenging, and fun experiences drive demand for public space travel. This desire is currently fueling a worldwide tourism industry with receipts in excess of US$450 billion.[1] Given the generous revenues associated with tourism, public space travel represents a huge potential market. It is only potentially large, however, because the technical ability to service this market is currently very limited.

Two distinct services are currently envisioned for public space travel: travel to low Earth orbit or orbital flights, and short excursions beyond Earth's atmosphere and back, or suborbital flights. Each of these markets are in different stages of development and execution as discussed below.

## 2.1 Orbital: We Have Lift-Off

Public space travel became a reality in April 2001 when American businessman Dennis Tito paid US$20 million to fly to space. Tito was launched on a Russian *Soyuz* spacecraft, which docked with the International Space Station (ISS) during the mission. Tito spent eight days in space, six of which he spent inside the ISS.

Tito's successful flight, carried out over the initial objections of NASA and other ISS partner nations, opened the door to further flights by paying customers. In April 2002, South African entrepreneur Mark Shuttleworth became the second commercial space tourist as a member of another *Soyuz* mission to the ISS. At the time of this writing, a number of other potential orbital passengers have been announced. Some of these passengers intend to pay their own way, while some celebrities are seeking corporate sponsorship to cover the cost of the flight.

Orbital public space travel is currently limited to one spacecraft, the Russian *Soyuz* vehicle. Twice a year, Russia launches *Soyuz* on supply flights to the ISS. Because only two cosmonauts are required to fly the *Soyuz*, a third seat on each mission is available to potential space tourists.

[1] World Tourism Organization Facts and Figures, available online at http://www.world-tourism.org/market_research/facts&figures/menu.htm.

This creates a steady number of flight opportunities for those interested in orbital space tourism. Although the *Soyuz* is currently the only option for orbital public space travel, other potential, future options exist:

Government Spacecraft/Programs
- *Space Shuttle* (U.S.)
- *Shenzhou* (China)
- Defense Advanced Research Projects Agency (DARPA) Responsive Access, Small Cargo, Affordable Launch (RASCAL) Program (U.S.)
- NASA's 2nd Generation Reusable Launch Vehicle Program (U.S.)

Commercial Spacecraft
- *K-1* (Kistler Aerospace)
- *SA-1* (Space Access)
- *Starbooster* (Starcraft Boosters, Inc.)
- *Neptune* (Interorbital Systems)

## 2.2 Suborbital: If You Build It, Will They Come?

While most public attention on space tourism has focused on orbital flights, suborbital space tourism holds significant promise. Space Adventures, the space tourism agency that contracted Dennis Tito's orbital flight, currently claims to have 100 reservations for suborbital flights at a price of US$98,000 each, despite the absence of a vehicle capable of offering such a flight[2]. The projected price of a suborbital flight is a small fraction of the price of orbital travel, and as such, puts space tourism within the financial means of a much larger audience.

**"The projected price of a suborbital flight ... puts space tourism within the financial means of a much larger audience."**

While there are currently no vehicles that can serve the suborbital space tourism market, a number of vehicles are under development. The primary forum for development is private entrepreneurial ventures competing for the X PRIZE, a competition that will award US$10 million to the first team to privately build and fly a spacecraft capable of carrying three people to 100 kilometers altitude twice in a two-week period.

[2] Space Adventures press release. "Sub-Orbital Spacecraft Prototype Unveiled In Russia," http://www.spaceadventures.com, March 14, 2002.

Approximately twenty teams have registered to date to compete for the X PRIZE, although some of those teams have subsequently dropped out of the competition. In addition to the X PRIZE participants, there are several other companies and entrepreneurs attempting to develop vehicles to serve the suborbital public space travel market. Below is a partial list of some of the suborbital vehicles under development:

Suborbital Vehicles (and developers)

- *Armadillo* (Armadillo Aerospace)
- *Ascender* (Bristol Spaceplanes)
- *Astroliner* (Kelly Space and Technology)
- *Canadian Arrow* (Canadian Arrow)
- *Cosmopolis XXI* (Myasishchev Design Bureau)
- *Millennium Express* (Third Millennium Aerospace)
- *Pathfinder* (Pioneer Rocketplane)
- *Proteus* (Scaled Composites, LLC)
- *SC-1 and SC-2* (Space Clipper International)
- *Space Cruiser* (Vela Technology Development)
- *Starchaser* (Starchaser Industries)
- *Xerus* (XCOR)

All of these ventures face a number of obstacles in their efforts to turn plans and prototypes into operational vehicles. In addition to the technical obstacles associated with any new aerospace vehicle, passenger spacecraft may face major regulatory hurdles, depending on their nation of operation, in their quest to become operational, commercial providers of suborbital tourism. The biggest obstacle, however, appears to be financial, as companies struggle to raise the funding needed to build their proposed vehicles. Much of the difficulty stems from the inability to demonstrate that there is a sufficiently large market for space tourism to attract the investment needed to develop vehicles that can service this market.

## 3 Understanding the Current Demand for Public Space Travel: the Futron/Zogby Survey

Given the nascent state of the public space travel industry, Futron sought to understand and quantify the current interest in the service, as well as the factors that could affect the future demand for public space travel. Futron examined the current demand for public space travel via a survey of affluent households, the population segment most likely to be able to afford participation in leisure space travel. In particular, the goal of the survey was to objectively answer the most important questions facing the public space travel business:

- What is the size of the market?
- What is the growth potential of the market? and
- What are the customer characteristics for this market?

The suborbital portion of the survey focused on a 15-minute suborbital ride to the edge of space. The survey also addressed some future possibilities or changes to this scenario that could occur over a 20-year period for use in forecasting the future demand for public space travel.

Futron contracted Zogby International to conduct 450 telephone interviews of "qualified" individuals in the United States. Zogby conducted the survey in January 2002. Each survey interview lasted an average of 30 minutes to ensure that the survey participants understood the concepts and questions presented. The survey margin of error was +/- 4.7%.

Futron restricted the respondent pool to people with a household income of at least US$250,000 annually, or a minimum net worth of US$1 million. These particular figures were carefully chosen as the parameters necessary to identify the proper market segment and to extrapolate the survey results. The income/net worth qualifier selected to identify the survey population was the highest-level qualifier that would enable a statistically valid sample that could be extrapolated for a global forecast.

**"Futron restricted the respondent pool to people with a household income of at least US$250,000 annually, or a minimum net worth of US$1 million."**

## 3.1 Building a Strong Survey

Although space travel has many positive aspects, it is also fraught with realities that may limit the size of the potential market. A fundamental weakness of many previous surveys on the space tourism market is that they presented a future-oriented picture of public space travel centered on a luxurious and exciting adventure. Few, if any, references were made to the less-than-glamorous realities of the current public space travel scenario, a side of space travel that may be unknown to the prospective traveler.

In particular, three major restrictions that have generally been overlooked in the past were given a strong review and incorporated into the Futron/Zogby survey:

- *Fitness:* Space travel is not for everyone. The stresses of launch and reentry, the effects of exposure to microgravity, and confinement inside a relatively small vehicle can challenge the health of even the fittest individual. Although suborbital service is unavailable at this time, it is likely that travelers will have to meet some minimum health requirements in order to withstand the stresses of the trip.

- *Training Time:* In addition to physical and mental fitness, potential travelers must also spend some time completing the requisite training for the trip. Although preparation time for suborbital travel is expected to be significantly less than that required for orbital travel, Futron estimates that a minimum of one week of training would be necessary to prepare for a suborbital trip.

- *Expense:* One of the most important points of realism that has not been addressed in previous studies remains the most limiting factor of all — the price. Futron estimates that the current advertised price for suborbital travel, US$100,000, will likely remain in place through the first few years of full commercial service with changes occurring as the market develops.

Realities such as fitness and training requirements, the physical hardship of the trip itself, and the current price and availability of suborbital flights are all factors that could greatly affect customers' interest in, and thus the demand for, public space travel services. Realizing that an accurate assessment of the current demand for public space travel relies on an accurate portrayal of public space travel scenarios, Futron sought to incorporate objectivity and realism into its survey by presenting a complete picture of space travel — both its glamorous and less-glamorous sides. Futron utilized all available resources to test the survey for realism, including input and review from former Space Shuttle Commander Bryan O'Connor.

In addition to portraying a realistic picture of public space travel, the Futron/Zogby survey asked questions related to respondents' fitness levels, prior training activities and spending patterns. The survey targeted a relevant population — that is, one that could potentially afford the service — by composing the respondent pool of affluent individuals. The survey also included questions related to past activities and behaviors in order to provide a "reality check" on the space travel-related responses.

The results of the survey, detailed below, demonstrate that a balanced portrayal of both the high points and hardships of the trip had a significant impact on the survey responses. A list of the questions asked in the Futron/Zogby survey can be found in the appendix.

**"...a balanced portrayal of both the high points and hardships of the trip had a significant impact on the survey responses."**

## 3.2 Suborbital Survey Results

The survey presented the respondents with two different descriptions of space travel: one focusing on potentially attractive aspects and the other on potentially detractive aspects. First, it gauged a respondent's interest in space travel after describing the more exciting and adventurous aspects:

> *In a suborbital space flight, you would experience what only astronauts and cosmonauts have experienced. During the 15-minute flight on a vehicle that meets government safety regulations, you will go 50 miles into space, and experience the acceleration of a rocket launch. You will also experience a few minutes of weightlessness and have the unique experience of viewing the Earth from space.*

After hearing the above description, seventeen percent of respondents said they were "definitely likely" to participate. Combining the "definitely likely" responses with the "very likely" responses yielded a total of 28 percent of the respondents being interested in suborbital flight participation. On the other hand, over 40 percent of the respondents stated that they were "not very likely" or "definitely not likely" to participate in suborbital travel.

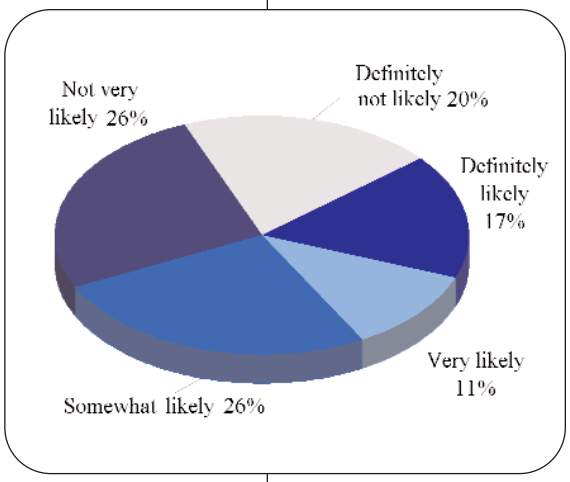



*Figure 1: Interest in suborbital travel after the first description*

Next, the survey presented the participants with the following description featuring the lesser-known aspects of suborbital flight, and questioned them again on their liklihood of participation:

> *Space flight is an inherently risky activity. The vehicle providing these flights will be privately developed with a limited flight history. In order to take the trip, you would have to undergo training for one week prior to the launch. Although you would experience weightlessness, you would be strapped into your seat throughout the trip.*

As expected, after hearing the second description, the respondents' answers changed. Now, only twelve percent of respondents were "definitely likely" to participate, and seven percent were "very likely." The presentation of the second description also increased the percentage of respondents that were either "not very likely" or "definitely not likely" to 57 percent.

A comparison of the responses to the first and second descriptions shows the effect that a realistic portrayal of space travel can have on interest and demand. The percentage of respondents that were "definitely likely" to participate in suborbital travel after hearing the first description dropped by five percentage points after being presented with the second description. The least amount of change between the two descriptions came from those respondents that were "somewhat likely" to participate, which decreased by three percent after the second description.

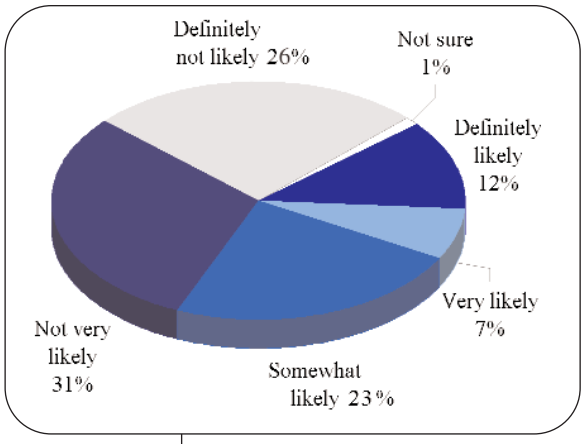



*Figure 2: Interest in suborbital travel after the second description*

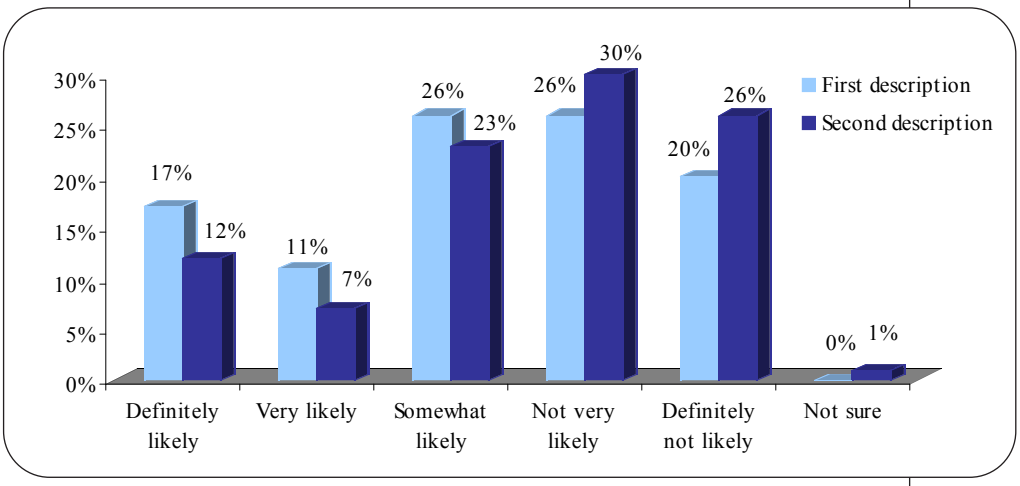



*Figure 3: A comparison of responses to the first and second suborbital descriptions*

## 3.2.1 experiences affecting interest in suborbital flight

In order to understand the attributes that attract potential public space travelers, the Futron/Zogby survey presented a list of suborbital flight experiences, pulled from the two descriptions presented above, and asked respondents to rate each attribute in terms of its importance and/or impact on their likelihood of taking a suborbital flight. The respondents rated the following experiences:

*First description:*

- Viewing Earth from space,
- Experiencing weightlessness

- Experiencing the acceleration of a rocket launch, and
- Experiencing what only astronauts and cosmonauts have experienced

*Second description:*

- Participation in a week of training
- Flying in a privately-developed vehicle, and
- Being strapped into their seats for the entirety of the flight

Of all the experiences presented from the first description, the ability to view Earth from space was by far the most important aspect, with over 60 percent of respondents rating it as "very important." The other

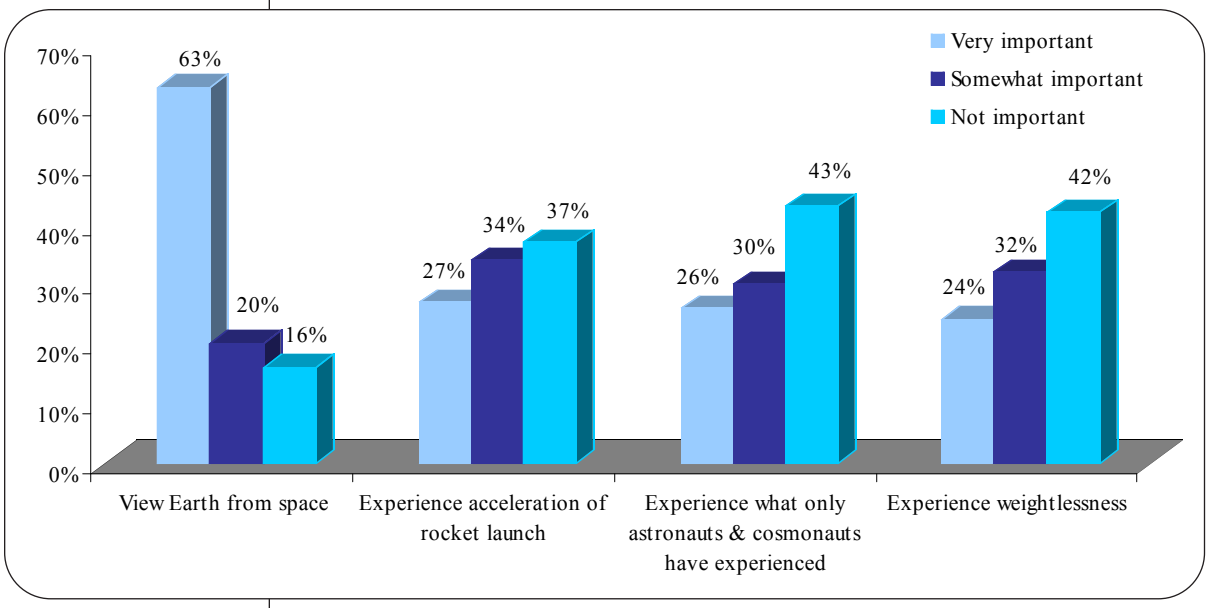



*Figure 4: The importance of flight experiences taken from the first description*

experiences were rated as "very important" by only one quarter of respondents. When questioned about experiences taken from the second description, 40 percent of the respondents revealed that some experiences, such as flying in a privately-developed vehicle and participating in required one-week training, would not affect their likelihood of taking a suborbital flight. The experience that yielded the most "somewhat less likely" responses — over 35 percent— was being strapped into their seat for the entirety of the flight.

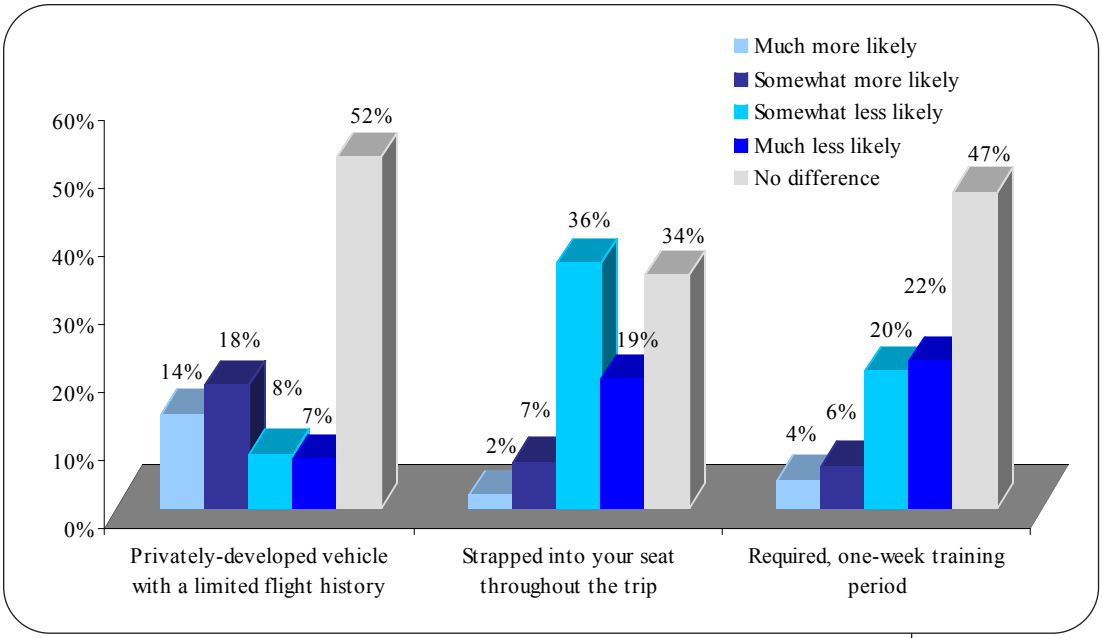



*Figure 5: The impact of flight experiences taken from the second description*

## 3.2.2 willingness to pay for suborbital space travel

Current ticket prices for suborbital space travel hover around US$100,000. However, it is unclear how the ticket price may vary once regular commercial operation of suborbital service commences. In order to test the full range of possible price points for this market now and in the future, the Futron/Zogby survey covered a range of price points from US$25,000 to US$250,000. Figure 6 represents the cumulative responses to these price points presented in descending order of price.

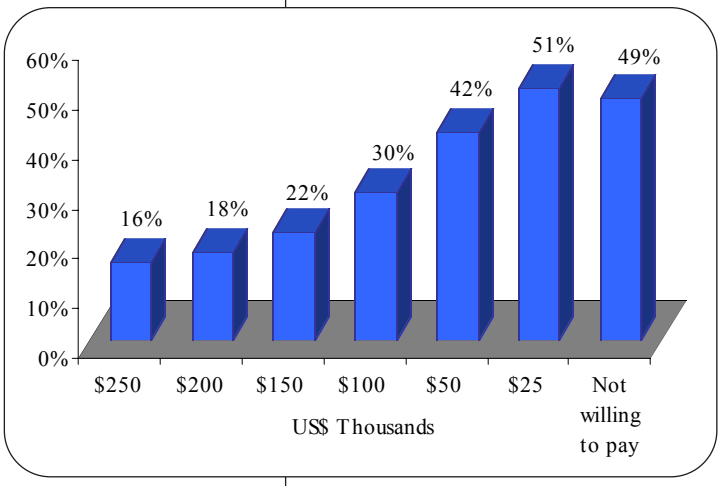



*Figure 6: Willingness to pay for suborbital travel grouped by price point*

The survey asked respondents about their willingness to pay ticket prices within the range mentioned above beginning with the highest price. Once an individual replied to a price, they were not asked any other price points for that scenario as it was assumed they would be willing to pay a lower price. Of the price points offered, sixteen percent of respondents immediately accepted the maximum ticket price of US$250,000 to travel on a suborbital flight.

As expected with most goods and services, interest in taking a suborbital

flight increased as the price decreased. Just over 50 percent of the survey pool expressed their willingness to pay one of the ticket prices presented in the range mentioned above.

### 3.2.3 potential future changes for suborbital travel

The Futron/Zogby survey was designed not only to gain an understanding of the current demand for public space travel, but also to lay a solid foundation for the forecast of demand for public space travel over the next 20 years. Although price is often the greatest factor affecting demand for a service, the Futron/Zogby survey did include some questions on non-price related scenario changes that could possibly affect the demand for suborbital travel in the future. For example, over the 20-year forecast period, the training process will likely be streamlined and a second generation of suborbital vehicles could be developed that will offer the opportunity for passengers to better experience microgravity during flight. In order to measure how these developments might influence demand, the survey included questions on how these changes would affect the respondents' interest in participating in suborbital travel.

Of these possible future scenarios for suborbital travel, the ability to leave your seat during flight was clearly the most important. Fifty-two percent of respondents said they would be more likely to participate in a suborbital flight if they could leave their seat. On the other hand, just over twenty percent of the respondent pool said they would be more likely to participate in suborbital travel if the training took less than a week.

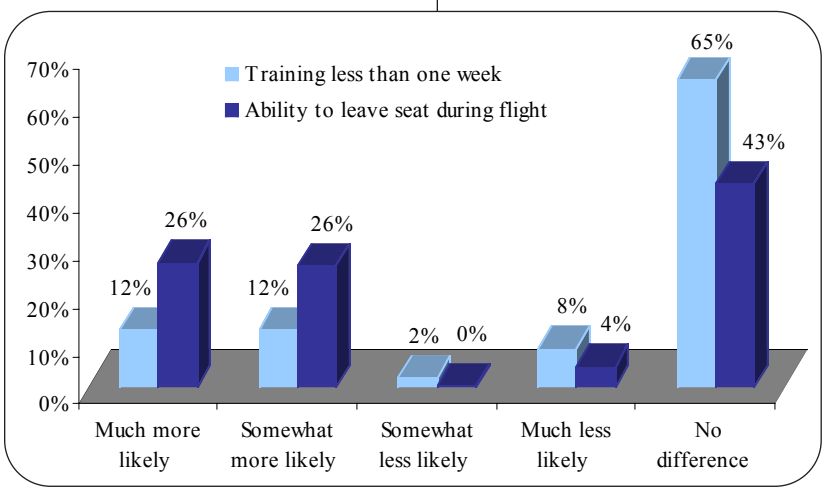



*Figure 7: The impact of future suborbital scenarios on the demand for suborbital travel*

### Opportunity to finance the trip

The high price tag of space travel places it out of reach for most people. The survey queried respondents who answered that the trip was too expensive whether they would be more willing to pay for the flight if they could finance the trip. Eighty-six percent of these respondents said that the opportunity to finance either an orbital or a suborbital trip would not increase their interest.

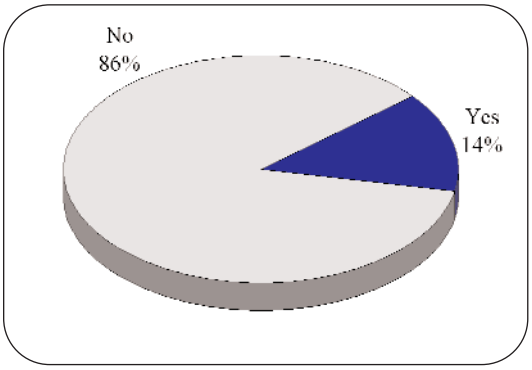



*Figure 8:*
*The impact of financing on demand for suborbital travel, based on a subset of respondents*

## 3.3 A Full Portrait of Survey Respondents

Beyond testing interest in space travel, the Futron/ Zogby survey gathered demographic and behavioral information on the respondents to enhance understanding of their preferences and past purchasing behavior.

### 3.3.1 demographics

In order to be qualified to participate in the Futron/ Zogby suvey, respondents had to have a minimum annual household income of US$250,000 or a minimum of US$1 million net worth. Income and/or wealth was selected the sole qualifier for the 450 respondents in order to obtain as wide a snapshot of the target market as possible. Survey respondents were also asked about their gender, age, education, employment status, dependent status, and marital status. Futron/ Zogby used U.S. demographics, published by sources such as Internal Revenue Service (IRS), to balance the respondent pool so that it statistically reflected the demographic profile of millionaires in the United States. Tables 1 and 2 feature some of the demographic highlights of the Futron/Zogby respondent pool.

| Net Worth | % of survey respondents |
|---|---|
| Less than $1 million | 12% |
| Greater than $1 million | 88% |
| **Annual Income** | **% of survey respondents** |
| Less than $250,000 | 61% |
| $250,000 to $500,000 | 30% |
| $500,000 to $1 million | 7% |
| $1 million to $2 million | 1% |
| $2 million or more | 0.4% |
| **Employment Status** | **% of survey respondents** |
| Full-time | 35% |
| Retired | 29% |
| Self-employed | 24% |
| Part-time | 6% |
| Other | 6% |

*Table 1: Net worth, income, and employment demographics of survey respondents*

The majority of respondents qualified for the survey through their net worth rather than their income. Sixty-one percent of respondents had a household income of less than US$250,000, but had a net worth of more than US$1 million. Nearly all respondents (88 percent) fulfilled the net worth qualifier of US$1 million.

Futron research revealed that 57 is the average age for millionaires in the United States.[3] The average age of respondents was 57 years old, with more than half of respondents (58 percent) between the ages of 50 and 64 and 22 percent being 65 or older. Eighteen percent of the respondents were between the ages of 30 and 49, and only one percent was between 18 and 29.

Seventy percent of survey respondents were male and 30 percent were female, which mirrors the ratio of wealth holders in the United States, as published by the IRS.[4]

The survey also queried respondents about their dependents and found that 32 percent of respondents had children that were financially dependent on them, while 27 percent had other dependents. Nine percent of the pool had both dependent children and other dependents.

| Age | % of survey respondents |
|---|---|
| 18-29 | 1% |
| 30-49 | 18% |
| 50-64 | 58% |
| 65+ | 22% |
| **Gender** | **% of survey respondents** |
| Male | 70% |
| Female | 30% |
| **Marital Status** | **% of survey respondents** |
| Married | 86% |
| Single | 2% |
| Divorced/Widowed/Separated | 10% |
| Other | 1% |
| **Dependents** | **% of survey respondents** |
| Dependent child | 32% |
| Other dependents | 27% |
| Both | 9% |

In addition to gathering demographic information on the survey respondents, the Futron/Zogby survey was designed to gather data on a wide range of other variables that might provide insight into the decision drivers of this group, and their possible motivations for purchasing public space travel services.

*Table 2: Age, gender, marital status, and dependents demographics*

[3] Thomas J. Stanley, William D. Danko. *The Millionaire Next Door: The Surprising Secret of America's Wealthy,* Longstreet Press, 1996, p. 8.

[4] Barry W. Johnson. "Personal Wealth, 1992-1995," *SOI Bulletin*, 1997/1998 Winter , Internal Revenue Service, p. 71.

### 3.3.2 perception of risk and participation in risky activities

Since space travel is an intrinsically risky activity, the Futron/Zogby survey included a series of questions designed to gauge how participation in and perception of risky physical activities might indicate the target population's attitude and desire to fly in space. Respondents were asked to provide the frequency of participation in a wide range of activities of various risk levels, provided in Figure 9, including some that Futron considered to be on the same level of danger and physical exertion as public space travel.

Respondents were asked to measure their participation in risky activities on a four-point scale, ranging from “regularly" to “never." More than three quarters of respondents stated that they participated in at least one of these activities “sometimes" or “regularly." The two activities that had the smallest number of participants in the survey pool were skydiving and mountain climbing, in which only 18 percent of respondents “sometimes" or “regularly" participate.

In addition to questions about participation in risky activities, the survey included questions intended to gauge the respondents' perception of

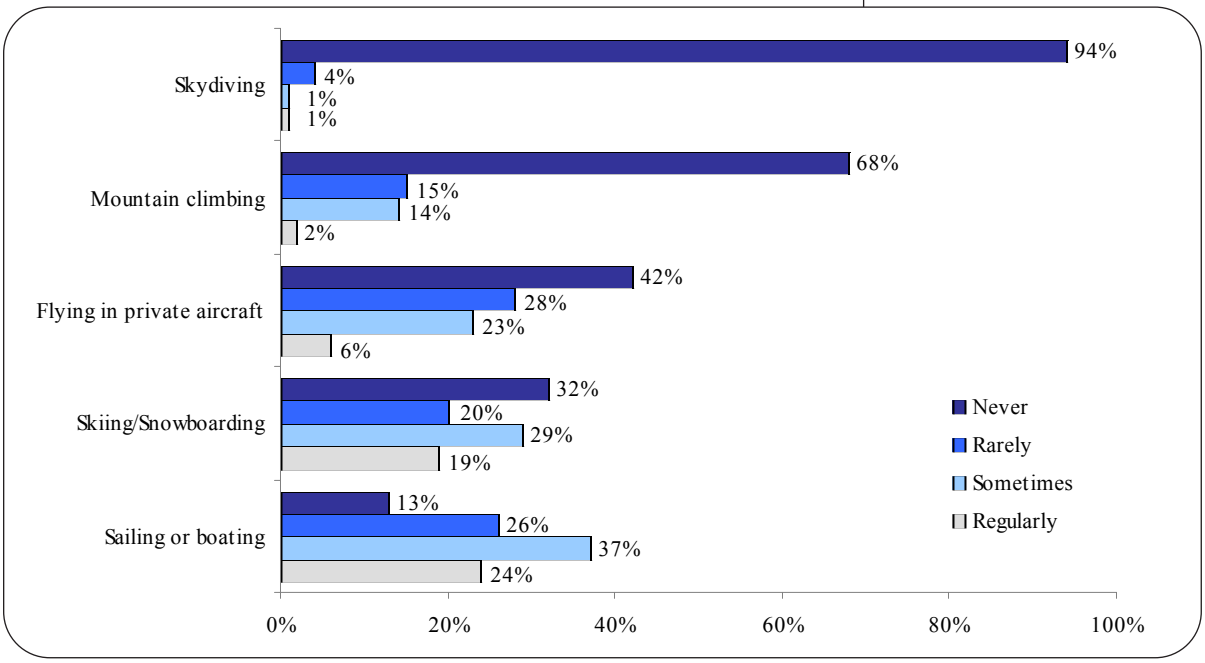



*Figure 9: The survey respondents' participation in risky activities*

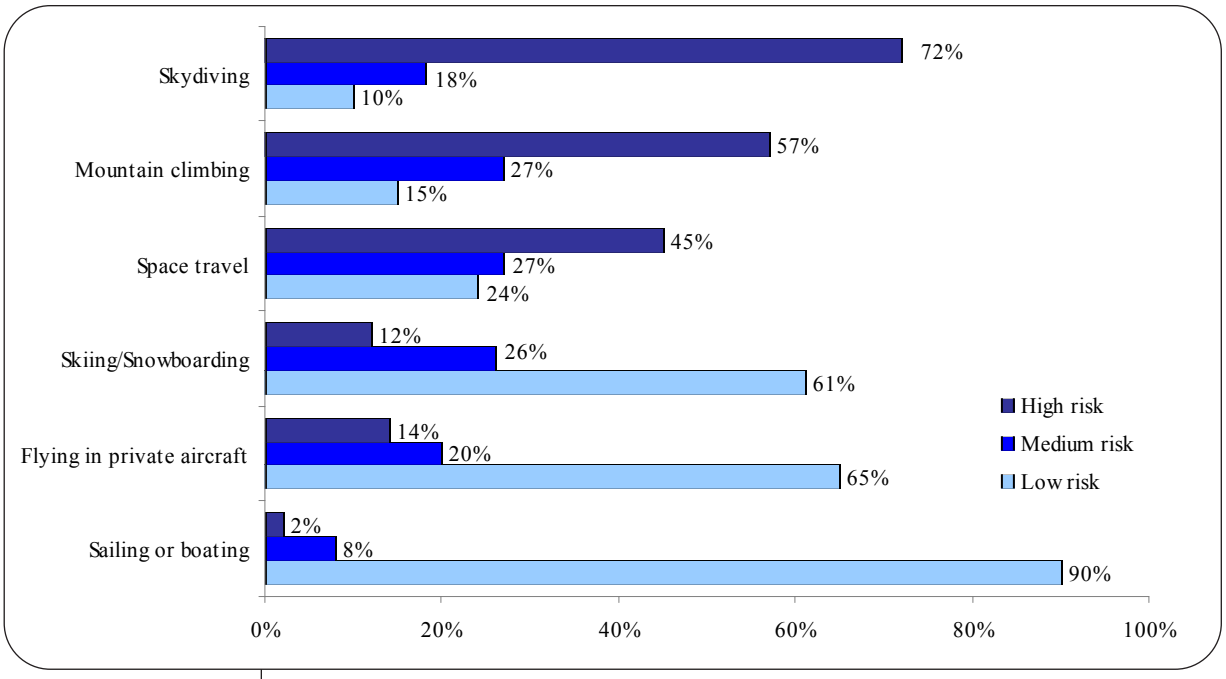



*Figure 10: Respondents' perceived level of risk for a selection of risky activities*

the risks associated with a range of activities, including spaceflight. Respondents were asked to rate each of the activities, including space travel, on a five-point scale, ranging from "not at all risky" to "extremely risky." The survey pool's rankings indicated that they felt that space travel was the third-riskiest activity, after skydiving and mountain climbing. Space travel received an average rating of 3.0 on the five-point scale, while both skydiving and mountain climbing received a significantly higher average rating of 4.0. Broadly, these results portray a realistic appreciation of the relative risks of each activity.

### 3.3.3 discretionary income patterns

In order to gain insight into spending patterns of respondents, the Futron/Zogby survey asked respondents to identify the item or activity on which they spent the most discretionary income last year, as well as how much was spent. This series of questions helped to illuminate how respondents typically spend large sums of money, whether on experiences like traveling and vacations, or by investing the money in something more stable like a new home.

Nearly one-third of respondents indicated that they spent the largest amount of their discretionary income on experiential purchases, such as traveling and vacations. Twelve percent of respondents spent the most discretionary income on the second-most popular purchase, a new vehicle.

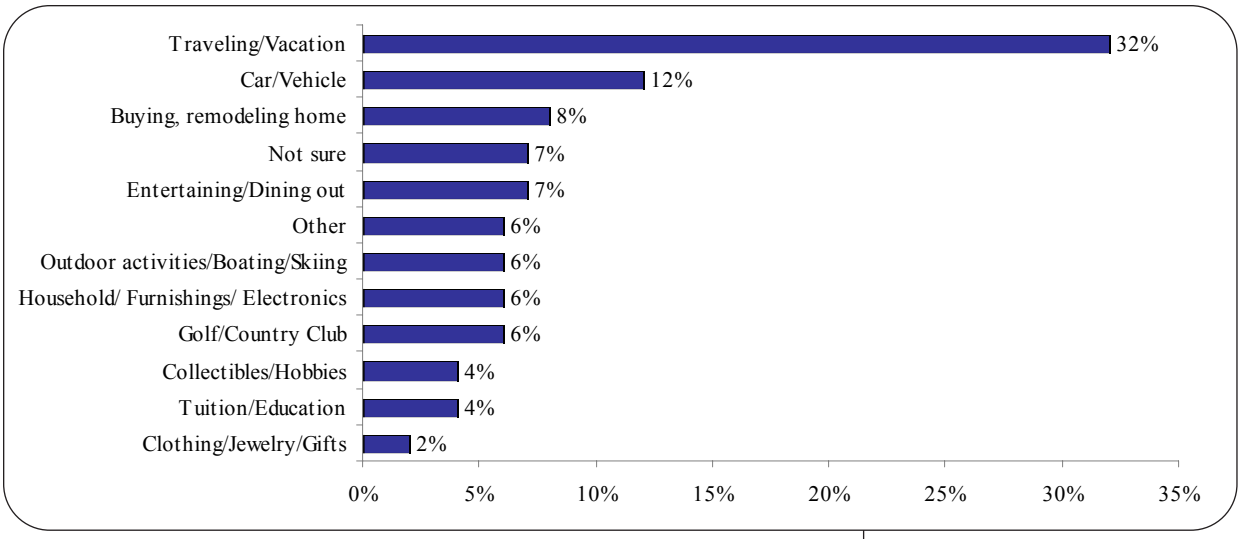



*Figure 11: The respondents' discretionary income spending habits*

Twenty-four percent of respondents said they spent less than US$5,000 on their largest discretionary purchase in 2001. Twenty-five percent spent between US$5,000 and US$10,000. Yet another 24 percent spent between US$10,000 and US$25,000. Respondents spending in excess of US$25,000 tended to focus on material purchases. More than half (58 percent) of those spending US$25,000 to US$50,000 in discretionary income purchased a vehicle and one-third (35 percent) of those spending more than US$50,000 in discretionary income did so on a new home or home improvements.

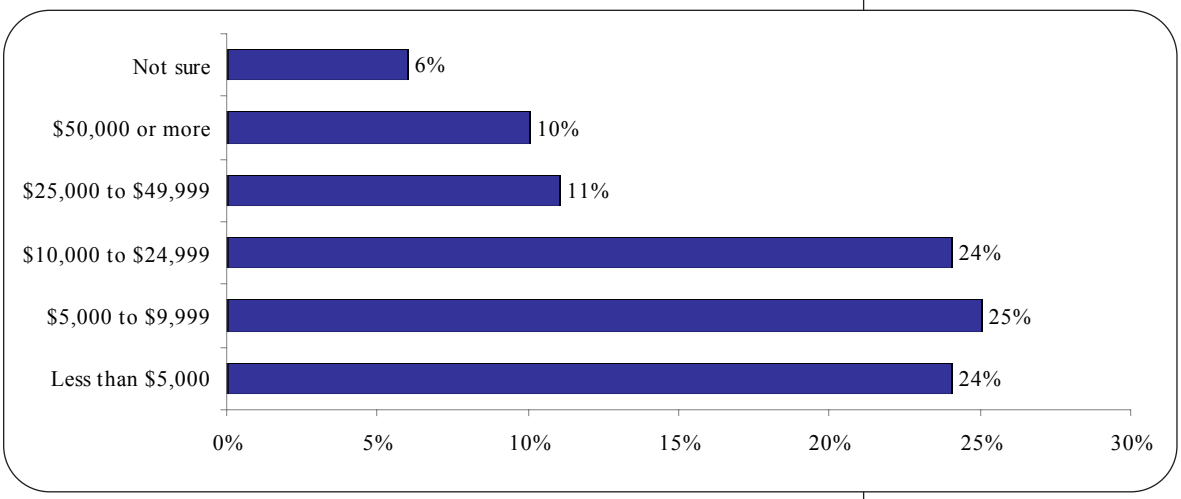



*Figure 12: The amount spent by respondents on their largest discretionary purchase in 2001*

### 3.3.4 public space travel vs. other expenditures

As another insight into the spending patterns of the respondent pool, the Futron/Zogby survey posed a situation in which the respondents had a specified amount of discretionary income to be spent on one thing. Respondents were given a list of options on which they could spend US$100,000, including suborbital space flight, with an opportunity to offer an open-ended answer. Fifty-six percent of the respondents said that they would invest the US$100,000; eighteen percent stated they would choose to purchase a dream vacation, while only twelve percent said they would spend it on a suborbital flight. (At this point in the survey, respondents had not been told the current price for a suborbital flight is approximately US$100,000.)

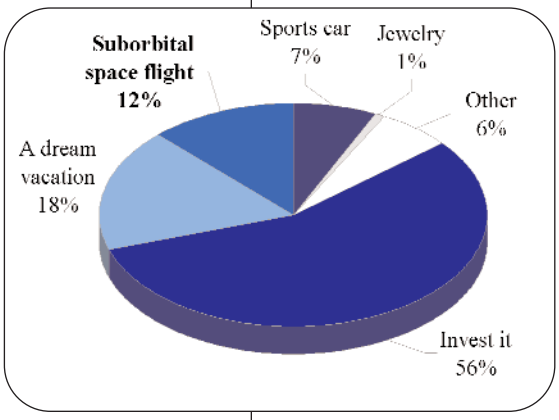



*Figure 13: How survey respondents would choose to use US$100,000*

### 3.3.5 vacation and leisure patterns

Public space travel could be viewed as the ultimate extension of the travel and tourism market. As such, the Futron/Zogby survey gathered data on respondents' vacation and spending patterns and used this data to analyze behavior in regard to public space travel.

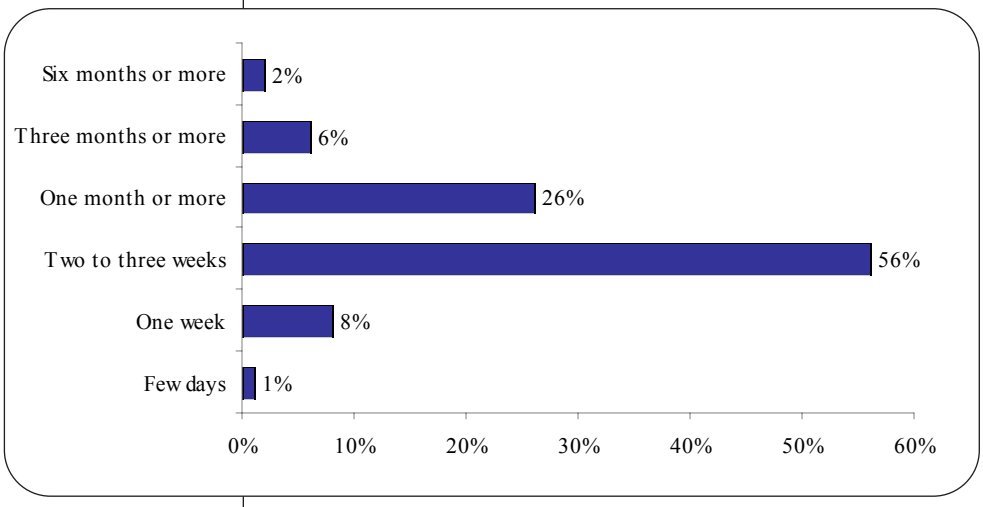



*Figure 14: Most time ever spent on vacation*

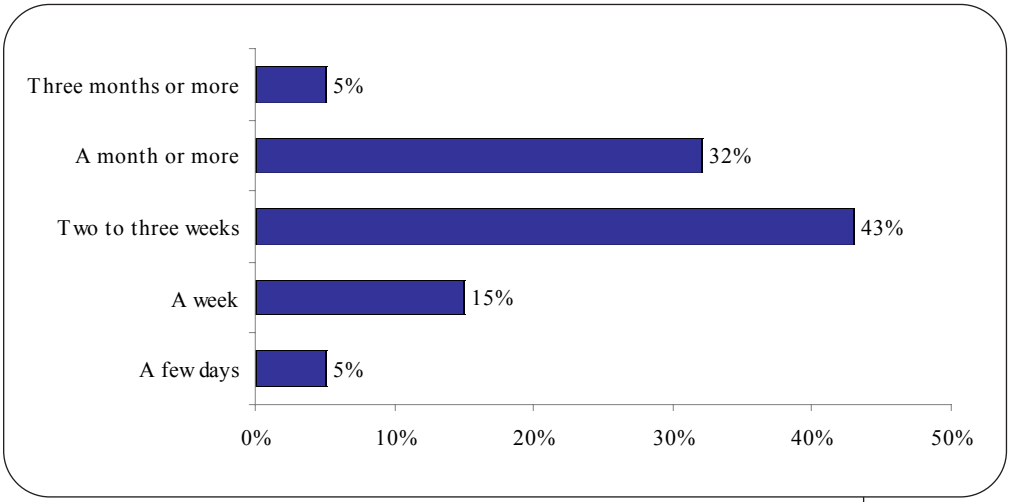



*Figure 15: The amount of time respondents spent on vacation per year*

The survey asked respondents to indicate both the longest time that they had ever spent on a vacation and their average annual vacation length. The majority of respondents (56 percent) revealed that their longest vacation was two to three weeks. In contrast, only two percent said they had spent six months or more on vacation. Only five percent of the respondents spent more than three months on an average annual vacation. Forty-three percent spent an average of two to three weeks on vacation per year.

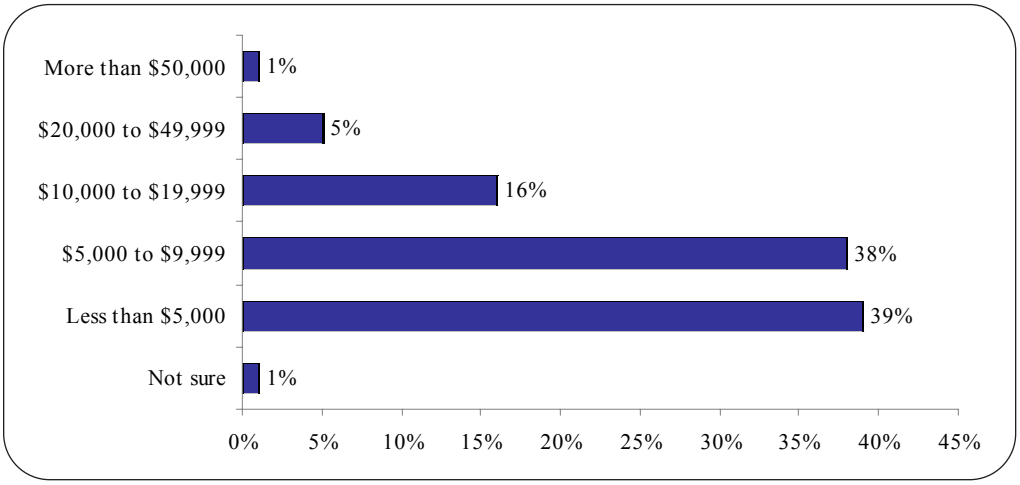



*Figure 16: The amount of money (US$) respondents spent on annual vacation*

In terms of annual vacation spending, 77 percent of respondents said they spent less than US$10,000 a year on vacation travel. In contrast, only one percent of respondents claimed to spend more than US$50,000 on annual vacations.

## 3.3.6 fitness and training

Given the current realities of preparing for space travel, Futron deemed it necessary to gain insight into the respondent pool's fitness and training habits. As with the questions on vacation habits, the data on the respondents' current fitness and training habits provided a basis of analysis for their potential willingness and ability to undergo training for public space travel. Thirty-six percent of respondents rated themselves as having "above average fitness" and eleven percent rated themselves as "extremely fit." Fourteen percent indicated that they possessed "below average fitness" or were "not at all fit." The remaining 39 percent rated themselves as having "average fitness."

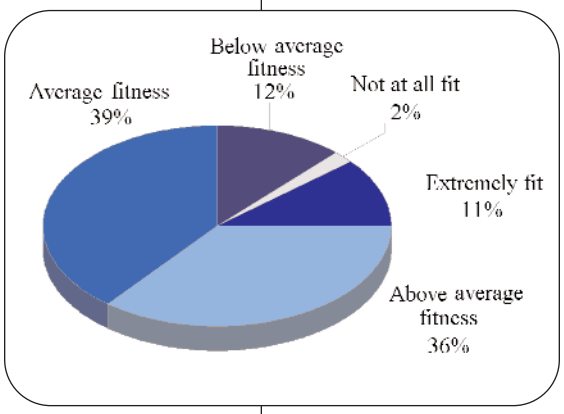



*Figure 17: Stated fitness levels of respondents*

When asked about prior training experiences, 25 percent of respondents said they had spent "several months" in training for a single activity, while eight percent had spent six months in preparation, and 17 percent had spent a full year or more physically preparing for one activity. However, nearly half (46 percent) had spent only three weeks or less in preparation for a single activity.

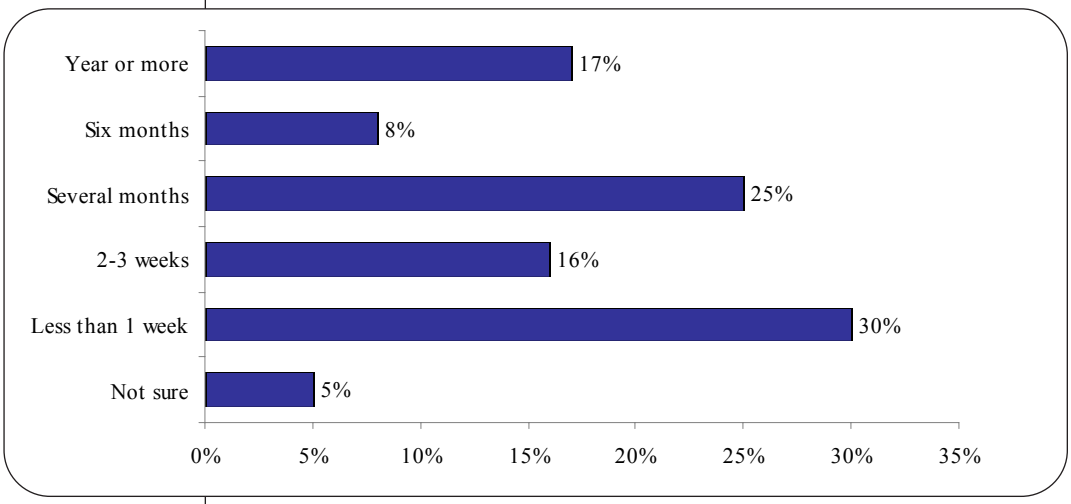



*Figure 18: The longest amount of time respondents have spent training for a single activity*

## 3.3.7 interest in space

As a proxy for determining the respondents' level of "space enthusiasm," and to ascertain any possible relationship between the demand for public space travel and general interest in space, the Futron/Zogby survey questioned respondents on their past participation in terrestrial space-related activities. Respondents were asked if they had ever visited a space museum, a launch site, or a planetarium, and whether they had ever attended a space shuttle launch or participated in space camp. The number of these activities that respondents have engaged in was used to gauge their interest in space.

**"Three percent of respondents demonstrated a clear interest in space..."**

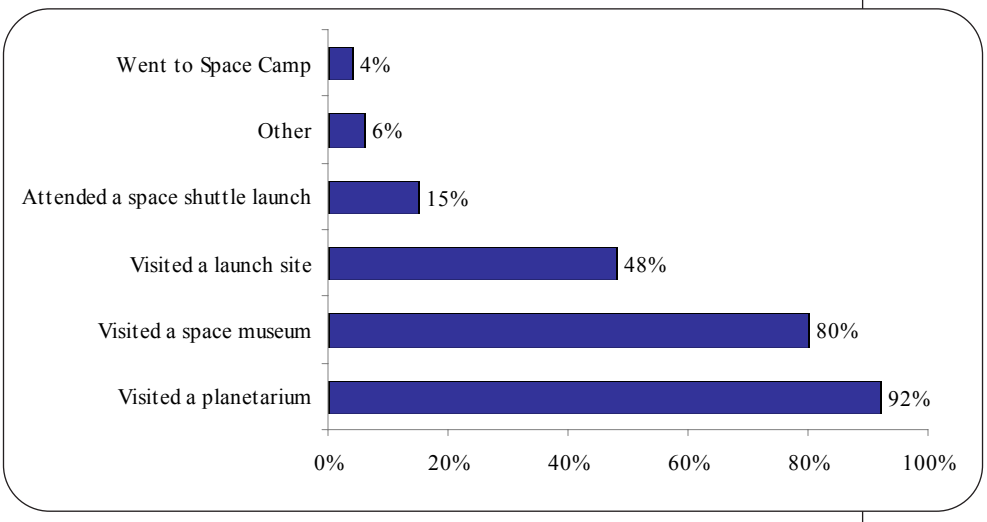



*Figure 19: The respondents' participation in terrestrial space-related activities*

Of all the space-related activity options presented, the greatest percentage of respondents (92 percent) had visited a planetarium, with visiting a space museum close behind at 80 percent. More than one-third of respondents (34 percent) had participated in two activities, and an additional 34 percent had participated in three activities. Three percent of respondents demonstrated a clear interest in space having taken part in all five terrestrial space-related activities.

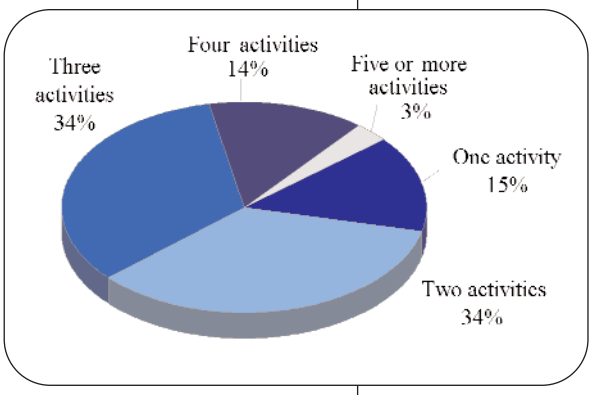



*Figure 20: The number of terrestrial space-related activities in which respondents had participated*

### 3.3.8 reasons for space travel

In order to gain additional insight, respondents were asked to identify the most important and second-most important reasons as to why they would have an interest in traveling to space. Although responses varied greatly, the most important reason that gathered the largest percentage of responses was the opportunity to be a pioneer or to do something that only a few have done before. The ability to view Earth from space was rated as the most important reason for traveling into space by fifteen percent of respondents. Twenty percent had no interest in space travel at all.

### 3.3.9 reasons for not participating in public space travel

Individuals that repeatedly expressed no interest in space travel were asked for the reason why they were not interested. Survey respondents most often cited that the trip was too expensive. This was supported by the fact that almost one-half of survey respondents indicated that they were unwilling to pay at least US$25,000 for a suborbital flight.

| | Most important reason | Second -most important reason |
|---|---|---|
| Pioneer | 24% | 14% |
| See Earth from space | 15% | 24% |
| Lifelong dream | 9% | 13% |
| Space enthusiasm | 7% | 9% |
| Other | 25% | 40% |
| Not interested | 20% | N/A |

*Table 3: Reasons for interest space travel*

# 4 Survey Analysis — Cross-tabulation of Survey Data

The Futron/Zogby survey results presented above highlight some of the straightforward responses to the questions posed. Cross-tabulation of responses from one or more questions, however, often reveals unexpected relationships between variables. Certain survey data were cross-tabulated to augment understanding of buyer preferences and to increase the fidelity of Futron's analysis and forecasting of the public space travel market.

**"...nineteen percent of respondents said they were interested in participating in suborbital space travel..."**

## 4.1 Interest in Suborbital Flight

Approximately nineteen percent of respondents said they were interested in participating in suborbital space travel, as shown in Figure 2 above. An analysis of the answers of this subset of respondents to other survey questions yielded insight into the characteristics and behaviors of these potential suborbital customers.

### 4.1.1 risky activities

The subset of respondents who expressed an interest in participating in suborbital travel also indicated that they participated in other risky activities. (See Figure 9 for the responses of all survey respondents.) Just under one-third of these respondents participated in one or both of the two activities deemed riskiest — skydiving and mountain climbing — which is almost double the relative participation rate of all survey respondents.

| Other risky activities: Suborbital | Participation | Risk perception (on a five -point scale) |
|---|---|---|
| Skydiving | 7% | 3.7 |
| Mountain climbing | 25% | 3.6 |
| Space travel | N/A | 3.0 |
| Skiing/snowboarding | 55% | 2.2 |
| Flying in a private jet | 44% | 1.9 |
| Sailing or boating | 68% | 1.4 |

*Table 4: Suborbital subset's interest in other risky activities*

The respondent subset gave space travel a 3.0 rating on a five-point scale of perceived risk, where 1 was not at all risky and 5 was extremely risky. For the same group, the average risk perception for mountain climbing was 3.6 and sky-diving was 3.7, indicating that they deemed space travel less risky than those two activities. (Figure 10 shows ratings of perceived risk for all survey participants.)

### 4.1.2 reasons for space travel

For 45 percent of those interested in a suborbital trip, doing something that only a few people have done before, or being a "pioneer," was either the most or second-most important reason for taking the trip. Forty-two percent of those interested in suborbital space travel responded that seeing Earth from space is either the most or second-most important reason for taking the trip. Fulfilling a lifelong dream was a driver for 30 percent of those interested.

| Reasons: Suborbital | Most important reason | Second -most important reason |
|---|---|---|
| Pioneer | 32% | 13% |
| Lifelong dream | 18% | 12% |
| See Earth from space | 16% | 26% |
| Space enthusiasm | 9% | 14% |
| Other | 25% | 35% |

*Table 5: Suborbital subset's reasons for interest in space travel*

### 4.1.3 willingness to pay

Of the Futron/Zogby survey participants, ten percent were both interested in suborbital space flight and willing to pay at least the current list price for the trip. That is, a majority (54 percent) of the subset would be willing to pay between US$100,000 and US$250,000 for the experience.

Overall, the subset interested in suborbital travel were demographically similar to all survey respondents. The demographic profile of these respondents as compared to the demgraphic profile of the survey sample as a whole is illustrated in Table 6.

| Demographic | Interested and Willing to Pay Current Price for Suborbital Flight | All Survey Respondents |
|---|---|---|
| Average age | 56 | 57 |
| Employed full-time | 39% | 35% |
| Self-employed | 24% | 24% |
| Retired | 26% | 29% |
| Have dependent children | 33% | 32% |
| Have other dependents | 37% | 27% |
| Married | 87% | 86% |
| Male | 72% | 70% |
| Female | 28% | 30% |

*Table 6: Demographics for suborbital subset and all respondents*

Surprisingly, the subset's past participation in terrestrial space-related activities did not a play a major role in their interest in suborbital flight. Their participation in terrestrial space-related activities did not differ significantly from that of all survey respondents. Among the subset, 92 percent had participated in two activities or more, compared to 86 percent of all respondents. There is a slightly larger difference for those who have participated in three activities or more: 60 percent of the subset as opposed to only 51 percent of all respondents.

| Participation in Space - related Activities | Interested in Suborbital | All Survey Respondents |
|---|---|---|
| One activity | 8% | 15% |
| Two activities | 32% | 34% |
| Three activities | 44% | 34% |
| Four activities | 13% | 14% |
| Five or more activities | 3% | 3% |

*Table 7: Participation in terrestrial space-related activities, suborbital subset and all respondents*

## 4.2 Reality Checks

Futron performed cross-tabular analysis on the vacation expenditures, discretionary income spending and likelihood of available training time for the orbital and suborbital respondent subsets mentioned above in order to provide a "reality check" on their responses and their potential for participation in spaceflight.

### 4.2.1 annual vacation expenditures

Futron compared the annual vacation expenditures of those people who indicated they were interested in and willing to pay for suborbital flight. Only eighteen percent of this subset spent more than US$10,000 annually on vacations, while the majority (64 percent) tended to spend between US$5,000 and US$10,000.

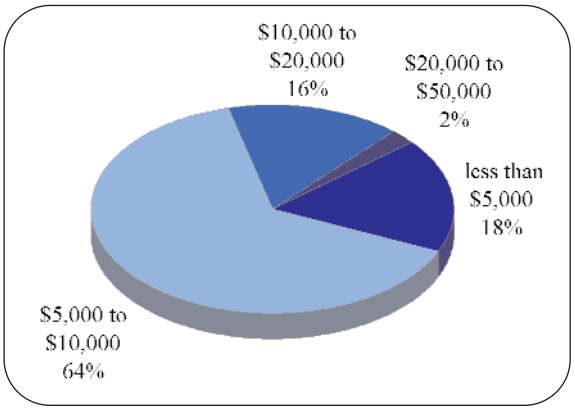



*Figure 21: Annual vacation spending of suborbital subset*

## 4.2.2 discretionary income spending

Much like the reality checks performed for vacation expenditures, a discretionary spending reality check was performed on the responses of those people that indicated that they were both interested and willing to pay for suborbital travel. Only 14 percent of those interested in and willing to pay for suborbital travel spent more than US$50,000 annually of their discretionary income on a single purchase.

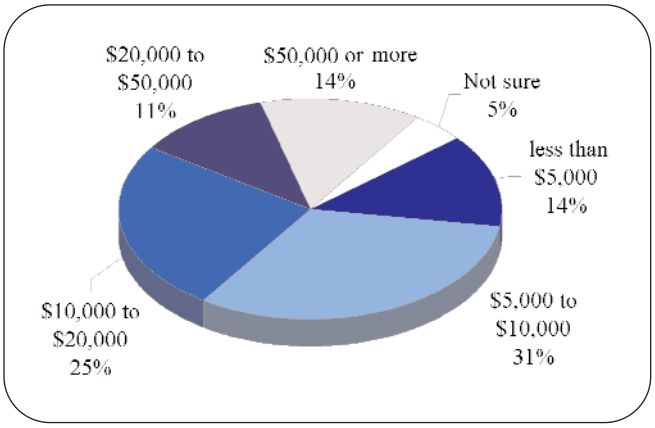



*Figure 22: Discretionary income spending of suborbital subset*

# 5 Suborbital Forecast

## 5.1 Methodology

Futron commissioned the Futron/Zogby survey to obtain an accurate portrayal of the current market for public space travel. The survey lays a solid foundation for a twenty-year forecast of market demand. The results of the survey are crucial elements in the forecasts for public space travel. Futron/Zogby survey results were used in conjunction with additional data and analysis to determine the number of passengers per year for the next twenty years for suborbital public space travel. A summary of the methodology used to formulate the forecast is shown in Figure 23, with detailed descriptions in the following subsections.

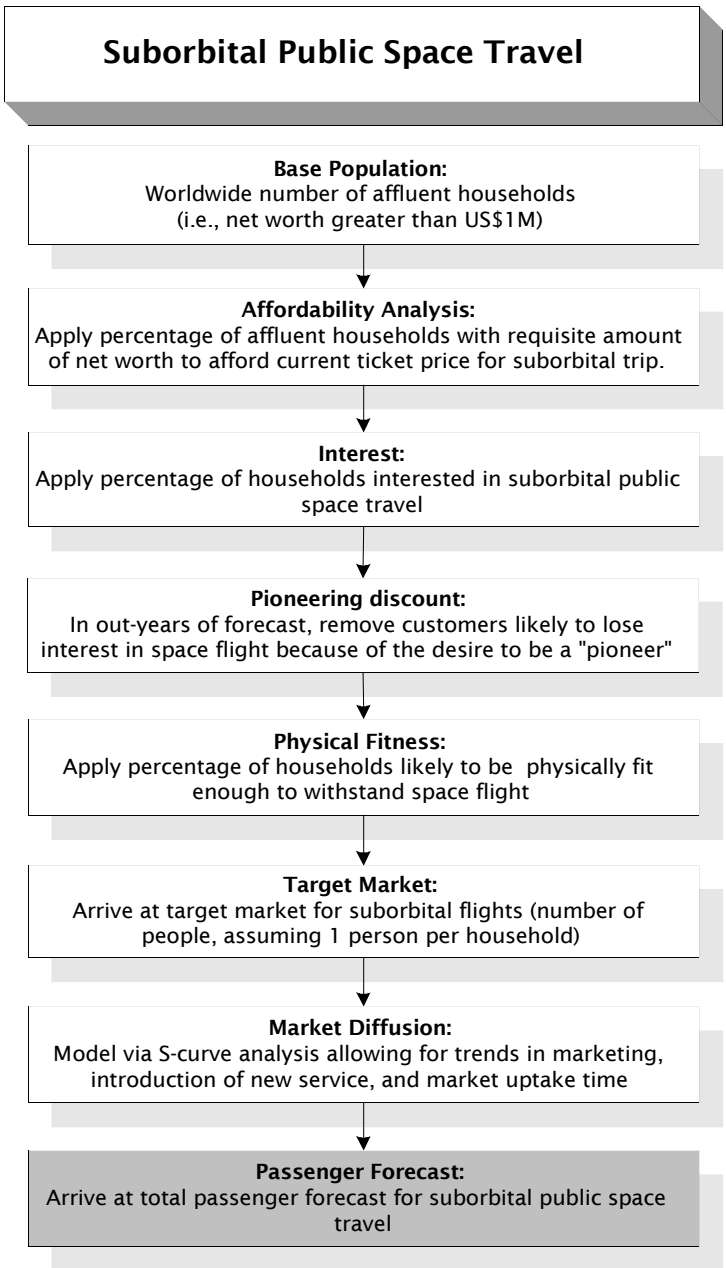



*Figure 23: A summary of the suborbital travel forecast methodology*

### 5.1.1 estimating the potential market

Futron bases its suborbital travel forecast on the potential pool of customers for the service. Although a great portion of the general population may be interested in suborbital travel, the price tag prevents many from becoming viable customers for this service.

To extrapolate a global forecast from the results of the survey for suborbital travel, Futron estimated the number of high-net-worth individuals—those people with at least US$1 million in financial asset wealth—on a regional and global basis using publicly available data from the 2002 Merrill Lynch/Cap Gemini Ernst & Young's World Wealth Report. Futron assumed that one qualifying individual is equal to one household.

Analysis of the vacation and discretionary income spending habits taken from the Futron/Zogby survey results indicated that an individual is willing to spend about 1.5 percent of their net worth on a single, large discretionary purchase (see Figure 11 and Figure 12, above). With a suborbital trip ticket currently priced at US$100,000, the minimum net worth required for a potential customer is nearly US$7 million. Therefore, the potential market of suborbital travelers is the proportion of the global population with a net worth in excess of US$7 million.

Futron further narrowed the potential market to a target market for suborbital space travel by applying limiting factors, such as interest in suborbital travel (see Section 3.2), willingness to pay current prices (see Section 3.2.2), reasons for interest in space flight (see Section 3.3.8), and physical fitness (see Section 3.3.6). Specifically, Futron gauged interest based on individuals who responded "definitely likely" and "very likely" to questions pertaining to participation in suborbital space travel, after having been presented with both the positive and less attractive aspects of suborbital flight. Their responses were then analyzed in conjunction with their responses to the range of suborbital price points given in the survey. Overall, this analysis revealed that ten percent of the survey respondents were both interested in the flight and willing to pay at least the current price, while 14 percent were interested at the assumed 2021 price of US$50,000. Futron applied these percentages to the total global potential market to arrive at a global baseline demand for suborbital space travel from 2002 to 2021.

### 5.1.2 pioneering reduction

Customers' interest in new products and services can change quickly and vary for any number of reasons. The respondents' reasons for interest in space travel included fulfilling a lifelong dream, wanting to see Earth from space, and experiencing weightlessness. However, more than 20 percent of the respondents who were interested in and willing to pay for suborbital travel indicated that the primary reason for interest was to do something that few people had done before — in other words, to be a pioneer. This reasoning presents a potential threat to interest levels as service becomes regular. Thus, to account for this likely drop-off in interest due to the loss of "pioneers," Futron introduced a pioneering reduction into the forecast. This reduction begins during

the third year of service for the suborbital travel market, with complete removal of the pioneers occurring within ten years.

### 5.1.3 physical fitness

At this time, affordability and interest in suborbital travel are the primary constraints on demand for suborbital travel. However, suborbital space flight is an inherently risky activity and will require a certain level of physical fitness in order to withstand the physical stresses of the flight, at least until the vehicles have undergone substantial change that would reduce stresses. Therefore, interested customers who can afford a ticket may be prevented from suborbital flight on the basis of physical fitness.

Respondents were asked to assess their physical fitness (see Figure 17). Futron considered respondents who rated themselves at least "above average," if they were below 65 years old, and "extremely fit," if 65 and older, as being viable candidates for suborbital flight. Futron then applied that percentage to the global target market population that had already been identified via wealth and interest levels.

### 5.1.4 modeling market diffusion

For suborbital public space travel, Futron assumed a market start date of 2006 and a timeline of 40 years to full market maturity. Futron selected a 40-year market maturity on the basis of terrestrial analogs (e.g., 20th century aviation evolution from barnstorming to commercial passenger travel) and the current state of the public space travel industry and infrastructure.

Market experience has shown that the adoption of new technological services typically follows an established pattern popularly known as an 'S' curve, characterized by slow absorption as the market becomes familiar with the product, followed by a period of accelerated adoption as the market embraces the product, and culminating with a deceleration in adoption as the market nears a saturation point. To model this phenomenon in commercial space travel, Futron applied a Fisher-Pry curve to the total potential demand pool for suborbital service. The Fisher-Pry curve is a typical algebraic formulation that translates known market saturation and build-out time into an "S" curve forecast.

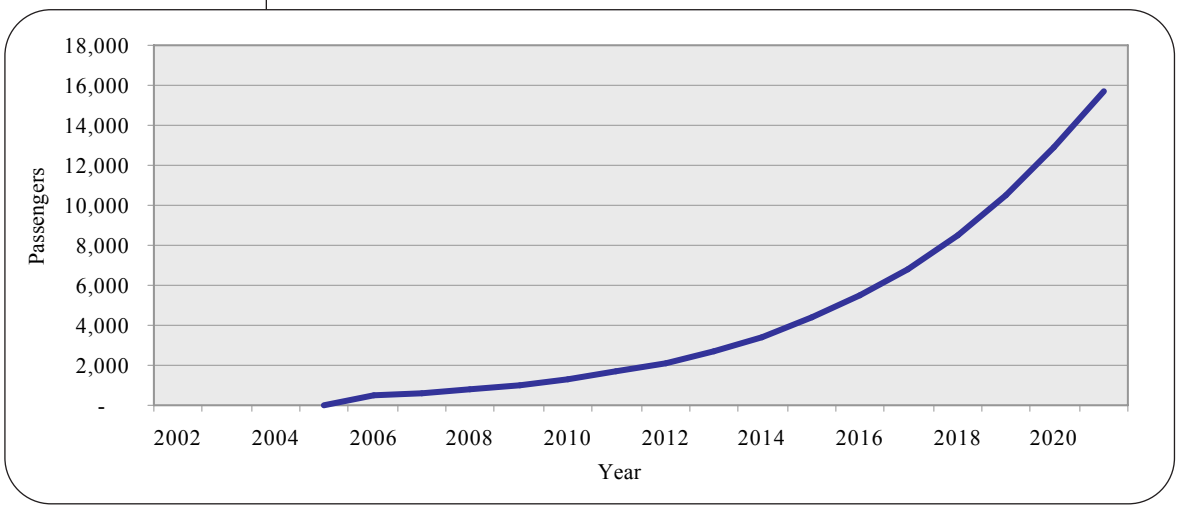
**"...the adoption of new technological services typically follows an established pattern popularly known as an 'S' curve..."**

## 5.2 Forecasts

### 5.2.1 baseline suborbital forecast

The baseline forecast for suborbital public space travel assumes a 15-minute trip on a suborbital trajectory, preceded by a week of training. Although it is likely that at some point in the future, suborbital vehicles could expand to serve other market niches, such as remote sensing, rapid package delivery, and point-to-point passenger transport, it is not clear when expansion into these applications is likely to occur. Therefore, the Futron suborbital forecast focuses solely on the suborbital scenario described above and does not reflect changes in demand that could result from expansion into other market niches.

The base service price (US$100,000) is maintained for the first five years of service, and then experiences linear reduction over the following decade to US$50,000 by 2021. Figure 24 illustrates the number of passengers likely to demand suborbital public space travel service over the forecast period. This forecast does not assume any supply constraints after service launch, as the service capacity and technical details of potential vehicles are not established at this time. However, demand is constrained until service is assumed to begin in 2006, at which point




| | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Passengers | 503 | 642 | 820 | 1,045 | 1,330 | 1,692 | 2,150 | 2,726 | 3,448 | 4,350 | 5,468 | 6,842 | 8,517 | 10,532 | 12,923 | 15,712 |

*Figure 24: Baseline suborbital forecast*

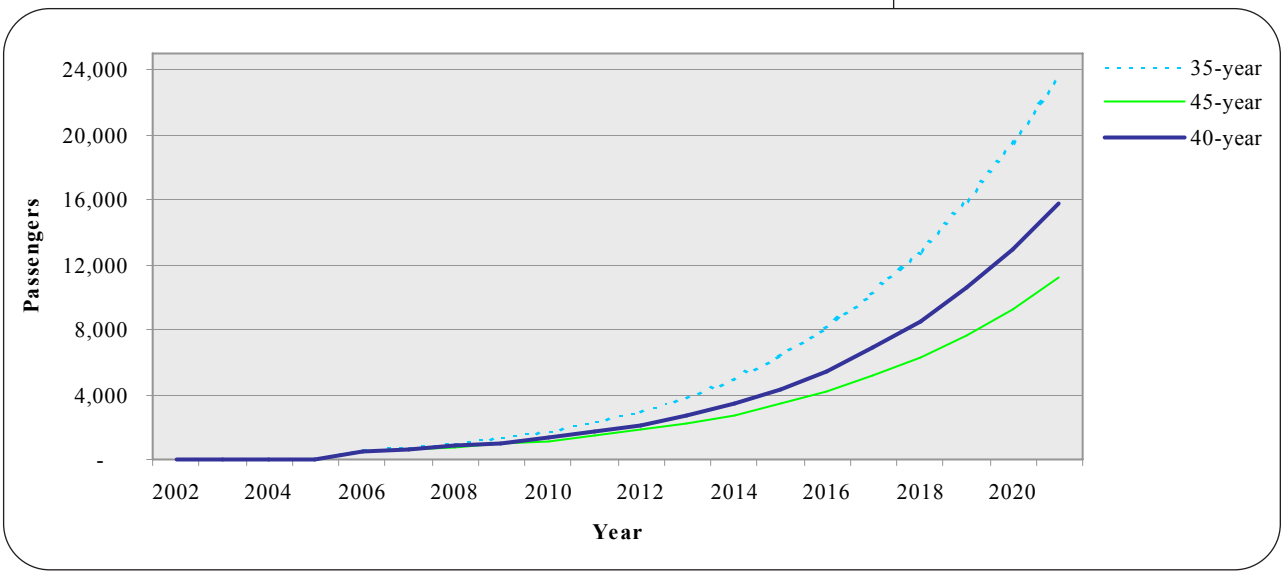
demand would rise from 503 passengers in 2006, when regular service is assumed to begin, to over 15,700 passengers in 2021.

## 5.2.2 forecast ranges

The Futron suborbital travel forecast methodology contains sensitivities that could affect the forecasted market. The forecast exhibits the greatest sensitivity when changing the estimated period to full market saturation, or market maturity (40 years at baseline). The shape of the Fisher-Pry curve applied to model the rate of saturation has a significant impact on forecasted market demand, especially in the near term. In order to display the effects that market maturity can have on the forecast results, Futron ran a series of forecasts with varying market maturity dates. This exercise was intended to give a range of the results for each forecast.

**"Futron ran a series of forecasts with varying market maturity dates."**

Futron developed the forecast range for this market by producing two additional forecasts with varied market maturity dates while holding all other forecast inputs constant. The alternative market maturity dates were 35 and 45 years. The robust forecast that assumes a 35-year time to



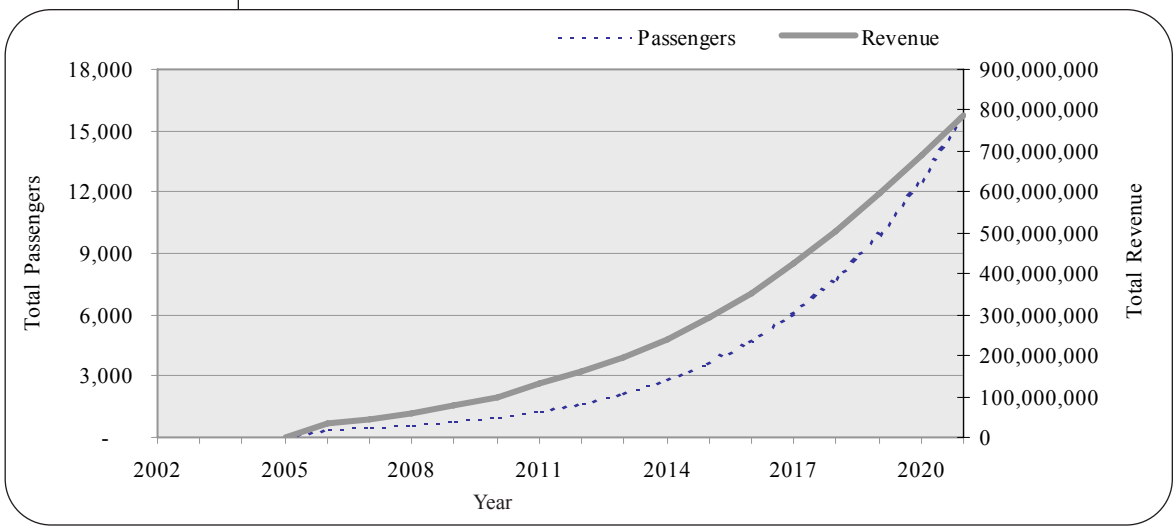

| | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Baseline (40-year) | 503 | 642 | 820 | 1,045 | 1,330 | 1,692 | 2,150 | 2,726 | 3,448 | 4,350 | 5,468 | 6,842 | 8,517 | 10,532 | 12,923 | 15,712 |
| 35-year | 611 | 798 | 1,042 | 1,358 | 1,768 | 2,298 | 2,980 | 3,853 | 4,962 | 6,359 | 8,100 | 10,241 | 12,829 | 15,895 | 19,443 | 23,437 |
| 45-year | 489 | 608 | 756 | 939 | 1,166 | 1,447 | 1,794 | 2,222 | 2,747 | 3,390 | 4,174 | 5,125 | 6,273 | 7,646 | 9,277 | 11,192 |

*Figure 25: Suborbital forecast ranges using a Fisher-Pry model*

market maturity reveals a demand of over 23,000 passengers in 2021; a significant increase from the baseline results for total demand over the forecast period. The constrained forecast, with a 45-year time to market maturity, reveals a demand of more than 11,000 passengers in 2021, a 29 percent drop off from the baseline suborbital forecast from 2006 through 2021.

### 5.2.3 suborbital revenue forecast

The revenue forecast for the suborbital travel market demonstrates the potential revenue that can be realized if all of the demand for flights could be satisfied. Figure 26 shows the annual revenue forecast for suborbital travel. The annual revenue forecast is based on the baseline suborbital forecast,



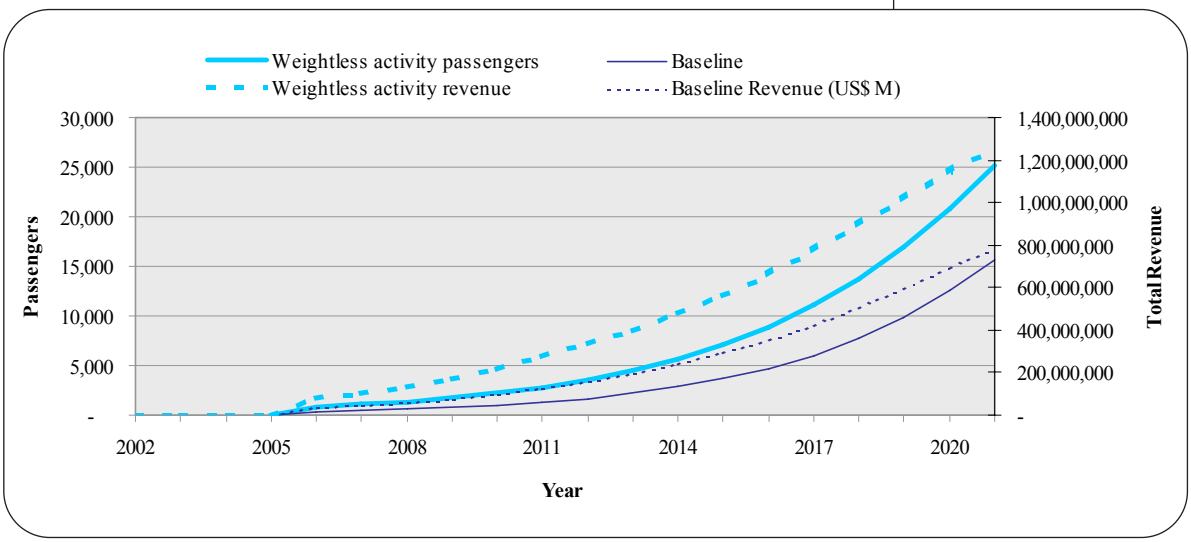

| | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Passengers | 356 | 455 | 591 | 769 | 999 | 1,298 | 1,685 | 2,186 | 2,830 | 3,656 | 4,711 | 6,048 | 7,770 | 9,916 | 12,545 | 15,712 |
| Price (US$ K) | 100 | 100 | 100 | 100 | 100 | 100 | 95 | 90 | 85 | 80 | 75 | 70 | 65 | 60 | 55 | 50 |
| Rev. (US$ M) | 36 | 46 | 59 | 77 | 100 | 130 | 160 | 197 | 241 | 293 | 353 | 423 | 505 | 595 | 690 | 786 |

*Figure 26: Suborbital revenue forecast*

which includes a decreasing ticket price over the forecast period. The forecast assumes an initial price of US$100,000 for the first five years of service, decreasing to US$50,000 by 2021. The forecast for 2021 reveals a potential demand — without supply constraints — of 15,700 passengers, and yielding potential revenue of US$786 million within the year. It should be noted that supply constraints on the market could significantly lower the potential number of passengers and, therefore, revenue.

## 5.2.4 experiencing weightlessness

The Futron/Zogby survey and the above suborbital forecast focused on the trip scenario of being strapped into a seat for a fifteen-minute flight after one week of pre-flight training. However, changes to the basic scenario (i.e., shorter training time, ability to leave one's seat during the flight) could occur over the forecast period and have an effect on demand for suborbital flights. Futron queried respondents on these scenario changes and then used the responses to generate alternativ e forecasts. At this time, it appears unlikely that the training scenario would be significantly shorter than one week, therefore, Futron chose to generate an alternative forecast for the ability to leave one's seat during the flight, thus enabling passengers to experience weightlessness more fully. More than one-quarter of all respondents indicated an increase in interest if this activity were included in the trip scenario (see Figure 7).




| | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Weightless Passengers | 843 | 1,075 | 1,367 | 1,737 | 2,205 | 2,796 | 3,539 | 4,472 | 5,638 | 7,086 | 8,875 | 11,066 | 13,774 | 16,968 | 20,747 | 25,139 |
| Baseline Passengers | 356 | 455 | 591 | 769 | 999 | 1,298 | 1,685 | 2,186 | 2,830 | 3,656 | 4,711 | 6,048 | 7,770 | 9,916 | 12,545 | 15,712 |
| Price (US$ K) | 100 | 100 | 100 | 100 | 100 | 100 | 95 | 90 | 85 | 80 | 75 | 70 | 65 | 60 | 55 | 50 |
| Weightless Rev. (US$ M) | 84 | 108 | 137 | 174 | 221 | 280 | 336 | 402 | 479 | 567 | 666 | 775 | 895 | 1,018 | 1,141 | 1,257 |
| Baseline Rev. (US$ M) | 36 | 46 | 59 | 77 | 100 | 130 | 160 | 197 | 241 | 293 | 353 | 423 | 505 | 595 | 690 | 786 |

*Figure 27: Suborbital demand forecast with the ability to leave your seat*

Several respondents who were somewhat interested in suborbital space travel, and willing to pay for a trip, would be significantly more interested if this activity were available.

Figure 27 illustrates the change in demand generated by the ability to leave your seat during flight. The forecast for 2021 increases by around ten thousand passengers, with an increase in revenue of almost $500 million.

# 6 Possibilities for Further Analysis

This report provides a solid foundation for understanding the realistic market for public space travel. For anyone with an interest in public space travel, Futron can provide customized consulting services for a wide range of technical, regulatory, and market questions. Some examples of possible analyses are highlighted below.

## 6.1 Effect of New Vehicles on Demand for Suborbital Travel

The suborbital survey results and forecast were generated with one underlying assumption: currently no specific vehicle exists. Expanding the analysis to include specific vehicles or characteristics associated with them would impact the target market and associated forecast. Several variables merit examination in the context of new vehicles providing public space travel:

- Passenger capacity,
- Flight frequency,
- Country of ownership and flight operations,
- Training time and location,
- Programmatic risk,
- Economic cost modeling,
- Safety, and
- Regulatory environment.

## 6.2 Future Suborbital Markets

The suborbital forecasts in this study only address the suborbital market in the context of space tourism. However, it is likely that suborbital vehicles will expand to serve other market niches, maybe including rapid package delivery and point-to-point passenger transport. These markets could have a significant impact on the cost and trip profile for the suborbital tourist, eventually even supplanting the initial market offering.

**"Expanding the analysis to include specific vehicles or characteristics associated with them would impact the target market and associated forecast."**

## 6.3 Infrastructure for Suborbital Public Space Travel

Can a business case be made for an independent spaceport based on public space travel alone, or would it be a mixed-use facility? What is the optimal configuration and operational model for such a business? Financial analysis, cost modeling, programmatic risk, and safety can all be applied to answer a range of customized questions concerning various system architectures and business models.

## 6.4 The Whole Space Experience

The survey data suggested that some people actually preferred the physical and mental challenge of a rigorous training routine, while others preferred to stay closer to home, finding a shorter training time more appealing. Analyses further segmenting the market pool could reveal the importance and range of preferences for all aspects of the space flight experience. Aspects to consider include the following:

- The primary motivation for interest in a space flight experience;
- Sensitivities to various service alternatives;
- Amenities and other specialty services;
- In-flight activities; and
- Programs that would include family and friends.

## 6.5 Economic Impact

What is the potential impact of public space travel on the aerospace industry, the tourism and hospitality industries, and the communities where public space travel organizations may locate? By studying the range of support services, personnel, and other factors generated by this new industry, Futron can quantify the economic benefits and identify ways to stimulate economic development.

## Futron Overview

Futron applies analytically-rigorous decision-support methods to transform data into information. We collaborate closely with clients to relate decisions to future outcomes and measures of value. Our aerospace consulting services include market and industry analyses, safety and risk management, remote sensing, and communications and information management. Futron's vision and commitment to innovation, quality and excellence results in a higher performing future for clients.

*Futron's headquarters in Bethesda, Maryland*

## summary of capabilities

Futron's Space and Telecommunications Division is the industry leader in researching, analyzing, and forecasting space and telecommunications markets and programs. Futron offers our commercial and government clients a suite of proprietary, leading-edge analytical methodologies. Our world-class team of market and policy analysts, economists, and engineers bring unparalleled skills and expertise to each account.

- Futron has surveyed hundreds of aerospace firms to develop unique revenue, employment, and productivity profiles of the industry.
- Futron has developed country-by-country models of demand for satellite telecommunication services that aggregate a global forecast from the individual household PC or business network level; these models have accurately predicted future launch levels and business changes in the satellite industry.
- Futron's database on satellite transponder pricing includes more than 4,000 price points from around the world, including actual deal pricing and terms.
- Futron's Electronic Library of Space Activity (ELSA) is a searchable, interactive database of every launch since 1957. The database also acts as a dynamic source of information on satellite activity; keeping track of the status and operational activity (including transponder coverage and carriage) of every satellite in orbit.
- Futron generates bottoms up, parametric, and analogous cost estimates for commercial satellite and launch vehicle programs.
- Futron provides a subscription-based service providing information on every FCC satellite application filed since 1990. Futron's FCCFilings.com is the only source for competitive intelligence and business data contained in FCC satellite licensing documents.

## Appendix: The Futron/Zogby Survey

We would like to ask you about your vacation and travel preferences.

1. About how much money would you say you spend annually on vacation travel?
2. Which of the following best represents your household income last year before taxes?
3. Which of the following best describes your net worth?
4. What is the longest time you have ever spent on vacation?
5. On average, how much time each year do you typically spend on a vacation?
6. On what activity or item did you spend the most discretionary income last year?
7. Approximately how much did you spend on this activity or item?
8. On what activity or item did you spend the second most discretionary income last year?
9. Approximately how much did you spend on this activity or item?
10. Overall, on a scale of one to five with one being extremely fit and five being not at all fit, how physically fit would you rate yourself
11. Considering all the activities in which you participate, what is the most amount of time you have ever spent on training or physical preparation for any single activity?
12. If you had US$100,000 of discretionary income and could only spend it on one thing, which one of the following would you purchase?
    · A sports car · A dream vacation · A designer outfit · Jewelry · A sub-orbital space flight · Invest it · Other
13. If you had US$5 million of discretionary income and could only spend it on one thing, which one of the following would you purchase?
    · A home in some exotic location · A piece of artwork · An orbital space flight · A yacht · A jet · Invest it · Other
14. Now I am going to read to you a list of activities. For each, please tell me if you participate in the activity regularly, sometimes, rarely, or never?
    · Mountain climbing? · Flying in a private aircraft? · Skydiving? · Skiing (on snow or water)/Snowboarding? · Sailing or boating?
15. Now, using a scale of 1 to 5 where 1 is not at all risky and 5 is extremely risky, please rate for me the risk of each of the following activities.
    · Mountain climbing? · Flying in a private aircraft? · Space travel? · Skydiving? · Skiing/Snowboarding? · Sailing or boating?
16. Have you ever participated in any of the following space tourism activities?

Now I am going to ask you some questions about space flight.

In a sub-orbital space flight, you would experience what only astronauts and cosmonauts have experienced. During the 15-minute flight on a vehicle that meets government safety regulations, you will go 50 miles into space, and experience the acceleration of a rocket launch. You will also experience a few minutes of weightlessness and have the unique experience of viewing the Earth from space.

17. How likely would you be to participate in a sub-orbital space flight?

Now we want to tell you about other aspects of sub-orbital space flight.

Space flight is an inherently risky activity. The vehicle providing these flights will be privately developed with a limited flight history. In order to take the trip, you would have to undergo training for one week prior to the launch. Although you would experience weightlessness, you would be strapped into your seat throughout the trip.

18. Knowing what you know now, how likely would you be to participate in a sub-orbital space flight?

Please rate the following on their importance to you as an aspect of a sub-orbital space flight.

19. You would be able to view the Earth from space?
20. You would experience weightlessness?
21. You would experience the acceleration of a rocket launch?
22. You experience what only astronauts and cosmonauts have experienced.
23. Now I am going to ask you about certain aspects of the flight. Please rate each on your likelihood to participate in a sub-orbital space flight.
24. There is a required, one-week training period. Would this make you...?
25. Knowing that the vehicle would be privately developed with a limited flight history. Would this make you...?
26. You would be strapped into your seat throughout the trip. Would this make you...?
27. Now some questions about the prices of sub-orbital space travel.
28. Would you be willing to pay US$250,000 for a sub-orbital flight?
29. Would you be willing to pay US$200,000 for a sub-orbital flight?
30. Would you be willing to pay US$150,000 for a sub-orbital flight?
31. Would you be willing to pay US$100,000 for a sub-orbital flight?
32. Would you be willing to pay US$50,000 for a sub-orbital flight?
33. Would you be willing to pay US$25,000 for a sub-orbital flight?
34. What is the most important reason why you are not interested in a sub-orbital flight?
35. The conditions I just outlined could change in the future and affect the demand for sub-orbital space travel. If certain conditions change, how likely would you be to participate in space travel? For instance if...
36. The training would take less than one week?
37. You would have the ability to leave your seat during a flight?

Now I have some questions about another type of space flight.

In an orbital flight, you would have the opportunity to experience what only astronauts and cosmonauts have experienced. The trip would begin with a launch aboard a thoroughly tested rocket. You would then dock with an orbiting space station and would have the freedom to move about the facility. During your two-week stay you would be weightless. You would have the opportunity to eat, sleep, exercise and view the Earth from space.

38. How likely would you be to participate in an orbital space flight?

Now we want to tell you about other aspects of orbital space flight.

Space flight is an inherently risky activity. Currently, the flight is only available on a Russian vehicle. In order to take the trip, you would have to undergo intensive cosmonaut training in Russia for six months prior to the launch. During the flight you may experience headaches and lower backache. While in space, you might experience some nausea. You would be able to view the Earth through porthole-sized windows. Upon your return to Earth and to normal gravity, you might experience some dizziness for a few days and have difficulty standing.

39. Knowing what you know now, how likely would you be to participate in an orbital space flight...?

Please rate the following on their importance to you as an aspect of an orbital space flight.

40. You would stay two weeks on a space station?
41. Orbiting the earth every 90 minutes?
42. Eating, sleeping and exercising in space, with the freedom to move about in a large space station?
43. Going into space in a thoroughly tested rocket?

Now I am going to ask you about certain aspects of the flight. Please rate each on your likelihood to participate in an orbital space flight.

44. You would undergo intensive physical and mental training over a six-month period. Would you be...?
45. Two weeks of weightlessness might cause you to experience dizziness/difficulty standing for a few days upon returning to Earth. Would you be...?
46. Going into space in a Russian-made vehicle. Would you be...?
47. Currently, the orbital trip is only available in Russia. Would six months of training in Russia, including learning to speak Russian make you...?

Now some questions about the prices of orbital space travel.

48. Would you be willing to pay US$25 million for an orbital space flight?
49. Would you be willing to pay US$20 million for an orbital space flight?
50. Would you be willing to pay US$10 million for an orbital space flight?
51. Would you be willing to pay US$5 million for an orbital space flight?
52. Would you be willing to pay US$2.5 million for an orbital space flight?
53. Would you be willing to pay for an orbital space flight if it cost US$1 million?
54. What is the most important reason why you are not interested in orbital flight?
55. What is the likelihood you would have six months available to prepare for space travel?
56. The conditions I outlined could change in the future and affect the demand for orbital space travel. If certain conditions change, how likely would you be to participate in orbital space travel? For instance...
57. If the orbital trip were available from a U.S. company, would you be...?
58. If you could train for a shorter period of time, perhaps three months, would you be...?
59. If you could train for only one month, would you be...?

60. If you could train in the United States, would you be...?
61. Currently, the only destination in orbit is the International Space Station. Would the possibility of visiting a commercial facility designed for tourists (with increased comforts) make you...?
62. How would the opportunity to take a spacewalk outside the vehicle -- even if it would cost more -- affect your likelihood of taking an orbital trip?
63. How about the opportunity to take a spacewalk, even if it meant a year's worth of training?
64. If you could take a companion with you on an orbital space flight, how would it affect your likelihood of participating?
65. If you could not travel to a space station, would you be much more likely, somewhat more likely, somewhat less likely, or much less likely to take a two-day orbital trip in which you would remain inside the vehicle, or would it make no difference?
66. If you could finance an orbital or sub-orbital flight, would you be interested in going?
67. What is the most important reason why you would have any interest in traveling into space?
68. What is the second most important reason why you would have any interest in traveling into space?
69. What is your age?
70. Which of the following best describes your highest level of education?
71. Which of the following best describes your employment status?
72. Are you a parent or guardian of a dependent child who is living at home?
73. Do you have any dependents other than children?
74. Which of the following best describes your marital status?