Do space hotels differ from hotels on Earth? The mystery is solved.

Introduction
Space hotels will become another product offering by the tourism and hospitality industry in the future. Van Pelt (2005, xxii) suggests it is the “logical next step in the evolution of spaceflight”. Although not yet a reality, the private sector is striving to make tourist space travel possible and the industry is closer to achieving this goal than ever before (Excell, 2009). The space industry providers suggest that it will be expensive to begin with but research indicates that there are ‘at least 10 million persons globally who are prepared to spend a years salary for a space trip’ (Smith, 1999, p.238) and arguably interest has risen since then. The Shimizu Corporation (2011, para.1) states “if low-cost fully reusable space vehicle is successfully developed, space tourism will be a viable market”. Shimla (2010) agrees quoting Sir Richard Branson, (a space travel advocate, entrepreneur and owner of Virgin Galactic that will take the first paying customers into zero-gravity in 2012) states that space travel will become affordable for many people in the next decade. Freeland (2005) acknowledges another commentator who predicts there will be over 100 orbital hotels and 5 million annually space tourists by 2030. Shimiza Corporation (2011) also suggest this is potentially a huge growth area for tourism and hospitality and it is time to start exploring space travel and space hotels. Van Pelt (2005, p.7) agrees stating that “extensive space tourism market studies are sorely needed” in this rapidly developing and under-researched area.

It has been noted that there are different types of space tourism options that are currently available or will be in the near future. These are generally associated with a space travel experience as perceived by the tourist. For example, a space experience could be viewed as adventure related, ground-based or air-based space tourism (Lappas, 2006; van Pelt, 2005). Laing and Crouch, (2004) and Laing (2006) has been more specific identifying six possible realms or categories that space tourism product offerings may fall into; virtual, terrestrial, near-space, sub-orbital, low-orbital and
high orbital space tourism. Each category has its own unique experience and consequently cost. It is expected that the distance from the Earth’s atmosphere and length of duration will affect the overall affordability with experiences on Earth or a lesser flight duration to be the least expensive. It is also expected that the cost of the space product/services and willingness to pay will ultimately determine the purchasing decisions of the tourist. Other factors that may influence purchasing a space travel product may include status, sense of adventure, value for money, expectations (Higgins-Desbiolles, 2010) and perceived risk of danger to health and mortality (van Pelt, 2005).

Although this industry is exceptionally new (Excell, 2009), the last 100 years has referred to space travel as something that was inevitable mainly through literature and cinema (Berinstein, 2002). The notion that space travel will be possible in the future resonates with many people globally therefore has always maintained human interest. Many adventurous travellers would like to embark on a ‘space adventure’ and experience something that never had before. When space travel becomes a reality, inevitably questions will be raised that surrounding product offerings and services. One such question is will space hotels offer the same facilities and services as hotels on Earth?

To help answer this question this paper explores the current literature defining hotels on Earth and ideology for space hotels. The literature uncovers four key areas that space hotels can be defined and offers a useful definition highlighting the distinction between space hotels and those present on Earth. This research will be beneficial for the hospitality industry as it brings together a range of literature to define space hotels by highlighting the differences between hotels on Earth and future hotels in space acknowledging that these new products and services will be vastly different. To the author’s knowledge, there is no other definition of a space hotel therefore this paper adds to the rapidly developing reality of space tourism publications.
What is space tourism?

There are great hordes of literature defining current tourism and hospitality products, trends and experiences. However most of the research is focused on Earth. This is understandable as until 2001 when Denis Tito privately funded his seat on a government space vehicle, space travel for tourists was not possible (Lappas, 2006). But times are changing (Shimla, 2010). Space tourism is becoming a reality. It stands to reason then, if space travel occurs for extended periods, it is inevitable that accommodation, food and beverage and other products and services will need to be provided to satisfy this developing market.

Space Future suggests that “space tourism is the term that's come to be used to mean ordinary members of the public buying tickets to travel to space and back” (2011, para. 1). These members of the public will be known as space tourists. However, others tend to believe it should be defined by the type of activity the potential tourist will embark on (Berinstein, 2002; van Pelt; 2005). These categories can be broad such as ground-based and air-based space tourism (Lappas, 2006). Or they may be more clearly defined by location therefore limited by options as Laing and Crouch (2004) previously highlighted. Collins (1999) suggests the activity itself will determine the type of space tourist you are such as wanting to Look at the Earth, Observe the sky, Engage in low-gravity sports, Observe low-gravity phenomena, Swim in low-gravity or artificial gravity, Walk in space, Hang out in low-gravity gardens or Immerse yourself in simulated exotic worlds. Although these suggestions may differ, they all include activities and experiences that differ in each distinct category, either on Earth or elsewhere. What these authors can agree on is that tickets will be purchased and the expectation is that the space tourist will return to Earth. These publications however, still do not offer an insight into space hotels. To try and address this issue, a definition will firstly be offered on a hotel located on Earth.
How is a hotel defined on Earth?

There are many ways to define a hotel depending on what the author is trying to achieve. Hayes and Ninemeier (2006, p.488) state that a hotel is “an establishment that provides sleeping rooms as well as various services to the travelling public”. Others suggest hotels should be defined by classification such as the intended function, location or market segment (Jones; 2002; Powers and Burrows, 2006). Stutts and Wortman (2006) assert that hotels and services are best described through a rating system such as AAA lodging classifications as this is a good indication of facilities, services standards that are customer oriented. Other attempts at defining the industry encompass a much larger section of hospitality taking in additional services such as transport and entertainment offerings including gaming (O’Shanessy, Haby and Richmond, 2001). Hayes and Ninemeier (2005) also acknowledge that lodging properties are only one segment of the tourism industry and should be described by their service offerings and standards. Lashley (2000) adds to the debate by suggesting that hospitality services including hotels should be defined via benchmarks such as quality, branding, sales and marketing. For the purpose of this paper, a hotel based on Earth is defined as “a facility that provides provisions of various standards for sleeping, bathing, food and beverage consumption, entertainment and other services based on quality, service levels and overall branding for the travelling public”.

How will a hotel be defined in space?

Firstly, using the definition presented above as a basis for defining hotels on Earth, additional criteria must be added to get an accurate depiction of how a space hotel will be defined. This is because the practicality of space travel means hotels will need to be modified in order to accommodate the principles of travelling in space. Exploring four key areas already identified by some space hotel design companies (MirCorp, 2011; Space Island Group, 2011; Shimizu
Corporation, 2011) will assist in defining a space hotel. These four areas are; location, function, market segment and recreational activities.

Firstly, the location of a space hotel needs to be considered. Logic dictates that a space hotel will be exactly that, located in space which is outside the Earth’s atmosphere (over 100km’s from the surface) says Cain (2009). Therefore a point of difference is that space tourists will also require transport from Earth to reach the hotel and then return. Although it is common practice for some hotels on Earth to provide transport it is not an absolute necessity. For example, a hotel may offer private transport to and from the hotel usually from airports, ports or an unfamiliar location to the tourist. There are many other methods of transport available that the hotel guests may choose such as trains, motorbikes, trams, buses, taxis, boats to name just a few. This is not the case for space hotels. Space hotels will not only have to offer the necessary facilities provided by hotels based on Earth, they will initially have to offer transport options to reach the destination. Potential space tourists do not currently have access to a transport vehicle that is capable of space travel therefore it stands to reason that the space hotel will have to provide transportation options. This may be provided by the space hotel or by a contract agency such as Virgin Atlantic.

The functionality of a space hotel must provide certain facilities and services for the tourists’ survival and overall experience. Space hotels currently have been suggested in three broad but distinct forms; on the transport vehicle itself, in an orbiting hotel around the Earth or a more permanent fixture that can be anchored to another planet or moon (van Pelt, 2005). Current space hotel designs suggest that the first space hotels will most likely use the space transport vehicle as a self contained room that will encompass all facilities and services including transport, food and beverages and bathing facilities (David, 2005). This is the most economical way of providing a space hotel experience with the transport vehicle taking all necessary amenities with the tourist. Suggestions for increasing the size of the area of the hotel whilst in space include inflating ‘balloon
like’ modules to experience weightlessness and perhaps all transport vehicles docking together and sharing amenities such as the non-commercial funded International Space Station (van Pelt, 2005).

At a greater expense, other designs have focused on creating artificial gravity therefore allowing for more permanent structures to be developed and perhaps more activity options in either an orbiting or permanent structure (van Pelt, 2005). Companies such as MirCorp, Space Island Group and Shimiza Corporation among others have all put forward designs for space hotels (MirCorp, 2011 para. 1; Space Island Group, 2011, para. 1; Shimizu Corporation, 2011, para.1). Each space hotel design strives to overcome the challenges that space hotel functionality present. For example, to make space hotels financially viable many considerations need to be overcome such as re-using the transport vehicle, docking, durability, safety, energy required, facilities offered, maintenance and lifespan etc. Designers of space hotels suggest the largest cost for current space travel is the amount of fuel required to exit the Earth’s atmosphere. Reducing the weight of the transport vehicle will result in less fuel required and cost (O’Neil, Bekey, Mankins, Rogers & Stallmer, 1998). These concerns among others will add additional costs not required by hotels on Earth. This is why it is expected that space hotels will initially be very expensive as the operating costs will ultimately be passed onto the consumer (Lappas, 2006). It is therefore likely that the first space travelers will be wealthy, adventurous and risk takers.

It has also been suggested that wealthy space tourists will expect a high standard of facilities and services that they have experienced on Earth (Goodrich, 1987). Although this is desirable for both that service provider and space tourist, economically and achievability suggests it will not be a viable option for the first pioneering space hotels (van Pelt, 2005). The cost and current technology simply has not overcome the problems associated with space travel. Concerns such as the amount of fuel required, the size of the transport vehicle, consumption of food and beverages, water supply, sophistication of equipment, transport vehicle docking, number of tourists and wastage are just a
few examples of obstacles that space travel has to overcome. With this in mind, the standards of service and facilities will have to be dramatically modified to satisfy the concerns that designers of space hotels face. This means the expectations of the space tourist will have to be altered to accommodate the complexities of space travel through education. This will include reducing human interaction within the space hotel to save costs which is against the desires of high end hotel uses on Earth (Walls, Okumus, Wang, Joon-Wuk Kwun, 2011; Kim, 2011). Although this is inevitable and some perceive as negative, there is some evidence to suggest that certain market segments willing to undertake this type of travel will overlook comfort in exchange for safety and practicality (Shimla, 2010). A space hotel must be functional and include “safety, privacy, baggage handling, entertainment, training and exercise facilities, and easy to operate toilets, showers, eating-drinking facilities and medical capabilities” (O’Neil et al., 1998, p.12). Practicality and economically this would mean that the transport vehicle itself may be the first type of space hotel. Consequently, the actual cabin/room size will be small which may be a disincentive for some potential space tourists (Troianovski, 2010). Initially this may be a concern, costs are predicted to reduce through economies of scale and it is expected that the desire for others to become a space tourist will increase as space tourism offerings become more affordable over time. Perhaps then, larger rooms can be offered.

Thirdly, incorporating the necessary recreational facilities in a space hotel will begin at the design stage. Collins (1999) highlights the design of the space hotel will be based on functionality but also offer recreational activities. For example, designs already put forward resemble activities available on Earth such as promenade decks, satellite TV, restaurants, cinemas, spas and beauty salons, gym, bars swimming pools shops and casinos. Van Pelt (2005) suggests the initial expectation of space hotels will be the same as 4-5 star rated hotel on Earth. This is most likely due to the perception that it can easily be achieved and the perhaps unrealistic influences of science fiction programs such as 2001: A Space Odyssey and Star Trek The Movie (the 11th movie in the franchise) make space
travel look simple, spacious and sustainable (2001: A Space Odyssey, 1968; Star Trek The Movie, 2009). Realistically, this is not achievable at present therefore space tourists will have to make compromises. These compromises will be many.

Berinstein (2002) asks the question what other activities or facilities can be offered? Suggestions put forward have been many including space walking, zero gravity zones and many others suggested previously by Collins (1999). What ever is offered either initially or in the distant future, it is universally agreed that space tourists will have to be educated in what to expect. Education will be seen as key to the success of the industry (Solnet, 2012). For example tourists will need to learn how to use all the equipment and facilities in a space hotel (O’Neil et al., 1998). This means training will be required prior to space travel. It has been suggested that a purpose built space travel training facility will need to be constructed in order to educate the space tourist (van Pelt, 2005). It is envisaged that this training will include computer simulations regarding take off and landing trajectories and emergency procedures. Tourists will need to know how to communicate with a ‘command post’ on Earth in every situation from take off, medical concerns estimating food supplies to the return landing. Additionally, training space tourists in weightlessness, learning how to eat, drink, bathe, toilet usage and the way to sleep is also necessary. Recreational activities may be substituted with exercise simply to maintain health. It is extremely important for the safety of passengers to follow the procedures that the space hotel has been designed for. Any variation from the guidelines may endanger the space tourist. Currently, basic training takes up to one year (van Pelt, 2005) whereas Dennis Tito (the first paying space tourist) spent nine months training (Laing & Crouch, 2004) however, this will need to be simplified for future space tourists even though some authors suggest the ‘anticipatory phase’ forms part of the overall experience, over six months may be too long (Clawson & Knetsch, 1966; Fridgen, 1984);
Tourist education will also incorporate medical training as self diagnosis and treatment will be required whilst in space. It is also ready established that space travel can have negative effects on the human body. Berinstein (2002) states that many people experience space sickness (space adaption syndrome) in the first two days of flight, with nausea and sometimes vomiting and diarrhea. This is thought to be due to disorientation when the fluid and small bones in the inner ear do not detect the pull of gravity, such as experienced on Earth. Berinstein (2002, p.85) also cites the ShareSpace Foundation that estimates “60-70% of first time space travelers will experience some sort of sickness for at least the first 24-36 hours” they spend in space, which has implications for short-duration flights of a couple of days or less. Laing & Crouch (2004, pg.19) suggest the “longer duration stays in space, of a month or more, may result in more serious physiological changes. A reduction in bone mass after a long time in space mainly affects the bones which take the load of the body’s weight on Earth, such as heels, legs, pelvis and spine”. These authors also suggest other risk factors such as bone fractures, ‘kidney stones’, anemia, shrinking of the heart, orthostatic intolerance (experience problems standing upright) and deterioriation of tendons and muscle mass. This is why it is important to exercise in space to help reduce these problems and to be in good over all health prior to departure. It is expected that space tourists will have to submit to health checks prior to travel and undergo medical training and education to ensure good health is maintained.

Having so many necessary inclusions to overcome health and safety concerns, the first tickets sold will be ‘package deals’. This is the most appropriate way of a successful return to Earth by ensuring all the safety checks are in place prior to departure. Hyde & Lawson (2003) suggest offering all inclusive ‘package deals’ for guests overcomes access concerns to products and services including transport and have a perceived value for money. This could also be indicative of a cruise ship market. Cruise ships usage is growing and gaining popularity, moving to mass markets where the majority of products and services are included (Murphy, 2008). As Baker and Huyton (2001,
p.301) suggest, “cruise ships are vessels with onboard accommodation, restaurants, gyms, swimming pools and other recreational activities designed for travelers to enjoy the experience”. It is for this reason that Fawkes and Collins (1999) and Mackay and Kersetter (2005) have likened space hotels to modern cruise ships as they potentially will offer all inclusive tours which include transport, accommodation, food and beverages, recreational activities and be totally self sufficient.

Space hotels have similar goals to cruise ships being self sufficient and offer similar products and services initially and perhaps diversifying as the industry matures however the functionality of these activities will be vastly different to hotels on Earth. The key to a successful and positive space tourism experience will be through the education and training prior to travel. Changing the expectations and pre-conceived notions of the actual experience will ideally alter the perception of space hotels and most likely be a more enjoyable experience.

**Definition of a Space Hotel**

In order to differentiate a space hotel to one based on Earth, the following definition is put forward to assist in re-defining current expectations of potential tourists that space hotels will be similar to hotels on Earth. Having two distinct hotel definitions will allow the audience to consider the general implications of space travel. People paying to travel in space will be known as *space tourists*.

Therefore for the purpose of this paper, a space hotel can be defined as a *packaged tourist facility located away from the Earth’s atmosphere that is self sufficient in providing transport, accommodation, food, beverages, sanitary facilities, health amenities and recreational activities. Space tourists should undergo extensive training and education prior to departure in order to meet their expectations and the ability to return to Earth safely.*
Conclusion

Although space hotels are not yet a reality, there is overwhelming research that space travel will become a new tourist product in the future. There is also evidence to suggest that space hotels will be completely different in functionality to hotels on Earth due to the challenges of space travel. Common tasks such as eating, drinking, bathing and sleeping will be completely different in space to what we have become accustomed to on Earth. For example, space hotels initially will not have the luxury of large spaces due to cost and practicality. Nor will common task functionality be the same.

Reviewing the literature has uncovered a variety of ways hotels on Earth can be defined. These include intended function, location and market segment. Some authors argue that amenity classification, facilities offered or service standards are the best way for defining hotels. Where as others suggest branding and marketing also play an important role. This paper has given a definition of an Earth hotel to be able to compare with a potential space hotel. Although some hotels on Earth have the ability to provide transport, it is not necessary for the majority due to other transport options. This is the first differentiation between the hotels. Space hotels must initially include transport and most likely the initial space tourists will have their entire experience within this transport vehicle due to financial restraints.

It is expected that the first space hotels will be expensive therefore most likely be reserved for the wealthy and adventurous that are willing to take risks. It is expected that the cost of space hotels will be much higher than most, if not all hotels on Earth. As previous mentioned the essential functionality activities such as eating and drinking will be undertaken in both circumstances, the practicality of undertaking these tasks in a space hotel will be vastly different. It is therefore necessary that all space tourists be well educated and trained in space travel including being able to
navigate the transport vehicle and attend to their own medical requirements. This is another level of services that will need to be provided and for extended period of time prior to departure. Purpose built training facilities on Earth will need to be constructed to simulate conditions in a space hotel. This will give the necessary training to return safely to the Earth. It will also be the facility for medical screening and education to take place as it is expected that only healthy tourists will be able to experience space travel and identify basic medical and communication concerns.

It is through this training process, the space tourists’ perceptions may be altered to understand the reality of the products and services provided, why space hotels cannot be the same as hotels on Earth and therefore give a realistic expectation of the experience. This will aid in meeting the expectations of the paying customer and entice future or even repeat tourists. It may also set the bench mark for future space travel and may assist in developing functionality and activities that in will become similar to Earth as currently accepted as obtainable in sci-fi cinema today.

This literature review has offered a discussion concerning a space tourist, hotels on Earth and in space. Investigating current literature a space hotel definition was presented for the first time and also offering a definition of a hotel on Earth for comparison. These definitions can be used to define space hotels and perhaps be re-visited in the future if and perhaps when space hotels do become similar to hotels that we are currently experiencing on Earth. Future research may focus on the laws governing space tourism including hotel and transport ownership, overall control of products and services, tax implications and rescue responsibilities. The concept of ‘timeshare’ may also share the cost of the hotel (Huang, Pennington-Gray, Thapa, Phillips and Holland, 2010). Although not clearly defined, it appears the organization owning the space hotel and the country in which a transport vessel was launched from is ultimately responsible (Lewis, 2008).
REFERENCE LIST


