

## **World Space Risk Forum 2010 Dubai, UAE**

Keynote opening address, March 1, 2010

By Dr. Ramin Khadem, Chairman Odyssey Moon Ltd.

Good afternoon ladies and gentlemen.

The title of my talk is “Where have we come from and where are we going in Space?”

I should like to begin extending my sincere congratulations to the organizers of the World Space Risk Forum. This inaugural session held in Dubai, is a recognition of the importance of this region not only in the satellite arena where multiple operators have been active for some time but also in the newly emerging markets of commercial and personal space flights. These are exciting new developments which we will be hearing much more about at this forum.

My congratulations also to the Dubai International Financial Centre (DIFC) for hosting this event, another clear indication of the Emirates’ commitment to establishing aerospace, high technologies and telecommunications as key strategic industries for their future progress, not only within the region but also outside.

Ladies and gentlemen, your participation and active involvement here, whether as operators, investors, manufacturers, brokers or underwriters will have a profound impact on the development of these industries in the years to come.

But this Forum serves another vital purpose, namely to bring out key issues of concern and major areas of opportunity into the open and to allow the frank and even passionate exchange of views, for it will lead ultimately to a better understanding and a respect for where we are coming from as stakeholders. I must say that I have been quite forceful and demanding myself, in the past as Inmarsat's CFO, on the need for more market distinction by the underwriting community between satellite operators and recognition of those with first class records compared to those with poorer performance. We all know that effectively one class subsidizes the other. Over the years the market has shown a greater discipline in pricing differentiation and I think we owe it to these debates and the efforts made by all parties including brokers to have arrived at the position we enjoy today. Lest I leave you with the impression we are fully there I do think we still have a little further to go.

Another area where the market is doing well, thanks to the good times we have seen, as reflected in the surplus of underwriting revenues for example (which we will touch on later), is the increased willingness by underwriters to consider novel approaches to coverage of risk and then to compete amongst

themselves for that business. I need not mention the number of initiatives that are in progress as we speak.

With so many programmes in the traditional satellite market and with novel approaches by both operators and launch providers, the pipeline looks very healthy indeed. Add to this new space projects and the prospect looks even more exciting. Of special importance for the new space projects is the pivotal role that the market can play in risk sharing and its beneficial impact on operators' business plans and their financing activities.

All in all, ladies and gentlemen, you representatives of this industry have much to be proud of. You and many who are not present here and your predecessors have been responsible in creating a thriving and enormously inventive industry that is going from strength to strength.

Let us look at the statistics briefly. (See Slide 1)

The year 2009 was another profitable one for the space underwriting community as we see in this slide, provided to me courtesy of AON ISB.

The blue bars in the top chart show the gross margin for each year, which is the difference between premium shown in green and claims in yellow.

The year 2008 was not bad either, nor for that matter the years from 2002 onwards, except for 2007. Each year recorded a positive gross margin. The dark line showing the 5 yr gross margin in fact looks healthier than ever, over the last 23 years shown, with cumulative surplus exceeding \$2 billion at one point and finishing 2009 in excess of \$1.5 billion. This is an extraordinary track record.

Now look at the years with huge losses starting in 1998. These were co-incident with an amazing build-up of capacity (shown in the lower chart by the blue bars) as a result of new market entrants which peaked in 1999 and helped drive typical rates shown in the yellow line, “launch plus 180/360 days”, to historically low levels.

I think this difficult period into early 2000s should have taught us all some tough lessons which hopefully will stay with us for years to come. An Operator should be willing to pay reasonable premia, reflected by the burn rate of the specific spacecraft and launch vehicle being utilized, adjusted up or down for the track record of the operator itself. Underwriters, on the other hand, should not “low ball” numbers on frenzied speculation to derive premium income or conversely look to “highball” their numbers unreasonably to make up for their past mistakes, particularly where the client being served had nothing to do with their past record.

In fact, to get this right I strongly believe in incentives. Having both operators and underwriters benefit from good performance through incentive payments featured in their contractual agreements and,

equally punished through additional charges when there is poor performance. Nothing makes parties more focused on performance than the prospects of pain or gain depending on how well they perform. That is really what defines a well performing healthy market and is also the fundamental basis of our own personal actions in our conduct of business and social responsibilities, in a free society.

I am also a strong believer that a thriving market is one that does not sit on its laurels but searches for new and innovative ways to expand its boundaries. For it is in this that the market not only serves its own best interests but performs a wider more valuable service to society at large.

Let us look at some examples in history where underwriters' stepping up to assume risks was the defining moment for the development of an entire industry.

I remind you of the birth of Aviation Insurance which effectively started when underwriters at Lloyds wrote the earliest aviation insurance policy in 1912. They considered the aircraft unsafe, and therefore only covered persons and property. After the initial Lloyd's policy, few others would be written before the First World War.

After the War, planes became more reliable and insurable. In 1919, The Travelers Insurance Company began offering a comprehensive policy that in many respects launched U.S. aviation insurance. It provided public liability protection, life insurance, workers compensation, and trip accident coverage.

Only a few years after the pioneering underwriting by Lloyds in 1912 comprehensive policies were now available and a few years thereafter pools of underwriters were organized to write aviation insurance. This is despite many pilots dying in crashes which led some to conclude that eventually all pilots would die if they flew long enough. The tragic disappearance of Amelia Earhart, the first female to fly solo across the Atlantic, and then her subsequent disappearance over the Pacific confirmed this worry.

In the late 1920s the answer by the insurance industry was that certain risks were excluded from policies such as "upside-down flying, looping-the-loop, spinning, rolling, hedge hopping, or other aerial acrobatics."

That aside, it is a testament to the market resilience and maturity of aviation that we see today air travel as the safest form of transport, something that if announced in the early days of aviation would have led an individual directly to the asylum! Fact is the most dangerous form of travel became the safest.... I let you draw your own conclusions on our perception of risk in new technologies that are ahead of us.

Let us next look at the satellite sector.

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In 2010 the satellite sector is within a whisker of 50 years of uninterrupted advance ever since the launch of early bird in 1962. Let us not forget, like the early days of aircraft, the early spacecraft launches were also considered unsafe and the first policies covered only the liabilities to 3rd parties arising from launch. As the industry matured, again like aviation, insurers soon were willing to offer coverage for the spacecraft.

One can argue that the satellite industry today has reached its maturity. All signs point to an industry that is functioning remarkably well. Manufacturers of satellites are generally providing improved and reliable hardware with highly sophisticated and advanced technology; global operators are more than ever expanding their range of offerings whilst vigilant that their new programmes adhere to tough qualification standards so to ensure risk minimization at every step; and traditional launch providers are showing impressive track record with ongoing commitment to quality while new launch players are learning as fast as they can so to get up the learning curve.

My guess is that barring a quirk in the works, going forward our industry is likely to continue to show a solid record of performance reflected by its overall maturity.

So what is next?

A number of new markets are emerging the most exciting of which are commercial space activities and personal spaceflights. We will

of course be hearing much more about these at this conference. In addition, there are a number of new applications one of which is satellite servicing. Clearly, if operators opt for life extension using known and tested hardware which is already in orbit the underwriting risk must be limited to the mechanics of the onboard fuelling operation itself.

What else?

Let me show you a slide which addresses these and also provides an overview of what we have been talking about so far. (See Slide 2).

This slide shows aerospace activity over the last century with projections into the future. The early flights by the Wright brothers at the turn of the century marked the beginning of our expansion beyond the bounds of Earth. Lindberg's historic flight between New York and Paris in 1927 set the standard for long distance travel and the start of modern aviation. Today traditional aviation has taken us to just under 40km above the earth's surface, and in the process created a multi billion dollar industry worldwide, touching every aspect of our daily lives, whether as private citizens, as governments or as businesses.

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With communication satellites in the 1960s we leaped to almost 40,000 km and have now a huge market at geostationary orbit, estimated at over \$200 billion a year! Affecting every aspect of our lives from the navigation system in our cars to weather reporting, TV broadcasting to telecommunications and remote sensing... I can go on and on... Little did we know back then or when the visionary Arthur C Clarke wrote his famous paper “Extra Terrestrial Relays” in 1945 that the geostationary satellite market could possibly ever be as large as it is today! I suspect if anyone had the foresight to predict the kind of business we enjoy today he or she would have been diagnosed as crazy and mentally unbalanced. Once again, I let you draw conclusions on our perception of risks.

Since 2000 personal spaceflight has become another attractive market. The success of Burt Rutan’s SpaceshipOne in 2004 led to further commitments by Virgin Galactic to SpaceshipTwo and other craft which we will hear more about at this conference from Will Whitehorn, Virgin Galactic’s president.

This represents the start of another exciting phase in space travel that could revolutionize how we get from one point to another on earth in years to come. It will have a profound impact that is hard for us to even comprehend today.

The NASA COTS programme is another promising activity, with SpaceX and Orbital as recipients of awards by NASA, that will open up significant new opportunities with hardware that can take us to the International Space Station and deeper into space.

The next frontier in the extension of Earth's economic sphere of influence is the Moon and asteroids. Odyssey Moon, of which I serve as Chairman, and other companies are committed to take this further step which gets us to almost 400,000 km, an order of magnitude higher than the geostationary market. We believe there is a robust market for science, commerce, education and exploration to the Moon. If the past is any indication, the actual size may well turn out to be 100 or 1000 times larger than our crude estimates of today.

We strongly believe that it is man's destiny in the decades and centuries to come to explore the vast universe and in the process help an ever advancing civilization which extends beyond the bounds of our planet. We are the pioneers that will make it happen as were our forefathers in the creation of the aviation industry and our fathers in creation of the satellite industry. Neither of these latter industries would have come about without risk takers. The underwriting community is owed a huge debt of gratitude for making these industries "get off the ground" to use the pun and prosper. Let us not forget that – without the risk takers there would be no thriving industry today! So I salute the risk takers, people like you gathered here at this Forum. Some of you may not appreciate the broader effect that your business activities have in opening up new horizons in the advancement of our planet's economic sphere of influence in space. I suspect years from now you will look back and marvel at the influence that you have had.

Some thoughts on role of government in development of aviation industry:

Now, I cannot let the opportunity go by without commenting on the recent Obama administration's budget for NASA. It is at once bold and challenging and has caused quite a stir and debate within the industry. There are plenty of views, pros and cons and too many issues to be able to properly address in the brief time we have together. The biggest single feature of the budget is the passing on of chunks of activity from NASA to the private sector.

Let us examine the aviation industry again and see what parallels can be drawn with what is happening now.

One of the biggest factors in the growth of the air transportation industry in the 1920s was the development of a mail transport system by the U.S. Postal Service. The Kelly Airmail Act of 1925 provided private airlines the opportunity to function as mail carriers through involvement in a competitive bidding system. These private carriers, through the airmail revenue, could then expand into carrying other forms of cargo, including passengers. Charles Lindbergh, in the position of "technical adviser" to Pan Am World Airways, piloted that airline's first airmail service flight to South America in 1929. Interestingly, that same year the Warsaw Convention was signed which defined the limits of liability for international passenger and luggage journeys.

In the US passengers were targeted as a way to augment the income of the airmail systems. Because of less than stellar safety performance and high fares, it was slow to start but passenger

volumes grew rapidly and carriers multiplied. The Air Commerce Act, passed in 1926, allowed Federal regulation of air traffic rules. The aviation industry backed the passage of this act, believing that without the government's action to improve safety the commercial potential of the airplane would not be realized.

Finally, in 1938, the Civil Aeronautics Authority, an independent regulatory bureau, was developed in the US. That same year, many air transport companies were flying the new DC-3s. These planes, created to carry both mail and passengers, were wide enough to seat 21 people.

Today its pretty much passengers and cargo that matter for the airlines rather than mail, though the postal service does provide some revenue contribution to airlines.

To draw a parallel now, replace US Postal Service with NASA and airlines with private contractors in the aerospace industry. NASA has missions that it wishes to accomplish which it is now increasingly asking private companies to bid. Those companies will have to provide their proposals and compete amongst one another for the business. Their business proposition may well be structured to make room for non NASA revenues to sweeten their bottom line.

Based on what we saw in the early development of the airline industry, would it surprise us down the line to see these non NASA business opportunities to take a life of their own and generate

untold new sources of space revenues? Just as passenger business in the aviation business dwarfed income from airmail systems?

The approach adopted by President Obama could well liberate the creative talents of private enterprise and accelerate the pace of innovation and technical advancement. To be sure this will take time and will not happen overnight.

While detractors of NASA bemoan the loss of focus and commitment that it once had to key deliverables, one could equally argue that by passing the torch to private enterprise NASA is leading the way in a new paradigm of how government programmes should be transitioned. Other space faring nations like China and India are clearly not ready for this transition nor do they have the depth of private companies to take up the challenge which the US industry clearly does. Yes, those countries will make further advances in their space programmes, just as the US did, but in the end there will have to be some transition to the private sector to get the phenomenally large upside potential.

Before we get too much ahead of ourselves, let us be clear: the success of the new NASA budget and deferral of activities to the private sector will depend on its progress thru US Congress, and then once adopted the clarity of vision with which it is delivered and executed to the benefit of stakeholders in the space industry.

It is not “clear sailing” by any means and yet Charlie Bolden, the NASA administrator, has been quite forthright about what needs to be done and we wish him all success as he maps out the path in the weeks and months ahead.

To be sure the approach has to ensure regulatory standards and principles are followed to meet safety standards and highest levels of rectitude by the private sector. Not unlike the creation of independent regulatory body for the aviation sector, NASA and other government agencies will want to assume regulatory oversight. This is not to suggest that private enterprise will be more cavalier or less committed to safety than NASA. Companies today carry significant risk in whatever they do and cannot afford to be less than totally dedicated to safety, as their very existence, as an entity, and their very livelihood is at stake. Examples of this are all around us set by companies in the satellite sector. Furthermore, they know that without a strong culture of safety matched by a consistent track record they may well find it difficult, or very expensive, to insure their ware in the market place.

It follows further that the underwriting market will be faced with a range of new opportunities that heretofore NASA would have assumed, but now the private sector must collaboratively undertake with the insurance market. This will be a defining moment for the market and may well lead to closer working relationship with private companies and a much improved understanding of their systems and procedures. The spectrum of possibilities for brokers and underwriters will be extraordinary and quite exciting but no less challenging as we embark into a new era of expanded space commerce and risk mitigation.

Welcome to this new exciting world ladies and gentlemen- together we will be defining new opportunities for mankind and together we will be scaling new heights.

Thank you

Ramin Khadem

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