SPACE MARKET ROUND-UP & RELIABILITY TRENDS

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Agenda

❖ Market Trends (Tim Fuller)
  ▪ Launch
  ▪ Orders

❖ Reliability Trends (David Todd)
  ▪ Is launch reliability improving?
  ▪ Is satellite reliability improving?
Launch Market Trends

Source: Seradata’s SpaceTrak database, Oct. 2016
Spacecraft By Mass Cat.

All spacecraft launch attempts

GEO comsat launches, not mil

From Jan 2013  To End 2019

1000 - 2500kg – Medium satellite
2500 – 3500kg – Large Satellite
3500 – 5000kg – Very Large Satellite
>5000kg – Extra Large Satellite

70 since 1/1/13
87 to go to 31/12/19

Source: Seradata’s SpaceTrak database, Oct. 2016
Orders (firm, excluding estimates)

GEO comsat orders, not military

All orders, excluding OneWeb

GEO communications satellite (comsat) orders have been significantly boosted by HTS (High Throughput Satellites)

Source: Seradata’s SpaceTrak database, Oct. 2016
Spaceflight Reliability Trends
Maiden Launch (Un)reliability

According to Seradata SpaceTrak’s data Brand New Launch Vehicles have a maiden launch failure rate of:

46%

Source: Seradata’s SpaceTrak database, Oct. 2016
Launcher Learning Curve

The good news is that after initial ‘teething troubles’ most ‘Western’ rockets go on to achieve the ‘Nirvana’ state of (nearly) zero further losses.

Source: Seradata’s SpaceTrak database, Oct. 2016
‘Nirvana’ Is Achieved By Most

Just to prove the ‘Nirvana’ trend - here are some more.

And nowadays even non-Western launch vehicles are achieving ‘Nirvana’

Source: Seradata’s SpaceTrak database, Oct. 2016
…But Not All Reach Enlightenment

Some launch vehicles take longer to reach ‘Nirvana’ while some sadly never reach it (poor quality control, marginal designs, continual mods, complicated firings etc)

Source: Seradata’s SpaceTrak database, Oct. 2016
Launcher Reliability Trend

But is launch vehicle reliability improving overall?
Yes slowly – after a ‘blip’ caused by new rocket failures in 1990s

Source: Seradata’s SpaceTrak database, Oct. 2016
Satellite Reliability
Geo Satellite Life Experience

Half a bathtub

Peaks caused by a few buses’ ‘mid-life crises’

Typical GEO comsat design life: 15 years

High rate of failure in first year followed by a relatively safe middle age

Source: Seradata’s SpaceTrak database, Oct. 2016
Sat Bus/Platform Learning Curve

Do satellite bus platforms reach ‘Nirvana’ as well? Yes, many do

BUT there are some exceptions

Source: Seradata’s SpaceTrak database, Oct. 2016
Satellite Reliability Trend

So are commercial satellite platforms getting more reliable? Yes – but very slowly.

Source: Seradata’s SpaceTrak database, Oct. 2016
Underlying Causes Of In Orbit Loss

Most major in orbit insurance losses are caused by **DESIGN ERROR**

Good design is key to high reliability

But don’t take your eye off quality control, solar storms, meteors etc.

Source: Seradata’s SpaceTrak database, Oct. 2016
Insurance Market Profitability

As premium rates have fallen due to market conditions, so thankfully have failure rates...

Space Insurance premium rates now appear to be roughly the same as the launch and in orbit failure rates (the technical burning rates).

If premium rates do not rise space insurers will only make money if the trend of falling failure rates continues

Source: Seradata’s SpaceTrak database, Oct. 2016
Summary

- India and China are a growing force in spaceflight
- GEO comsat mass shift from over 5t to under 5t (but biggest comsats are getting bigger)
- Healthy GEO comsat backlog but 2016 orders slow
- Brand new rockets are initially very unreliable
- Rockets and satellite buses usually settle down to very low loss rate ‘Nirvana’ after about ten flights
- Good design AND maturity key to high reliability
- Insurance rates are close to technical failure rates
Thank you.

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