A PHASED APPROACH TO ORBITAL PUBLIC ACCESS

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BAD NEWS: THE INVESTMENT TRAP

A PHASED APPROACH TO ORBITAL PUBLIC ACCESS

ASSUMPTIONS
5 Years before operations
10% per annum interest
50% operational profit
CERTIFICATION

To carry the public “reasonable” levels of risk need to be demonstrated.

What is “reasonable”? Approaching 1 in million risk of death

Only achieved by testing and operational experience.

= More cost and more time

Realistic certification makes the investment trap even worse. The investment would need to be reduced by two orders of magnitude to break out of the trap.
SUB-ORBITAL TOURISM

Plus Point:

Vehicle an order of magnitude lower to acquire than orbital (still higher than many think!).

But:

Order of magnitude lower ticket price

Specialist infrastructure – no other sub-orbit applications

The sub-orbital business is on its own
Orbital passenger flights are more marketable – higher perceived value

But the infrastructure is order of magnitude more expensive

An orbital transport infrastructure can service other markets and they can cover the acquisition costs
A CASE STUDY

A Skylon personnel module

(Reaction Engines Ltd).
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PERSONNEL MODULE - INITIAL CONFIGURATION

- Hygiene & ECLSS
- Docking port
- Kitchen
- Cargo space (3 tonnes)
- Pilot cabin
- 21 under floor triple CTB bays
- Ground entry door
- 4 Passengers (ejector seats up, supine down)
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15 degree docking port alignment allows rescue missions

(Reaction Engines Ltd).
EARLY OPERATIONS

ISS SUPPORT

8 flights a year with half crew rotation with each flight.

Annually deliver 32 crew and 24 tonnes of supplies

Annual budget of around $300 million ($40 million/flight)

+ OTHER MISSIONS

Another 4 flights?
After 3 years of initial operations
- over 1000 Skylon flights
including around 50 personnel delivery

Ready for certified public access operations.

Needs only the investment to upgrade the Personnel Module (fast and cheap - no investment trap!)

To get to this point on a standalone basis would require investment in excess of $20 billion over more than a decade
PERSONNEL MODULE - FINAL CONFIGURATION

- Hygiene & ECLSS
- Docking port
- Kitchen
- 4 Long stay Passengers
- Pilot cabin
- 21 under floor triple CTB bays
- Ground entry door
- 16 short stay Passengers
SHORT STAY
Up to 14 days
Cost 1

Upright

4 days up down
Usable days = 10
Cost per day = 0.1

LONG STAY
over 14 days
Cost 6

Supine

If 100 day tour of duty
4 days up down
6 work days a week
Usable days = 79 days
Cost per day = 0.076
ASSUMPTIONS ON LONG TERM OPERATIONS

Flights every 14 days to service short stay passengers

Long stay passengers return 7 flights later 98 days

Cost of a personnel launch is $20 million.

Annually 520 passengers - turn over $520 million

BUT WHAT MIX OF SHORT AND LONG TERM
For case study:
- 104 long stay/year
- 416 short stay/year

For case study 2:
- 28 long stay
- 16 short stay

For case study:
- Long stay = $3.0 M
- Short stay = $0.5 M

Annual Passengers vs. Short Stay (Tourist) Seats per Flight:
- For case study, 104 long stay/year and 416 short stay/year.

In Orbit Population Structure:
- Case Study Assumption

Total Long stay vs. Short stay seats:
- For case study, 28 long stay and 16 short stay.

Seat Price vs. Annual Passengers:
- Long stay seat price is $3.0 M, short stay seat price is $0.5 M.
CONCLUSIONS

Public access operations to orbit can beat the investment trap by using the general space infrastructure.

A first generation reusable launcher can evolve from ISS support to public access with seat cost well below $1 million.

However the infrastructure developments must incorporate the requirements for public access into the development process.
THANK YOU