

Israeli Civilian Space Program: Turning Swords into Plowshares

Presentation for the
49 Session of the Committee on the Peaceful Uses of Outer Space
Scientific and Technological Subcommittee

Tal Dekel



STATE OF ISRAEL
MINISTRY OF FOREIGN AFFAIRS



Yuval Ne'eman Workshop for
Science, Technology
and Security



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TEL AVIV UNIVERSITY



February 7, 2012

Outline

PAST

**JOINING THE
SPACE CLUB**

**INDUSTRIAL AND
TECHNOLOGICAL
TRACK RECORD**

PRESENT

**CURRENT DEPLOYED
SATELLITES
AND AVAILABLE
CAPABILITIES**

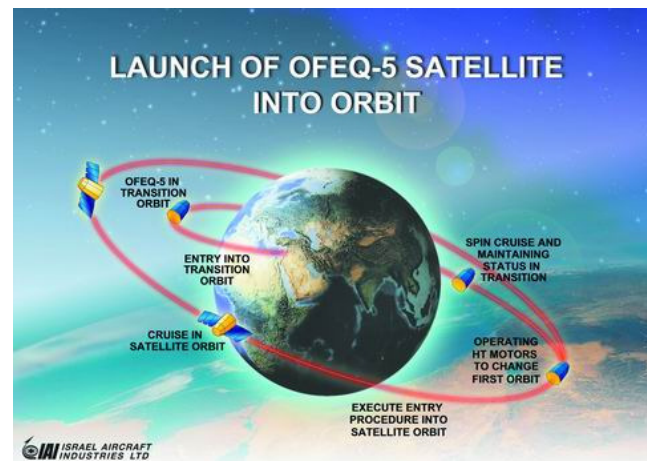
**THE NEW ISRAELI
SPACE POLICY**

FUTURE

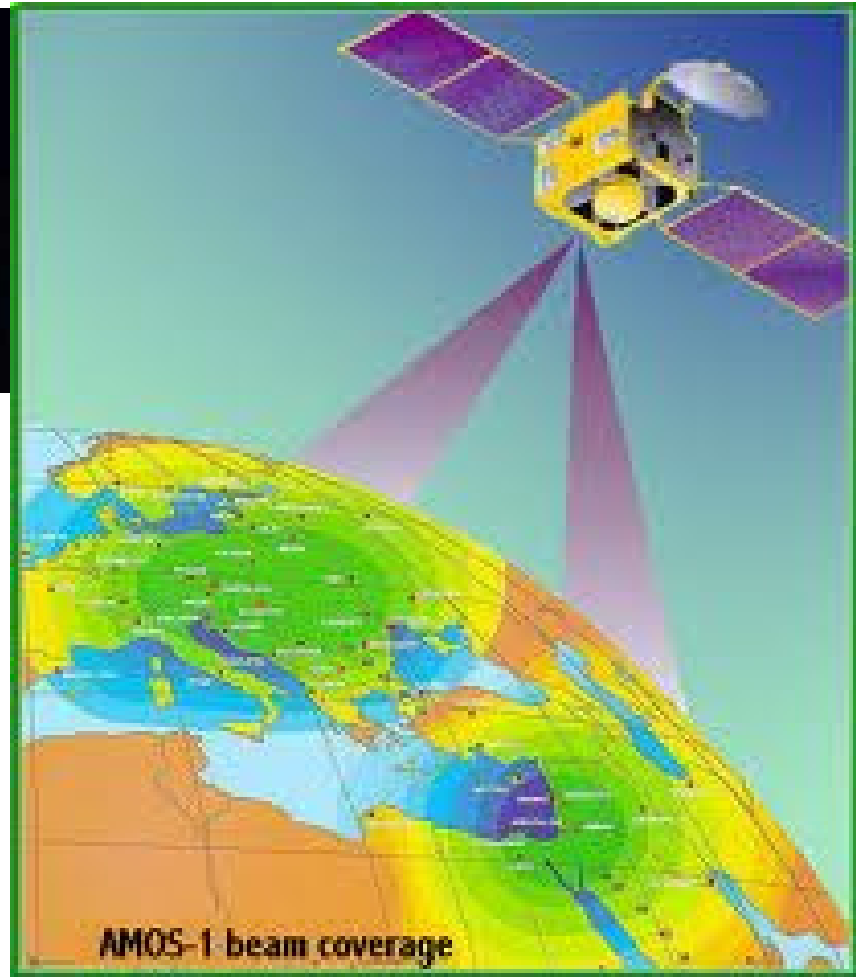
COOPERATION

VISION

First Came The Security Need



Then came the need to communicate

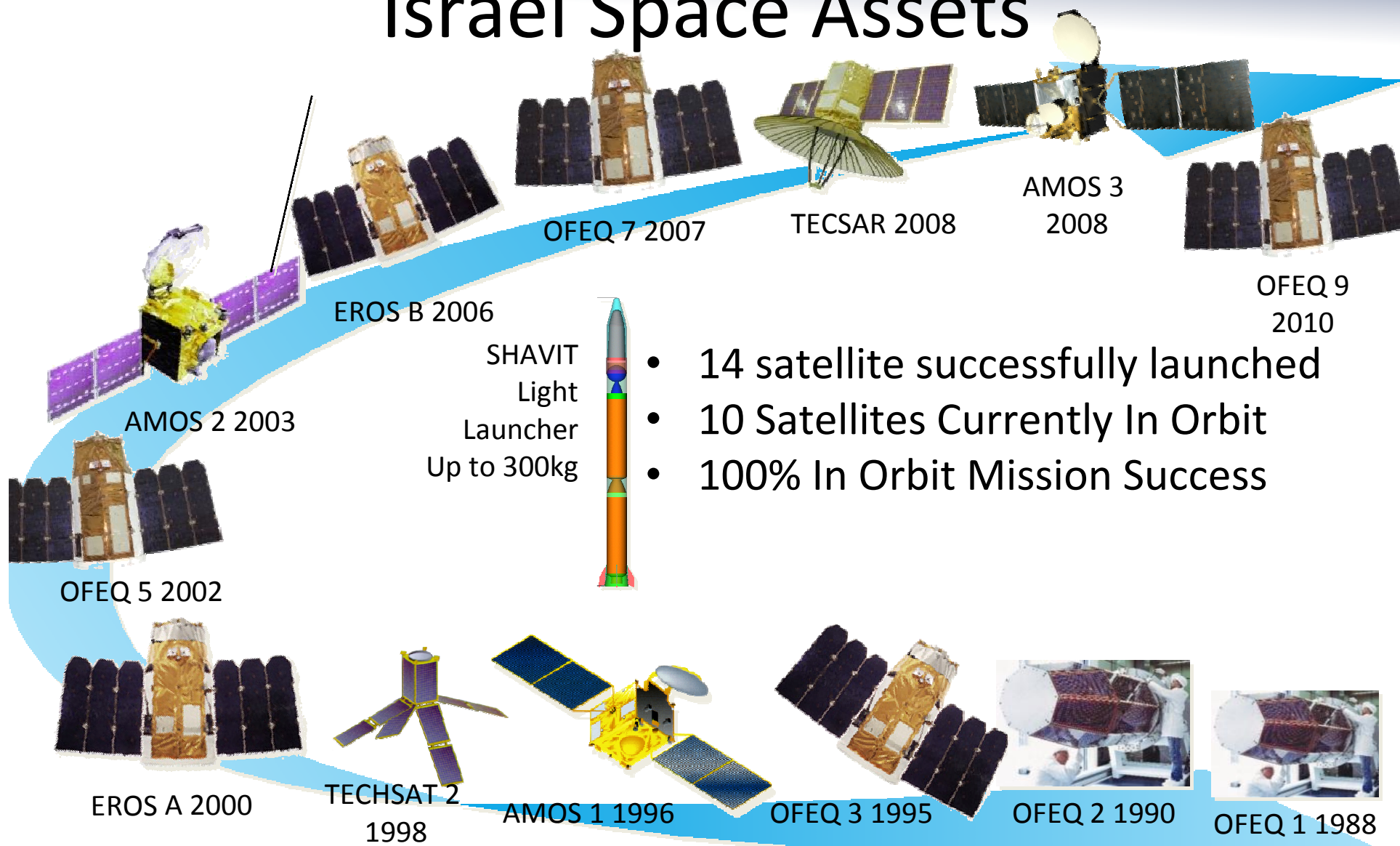


Israel is a proud member of the exclusive Space club

- Joined in 1988
- 300kg in orbit lunch capabilities
- Only country that launches to the west
- Internal production:
 - Optical satellites
 - Communication satellites
 - SAR



Israel Space Assets



Israel Space Products

Israeli satellites and space products



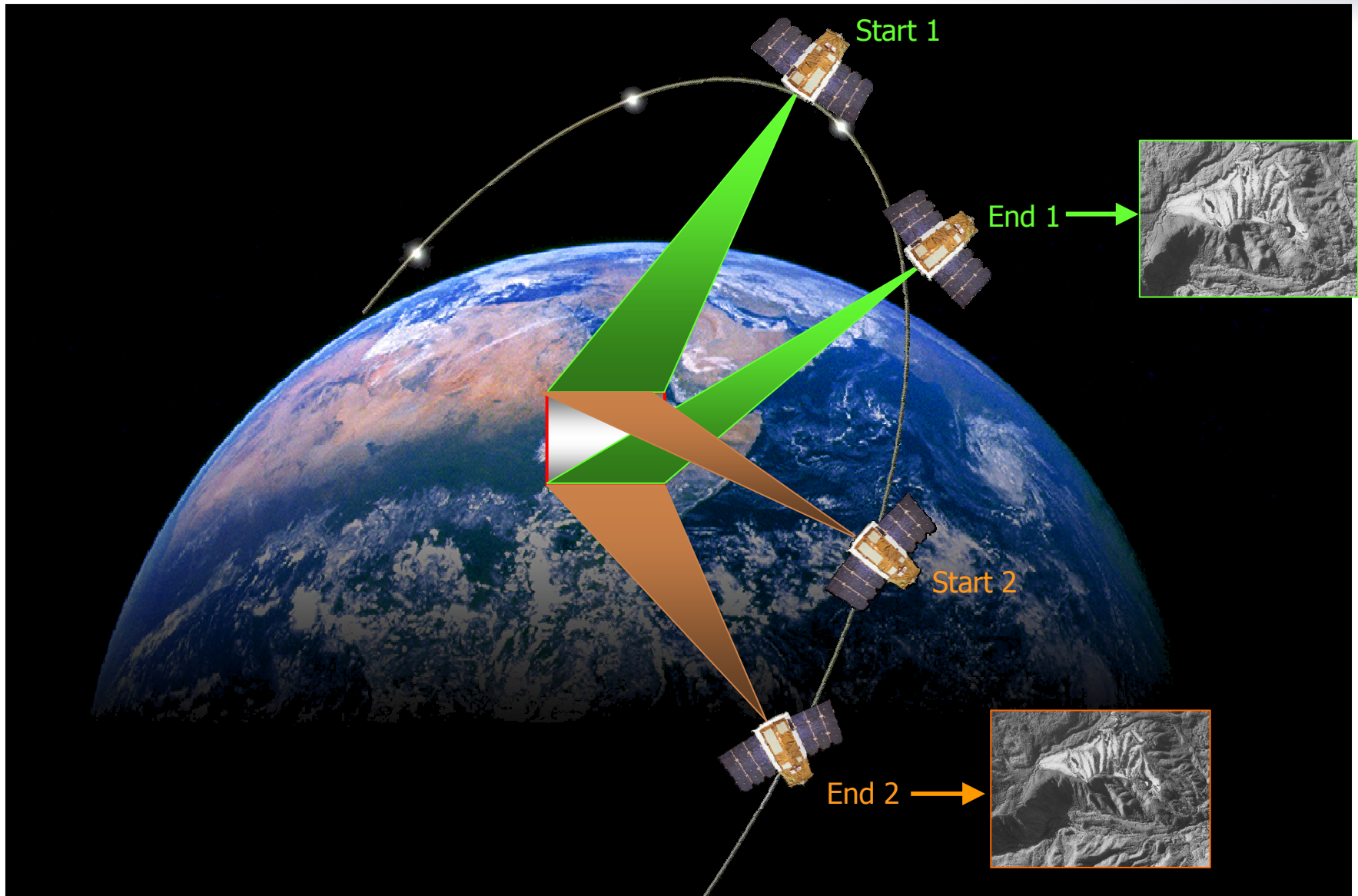
Components in Space



Cameras in Space



Single-pass stereo images



Source: Ilan Porat Head of Space Systems, Elbit Jan 2012

Pan-chromatic capabilities

MSC PROGRAM for KARI Kompsat - II

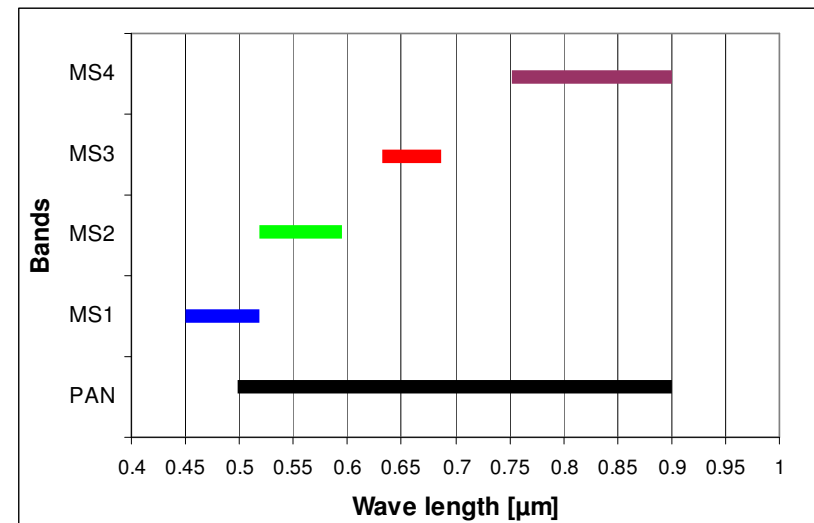
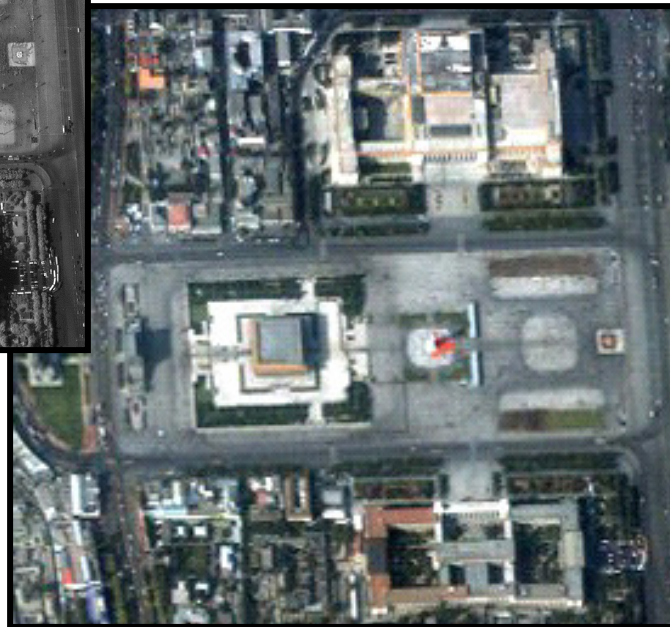


Image fusion capabilities – pan sharpening



High resolution PAN Image



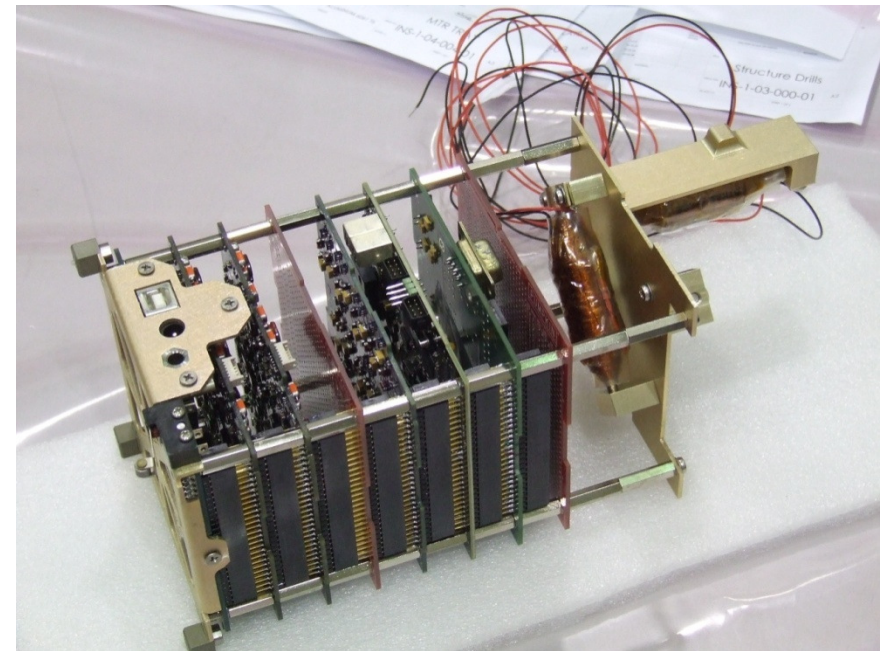
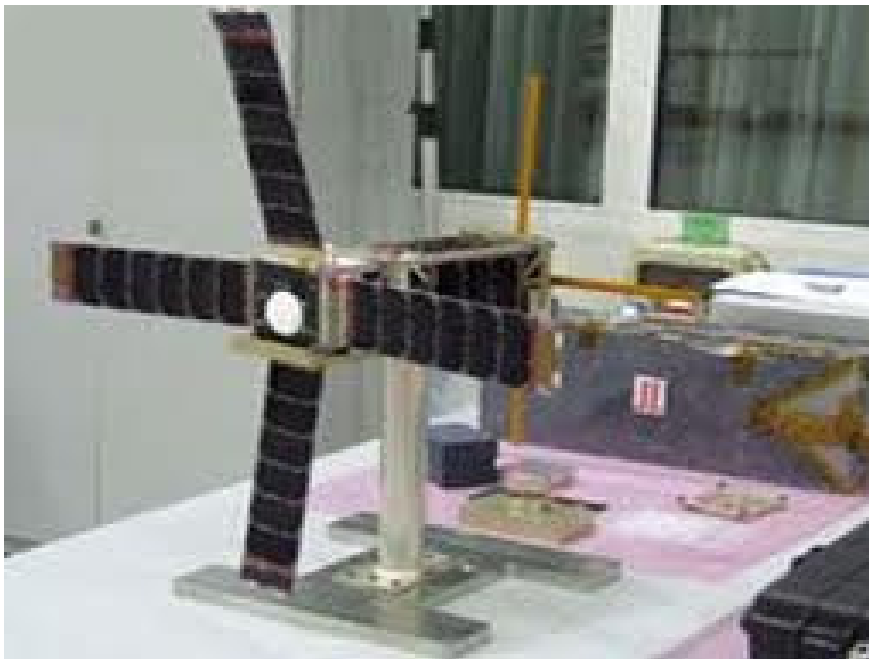
Low resolution MS Image

Fusion of Multi Spectral low Res. &
Hi-Res. Pan



Development of Nano satellites

Inklajn-1



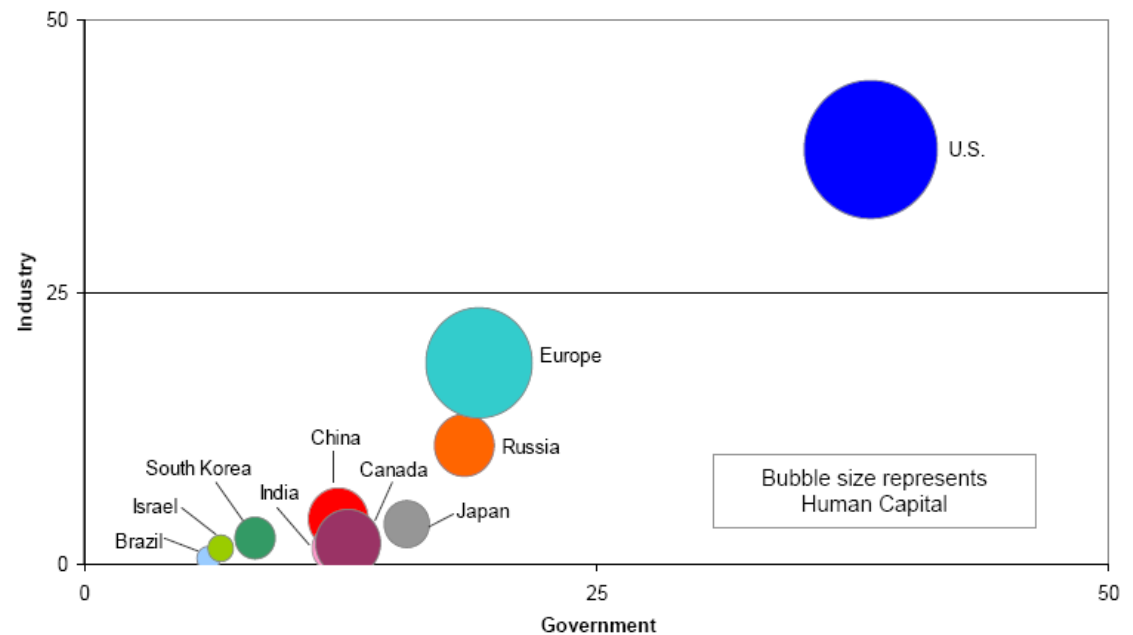
Industrial and technological Track record

“Israel continues to be a leader in Space technology but has limited commercial scale...”

(Futron Space competitive index 2009)

- India is poised to be a major collaborative player
- Canada's space program benefits from strong European capital indicators, positioning it for advancement in decision-makers
- Japan has overcome recent difficulties and continues to be an important player focused on the exploration and earth observation segments
- South Korea has significantly ramped up its space program but its sector remains small and immature
- Israel continues to be a leader in space technology but has limited commercial scale
- Brazil has seen its position decline vis-a-vis India and China, and lacks a clear strategy and commitment to invest in space activities

Figure 1: 2009 Space Competitiveness Index Country Comparisons



Futron Space competitive index 2009

Israel Space Value chain

Government



NPO



Industry



Research



Weizmann Institute of Science



Satellite Operators



Service Providers



ISA International Agreements



NASA – USA

CNES – France

CSA – Canada

ISRO – India

DLR – Germany

NSAU – Ukraine

RKA – Russia

NLR – Holland

ESA – EU/EC

In discussion:

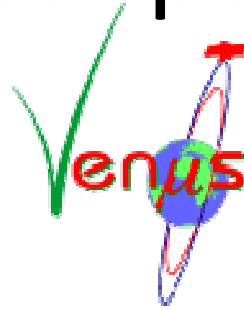
Chile

Brazil

Korea

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International cooperation- France



- VENμS (Vegetation and Environment New μ -Satellite)
- Scientific Mission –
Environment monitoring
- Technological Mission –
Qualification and Validation
of Israeli electric propulsion engine.
- \$60 million project split 50/50
- Launch - 2013

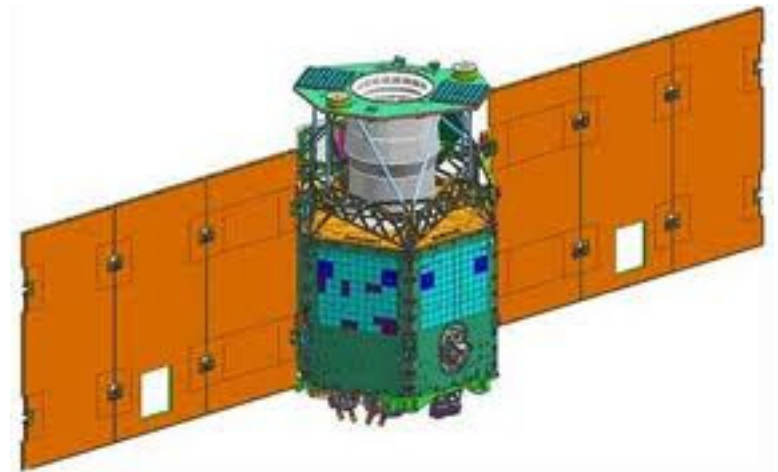
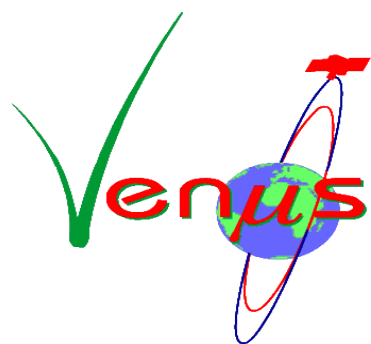
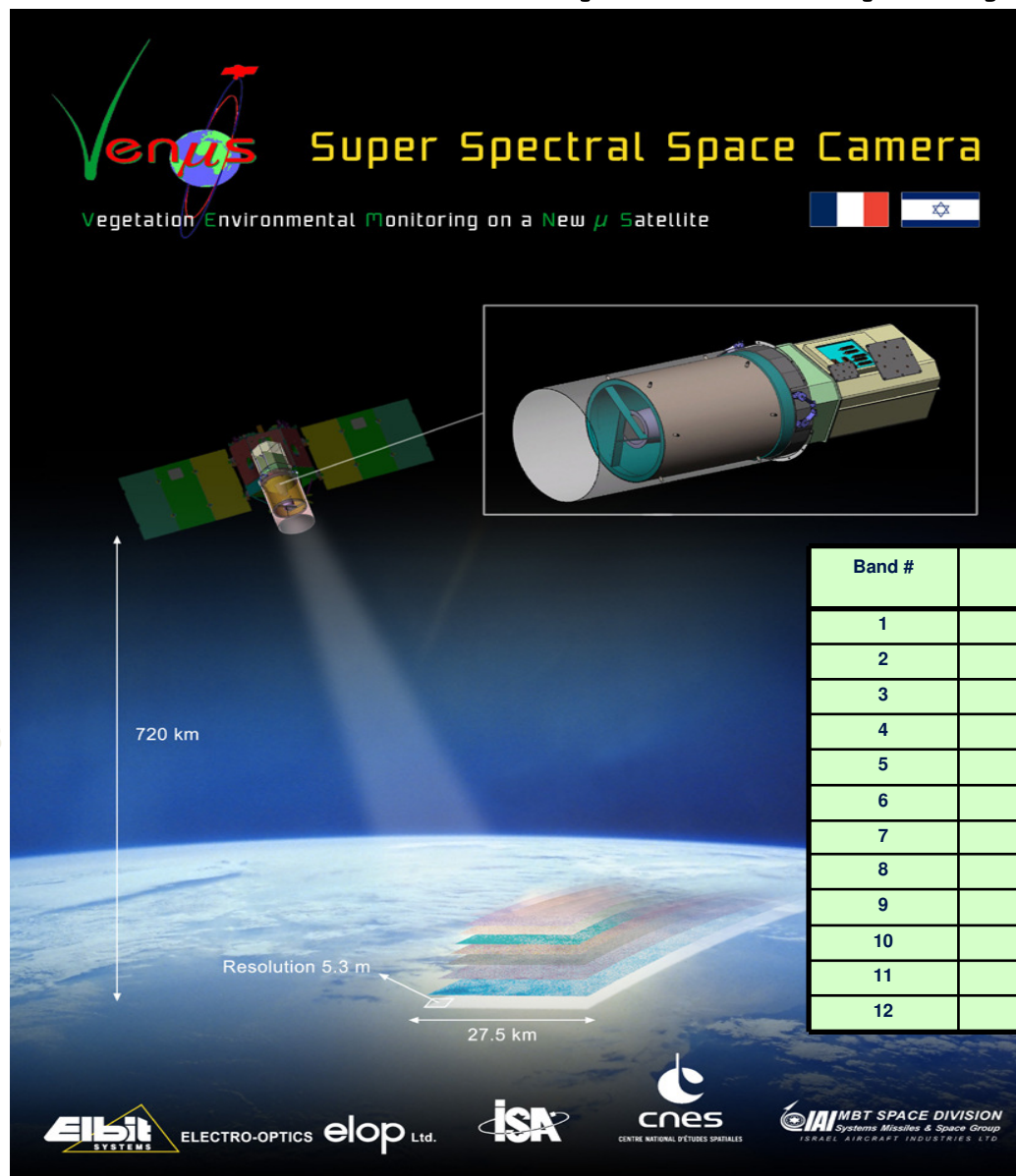


Image: Space.skyrocket.de

Venus electro-optical payload



Venus
A Micro Satellite
with Remote
Sensing Capabilities

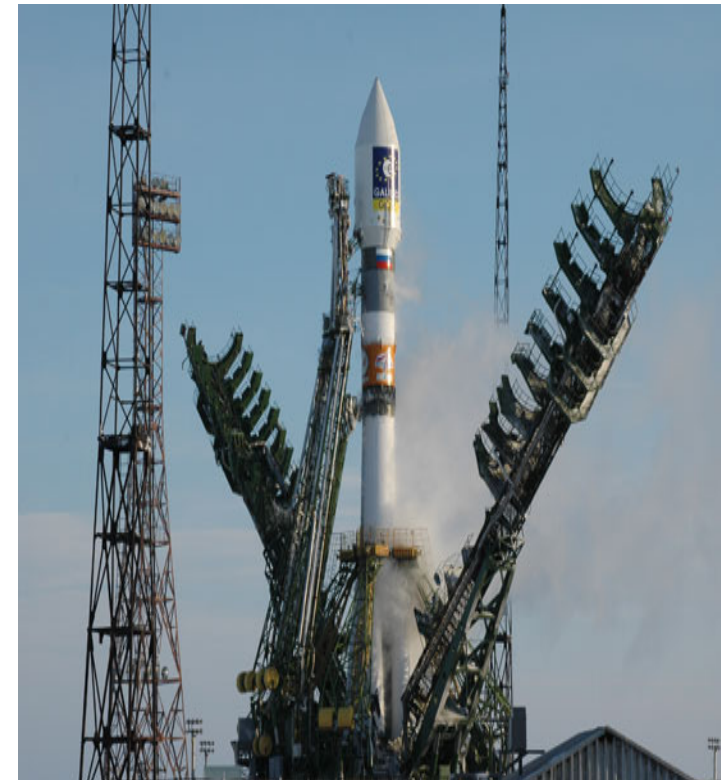


International cooperation - EU



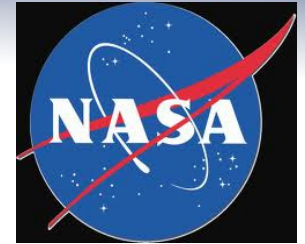
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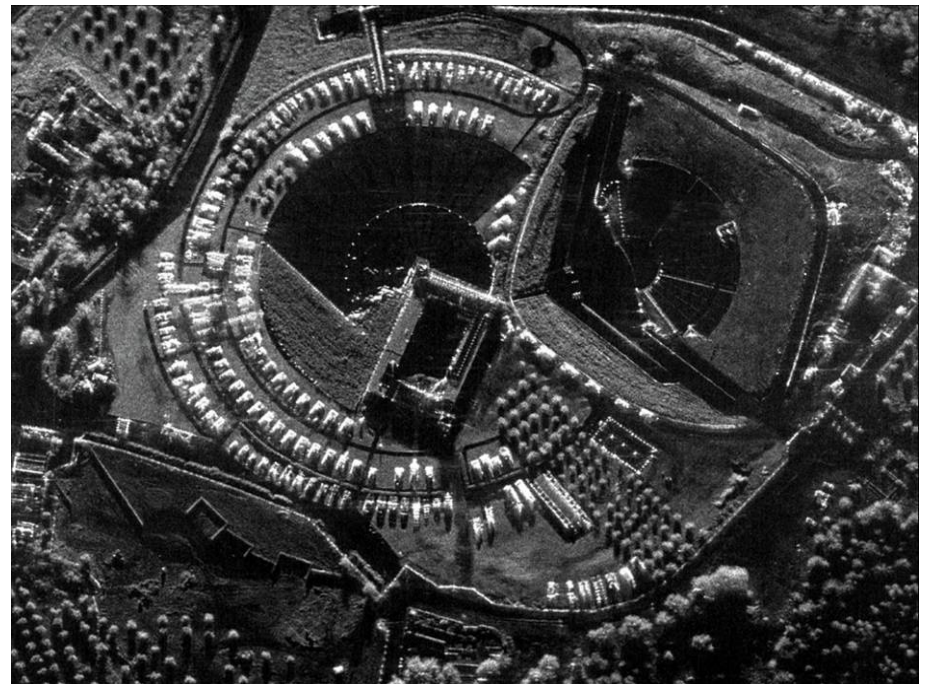
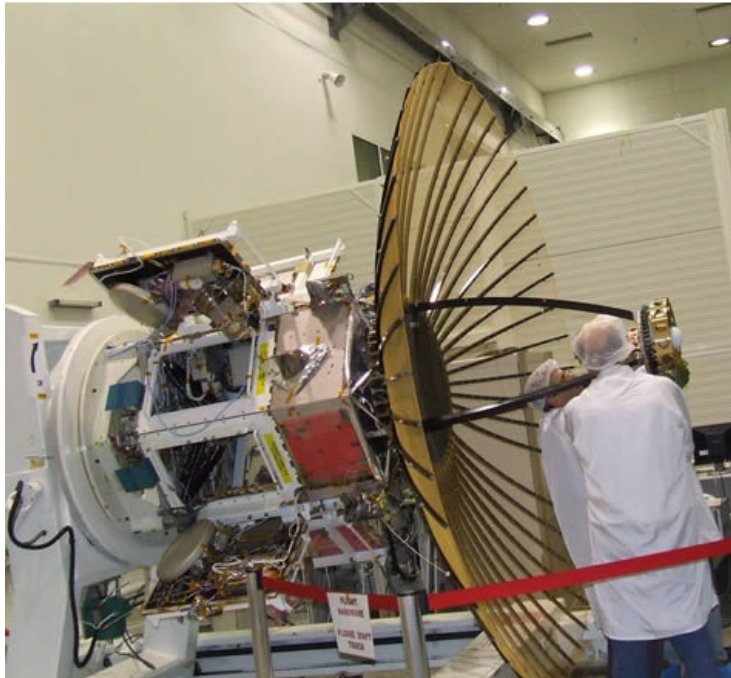
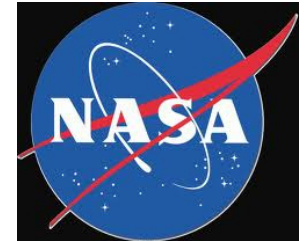


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International cooperation NASA

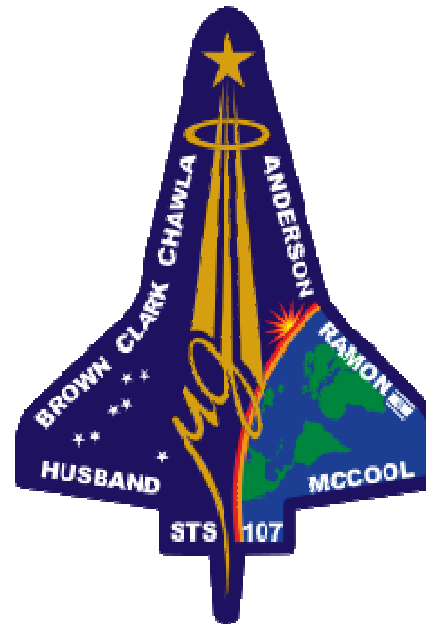


International cooperation - NASA

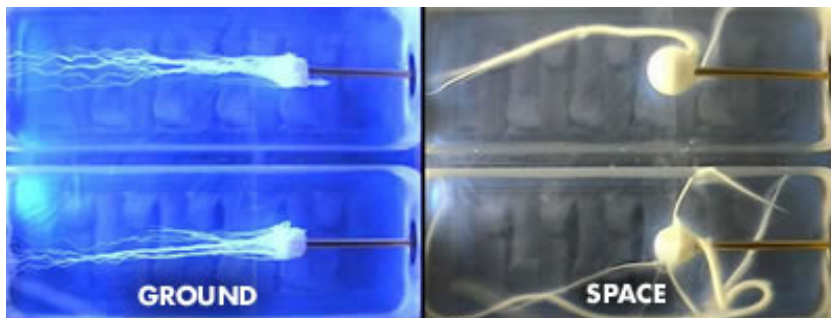


NASA considering Israeli TecSAR satellite for Venus mission

Israel Space exploration mission

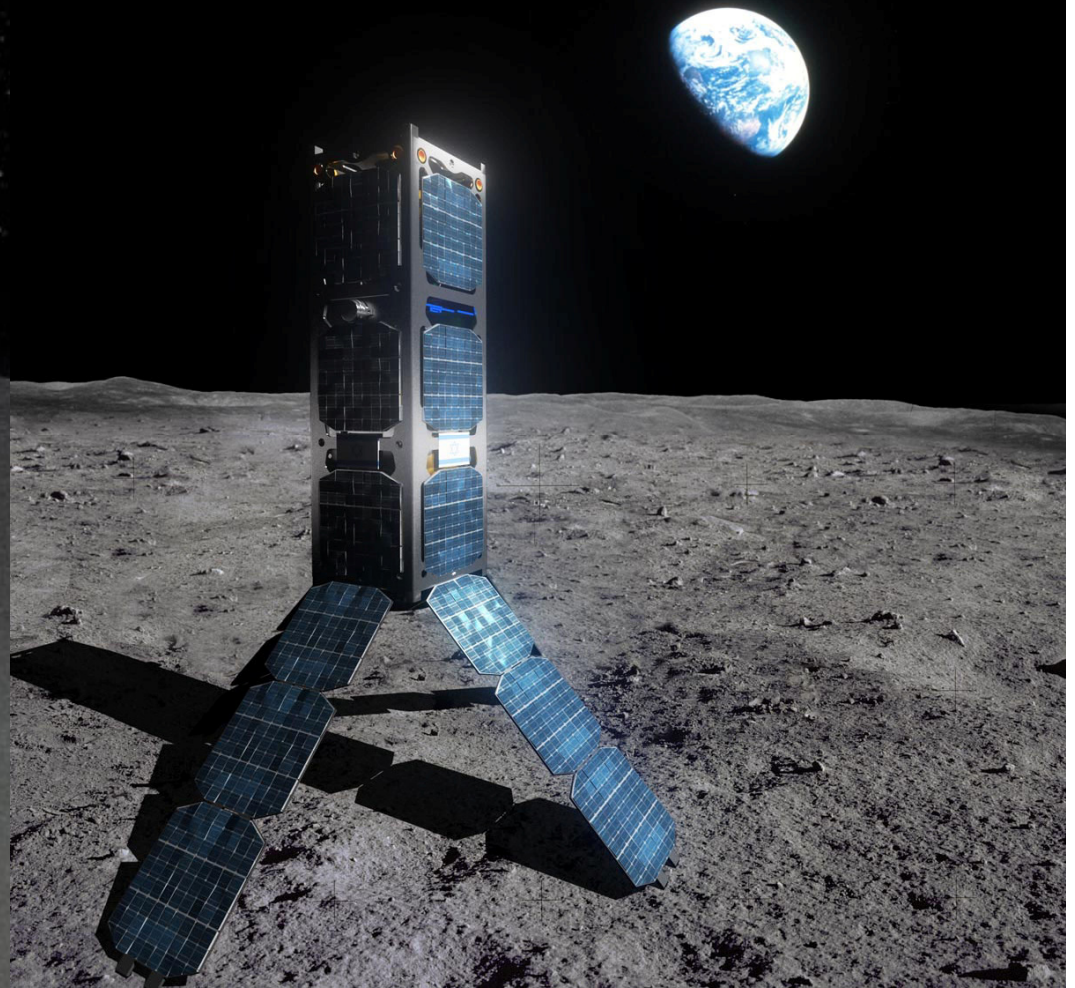


ILAN RAMON



Israel – Going to the moon?

Google
LUNAR X PRIZE



Images: SpaceIL, Google

The New Policy - Objectives

- To Position Israel Space industry among the 5 leading world industries
- To achieve 5% of total Space market.

Our four fives policy : Top 5 - 5% - \$5B – 5Y

- To maintain a continuous presence in Space for research, commercial and government uses
- To improve Israeli knowledge and infrastructure with emphasis on our comparative advantages
- To Increase local industry revenues
- To bond Space research and use with the Israeli society

Source: Menachem Kidron, Head of ISA, **Jan 2012**

Prof. (Gen.) Ben Israel, ISA Cairmain, **Jan 2011**

The New Policy- Action Items

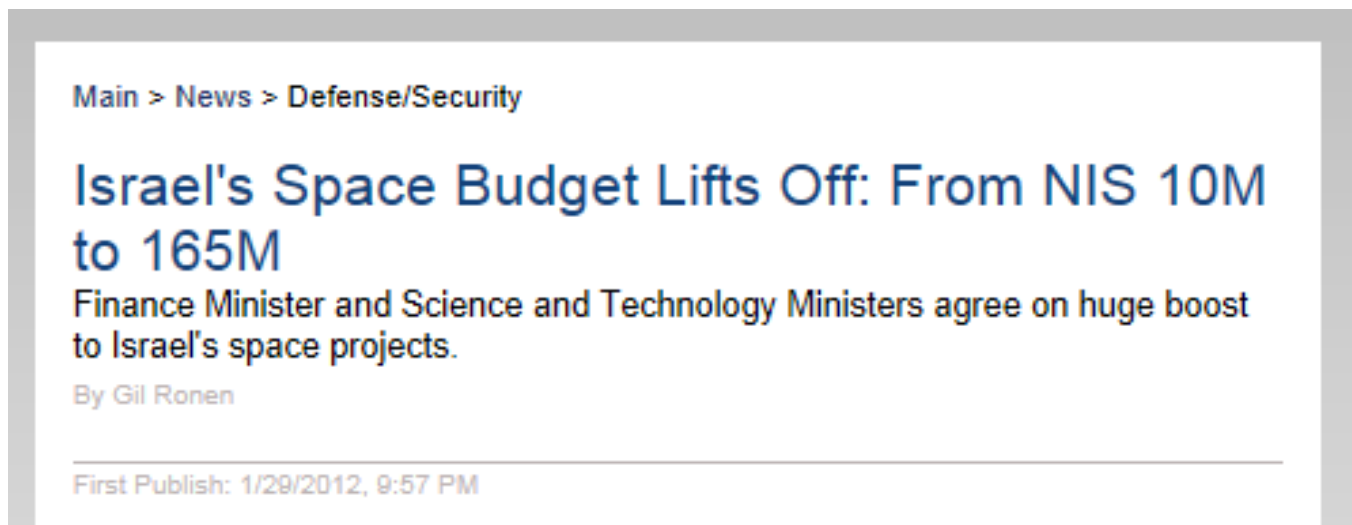
- **Embrace international cooperation**
- **Take active parts in international organizations activities and programs : UNOOSA; ESA etc.**
- Strengthen the existing scientific, technological and industrial infrastructure.
- Promote internal synergy (industry – academy)
- Create centers of excellence for industrial use of Space technologies.
- Adjust the Agency structure to future challenges

Source: Menachem Kidron, Head of ISA, Jan 2012

Budget approval

This year civilian Space budget increased from \$2.5M to \$50M

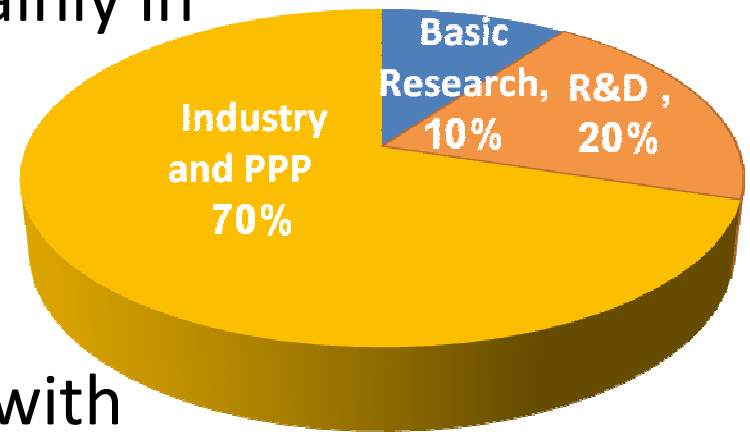
Expected increase to \$150M in 5 years



Source: <http://www.israelnationalnews.com/News/News.aspx/>

The New Policy –Budget allocation

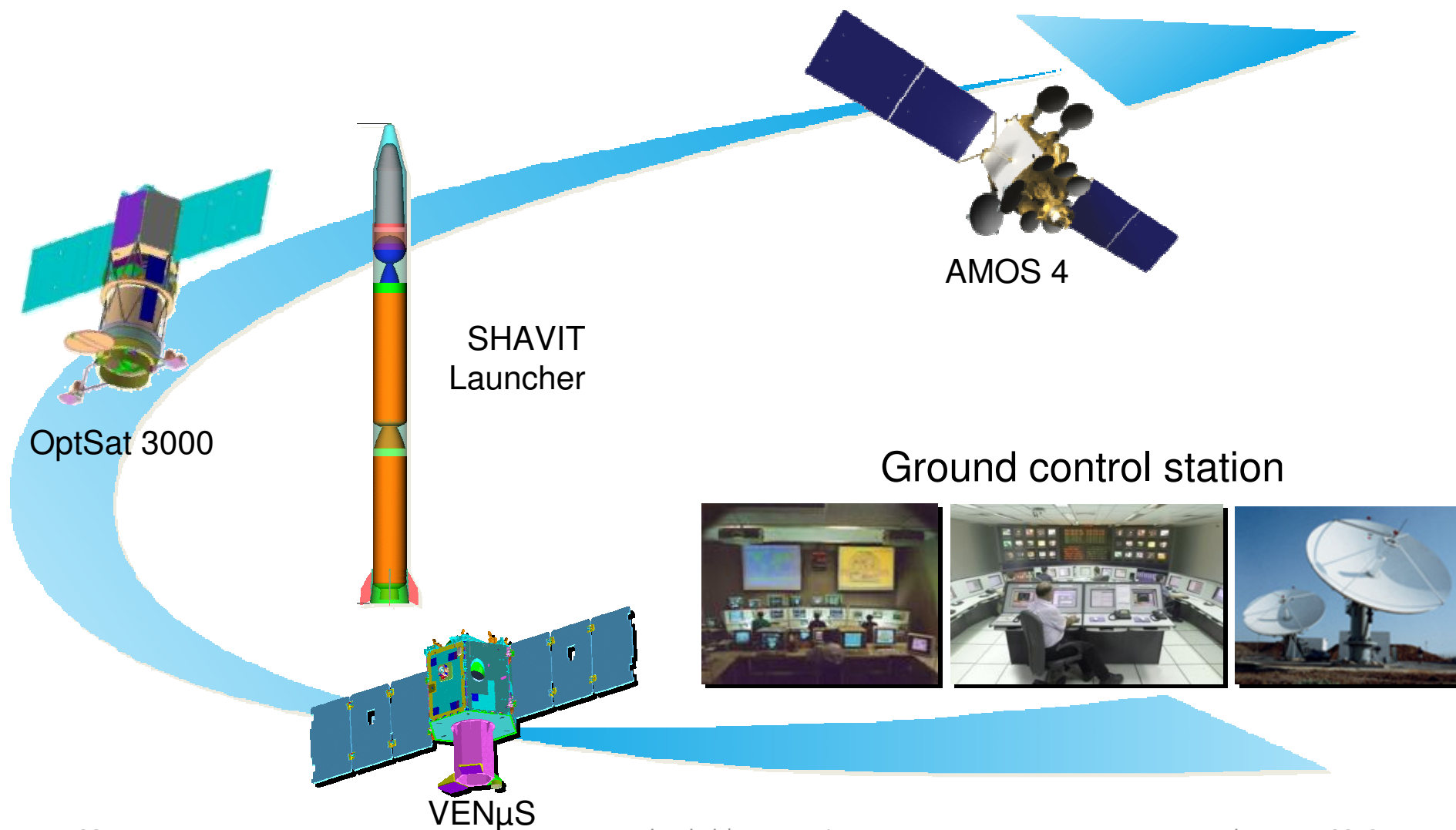
- Government will directly invest mainly in research and miniaturization technologies
- ISA will initiate and financially support international cooperation with market leaders
- ISA will Leverage the existing budget Using Public Private Partnership (PPP) Mechanism



Source : Prof. Ben Israel, Space as a national Project , 2010

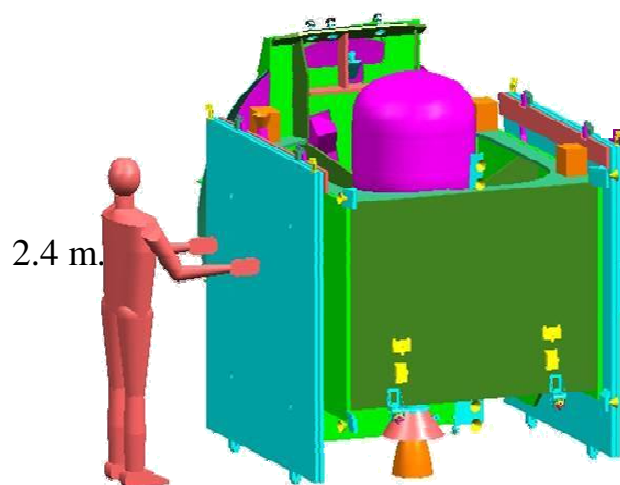
Source: Menachem Kidron, Head of ISA, Jan 2012

Near Future Roadmap

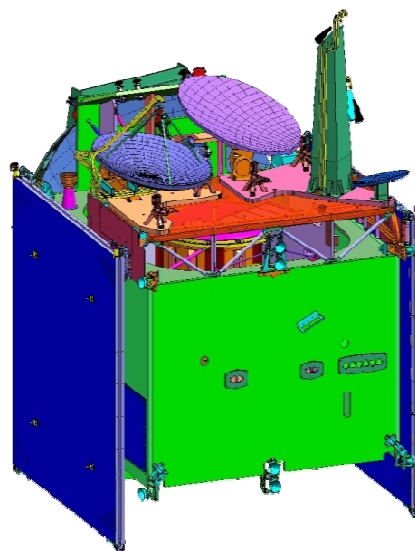


The Amos family is growing

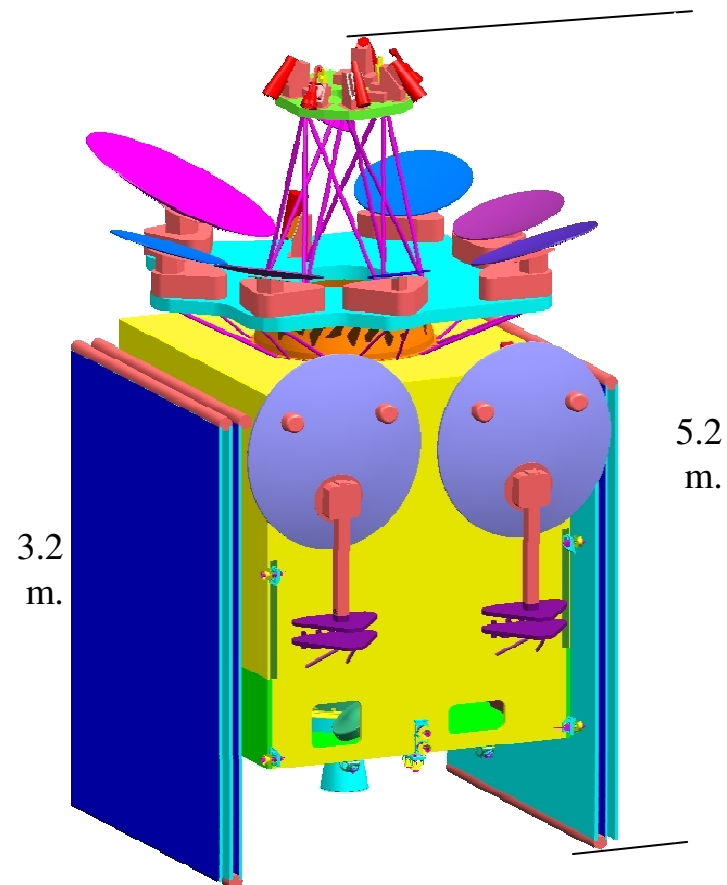
AMOS
by Spacecom



AMOS 2



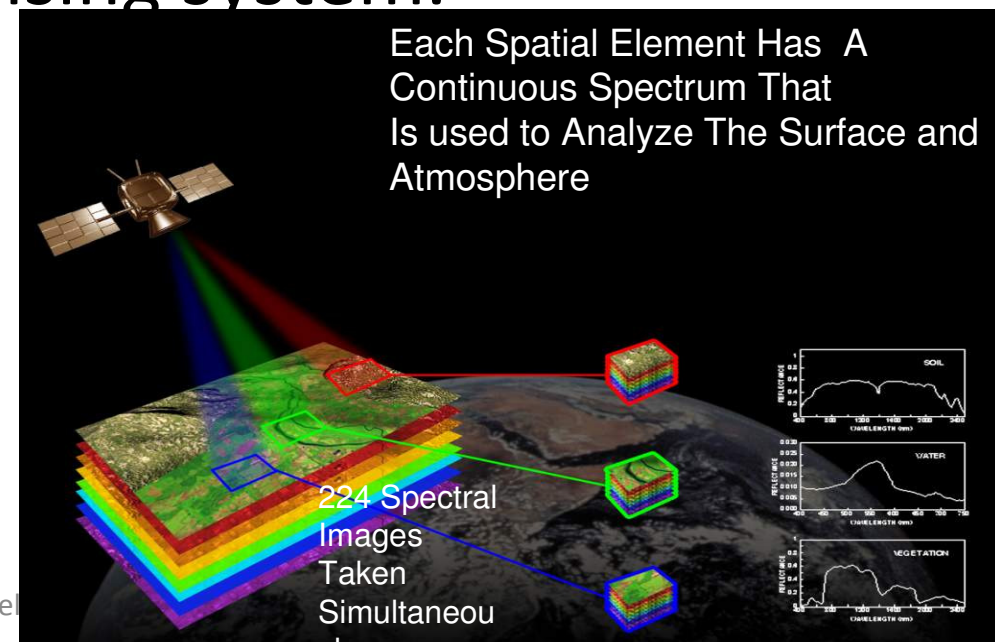
AMOS 3



AMOS 4

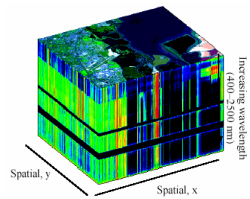
Future - SHALOM project

- Space borne Hyperspectral Atmosphere, Land & Ocean Mission
- Development, manufacture, launch, and implementation of a commercial Hyper spectral Space borne sensing system.
- An Israeli Italian cooperation

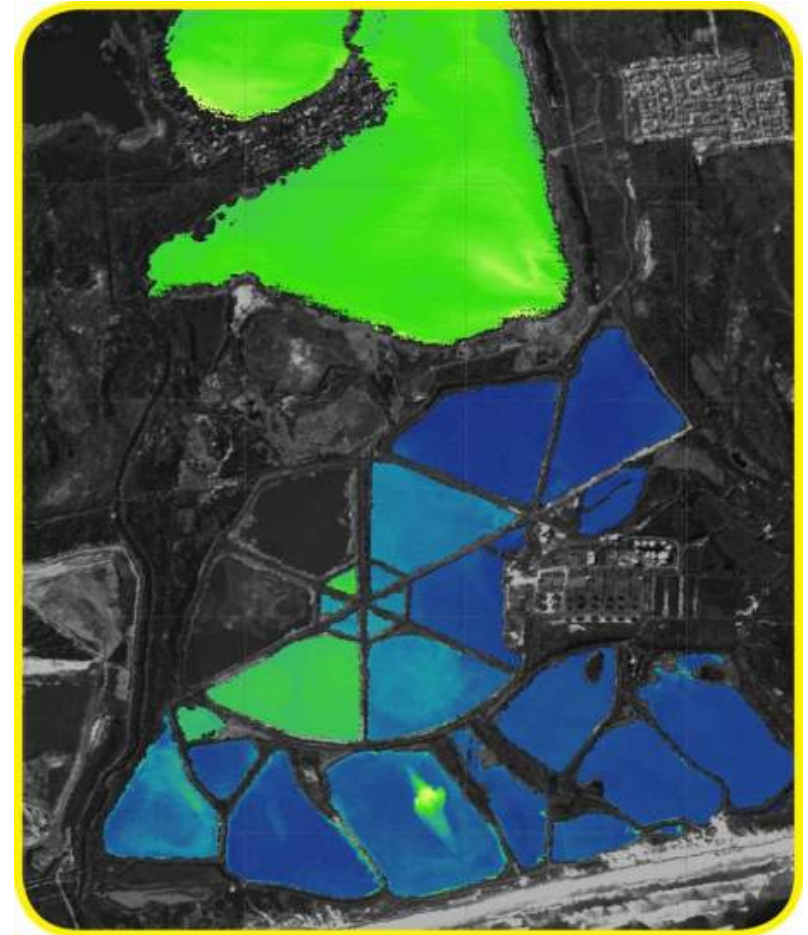


Hyperspectral Advantages

- Every pixel is photographed in 256 “colors”
- Optional use:
 - Bathymetry (measuring sea depth)
 - Water quality
 - Precise agriculture



Representation of hyper spectral data in a cube.



Map shows chlorophyll concentration an indicator for contamination leak between reservoir is documented

Microsatellite Advantages

High operational benefits to Cost (LCC) Ratio

On Single Satellite level

On constellation level (e.g. short revisit time)

Operational Responsive Space – Mission On Demand

Formation Flying

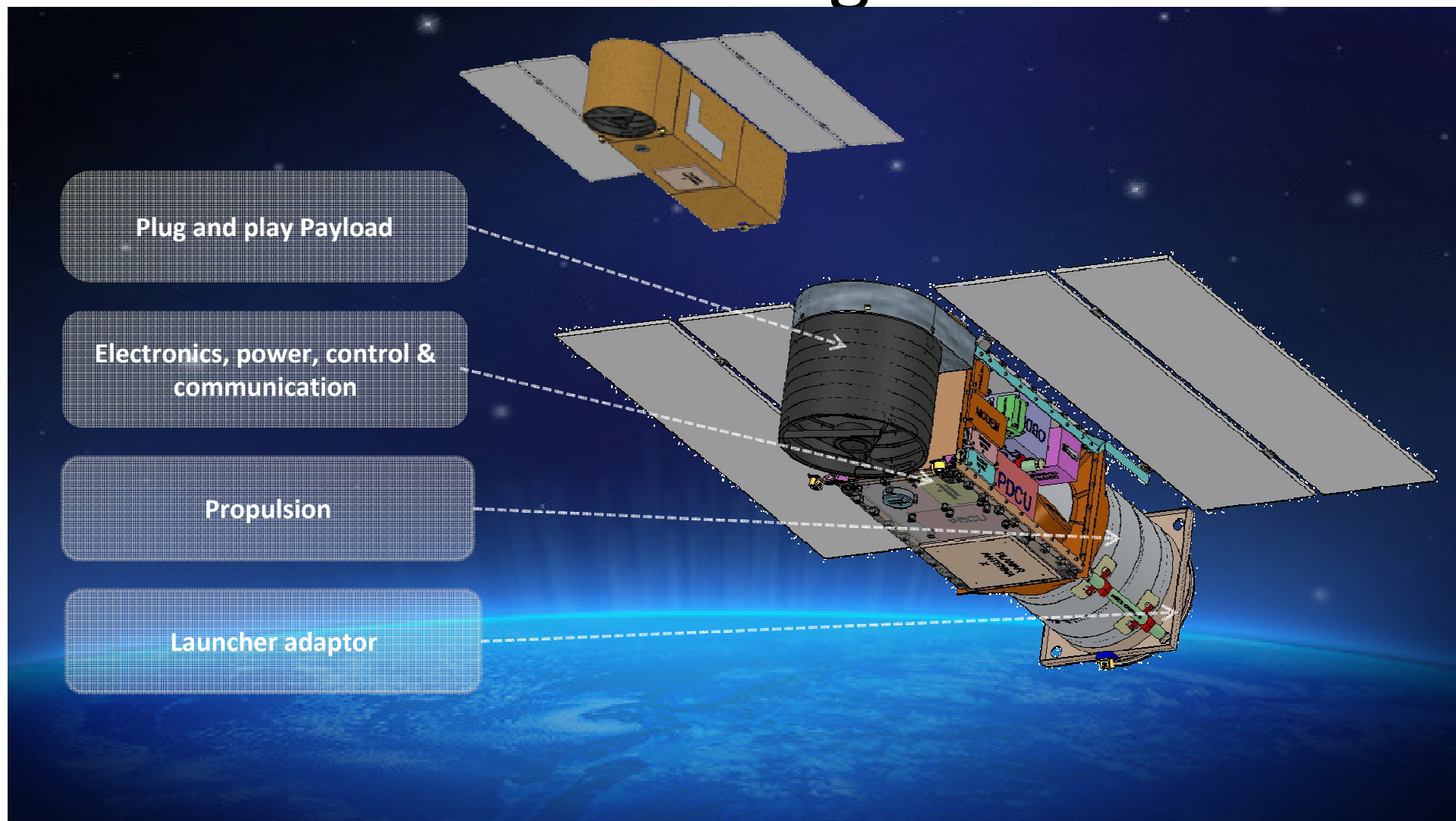
“Affordable, Timely, useful and Scalable” *

* Prof. Sir Martin Sweeting – 8th IAA Symp. April 2011

Future Concepts – Litesat

- **Dual Use on-demand micro satellite constellation**
- **Low cost**
- **High Performance Imaging Exploitation**
Space and Ground segments
- **High revisit rate**
- **Comply with Operational Responsive Space (ORS) concept**
- **Fast damage assessment for disaster management**

Satellite configuration



Vision

- Israel sees space as a vital resource to be explored.
- Israel will embrace cooperation based on the technological advantages of the local industry
- Israel will invest funds to promote science and technology for the benefit of the international community

Israel is a country to keep an eye on

Thank You!

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