

Romfart og dypvannsteknologi

~~Er det~~ synergier og bør vi jobbe mer sammen?

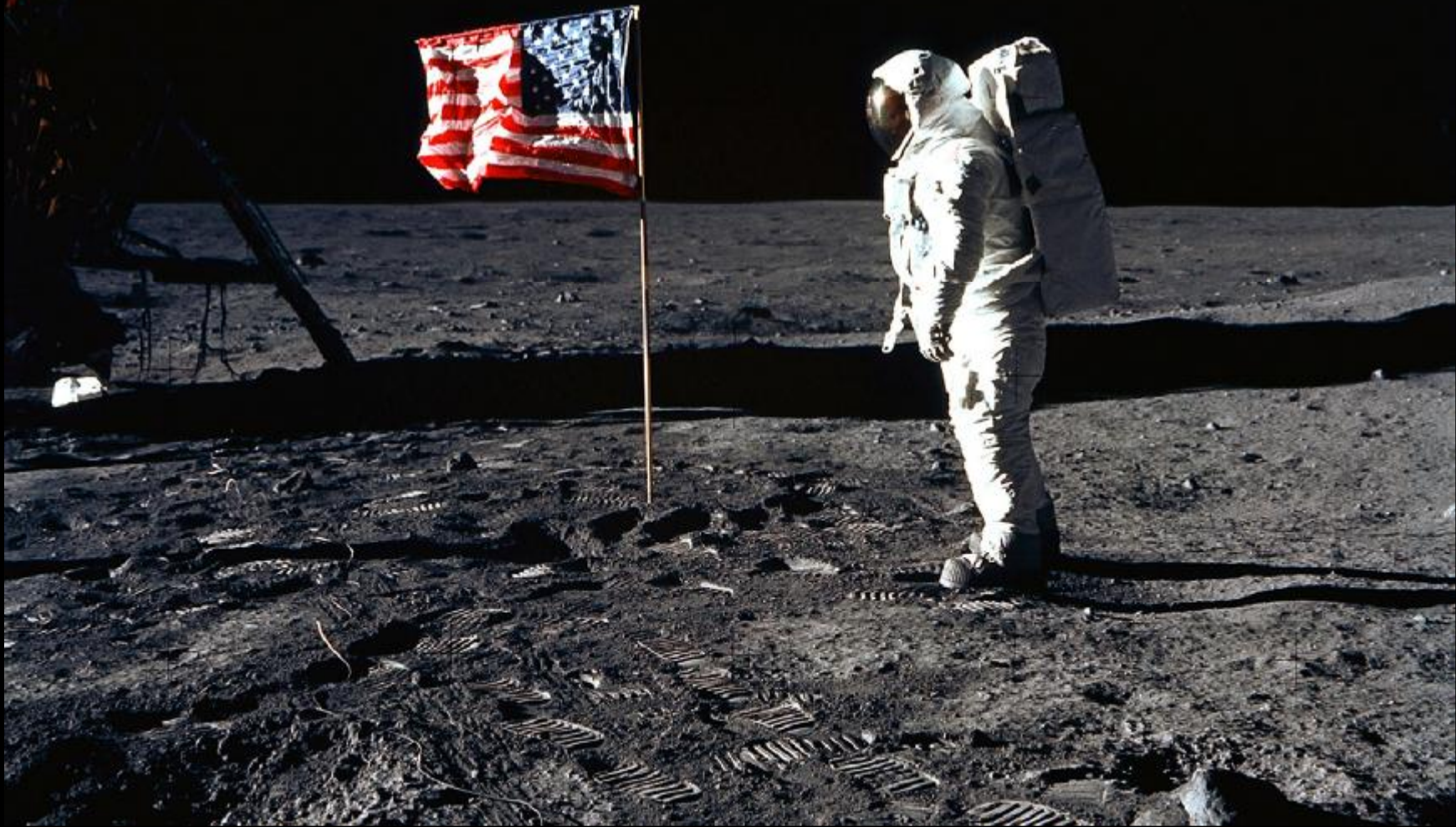


Bjørn Ottar Elseth
Norwegian Space Centre
bjoern.elseth@spacecentre.no

©2010 ESA-ENES-ARIANESPACE / Optique Vidéo du CSG - P. DAUDON

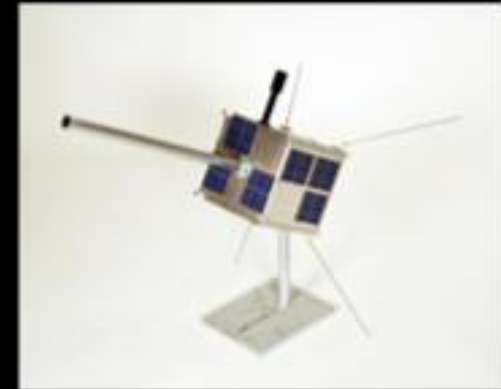


USA kom først til Månen



Norway has a Space history

- 1900 Birkeland – Aurora Borealis
- 1962 Andøya Rocket Range
- 1987 Full Member of ESA, NSC established
- 1997 SvalSat Ground Station (Svalbard)
- 2007 Troll Station (Antarctica) "Pole to Pole"
- 2009 Thor-6 launched
- 2010 AISSat-1



Norwegian Space Priorities

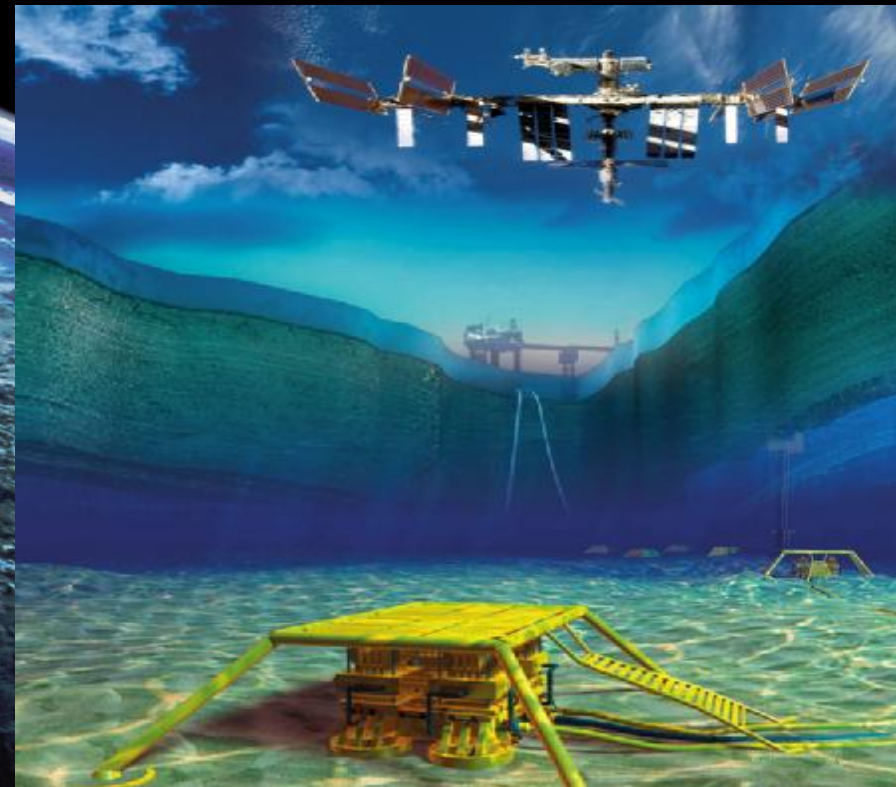




Likhetstrekk

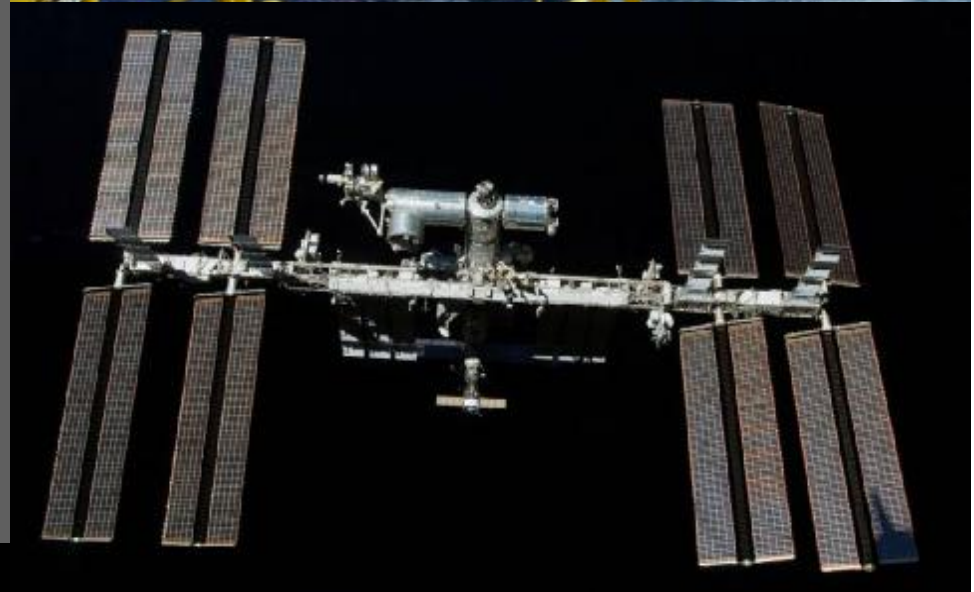
Eksempler på likhetstrekk mellom rombasert og bakkebasert virksomhet (energi, forsvar, maritim og offshore/subsea);

- teknologiske utfordringer
- ekstreme miljøer
- omfattende, kompliserte og kostnadskrevenende
- dokumentasjon!
- bemannede- og ubemannede operasjoner
- funksjonalitet og pålitelighet kreves demonstrert
- sikkerhet



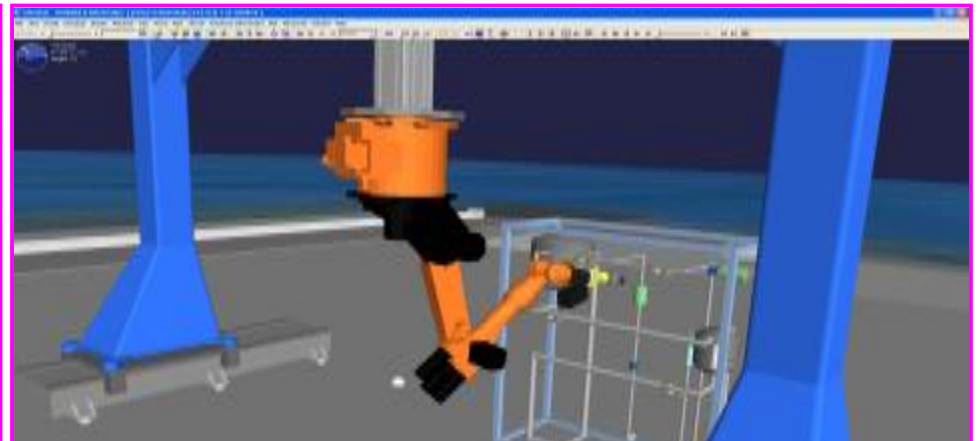
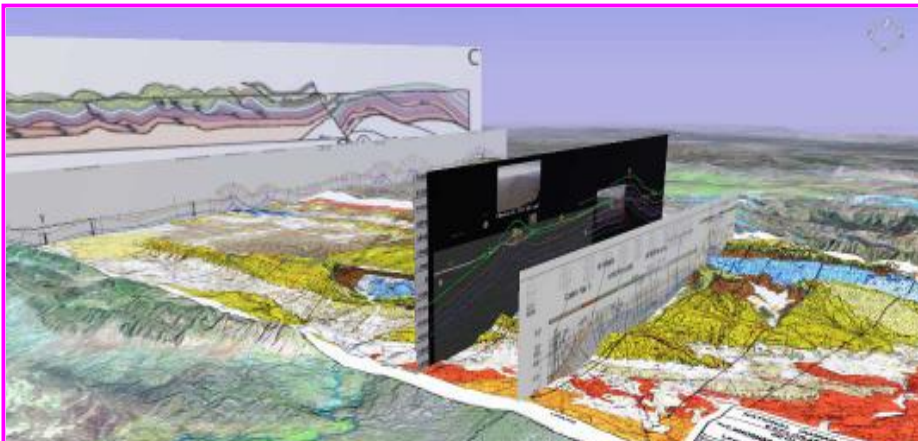
Similarities between the oil/gas sector and the space sector

- Focus on safety
- Harsh environment
- Great distances
- Transportation carries risk
- Human isolation/risk
- Risk avoidance
- High costs
- Complex technologies
- Need for innovation



Areas where Statoil believes Energy and Space industries may benefit from each other

- Robotic systems
- Data management
- Design processes
- Methods for exploration/examination
- Advanced materials
- Advanced sensors and instrumentation
- Environmental monitoring technologies

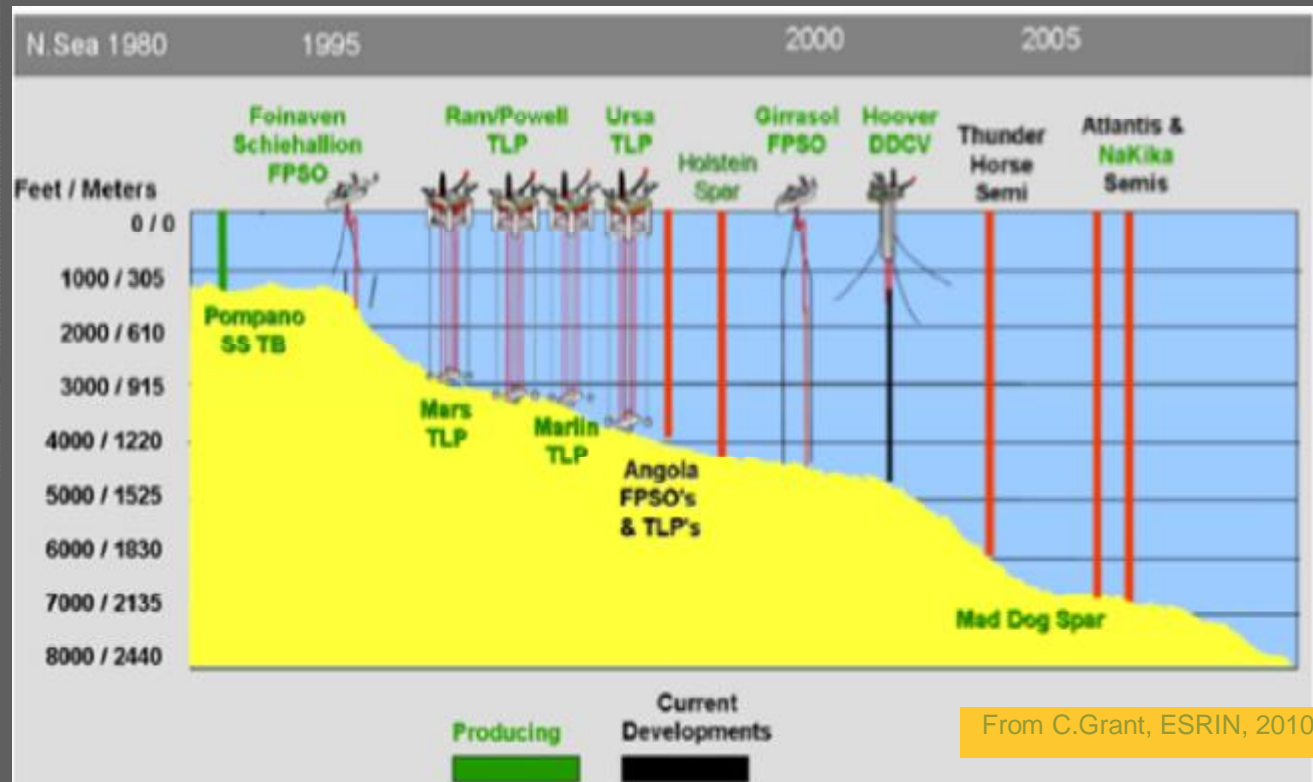


Some common challenges!

- Robotics
- Design engineering/roadmaps
- Common small critical systems
- The Valley of Death!

+ Futures thinking

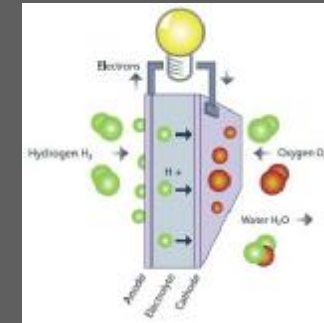
About technology for energy



Harsh and remote environment
Deeper wells

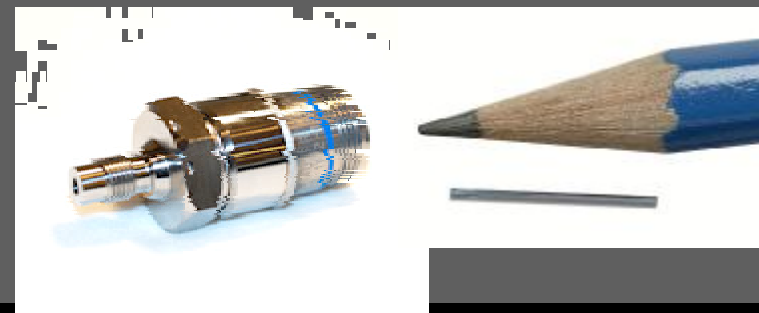
Norwegian synergy examples (1)

Fuel cells and energy storage



Method of producing Titanium components

Small sensors for offshore and space



Norwegian synergy examples (2)

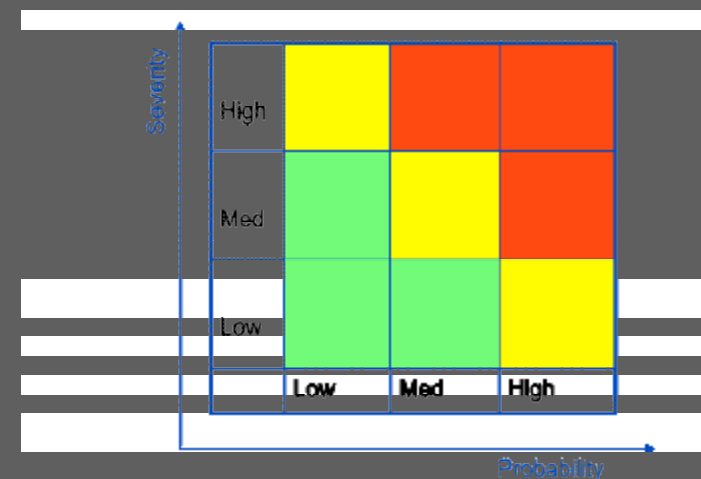
Logistics spin-in from maritime



Wireless, low energy detector for oil and gas installations

Risk Management

Risk matrix



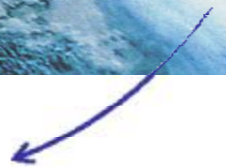
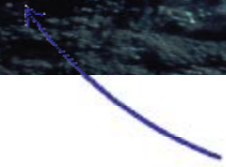
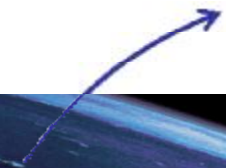


Space: sensor for measuring pressure and temperature for satellites

SubSensor AS – Offshore segment
Onshore segment

SubSensor AS – new Space segment
Space segment

Earth: improved sensor for measuring pressure and temperature offshore/onshore

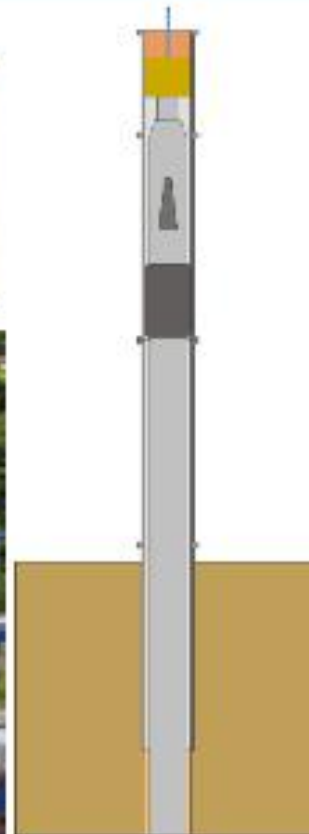




Badger

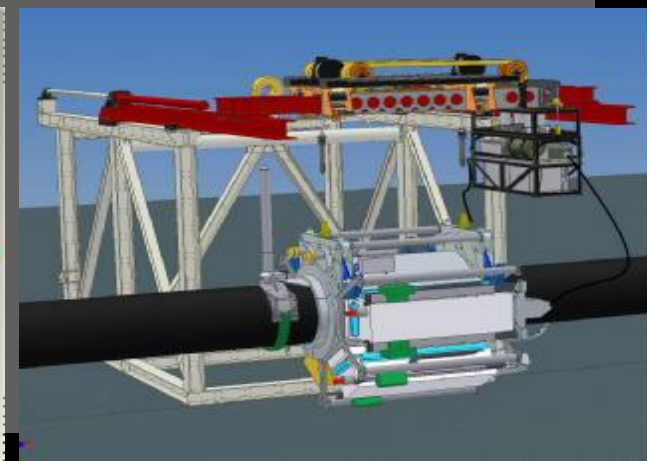
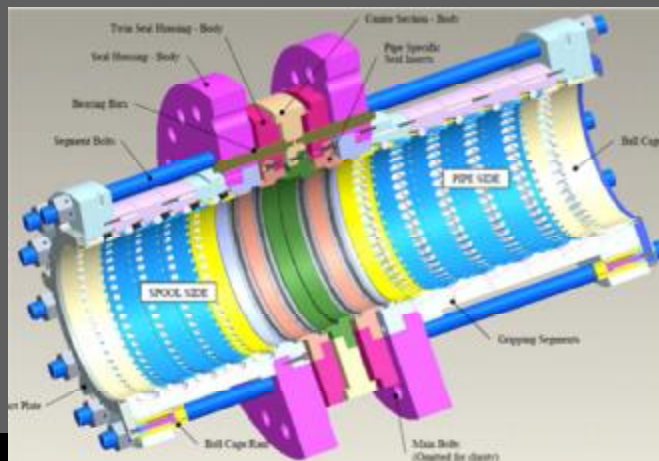
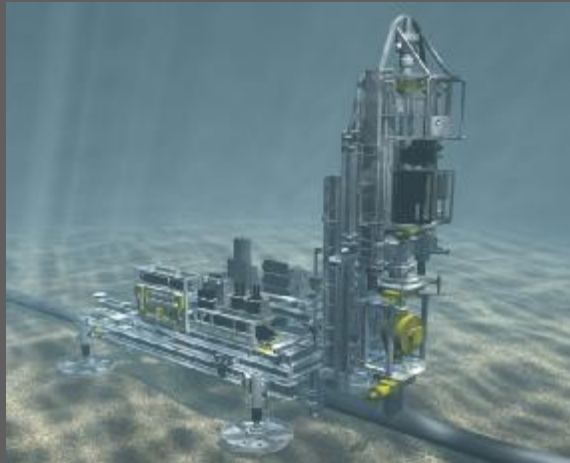


Testing.



Copyright © BXPL 2011

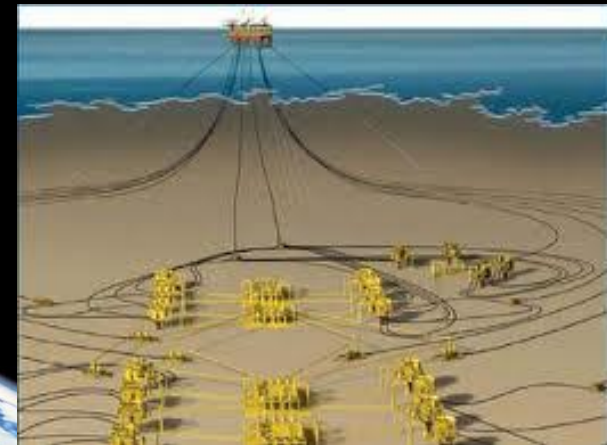
Pipeline Tie-in and Repair



men kan vi få til mer?

Erfaringer

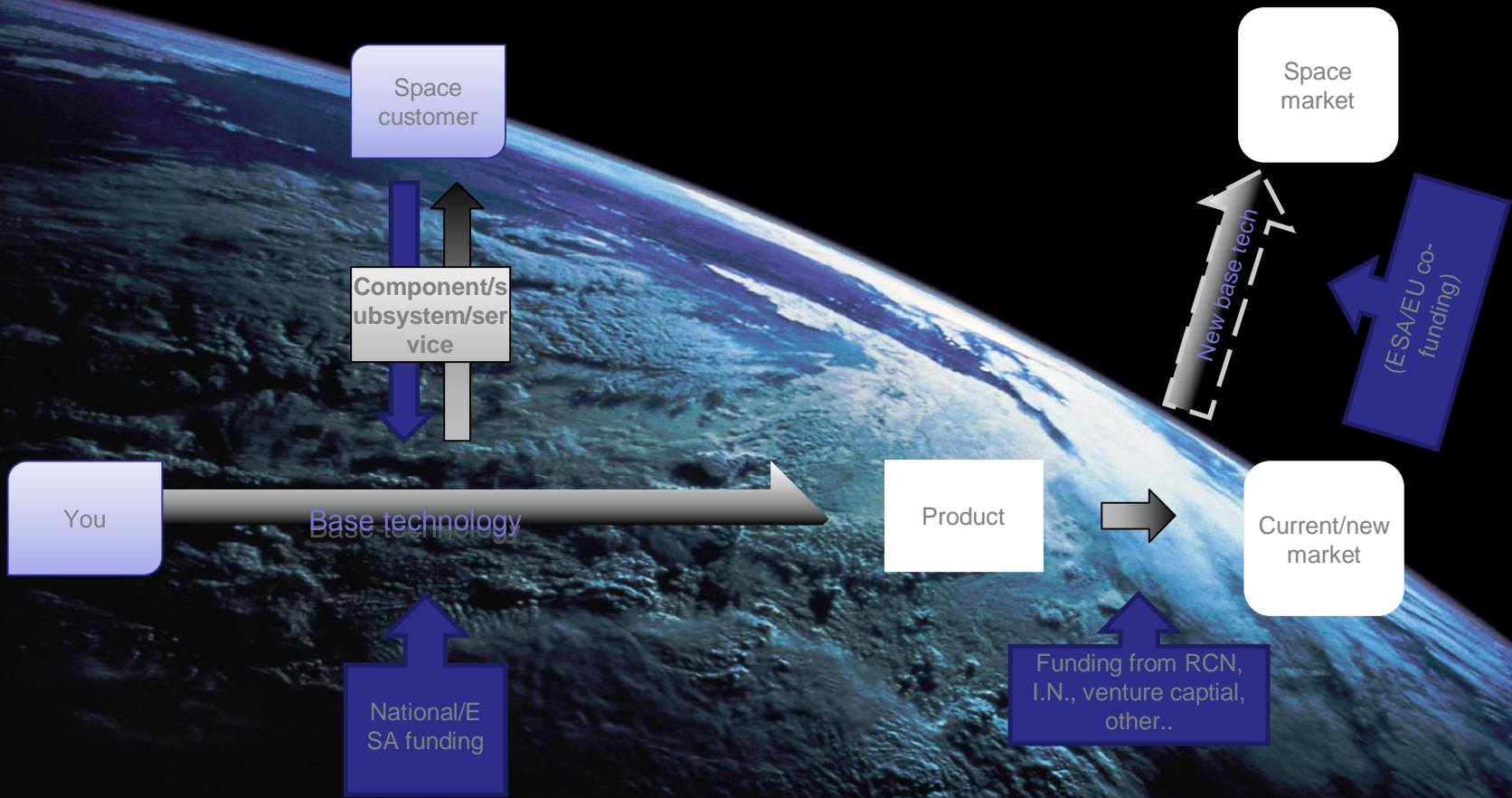
- * Forsvarsindustri
- * Energi / offshore
- * Maritim / subsea
- * *Tilfeldigheter*
- * *Ting tar tid*



Antakelser

- * Stort markedspotensiale for uprøvet norsk teknologi hvis mulighetene tilkjennegis
- * Krevende å bygge bro mellom "space" og "non-space"- markeder/aktører/utfordringer og skape forståelse for hvor/når en kan delta





29.02.2012

Dere bygger ROV/AUV, vi bygger store og små satellitter !

TEKNIKBLAD

TU.NO BYGG-ANLEGG ENERGI INDUSTRI IT OLJE-GASS MILJØ-KLIMA



BEET: Bjørn Oskar Elseth (f.v.) fra Norsk Romsenter og Bjørn Nørheim, sjefsforsker ved FFI og prosjektleder for AISat-1, er stolt over å ha laget satellitten så lett og kompakt. Satellittoppen mellom dem er i størrelse 1:1. Foto: Tore Stensvold

Ingeniørbragden 2010: AISat-1: Tar tyvfiskere – sikrer skipsfart

En 20x20x20 cm kube i verdensrommet kan avsløre fiskejuks. Men viktigere er det at sjefarten i nordområdene blir sikret.

[Sjåv st](#) [TIPS om vann](#) [Motta nyheter på e-post](#) [TIPS redaksjonen](#) [Facebook](#) [Tweet](#)

Av Tore Stensvold · Publisert: 26.10.2010 kl. 13:30

På Kjeller utenfor Oslo sitter forskere og følger med på skjermen. Herfra styres og kontrolleres den lille kuben 630 kilometer ute i verdensrommet.

Drøye tre måneder etter at Norges første observasjonssatellitt, AISat-1, ble skutt ut og satt i bane rundt jorda, kan forskerne fra Forsvarets Forskningsinstitutt og kolleger ved Norsk Romsenter og Kongsberg Seatek fastslå at den lille kuben gjør en stor jobb.



Dat er ikke minst Kystverket som jobber med. Nå har de fått

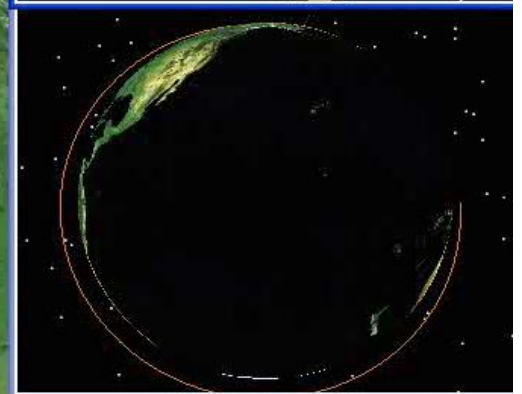
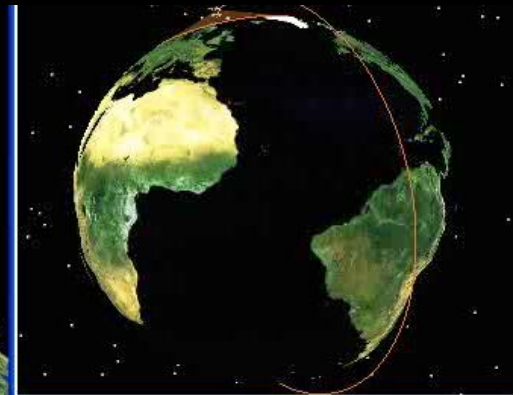
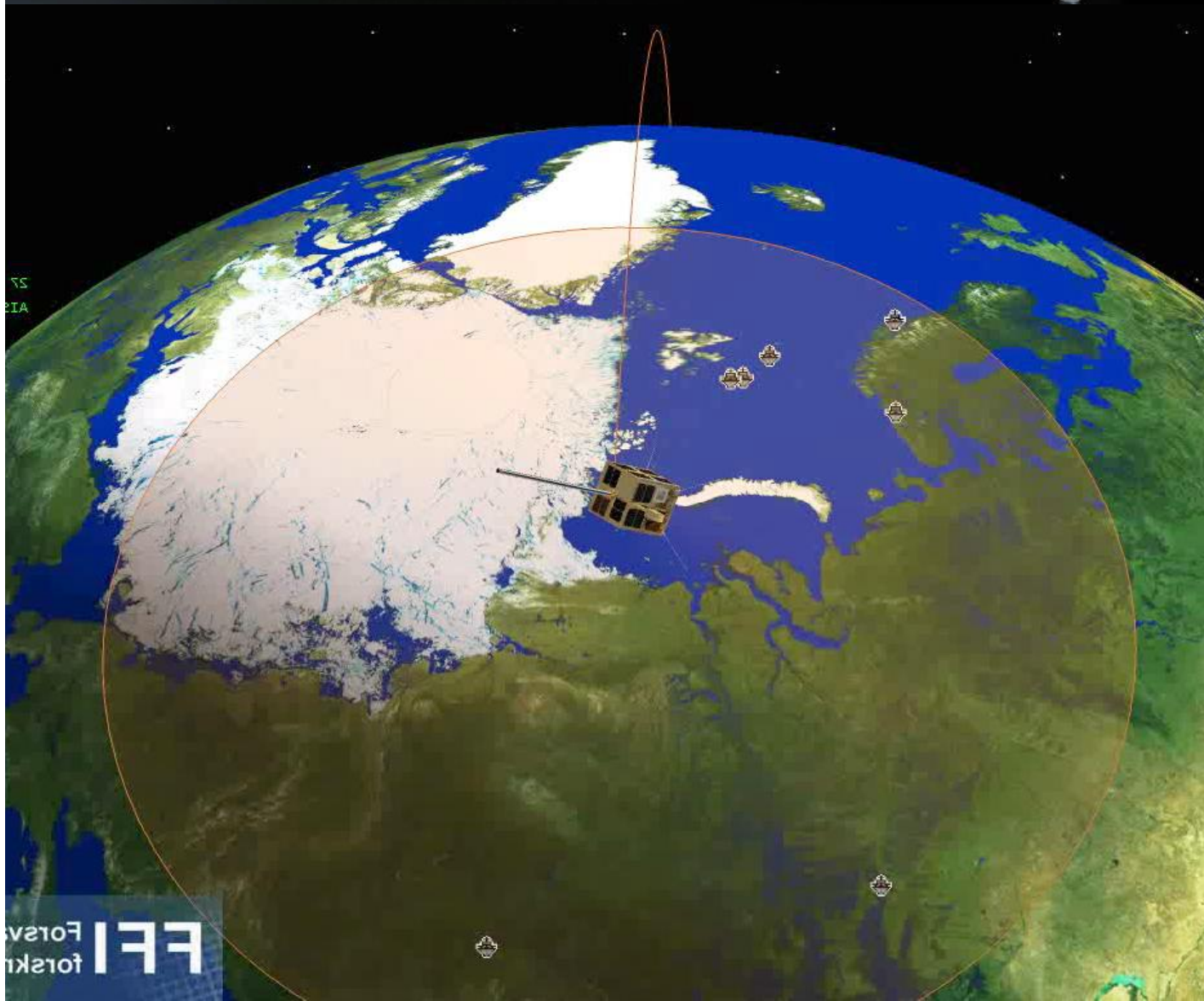
Les også:

- Norge illojlig skogsbrått
- Ingeniørbragden 2010: AISat-1: Tar tyvfiskere – sikrer skipsfart
- Skjult utvinning av olje og gass
- Skjult utvinning av olje og gass
- Skjult utvinning av olje og gass
- Skjult utvinning av olje og gass
- Skjult utvinning av olje og gass
- Skjult utvinning av olje og gass

AISat-1

- Norsk satellitt skutt opp i verdensrommet 12. juli 2010. Går i bane rundt jorda og passerer nordområdene hvert 96. minutt. Mottar og viderefører informasjon om skipsfart ved

SMALL SATELLITES TO SOLVE OUR HIGH NORTH CHALLENGES



FFI
forsk
Forsv

www.tottischoer.no

Obligatoriske aktiviteter

- Vitenskapsprogrammet

Frivillige aktiviteter

- Satellittkommunikasjon
- Navigasjon
- Romtransport
- Romstasjon (bemannet romfart og μ G-eksperimenter)
- Jordobservasjon
- Utforsking av verdensrommet
- Romovervåking
- Teknologi



Budsjett +4.000.000.000 €/ år

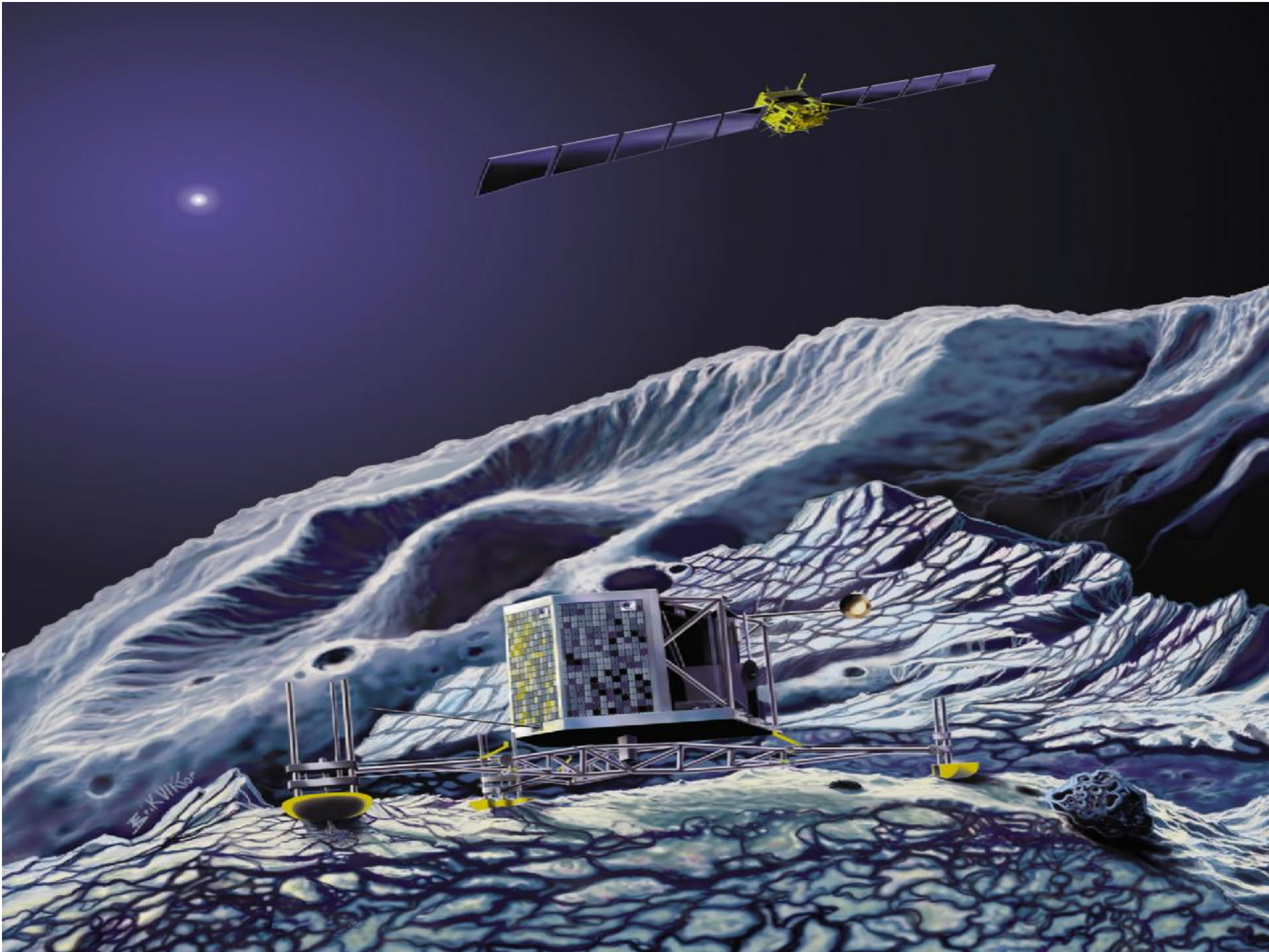
”Fair return”

Kanskje drar vi en gang til Mars



Men før må vi til Månen eller...asteroider





Space Systems: Robotic and Human Exploration

2012

2014

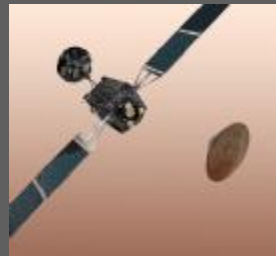
2016

2018

2020

2022

From Exomars (2016 -2018)
through Intermediate missions
to Mars Sample Return



Exomars
Trace gas orbiter

Exomars Rover



Intermediate
Missions

Network
Science
Mission



MSR

From ISS utilisation to human exploration



Potential interest



ISS

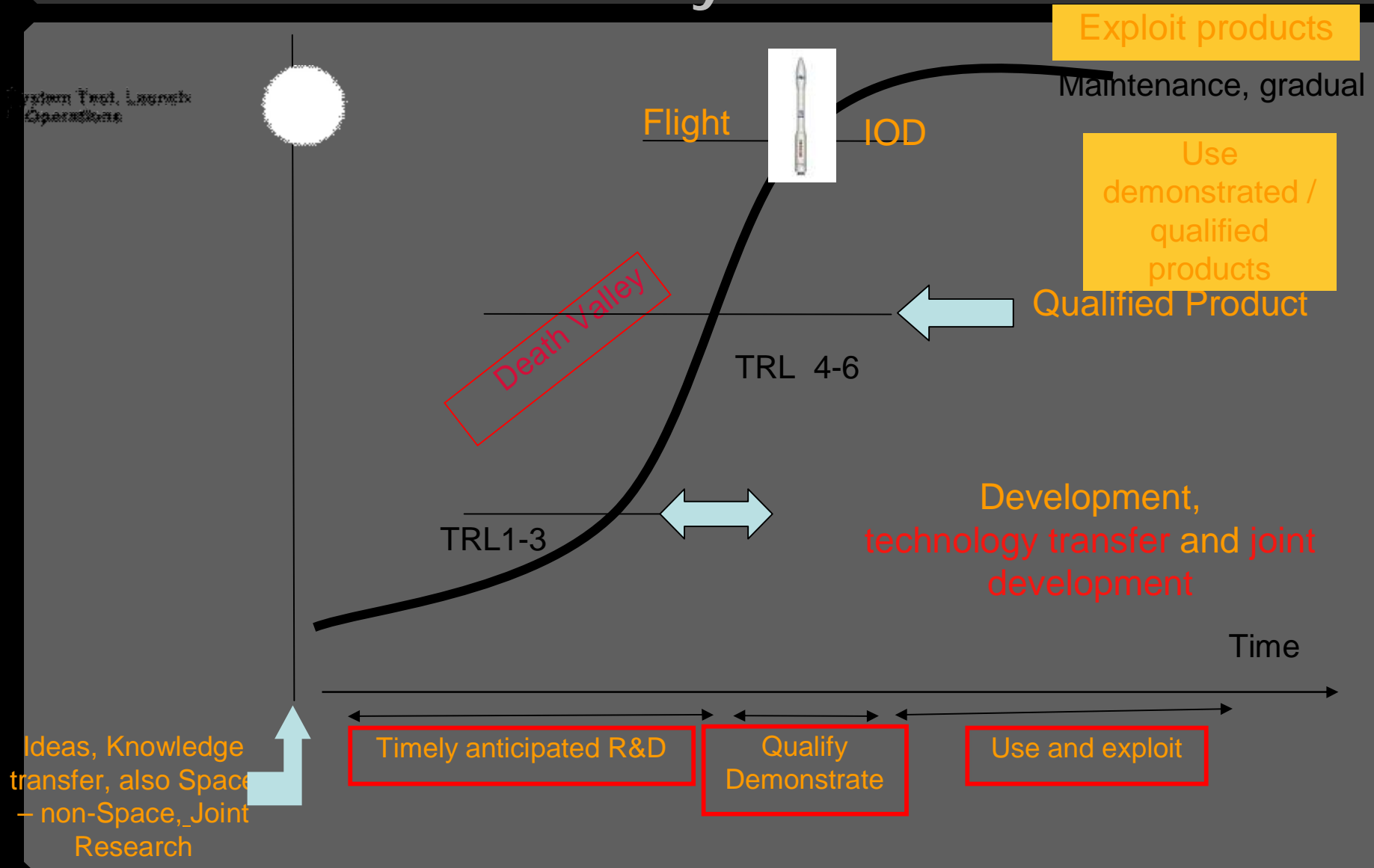


Lunar Lander



Creative Materials: partnership
space – non space, use ISS

Technology maturity and the valley of death

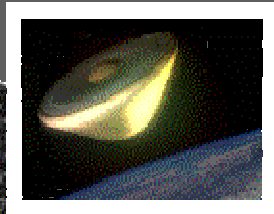


Safety/risk management

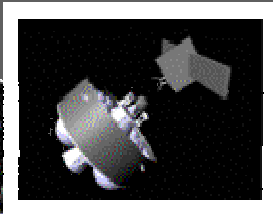
Ulykken i Mexicogolfen – Risikogrubbens vurdering



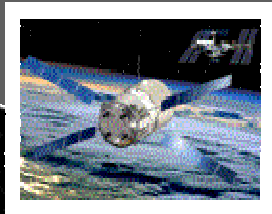
PREDICTING THE FUTURE?



Entry Vehicle Demonstrator (EVD)



Mars Sample Return (MSR) First Launch



Human Mission Technologies Demonstrator(s)



Human-Moon Mission



Cargo Element of Human Mission



2009

2011

2013

2016

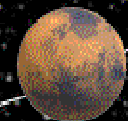
2020

2026

2028

2032

2035



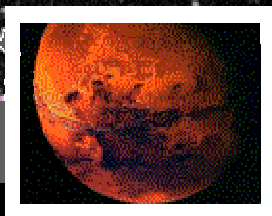
ExoMars



Mars Sample Return (MSR) Second Launch



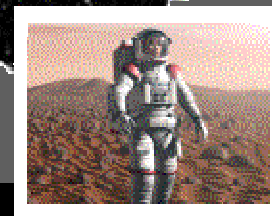
Technological Precursor Mission



Automatic Mars Mission



First Human Mission to Mars



TENK UTENFOR BOKSEN!

***think outside the planet**

Explore business and technology opportunities between space and energy industries. The vision is to generate new businesses, workplaces and technologies

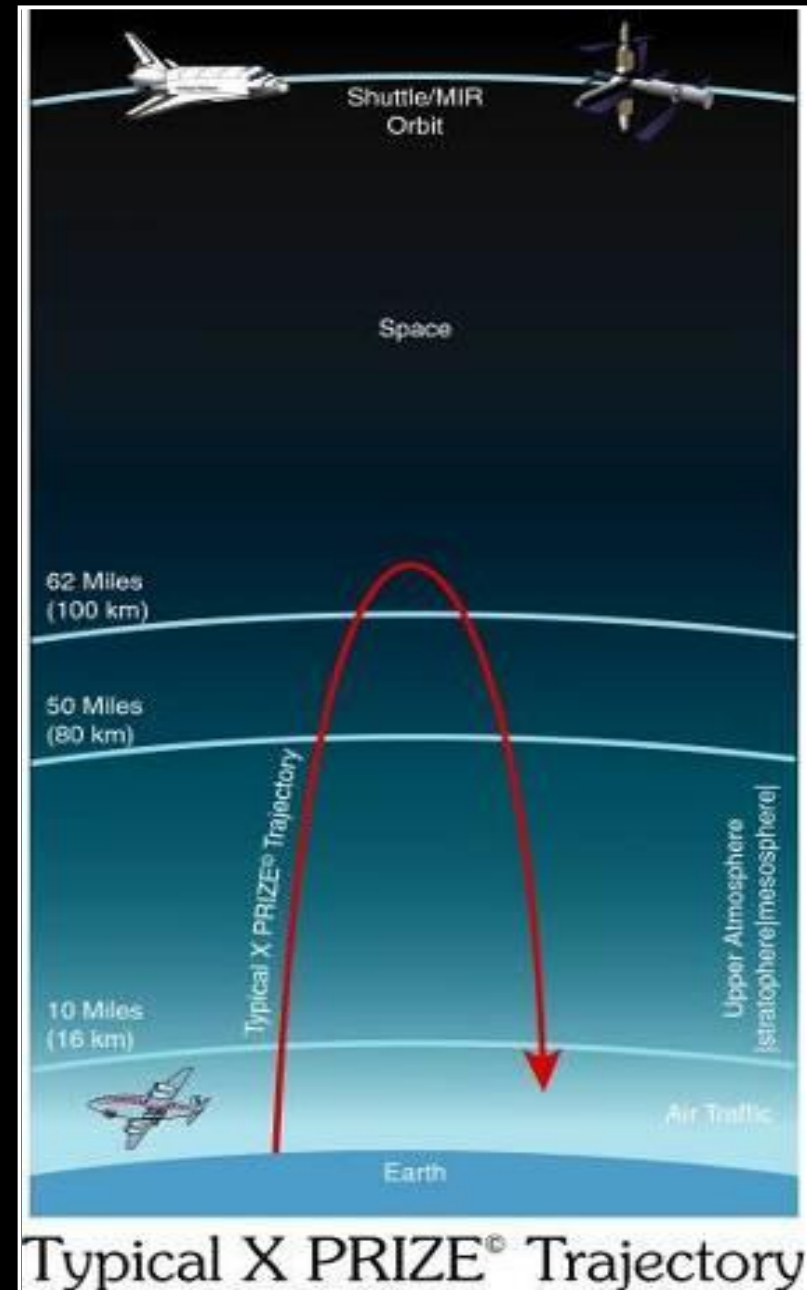
Welcome to a change of perspective!



“First team to fly 3 people to space, twice within 2 weeks”

Rules:

- \$10 Million prize purse
- Privately funded teams
- 3 person reusable spaceship
- 100 km altitude
- Two flights within 2 weeks





Funding

- ✈ National funding through the Norwegian Space Centre
- ✈ Range of ESA technology programmes
- ✈ New ESA funding tool

New ESA funding tool

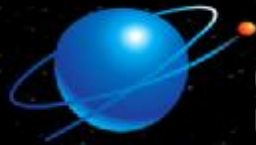
- ✚ Identification of space technology needs that can be satisfied by spinning-in non-space technologies or by joint R&T action with other sectors.
- ✚ Description and evaluation of the opportunity for spin-in, joint R&T
- ✚ Identification of potential users and applications (Market Analysis)
- ✚ Analysis and preliminary verification of feasibility of the spin-in, joint R&T
- ✚ Detailed development plan of the space product or for joint R&T

6 months, à 100k€/100%

Og svaret på spørsmålet er ...

mulig
Kanskje ikke...





Space & Energy

Space & Energy is a network of technology companies, knowledge and research institutions focusing on the parallel challenges and opportunities within the space and energy sectors.

We believe the intersection and interaction between these two large industries will reveal a vast potential for competence and technology transfer that will generate new solutions and new business opportunities.

Founding Partners:



Statoil

OCEANEERING



ipark



GREATER STAVANGER



prekubator

Join the network!

Name

Company

Email

Includes Think Outside The Planet Network!

Current Projects

Space & Energy 2012 at ONS
Joint Safety Project
Automated Robotics
Planetary Drilling
Arctic Operations
[Open Innovation: Think Outside The Planet](#)

History

Space & Energy 2011
NASA workshop JSC 2011
Space & Energy 2010
Space & Energy 2009

Project manager:

Katrine Velleesen
velleesen@prekubator.no
920 17 945

Teknologiområder

Eksempler på aktuelle teknologier og fagområder

- Transportsystemer (raketter/motorer)
- Energisystemer (brenselceller, solceller etc.)
- Robotikk, automasjon, fjernteknologi
- Nye materialer, strukturer, prosesser
- Integreerte operasjoner, logistikk
- Elektromagnetisk teknologi og teknikk
 - Datasystemer og software
 - Visualisering og simulering
 - Flydynamikk og navigasjon
 - Elektriske, elektromekaniske og elektroniske komponenter
 - Kvalitetssikring
 - Termisk kontroll
 - Sensorer
- Livsstøttefunksjoner
- Mikro- og nanoteknologi
- Optikk og optoelektronikk
 - Rom-miljø og effekter
 - Mekanikk og tribologi
 - Aerodynamikk



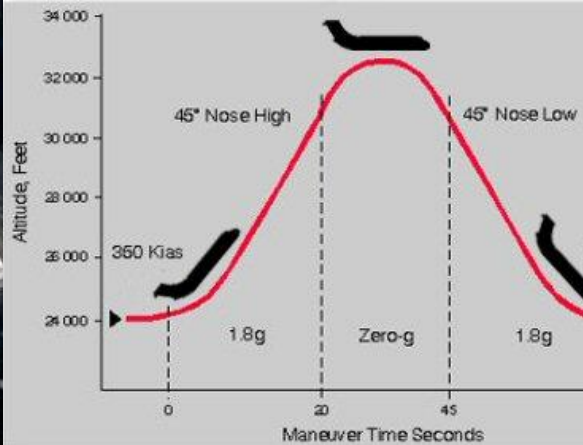
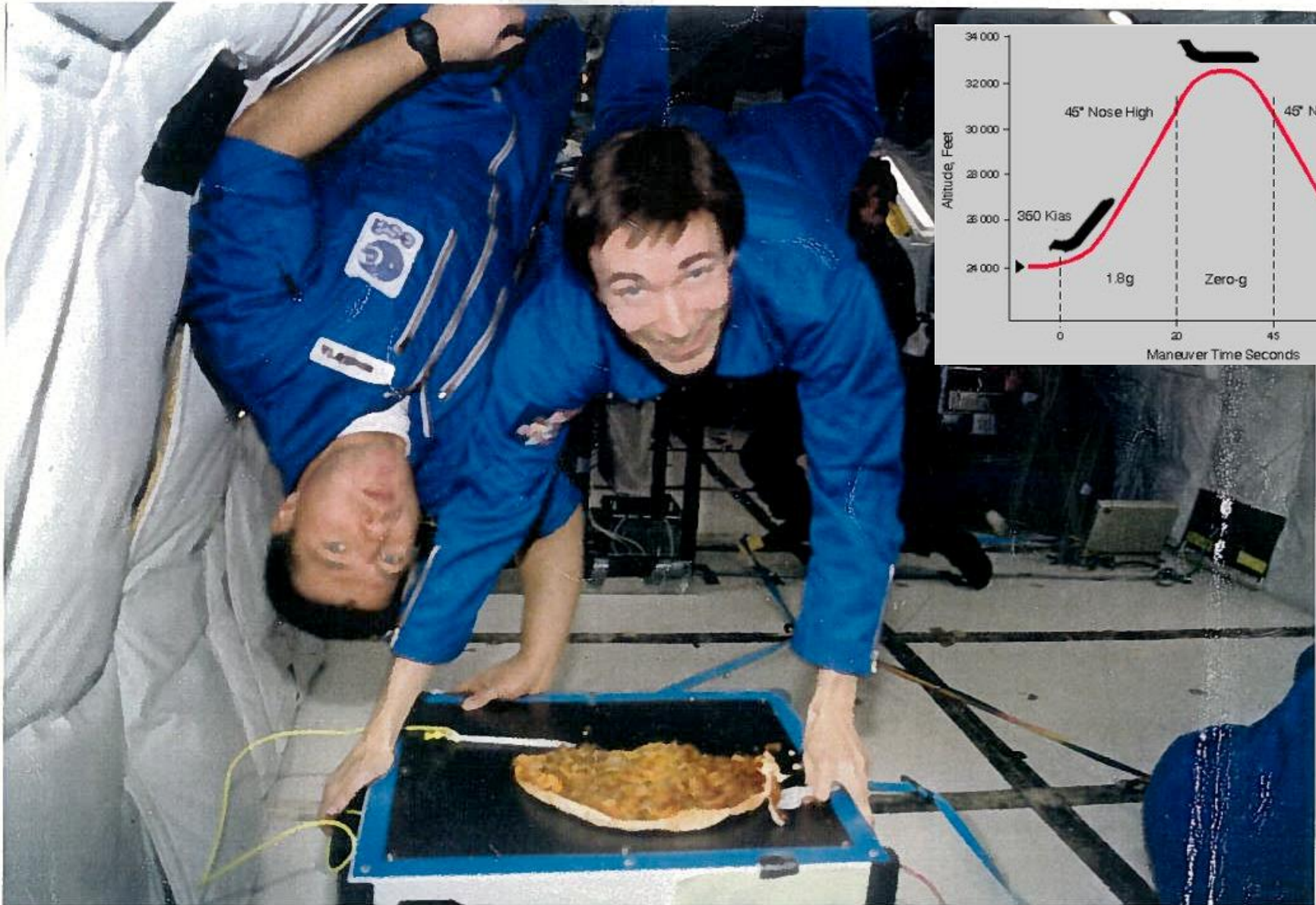
AVSLUTNINGSTANKER

- NORGE BØR KUNNE LEDE AN MOT NORD
- (da trenges både undervannsteknologi og romteknologi)

I noen tilfelle: Teknologioverføring fra space til rom
Andre ganger kan din bedrift bli en (under)leverandør til romoppdrag (ESA, NASA, kommersielle marked)

stimulere til realfags- og ingeniørinteresse
inspirerere hverandre (og gjøre det som er gøy)

Teambuilding ide!



Hunting high and low!

www.spaceandenergy.no

cq@iris.no

technology@spacecentre.no

