

# GERMANY IN SPACE

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German Aerospace Centre (DLR)

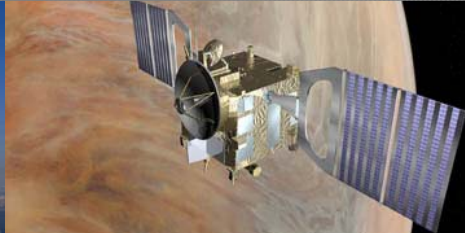
EISC, Berlin  
October 17<sup>th</sup> 2011



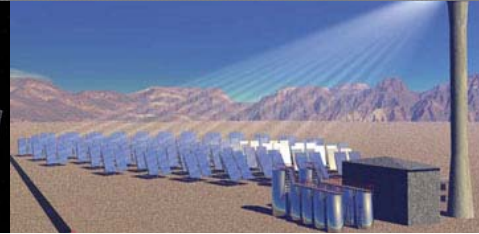
aeronautics



space



energy



transport



German Aerospace Center DLR

# Research Center & German Space Agency

DLR



missions



science



service



technology



security



outreach



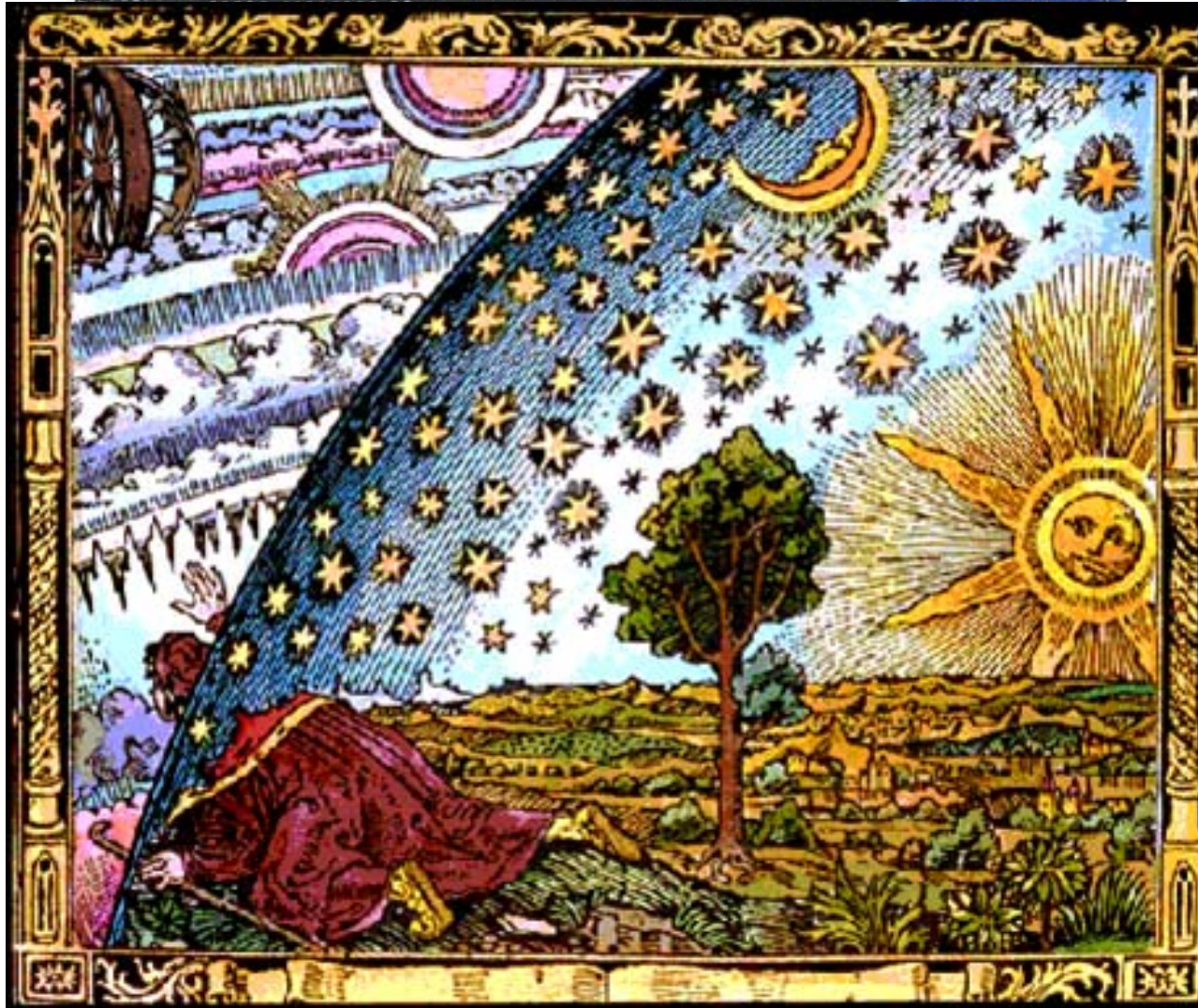
## Global challenges

- climatic change
- mobility
- communication
- energy
- shortage of resources
- demographic development
- conflicts / catastrophes
- health
- ...





...curiosity...knowledge for tomorrow





# Germany in Space...







August 2009



October 2009



March 2010

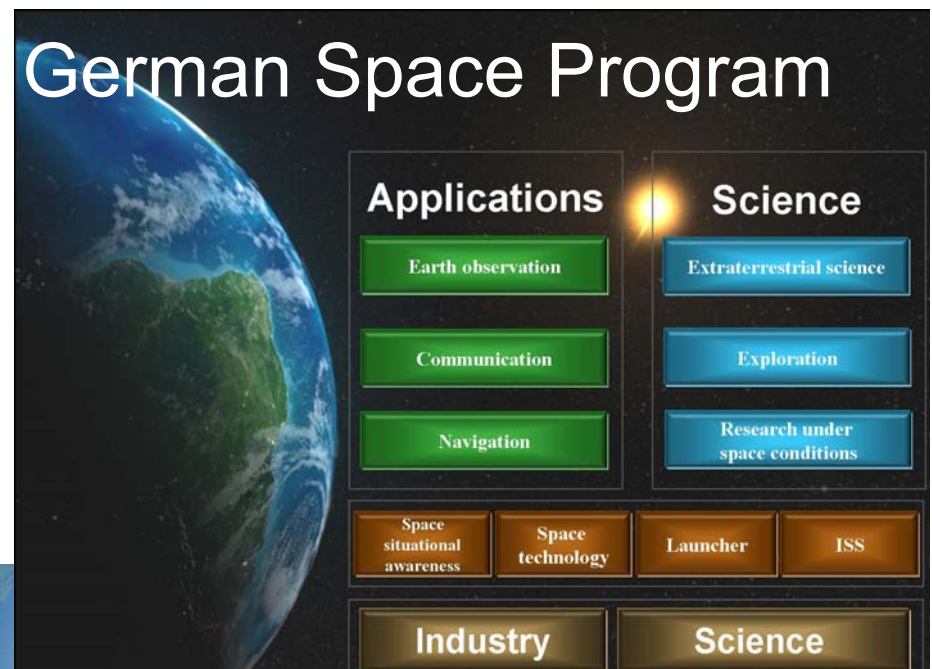


November 2010

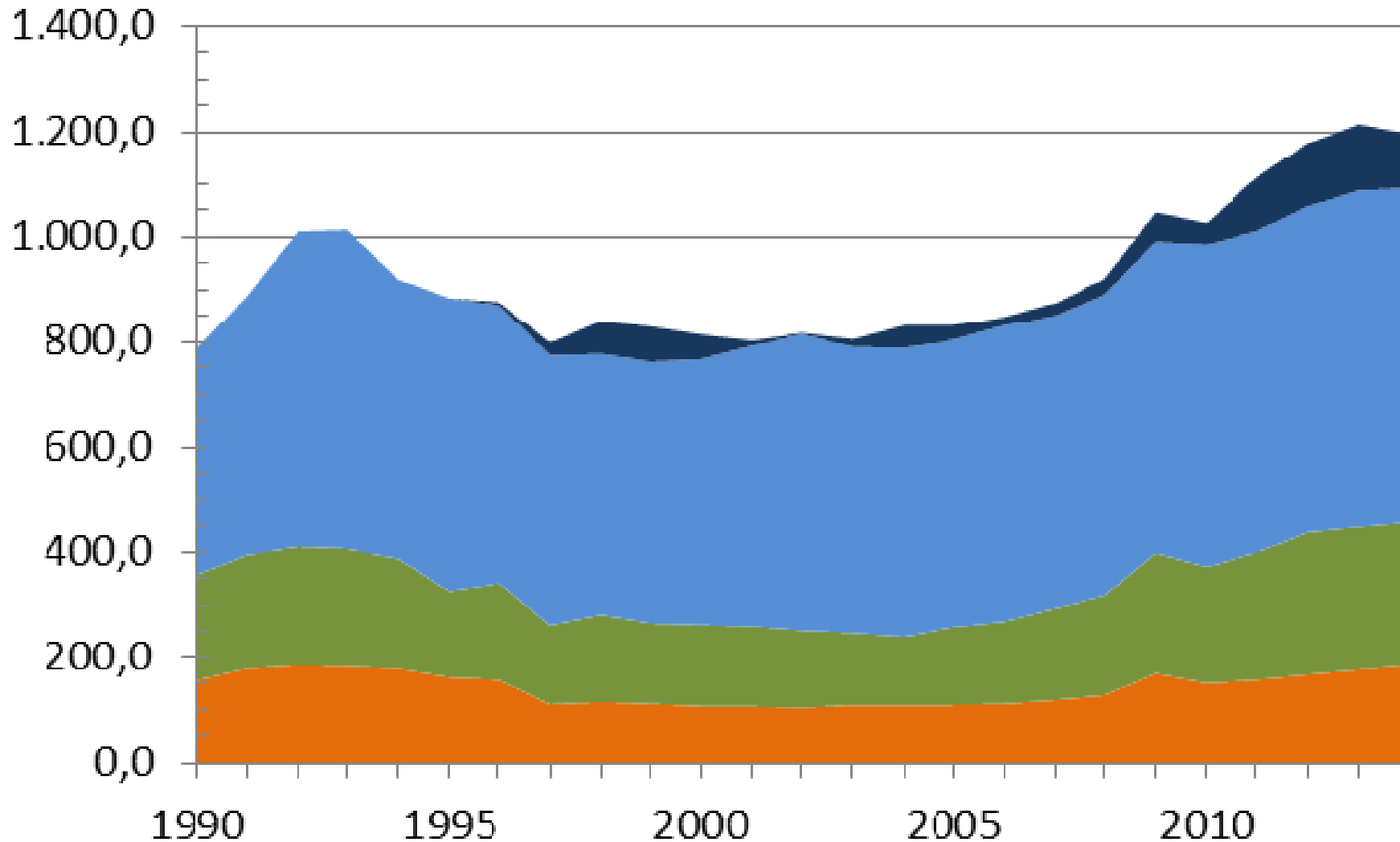


Integrated

German Space Program



## German civil space budget 1990-2014 [Mio. €]



- ESA&Eumetsat / BMVBS
- National Prog. / BMWi
- ESA / BMWi
- DLR F&T / BMWi





# Who is „Space“ in Europe?

- National Agencies
- ESA
- European Union



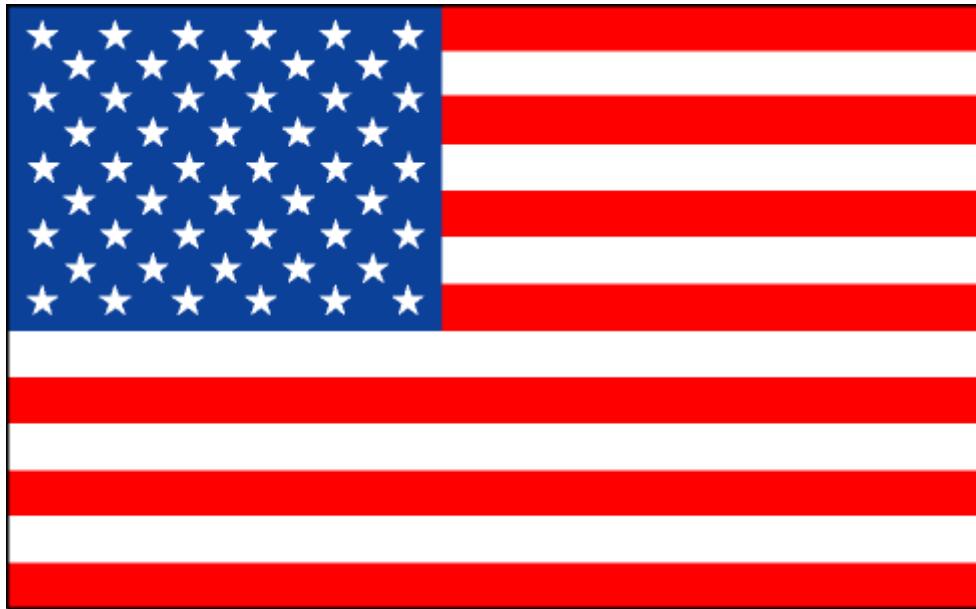
# **European Activity in Space**

## **Why?**

- **local / national / European... prosperity**
- **proof as sound and strong partner**
- **unhampered development**
- **(national) jobs**
- **industrial competence**
- **preparedness/readiness for crisis situation**
- **flexibility**
- **(technical) independence / redundancy (but costs...)**
- **decision close to action**
- **direct link decision – responsibility**



1950..1960...



**cold war ... space race**





cynic „advantage“ of cold war:  
money for space...



# Shift of paradigms:

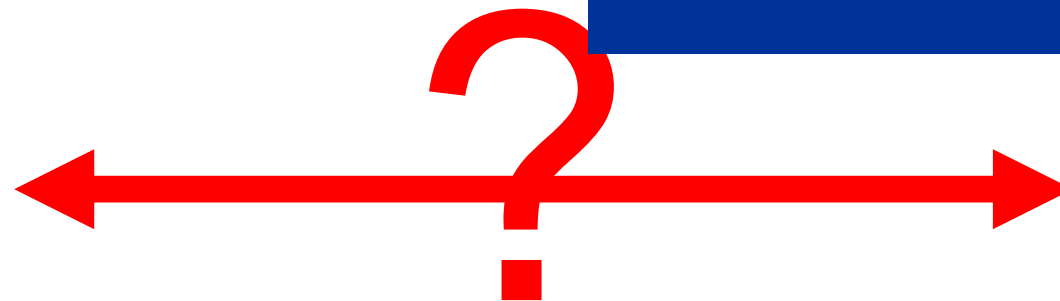
- from yesterday to tomorrow
- from cold war to „one world“
- from national projects to European space activities
- from national vanities to global cooperation
- from specialist's interest to general societal significance
- from prestige projects to science and application
- from purely state activities to diversity private & public
- from detailed governmental planning to politically set goals realised by competent entities







# Lisbon-Treaty and Space





# Lisbon-Treaty and Space

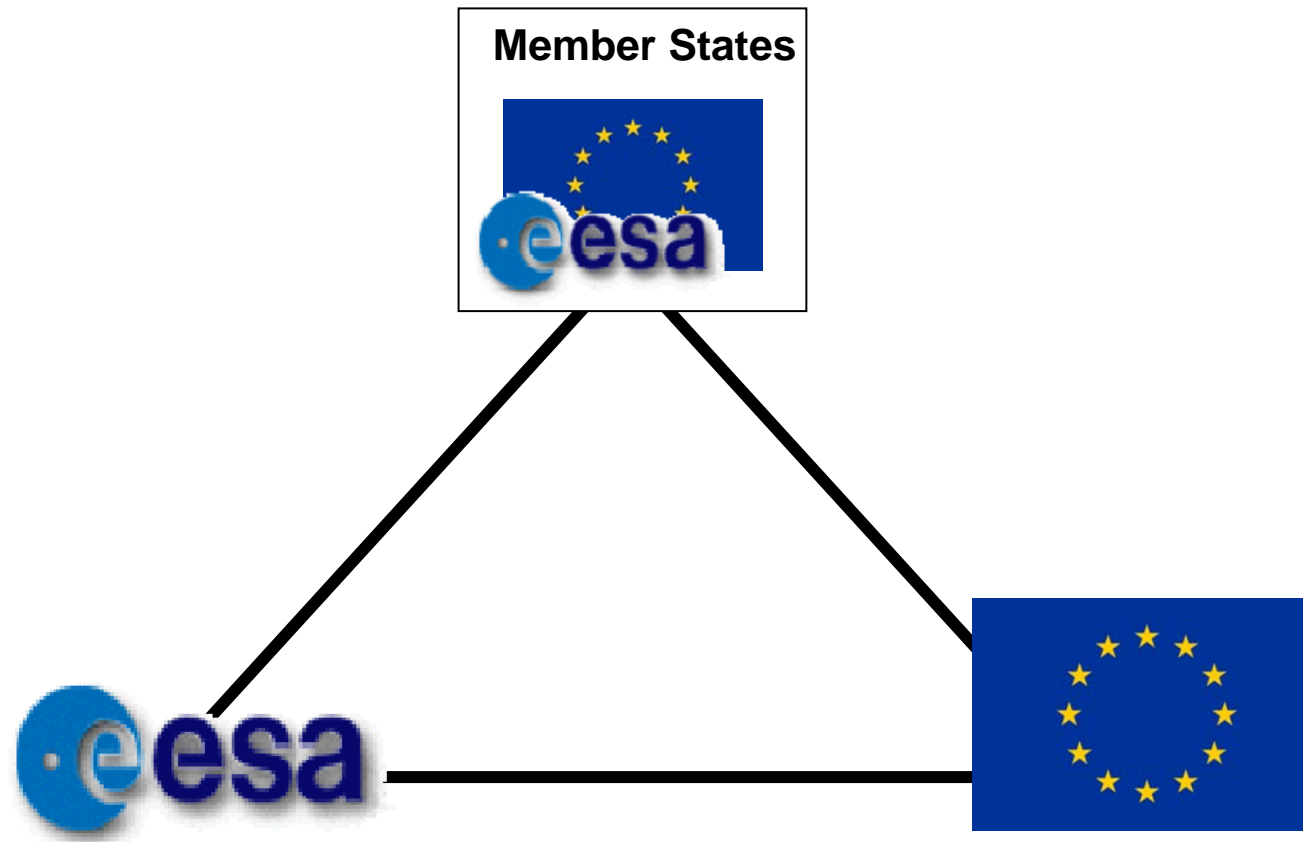
Effective December 1, 2009



- “**parallel**” competence of the EU for space
- call for discussion and decision on **future role of the EU in space**
- call for discussion on **sharing/division of work and responsibilities between EU, ESA and MS**



## The three main actors

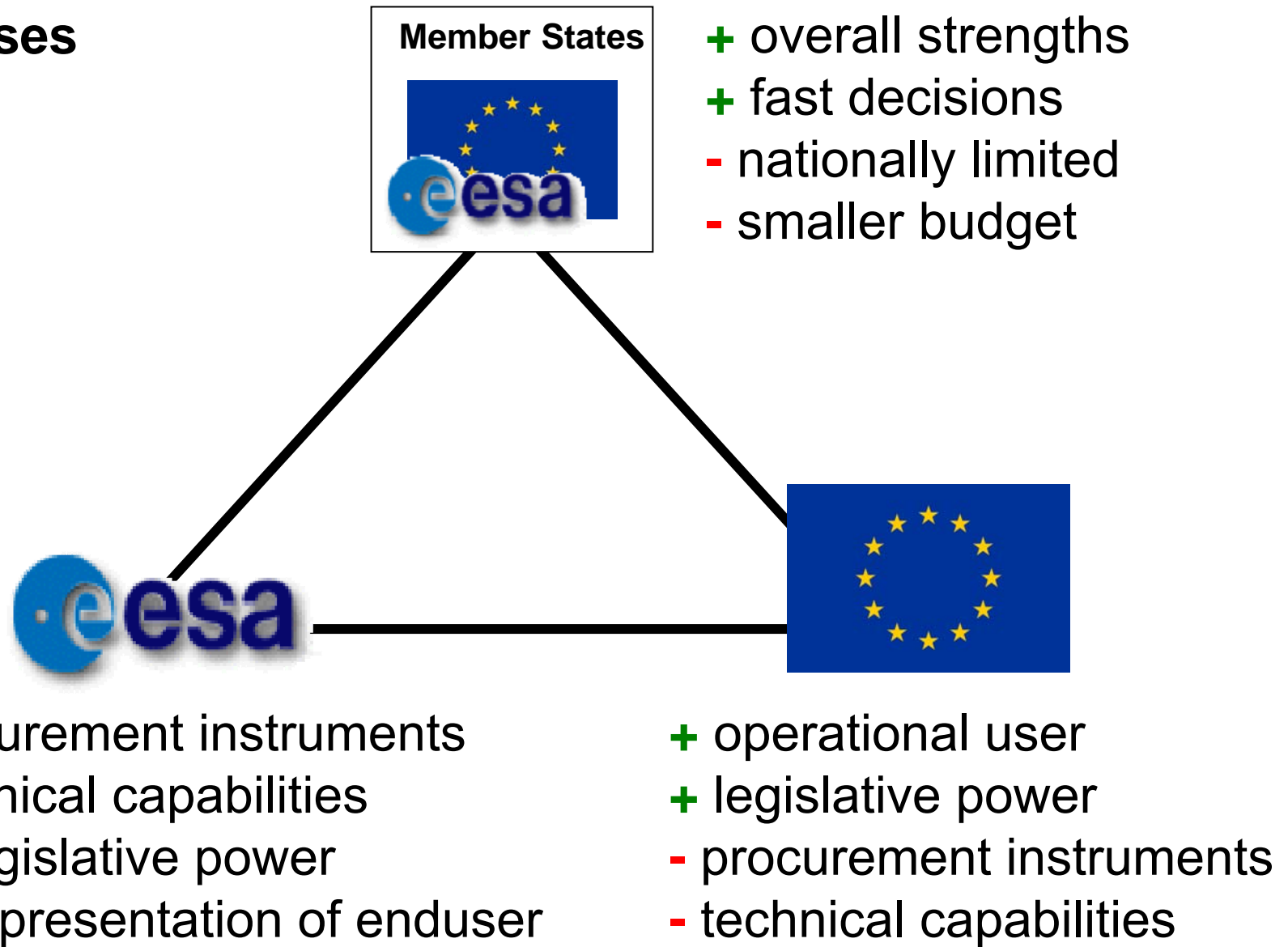


Who should be doing what?





# Strengths and weaknesses



## Actions

R&D  
missions  
initiating  
financing  
supervising



R&D  
missions  
technical implementation  
space policy



R&D funding  
**Galileo, GMES**  
downstream market  
space policy



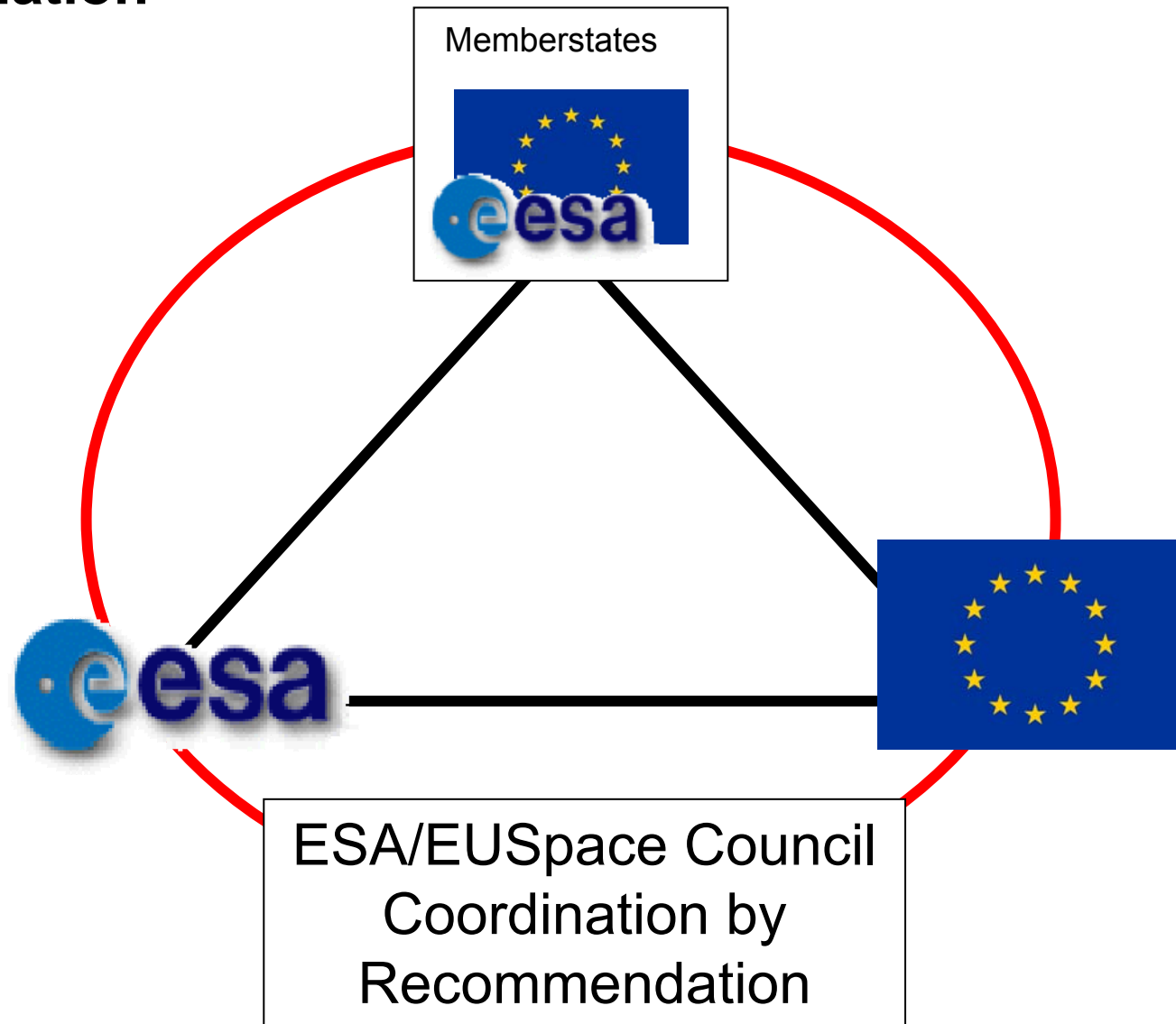




# European space-flagship programmes



# Coordination





# EUROPE:

## Satellites, Control, Launcher, ISS...



Developing own satellites



Capability to control  
space infrastructures



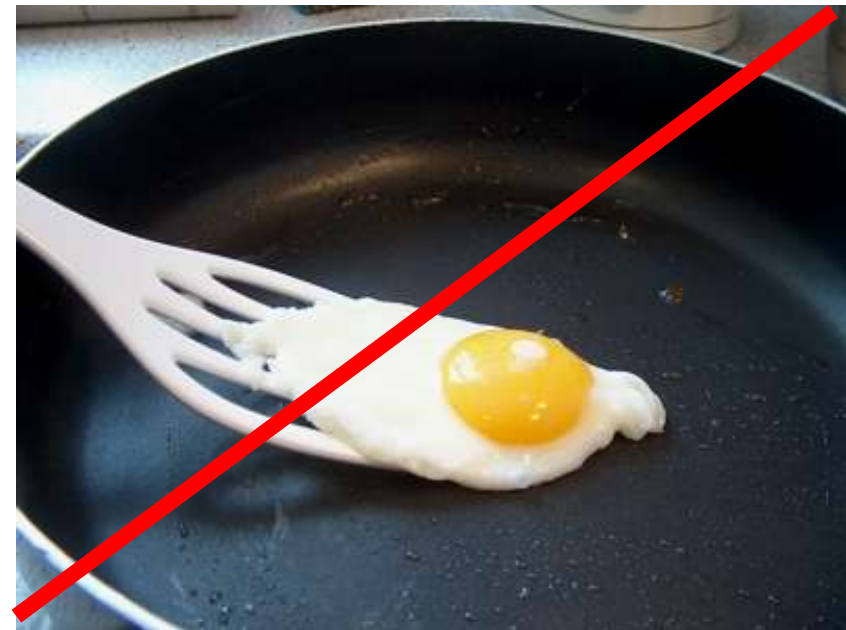
European space port  
and developing  
launchers



# Special challenge space:

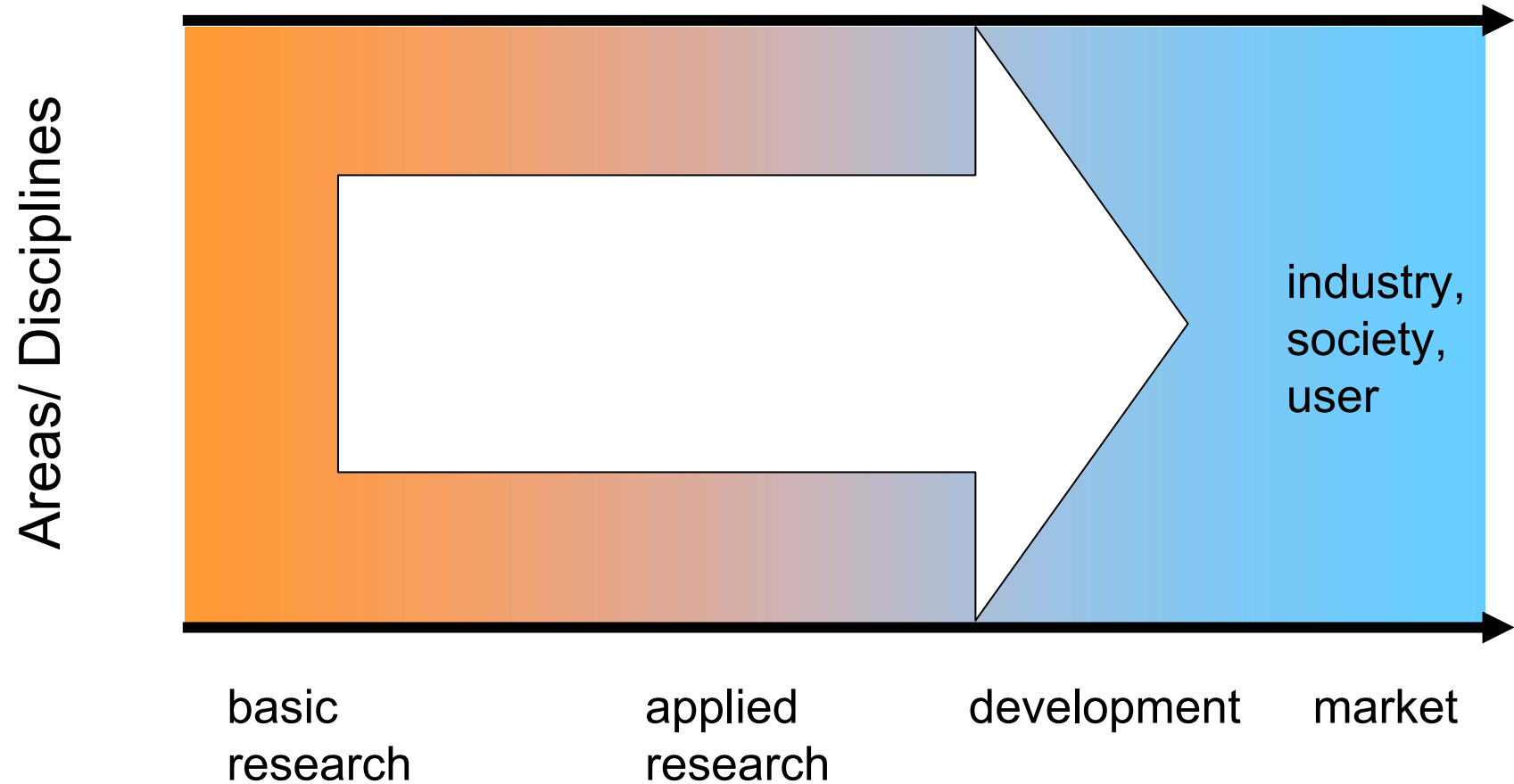
## OUTPUT...!

1. direct → missions with contents for Earth
2. indirect → „Teflon pan – effect“

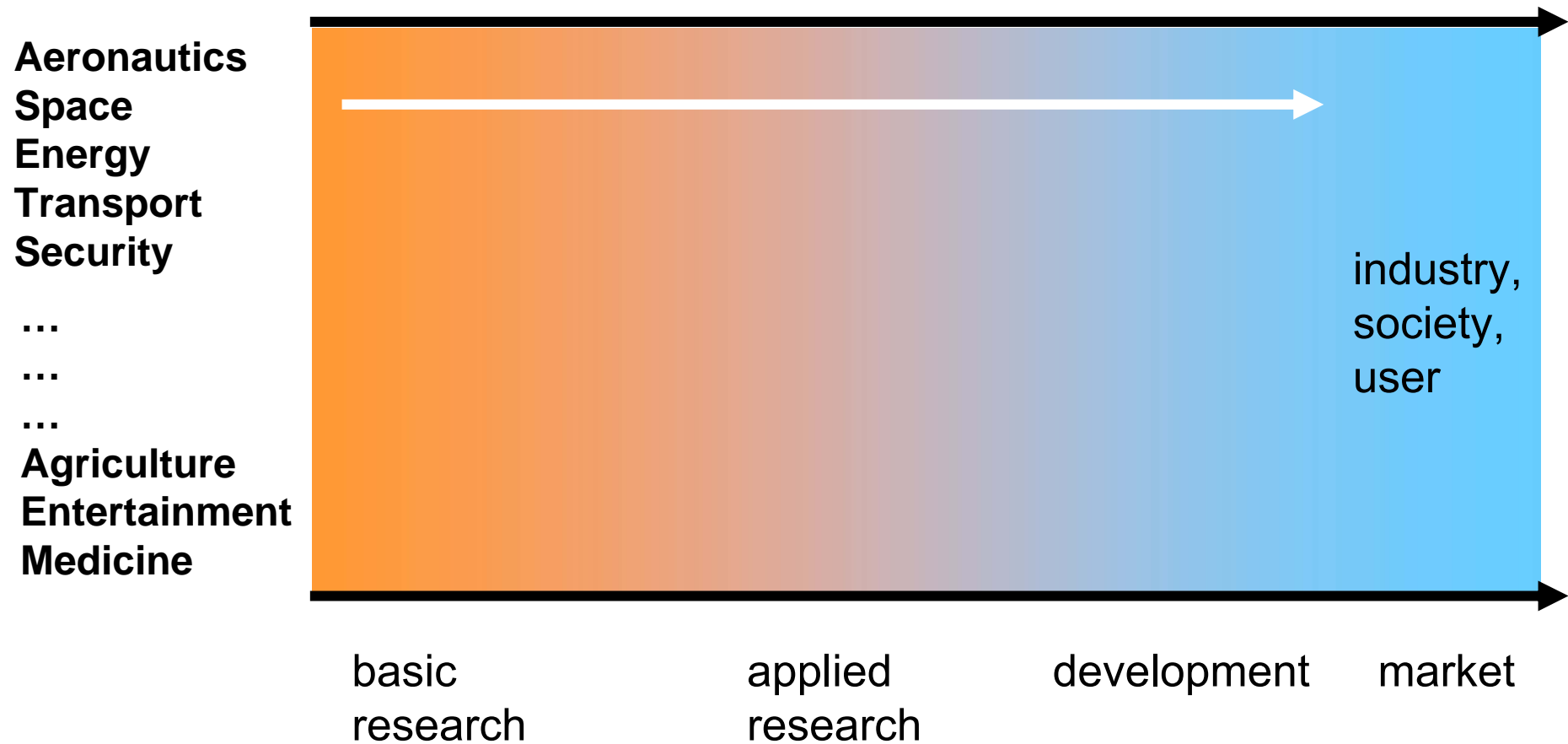




# Invention → Innovation



# Invention → Innovation

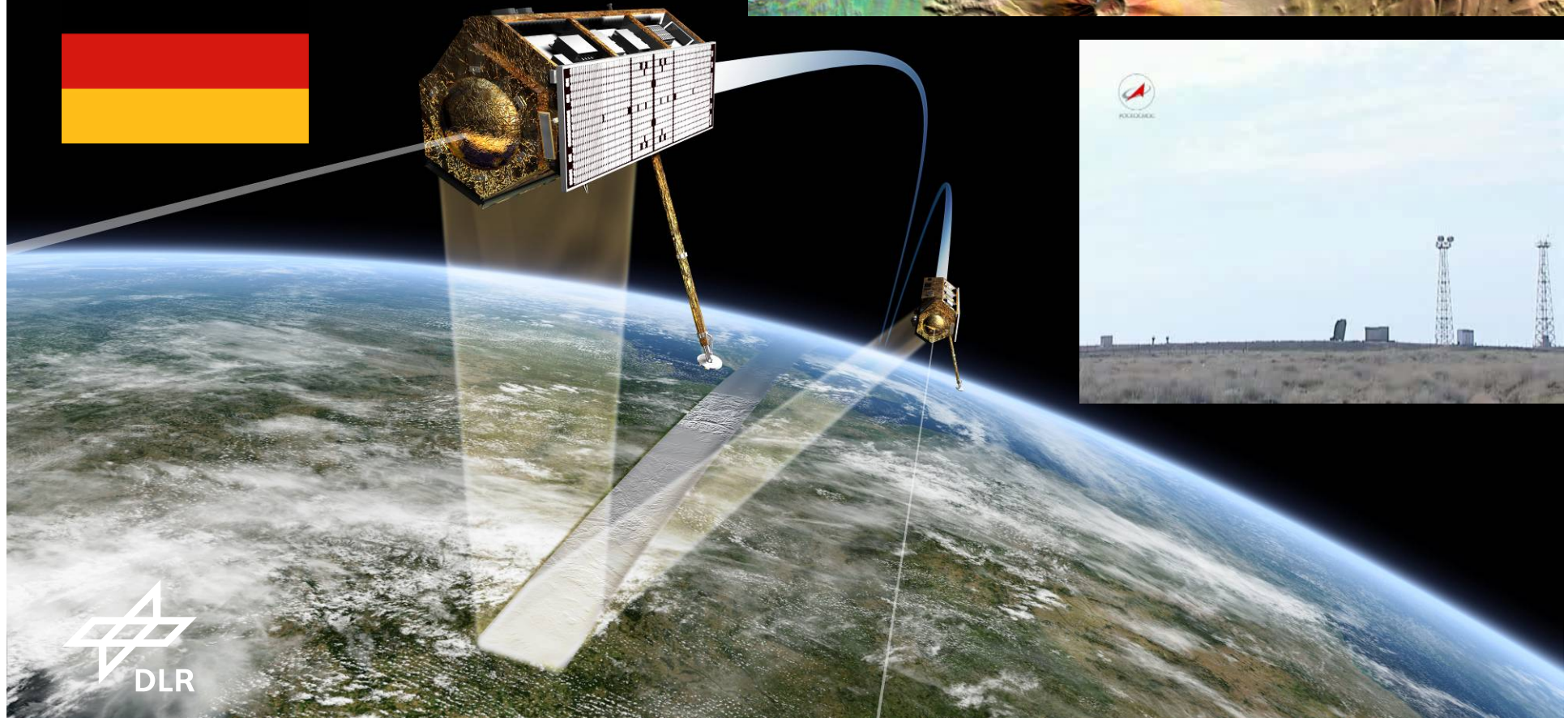
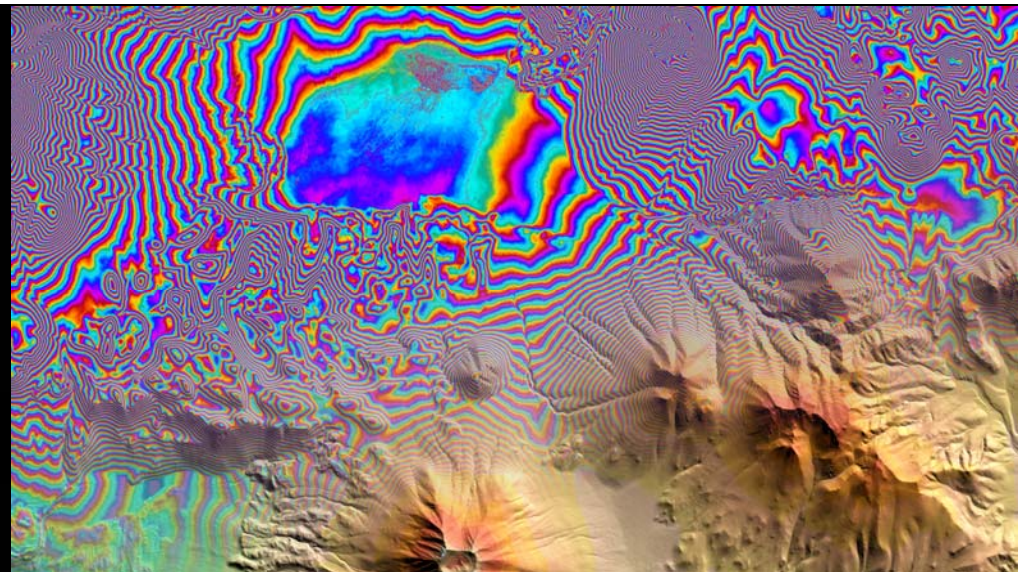




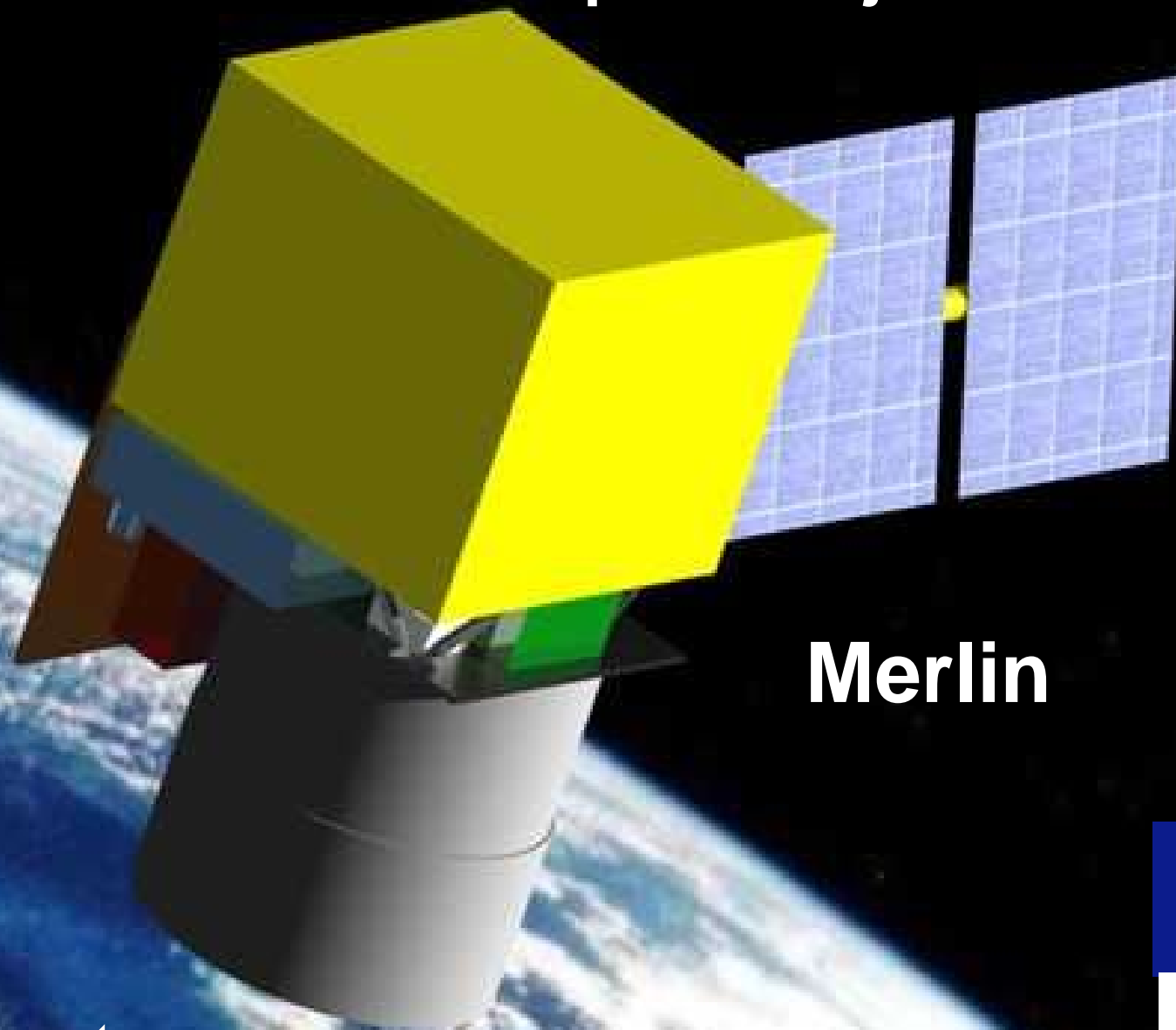
# National Projects



Launch 21<sup>st</sup> June 2010



# Bilateral European Projects

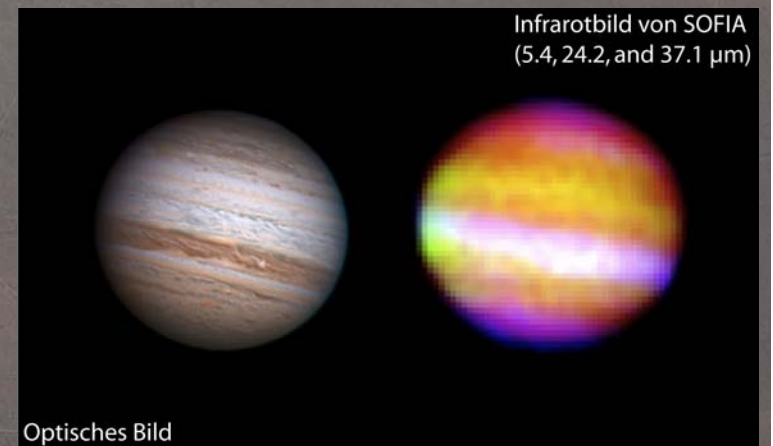
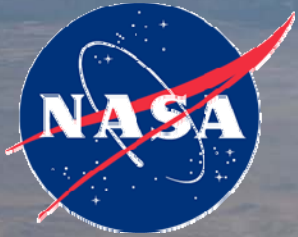


**Merlin**





# Bilateral International Projects



# Satellite-Communication



ESA ARTES 11



Heinrich-Hertz-Mission



SGEO

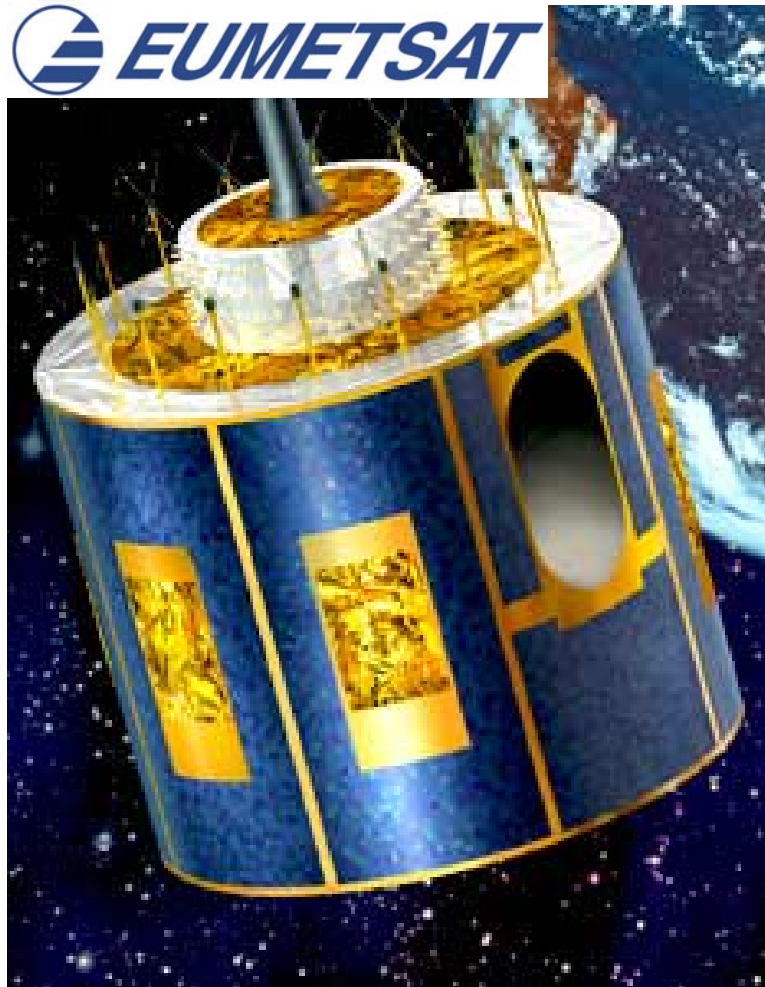




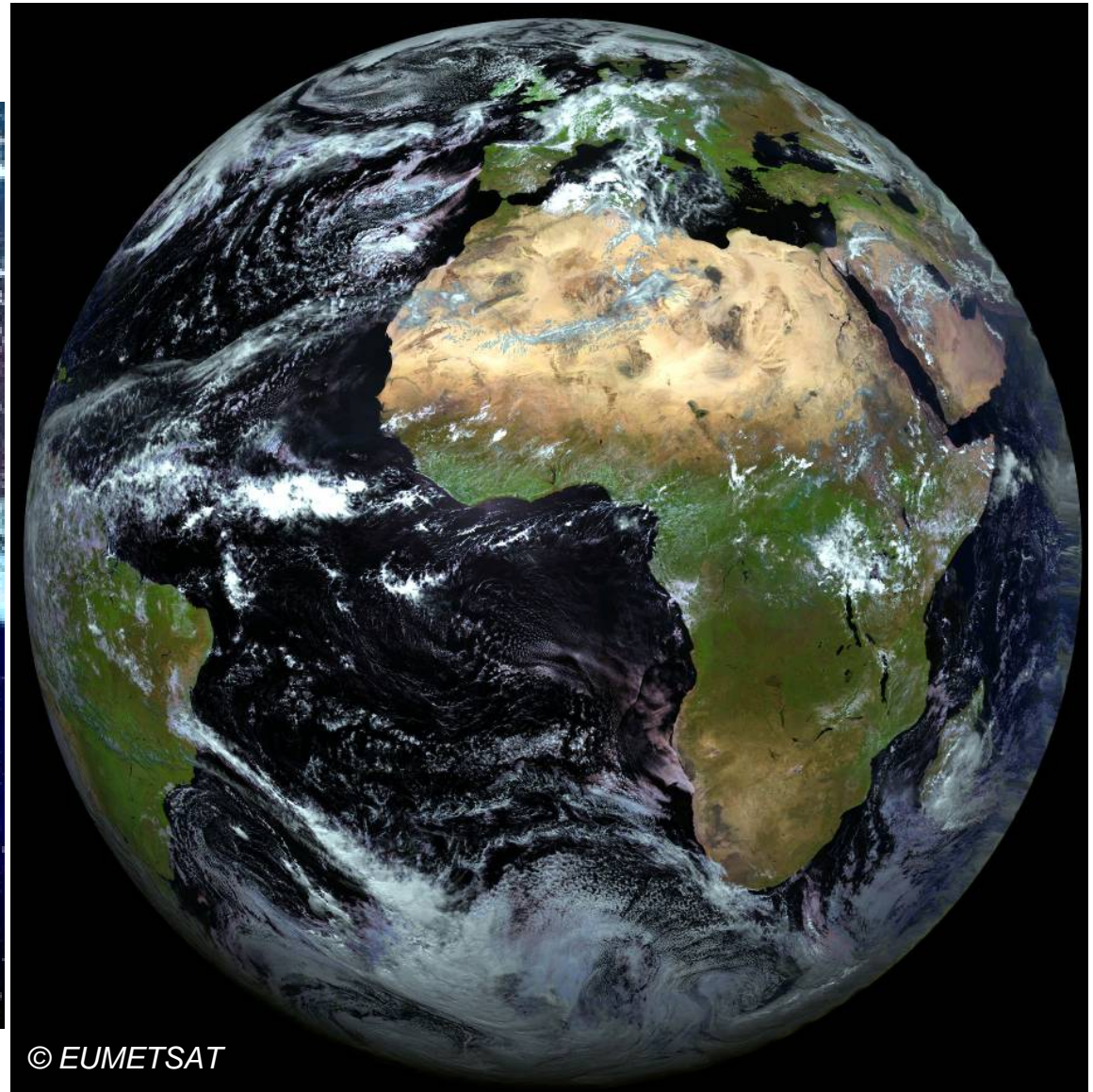
# EDRS



# Weather and climate observation from geostationary orbit



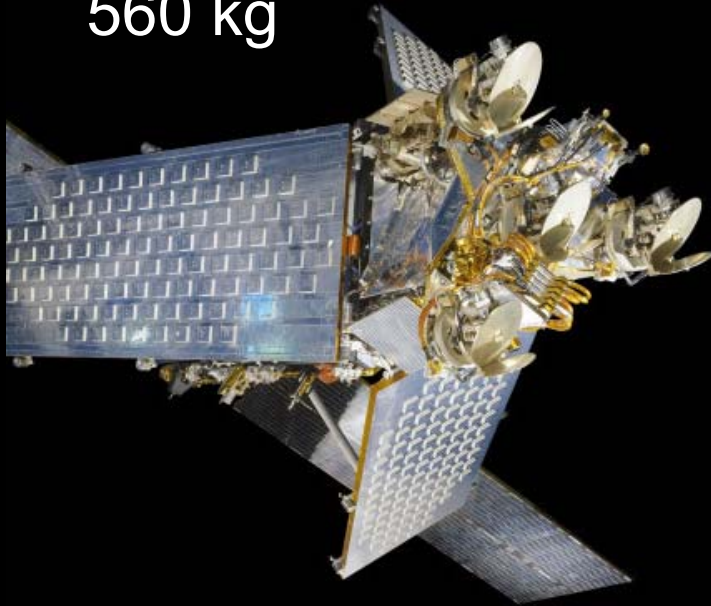
2008: METEOSAT-8







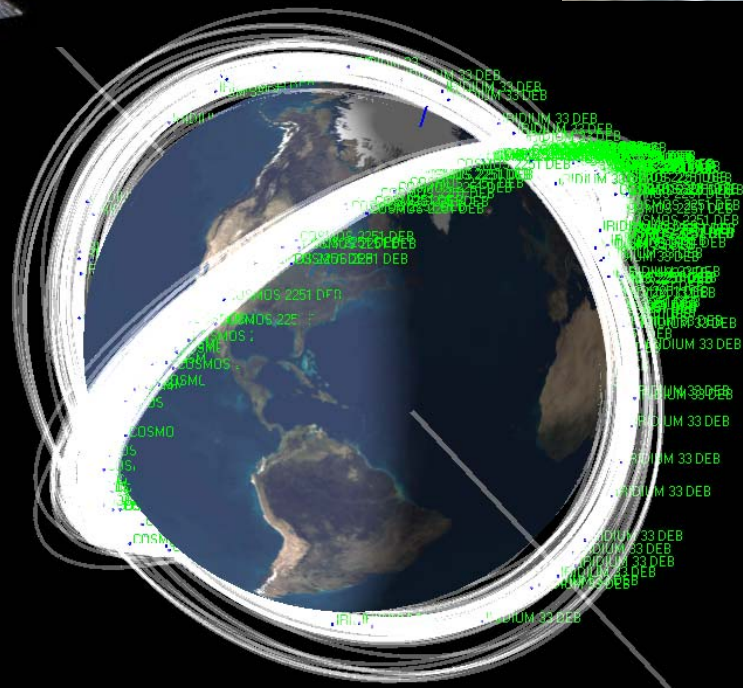
Iridium 33  
560 kg



Kosmos 2251  
900 kg

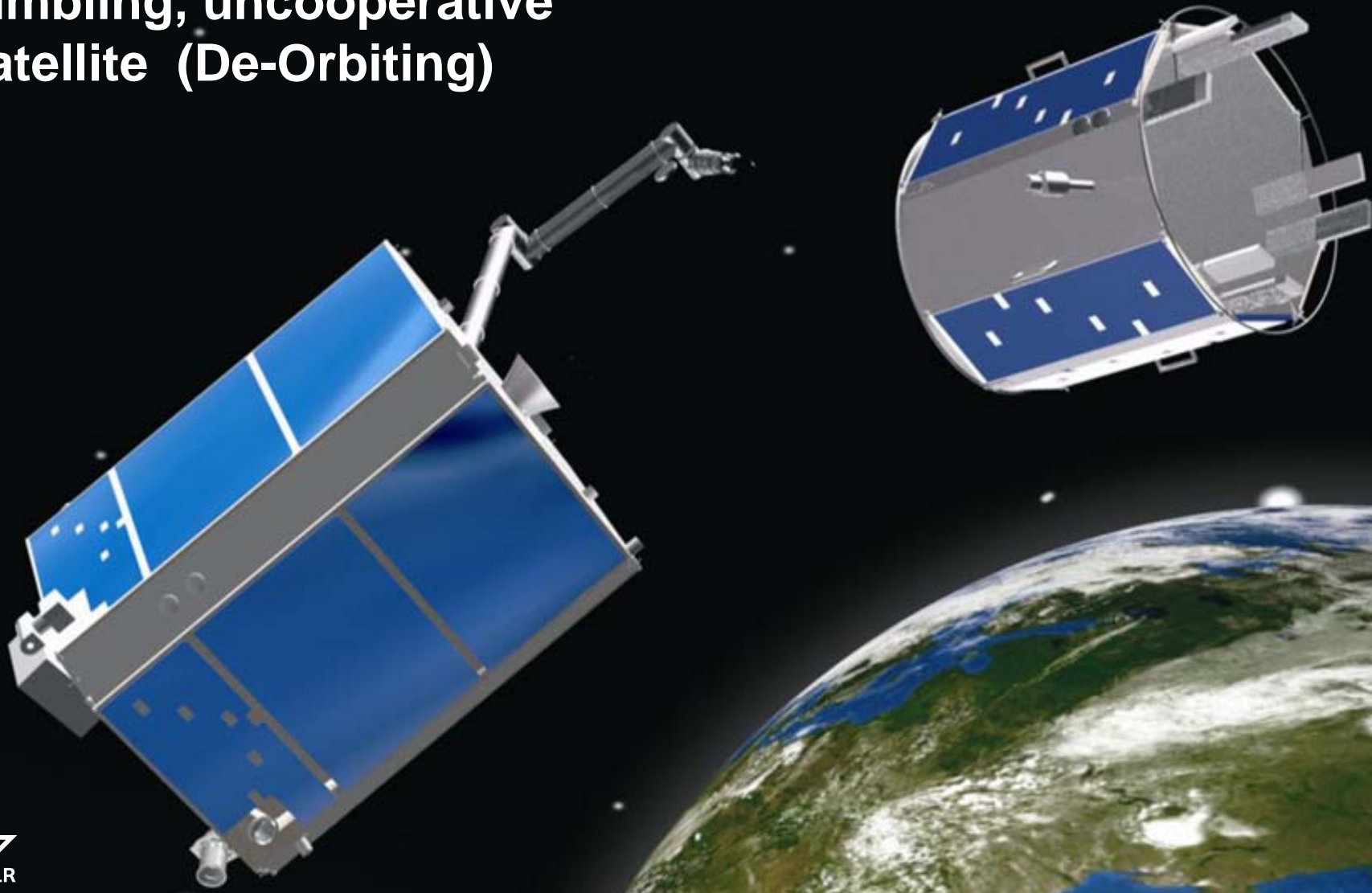


Collision  
10.2.2009

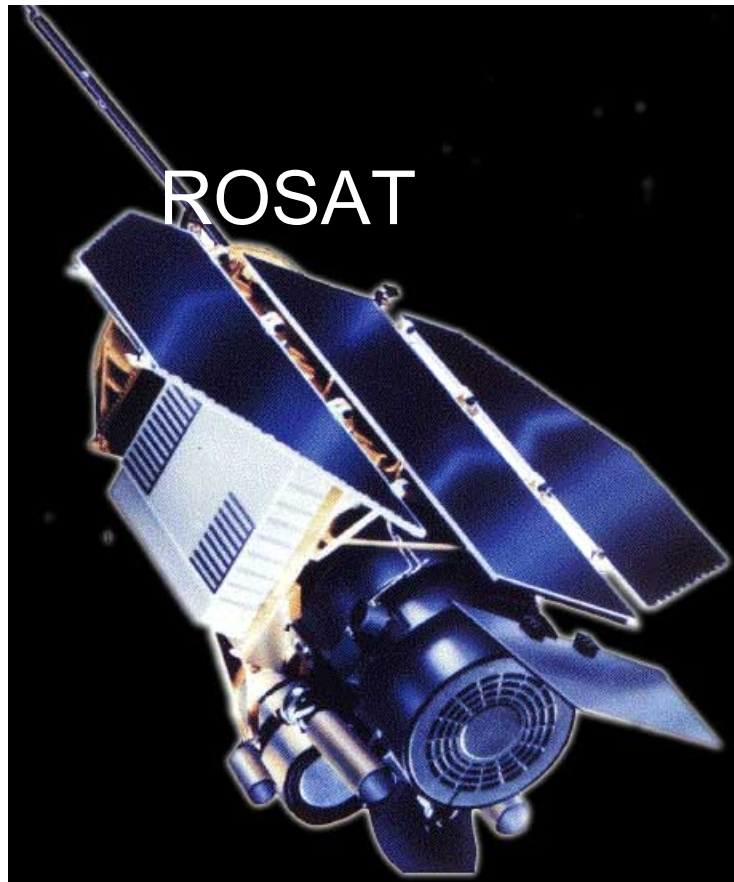


# DEOS – German Orbital Servicing Mission

Capture and disposal of a tumbling, uncooperative satellite (De-Orbiting)







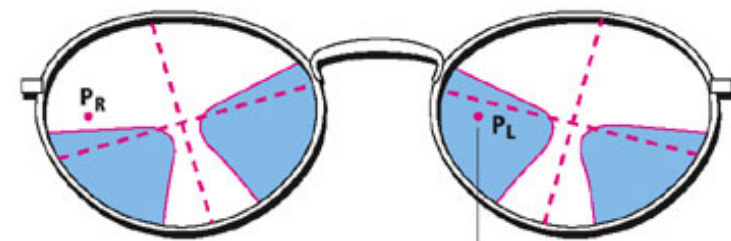
ROSAT

Launch 1.6.1990

Operation - 12.2.1999

Mass 2,5 t

Reentry 20<sup>th</sup>-24<sup>th</sup> Oct. 2011



multifocal glasses

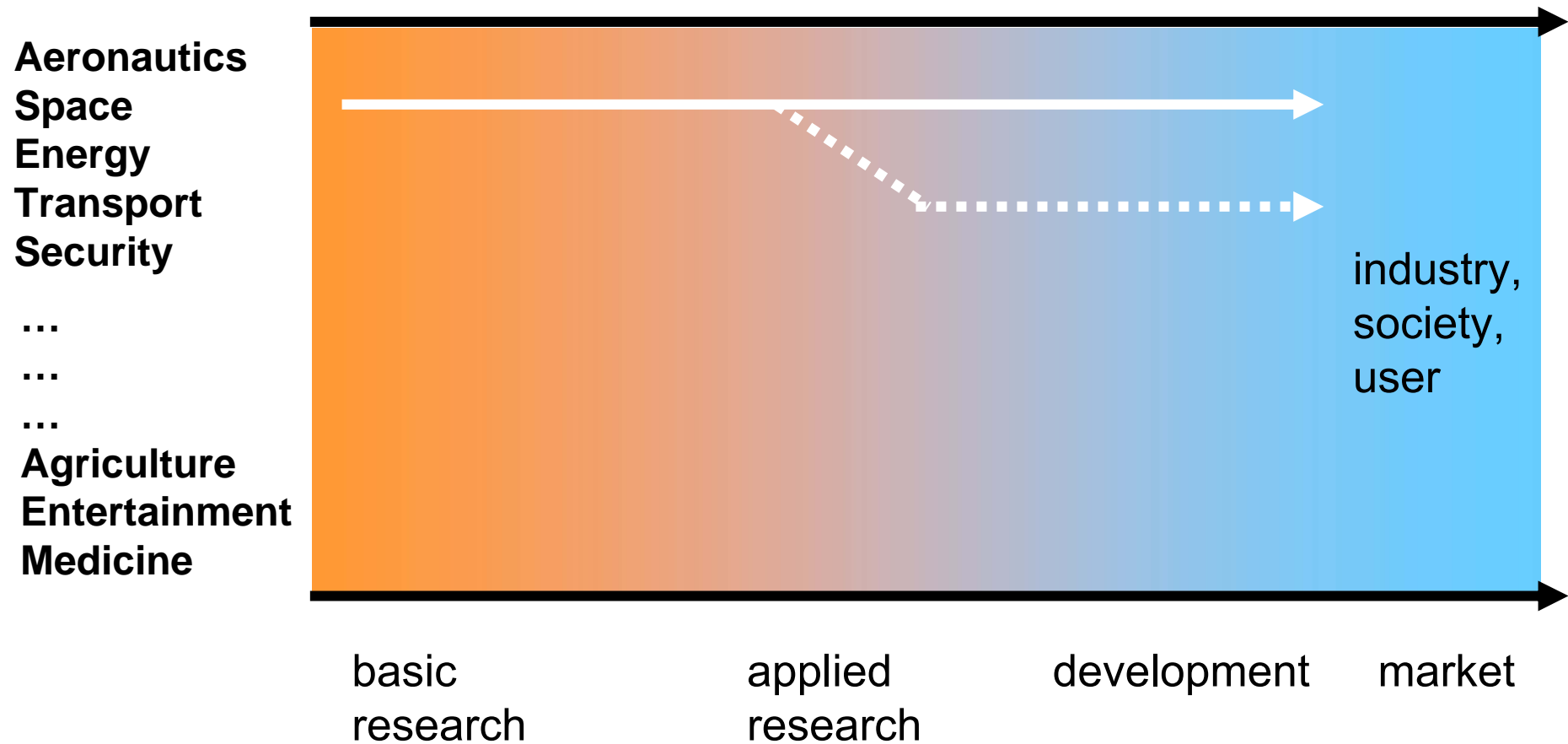


# Innovation

!

?

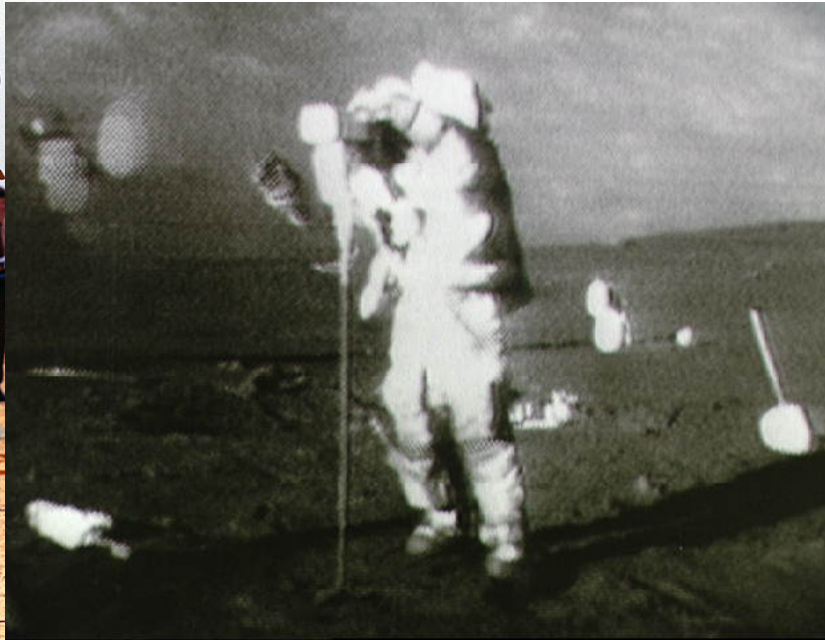
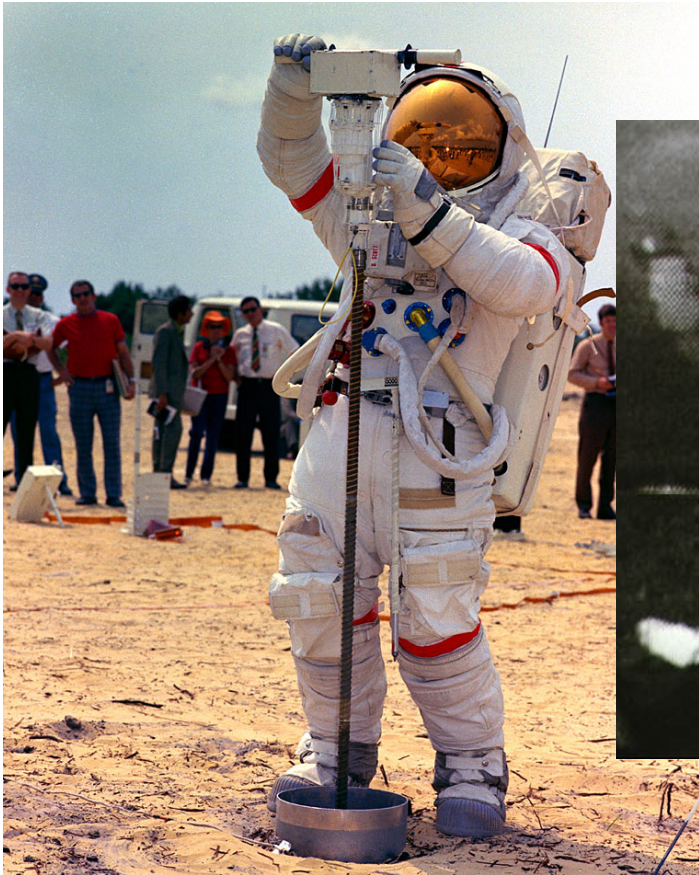
# Invention → Innovation





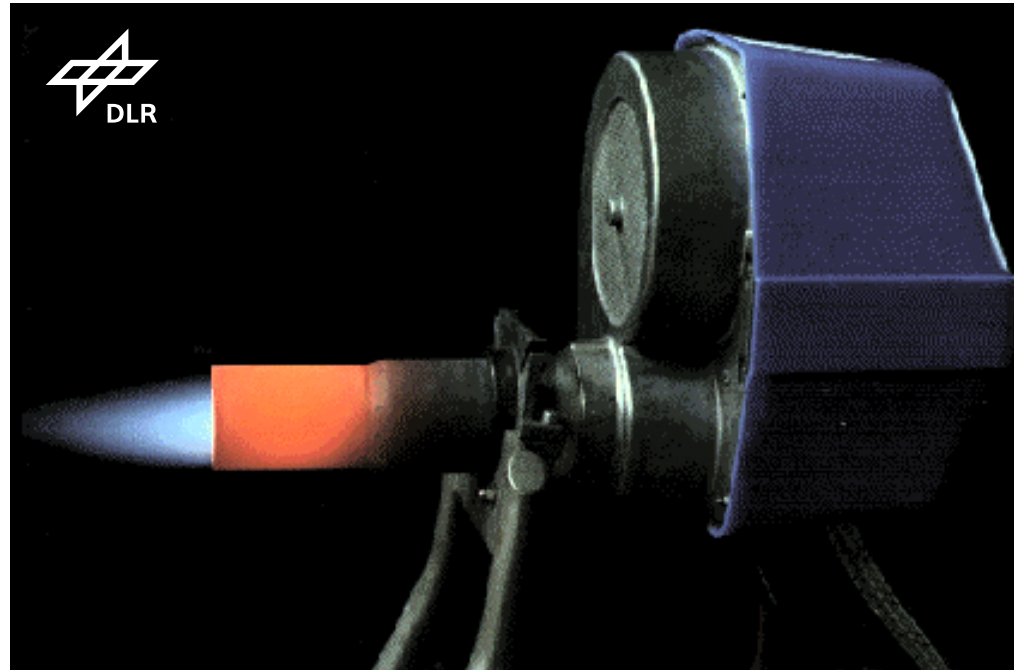
# From Moon to your workshop

## Cordless screwdriver



# From Space into your house

Oil burner with rocket technology





# From Space into your car

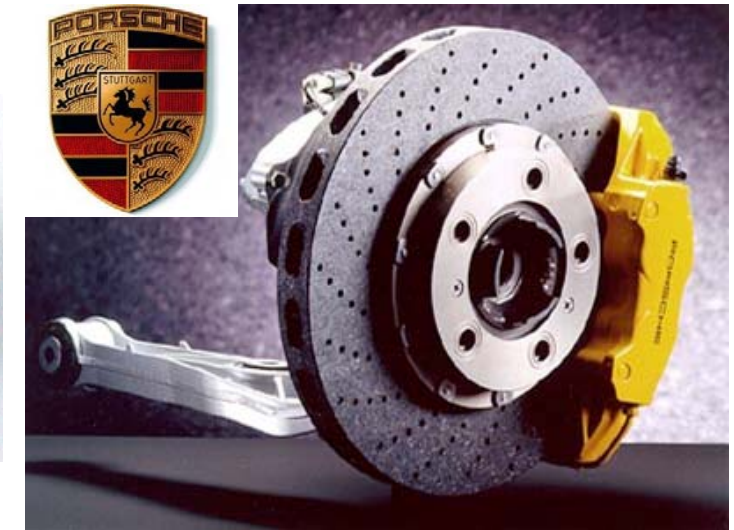
## Thermoelectric generators



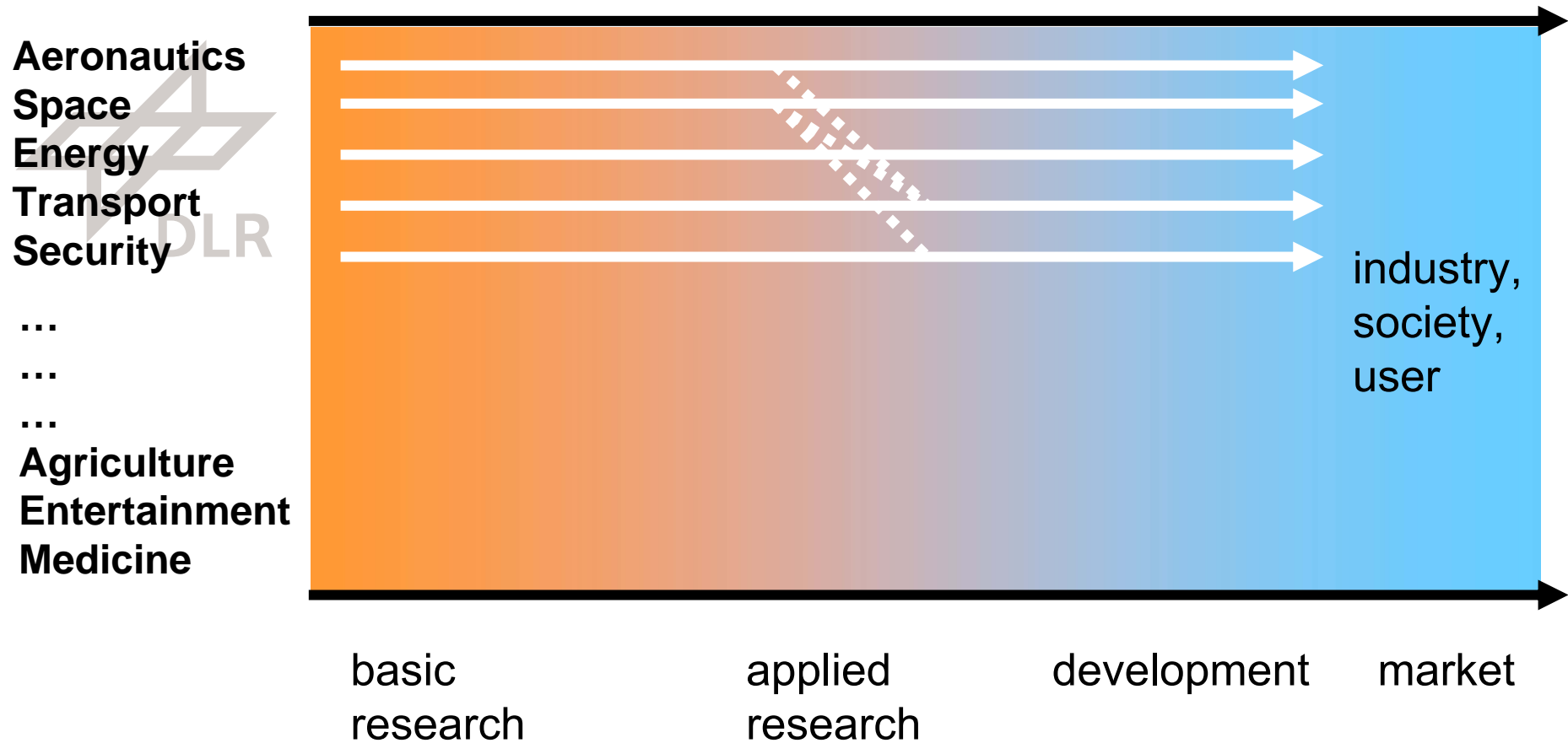


# From Space into your car

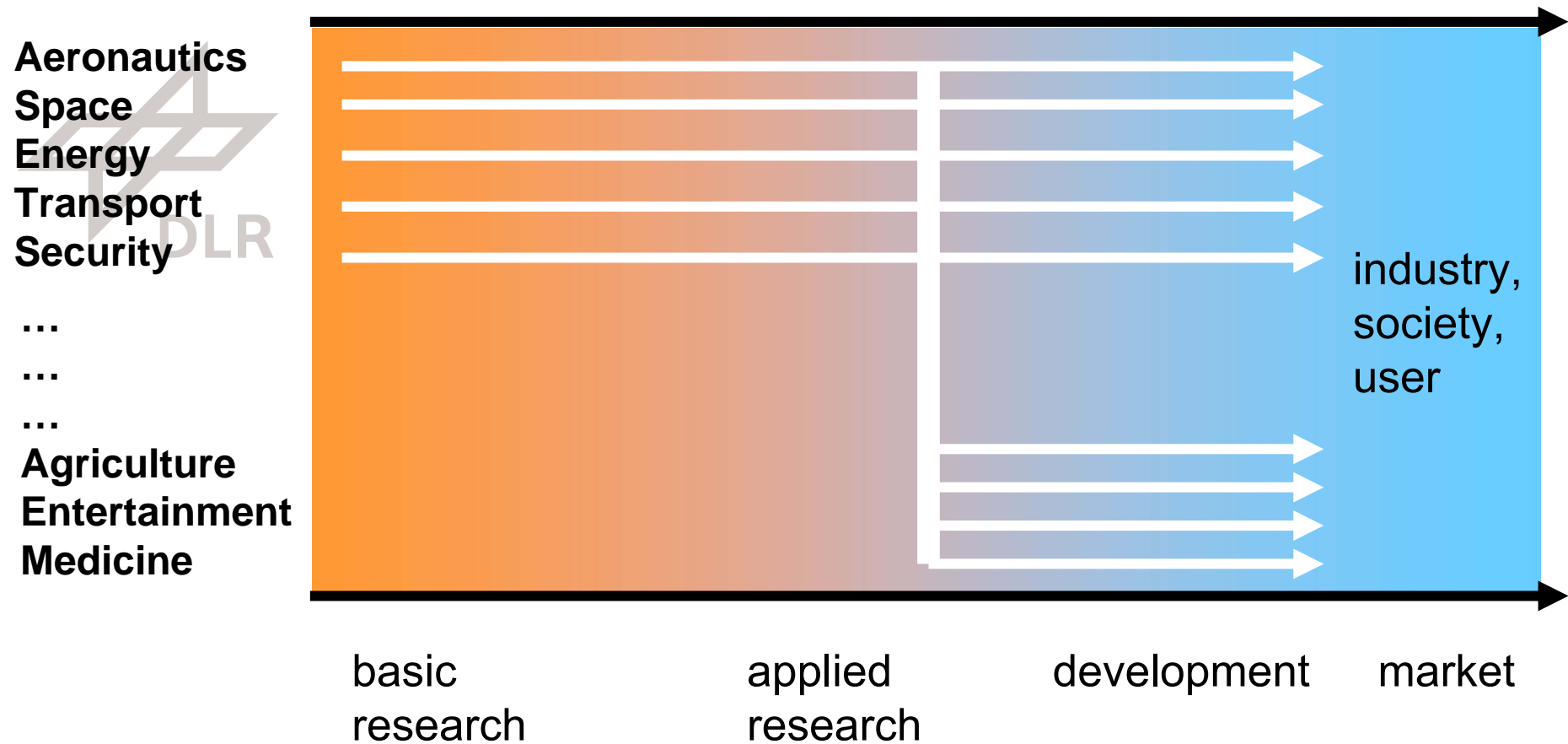
## Ceramic break discs



# Invention → Innovation

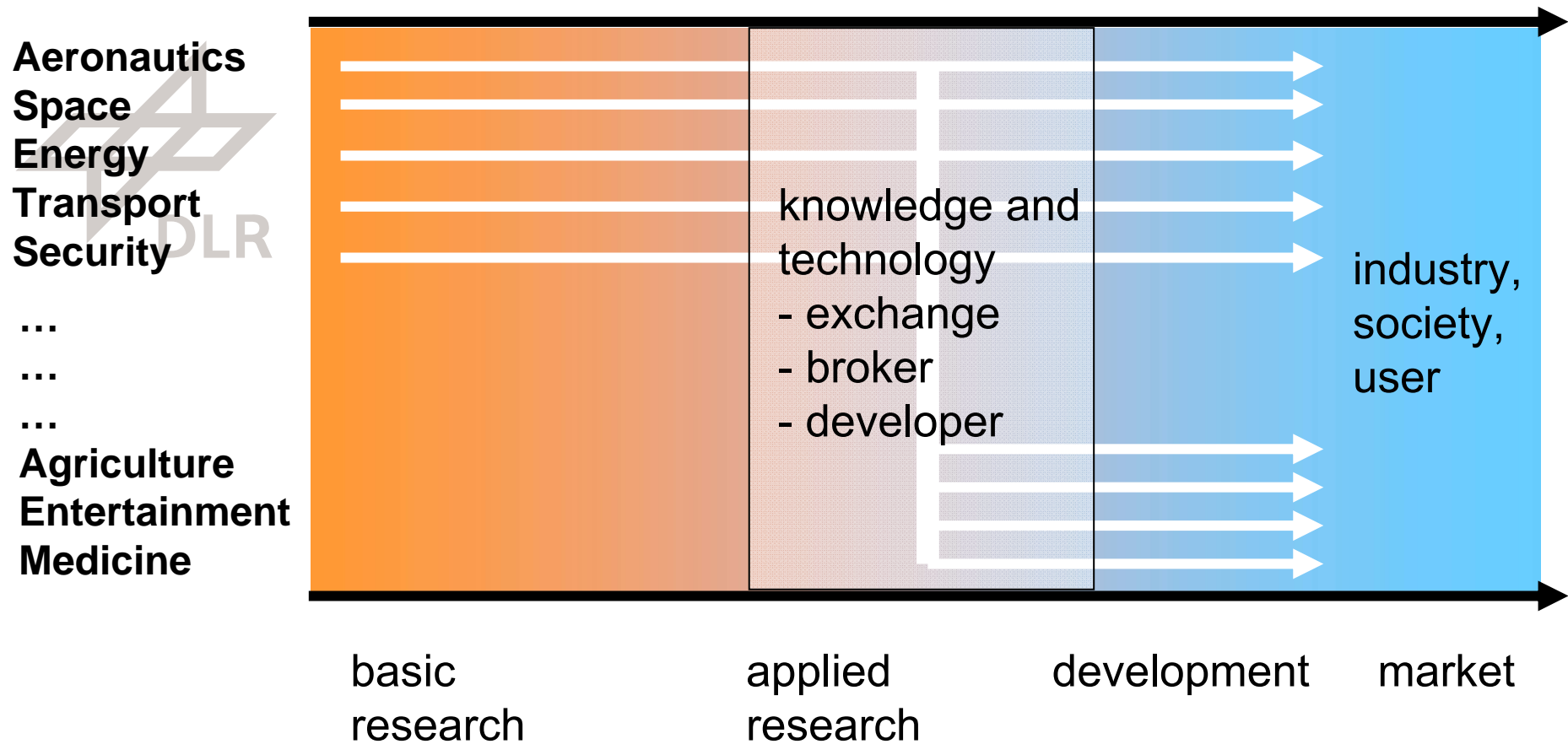


# Invention → Innovation



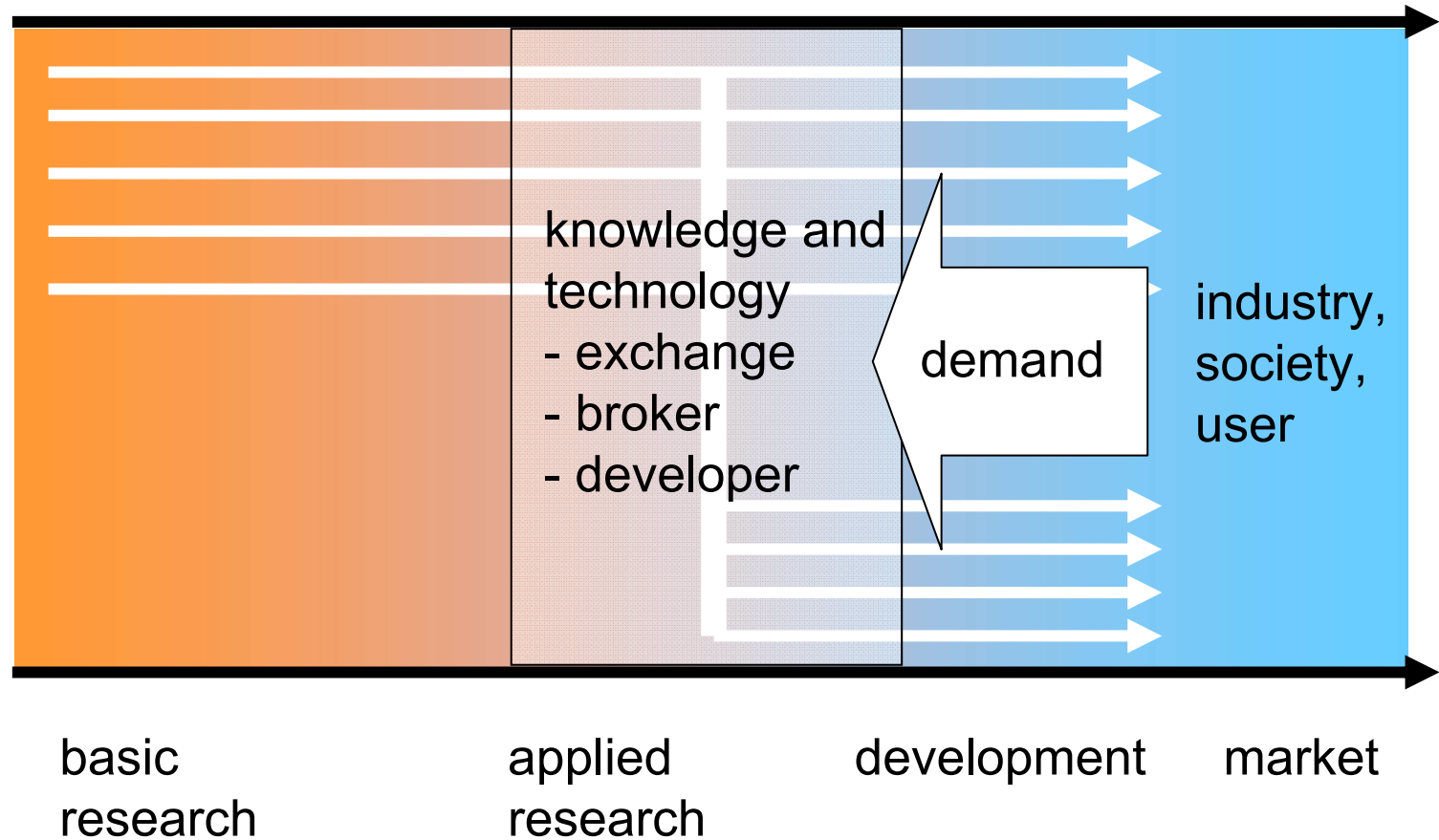


# Invention → Innovation



# Invention → Innovation

Aeronautics  
Space  
Energy  
Transport  
Security  
...  
...  
...  
Agriculture  
Entertainment  
Medicine





Stay Hungry. Stay Foolish.



**Knowledge for  
Tomorrow**



**DLR**

