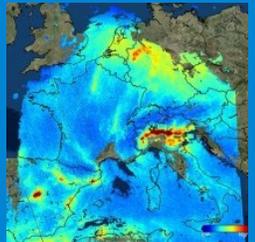


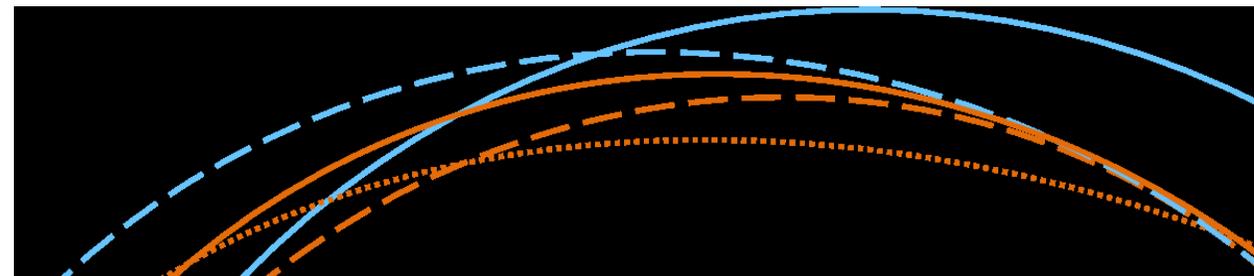
Top sector
HTSM
Roadmap Space
2017-2021



Space within top sector policy



*Aerospace is an
Enabling Technology*



Roadmaps within Top sector HTSM

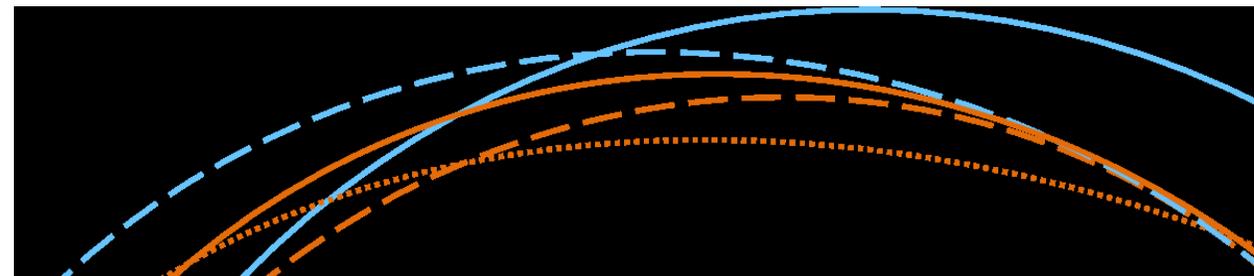
Top sector
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Holland High Tech

Global Challenges, Smart Solutions



- Advanced Instrumentation
- Aeronautics
- Automotive
- Electronics
- Embedded Systems
- Healthcare
- High Tech Materials
- Lighting
- Nanotechnology
- Photonics
- Printing
- Security
- Semiconductor Equipment
- Smart Industry
- **Space**

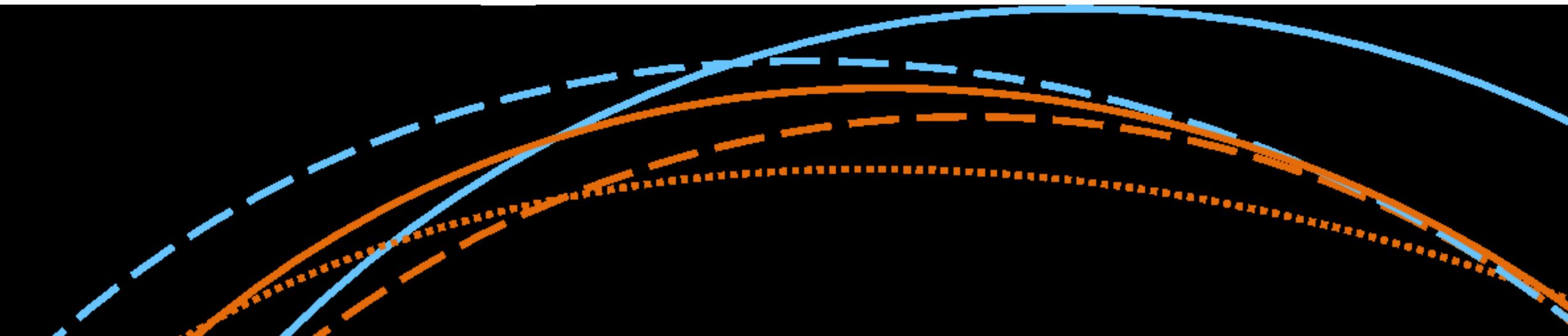


Top sector HTSM Roadmap Space

Space is a **critical enabler for innovation** in technical and societal fields of application and - as such - a cross-sectorial activity in the 'Top sectors'

Fast growing commercial market provides **new opportunities for the Netherlands**. Institutional space programmes remain crucial for level playing field

Continued loyal Dutch participation in ESA is a prerequisite for competitiveness



Space for societal challenges

Space infrastructure & applications → critical enablers for key societal challenges



Climate change
& Air quality



Secure broadband
communication



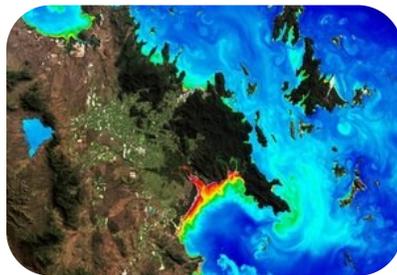
Secure & accurate
navigation and time



Monitoring &
observation



Food &
food security



Water &
water quality



Mobility &
transport



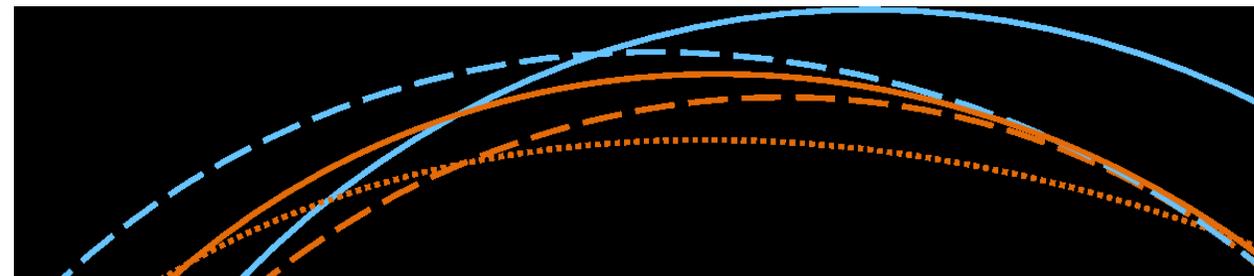
Scientific instruments for
insights in our Universe



Technology drive
& spin-off

Space for economic relevance

- \pm 77% of space economy consists of satellite industry, including:
 - Satellite manufacturing
 - Launch industry
 - Satellite services
 - Ground equipment
- Niche market Small Satellite is showing strong growth
- Institutional actors (national agencies) provide majority of funding
- Competitive position of NL space ecosystem:
 - Turnover: €600 million
 - 4,000 highly skilled knowledge workers
 - Presence ESTEC; 1 of the largest R&D centres in NL
 - Space Campus Initiative
- *NB: NL public investment in space doesn't match sector's potential*



Applications & technologies

Future outlook in present & emerging markets:

Space Infrastructure



- **Satellite market** undergoing fundamental changes
- **Launcher market** → pressure of increased international competition

Space Applications



- **Earth Observation** to be used for wide range of applications. Copernicus will accelerate growth.
- Netherlands successful contributor to **space science**

Space Services



- Growing demand for **secure broadband comms.** served by optical comms. terminals & ground stations
- NL involved in **navigation** services with Galileo Reference Centre

National Strategic Needs



- Space Security Centre (Ministry of Defence) to target **defence & security**
- **Smart Government** → NSO downstream roadmap process & National Satellite Data Portal

Priorities & implementation

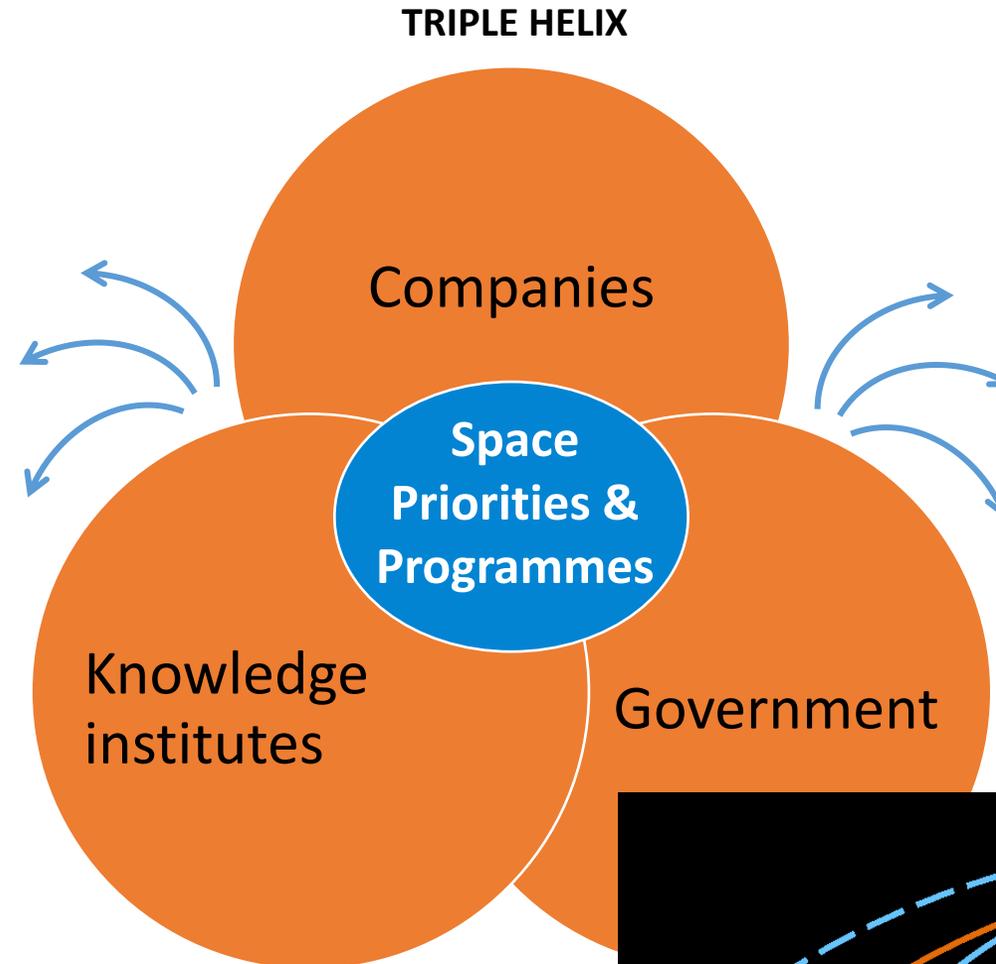
PPP for Space Instruments & Applications Preparatory Programme

Stimulating PP cooperation:

- **DOC** - Dutch Optics Centre
- **SAM-XL** - Smart Advanced Manufacturing XL
- **Space Campus**

NSO Roadmaps:

- Outline the needed development of key technologies
- Public/ private budget needed
- Implementation

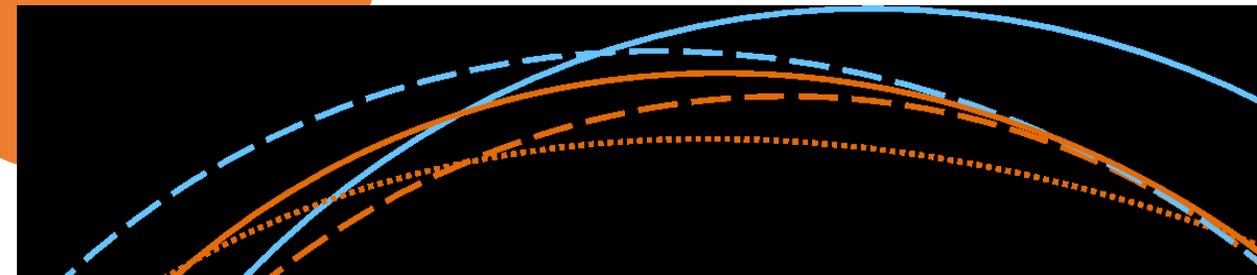


Transition from institutional (science focus) towards commercial:

- After satcom, now EO
- New players US shape use of space
- Europe: more countries at play + private investments lagging behind

Changing role of government

- As launching customer / direct (smart-) buyer of space solutions
- EU + ESA → joint Space Strategy. NL involvement through mandatory/ optional programmes, and EU framework Programmes



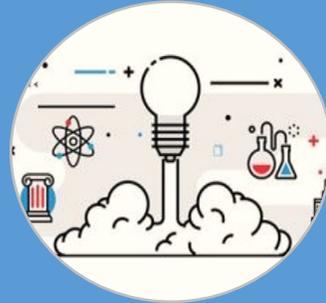
Partners & processes



Loyal NL participation in ESA programs is prerequisite



Research agendas international space agencies



Collective European R&D, backed by national R&D



Scientific activities based upon NWO ambitions



National R&D elaborated in NSO Technology Roadmaps



Private Investments in PPP's for ESA and EU programs

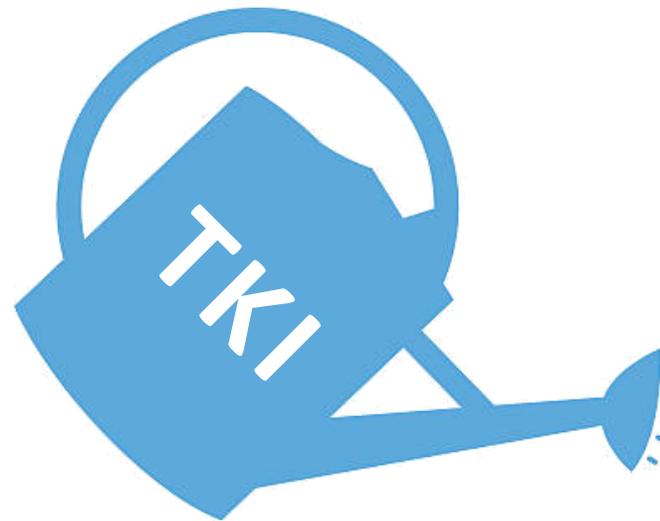
Implementation through regional, national and international partnerships

Partners & processes

Top sector
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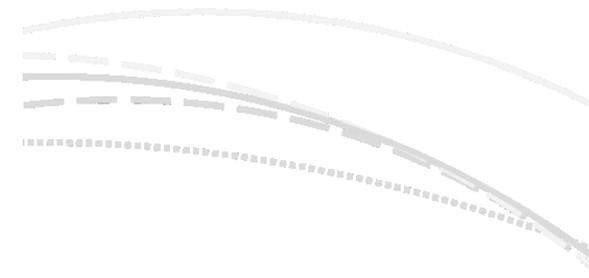
TKI - Topconsortia voor Kennis en Innovatie



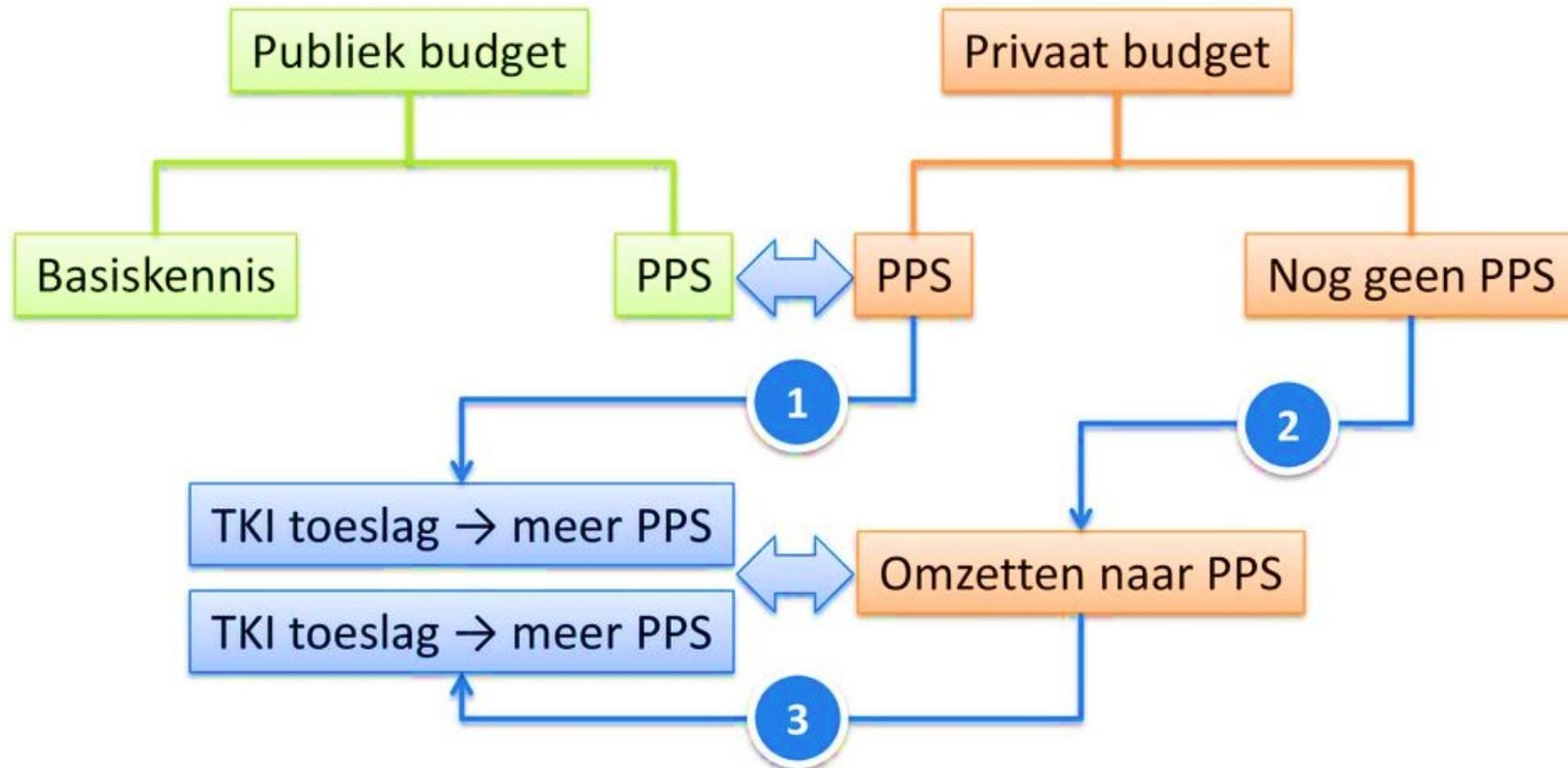
Additional budget
for R&D

innovatic

PPP



TKI - mechanism

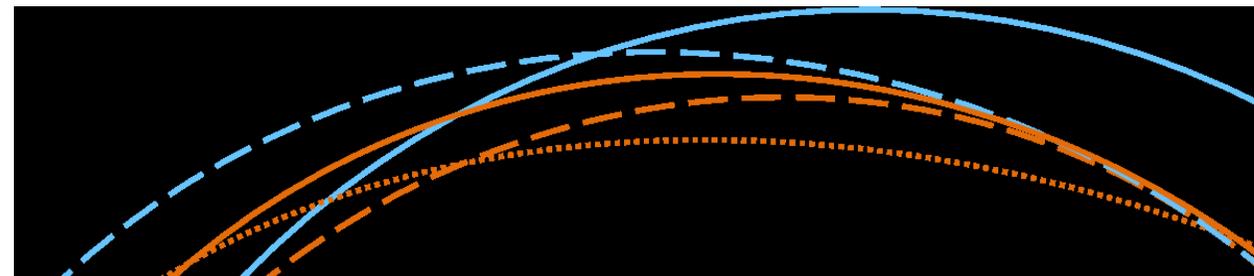


Investments

Roadmap	2017	2018	2019	2020	2021
Industry	6	6	7	8	9
TNO	4	4.5	4.5	5	6
NLR	1	1.1	1.1	1.2	1.2
NWO-SRON PPS/PPP	3.5	3.5	3.5	3.5	3.5
Universities	10	12	12	12	12
Government support space programmes	80	90	90	100	100
Departments and regions	4	4	4	4	4
Grand total	108,5	121,1	122,1	133,7	135,7

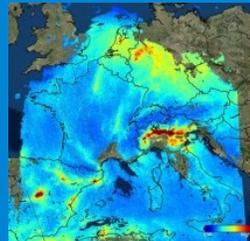
Concluding

- Space is a roadmap of its own
- Objective of authors: all NL organisations are recognised in the Roadmap Space
- It's up to all of us to give substance to it by obtaining TKI premiums
- Space has great added value for the NL; joint lobby essential for adequate public & private investment in order to maintain our level playing field in international context



Top sector **HTSM**

Roadmap Space **2017-2021**



www.hollandhightech.nl/nationaal/innovatie/roadmaps