Bridging Curiosity-Driven Research and Innovation in Space Science: a Gender-Balanced Approach for Flanders

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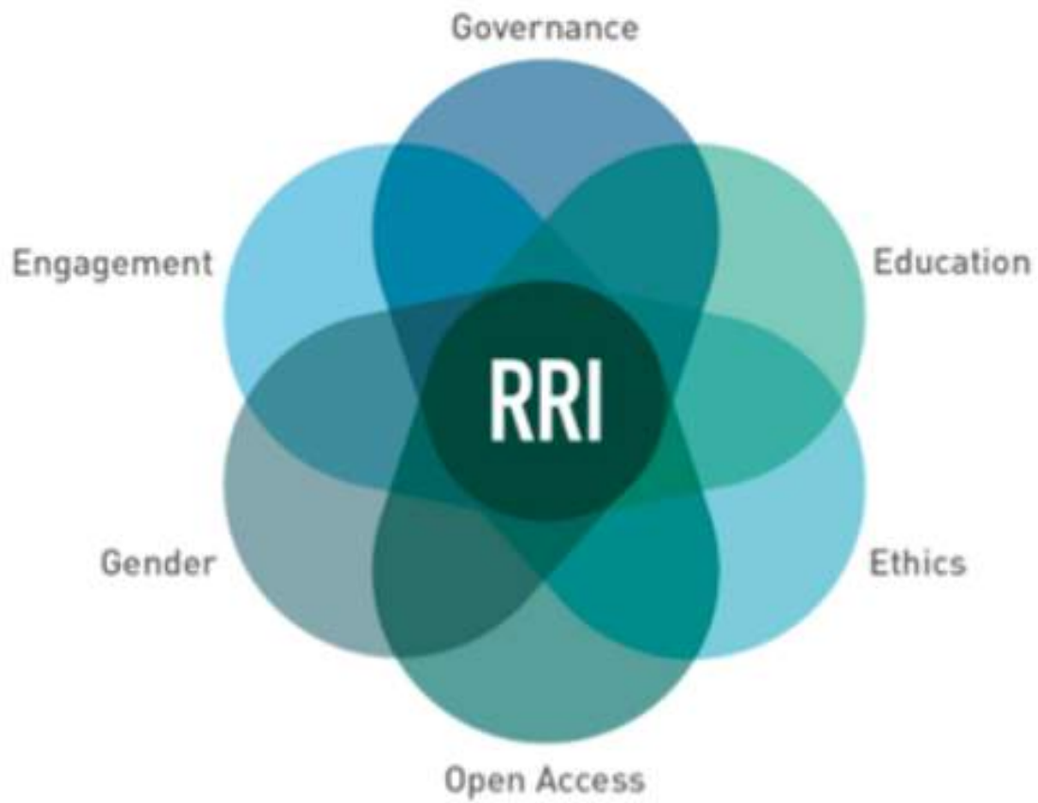
THE SIX PILARS OF RRI

http://www.rri-tools.eu/

Open Access
addresses issues of access
scientific information. Free
work might improve the qu
facilitate fast innovation, c
peers, and productive dialo

Public Engagement
fosters R&I processes that
all societal actors work tog
in order to align its outcom
expectations of society.

Science Education
focuses on (1) enhancing t
better equip citizens with t
skills so they can participat
increasing the number of r
vocations).



Ethics
egrity: the prevention of
earch practices; and (2)
cceptability of scientific
ological developments.

Gender Equality
lanced teams, ensuring
odies, and considering
I to improve the quality
elevance of the results.

Governance
e and desirable futures
le to the unpredictable
ernance); (2) be familiar
actices in R&I; (3) share
mong all actors; and (4)
ts to actually foster this
shared responsibility.

PRELIMINARIES ON RESEARCH FUNDS

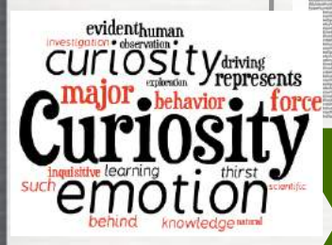
Pillar I (ERC/MSCA) & FET in H2020

Pillars II & III in H2020

1. Major **need for collaborative discovery research;** H2020 restrictions to TRL 1,2,3 problematic (LERU, 2016, http://www.leru.org)
   - calls heavily oversubscribed: few % successrate…
   - TRL>3 is not a good criterion: too much steering
2. Too low level of **women's participation in leadership & decision-making in research & innovation**: limits inclusive socioeconomic growth (Lee & Pollitzer, Gender Summit Report, 2016)

   → **obliged gender education**, from schools to managers

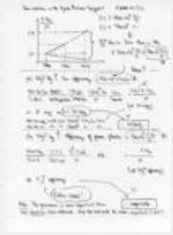
THE CASE OF SPACE SCIENCE



Agency Call

Selection (~3/50)

Selection (1/~3)



System Design review

Launch

End of mission

Idea | Phase A | Phase B | Phase C/D | Phase E | Post ops

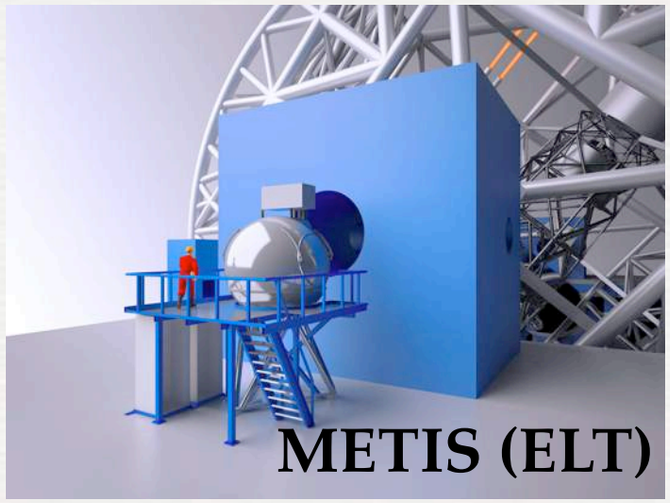
-12y | -10y | -8y | -5y | T0 | +3y | +6y

- -10y: Proof of concept; Feasibility technology; Feasibility budget
- -8y: Baseline technical solutions; Schedule; Specifications
- -5y: Design & Development; Integration & Test; Launch campaign
- T0: Operations; Exploitation
- +3y: Final calibration; Documentation; Legacy data; Exploitation

Timeline of a typical ESA space science project

THE CASE OF SPACE SCIENCE

Extremely Large Telescope (ELT)


METIS (ELT)

Large ground-based
ESO infrastructure
& instruments
= similar situation

- **1) Idea = curiosity-driven** = selection criterion; **2) feasibility checks on technology; 3) EU space industrial capability; 4) national funding policies (MLAs)**
- **Long-term policy/costing is required: hard- & software; big data handling, archiving, maintenance,… (STEM!)**
- **Public outreach & educational projects included**
- **Data = public after 1 year (nobody owns stars & planets…)**
- **Large gender-imbalance, both in science & management**

SUCCESSFUL RRI: VIB (20 YRS)

VIB

HOME | RESEARCH | TRAINING | CONFERENCES | BUSINESS OPPORTUNITIES | ABOUT VIB

VIB is a life sciences research institute, based in Flanders, Belgium. We perform basic research with a strong focus on translating scientific results into pharmaceutical, agricultural and industrial applications.

eulife

Research

- Departments and campuses
- Research areas
  - Bioinformatics
  - Cancer
  - Cardiovascular medicine
  - Developmental biology
  - Inflammation and immunity
  - Microbiology
  - Neuroscience
  - Plant biology
  - Proteomics
  - Structural biology
  - Systems biology
- Model organisms
- Technologies
- Core facilities

Training

- TRAINING AT VIB
- PhD Programme
- Omics@vib

Quick links

- Contact information
- VIB Vision and HR Strategy
- Press
- Who's Who

Alliances

- EU-LIFE

Business op

- Licensing
- Biotech R&D Part
- Facilities for biot
- Spin-offs
- Research service

Jobs

- PhD positions
- Postdocs
- Senior scientific
- Technical suppor
- All jobs

SUCCESSFUL RRI: VIB (20 YRS)

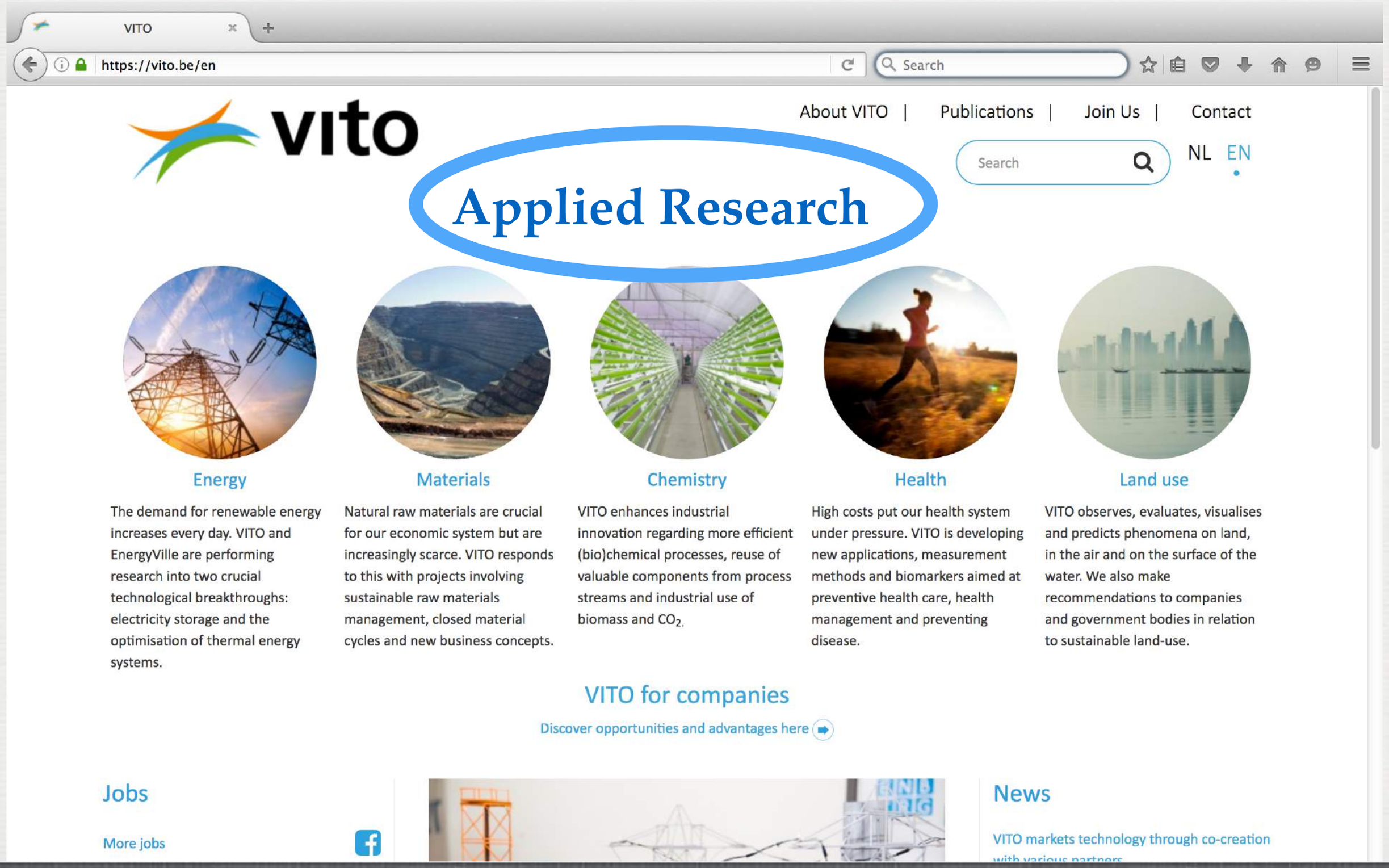
- **High focus on fundamental research:**
  28 ERC grants! (1.5 to 2.5 M€ each)
- **Decentralised @ 5 Flemish universities**
- **Gender balance improving, but tough**
  in management positions…

NOTE, so far :

- **Belgium hosts 150 ERC grants:**
  108 at Univ. Flanders,
  38 at Univ. Wallonia,
  4 at Federal Institutes
  (cf. NL has 354…)

European Research Council

SUCCESSFUL RRI: VITO (25 YRS)



SUCCESSFUL RRI: VITO (25 YRS)

- **High focus on technology development, with attention to sustainability, for companies & governments:**
no ERC grants(?), yet highly successful project income (topics of pillars II & III H2020)
- **Limited joint PhD & postdoc research with universities**
- **Centralised @ Mol (OK, since focus is NOT fundamental basic research)**
- **Gender balance??**

SUCCESSFUL RRI: IMEC (32 YRS)

- High focus on technology development, with attention to health, energy, ICT, for research institutes, companies & governments: some ERC grants, highly successful project income (mainly pillars II & III H2020)

- Strong joint PhD & postdoc research with universities (&VIB)
- (De-)Centralised @ Leuven (UGent, UHasselt, NL, international)
- Gender balance??

THE CASE OF SPACE SCIENCE

Space (Science) is everywhere in B;
policy too disconnected from scientific impact (e.g.,citations) & international competition (e.g., ERC grants)

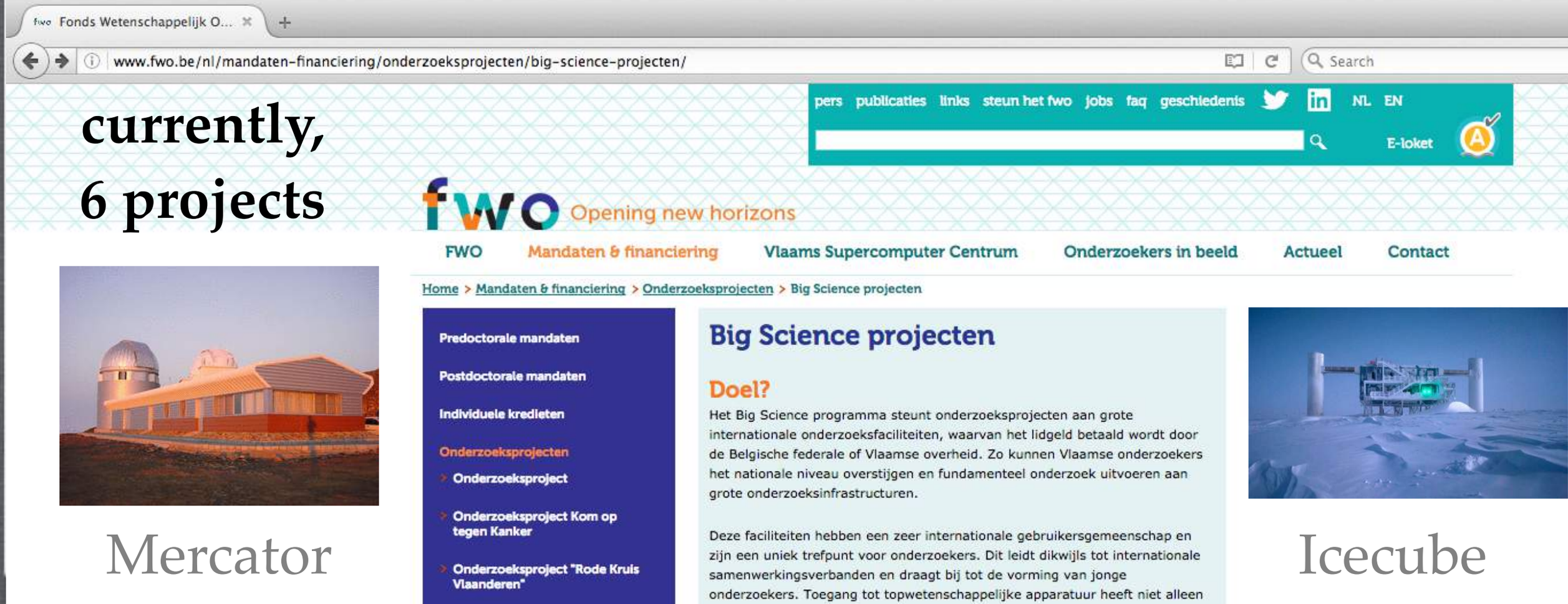
In terms of instrumentation & industrial development:
Belgium modest player @ ESA, NO player @ ESO:
limited funds; strategy insufficiently based on international scientific leadership
i.e., lack of RRI…

TOWARDS RRI IN BELGIAN SPACE SCIENCE

- **Various organisations dealing with space science: ESA & ESO are treated by Belspo, in ≠ way (why?)**
- **3 FWIs: BISA, ROB (1 ERC grant), KMI: separated from bachelor, master (& PhD) research education…**
- **FWO, BIG SCIENCE: operational & logistics costs for participation in international infrastructure (cf. ESFRI);**

currently, 6 projects

Mercator



Icecube

TOWARDS RRI IN BELGIAN SPACE SCIENCE

- Belspo ESA & ESO treated in ≠ way (why?)
- FWIs: BISA, ROB (1 ERC grant), KMI
- (2)6 FWO (astro)physics Big Science projects
- Von Karman Institute (Belspo, 60 yrs, 2 ERC grants): limited collaboration with other Belgian actors

TOWARDS RRI IN BELGIAN SPACE SCIENCE

- Belspo ESA & ESO treated in ≠ way (why?)
- 3 FWIs: BISA, ROB (1 ERC grant), KMI
- (2)6 FWO (astro)physics Big Science projects
- Von Karman Institute (Belspo, 60 yrs, 2 ERC grants)
- Universities: 9 (!!) ERCs in space science (PE9 & PE10)
  4 KU Leuven, 3 ULg, 1 VUB, 1 ULB;
  several FP7 & H2020 projects in space science

6 ERC grants by women, 6 ERC grants by men;
yet, these women not involved (?) in current reform of space science & space technology in B…

TOWARDS RRI IN BELGIAN SPACE SCIENCE

- Appropriate governance: cf. VIB model, **i.e. couple basic ERC/H2020 research done at universities/FWIs to industry**
- Selection of space science missions is international & at 2% success-level: implementation should be no-brainer ⟷ B industry rather technology-driven: **bridge fundamental science & innovation: translational**
- Belgian scientists & industry should be able to sign in for **Phase A studies!! for ESO as well as ESA**
- Public Engagement: **space science education (STEM) & outreach** should be facilitated & included in career evaluations (schools, universities, companies)

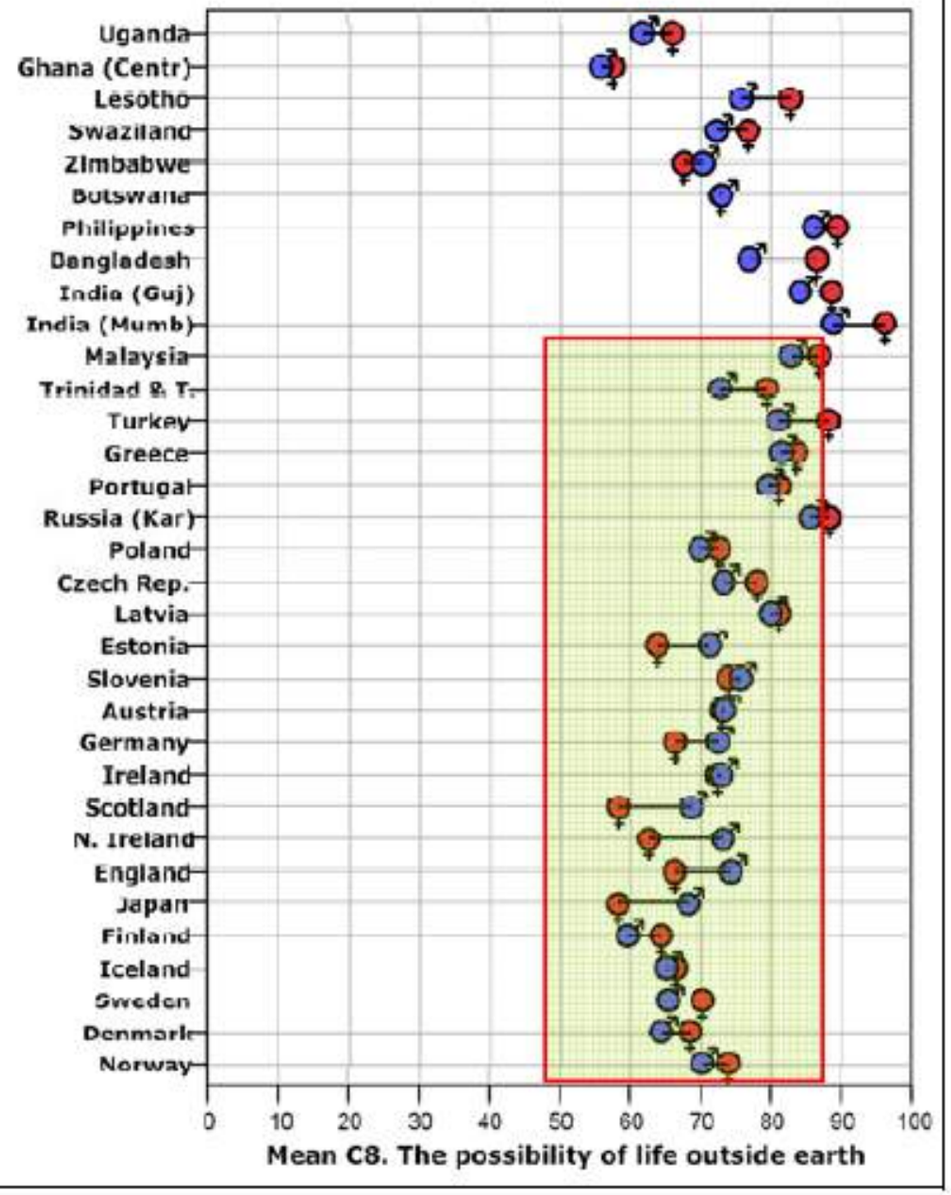
STEM EDUCATION: EVERYONE IS INTERESTED IN THE UNIVERSE & IN GENDER-BALANCE!

In spite of the strong gendering of interest, there are some items that seem to be interesting for both girls and boys. One example is given below.

The "winner" is:

The possibility of life outside earth

"Space, life, wonder, oppenness"
The **most** popular for girls and boys



The ROSE project
An overview and key findings[1]

Svein Sjøberg <svein.sjoberg@ils.uio.no>
Camilla Schreiner (Camilla Schreiner <camilla.schreiner@naturfagsenteret.no>
University of Oslo, March 2010

INTEGRATED STEM EDUCATION IS A "MUST"

Cf. Standpunt De STEM Leerkracht KVAB, 2016

- **STEM education @ school** treating modern societal questions, rather than outdated seemingly unrelated topics in science
- Treat **multidisciplinary research @ school**: astrophysics, biotechnology, climate, energy, health,… & highlight large infrastructures/international character/sustainability needs
- **Structural funds for collaboration teachers/scientists**, through school teaching projects by universities & training opportunities for science teachers (long-life learning!)

Welcome@Science.kuleuven

KU LEUVEN

Kom met uw leerlingen naar de Faculteit Wetenschappen, of nodig een wetenschapper uit bij u op school. Bekijk het aanbod!

School@Faculty

Kom met de klas naar de Faculteit Wetenschappen, voor een les en/of een workshop

Scientist@School

Nodig een wetenschapper uit in uw klas, maak kennis met de wereld van het onderzoek uit eerste hand

Ladies@Science

Wetenschappen iets voor meisjes? Natuurlijk!
Datum volgende editie: **20 april 2016**

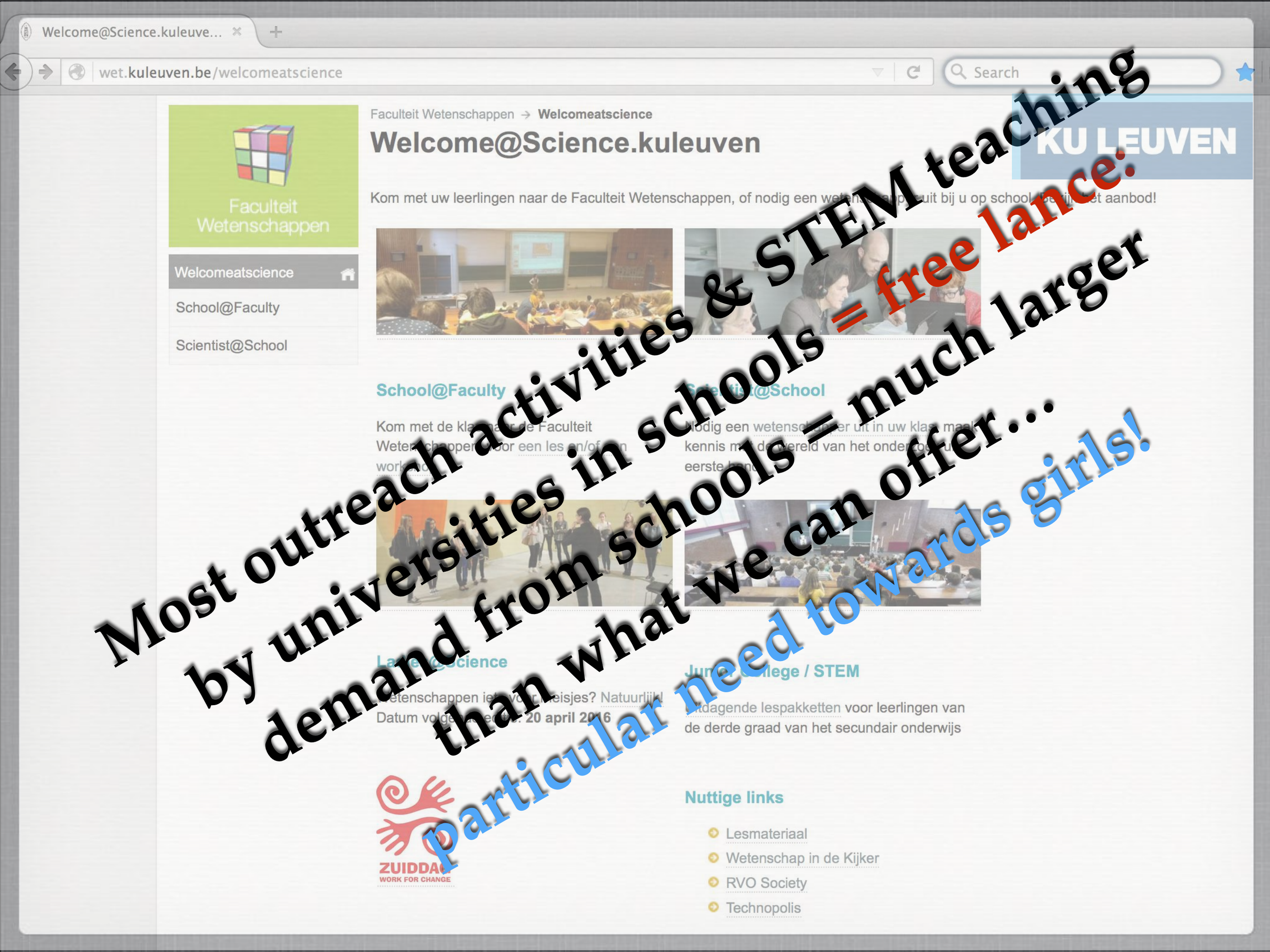
ZUIDDAG
WORK FOR CHANGE

Junior College / STEM

Uitdagende lespakketten voor leerlingen van de derde graad van het secundair onderwijs

Nuttige links

- Lesmateriaal
- Wetenschap in de Kijker
- RVO Society
- Technopolis

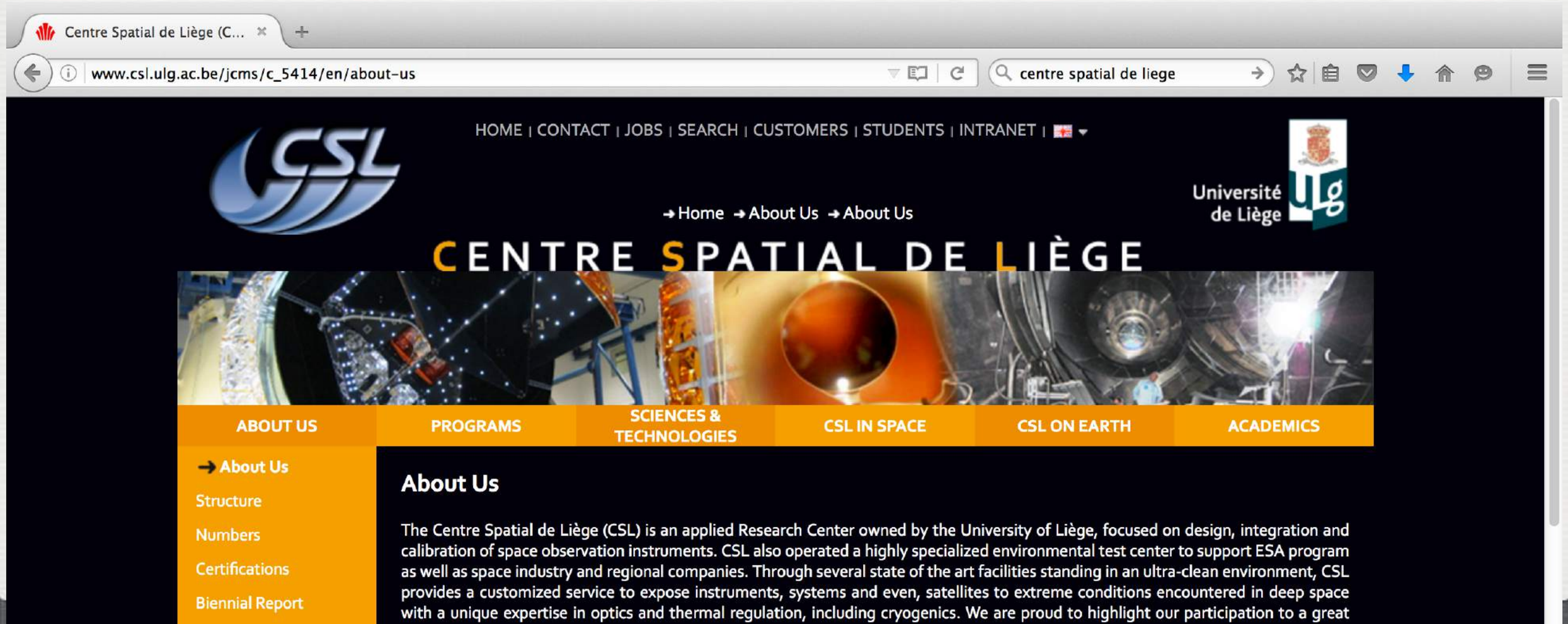


Most outreach activities & STEM teaching by universities in schools = free lance: demand from schools = much larger than what we can offer…

particular need towards girls!

RRI RECOMMENDATIONS FOR BELGIAN SPACE SCIENCE

- Define 1 strategic policy, bridging 3 pilars with **gender-balanced** competitive approach, well embedded in university research (cf., VIB)
- Flemish industry deserves boost to operate à-la CSL



RRI RECOMMENDATIONS FOR BELGIAN SPACE SCIENCE

- Define 1 strategic policy, bridging 3 pilars with **gender-balanced** competitive approach, well embedded in university research (cf., VIB)
- Flemish industry deserves boost to operate à-la CSL, in close collaboration with scientists; oblige industry to offer **internships for master & PhD students** in return for funds
- Work towards **Belgian-led option in Phase A of ESA/ESO** instruments (cf. needs @ EU level, LERU advice to H2020)
- Structural funds for STEM education & teacher training
- Two new & beautiful RRI opportunities (S&T):
  - S->T: Belgian involvement in **Einstein telescope** for gravitational wave astrophysics (NL & D; Limburg area)
  - T->S: support Belgian activities in **cubesats** (EC priority)