



Research and Innovation in India – challenges and opportunities

NHOs forsknings- og innovasjonsnettverk, 8 september 2015
Marianne Jensen

Incredible India



Indian Government: The Modi way



New Science, Technology and Innovation Policy from 2013

3 previous policies since independence: 1958, 1983 and 2003

- “faster, sustainable, inclusive growth”
- Science for society
- Private sector involvement

2010-2020: Decade of Innovation in India



Innovation potential

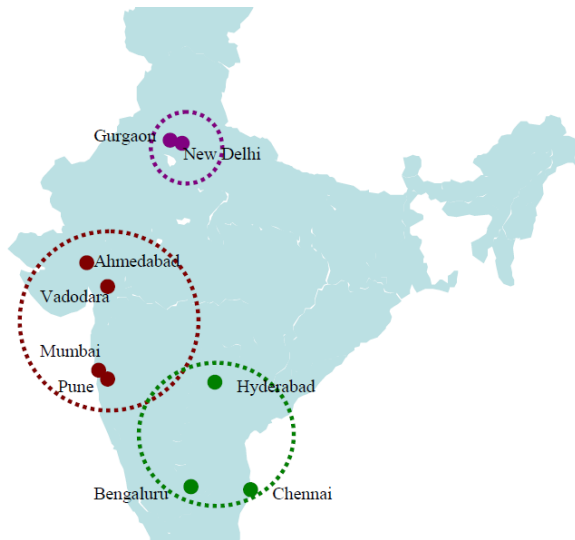
- **More than 100 Fortune 500 companies have R&D facilities in India**
- **IITans in top 10 list of US start-up founders**
- **More difficult to get into top IITs than Harvard**

Inclusive Innovation/Frugal innovation – the Indian way

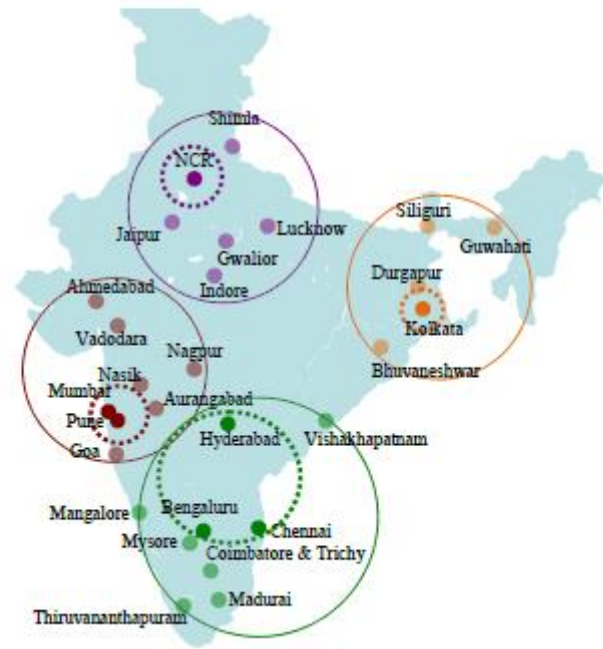


Indian clusters

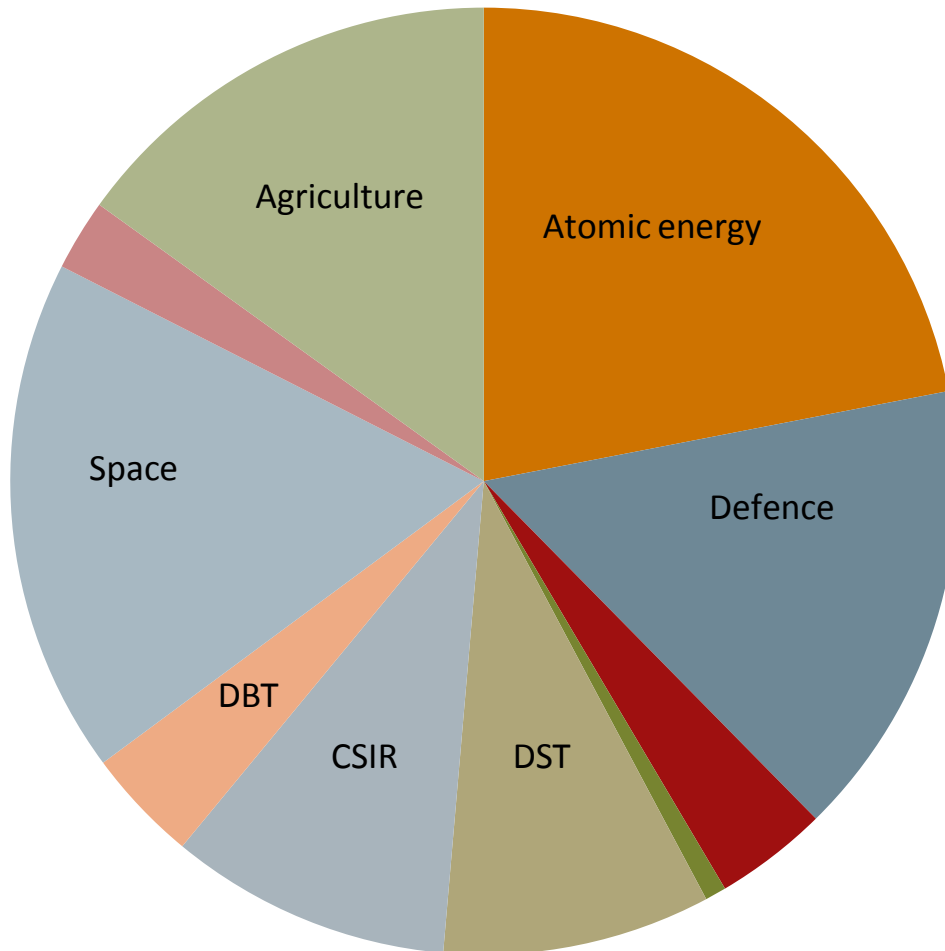
Biotech/Pharma hubs



ICT hubs



Indian budget S&T 2015-2016



- Department of Atomic Energy
- Defence Research & Development
- Ministry of Earth Sciences
- Ministry of New & Renewable Energy
- Department of Science & Technology
- Department of Scientific and Industrial Research
- Department of Biotechnology
- Department of Space
- Department of Health Research
- Department of Agricultural Research and Education

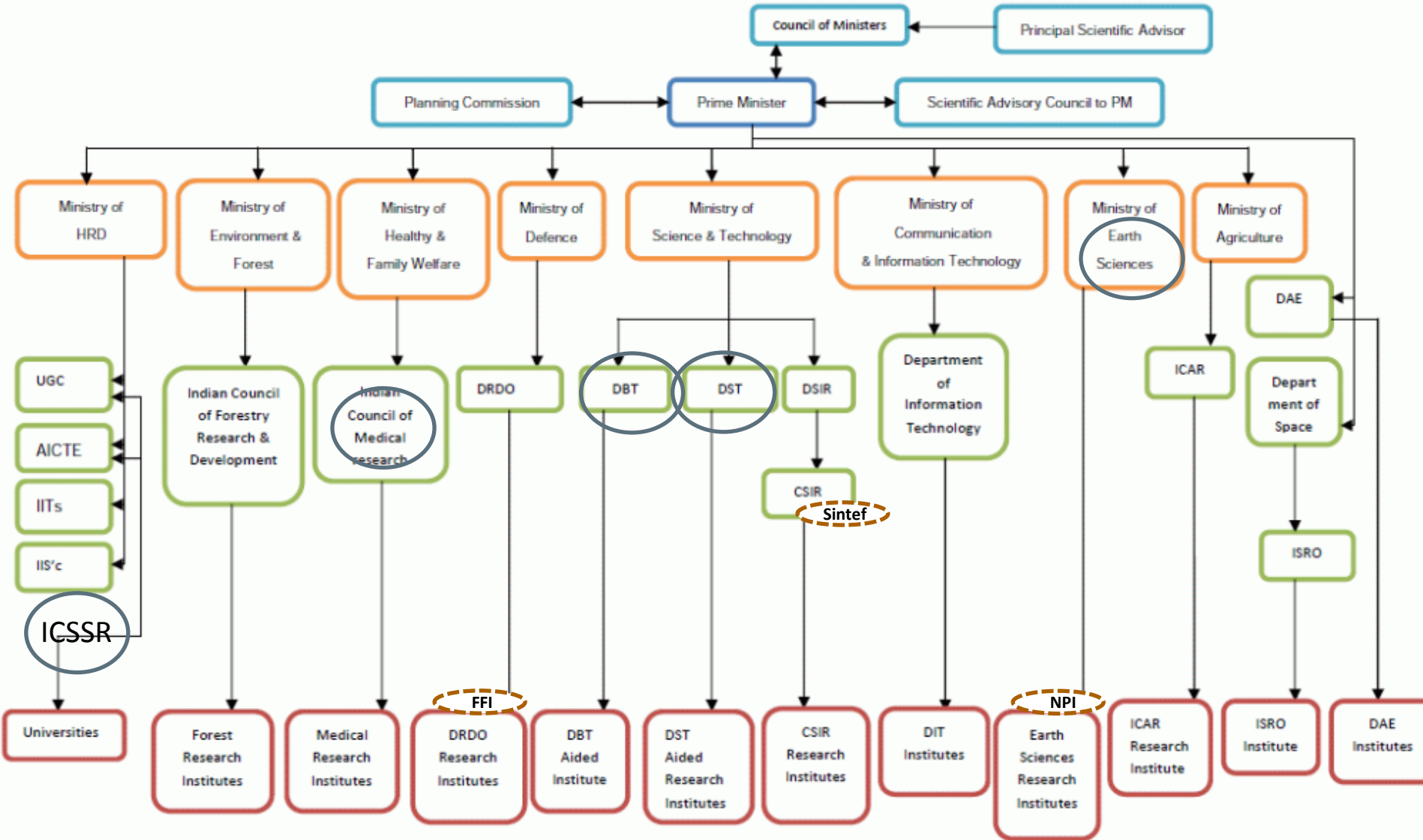
Motivation for collaboration with India based on:

- High quality research
- Meeting global challenges
- Access to Indian markets
- Capacity building
- Insight into research and innovation systems



Dialogue partners in India

Indian S&T Structure



Important Norwegian Initiatives

- **Norwegian government white papers on research, (2009, 2013)**, identifies India as one of Norway's prioritized countries
- **Bilateral agreement** between the India and Norway on Cooperation in the fields of Science and Technology (2006)
 - Joint Working Group on Science and Technology
 - Programme of Cooperation (2009)
- **The Norwegian Government India Strategy «Opportunities in Diversity» (2009)**
 - **INDNOR programme (2010-2019)**
 - **MFA – Embassy funds routed through the Research Council**
- **The Research Council's Roadmap for bilateral research cooperation with India (2014)**

Indo-Norwegian research priorities

Programme of Cooperation in Science & Technology India – Norway (2012-15)

- **Climate research** including **ocean** and arctic/**polar** research
- **Clean (renewable) energy**
- **Geotechnology** and early warning systems for **geohazards**
- **Marine** research – **bioprospecting** and polar research
- **Nano-science/ technology** primarily related to **clean energy and solar energy and medical issues**
- **Vaccines** – human and fish/ animal, including vaccination programmes and biotechnology of new vaccine development
- **ICT**
- **Glaciology**
- **Medical research** (cancer, diabetes, infectious diseases etc)
- **Social aspects of climate change** related issues (adaptation)



India

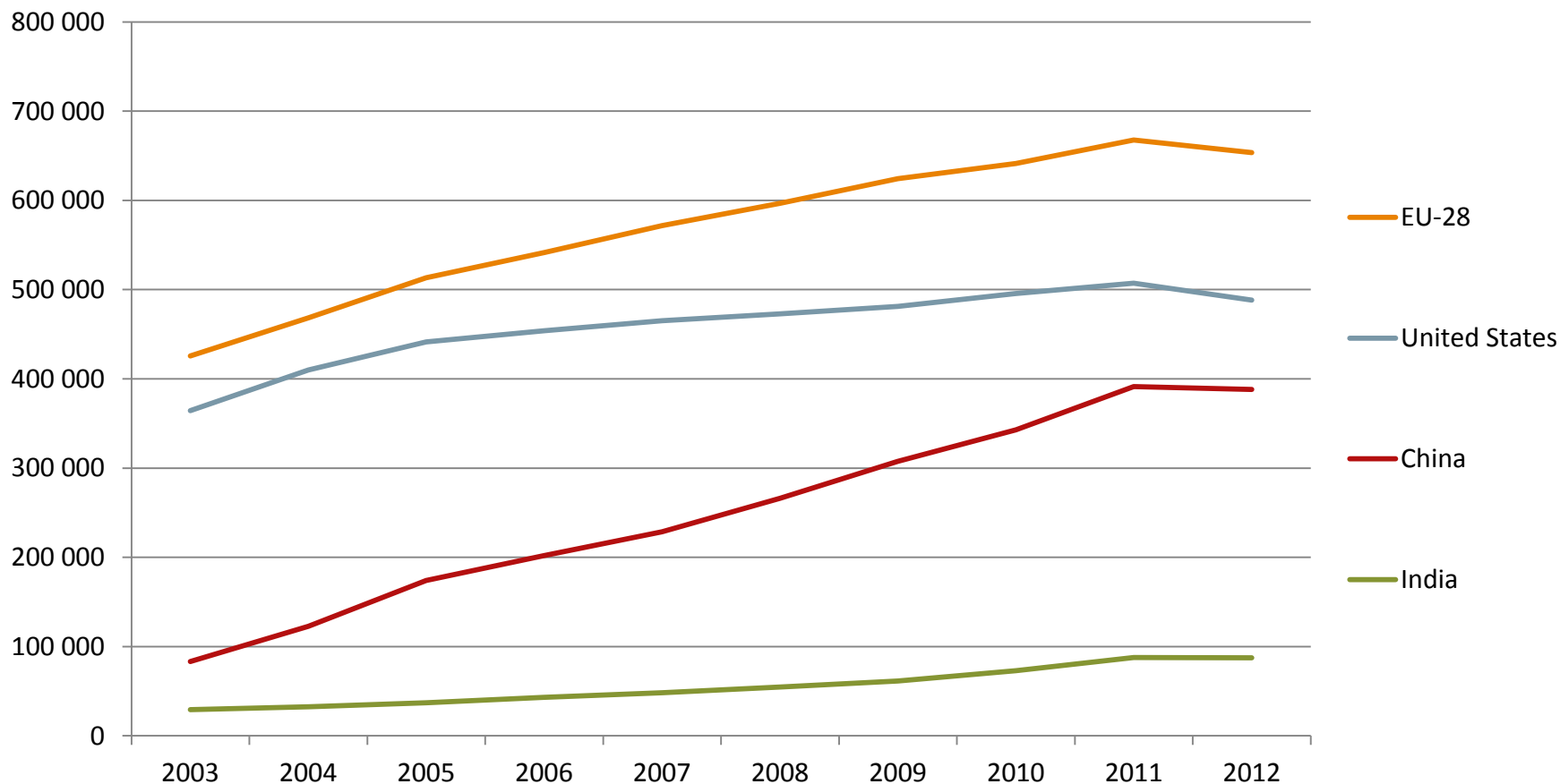
- Rask økonomisk utvikling og satsing på kunnskapsproduksjon.
- Vil øke investeringene i FoU fra ca. 1 pst av BNP til 2 pst innen 2018.
- Har lyktes med innovasjonsbasert tjenesteproduksjon, særlig IKT
- Outsourcing av kunnskapsbaserte tjenester til India har bidratt til å gjøre den indiske tjenestesektoren til den største bidragsyteren til landets bruttonasjonalprodukt.
- Internasjonale forskningsinstitusjoners tilstedeværelse har styrket landets integrasjon i det globale forskningssystemet.
- Privat sektors andel av landets FoU er omlag 54 pst., men økende.
- Indias styrkede posisjon internasjonalt er et viktig utgangspunkt for forskningssamarbeidet med landet, blant annet om globale utfordringer knyttet til klima, miljø og energi.
- India har forskningsmiljøer i verdensklasse på flere områder, spesielt IKT og farmakologi.
- Viktige områder for forskningssamarbeid med India:
 - IKT, helse, bioøkonomi, marin og havbruk, polarforskning og energi.



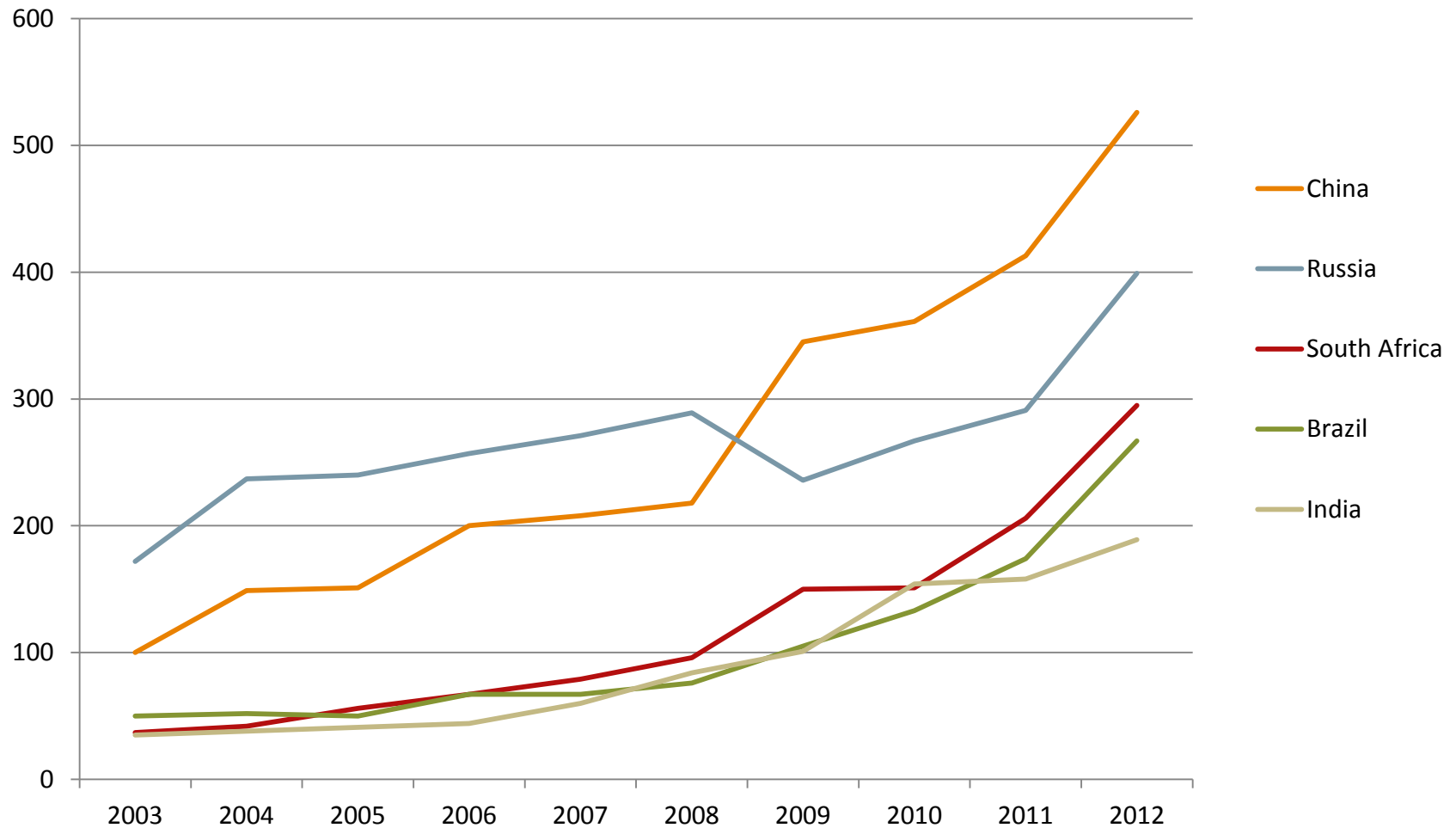
India – veikartets anbefalinger

- Viktige områder for forskningssamarbeid med India er **IKT, helse, bioøkonomi, marin og havbruk, polarforskning og energi**.
- **Tjenesteutvikling** kan være et samarbeidsfelt for norsk næringsliv eller innovasjonsforskningen.
- India styrker sin FoU-produksjon innen **materialvitenskap og nanoteknologi** og dette kan være et aktuelt tema for samarbeid.
- Aktuelle **samfunnsvitenskapelige temaer** er demokratiutvikling, fattigdom, kastesystem og sosiale strukturer, industrialisering og rask økonomisk vekst, internasjonal styring, internasjonale forhandlinger, fred og konfliktløsning.
- Forskningsrådets **India-program** er sentralt i oppfølgingen av Indiasamarbeidet.
- Ut fra innovasjonsaspektene ved flere av de prioriterte temaene er det gode argumenter for å **fremme innovasjon** som et eget område.
- Det er ønskelig å legge til rette for mer **langsiktig institusjonelt samarbeid** mellom norske og indiske FoU-institusjoner.

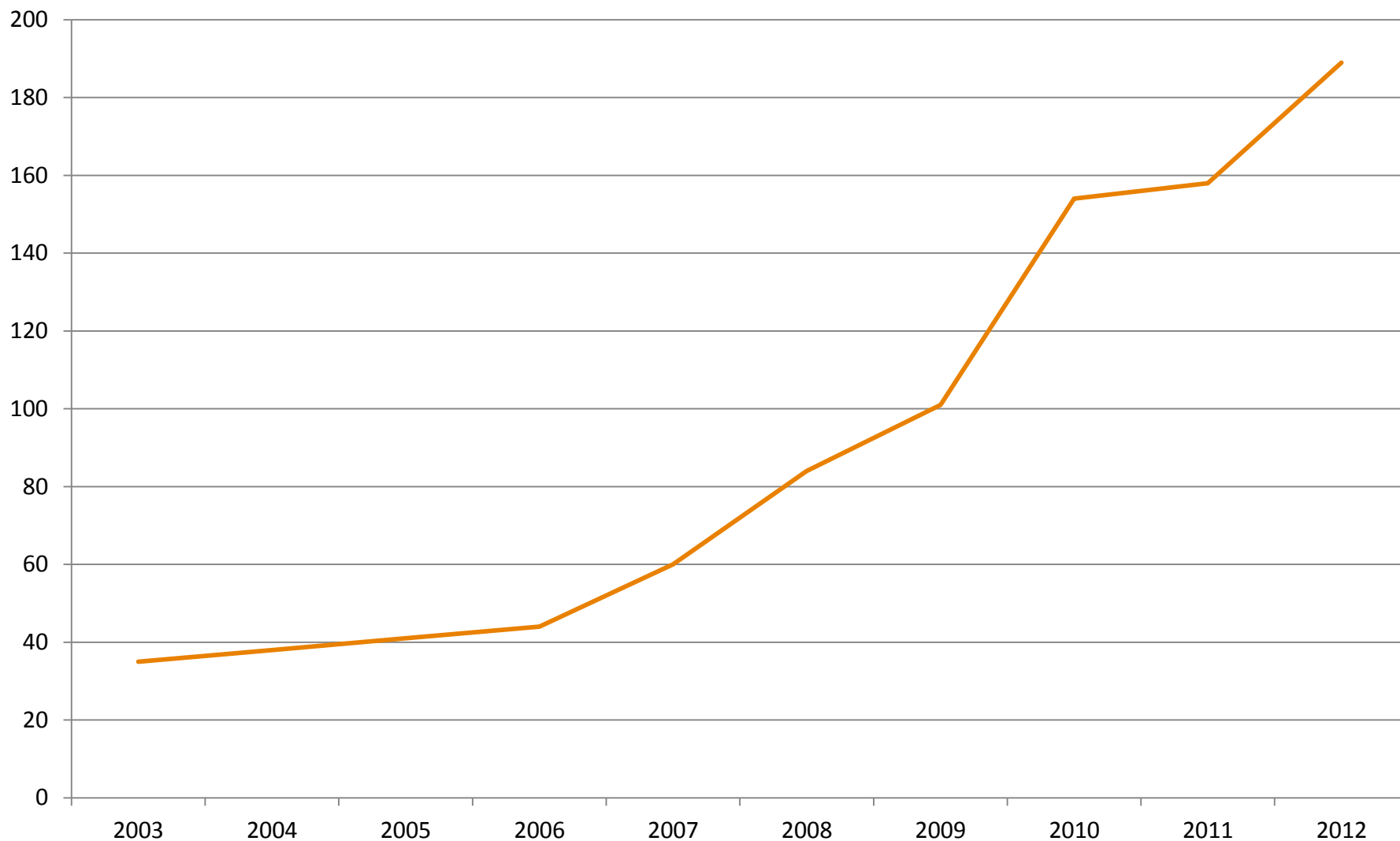
Number of publications per country/region, 2003 - 2012



Number of co-publications Norway and selected countries, 2003 - 2012



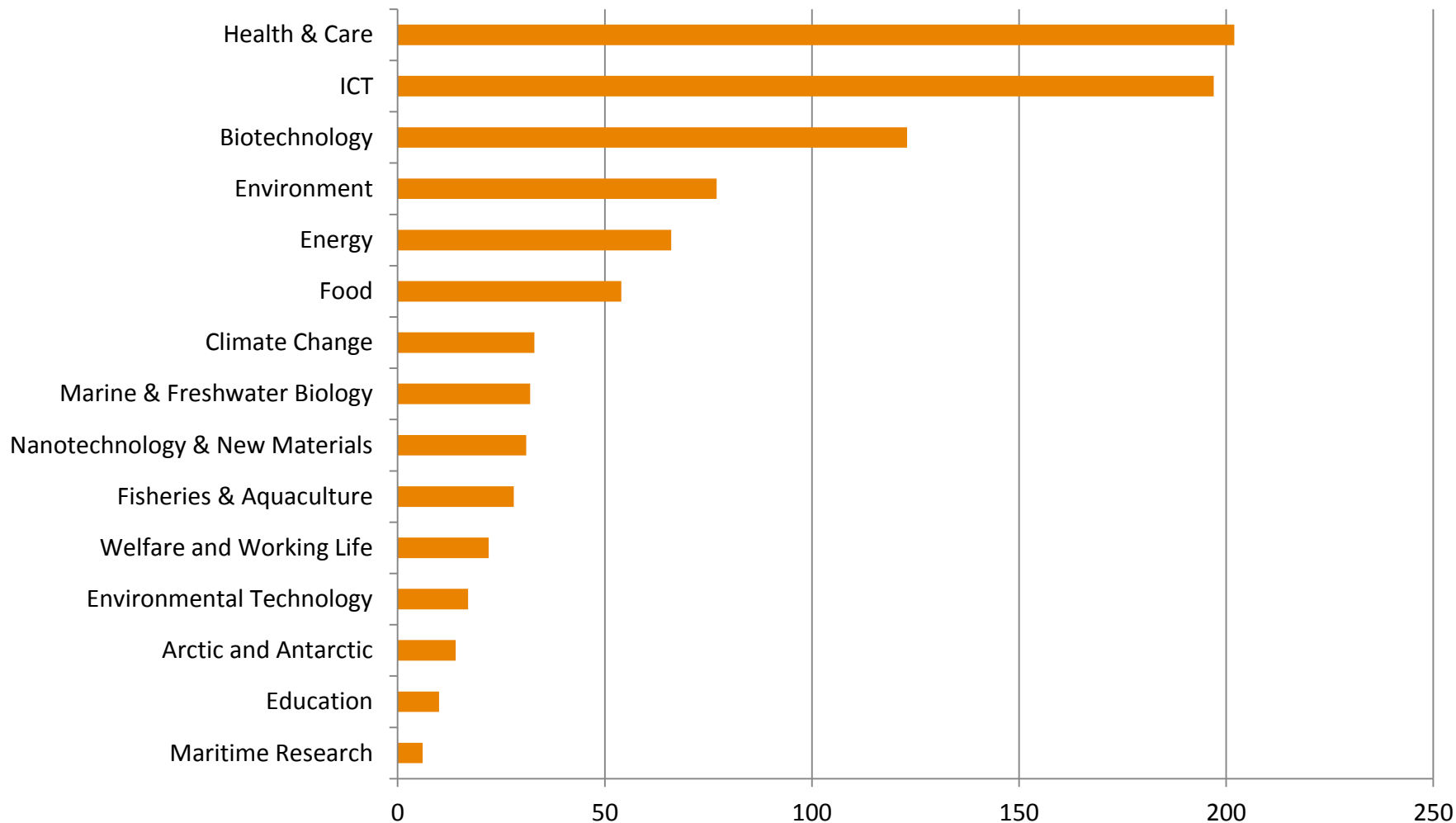
Number of co-publications India and Norway



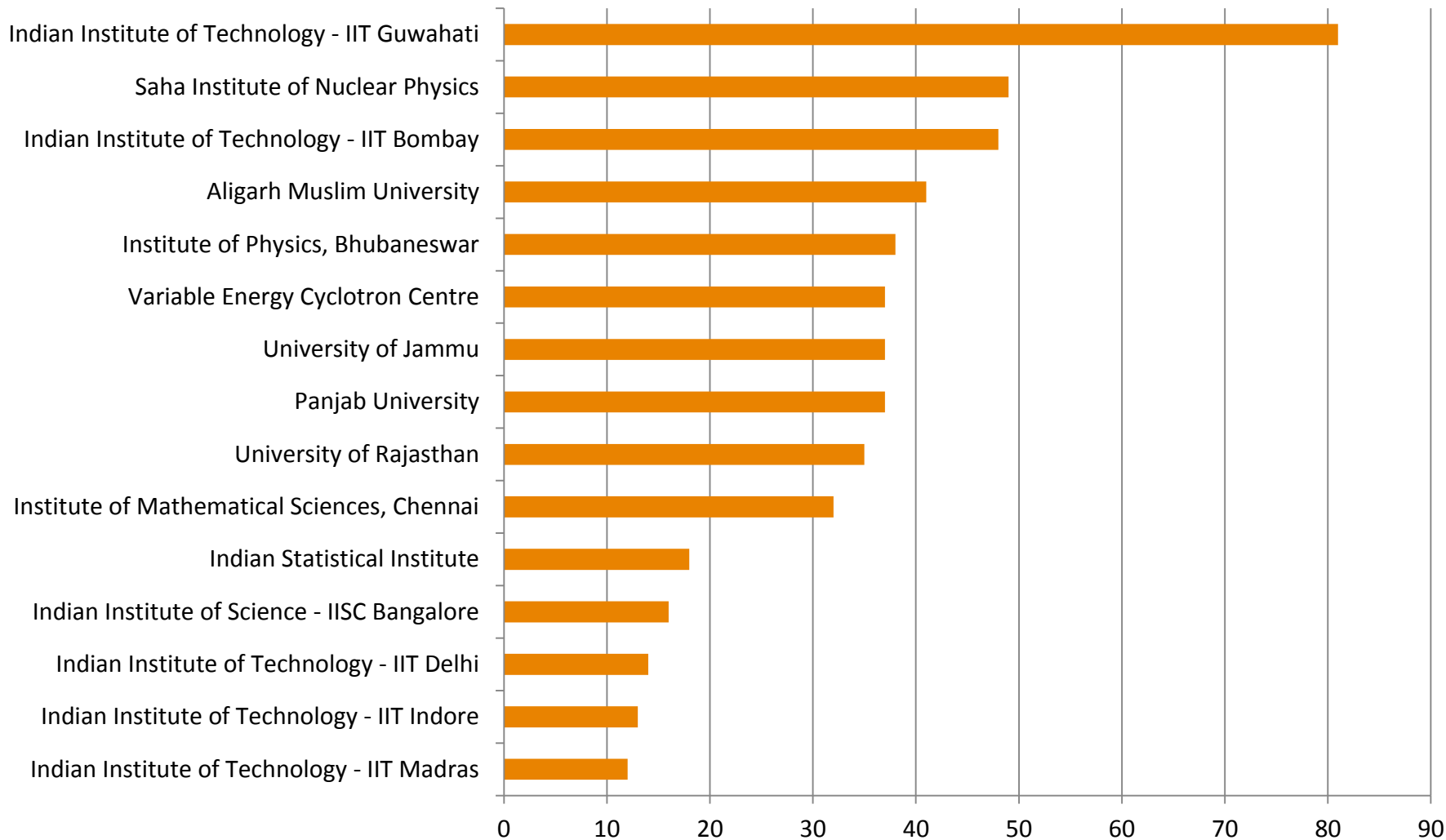


Figur 2. Antall publikasjoner med minst én forfatter fra India, etter tema, totalt for 2008-2012

Number of co-publications India and Norway by thematic area. Total 2003 – 2012.

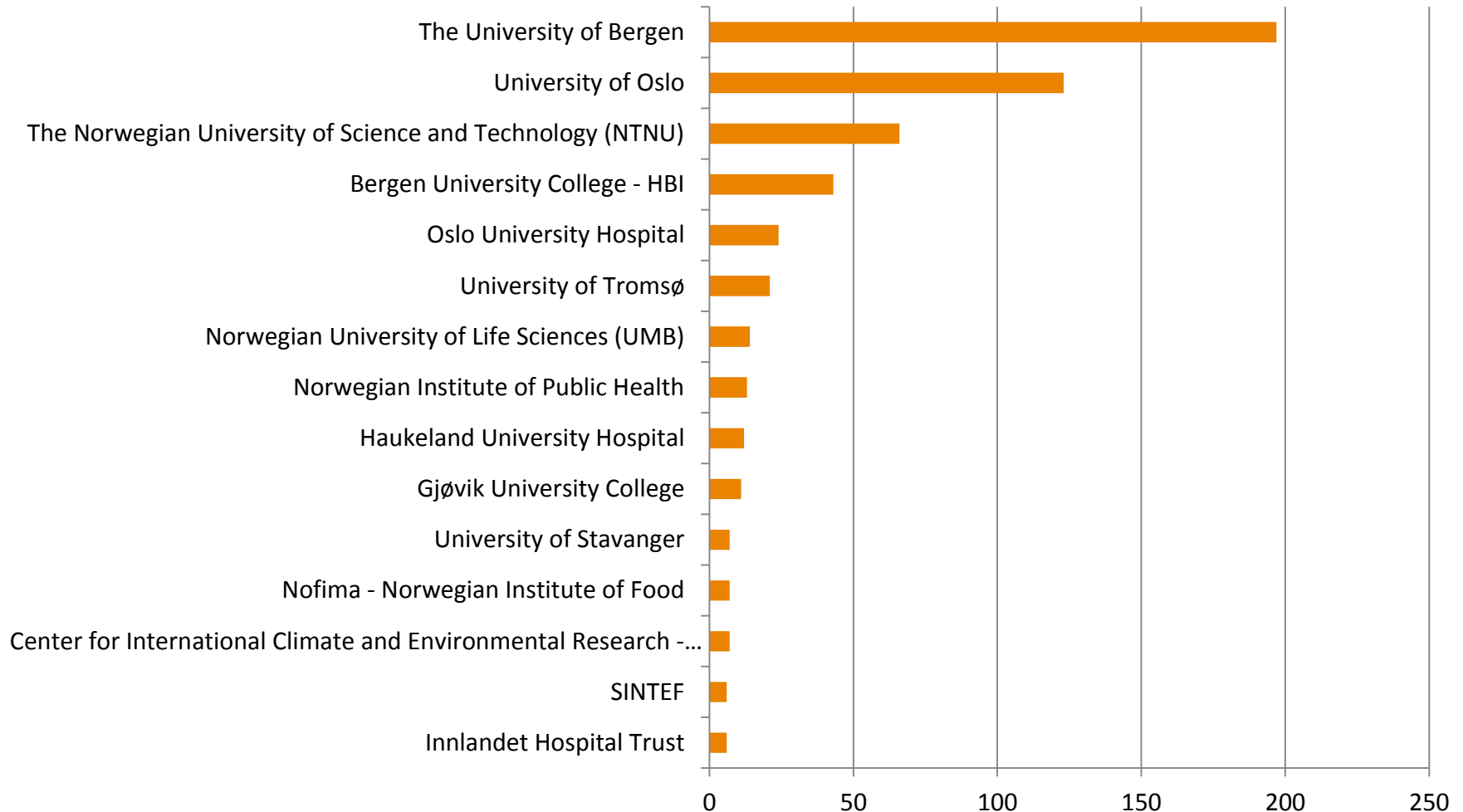


Top 15 Indian institutions co-publishing with Norway. Total number of co-publications 2010 – 2012.

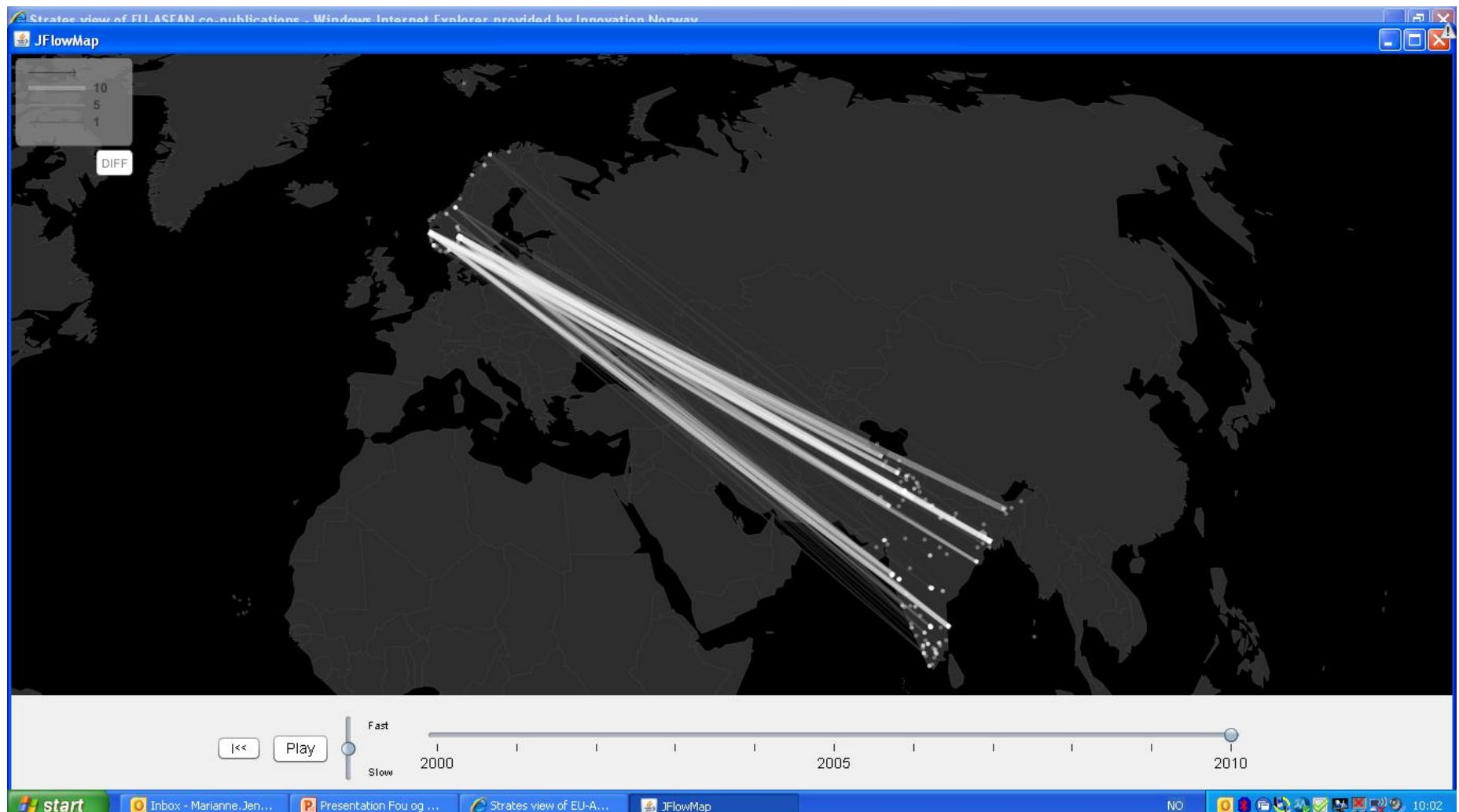


Source: Scopus/Science Metrix

Top 15 Norwegian institutions co-publishing with India. Total number of co-publications 2010 – 2012.



Research collaboration – all corners of Norway and India are involved!

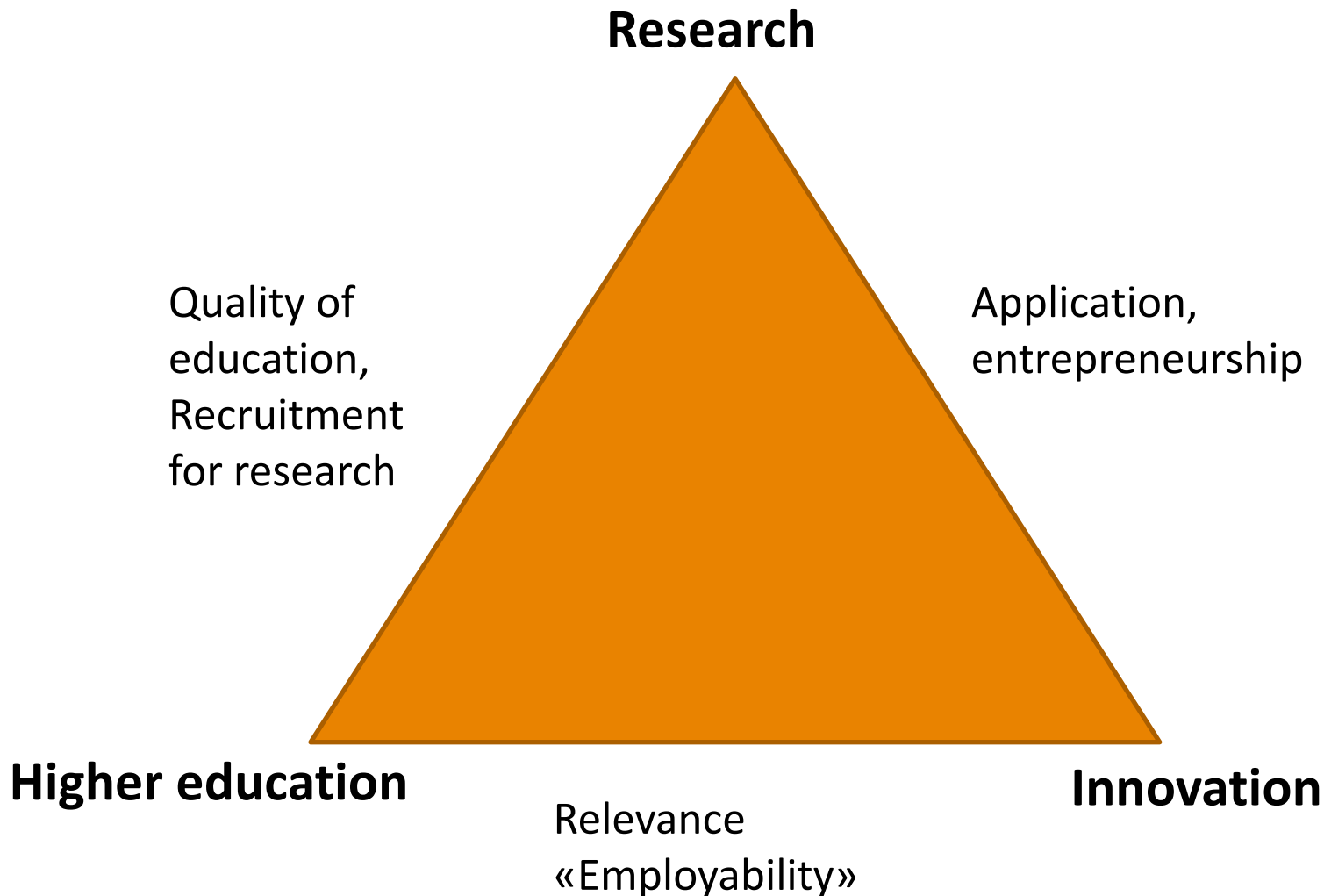


European initiatives

- EU programs/Horizon 2020
- Multilateral programs
 - Inno-indigo
 - Indigo-policy
- Strategic Forum for International Collaboration (SFIC)
- EU-India Joint Declaration on Research and Innovation Cooperation (2012)
 - GSO (group of senior officials) : Water, Energy, Health, ICT, Bio-economy



The knowledge triangle – a path to growth



Main objectives of the INDNOR programme

1. To strengthen bilateral research cooperation with India
2. To establish long-term cooperation on research funding with Indian governmental research funding bodies
3. To foster relations with India through cooperation with EU and Nordic countries as well as multilateral organizations in which India and Norway are partners
4. To build new capacity, increase dissemination and promote the establishment of new research cooperation between India and Norway
5. To lay the foundation for increased cooperation with India in all thematic areas and scientific fields, and encompassing basic research, applied research and innovation

Indnor: Calls for Proposals arranged

- Pre-projects INDNOR 2010: all topics (24 projects)
- Joint Call DST 2010, Programme of cooperation topics, 3 projects
- NORKLIMA, 2011, climate change and water, 3 projects
- RENERGI, 2011, renewable energy, 3 projects
- NORGLOBAL, 2011, Women and gender, globalisation and effects on environment, energy and climate, 6 projects
- MILJØ 2015, Joint call DST 2012: Environment, 2 projects
- NORGLOBAL, 2012, social sciences and humanities, 9 projects
- GLOBVAC (New Indigo), 2012, biotech, 1 project
- ENERGIX (New Indigo), 2013, energy, 3 projects
- KLIMAFORSK, 2013, Climate change and society, 2 projects
- ENERGIX, 2014, Joint call DST, renewable energy, 4 projects
- Polarprog, joint call MoES, 2015: polar and geohazards
- Clinical research (Inno Indigo), 2015, non-communicable diseases
- Milpaahel, Joint call ICMR, planned 2015, anti-microbial resistance

Indo-Norwegian workshops 2007-2015

- **Climate Change**
- **Renewable Energy**
- **Geo-hazards**
- **Vaccination**
- **Maternal / Child Health**
- **Waste treatment**
- **Solar energy**
- **Water and Climate Change (2011)**
- **Geo-hazards (2011)**
- **India NTNU 2011 Week (Norway Oct 2011)**
- **ICAM-2011: Solar Energy Materials; Hydrogen Storage**
- **Climate Change and Hydrology (DSDS Delhi 2012)**
- **Social sciences (Univ Bergen; NTNU Trondheim 2012)**
- **Renewable energy and hydro power (2013)**
- **Anti-microbial resistance (Tromsø, 2013)**
- **Polar Research (Delhi 2013)**
- **Geo-hazards (Delhi 2014)**
- **Bio-economy (2014)**
- **ICT (planned 2015)**



Other activities at the Research Council

- 2009-2013; 146 projects marked with cooperation with India

- Humanities 6
- Agriculture and fisheries 8
- Mathematics and science 29
- Medicine and health 18
- Social sciences 55
- Technology 30

Struktur for forskningssamarbeidet

- Utenriksdepartementet og ambassaden i New Delhi samarbeid med Forskningsrådet
 - INDNOR – UDs bevilgning for oppfølging av Indiastrategien
 - Ambassadens bevilgning for forskning – via Forskningsrådet
 - Utløse midler i andre tematiske programmer i Forskningsrådet
 - Andre virkemidler, klyngeprogrammer, INTPART etc
- Relatert
 - Virkemidler Innovasjon Norge
 - Klyngene (GCE, NCE og ARENA)
 - IFU/OFU
 - Virkemidler Senter for Internasjonalisering av Utdanning
 - India Institutional cooperation programme
 - INTPART

Elkem Solar successful research collaboration



“Findings from the Indo- Norwegian research project (INDNOR) has shown that Norwegian technology has competitive advantages under certain climatic conditions such as in Hyderabad India, and has been important both scientifically and commercially for Elkem Solar.”

Jan Ove Odden, Elkem Solar

Potential application of research in aquaculture

“White spot syndrome is one of the most serious diseases of farmed shrimp, and Indian and Norwegian scientists have recently discovered markers for genes that determine how well black tiger shrimp resist the disease. They are now planning to look for the genes in the white shrimp”



Partners are Nofima and the Indian CIBA (Central Institute of Brackishwater Aquaculture), project financed by the Research Council of Norway and the Indian Department of Biotechnology

Future plans

- Minister of Science and Technology and Minister of Earth sciences is coming to Norway in Sept.
- Joint workshops and in cooperation with DST to take place within the next year
 - ICT (Knowledgexpo, December 2015 in Delhi)
 - Bioeconomy (spring 2016, Norway)
- Joint Working Group Science and Technology - meeting planned in Norway, May 2016
 - Back to back with JWG Higher Education
- Adjustments according to India roadmap and programme review feedback
 - More industry involvement

Oppsummering

- Store muligheter for økt samarbeid mellom India og Norge innen områder av felles interesse
 - Mange felles prioriteringer
 - Bred tematikk i dagens samarbeid
- Stor variasjon i kvalitet på miljøene – tenke strategisk (både kvalitet og kapasitetsbygging)
- Ønske om å trekke næringslivet sterkere inn i samarbeidet
 - Gjennom felles utsending
 - Samarbeid «Team Norway»
 - Utlysning av midler til forskning og innovasjon

Whats next for India ???



Flytter til India

Kostnadsnivået i Kina stiger, og begynner å nærme seg vestlig nivå. Apples hoffprodusent vil investere over 200 milliarder kroner i India.

FINANS
Morten Iversen
Asia-korrespondent

Det er mange år siden Nike, Adidas og tekstilprodusenter som H&M og Gap fant ut at det ble for dyrt å produsere i Kina. Produsentene de benytter har vært på flyt...

ikke. Foxconn har signert en avtale med indiske myndigheter om å investere 42 milliarder kroner i utviklingsavdelinger og fabrikker i delstaten Maharashtra.

- Dette er bare begynnelsen for vår India-satsing. Vi regner med å ha 10-12 anlegg i India innen 2020, blant annet fabrikker, datasentre og utviklingsavdelinger, sa Foxconnns styreformann Terry Gou på en pressekonferanse denne uken.

Disse investeringene kommer i tillegg til et samarbeid med japanske Softbank. De to selskapene skal investere over 160 milliarder kroner i den indiske solenergisektoren med blant annet store produksjonsanlegg av solcellepaneler.

Fabrikkarbeiderlønnningene er mer enn tidoblet i Kina på under 20 år. For et selskap som taiwanske Foxconn, som har over 1,3 mil-

Elektronikkselskapet Foxconn vil investere 42 milliarder kroner i utviklingsavdelinger og fabrikker i Maharashtra, hvor Mumbai er delstatshovedstad. Foto: Dhiraj Singh, Bloomberg