



# What is mission oriented R&D?

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- R&D focused on big issues and problems? Big science?
- Applied R&D *versus* basic research?
- R&D with specific outcomes and deliverables?
- R&D supported by problem-solving agencies?



# Which agency supports S&T?

## Main agencies and departments in Brazil versus USA (2013)



MINISTRIES	%
Ministry of Science, Technology and Innovation (MCTI)	36%
Ministry of Education (MEC)	19%
Ministry of Agriculture (MAPA)	13%
Ministry of Health (MS)	11%
Ministry of Development, Industry and Foreign Trade (INMETRO and INPI)	6%
Ministry of Planning (IBGE)	6%



Only 30% of S&T investments are attached to institutions with problem-solving missions



DEPARTAMENTOS	%
Department of Defense (DoD)	49%
Department of Health (DHHS)	23%
Department of Energy (DOE)	8%
NASA	9%
National Science Foundation (NSF)	4%
Department of Agriculture (USDA)	2%
Others	5%



More than 90% of R&D investments are attached to Departments with other missions besides fostering science

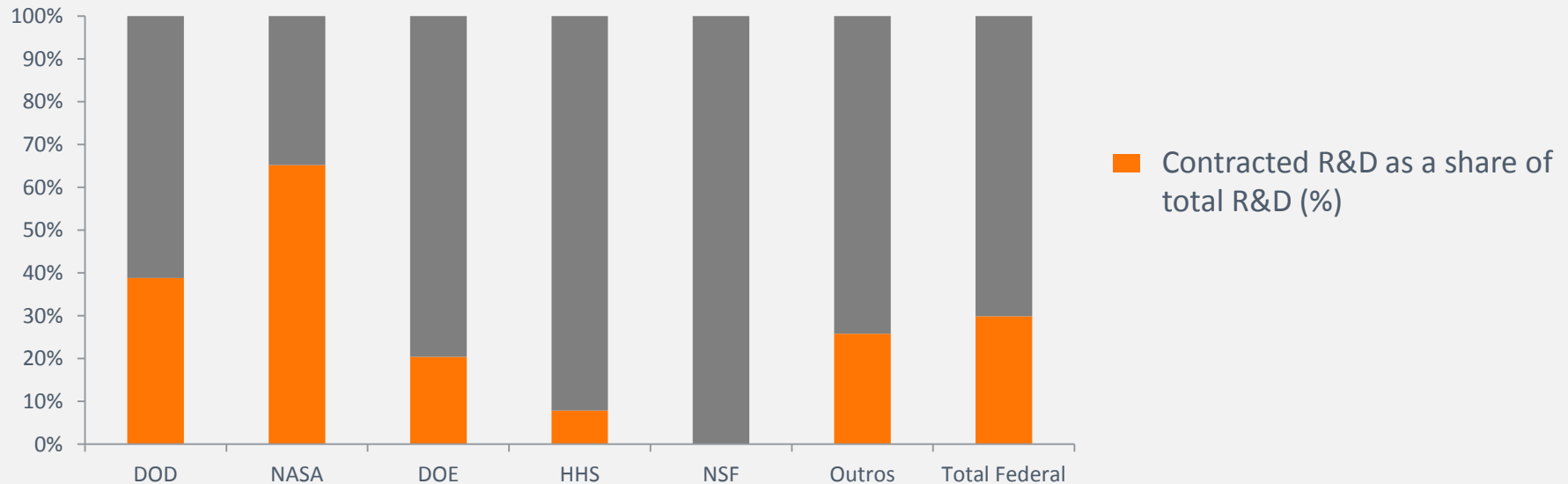
# The way to foster R&D matters

## Main instruments used by US government to support S&T

**Contract** – An agreement between the federal government and a prime recipient to execute goods and services for a fee.

**Cooperative Agreement** – A grant requiring substantial involvement between the recipient of the grant and the federal agency and has different reporting requirements than other grants.

**Grant** – An award of financial assistance from a federal agency to a recipient to carry out a public project or service authorized by a law of the United States.



# S&T federal investments in Br

MINISTRIES	R\$ MILLION	%
<b>TOTAL FEDERAL BUDGET TO S&amp;T</b>	18.387,9	100%
<b>Ministry of Science, Technology and Innovation (MCTI)</b>	<b>6.640,2</b>	<b>36%</b>
Ministry of Education (MEC) – mainly CAPES	3.479,9	19%
Ministry of Agriculture (MAPA) – mainly Embrapa	2.448,3	13%
Ministry of Health (MS) – mainly Fiocruz	2.072,3	11%
Ministry of Development, Industry and Foreign Trade (INMETRO and INPI)	1.041,5	6%
Ministry of Planning (IBGE)	1.013,6	6%
<b>MINISTRY OF SCIENCE, TECHNOLOGY AND INNOVATION – DETAILED BREAKDOWN</b>		
<b>MCTI - TOTAL</b>	<b>6.640,2</b>	<b>36%</b>
FNDCT (Sectoral Funds)	2.981,4	16%
National Counsel of Technological and Scientific Development (CNPq)	1.515,9	8%
Headquarters and MCTI research institutions	1.265,5	7%
Space program (Brazilian Space Agency - AEB)	278,1	2%
Nuclear program (National Nuclear Energy Commission - CNEN)	515,5	3%

→ Grants

→ R&D in public Research institutions

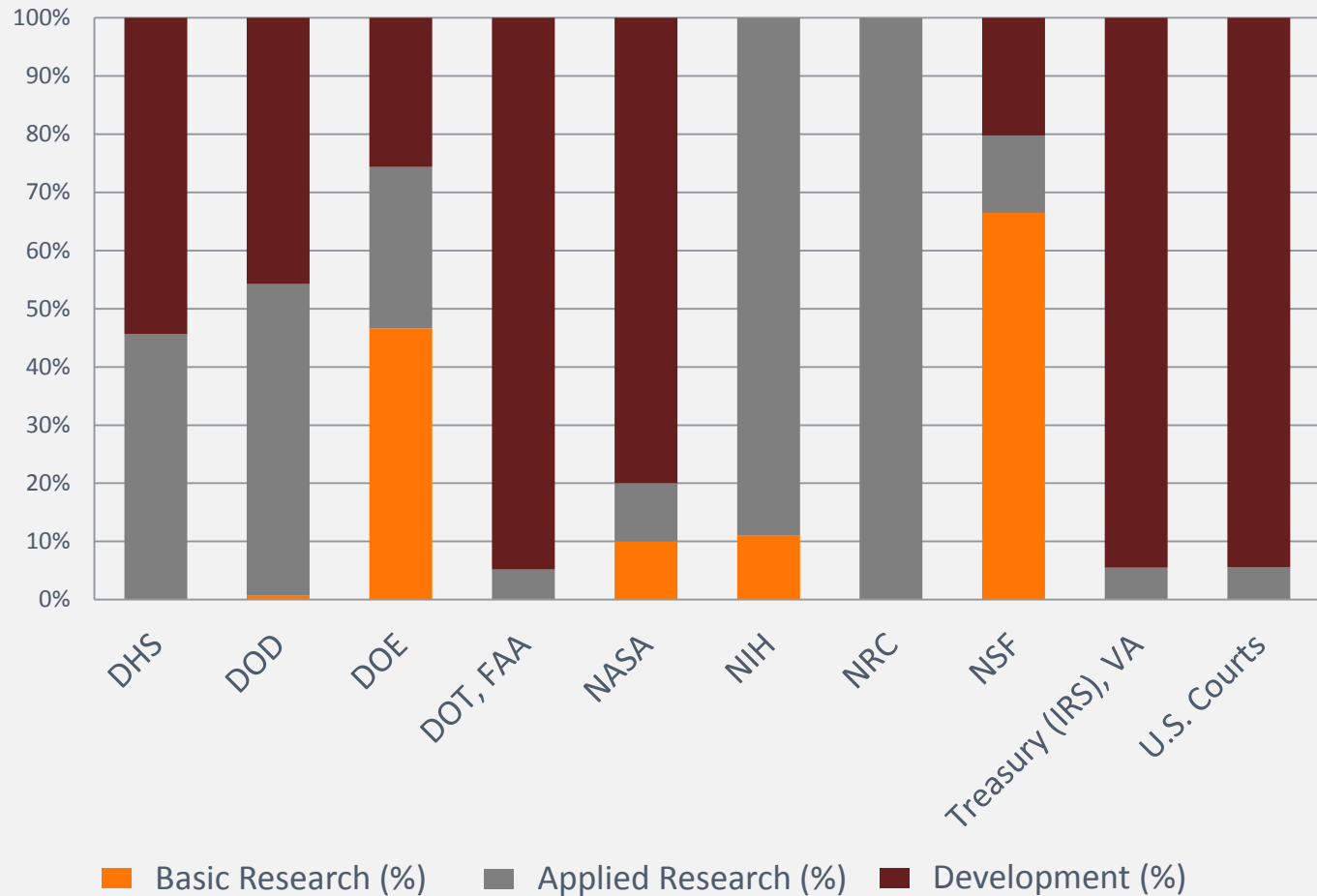
→ Mostly grants

→ Grants

→ R&D in public Research institutions



# Applied versus Basic Research– USA



# Having a strong scientific basis also matters

Size of research facilities in Brazil

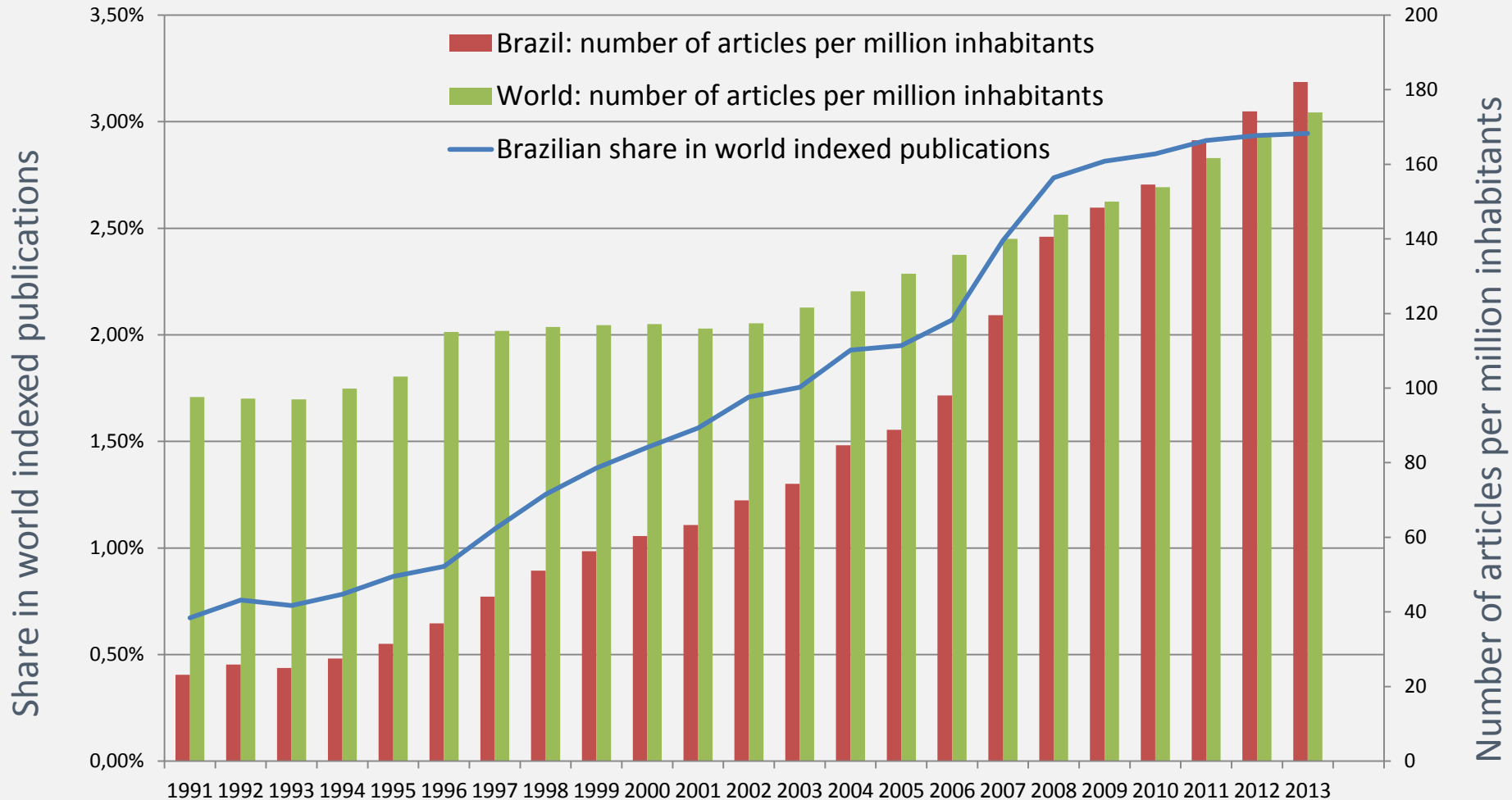
Estimated value	Number of facilities
Up to R\$ 500 k	1054
(R\$ 500 k - R\$ 1 M]	301
(R\$ 1 M - R\$ 3 M]	222
(R\$ 3 M - R\$ 5 M]	73
(R\$ 5 M - R\$ 10 M]	55
(R\$ 10 M - R\$ 20 M]	33
(R\$ 20 M - R\$ 30 M]	11
(R\$ 30 M - R\$ 50 M]	2
(R\$ 50 M - R\$ 100 M]	2
(R\$ 100 M - R\$ 200 M]	4
More than R\$ 200 M	2
Not informed	1

# Research facilities around the world

Name	Country	Investment (€ mi)
Centre d'Elaboration et d'Etudes Structurales (CEMES - CNRS)	França	50-250 M€
Forschungszentrum Rossendorf	Alemanha	250 - 500 M€
Research Platform on Nanoelectronic Systems	Alemanha	20 M€ - 50 M€
Central Laser Facility	Reino Unido	50 M€ - 250 M€
Robotics Research Platform	Bélgica	< 20 M€
Plataforma Solar de Almeria	Espanha	50 M€ - 250 M€
European Bioinformatics Institute (EBI) (European Molecular Biology Laboratory (EMBL))	Reino Unido	50 M€ - 250 M€
Center for Biomolecular Magnetic Resonance (BMRZ)	Alemanha	50 M€ - 250 M€



# Scientific production in Brazil



# Complex tasks and objectives



## BRAIN Initiative

**Objective: to map the circuits of the brain**

**Several clear and specific deliverables:** around 180 outcomes. Examples: census of neuronal cell types; development of new methods to map neural connections in human and animal brains.

**Cost:** around US\$ 1,5 bi since the beginning (2013)

**Agencies involved:** NIH, DARPA, NSF (there is no single agency responsible for coordinating the project)

**Instruments** used to support projects: cooperative agreement is predominant in NIH (60% of the projects at Brain versus 10% at NIH as a whole)

# EXAMPLES

# Using S&T to build better cities

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**Hamburg/Germany**

**HafenCity Projec:** using urban data analytics to create interactive city planning tools (MIT Media Lab and HafenCity University)

**Innovate UK**

**Catapult Driverless Vehicle Project:** intelligente Mobility project using self-driving technologies for people and goods movement

**NY Fire Department**

**Improving fire prevention with artificial intelligence:** using an algorithm that assigns building with a risk score