



**DLR Project Management Agency**

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International Realm  
„Future Megacities“**

**Systemic Innovation for Sustainable Cities  
Workshop  
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## Motivation for Research: International and National Policies

- 2000 MDGs – UN Millennium Summit**
  - Goal 7: Ensure Environmental Sustainability
  - Goal 8: Develop a Global Partnership for Development
- 2005 Gleneagles**
  - agreements on development in Africa and on Global Climate Change
- (2007 IPCC 4th Report)**
- 2007 Heiligendamm 2007**
  - Global Concern: Climate Protection and Energy-Efficiency – Appropriate Technologies

- **2002 National Sustainability Strategy**
- **2004 FONA – Research for Sustainability - BMBF Framework Programme for a sustainable and innovative society**
  - **Sustainable Development of Regions**
    - » Research for the Sustainable Development of Tomorrow's Megacities
- **2006 HighTech-Strategy of the Federal Government**
- **2010 High-Tech Strategy 2020**
- **2010 FONA II**
- **2008 - 2014 Future Megacities – Energy- and Climate-efficient Structures in Urban Growth Centres**

>> Integration of emerging economies and developing countries in the international climate regime

## Motivation for Research: Global Economic Development

**80%** of the economic growth in emerging economies- and developing countries is generated in cities

Worldwide, a total of \$260bn in renewable energies in 2011,  
for India \$10,2bn

Source: [www.fs-unep-centre.org/sites](http://www.fs-unep-centre.org/sites)

**China:** invested \$10bn in renewable energies in 2006. Allein China wird bis 2030  
in seine Energieinfrastruktur 2,3 Billionen Dollar investieren,

**India:**

Budget places infrastructure investment to be around Rs12-trillion, or about 13 per  
cent of the total budget, or about a third of the investment budget Source:

<http://www.indianurbaninfrastructure.com/?p=1514>

To meet **Africa's** infrastructure gap, \$93bn of annual investment is needed, while  
governments currently spend only \$45 bn. Investments driven by  
urbanisation will grow much faster across the continent, thus creating  
scope for exceptional growth in infrastructure projects, real estate, and  
other subsectors. This potential is still largely unknown to international  
investors and its profitable opportunities are yet to be tapped into. Source:  
[www.ic-events.net/africa\\_urbaninfrastructure](http://www.ic-events.net/africa_urbaninfrastructure)

Because of the expected investments and the in the development of urban  
infrastrucutre solutions fast growing urban areas are of hight interest for  
energy-, mobility and can be looked upon as lead markets for these  
technologies.

Through 2030, \$71 trillion is needed to improve just basic  
infrastructure worldwide, according to the Organization for  
Economic Cooperation and Development.

Source: <http://www.oecd.org/dataoecd/8/30/38939680.pdf>

**Emerging markets expected to invest  
US\$6 trillion over three years**

- 32% Transportation and logistics
- 27% Water and Envioronment
- 23% Energy and power
- 5% Construction
- 3% Housing
- 10% other

Source: AMP Capital Investors Limited

ABN 59 001 777 591 AFSL 232497: Global Medium-term Outlook for  
Infrastructure Investment, December 2011

## Motivation for Research:

### Future Megacities as focal points of globally sustainable development

- 2%** of the earth's surface is covered by cities
- 78%** of all CO<sub>2</sub> emissions originate in cities
- 85%** of all anthropogenic greenhouse gases are produced in cities
- 2.4** billion people in developing countries have no access to modern energy supply forms.

**Cities are at a turning point– they can either pursue business-as-usual-scenarios or seize the opportunity toward sustainable development, including energy- and climate-efficient structures.**

## Obstacles

**W**hat obstacles do cities face for the installation of energy- and climate-efficient structures in the realm of sustainable development?

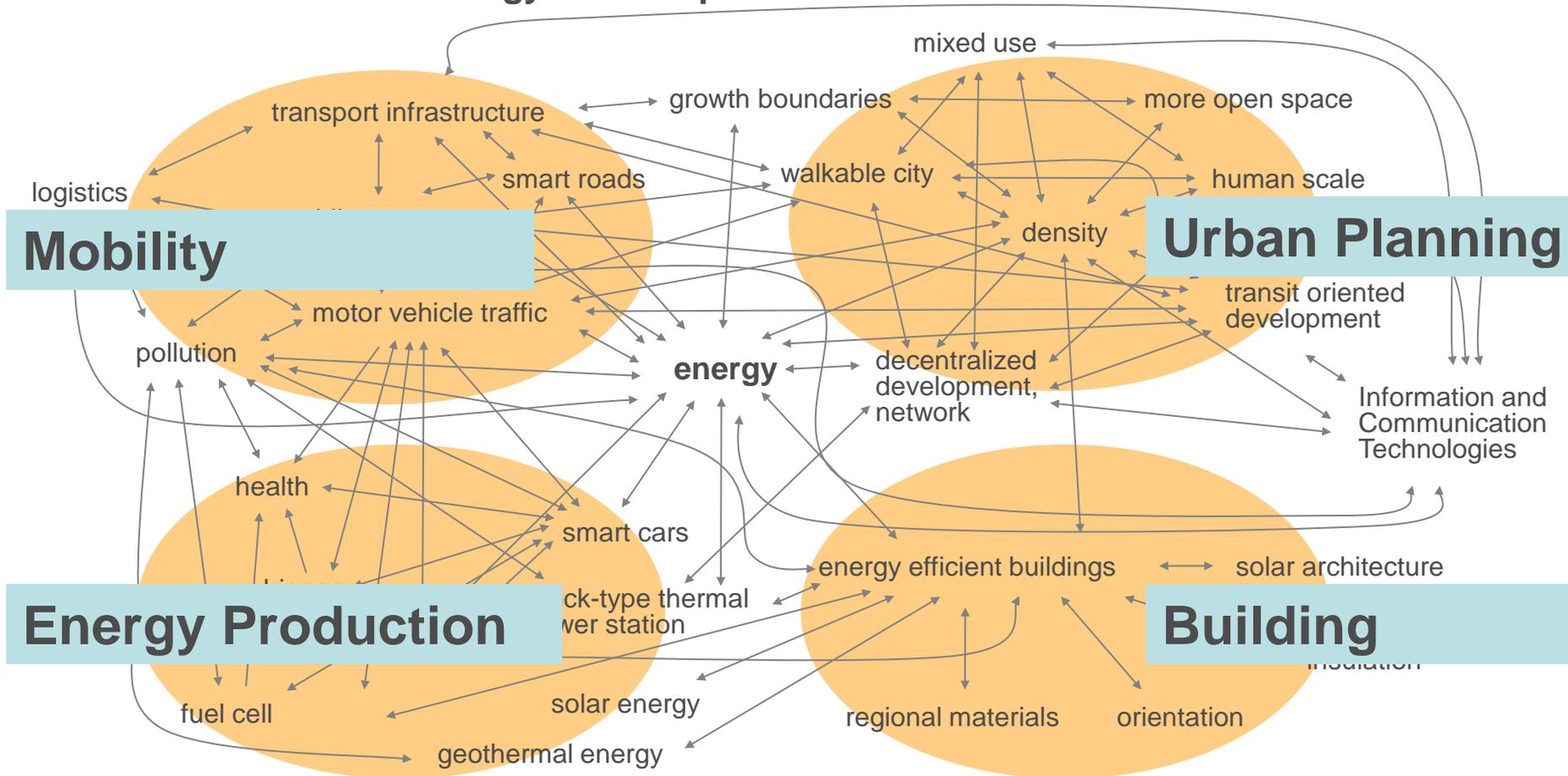
**W**hat obstacles do companies face in delivering their solutions?

and

**W**hat role do research and science play in overcoming these obstacles?

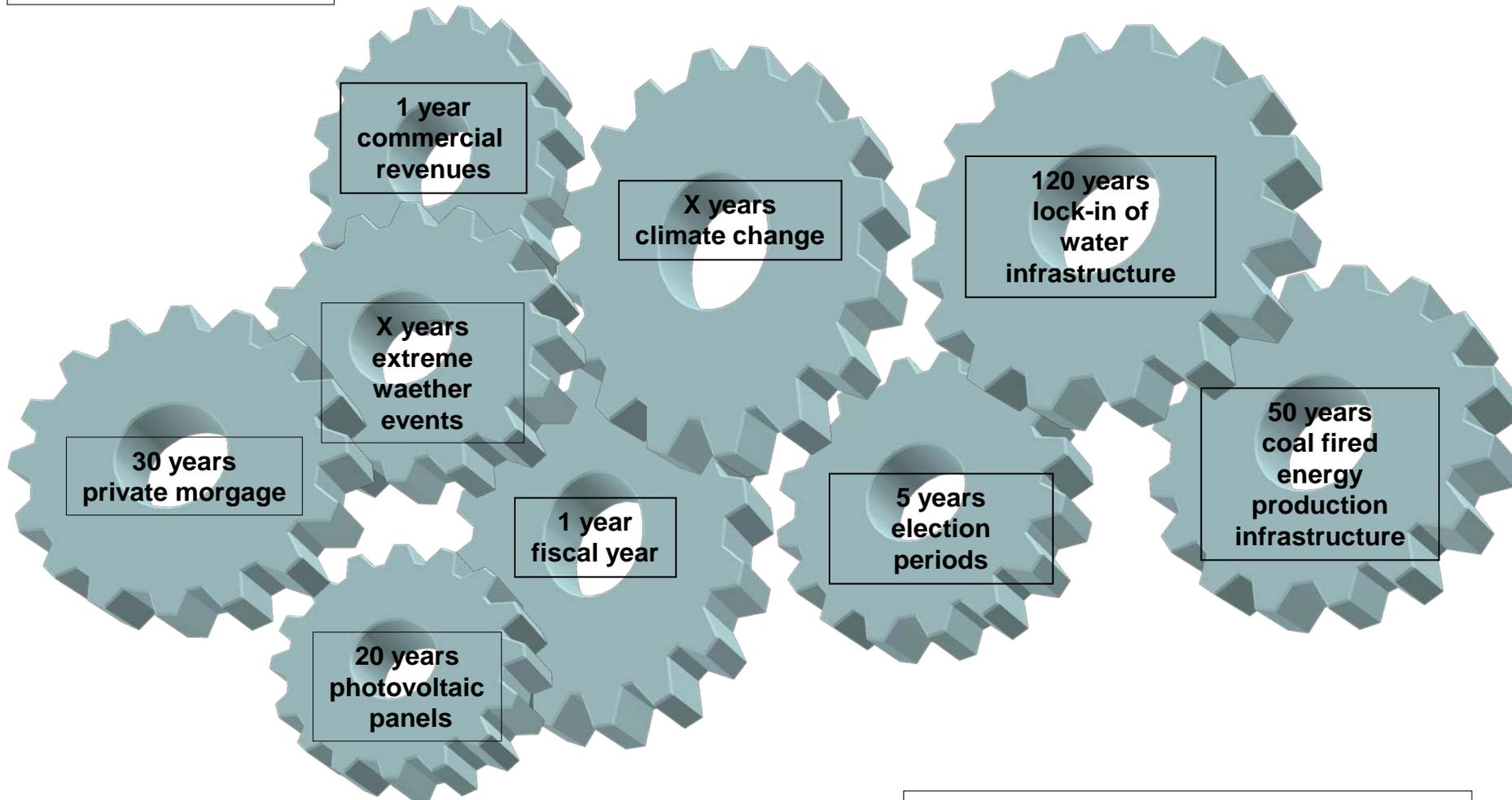
# Obstacle – Urban Complexity

## Parameters of Energy Consumption



Source: Prof. Dr. J. Alexander Schmidt/ University of Duisburg/ Essen 2005

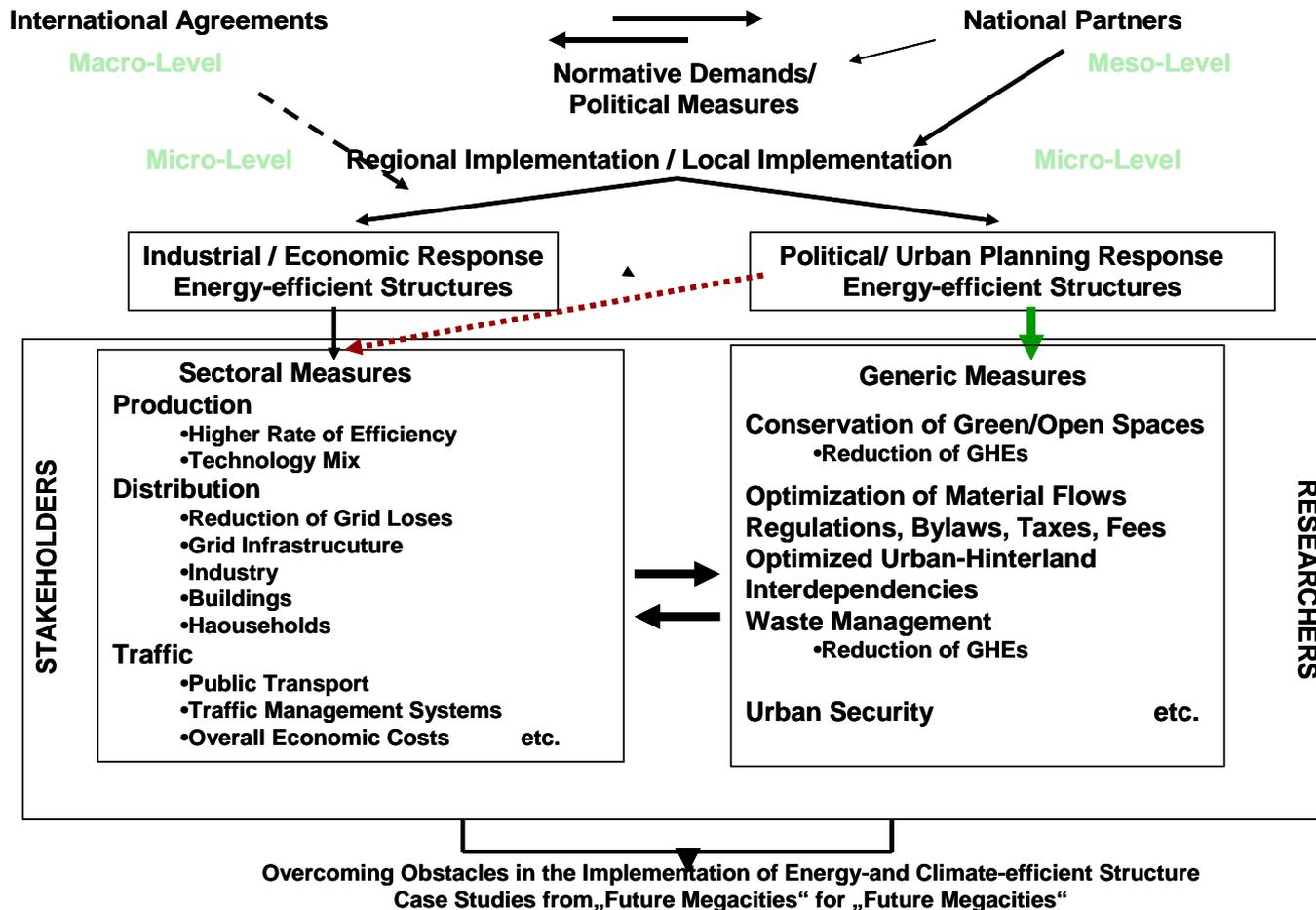
## Obstacles



Interacting timescales in urban decision making A. Koch-Kraft  
2013©

# Obstacles

## Implementation of Climate Protection



A. Koch-Kraft©

## **Overcome Obstacles:**

### **Sustainable Development.**

**There actually is only one definition that includes a broad political concept.**

This was coined by the World Commission on Environment and Development chaired by the then **Norwegian Prime Minister Gro Harlem Brundtland.**

**The Commission's report, Our common future (1987) defines:**

**"Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs."**

**Translated into the urban setting this means:**

**Sustainability is as much about the environment as it is about our communities and**

**economic systems and how they will survive into the future.**

## Operationalisation of BMBF's Research Priority on Future Megacities: Key goals

- **Research, planning, development and implementation of**
  - **solution-orientated and integrated**
  - **innovation strategies and management concepts for future Megacities**
- **Technical and non-technical innovations for Future Megacities**
- **Climate Change mitigation and adaptation measures**
  - **for the establishment of energy- and climate-efficient structures**
  - **„Tool Boxes“**
- **Showcase, that resource-consumption and greenhouse gas-emission can prospectively be reduced in terms of sustainability.**

# Cities and Projects



**Operationalisation of BMBF's Research Priority on Future Megacities:  
Thematic Foci**

**Lima: water- and wastewater management under  
9 mm of precipitation per year**

**Casablanca: urban agriculture - potentials and  
constraints for sustainable and climate- and  
energy-efficient urban growth**

**Addis Ababa: urban waste as a source of energy-  
production and income generation**

**Gauteng: efficient energy production and energy  
use**

## **Operationalisation of BMBF's Research Priority on Future Megacities: Thematic Foci**

**Ho Chi Minh City: Urban growth at 2 meters above sea level Integrative Urban and Environmental Planning Framework - Adaptation to Global Climate Change**

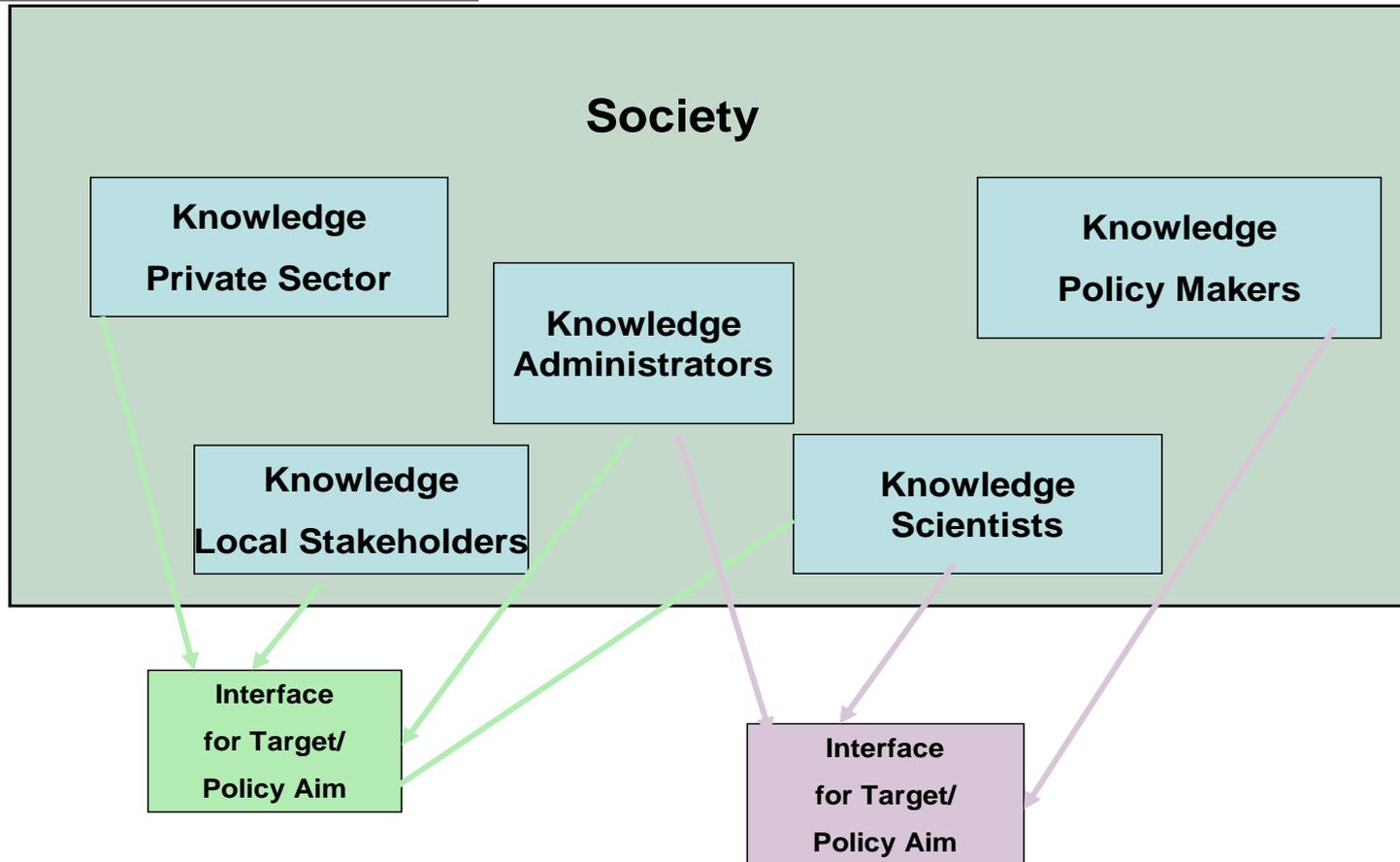
**Urumqi: Resource-efficiency and life cycle analyses in a highland-lowland interactive system within sensitive dryland environment**

**Hefei: Optimising Urban Transport Systems**

**Karaj/ Teheran: New Town Development integrated technology, architectural design and planning strategies**

**Hyderabad: Climate and energy in a complex transition process – towards sustainable Hyderabad – mitigation and adaptation strategies by changing institutions, governance structures, life styles and consumption patterns**

## Overcome Obstacles



Implementation-oriented science/sustainability science: Different forms of knowledge to be assembled individually and in relation to the policy- /implementation-oriented target being set by the research group  
(Source: Peter Moll, Ute Zander 2006)

**Overcome Obstacles:  
Operationalisation of BMBF's Research Priority on Future Megacities**

**User-oriented, participatory approach: Project development in close co-operation with decision-makers and interest groups on-site.**

**Multidimensional research themes oriented to specific demand areas: „prevention & therapy“ instead of mere „diagnosis“.**

**Take sustainability seriously: postulate a coherent concept for the interaction of economical, social and ecological transformations.**

**Long-term + graded promotion: 3 years set up phase, then 1 x 5 years main phase.**

**Implementation of pilot measures.**

## Overcome Obstacles

- **Identify the urban innovators**
- **Decipher the decision-making structures**
- **Introduce „good practices“ for participating planning**
- **Define a mutual interest for the best of the city**
- **Act transdisciplinary**
- **Think sustainable**

# City Action – Deciphering Decision Making

Urban Agriculture as an Integrative Factor of Climate-Optimised Urban Development, Casablanca (UAC project)

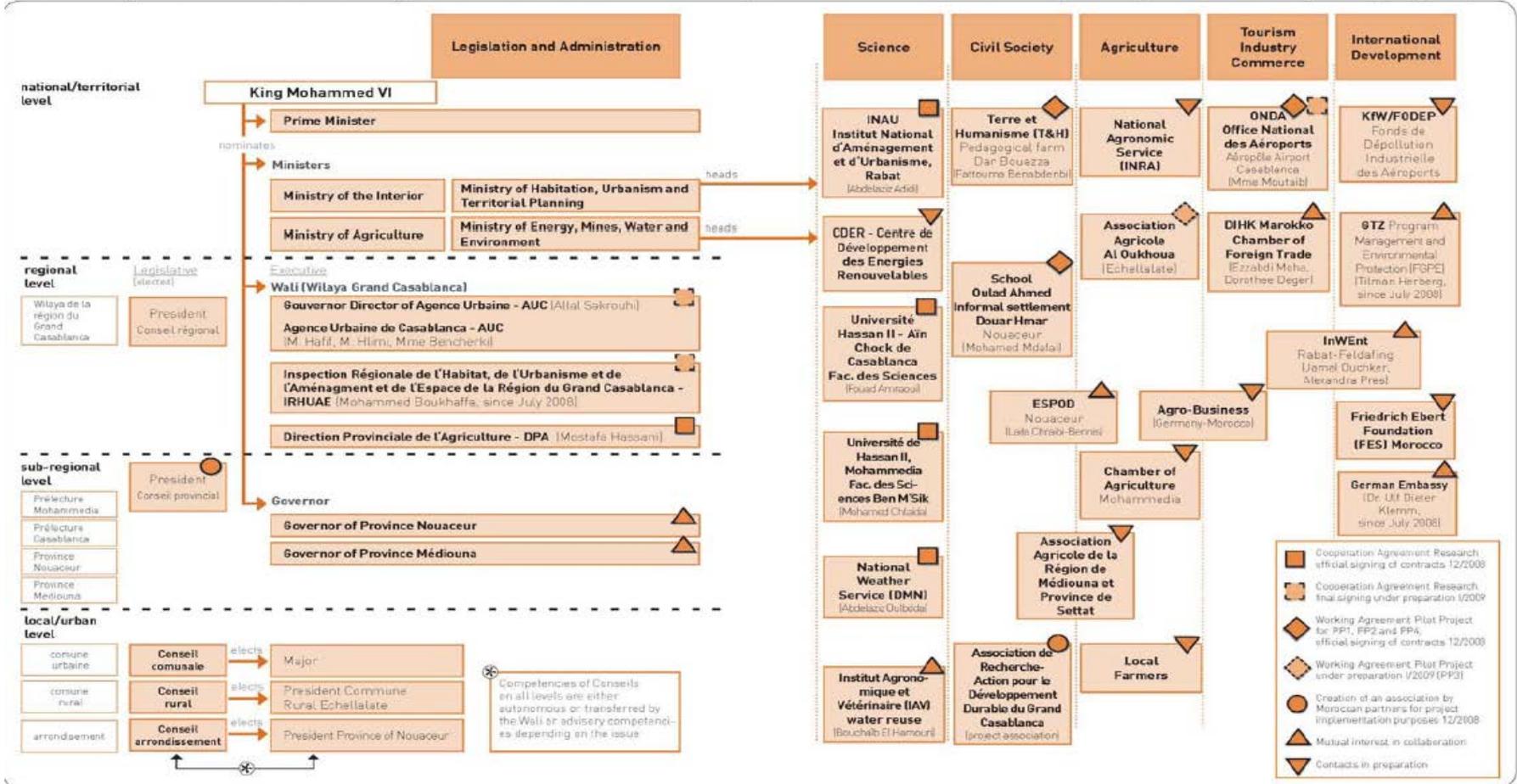


Figure: Overall project stakeholder cooperation scheme 2008 (UAC project)

## Findings and Products of BMBF's Research Priority Future Megacities

### The Gauteng Example:

- „EnerKey Technology Handbook“
- New Institution: The Gauteng Energy Office
- Modells and Instruments: the „TIMES GEECO“, a regional energy and emission-model
- The „EnerKey Advisor Tool“ to evaluate the energy performance of buildings
- An inventory of emissions originating from transport for future transport planning
- A technology guide for the mitigation of GGE in SA till 2040
- The African Sustainable House – a holistic approach to construction
- „EnerKey Detectives“ – an educational school-based initiative based on the practical work with solar collectors for the energy supply of participating schools
  
- Thorough institutional analysis

# New Initiative

A consortium of the Megacities project in Addis Ababa (lead), Casablanca, Gauteng, Ho Chi Minh City, Urumqi and Lima leads the project results in the joint project "Rapid Planning for regional management in megacities and Metropolises" together (2014-2018). The integration of selected sectors of the six networks (waste, urban agriculture, energy, water, environment and urban planning), the methods and tools of material flow management and planning of the period between the data generation is to capture the urban system as a whole (waste, UL etc.) and the use of data for planning adequate infrastructure adapted to be minimized. As a cooperating multiplier international organization acts UN-HABITAT

Rapid Planning

<http://rp.at-verband.org/>

## Further reading:

<http://www.bmbf.de/en/index.php>

<https://www.fona.de/en/index.php>

[www.future-megacities.org](http://www.future-megacities.org)

**Keywords fona**

[FONA<sup>3</sup>](#)

[System Earth](#)

[Society Water](#)

[Outlook Earth](#)

[Green Economy](#)

[Polar Research](#)

[Climate Change](#)

[Funding International](#)

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[Geotechnology Energy](#)

[Efficiency](#)

[Agenda Process](#)

[Global Change](#)

[Marine Research](#)

[Biodiversity](#)

[Resources](#)

[Sustainability](#)

**Thank you very much for your attention**

## **Operationalisation of BMBF's Research Priority on Future Megacities: Key Guidelines**

- **Technical innovations in urban infrastructure adapted to local conditions and accepted by the citizens**
- **New ways in political decision processes, new forms of political decision making and governance**
- **New management instruments in urban decision making**
- **Tools to evaluate the effectiveness of urban planning measures**
- **Capacity building and vocational training measures**
- **New partnerships combating climate change**