

Construction & demolition waste flows in a metropolitan area



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Outline of a current research project



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GEFÖRDERT VOM



Bundesministerium
für Bildung
und Forschung

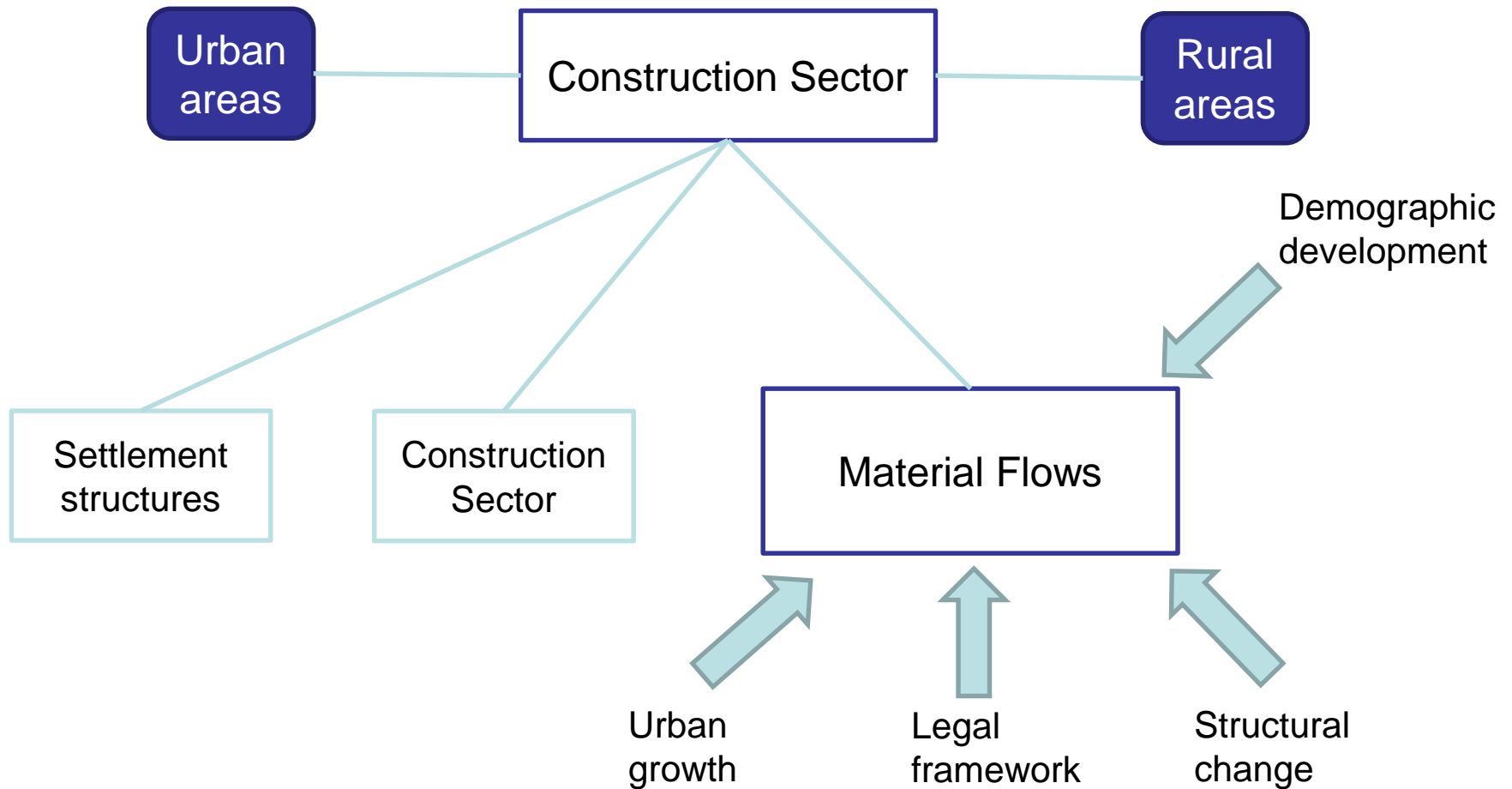


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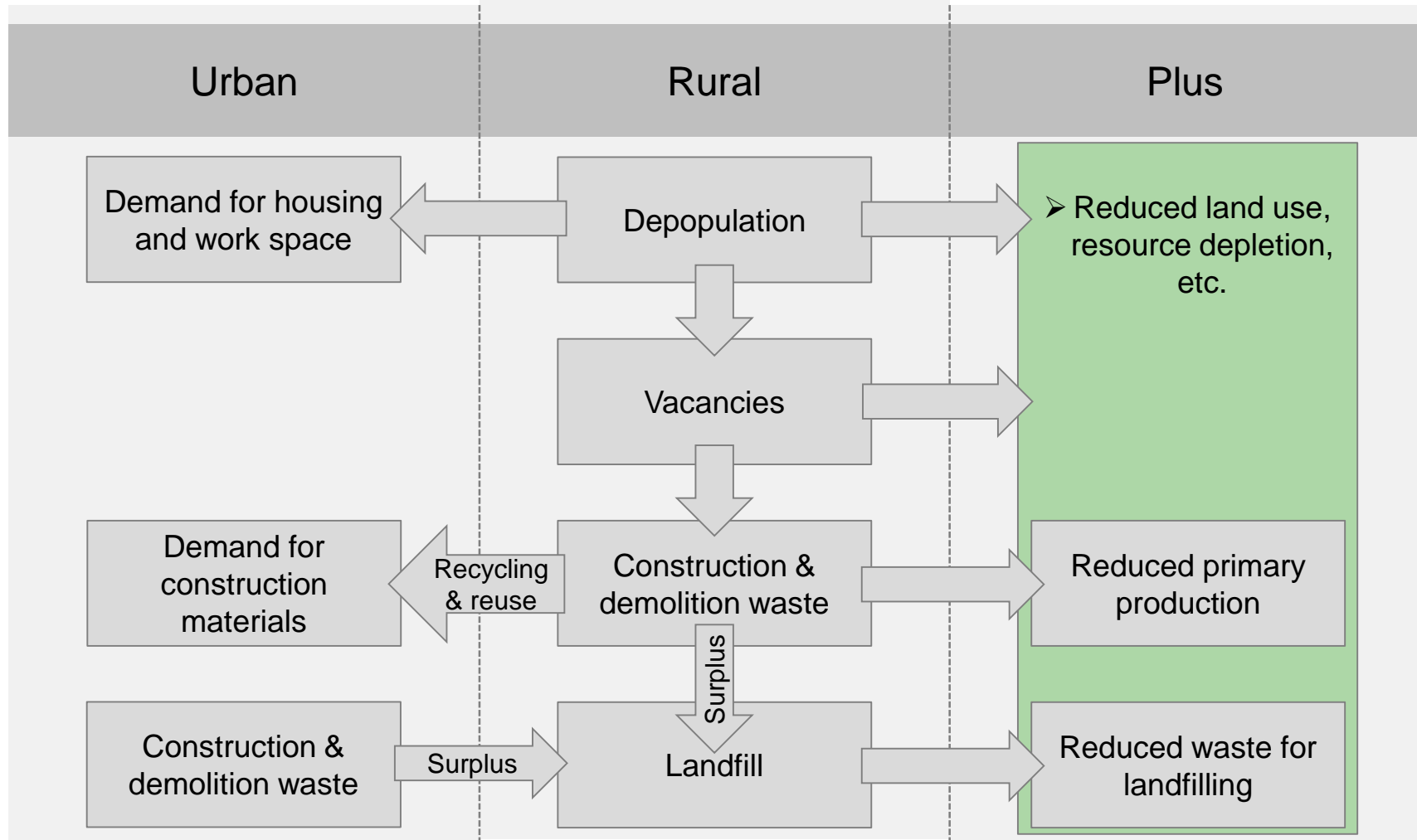
Agenda

- **Challenge**
- **Goal**
- **Approach**

Challenge



Challenge



Goal

Development of new approaches and tools to improve the material flow system of construction materials between urban and rural areas regarding environmental and economic criteria



Wissenschaftsstadt
Darmstadt



WieBauln – project outline



landmanagement



Department of Material
Flow Management and
Resource Economy



est fachgebiet entwerfen
und stadtentwicklung



Municipality
Münster



Municipality
Otzberg



Rural district
Darmstadt-Dieburg

Wissenschaftsstadt
Darmstadt



City of Darmstadt



Re2area
GmbH

Kompetenzzentrum
Innenentwicklung

Institut für kommunale
Geoinformationssysteme
IKGIS e.V.

WieBauln - to do's:

- Development of a value chain and business model
- Building and material cadaster
- Approaches for addressing owners of vacant real estate
- Educational material
- **Spatially differentiated material flow model**
- Environmental consequences
- ...

Previously at TU Darmstadt...

PRRIG

- Combination of bottom-up and top-down approaches
- Development of building typology for stock modeling
- Development of resource factors for components

AktVis

- Development of a building cadaster
- 3D visualization
- Communication with real estate owners
- ...



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Combining the geospatial approach (“top-down”) with a building-related approach (“bottom-up”)



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is part of a building stock

- location
- region
- ...

Connecting
information via
building typology

“bottom-up”

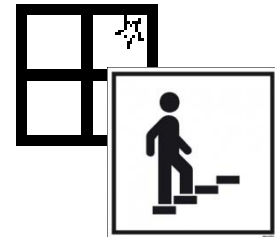
examination of real buildings

“top-down”

evaluation of geospatial
information



A building...



...has components

- walls
- windows
- ...

Approach PRRIG

Example:

		Exemplary material stock of office and administration buildings in the case study area by age classes and in total (in t)							
Co-hort	gross volume [m ³] in case study area	FE-metals	copper	aluminum	concrete	masonry, brick & tiles	wood	glass	others
1918 and before	1 080 399	25 543	258	236	174 069	129 038	1 740	2 080	2 465
1919 - 1948	715 633	16 867	167	151	125 216	70 695	1 043	2 008	2 094
1949 - 1957	8 272	217	2	2	1 583	946	14	24	26
1958 - 1968	844 402	22 066	217	193	173 264	79 122	1 266	3 211	3 168
1969 - 1978	685 813	18 003	161	139	142 215	43 911	909	3 149	2 823
1979 - 1994	114 842	3 021	26	22	23 939	5 649	142	572	494
1995 - 2001	43 403	1 143	9	8	9 071	1 813	52	225	191
2002 +	129 888	3 429	27	22	27 288	3 499	144	724	594
total		90 289	867	773	676 645	334 673	5 310	11 993	11 855

Source: Schebek et al. 2016

What's new?

PRRIG

- Modeling of material stocks
- Mostly static
- Only non-residential
- No distinction between urban and rural areas
- No environmental aspects



WieBauln

- Modeling of material stocks and flows
- Dynamic
- Residential & non-residential
- Distinction between urban and rural areas
- Environmental aspects

Approach

Material flow model

- Scenario analysis
 - Identification of possibilities and limits of reuse/recycling
 - Development of scenarios for relevant parameters such as
 - Demand for floor area
 - Rate of demolition
 - Implementation of value chains for reuse/recycling
 - Framework conditions: Economic, legal, etc.
 - Merging these scenario-components into „story lines“
- Spatially differentiated material flow model

Approach

Environmental assessment

- Using the MFA results as inventory data for LCA
- Assessing environmental impacts such as
 - Land use
 - Resource depletion
 - Climate change
 - ...
- Possibly relating to national or international sustainable development goals

Decision support

Schebek et al. 2016:

Schebek, L., Schnitzer, B., Blesinger, D., Köhn, A., Miekley, B., Linke, H.-J., Lohmann, A., Motzko, Chr., Seemann, A. "Material Stocks of the Non-residential Building Sector: the Case of the Rhine Main Area", in: Resources, Conservation & Recycling, Special Issue „Anthropogenic Stocks“, 2016.



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Thank you for your attention!



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