




timbre
Tailored Improvement of
Brownfield Regeneration
in Europe

Holistic Integrated Decision Support System for Brownfield Revitalization

Maximilian Morio, Sebastian Schädler, Michael Finkel
and Stephan Bartke, Alena Bleicher, Matthias Groß, Martin Bittens,
Andreas Justen, and many contributors more

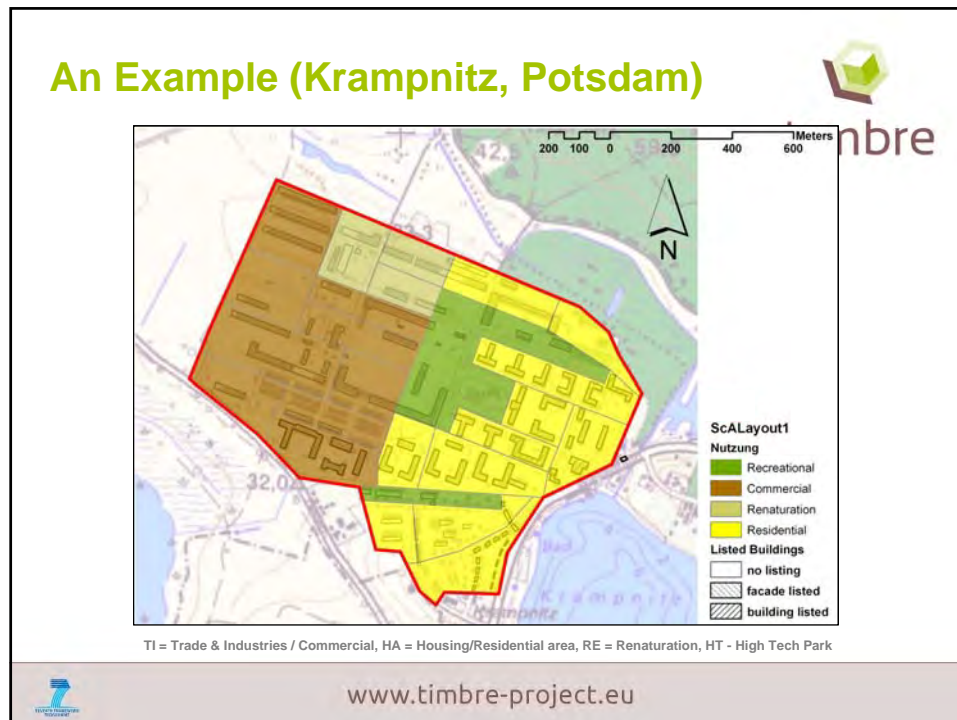


What is this talk all about?

- What is the most appropriate future use of a brownfield?
- What aspects and criteria should be considered?
- How should these criterias be ranked?
- Whom to ask?
- Who should decide?



www.timbre-project.eu



- ### Challenges
- Diverse perspectives of stakeholders
 - Stakeholders tend to have little interest in the needs/concerns of other stakeholders
 - Intransparency of existing knowledge about the given situation and related problems
 - Intransparency of evaluation and decision process
 - Economic interests dominate
 - More ...
- www.timbre-project.eu

More challenges – more specific



- Brownfields are typically contaminated (soil/GW)
- Uncertainty about (economic) consequences of contamination
- Existing buildings, possibly even listed due to their historical value
- Anticipated problems in the foreground, chances not seen
- Consuming Greenfields is often the preferred option



www.timbre-project.eu

Foto: André Kunzelmann/UFZ

Meet the challenges




- Sustainable re-use of brownfields is possible if ...
- ... stakeholders' interests and evaluation criteria are addressed in holistic way
 - ... existing situation, risks, and opportunities are clarified
 - ... re-use options are comparatively assessed
 - ... pros and cons of individual options are transparently communicated



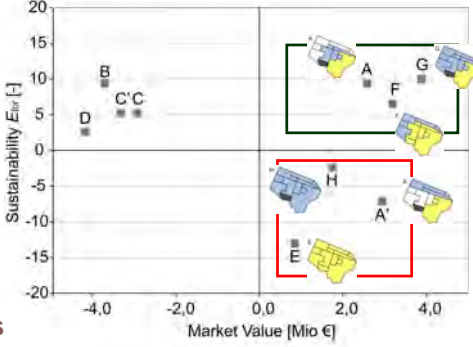
www.timbre-project.eu

How to assist in decision-making?

Plan – Assess – Evaluate/Discuss – Re-Plan




1. **Planning:** creating re-use vision(s)
2. **Integrated Assessment** (consideration of diverse assessment)
3. **Display and Evaluation**
4. **Discussion of Results, Re-Planning, Consideration of Alternative Re-use Options**



www.timbre-project.eu

Assessment Criteria




Cost

Evaluation of land use specific cost for soil and groundwater remediation and buildings deconstruction.

Sustainability

Evaluation of the contribution to sustainable (urban) development



€

Market Value

Appraisal of market value, based on a mercantile value reduction and a location-based land quality

www.timbre-project.eu

Integrated Assessment



- Conflict Analysis
 - Identify areas where existing contamination exceeds regulatory limit values
- Remediation Cost
 - Estimate the cost of remediating the conflicted areas
- Market Value
 - Estimate the market value for given land use vision
 - Subtract remediation cost and further cost (e.g., for deconstruction of buildings)
- Sustainability
 - Estimate the contribution of the land use option to sustainable urban/regional development



www.timbre-project.eu

Integrated Assessment



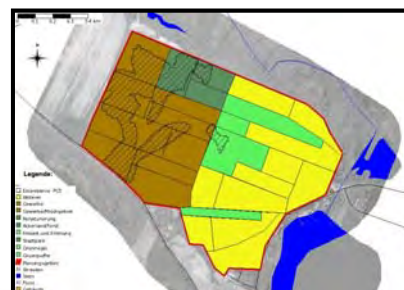
- 👉 Conflict Analysis
 - Identify areas where existing contamination exceeds regulatory limit values

Inputs:

- Contaminant distribution
- Land use map
- Land use specific remediation target **or** land use specific risk pathways


Outputs

- Maps of concentration/risk limit values (corresponds to land use map)
- Maps of concentration/risk exceedance values



www.timbre-project.eu

Integrated Assessment



Remediation Costs

- Estimate the costs of remediating the conflict areas
- Various cost estimation models for soil & GW remediation + deconstruction of buildings

Inputs

- Remediation target exceedance maps **or** risk level and HQ maps
- Contaminant / buildings parameters
- Unit cost data base

Outputs

- Remediation cost maps

www.timbre-project.eu

Integrated Assessment

Market Value

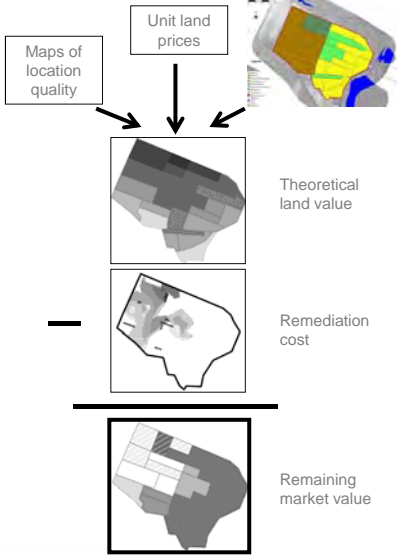
- Estimate the market value for given land use vision
- Subtract remediation and further cost

Inputs

- Land use map
- Use-type specific unit land price
- Use-type specific location quality maps
- Info on mercantile value reduction
- Results from cost models

Outputs

- Remaining market value map



The flowchart illustrates the process of determining the remaining market value. It starts with three input boxes: 'Maps of location quality', 'Unit land prices', and a 3D map. Arrows from these three boxes point to a central box labeled 'Theoretical land value'. Below this, a horizontal line with a minus sign indicates a subtraction step. An arrow points from the 'Theoretical land value' box to another box labeled 'Remediation cost'. A final horizontal line with a minus sign leads to the final output box, 'Remaining market value', which is accompanied by a 2D map.

www.timbre-project.eu

Integrated Assessment



Sustainability

- Estimate the contribution of the land use option to sustainable urban/regional development
- 2 different approaches implemented based on sustainability indicators
 - site-specific: indicators derived from stakeholder discussions
 - normative: one assessment scheme independent of the specific site conditions

Inputs

- Indicators
- Data to feed the „measurement“ of the indicators
- Definition of an aggregation/quantification scheme

Outputs

- (Maps of) „Sustainability value“



www.timbre-project.eu

Indicator: number and description	Weight [%]	Evaluation function ¹⁾	Concerned land use classes ²⁾	Land use class or feature examined ³⁾ / Global answer
1 Residential areas in the surrounding area	2	Distance	Recreational, commercial	Residential
2 Green spaces in the surrounding area	2	Distance	Residential	Recreational
3 Commercial areas within walking distance	2	Distance	Residential	Commercial
4 Neighboring uses strongly emitting	4	Neighbour	Residential, recreational	N.c. (Industry)
5 Site contains >40% sealed soil	2	Distance	Recreational, commercial	Spatial distribution of sealed surface
6 Site location within urban area	8	Global	Residential, commercial	TRUE
7 Site is part of a local habitat	8	Global	Residential, commercial	FALSE
8 High value tree/plant population	4	Global	N.c.	FALSE
9 Direct vicinity to nature reserve	8	Global	Residential	TRUE
10 Low capacity of access roads	6	Global	Commercial	FALSE
11 Good access to public transport	8	Distance	Residential, commercial	Location of public transport stations
12 Good access to clearway	4	Global	N.c.	TRUE
13 Good accessibility for bikers	2	Global	Residential, recreational, commercial	TRUE
14 Local amenities in walking distance	2	Distance	Residential, commercial	N.c. (Local services)
15 Primary school in walking distance	2	Distance	Residential	TRUE
16 Great impact on recreational areas	4	Global	Residential, commercial	TRUE
17 Historically relevant buildings	2	Distance	Residential, recreational, commercial	TRUE
18 Great influence on cityscape	2	Global	Recreational	FALSE
19 Neighbouring uses sensitive to immissions	8	Neighbour	N.c.	Residential, recreational
20 Good supply and disposal infrastructure	4	Global	Residential, commercial	TRUE
21 Area strongly contaminated	6	Global	Residential, recreational	TRUE
22 Site suitable for innovative industries	6	Global	Commercial	TRUE
23 Adjacent enterprises susceptible to new industries	4	Global	Residential	FALSE

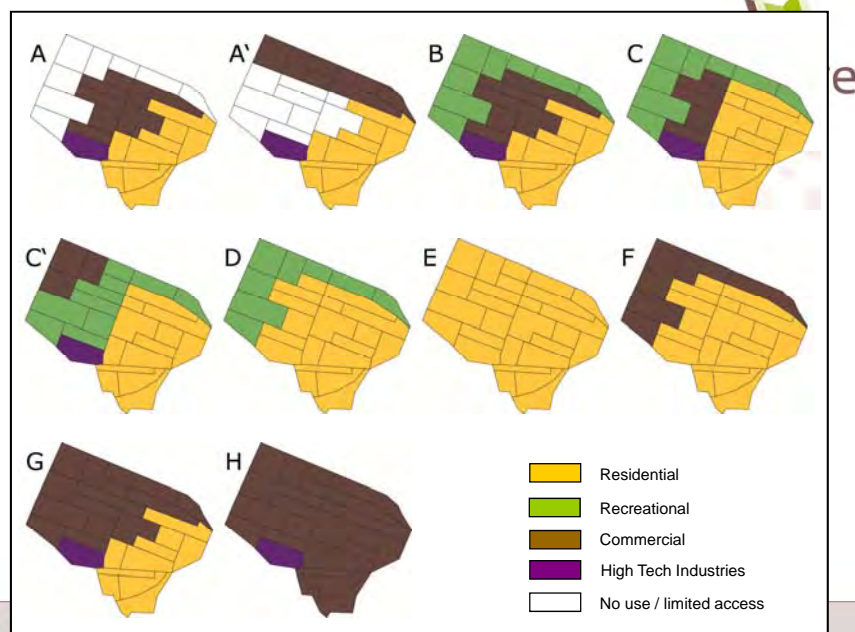
Case Study: Krampnitz, Potsdam

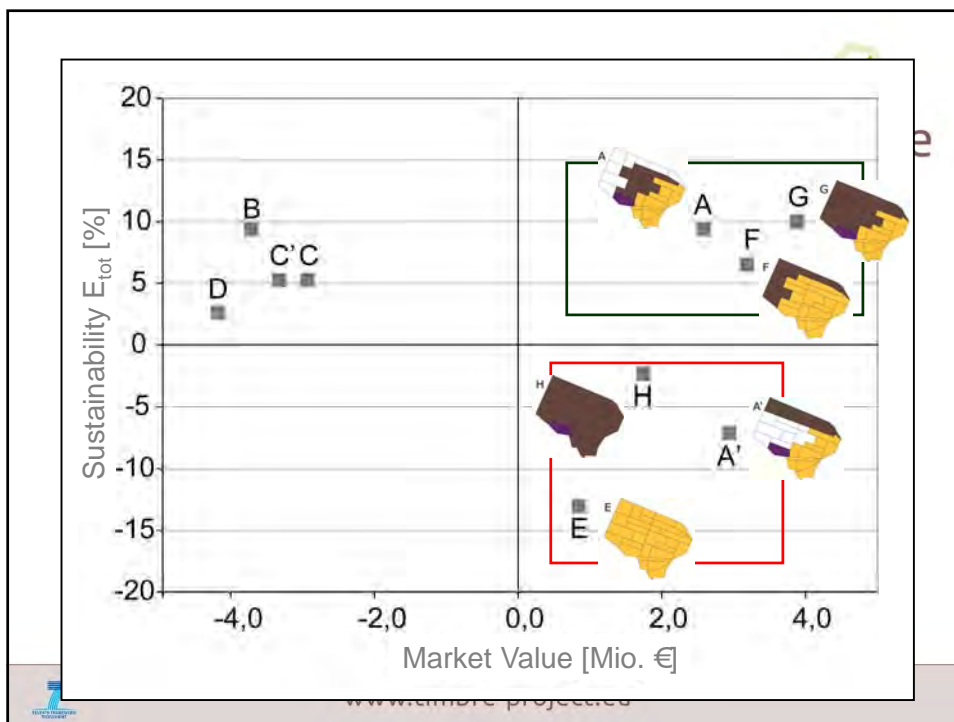
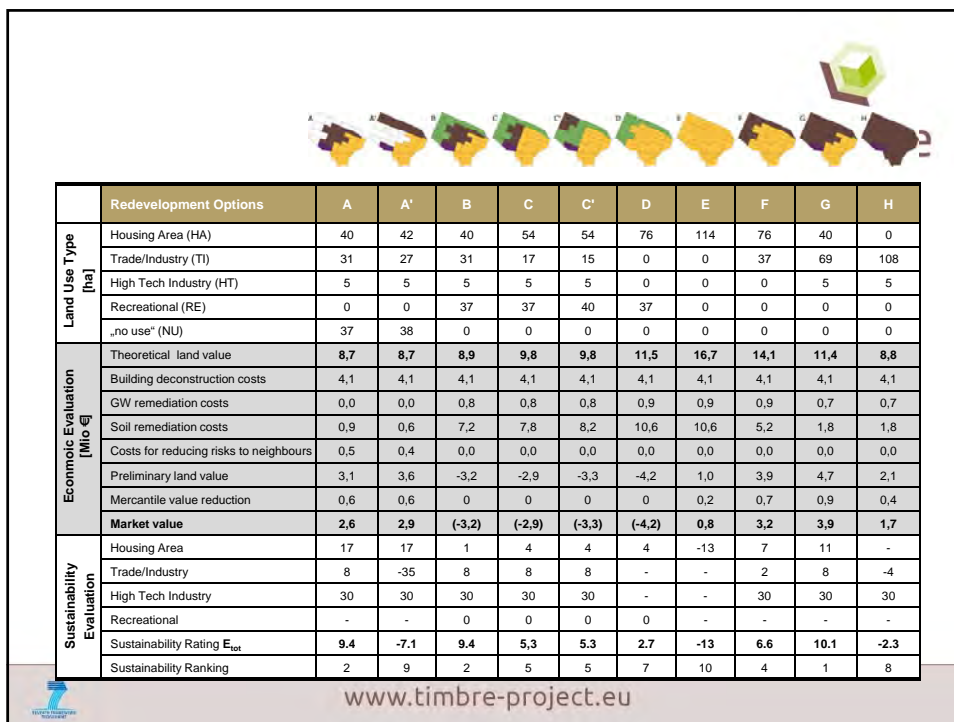


Schädler, S., Morio, M., Bartke, S., Rohr-Zänker, R., Finkel, M., 2011.
Designing sustainable and economically attractive brownfield revitalization options using an integrated assessment model,
Journal of Environmental Management, 92, 827-837.



www.timbre-project.eu





Case Study (2)

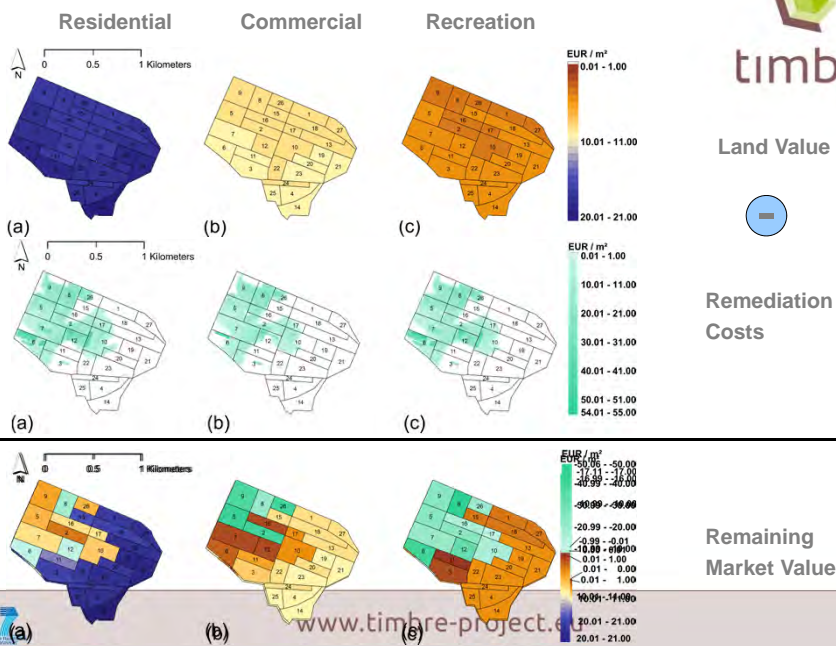


Schädler, S., Morio, M., Bartke, S., Finkel, M., 2011.
Integrated planning and spatial evaluation of megasite remediation and reuse options. Journal of Contaminant Hydrology, 127(1-4), 88-100.



www.timbre-project.eu

Uniforme land use options



Land Value

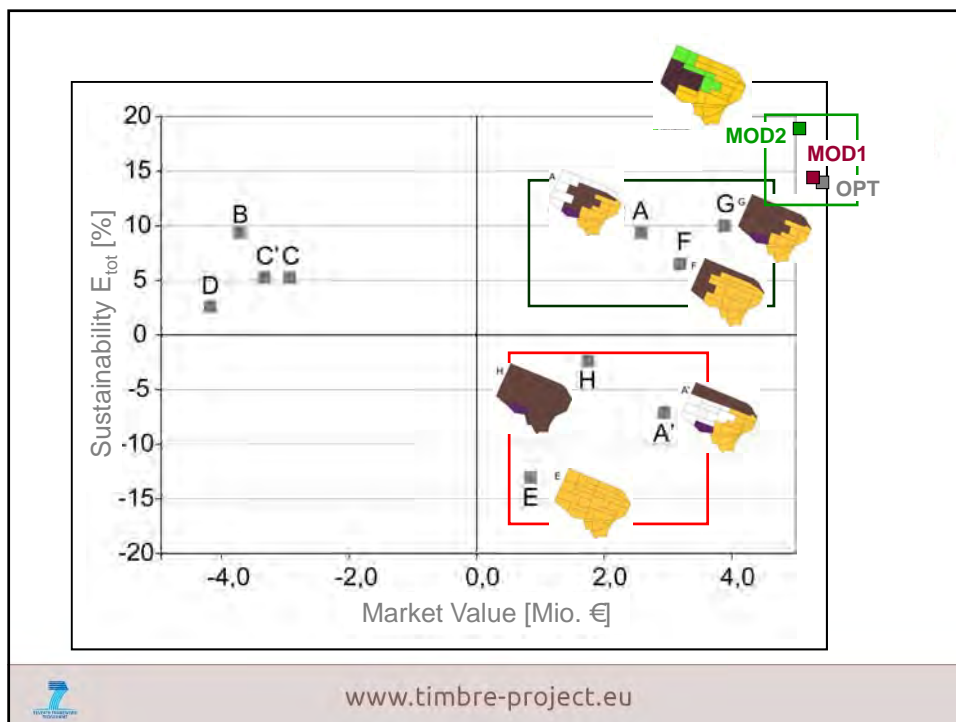
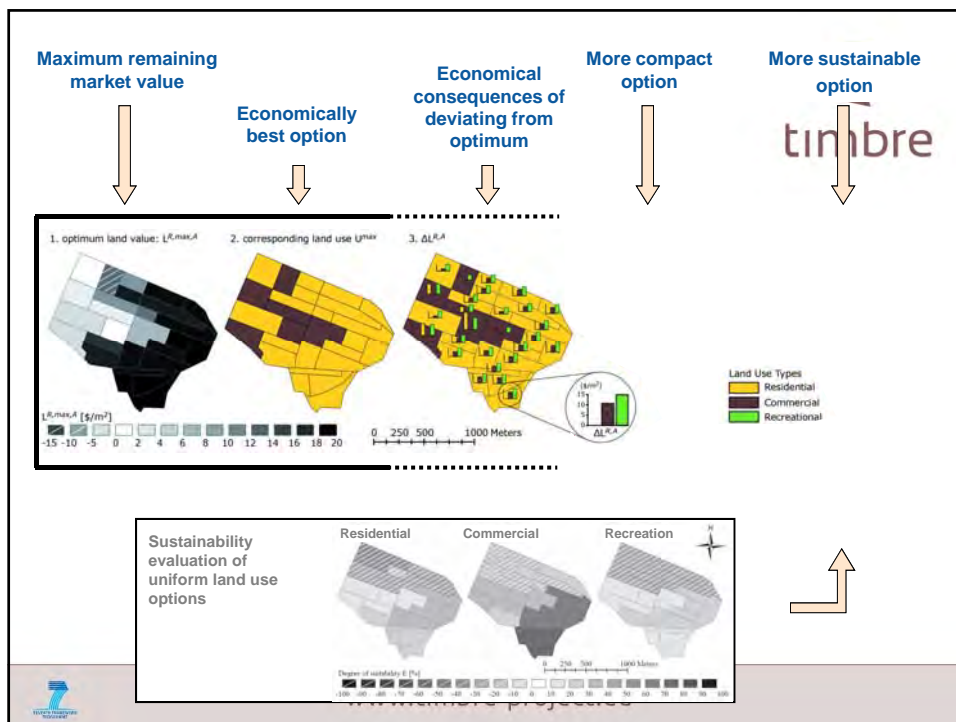


Remediation Costs

Remaining Market Value



www.timbre-project.eu



Further Case Studies

- Germany: Radeberg, City of Brandenburg
- Rumania: Hunedoara
- Poland: Szprotawa

Tool's Availability

- Desktop: Megasite Management Toolsuite - MMT
 www.safira-mmt.de
www.d-site.de
- Web-based:
 - 2014, completion of TIMBRE



timbre

GEFÖRDERT VOM
Bundesministerium für Bildung und Forschung



tasko
CENTRE OF COMPETENCE
LEIPZIG



HELMHOLTZ
ZENTRUM FÜR
UMWELTFORSCHUNG
UFZ



www.timbre-project.eu



timbre

Tailored Improvement of Brownfield Regeneration in Europe

Max Morio
Sebastian Schädler
Michael Finkel



EBERHARD KARLS
UNIVERSITÄT
TÜBINGEN



FACULTY OF
SCIENCE
Center for Applied Geoscience

michael.finkel@uni-tuebingen.de
www.timbre-project.eu



TIMBRE acknowledges funding by the European Community's Seventh Framework Programme under grant agreement 265364