On Transferring the Grid Technology to the Biomedical Community: the German MediGRID Case

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Outline

- Introduction
- Materials and Methods
- Results and Discussion
- Conclusion

Introduction

- Healthgrid Initiatives (e.g. caBIG, WISDOM, DE-MediGRID) are transferring the grid computing technology to life science.
- Bozeman Effectiveness Model of Technology Transfer
- Question: To which degree do the principles of technology transfer apply to DE-MediGRID (as an example for a healthgrid)?

Materials and Methods
Technology Transfer

- Technology transfer:
  - Common view: technology is a physical entity that can be transferred
  - Common view: transferring a technology developed in universities and governmental laboratories to the industry
  - Inter domain technology transfer does exist

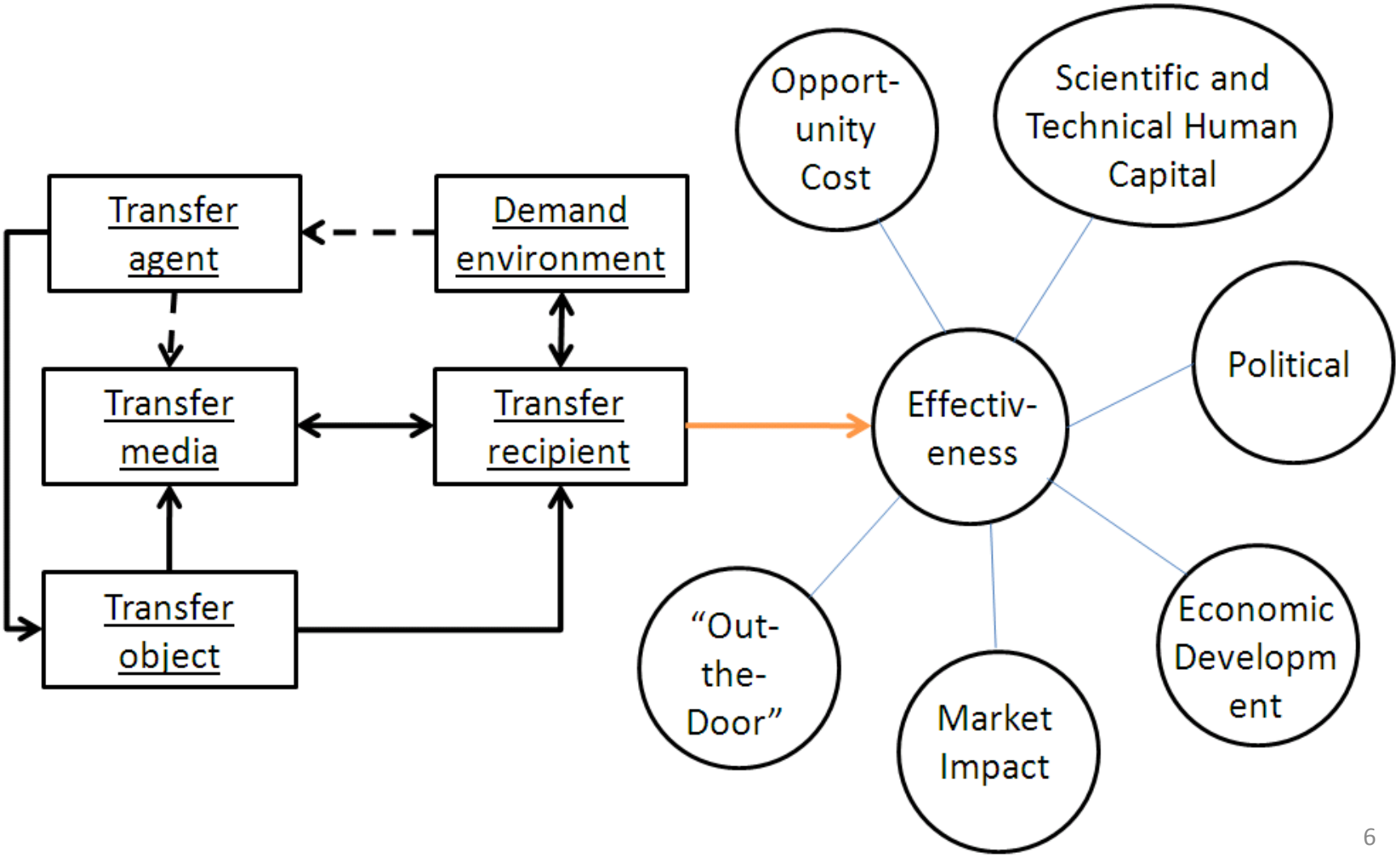
- Technology vs. knowledge vs. application transfer

Materials and Methods
Paradigms for Performing Research

- Market failure technology paradigm
- Mission technology paradigm
- Cooperative technology paradigm

Materials and Methods

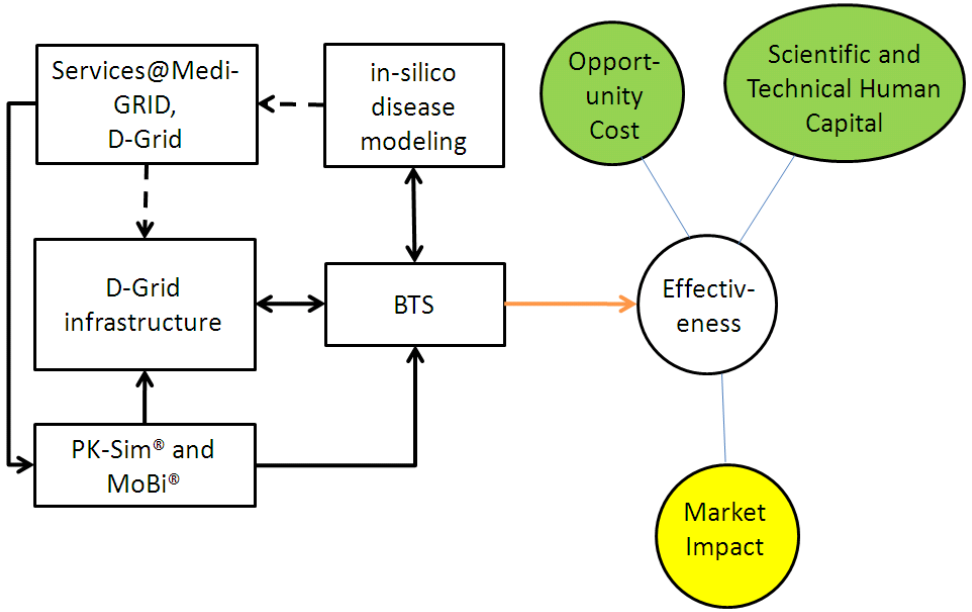
„Effectiveness Model of Technology Transfer“



Results and Discussion

Example: Bayer Technology Services GmbH (BTS) 1/2

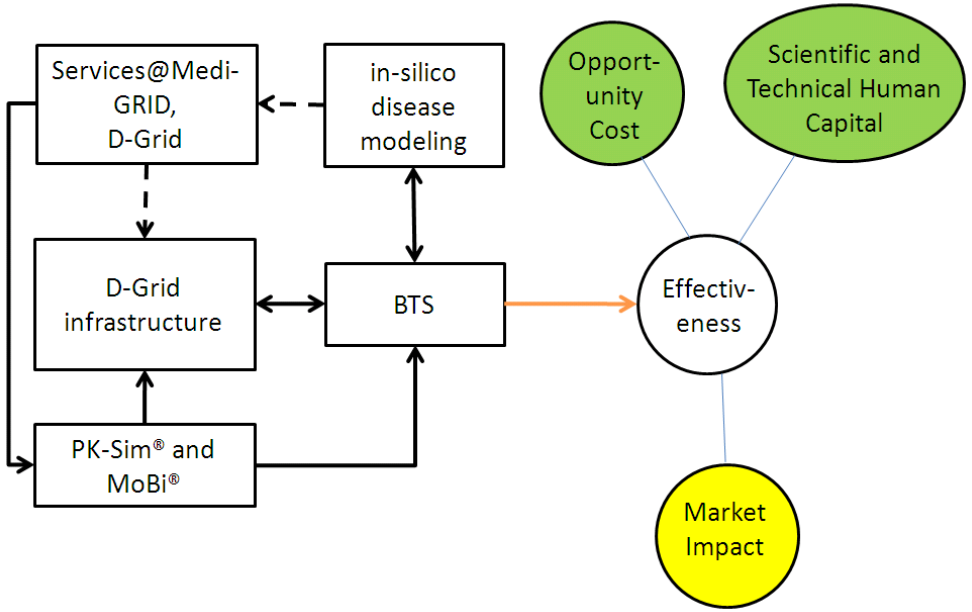
- PK-Sim® and MoBi® allow in-silico disease modeling and pharmaceutical interventions in humans
- We were able to achieve a speed-up proportional to the mean number of allocated cores on the grid



Results and Discussion

Example: Bayer Technology Services GmbH (BTS) 2/2

- Problem: D-Grid resources are dedicated to non-commercial research use only
- The grid technology transfer process was able to create new opportunities and increase the scientific capital



→ Difficulties in exploiting technology on the market due to legal and administrative problems

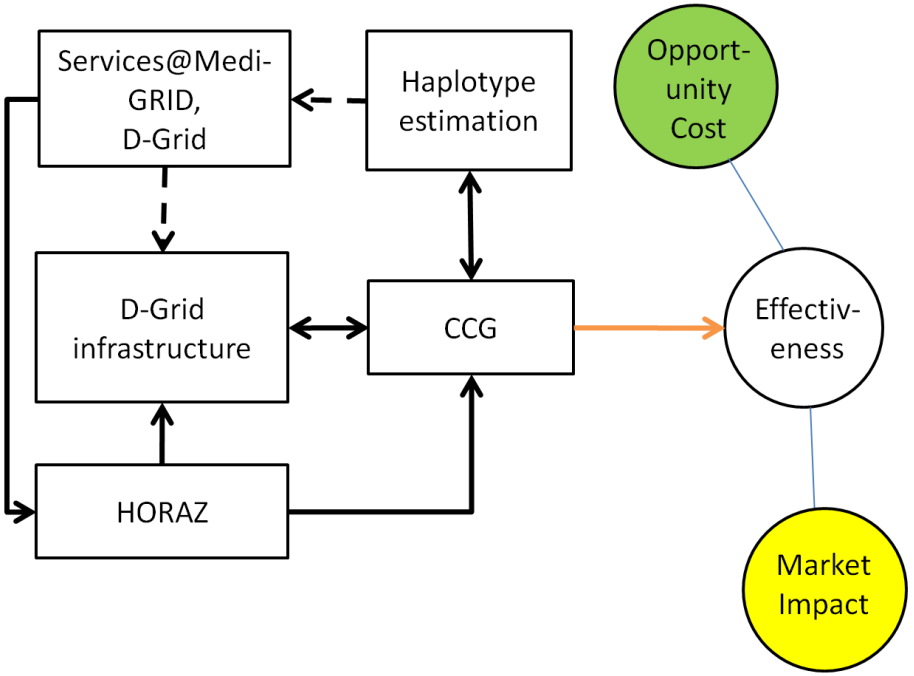
Results and Discussion

Example: Cologne Centre for Genomics (CCG) 1/2

- HORAZ (haplotype estimation as a parallel grid application with additional tools)

- Full genome scans (~1 million SNP) of all chromosomes of 468 people were processed in 46 hours.

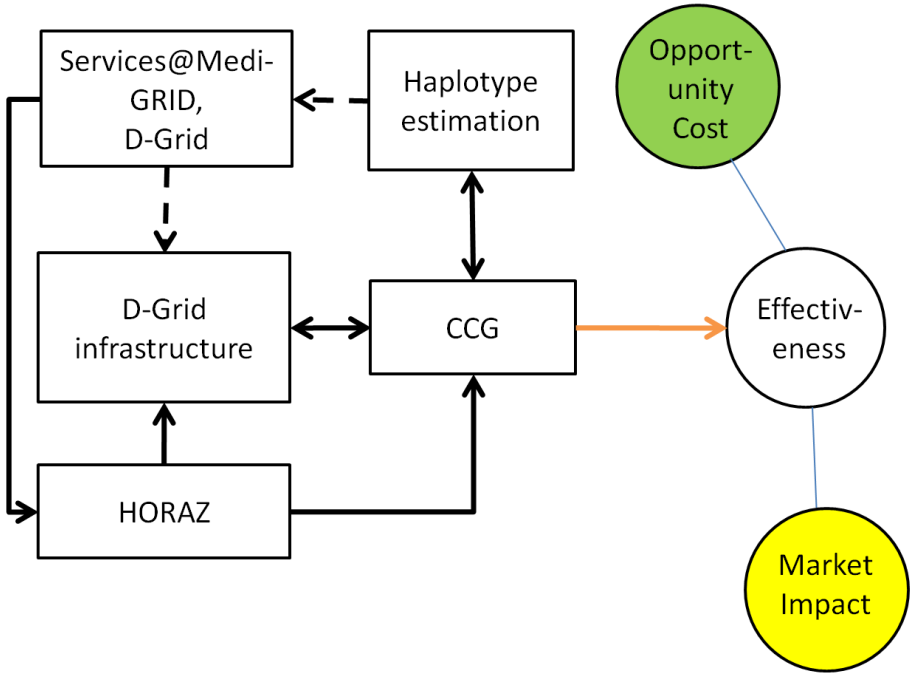
  The processing of the data of 200 people on a single workstation requires 14 months.



Results and Discussion

Example: Cologne Centre for Genomics (CCG) 2/2

- The planned business use case for HORAZ is a pay-per-use service
- Problem: no legal basis for billing resource and service use in D-Grid
- Problem: the accounting components are not fully supported on all compute sites

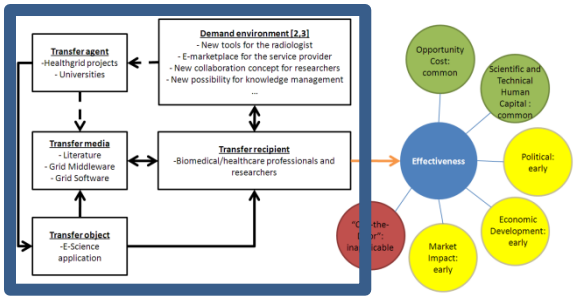


→ Difficulties in producing market impact due to organizational and legal issues

Results and Discussion

Dimensions of the Effectiveness Model

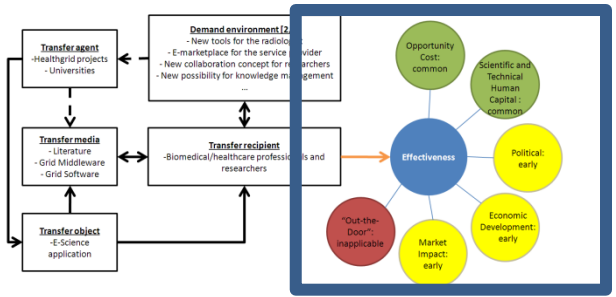
Dimension	Examples [6]	In MediGRID (as an example)	Comments
Transfer Agent	Government agency, university, industry	Mainly life sciences Grid projects from academia	Academia is not necessarily market oriented institutions
Transfer Medium	License, copyright, person-to-person, formal literature	Literature, Grid computing software, workshops	Literature is vague and complex. Software is not stable. Science Parks are very helpful
Transfer Object	Scientific knowledge, technological device, know-how	The methodology of performing e-science using the Grid technology	Is the dynamic Grid technology (used by healthgrids initiatives) ready to be commercialized?
Transfer Recipient	Firm, consumer, group, institution	Biomedical/healthcare professionals, researchers, and companies	Which is the right policy: market pull or a market push?
Demand Environment	Price for technology, substitutability, relation to technologies now used, market shelters	New tools for physicians, E-marketplace for medical service providers, collaboration concept for researchers, new possibility for knowledge management [2]	Depend mainly on public funding. Therefore, it is challenging to develop an economical sustainability



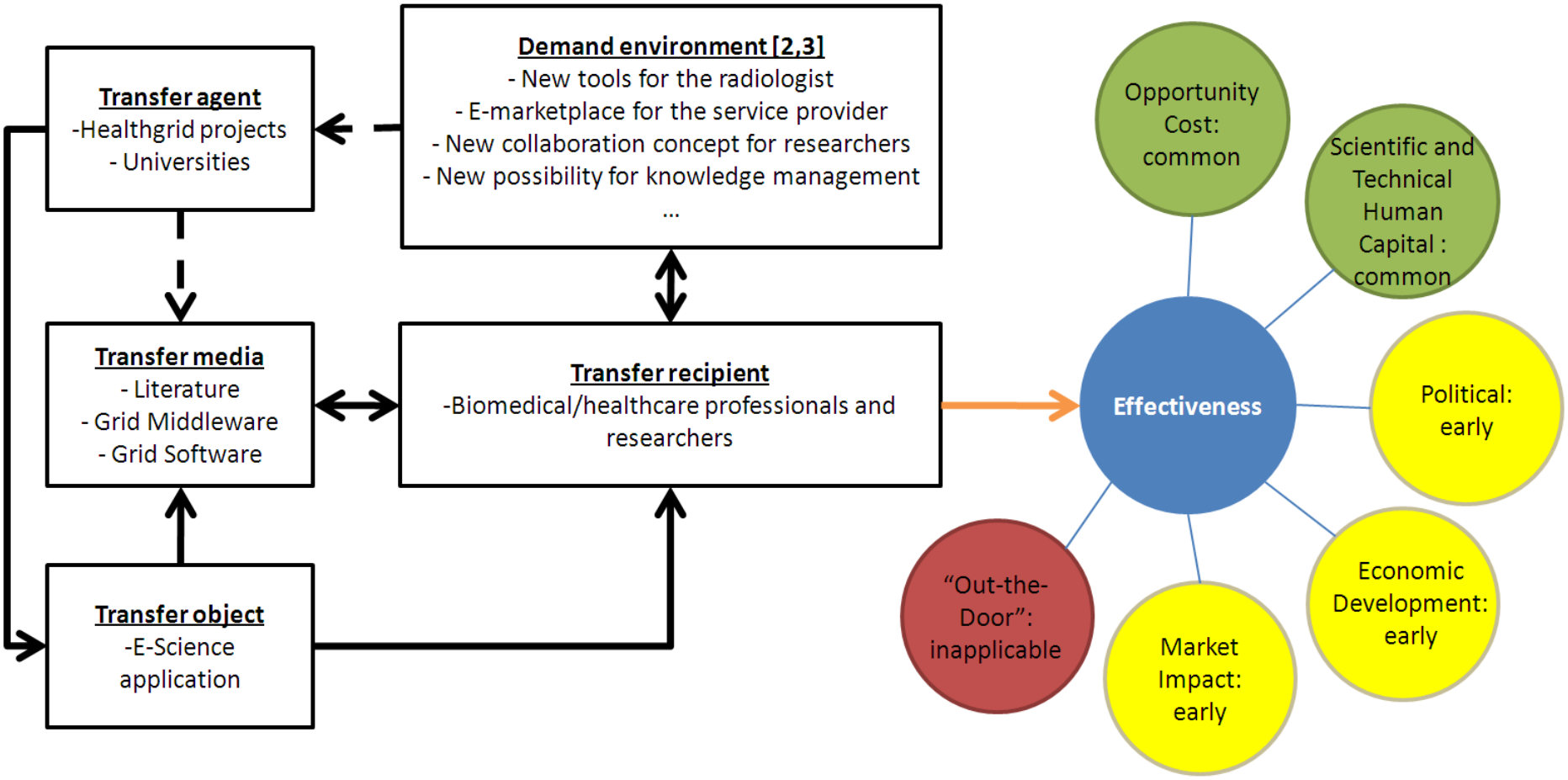
Results and Discussion

Effectiveness Criteria

Criterion [6]	Focus [6]	In MediGRID
"Out-the-Door"	One organization receives the technology provided by another, no consideration of its impact	Uncommon
Market Impact	Has the transfer resulted in a commercial impact, a product, profit or market share change?	Not yet reached
Economic Development	Similar to Market Impact but on a regional or national economy rather than a single firm or industry	Not yet reached
Political Reward	Based on the political reward flowing from participation in technology transfer (e.g. increased funding)	Minimal
Opportunity Costs	Examines alternative uses of resources and possible impacts on other missions of the transfer agent/recipient	Common
Scientific and Technical Human Capital	Considers the impacts of transfer on the enhanced scientific and technical skills, technically-relevant social capital, and infrastructures (e.g. networks, users groups)	Common



Results and Discussion



Conclusion

- In the absence of well established models for transferring a dynamic technology, a three steps strategy can be followed:

  1. building a strong scientific and technical human capital ☺
  2. reaching a clear political reward while in the mission funding phase 😐
  3. reaching out to the market and gradually ascent toward a market cooperative paradigm ☹

- The transfer object needs to be stabilized and the legal framework must be completed before a shift in funding policy is performed.

Thank you for your attention