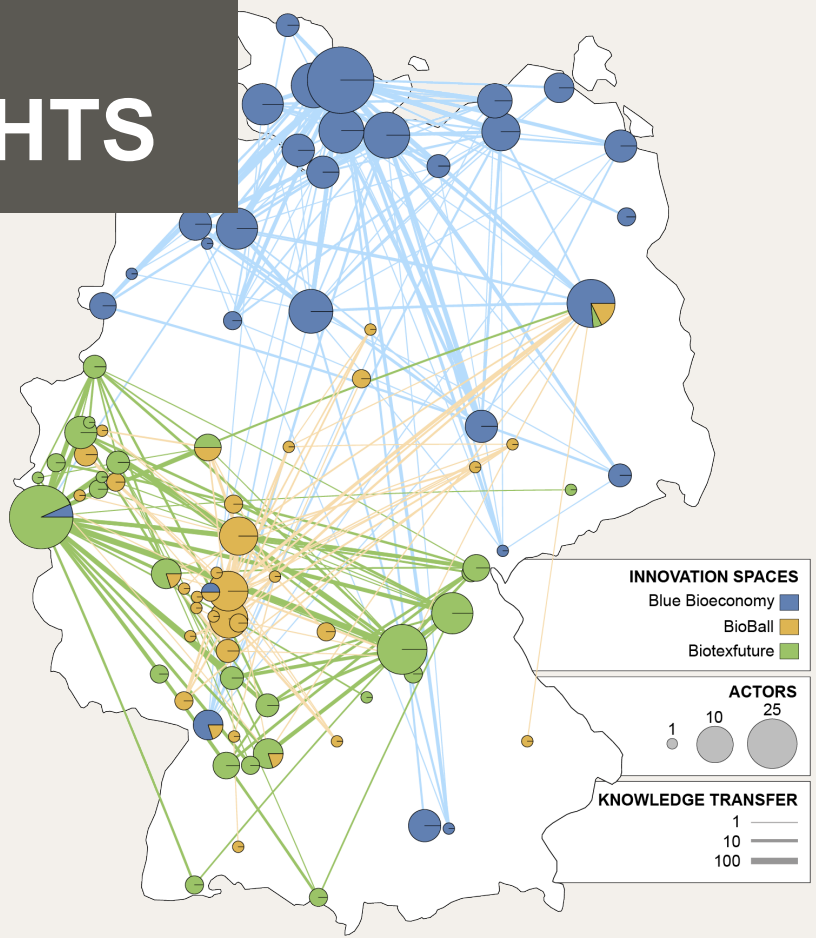
KEY INSIGHTS



BIOTEXFUTURE
TRANSITION LAB

COMPARING THE BIOECONOMY INNOVATION SPACES

Daniel Wagner – LMU
Jakob Hoffmann – LMU
Johannes Glückler– LMU

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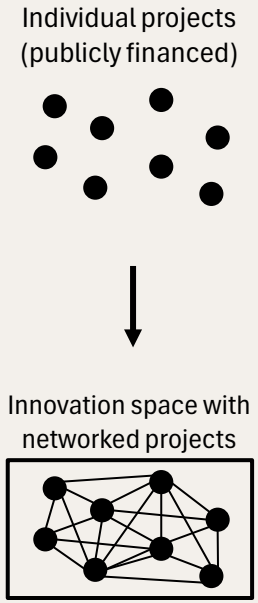
1. THE BIOECONOMY INNOVATION SPACES
2. METHODOLOGY:
   SITUATIONAL ORGANIZATIONAL NETWORK ANALYSIS
3. KEY FINDINGS
4. CONCLUSIONS

A NEW POLICY INSTRUMENT: THE GERMAN BIOECONOMY INNOVATION SPACES



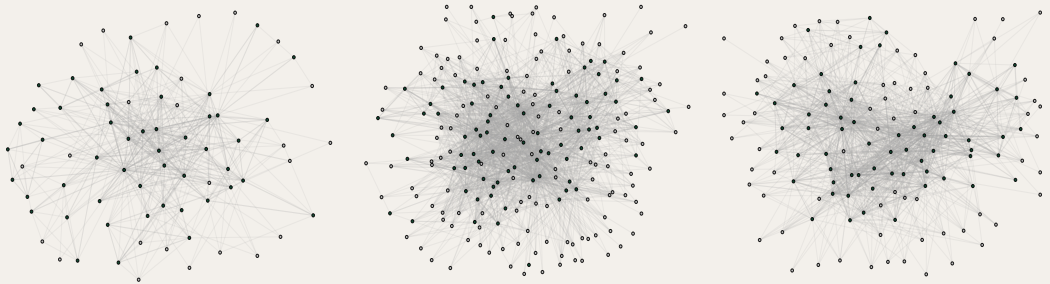
- A Bioeconomy Innovation Space (funding up to 20m EUR)
  - ... installs a governance structure, which defines its own research priorities.
  - ... adopts new partners, and develops and approves new projects on its own.
  - ... seeks to promote the emergence of synergies and cross-fertilization.
  - ... establishes a PMO that assumes administrative and coordinative tasks.
- This study covers three Innovation spaces:
  - **BioBall** promotes the reuse of biogenic residual and waste materials
  - **Biotexfuture** transforms the petroleum-based textile value chain
  - **Blue Bioeconomy** promotes aquatic circular economies
- Research questions
  - Have the Innovation Spaces experienced cross-project learning?
  - What are the conditions in which cross-project learning thrives?

BMBF & BMEL (2020) National Bioeconomy Strategy. ***Federal Ministry of Education and Research***. ■ Blue Bioeconomy: https://blaue-biooekonomie.de/de ■ BioBall: https://urban-bioeconomy.de/bioball/de/home_de.html ■ Biotexfuture: https://biotexfuture.info/

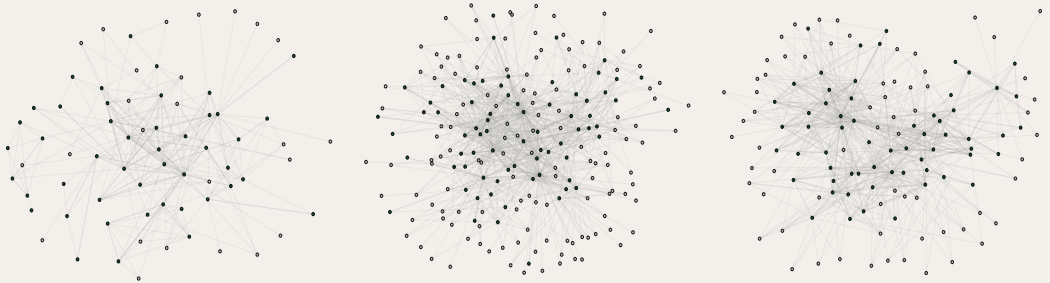
METHODOLOGY

Situational Organizational Network Analysis

"Who are the people ... that you have spoken to individually?"



"...that have helped you solve work-related problems or build new knowledge...?"

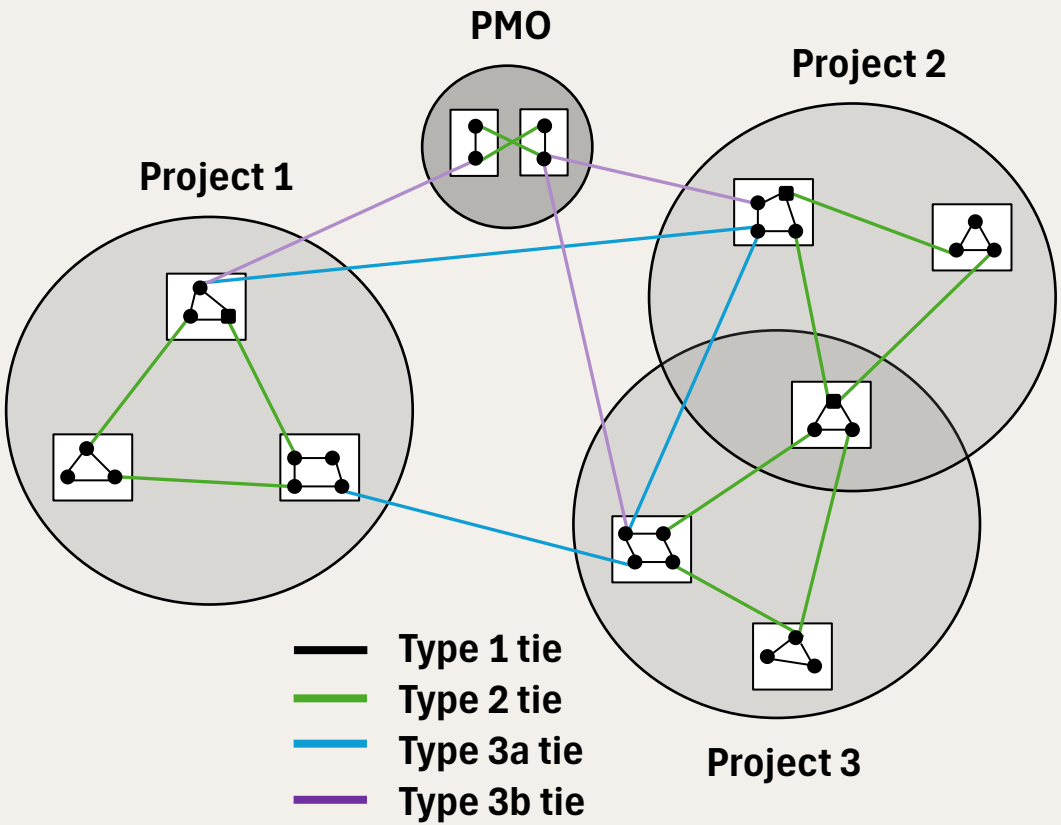


BioBall (N=71) **Blue Bioeconomy (N=140)** **Biotexfuture (N=135)**

- SONA is a mixed-method approach to studying innovation collaboration in organizational networks (Glückler et al., 2020).
- It combines qualitative interviews, standardized network surveys, and formal social network analysis and modeling.
- A total of *N*=30 Interviews were conducted with key informants.
- Three network surveys were run with a response rate of 80% or higher (81%; 80%; 86%).

The survey participants were presented with a list of all innovation space members. ■ The participants are visualized with a dark green node and the identified ones in a grey node . All calculated network measures refer to the respondents' network. ■ Glückler J, Panitz R, Hammer I (2020) SONA: A relational methodology to identify structure in networks. ***Zeitschrift Für Wirtschaftsgeographie***, 64(3): 121–133

A TYPOLOGY OF BOUNDARY-SPANNING LEARNING TIES



We distinguish three types of ties:

- **Type-1:** Learning **within organizations**
- **Type-2**: Learning **across organizations**
  - within an inter-organizational project
- **Type-3**: Learning **across projects**
  - **Type-3a**: Learning across projects between knowledge workers (but not between individuals in the same organization)
  - **Type-3b**: Learning across projects between members with at least one in a governance role (PMO)

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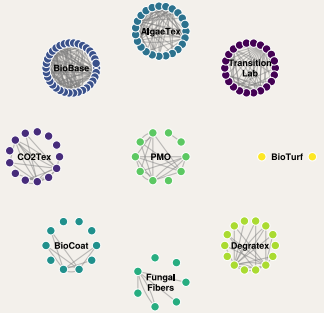
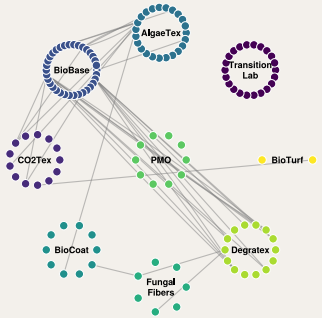
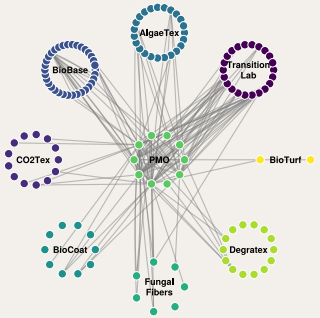
Hierarchy and Type-3a learning



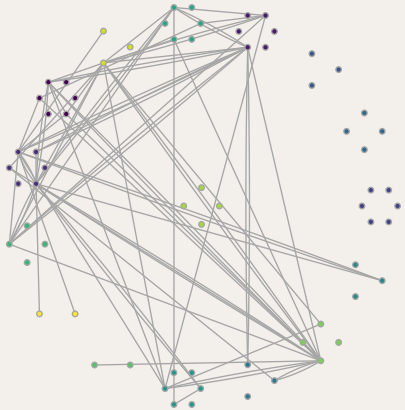




	Project manager	Project members
Project manager	11	17
Project members	9	11

- A total of 24 people reported *N*=48 type-3a ties, which connect all technical projects.
- A majority of 75% of these relations involve a project manager, only 11 (23%) ties are purely lateral relations between technical project members.
- In sum, only 1,38 % (11 out of 800) reported learning relations in the Innovation Space BIOTEXFUTURE are type 3a relationships between technical members.
- Response to RQ1: Yes, the Innovation Space has experienced the emergence of across-project learning relations. Although their number is small, they are particularly strong (reciprocity).

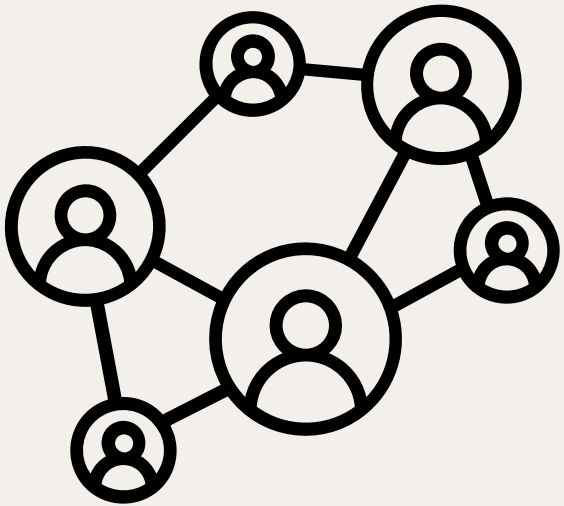
COMPARING THE THREE INNOVATION SPACES (TYPE 3A-TIES)



	BioBall	Blue Bioeconomy	Biotexfuture
Projects	16	31	9
thereof technical	12	29	7
Organizations	57	78	50
Members	71	140	135
thereof affiliated with multiple projects	12	20	8
Ties	99	222	59
Share of all ties (%)	.45 (99/218)	.20 (222/1072)	.06 % (48/800)

KNOWLEDGE SHARING

Drivers of Knowledge Sharing in the Bioeconomy Innovation Spaces

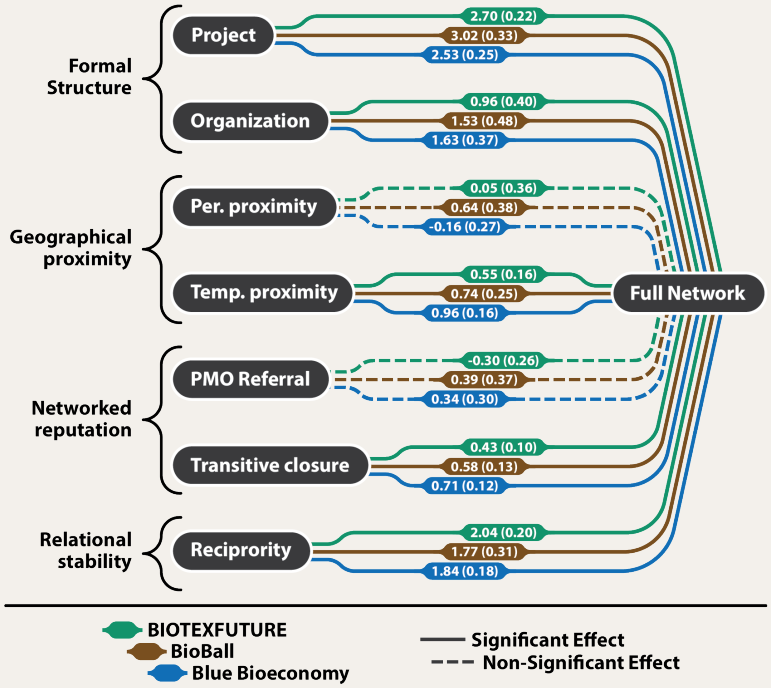


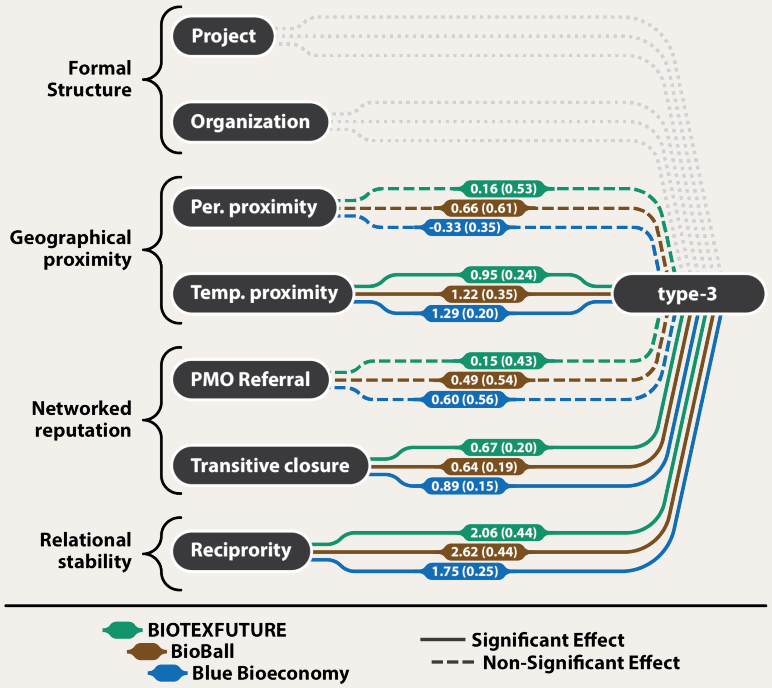
- **Formal structure,** measured by the employment in (1) the same project and the (2) same organization.
- **Geographical proximity**. (1) Permanent proximity (Boschma 2005), measured as co-location of members: the closer the actors, the easier and more likely it is to meet and interact. (2) Temporary proximity (Torre 2008), measured as the number of co-attendances at events.
- **Networked reputation** (Glückler & Armbrüster 2003), measured as (1) referrals among members (transitive closure), and (2) referrals by a governance person: a common third establishes a new connect by recommendation.
- **Relational stability** (Bapna et al. 2017), measured as reciprocity, where for each relation s→r the reciprocal tie r→s also exists.
- Implication for Management: Co-attendance and referrals by governance roles are indicators of the governance impact on across-project learning relations.

Boschma R A (2005) Proximity and innovation: A critical assessment. ***Regional Studies***, 39, 61–74 ■ Torre A, Rallet A (2005) Proximity and localization. ***Regional Studies***, 39(1), 47–59. ■ Glückler J, Armbrüster T (2003) Bridging uncertainty in management consulting: The mechanisms of trust and networked reputation. ***Organization Studies***, 24(2), 269–297. ■ Bapna R, Gupta A, Rice S & Sundararajan A (2017) Trust and the strength of ties in online social networks. ***MIS quarterly***, 41(1), 115-130.

KNOWLEDGE SHARING

A test of three potential drivers of collaboration

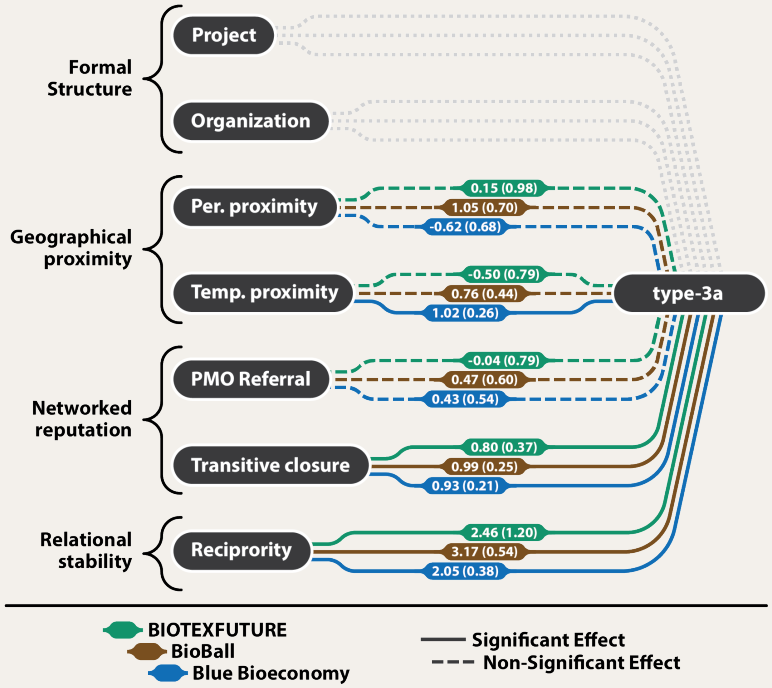




We use the Frailty Exponential Random Graph Model (FERGM) ■ Note: Coefficients are posterior medians; brackets indicate posterior standard deviations. Coefficients for which the 90% credible interval does not contain 0 are in bold.

KNOWLEDGE SHARING

A test of three potential drivers of collaboration



- Type3a-ties have been more likely to emerge …
  - with two members having **co-attended at events** (only significant in blue bioeconomy).
  - with being **introduced by common third parties** (transitive closure), although not by PMO members.
  - **Co-location** has been found insignificant for both, type-3a relations as well as the overall network.
  - **Governance** has become effective mainly through organizing proximity.

We here use the Frailty Exponential Random Graph Model (FERGM) ■ Note: Coefficients are posterior medians; brackets indicate posterior standard deviations. Coefficients for which the 90% credible interval does not contain 0 are in bold.

TEMPORARY PROXIMITY

Event co-attendance in the communication network of the bioeconomy innovation spaces

	Full Network	Type 3	Type 3a	Type 3b
Internal				
In Person Event				
Association meeting	1	1	1	1
Forum/ Symposium	2 1 2 2	2 1 2 2	X 1 X X	X 1 2 2
Insight Session	4 X	X X	X X	X X
Member Day	5 3 4	4 3 3	X X X	3 X 3
Study trip	X	X	X	X
Workshop	4 1 X	X 1 X	2 1 X	X 1 X
Online				
Online Event	-1 3 3	X 3 4	X X X	X 2 X
External				
Trade Fair	2 1	2 1	X X	X 1

BioBall
Blue Bioeconomy
BIOTEXFUTURE 2023
BIOTEXFUTURE 2025
X event type existed
1-n ranking of event types*
-1 negative effect

- Communication ties have been more likely to emerge co-attending …
  - open or semi-open events such as forums or symposia.
  - external events like trade fairs.
  - online events, even if this differs depending on the innovation spaces.
- Type 3a communication ties have been more likely to emerge by co-attending workshops and forums or symposia.

We use the Frailty Exponential Random Graph Model (FERGM) ■ * The ranking of event types is determined by ordering their coefficients in descending order, as measured within the innovation space and the surveys. Coefficients for which the 90% credible interval does not contain 0 are ranked.

TEMPORARY PROXIMITY

Event co-attendance in the knowledge network of the bioeconomy innovation spaces

	Full Network	Type 3	Type 3a	Type 3b
Internal				
In Person Event				
Association meeting	1	2	X	2
Forum/ Symposium	2 2 X 1	1 2 2 2	1 X X X	1 2 2 X
Insight Session	X X	X 3	X X	X X
Member Day	3 2 X	3 3 X	X X X	3 X 1
Study trip	X	X	X	X
Workshop	X 1 2	X 1 1	1 X X	X 1 X
Online				
Online Event	X X X	X X X	X X X	X X X
External				
Trade Fair	1 X	1 X	X X	1 X

BioBall
Blue Bioeconomy
BIOTEXFUTURE 2023
BIOTEXFUTURE 2025
X event type existed
1-n ranking of event types*

- Learning ties have been more likely to emerge by co-attending …
  - open or semi-open events such as forums, symposia workshops.
  - external events like trade fairs.
- Type 3a learning ties have been more likely to emerge by co-attending workshops and forums or symposia.

We here use the Frailty Exponential Random Graph Model (FERGM) ■ * The ranking of event types is determined by ordering their coefficients in descending order, as measured within the innovation space and the surveys. Coefficients for which the 90% credible interval does not contain 0 are ranked.

CONCLUSIONS

- Dense knowledge networks have emerged in each of the three bioeconomy innovation spaces. Project governance has made great contributions to the growth of the networks by organizing a multitude of different types of events and by facilitating new contacts.
- We have proposed a typology of learning relations to distinguish the potential for cross-fertilization of knowledge.
- Type3-ties have been more likely to emerge by co-attending at events and by being introduced through common third parties (transitive closure), although PMO members were less involved than project members.
- Co-location plays a minor role for both, type-3 relations as well as the overall network. Instead, governance has become effective mainly through organizing proximity.
- Co-attending events has shown to enables actors to build new contacts, fosters communication within the innovation space, and promotes knowledge exchange between actors, even if type-3a exchange could only be demonstrated in isolated cases for workshops and symposia.

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Please reach out for full report,
feedback and questions to

Daniel Wagner

d.wagner1@lmu.de