AN APPROACH TO MODEL TIME DEPENDENT PROCESS-STAKEHOLDER NETWORKS

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Keywords: customer integration, stakeholder network, innovation process analysis

1 INTRODUCTION

As previous research proves, DSM's provide a structured and systematic view on relations between elements within one domain (or various domains in the case of MDM's) [1]. Various research work supports analysis of DSM's, such as identification of structures [2].
Currently, at the Technische Universitaet Muenchen a project is ongoing focused on the investigation of innovation processes. The research project AKINET (active customer integration in innovation networks) aims on questioning customers "how" a product should be realized after the demand was identified ("what should be done"). Therefore the research focuses both guidelines for setting up processes and methods for active customer integration. An interview method allows for getting started in a structured way but also for the interviewee to narrate the story of one specific project in a non-constrained, open manner. Therefore the need for structured documentation and further analysis of processes and networks demands for the application and evaluation of DSM methods.
Especially time dependent relations of stakeholder participation and interdependencies provide a means of characterizing the innovation projects. The main lack of applying MDM methodology is the insufficient capability to represent dynamic behaviour [3]. The presented approach supports the description of time dependent interrelations by means of DSM methodology.

2 BACKGROUND

Contrary to modelling existing processes solely and trying to improve the arrangement of existing process phases and participators, the research project AKINET focuses on identifying stakeholders which are not yet to take part actively, but determine the process already. The stakeholder is defined as an individual or a group in the organization or company [4]. Within the research project the stakeholder is defined as an individual or a group with specific interests in the organization or in the resulting products. In this understanding the innovation process bases on a network consisting of several stakeholders [5–8], which may not yet be addressed directly.
The interview selection is structured as follows: (1) In the first step, a relevant innovation project is selected on the basis of research project requirements, such as the length of the project, its outcome, its technical focus, and further more. (2) Secondly determine one interviewee to cover the whole project [9] (in general the project responsible manager) and perform the first interview. (3) Determine further staff with participation in the project and perform interviews to verify and enrich the process and network data acquired in the first interview. The gathered process information is summarized in a graphical representation. In order to encourage the interviewee to tell about all he or she knows a visualization method activates the interviewee and summarizes the interview results directly. A process whiteboard enables the documentation of processes and stakeholders' interactions within either process steps and among each other.

3 METHOD

Multiple domain matrices (MDM) support the description of interactions between the process phases, the stakeholders, and among the stakeholders. A measurement unit is defined to monitor time dependent and dynamic interactions. In the case of evaluation and analysis of past innovation projects, the sequence of abstracted process phases is supposed to represent the time line. This assumption furthers standardization and supports the comparability among the explored projects. Data preparation takes place and a MDM is derived for each particular process phase using both a special interview technique and a special visualisation tool systematically. Difference matrices connect the particular

process phase MDMs. Data analysis takes place in two levels, whereas activity and passivity define the characteristics of elements:

(1) Analysis of the whole process, without considering time dependency
(2) Detailed analysis of the time dependent relations:
    a) Analysis per process phase
    b) Analysis among subsequent process phases

Finally the detailed understanding consists of both the snapshot of the whole process and a closer look to time-dependent relations. This supports the identification of stakeholders, which are not yet to take part actively, but determine the process already. A second talk to the interviewee about the documentation and analysis results validates the proceeding.

4 RESULT

The reviewed processes contain at least the domains *process phases* and *stakeholders*. Fig. 1 exemplifies an interview result. In this example one interviewee tells about one innovation project consisting of four distinguishable process phases and four participating stakeholders. In each process phase one stakeholder dominates and determines the proceeding, whereas influences between the stakeholders are documented. In order to visualize the time dependent change of interactions, for each process phase a MDM is derived.

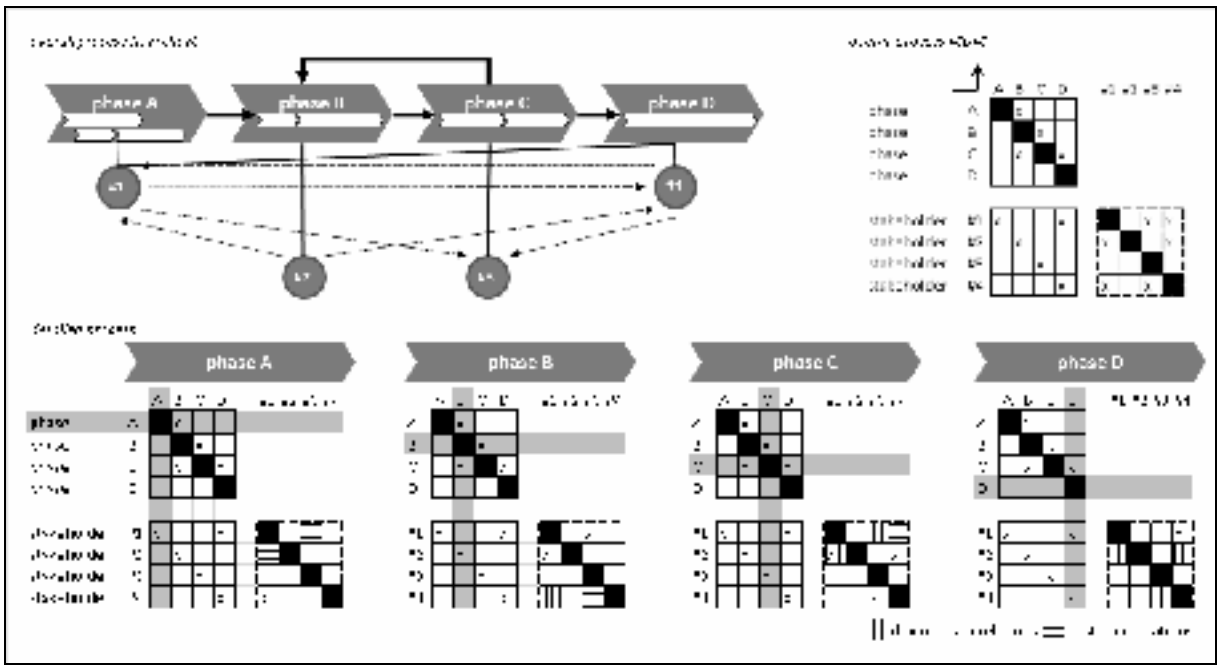

Figure 1. Reviewed process, documented by MDM and split by process phases

5 DISCUSSION

At first analysis of the whole process without consideration of time-dependency takes place. Analyzing the process mentioned above the MDM methodology is capable of incorporating sequences of particular process phases and even iterations by the **phase-phase matrix (Design Structure Matrix)**, as exemplified by *phase B and C*. Further analysis questions the reason for the iteration.

Directly process phase dominating stakeholders gather in the **stakeholder-phase matrix (Domain Mapping Matrix)**. Here *stakeholder #1* seems to play a highlighted role, because he determines more than one process phase *(A* and *B*) directly.

Taking the **stakeholder-stakeholder matrix** into consideration stakeholders *#1, #2, and #4* are supposed to be equal in activity (sum of rows) but not passivity (sum of columns) considering the interdependencies among stakeholders of the whole process. *#1* dominates two process phases (*A* and *D*) directly and influences one other process phases by stimulating the stakeholders (*#3* and *#4*) which determine phases *C* and also *D*. In sum analysis of the whole process indicates, that stakeholder *#1* plays a decisive role in the whole process assuming that process phases are equal in their importance for the whole process.

Secondly detailed analysis of the **stakeholder-stakeholder matrices** takes place in order to consider time dependent relations. Identification of identifying stakeholders who are not yet to take part actively in a process phase, but determine the process already (silent stakeholder) enriches the first step's results. Fig. 2 depicts the important role of stakeholder #2 both as phase dominating stakeholder and as influencing stakeholder *#3* indirectly via stakeholder *#1*. In phase *C* stakeholder *#2* is still influencing the phase dominating stakeholder *#3* via another stakeholder *#4*.

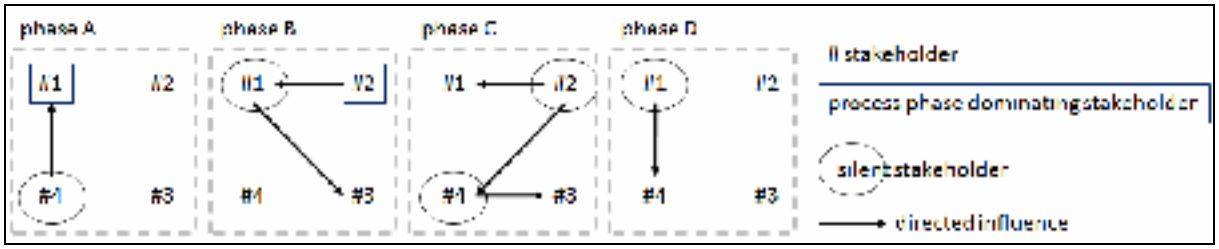

Figure 2. Identified silent stakeholders

The active integration of stakeholder *#3* in phase *B* and stakeholder *#2* in phase *C* systematically may result retrospectively as viable process improvement. A second talk to the interviewee validates the conclusion.

6 CONCLUSION

Splitting up the process in several MDMs supports visualization of time-dependent interrelations among stakeholders. Identifying the dynamics of processes and networks furthers the analysis of process participants. Structures such as decisive stakeholders, time relating stakeholder engagement, and silent stakeholders characterize the explored innovation processes.
DSM methodology furthers the identification of these structures, and enables deriving generic conclusions. MDM methodology proves an appropriate means to support both further data analysis from a generic point of view comparing several innovation projects as well as identification of process characteristics.

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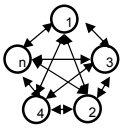
Introduction

Project AKINET (Active Customer Integration in innovation networks)

Research objectives
- **When** (which process phase) to
- integrate **whom** (stakeholder)
- actively **supported by methods** systematically.
- Therefore identify critical and **process decisive situations.**

Project AKINET covers

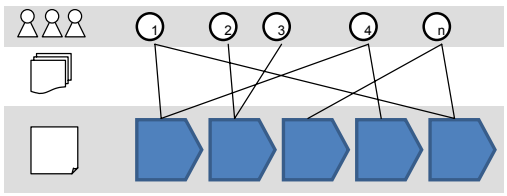
Relations among Stakeholders



Stakeholders

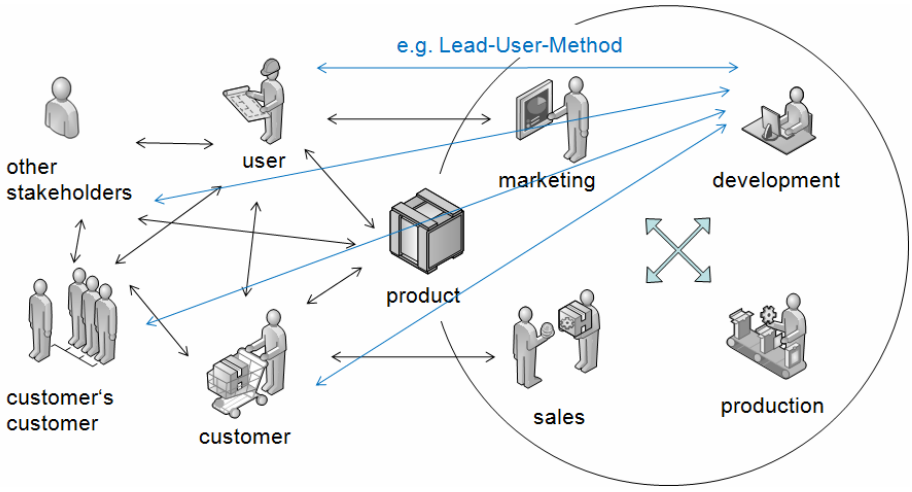
Methods for Integration

Process Layout



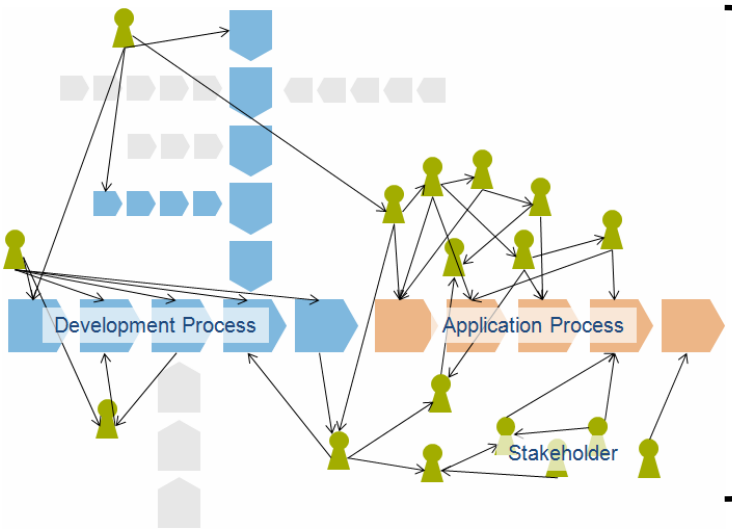
Background

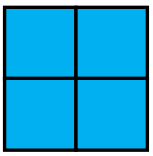
Stakeholder and Stakeholder Network



The stakeholder is defined as an individual or a group in the organization or company.

Background
Stakeholder Network and MDM



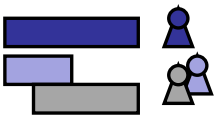


Domains
- Process phases
- Stakeholders
- …

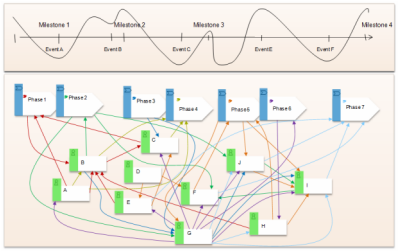
In this understanding the innovation process bases on a network consisting of several stakeholders, which may not yet be addressed directly.

Background
Interview and Documentation

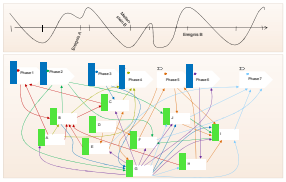
(1) Select relevant innovation project
(2) Determine one interviewee to cover the whole process
(3) Determine further staff to verify and enrich the process and network data acquired



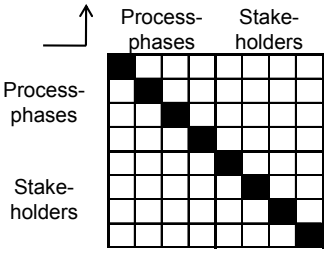
A process whiteboard enables the documentation of processes and stakeholders' interactions within either process steps and among each other.

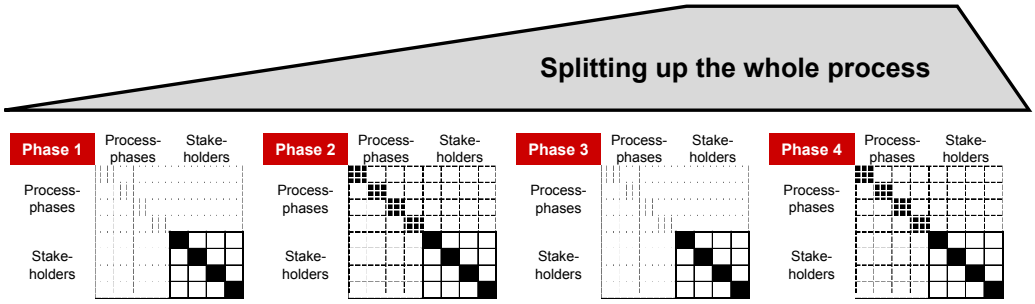


Method
Data Preparation



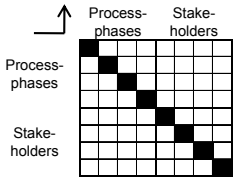
Interview Documentation



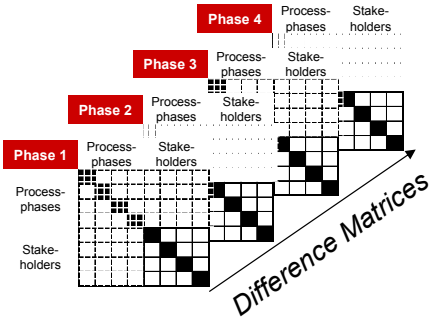


Method
Data Analysis Proceeding

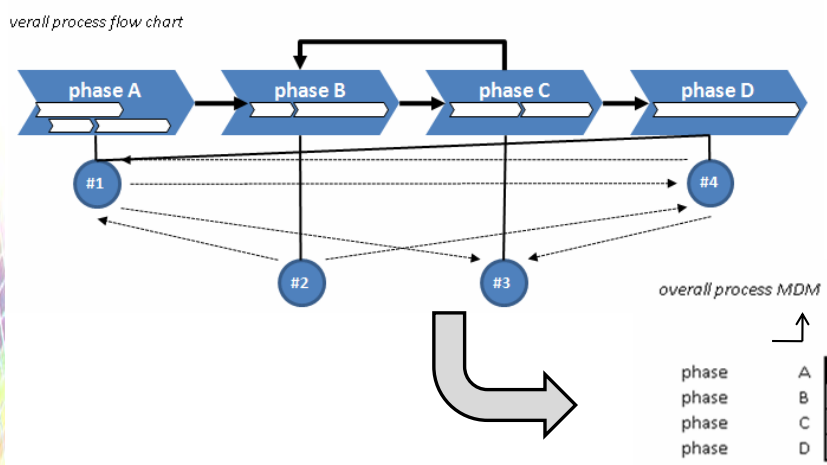
1. Analysis of the whole process, without considering time dependency



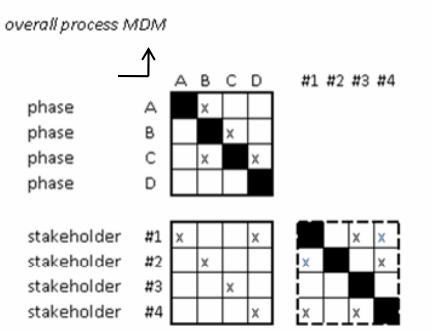
2. Detailed analysis of the time dependent relations:
   - Analysis per process phase
   - Analysis among subsequent process phases



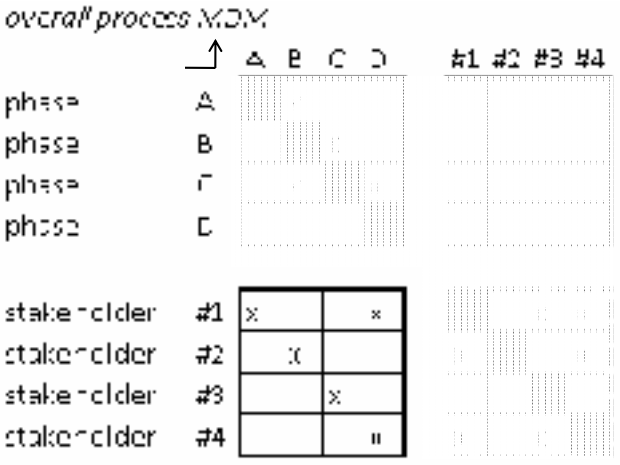
Result
Overall Process



Generating a Multiple Domain Matrix



Discussion
Process Analysis1

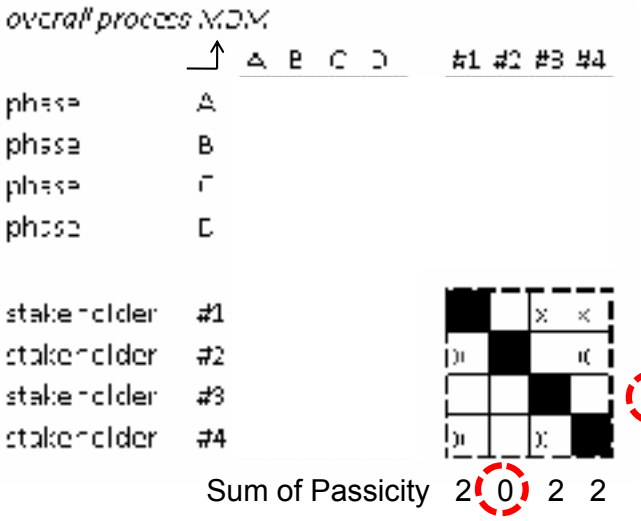


Sum of Activity

2	
1	
1	
1	

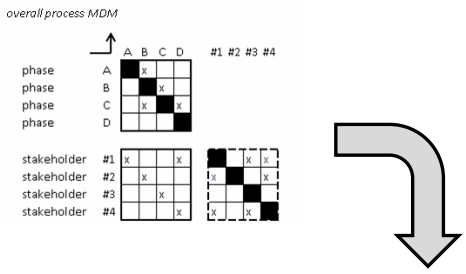
Here *stakeholder #1* seems to play a highlighted role, because he determines more than one process phase (*phase A and B*) directly.

Discussion
Process Analysis 2

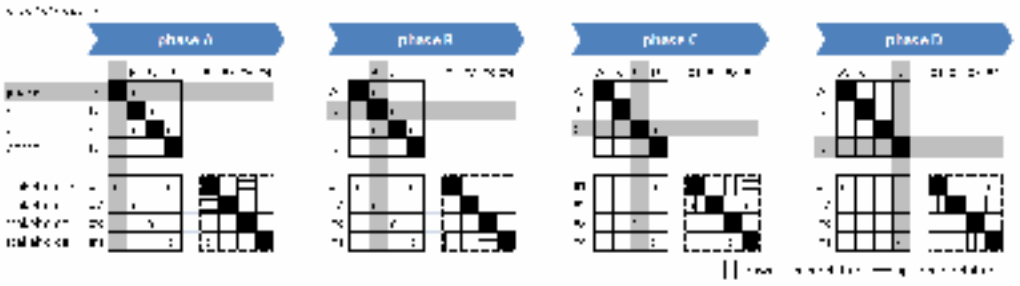


Differences in sum of activity and sum of passivity of each stakeholder indicate varying interdependencies among stakeholders of the whole process.

Result
Detailed Process

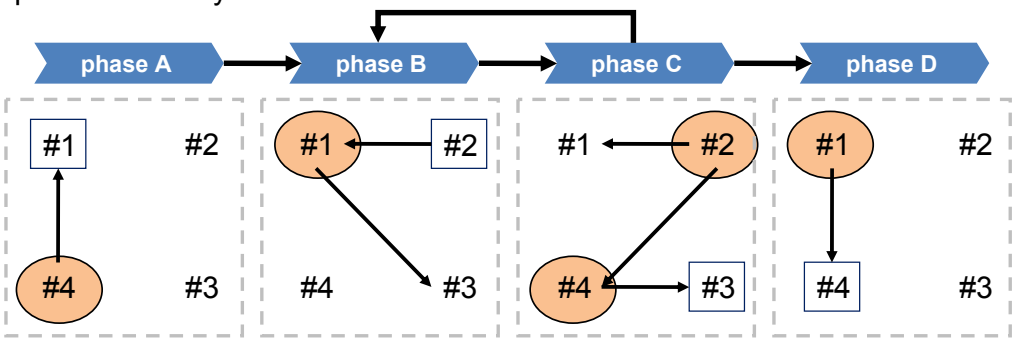


Detailed proceeding within the process resolved by process phases.



Discussion
Process Analysis 3

Stakeholders which are not yet to take part actively, but determine the process already:



stakeholder

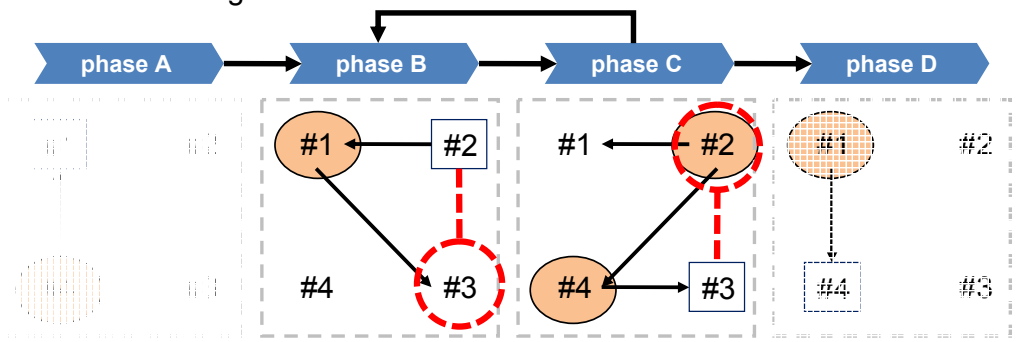
process phase dominating stakeholder

silent stakeholder

directed influence

Discussion
Process Analysis 4

Analysis among subsequent process phases identifies reasonable lacks of stakeholder integration.



active integration supported by methods seems to be reasonable

stakeholder

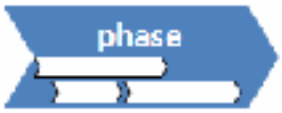
process phase dominating stakeholder

silent stakeholder

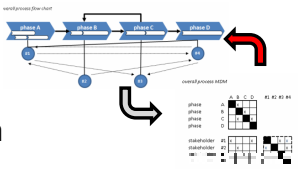
directed influence

Conclusion
Challenges

- Defining phases in an appropriate level of abstraction

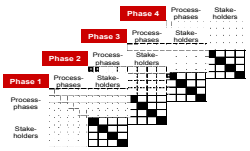


- Linking matrix contents to interview documentation



- Interpretation of interviewees statements vs. automation

- Extensive process analysis is required



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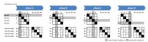
Conclusion

- Exploration of past innovation processes (interview and documentation technique)

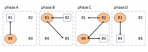
- MDMs support the description of domain interactions (process phases, stakeholders)

- Splitting up the process in several MDMs supports identification of time-dependent interrelations among stakeholders.

- Structures characterize the explored innovation processes (as decisive stakeholders, time relating stakeholder engagement, and silent stakeholders)



- MDM methodology proves an appropriate means to support
  - further data analysis comparing several innovation projects
  - identification of process characteristics.



Summary

The research project AKINET considers identification of stakeholders which are not yet to take part actively in innovation processes, but determine the process already.

An interview and documentation technique enables exploration of past innovation processes Especially time dependent relations of stakeholder participation and interdependencies provide a means of characterizing the innovation projects.

MDMs support the description of interactions between the process phases, the stakeholders, and among the stakeholders. A measurement unit is defined to monitor time dependent and dynamic interactions (sequence of abstracted process phases). Splitting up the process in several MDMs supports visualization of time-dependent interrelations among stakeholders.

MDM methodology proves an appropriate means to support both further data analysis from a generic point of view comparing several innovation projects as well as identification of process characteristics.