BUILDING OF KNOWLEDGE NETWORK BETWEEN DIFFERENT RENOVATION PROJECTS

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Abstract

- Knowledge networks, which allow collecting and organizing information from different renovation projects
- Provide an approach to exploid previously unrecognized relationships between information of renovation projects
- Data is based on real demonstration cases of the H2020 project P2Endure
- Purpose of this paper: collect and organize construction related information of different building renovation projects
- Aim: find relationships among information of building renovation projects

Background – P2Endure

- Horizon 2020 collaboration project between 16 partners (8 SME, 5 IND, 2 HES/RES, 1 PUB)
- The aim of the project is to improve the availability and performance of energy saving solution for deep renovation

- Building of Knowledge Network between different renovation projects

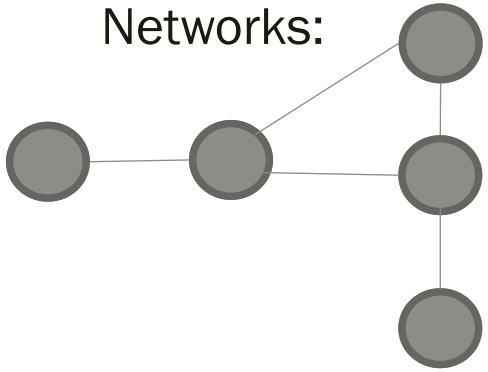
Introduction

- Within a renovation project, a large amount of information is created along the process
- Project Information is getting lost after project ending
- No suitable knowledge management processes for handling and storing information in structured manner

- Building of Knowledge Network between different renovation projects

Theoretical Review

Networks:



represent knowledge as a pattern of interconnected nodes and arcs

help to disseminates existing and to create new knowledge

networks identify and implement strategies to engage decision making

Powerful Knowledge Networks

Effective information transfer

Valid connection between information

associations within information

Detect unrelated information

Text Mining Processes

- Building of Knowledge Network between different renovation projects

Text Mining

We create a knowledge network based on Text Mining analyses

- technique used for automated information retrieval from textual data sources according to given task or text model
- core mining operations consists of various mechanisms for discovering patterns within a document or a document collection

With text mining procedures,

- we combine words or sentences into semantic relations
- and link the information to form the basis for a Knowledge Network

- Building of Knowledge Network between different renovation projects

Research Methodology

Two overall steps:

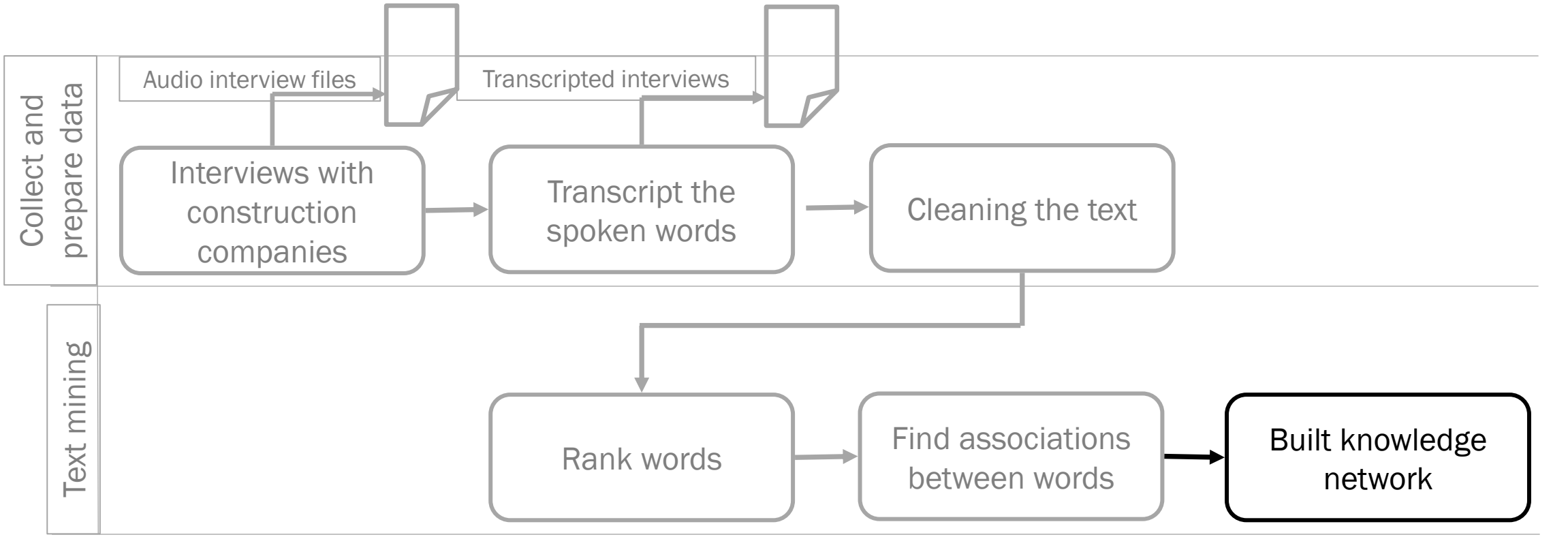


FIGURE 1: PROCESS STEPS OF THE APPROACH

- Building of Knowledge Network between different renovation projects

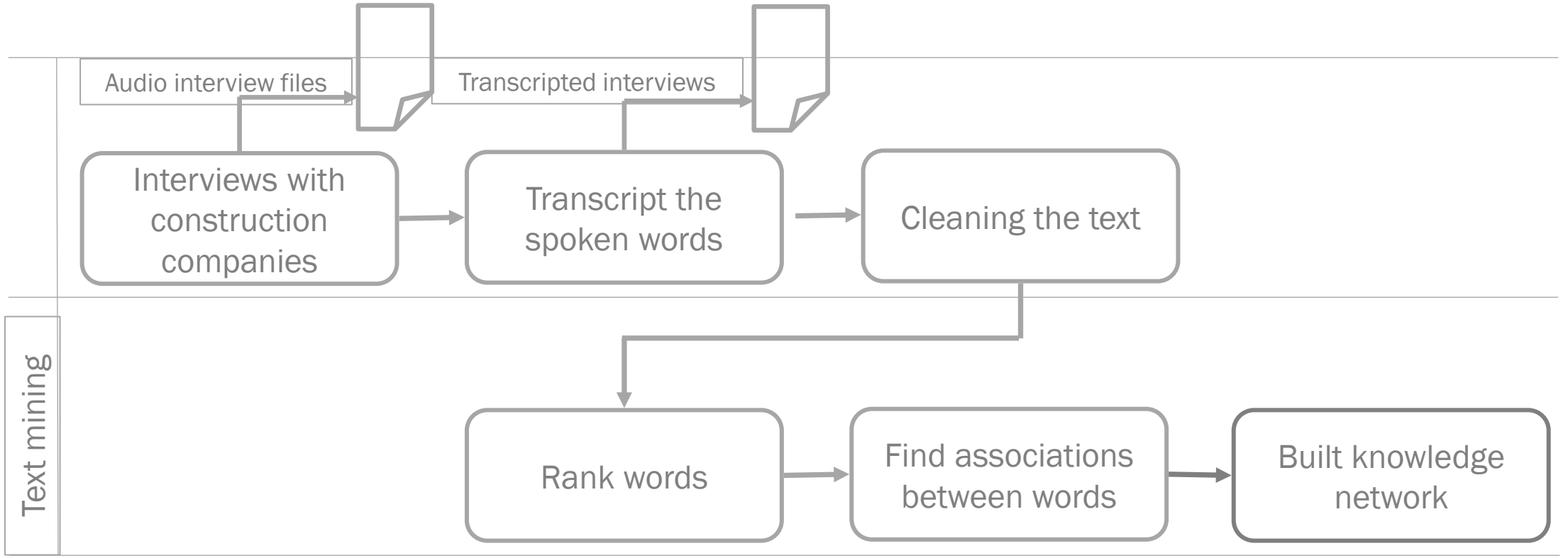


FIGURE 1: PROCESS STEPS OF THE APPROACH

Text Mining

Figure 1: Process steps of the Approach

Cleaning the text

- To prepare the interviews for the text mining procedures, we first need to bring the transcriptions in a formal structure

  → Normalization

- Remove stop words („the“, „I“, „me“, „my“)

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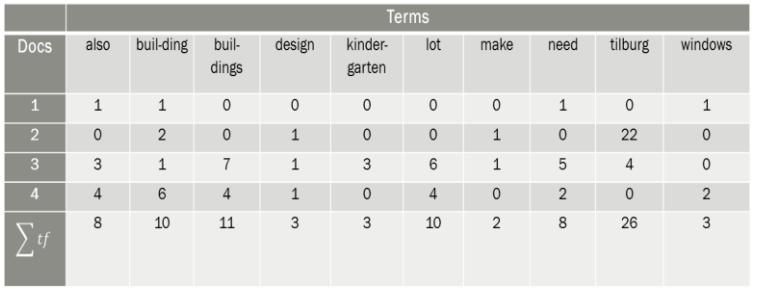
Text Mining



	Terms									
Docs	also	buil-ding	buil-dings	design	kinder-garten	lot	make	need	tilburg	windows
1	1	1	0	0	0	0	0	1	0	1
2	0	2	0	1	0	0	1	0	22	0
3	3	1	7	1	3	6	1	5	4	0
4	4	6	4	1	0	4	0	2	0	2
$\sum tf$	8	10	11	3	3	10	2	8	26	3

Rank words

- Central question in text mining: how to quantify the content of the documents
- Term frequency is measurement to examine the frequence of words in a document

TABLE 1: TERM FREQUENCY

	Terms									
Docs	also	buil-ding	buil-dings	design	kinder-garten	lot	make	need	tilburg	windows
1	1	1	0	0	0	0	0	1	0	1
2	0	2	0	1	0	0	1	0	22	0
3	3	1	7	1	3	6	1	5	4	0
4	4	6	4	1	0	4	0	2	0	2
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Text Mining

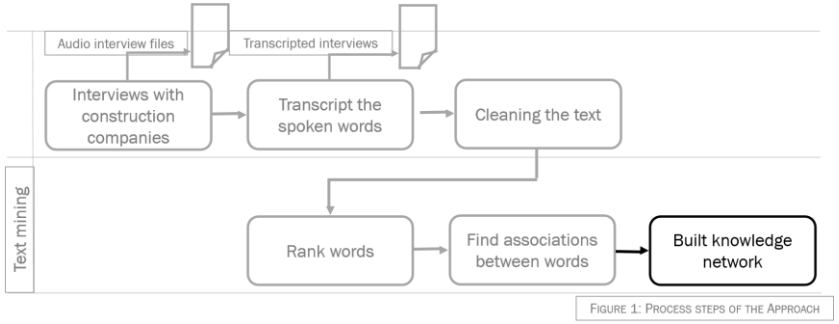

FIGURE 1: PROCESS STEPS OF THE APPROACH

Association between words

- The relativ position of words does not affect the word association value
- The important fact is the similarity of the context between the words
  - The *higher the equality value, the closer the visual connection in the later knowledge network*
  - *Within our approach, we exclude words, which have a lower association value than 0.58*

TABLE 2: Association Results For building

from	to	weight
building	already	0.97
building	budget	0.97
building	façade	0.97
building	retrofitting	0.97

TABLE 3: Association Results for windows

from	to	weight
windows	need	1.00
windows	architect	0.97
windows	building	0.91
windows	already	0.89

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Text Mining

FIGURE 1: PROCESS STEPS OF THE APPROACH

Results

- We use networks to present our results
- Networks demonstrate the connection based on the results of the text mining process
- We provide three Knowledge Networks
  - *Combine one, two and six interview transcriptions*

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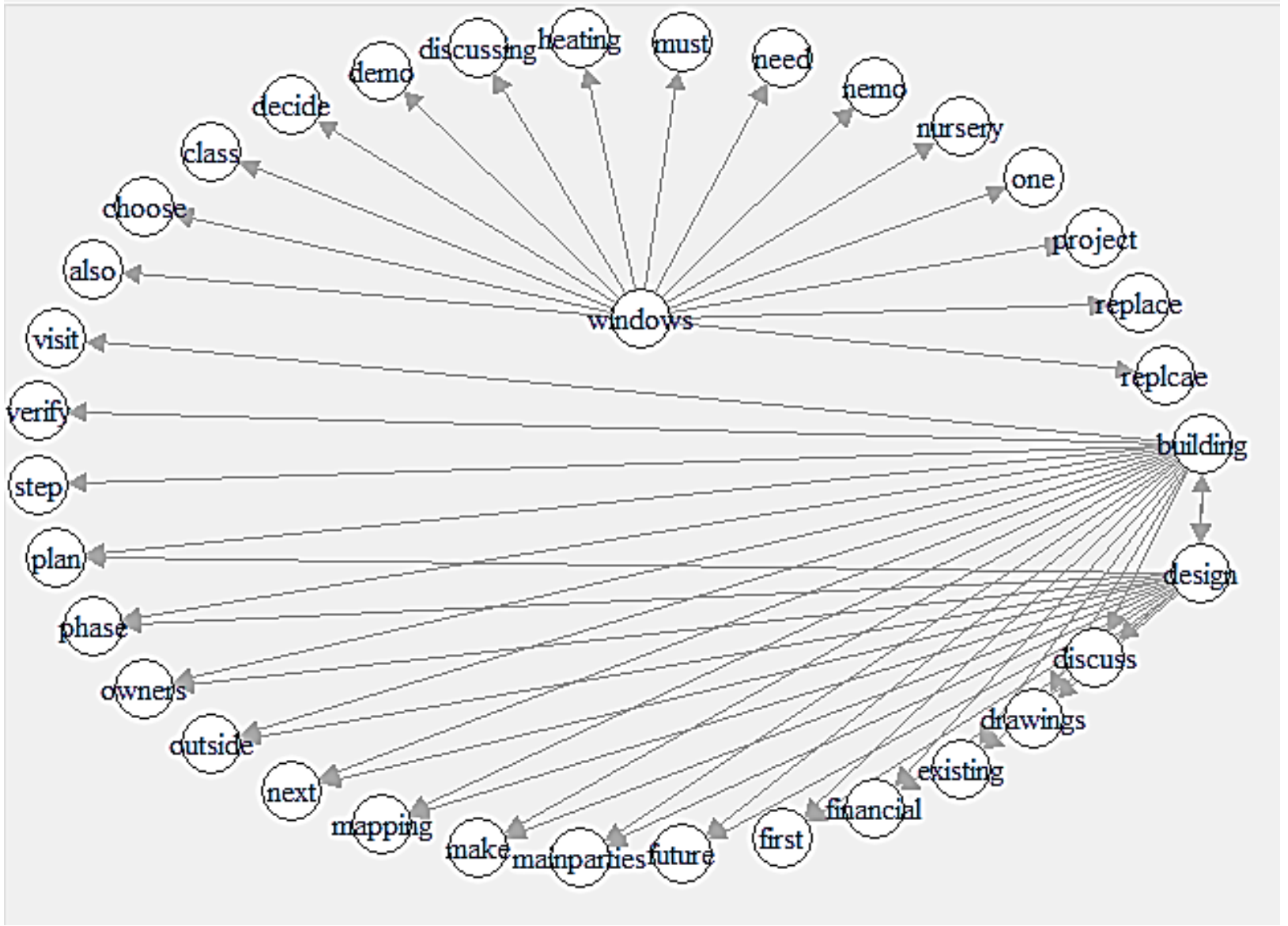
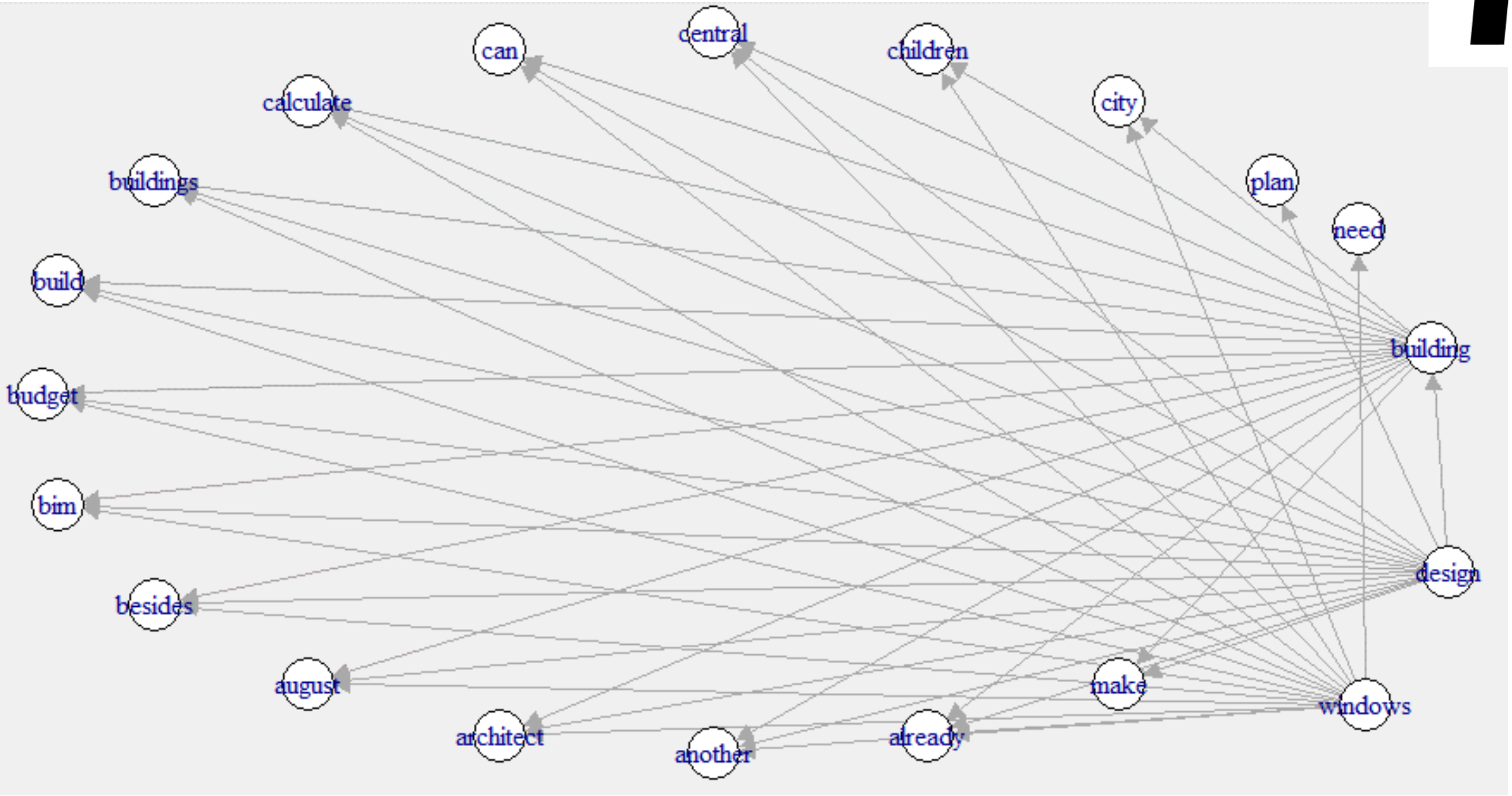
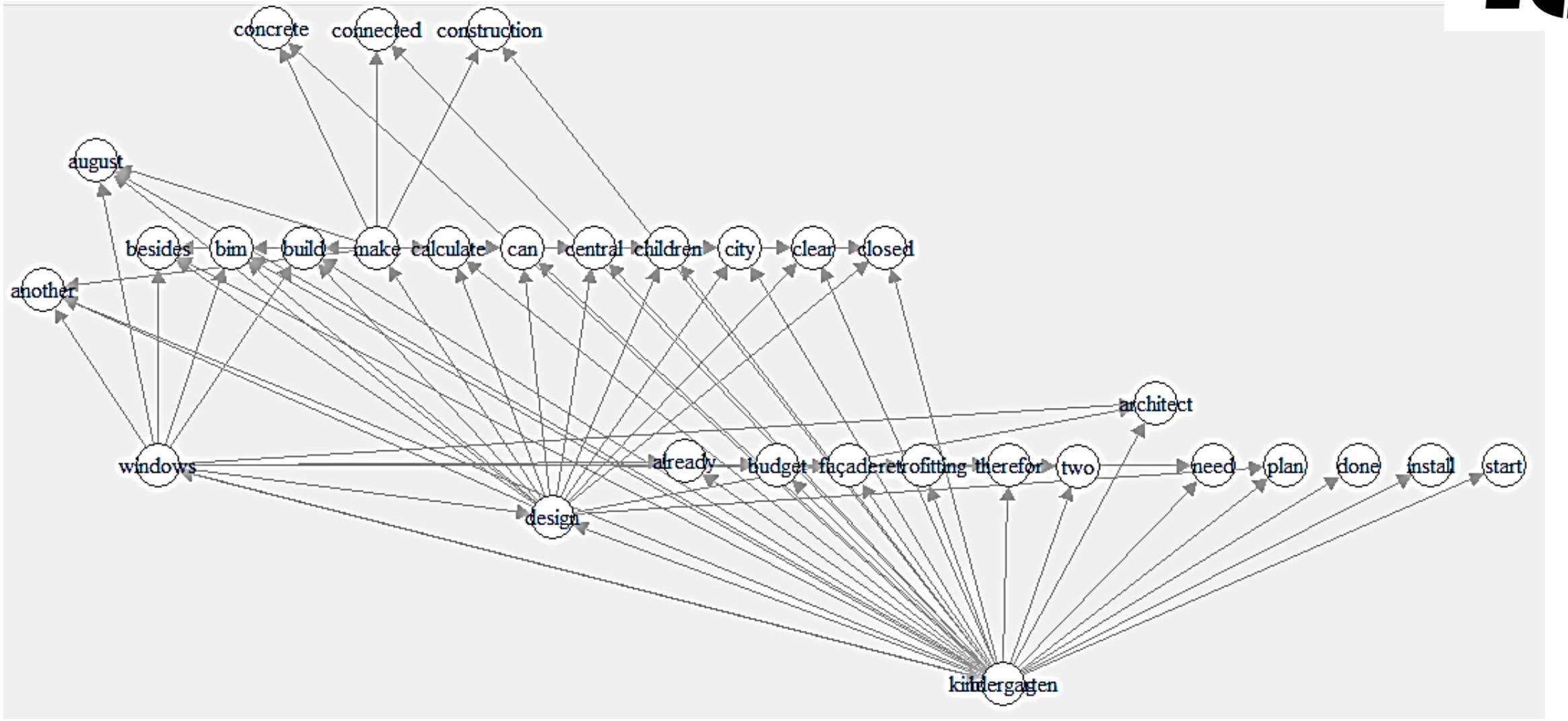


Word associations of "building", "design" and “Window” based on two documents



word Associations of "Building", "Design" and "Window" based on Three documents



Word Associations of "Building", "Design" and "Window" based on six documents

Current status and future works

- Within our approach we present a comprehensible way to deploy knowledge from past construction projects to actual or upcoming projects
- Future works:
  - *current state of the development, we make no distinction between information from different project stages*
  - *next step: set up a text mining process, which can select and combine information from different project steps.*
    - offer information to the user in a more targeted manner

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