



What is important in CMMI and what are the interrelations among its elements?

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Tasks of BME in this project

- 2009/10 (product oriented quality assurance):
 - ISO/IEC 9126 quality assurance schema for ODF applications
 - Quality profiles for ODF applications
- 2011 (process oriented quality assurance)
 - **CMMI^{®*} - based quality assurance schema for ODF applications**

2011 / Goal, problems, steps

- Goal:
 - CMMI-based quality assurance schema for ODF application
- Problem:
 - New version of CMMI was released in November 2010
 - CMMI currently has 3 constellations, 500 pages each
- Steps:
 - Understand CMMI
 - Analyze the new version of CMMI
 - Understand what is important
 - Understand dependencies/connections between components
 - Develop CMMI-based quality assurance schema for ODF applications having in mind the most important concepts and dependencies in CMMI

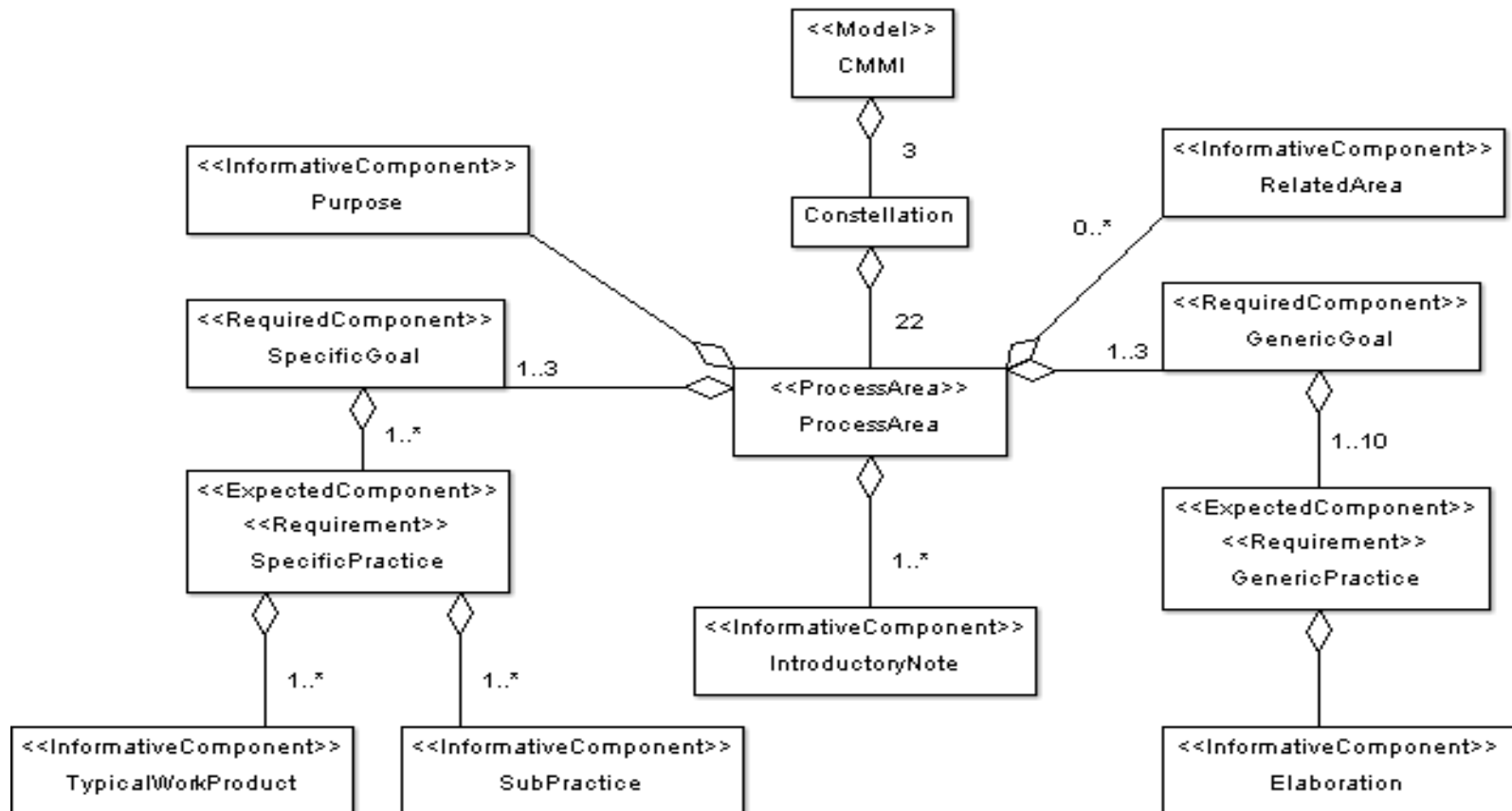


Comparison of CMMI models

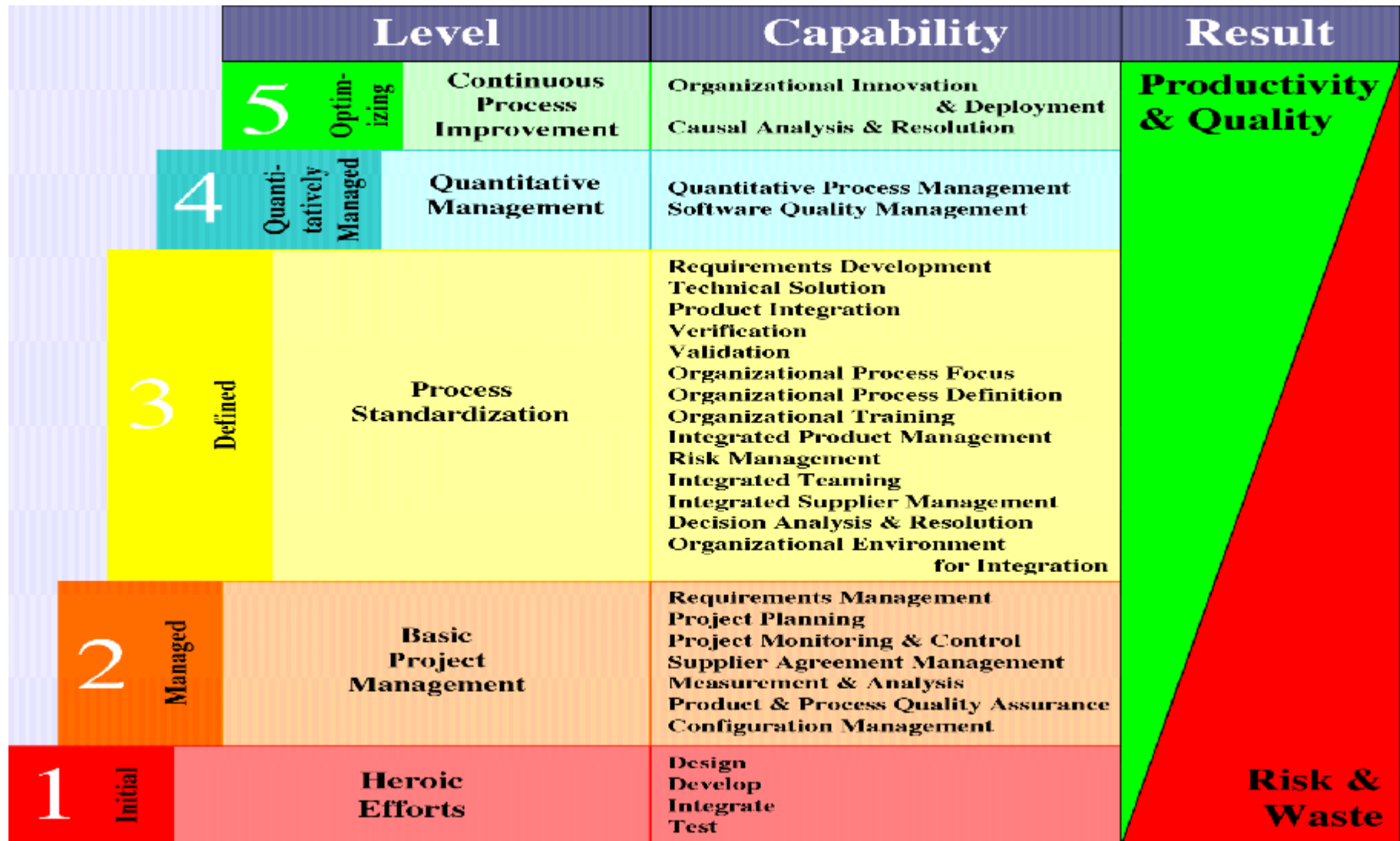
Measure	CMMI for Development					CMMI for Acquisition			CMMI for Services	
	V1.1 Staged	V1.1 Cont	V1.2	V1.3		V1.2	V1.3		V1.2	V1.3
Pages	715	710	560	482		428	438		531	520
Process Areas	25	25	22	22		22	22		24	24
Generic Goals	2	5	5	3		5	3		5	3
Generic Practices	12	17	17	13		17	13		17	13
Specific Goals	55	55	50	49		46	47		52	53
Specific Practices	185	189	173	167		161	163		182	181

Source: (Forrester & Wemyss, 2011)

The structure of CMMI



The structure of CMMI



The most important concept



The most important concept

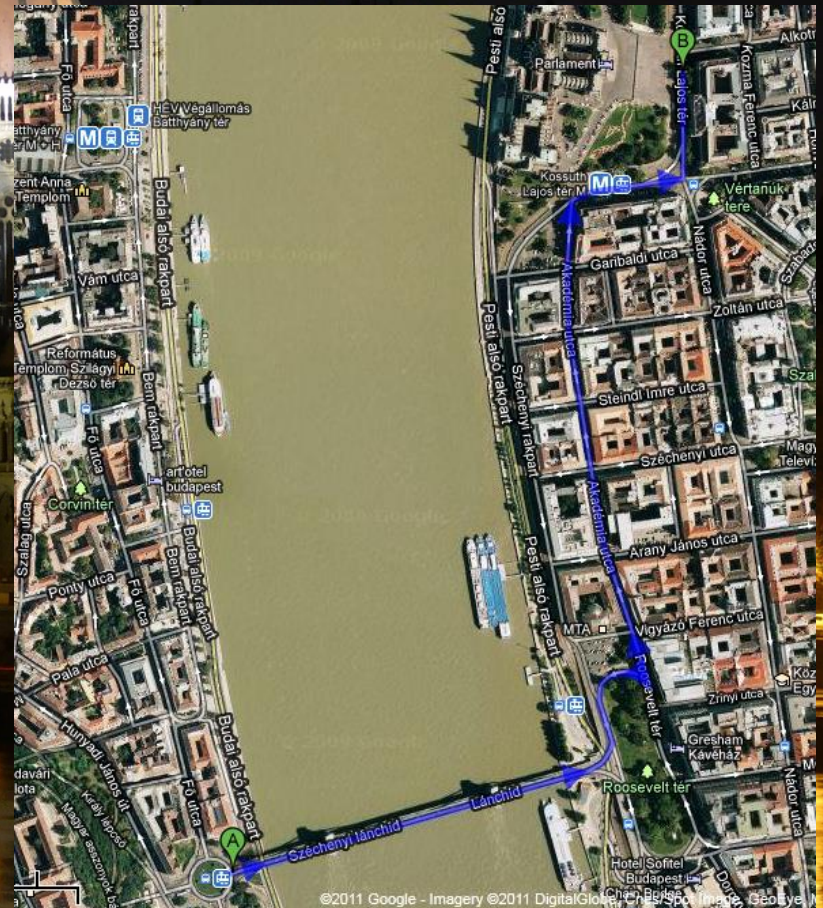


The most important concept



The most important concept

- All occurrences would make a 1627 meters long line
- 20 minutes walking (according to Google maps)
- More than
 - walking from Clark Adams square - center of Hungary
 - passing the Danube Europe's second largest river - on Chain bridge
 - walking till the Hungarian Parliament

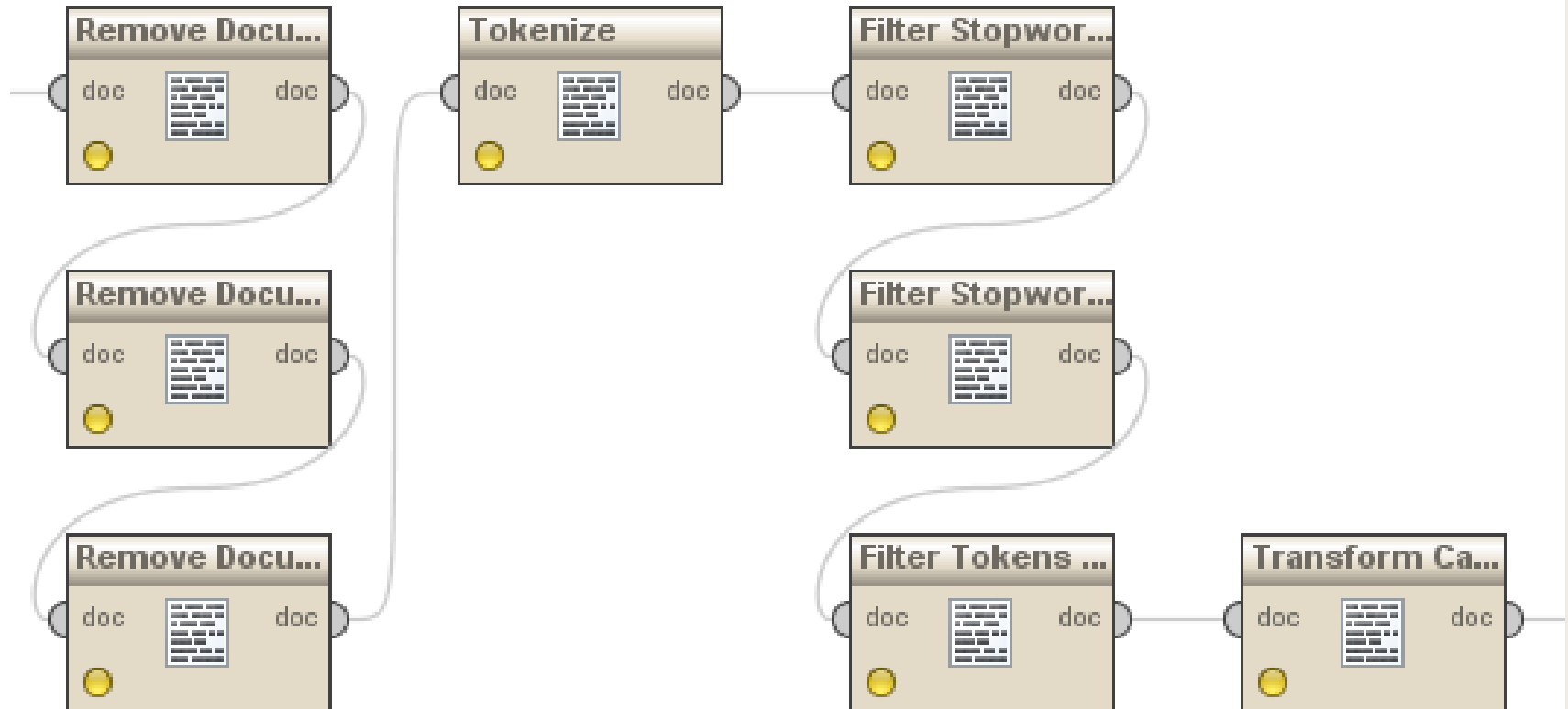


Processing CMMI documents

3 simple steps:

1. Processing CMMI documents from input files (3)
2. Converting wordlist to data
3. Writing results to an output file

Processing CMMI documents



Results

Tokenized wordlist

#	word	in documents	total
1	process	3	8946
2	work	3	3706
3	project	3	3170
4	service	3	2934
5	cmmi	3	2682
6	management	3	2532
7	performance	3	2437
8	requirements	3	2406
9	product	3	2338
10	organization	3	2194
11	area	3	2044
12	products	3	1903
13	processes	3	1879
14	organizational	3	1641
15	information	3	1589
16	version	3	1577
17	objectives	3	1545
18	include	3	1538
19	analysis	3	1366
20	supplier	3	1359

...

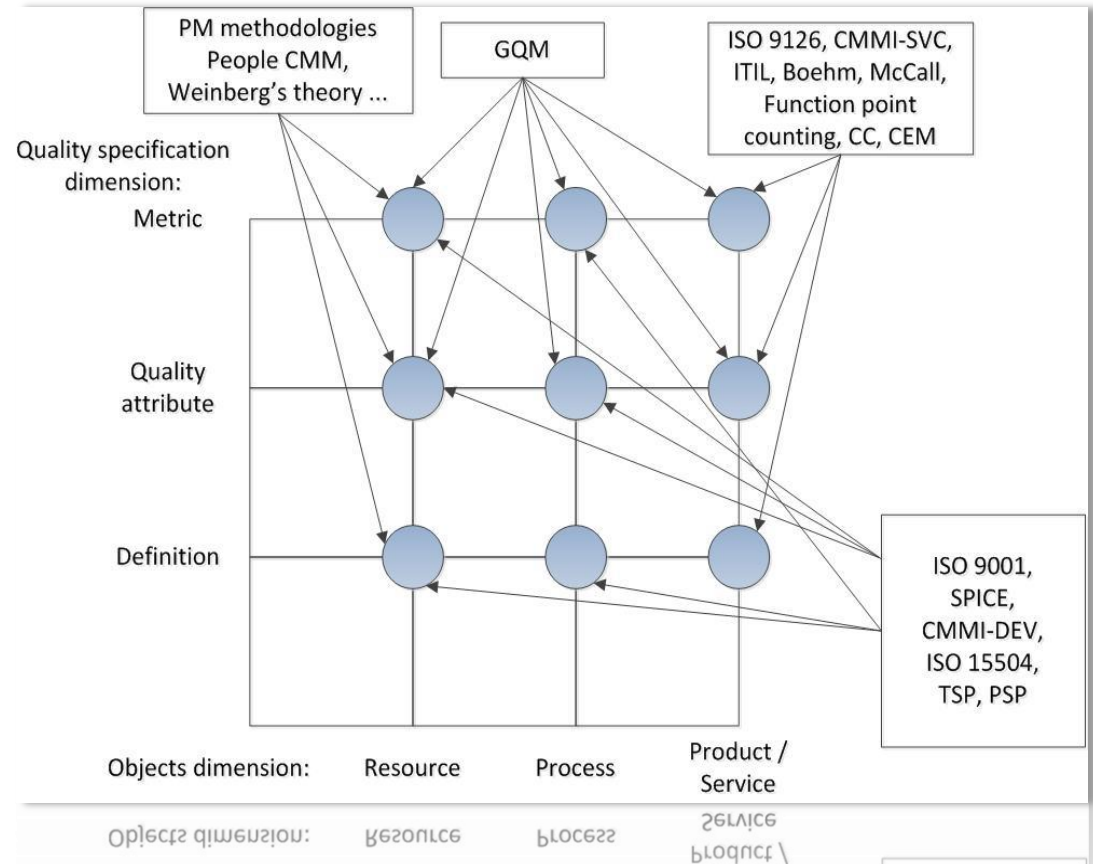
Stemmed (Snowball) wordlist

word	in documents	total
process	3	10853
product	3	4370
servic	3	4219
work	3	3751
project	3	3556
perform	3	3501
manag	3	3459
requir	3	3022
plan	3	2988
area	3	2930
cmmi	3	2682
organ	3	2546
includ	3	2319
measur	3	2124
risk	3	2089
develop	3	2017
establish	3	1969
improv	3	1924
exampl	3	1863
object	3	1798

...

The most important concepts and QMIM

- **Process**
- **Product**
- **Work/Project**
- **Service**



More details on QMIM in (Balla, Bemelmans, Kusters, & Trienekens, 2001)

Finding cross-references in CMMI

Conducting the search

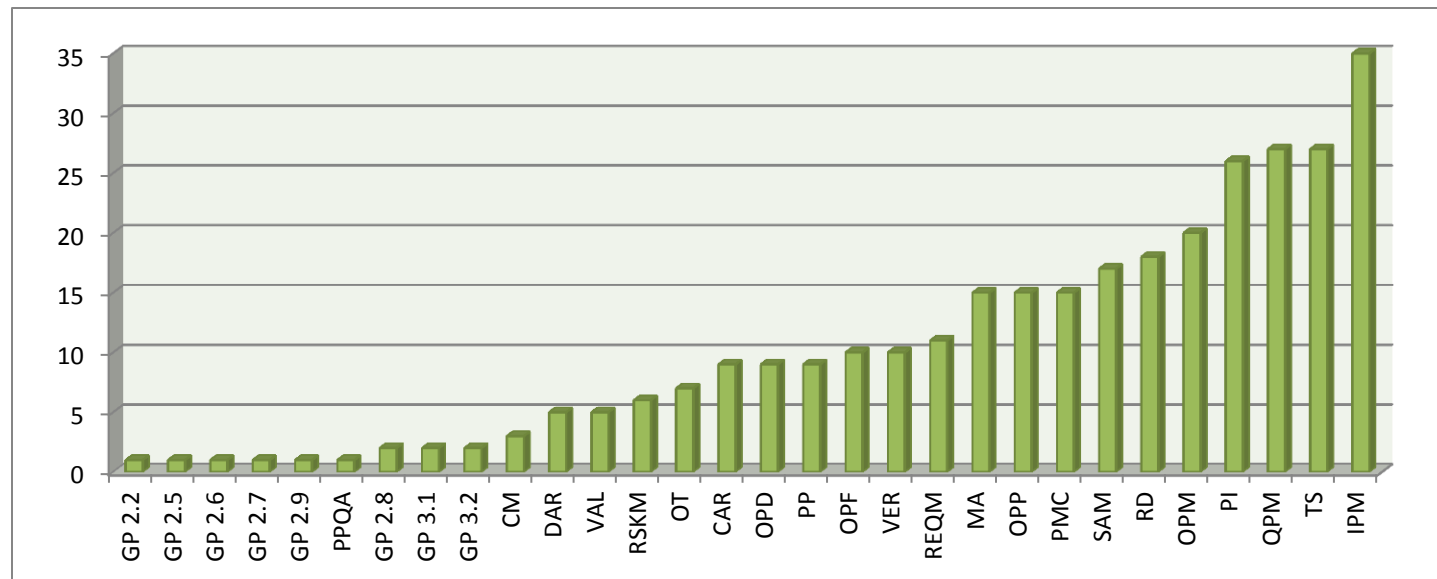
- We were looking for:
 - “Refer to the” ... “process area ...”
- OR
- “Refer to the” ... “specific practice in” ... “process area...”
- Part 2 of all constellations were examined
- Examples were filtered
- Irrelevant references were filtered, e.g.:
 - the organization’s set of standard processes can ***refer to the*** standard processes established at the organization level

Cross-references in CMMI

Results:

- Quite complex: 992 (1016) cross-references in total!
 - 311 in CMMI-DEV
 - 388 in CMMI-SVC
 - 293 in CMMI-ACQ
- Referring from different levels:
 - In PAs: Introductory notes, related process areas, specific practice level
 - In GPs
- Referring to different levels:
 - E.g. to PA, SG, SP

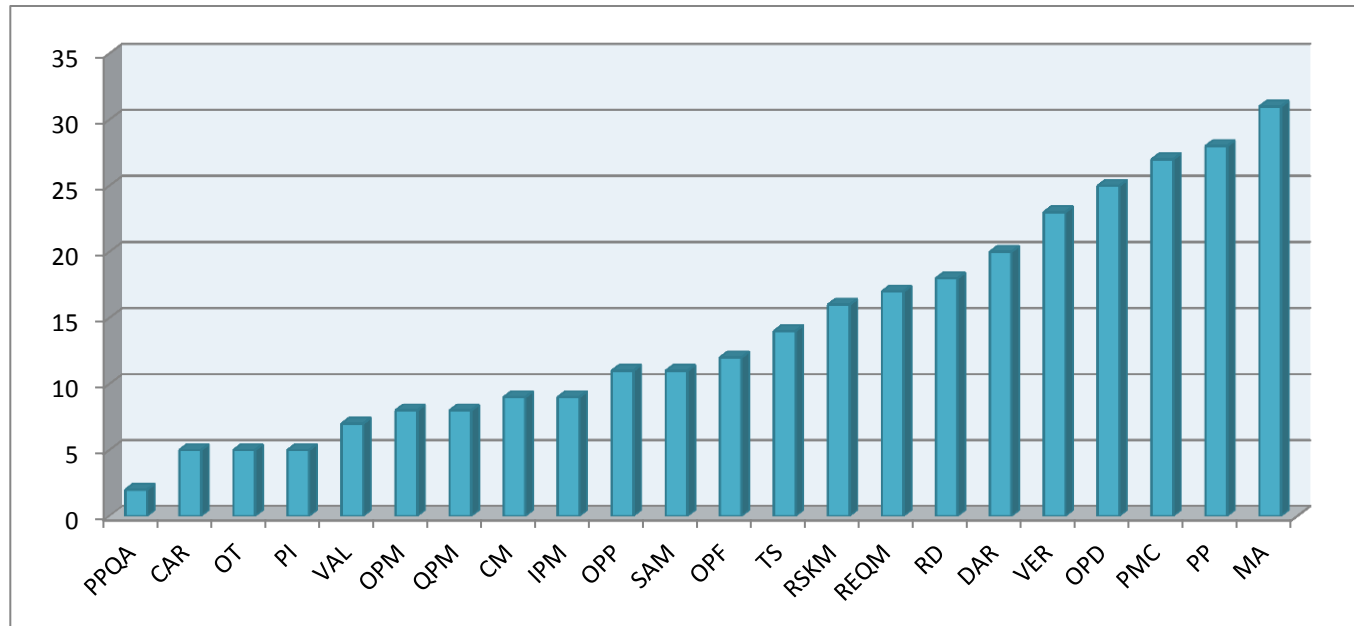
Understanding Cross-references in CMIMI-DEV (referring from)



Training: GPs and PPQA are probably easier to understand

IPM implementation can be quite difficult (especially in multimodel environment),
since it relies on many other elements

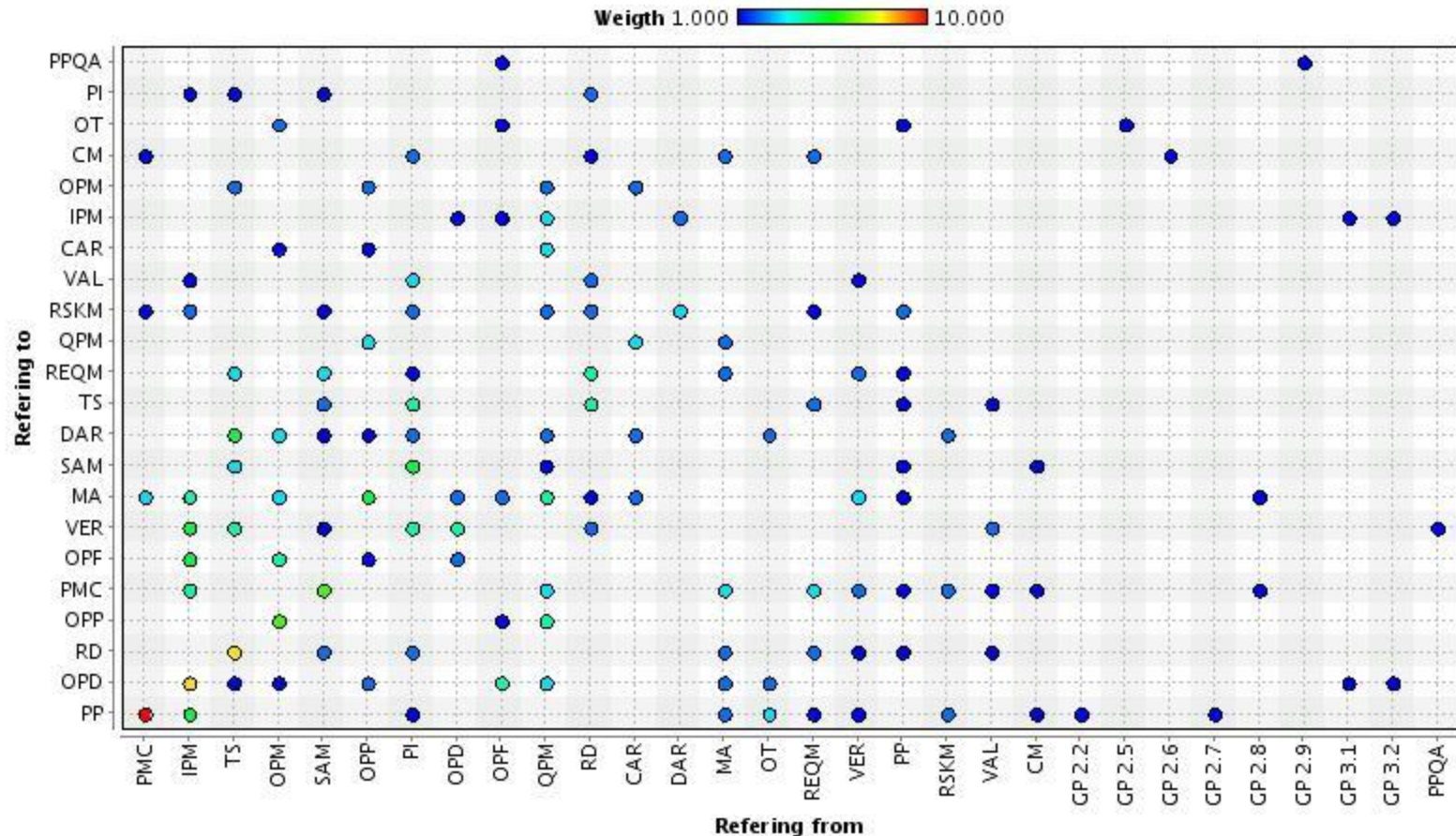
Understanding Cross-references in CMMI-DEV (referring to)



Implementing MA, PP, PMC will have effect on many other elements

PPQA, CAR, OT can probably be implemented more independently.

Coupled elements (139, weighted)

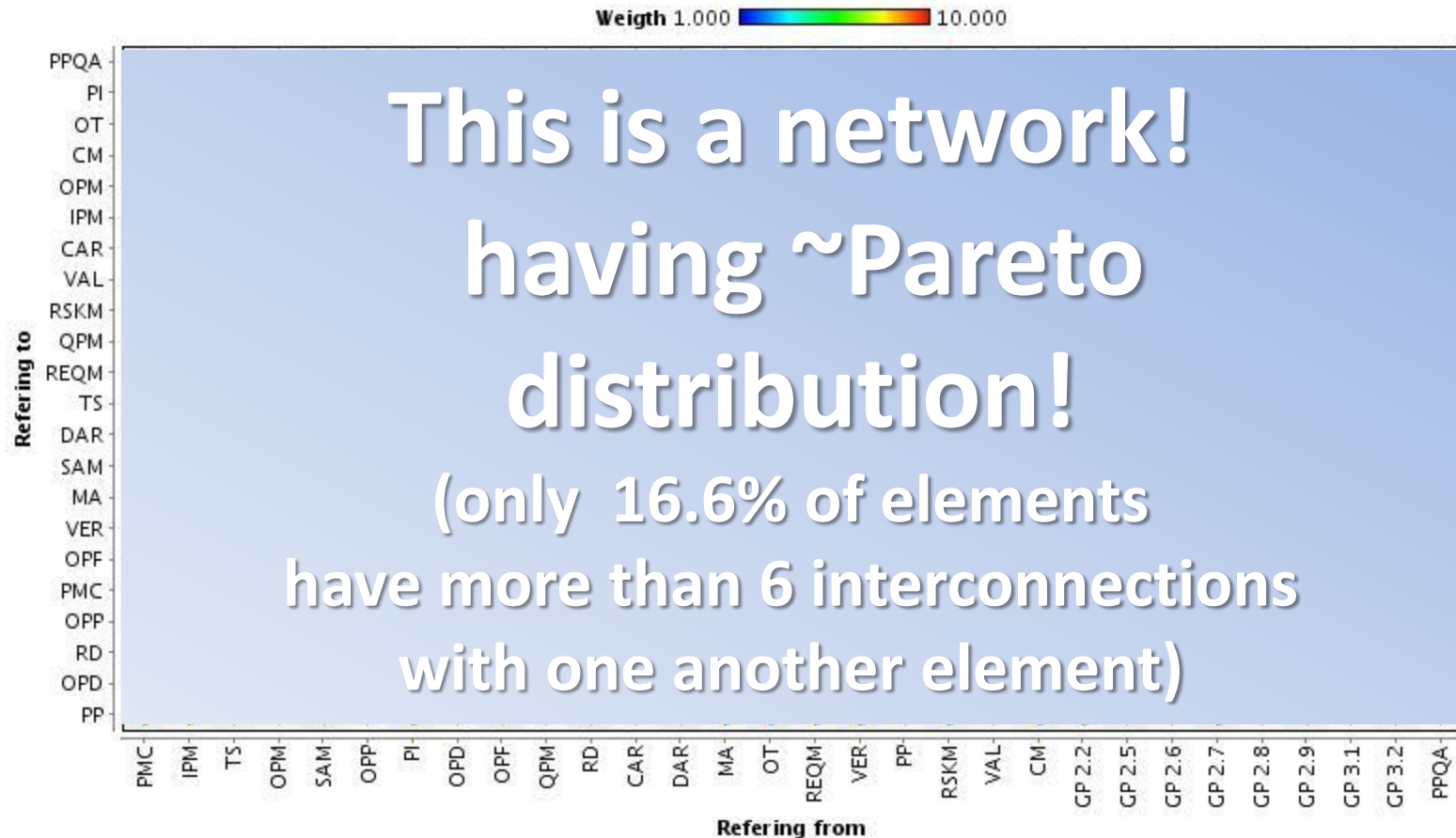


10 from PMC to PP, 1 from PP to PMC -> wise to implement them together

PPQA is the most isolated

TS-RD (8,4) -> 12; IPM-OPD (8, 1); OPM-OPD (6,2); QPM-OPD (4,3);

Coupled elements (139, weighted)

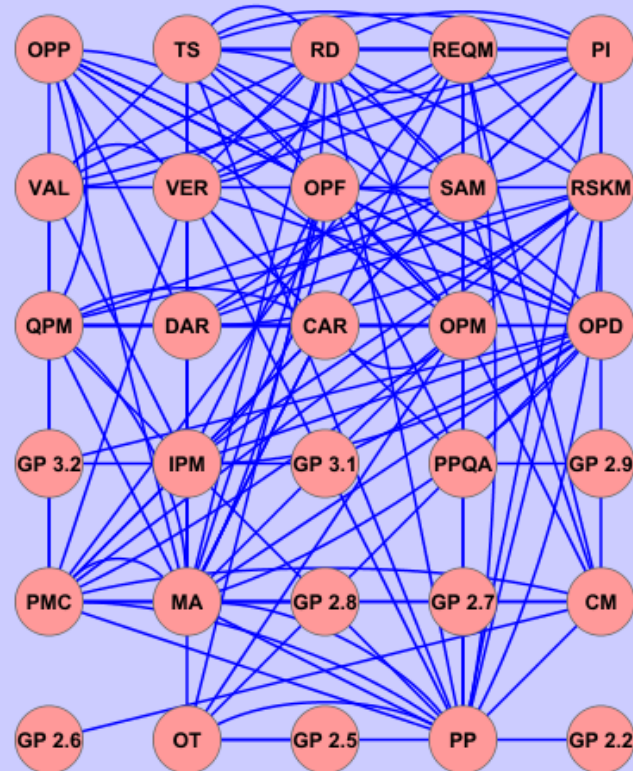


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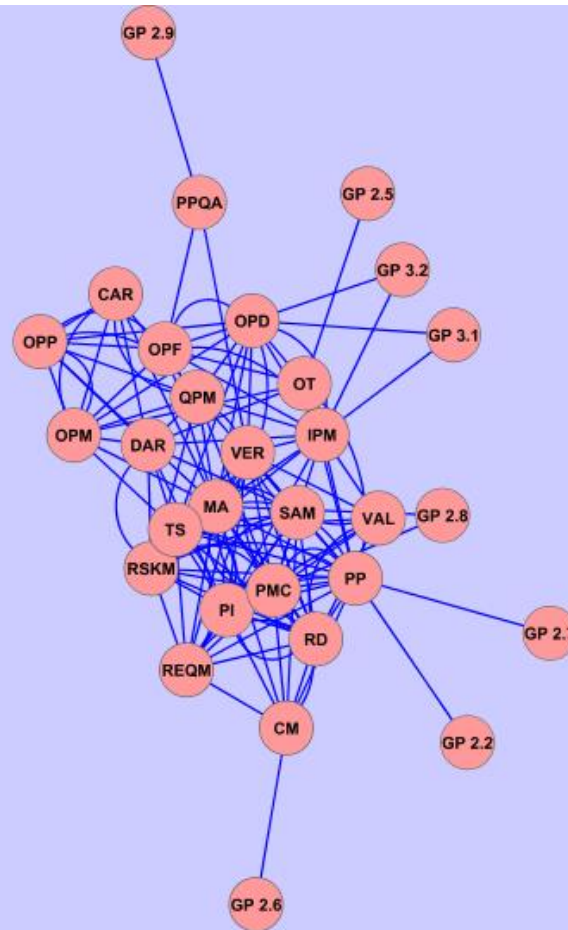
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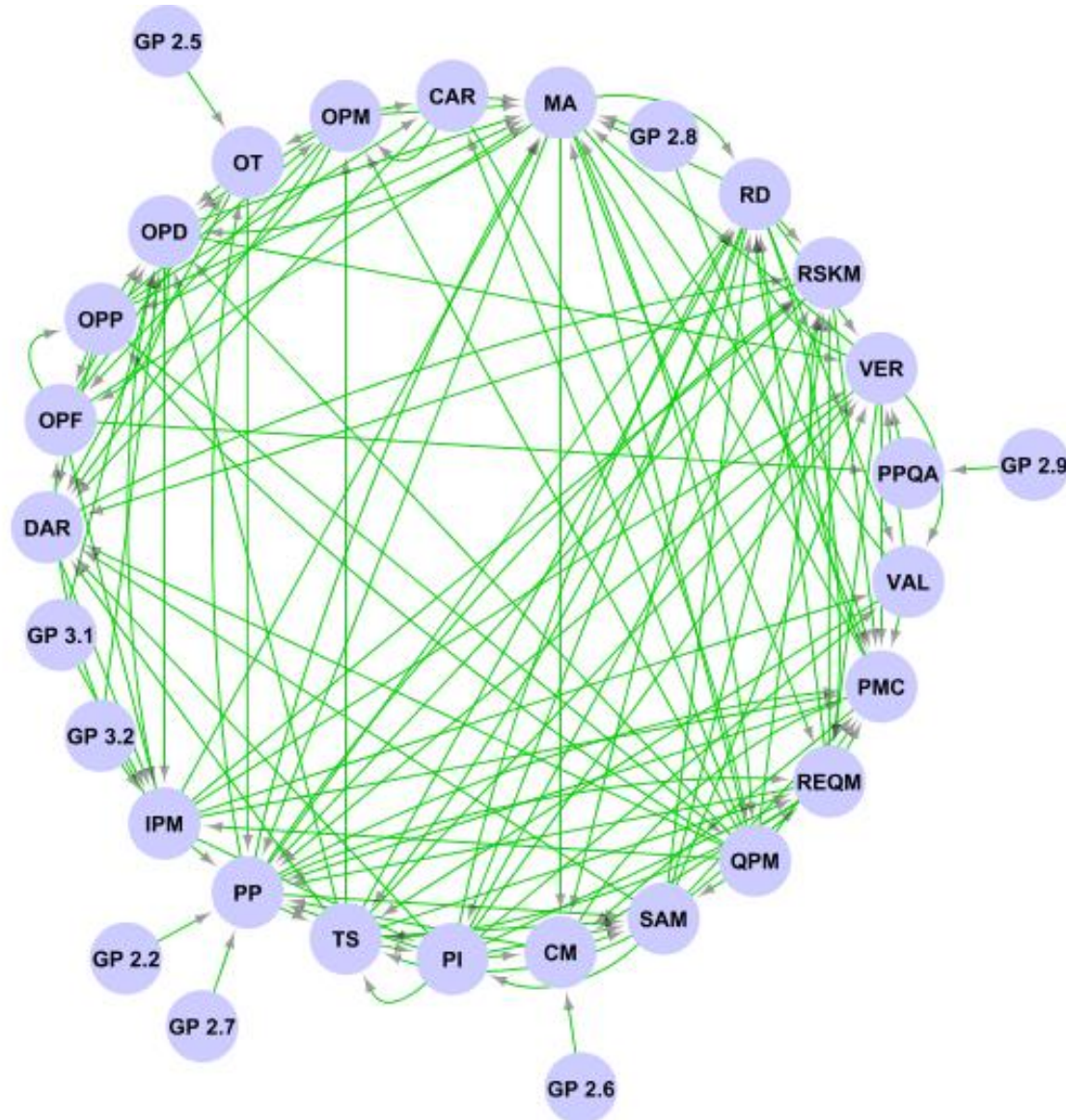
Views of the network



Views of the network



Views of the network



Summary / Further work

- Creating a CMMI based schema for ODF applications
 - **Analyzing CMMI** (preliminary results in this presentation)
 - **Most important concepts in CMMI**
 - **Cross references among PAs**
-

Ongoing/next steps:

- Aligning CMMI concepts to ODF environments
 - Recommendations, e.g. for MA, measuring ODF products, use ISO 9126.
 - What are the most important concepts/processes in ODF specific development?
 - How can be these supported by CMMI best practices?
 - How particular (e.g. strongly coupled) processes e.g. PP, PMC can be used in ODF development?

The End

Questions?

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Further reading:

- Balla, K., Kelemen, Z. D. (2011). Important Concepts In CMMI and What is Difficult to Understand. *SEPG Europe 2011. Dublin 7-9 June, 2011*
- Kelemen, Z. D., Kusters, R., & Trienekens, J. (2011). Identifying Criteria for Multimodel Software Process Improvement Solutions - Based on a Review of Current Problems and Initiatives. *Journal of Software Maintenance and Evolution: Research and Practice, incorporating Software Process: Improvement and Practice.* (in press)

References

Balla, K., Bemelmans, T., Kusters, R., & Trienekens, J. (2001). Quality through Managed Improvement and Measurement (QMIM): Towards a Phased Development and Implementation of a Quality Management System for a Software Company. *Software Quality Journal*, 9(3), 177–193.

Balla, K., & Kelemen, Z. D. (2011, June 7). *Important Concepts In CMMI and What is Difficult to Understand*. Presented at the SEPG Europe 2011, Dublin.

Forrester, E., & Wemyss, G. (2011). *CMMI® Version 1.3 and Beyond*. Dublin, Ireland.

Kelemen, Z. D., Balla, K., Trienekens, J., & Kusters, R. (2008). Structure of Process-Based Quality Approaches - Elements of a research developing a common meta-model for proces-based quality approaches and methods. *Proceedings of EuroSPI 2008 Doctoral Symposium*. Presented at the European Systems & Software Process Improvement and Innovation, Dublin, Ireland.

Kelemen, Z. D., Kusters, R., & Trienekens, J. (2011). Identifying Criteria for Multimodel Software Process Improvement Solutions - Based on a Review of Current Problems and Initiatives. *Journal of Software Maintenance and Evolution: Research and Practice, incorporating Software Process: Improvement and Practice*. doi:10.1002/smr.549