Scientific Methods in Information Systems
- Intermediate Meeting -

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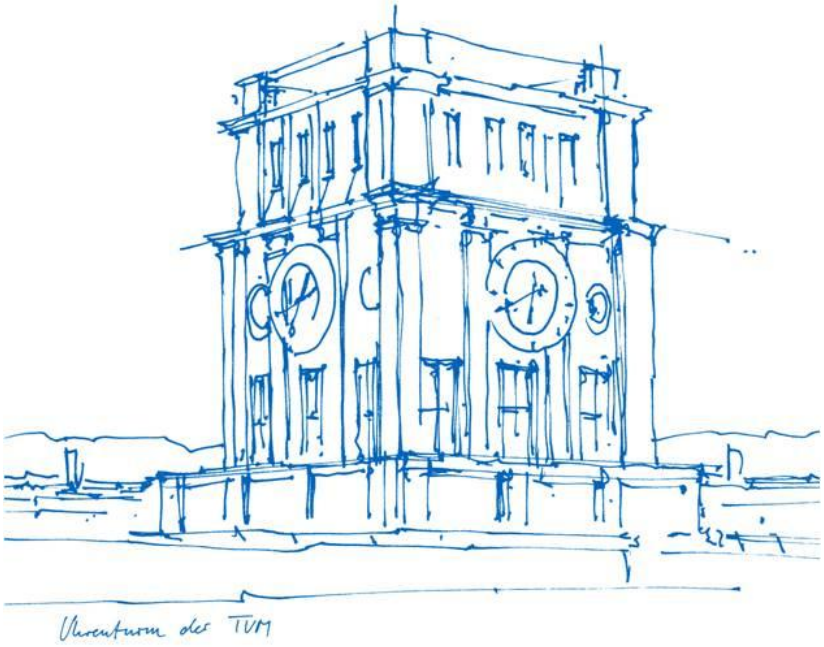
CIT

Information Systems and Business Process Management

May, 24th 2023



What happened so far...

Part I

Design science research

Part II

Systematic literature review

Systematic literature review

„A systematic literature review is a means of identifying, evaluating and interpreting all available research relevant to a particular research question, or topic area, or phenomenon of interest.“ [2]

Systematic literature review

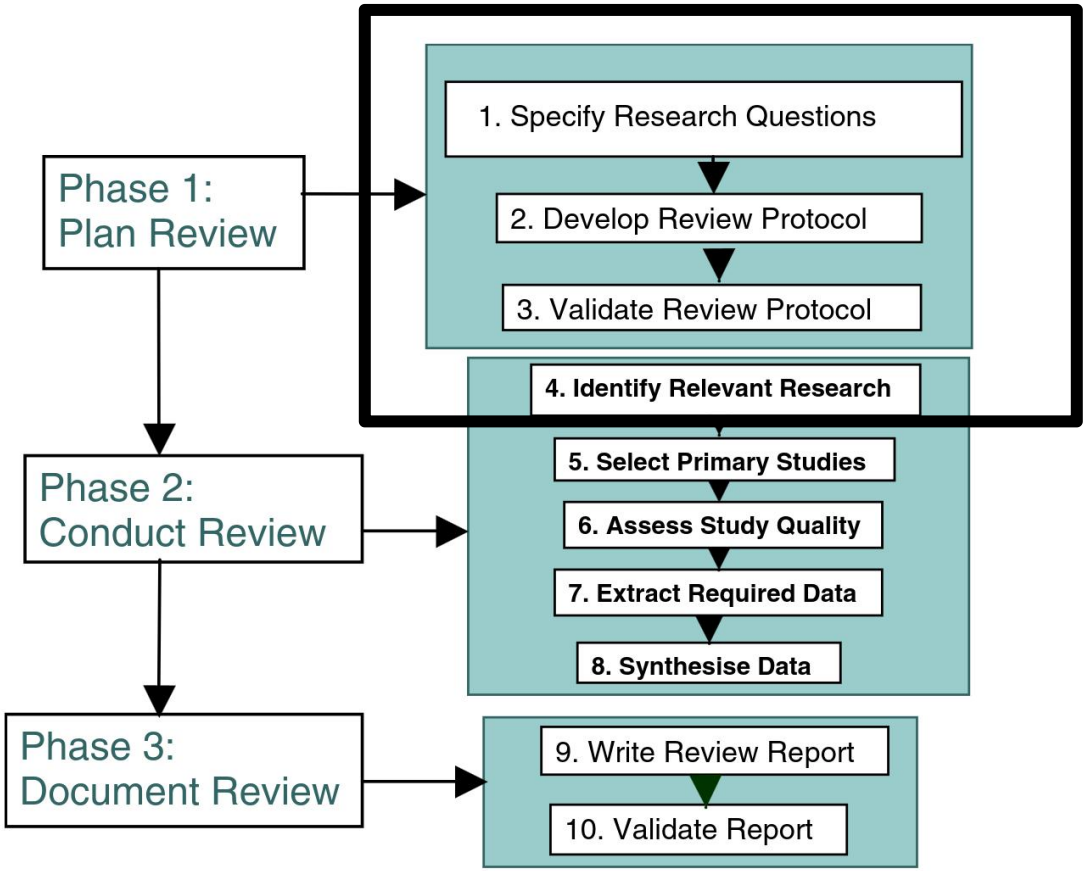


Fig. 1. Systematic literature review process.

from [1]

Today

Presentations

Discussion

- Is your review protocol feasible:
    - Research questions
    - Search strategies:
        - Terms
        - Resources
        - Databases
    - Study selection criteria
    - Study quality assesment checklists
    - Data extraction strategy
    - (Data synthesis)

Discussion

What comes next...

Final meeting

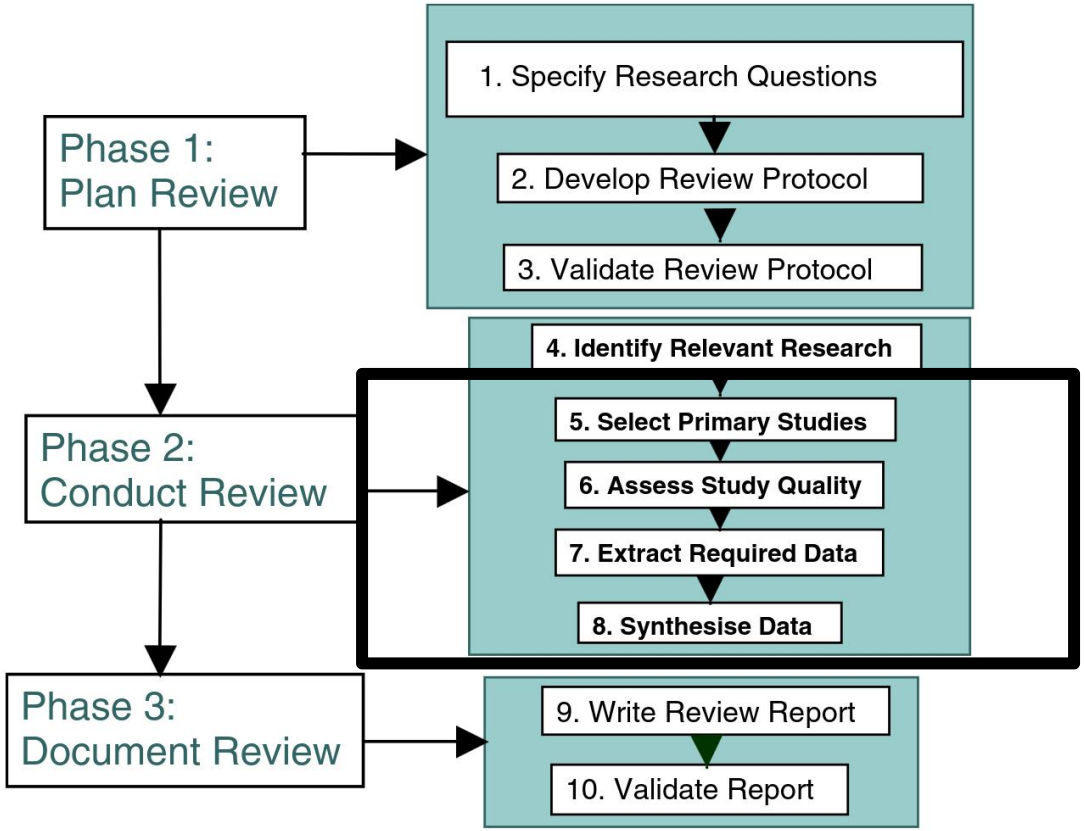


Fig. 1. Systematic literature review process.

from [1]

5. Select primary studies

- Review the title and abstract of studies identified by the initial searches
- Exclude irrelevant papers
  - Selection criteria should be interpreted liberally
- Obtain full copies of the papers not previously rejected. These papers are reviewed by two or more researchers against the inclusion/exclusion criteria defined in the protocol to obtain a final list of primary studies. The two researchers should resolve any disagreements (if necessary with the help of an independent arbitrator)

5. Select primary studies

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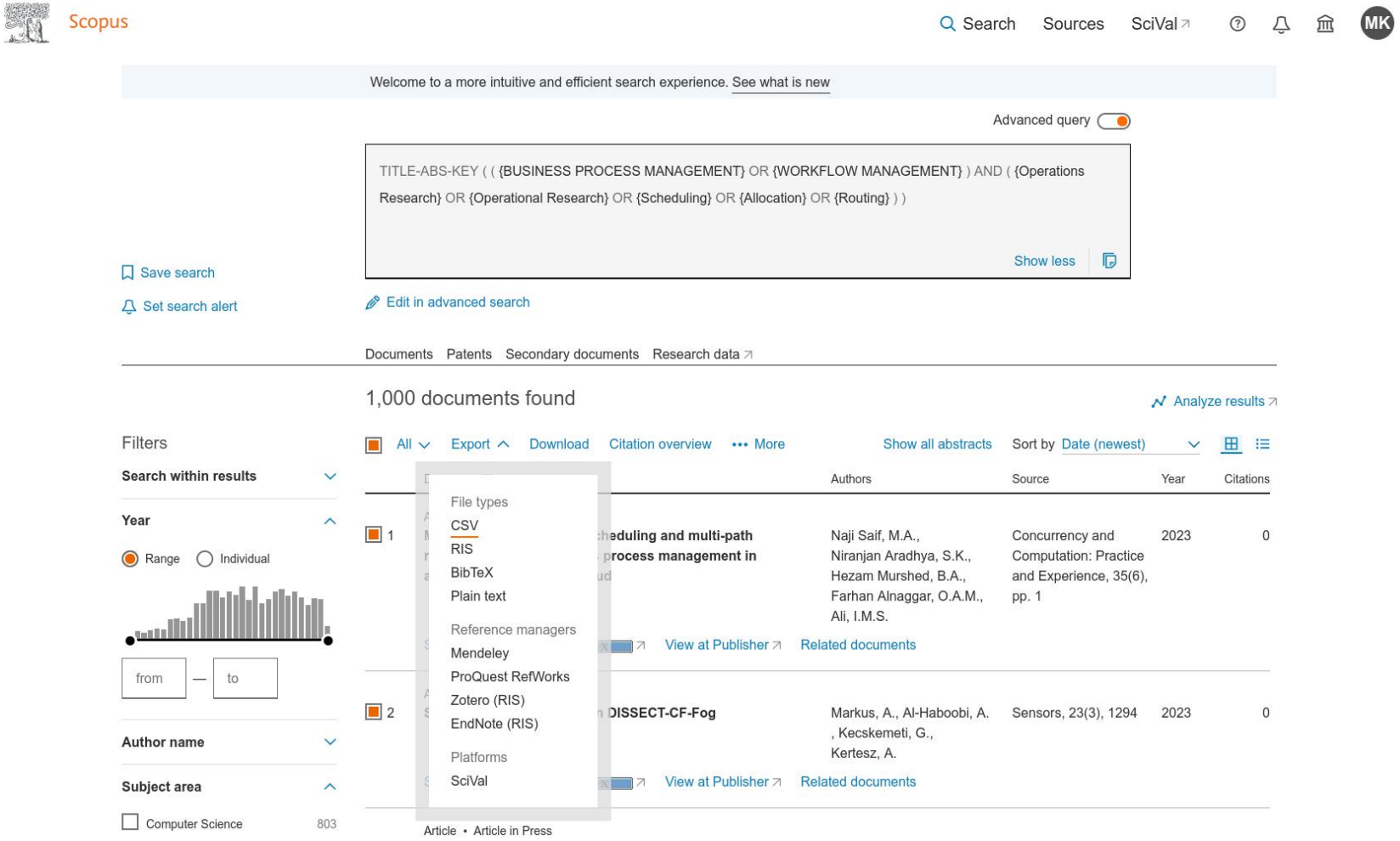
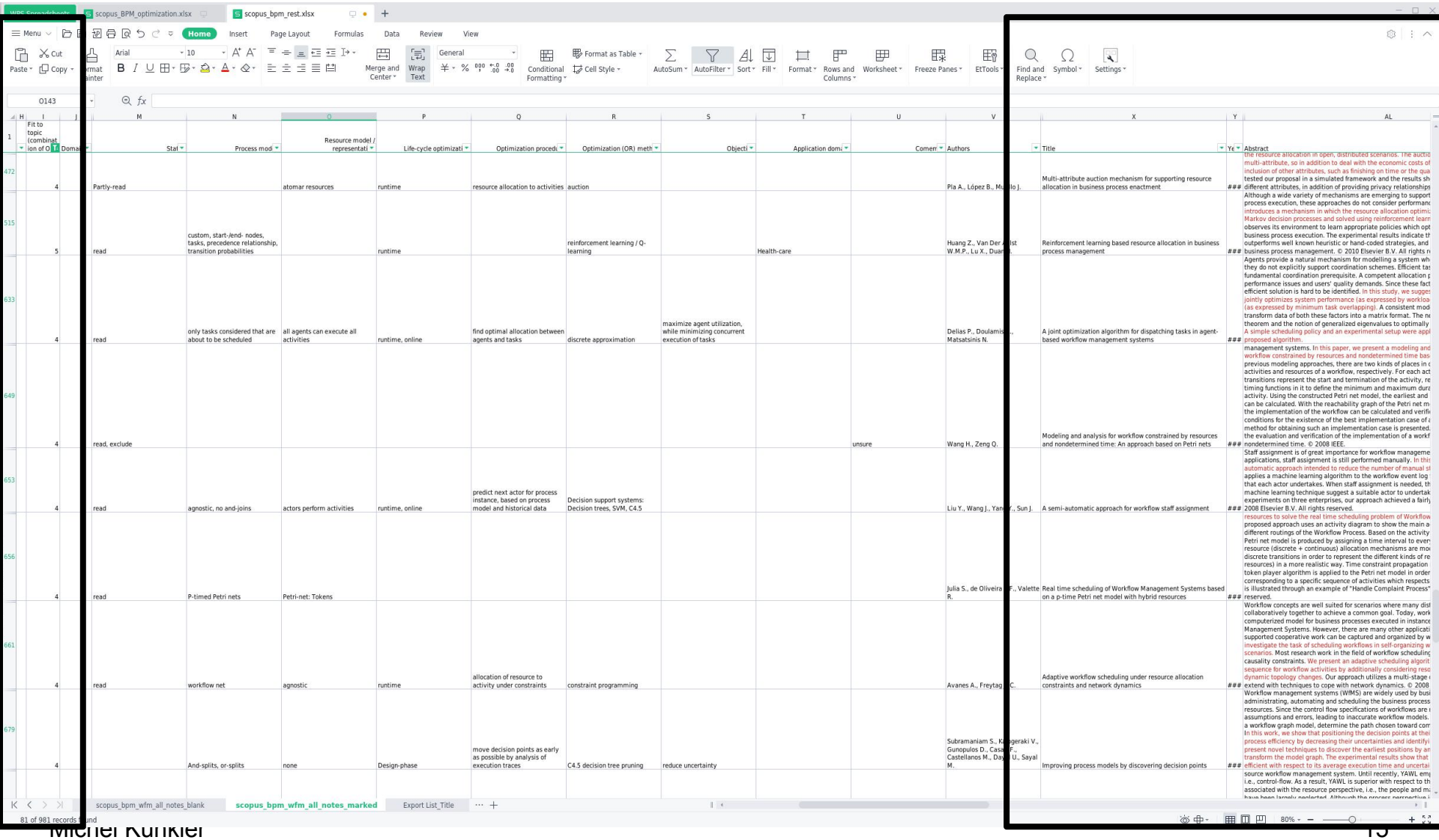


5. Select primary studies



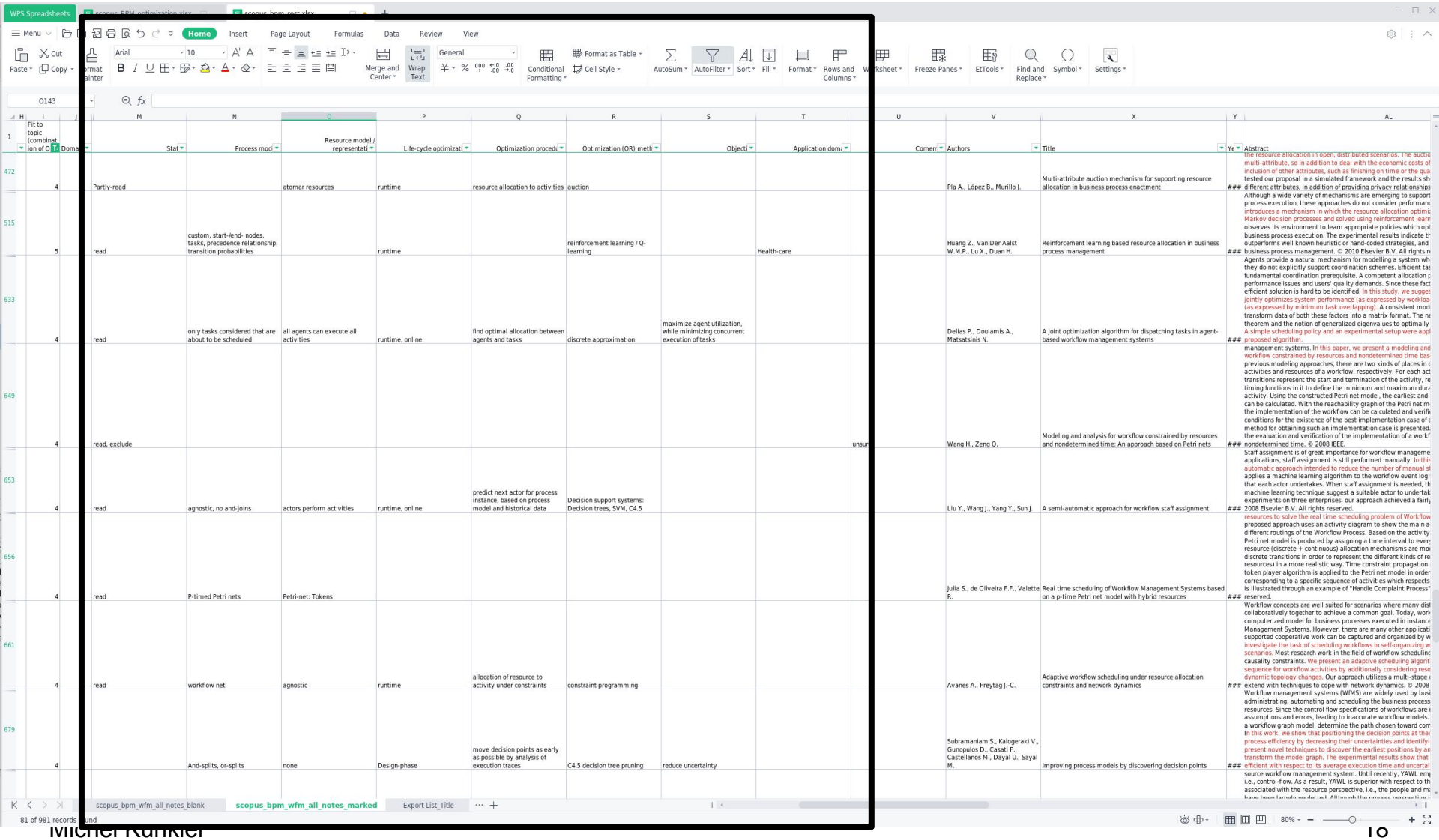
6. Assess study quality

- It might be meaningful to assess the „quality“ of primary studies:
- To provide still more detailed inclusion/exclusion criteria
- To investigate whether quality differences explain differences in results
- To weight the importance of individual studies in the „synthesise data „step
- To guide interpretation of findings and recommend further research

7. Extract required data

- Data extraction forms shold be designed to collect all the information needed to address the research questions and quality criteria
- Make sure the extraction process remains consistent
- Avoid multiple publications of the same data
- It may be necessary to contact the authors for data / additional information

7. Extract required data



	Fit to topic (combination of O	Domain	Staf	Process mod	Resource model / representati	Life-cycle optimizati	Optimization proced	Optimization (OR) meth	Objecti	Application dom	Comen	Authors	Title	Ye	Abstract
472	4		Partly-read		atomar resources	runtime	resource allocation to activities	auction				Pla A., López B., Murillo J.	Multi-attribute auction mechanism for supporting resource allocation in business process enactment	###	the resource allocation in open, distributed scenarios. The auctio multi-attribute, so in addition to deal with the economic costs of inclusion of other attributes, such as finishing on time or the qua tested our proposal in a simulated framework and the results sh different attributes, in addition of providing privacy relationships
515	5		read	custom, start-/end- nodes, tasks, precedence relationship, transition probabilities		runtime		reinforcement learning / Q-learning		Health-care		Huang Z., Van Der Aalst W.M.P., Lu X., Duan H.	Reinforcement learning based resource allocation in business process management	###	Although a wide variety of mechanisms are emerging to support process execution, these approaches do not consider performa introduces a mechanism in which the resource allocation optimiz Markov decision processes and solved using reinforcement learn observes its environment to learn appropriate policies which opt business process execution. The experimental results indicate th outperforms well known heuristic or hand-coded strategies, and business process management. © 2010 Elsevier B.V. All rights r
633	4		read	only tasks considered that are about to be scheduled	all agents can execute all activities	runtime, online	find optimal allocation between agents and tasks	discrete approximation	maximize agent utilization, while minimizing concurrent execution of tasks			Delias P., Doulamis A., Matsatsinis N.	A joint optimization algorithm for dispatching tasks in agent-based workflow management systems	###	Agents provide a natural mechanism for modelling a system wh they do not explicitly support coordination schemes. Efficient tas fundamental coordination prerequisite. A competent allocation p performance issues and users' quality demands. Since these fact efficient solution is hard to be identified. In this study, we sugges jointly optimizes system performance (as expressed by workloa (as expressed by minimum task overlapping). A consistent mod transform data of both these factors into a matrix format. The ne theorem and the notion of generalized eigenvalues to optimally A simple scheduling policy and an experimental setup were appl proposed algorithm.
649	4		read, exclude								unsur	Wang H., Zeng Q.	Modeling and analysis for workflow constrained by resources and nondetermined time: An approach based on Petri nets	###	management systems. In this paper, we present a modeling and workflow constrained by resources and nondetermined time bas previous modeling approaches, there are two kinds of places in c activities and resources of a workflow, respectively. For each act transitions represent the start and termination of the activity, re timing functions in it to define the minimum and maximum durz activity. Using the constructed Petri net model, the earliest and can be calculated. With the reachability graph of the Petri net m the implementation of the workflow can be calculated and verifi conditions for the existence of the best implementation case of a method for obtaining such an implementation case is presented. the evaluation and verification of the implementation of a workf nondetermined time. © 2008 IEEE.
653	4		read	agnostic, no and-joins	actors perform activities	runtime, online	predict next actor for process instance, based on process model and historical data	Decision support systems: Decision trees, SVM, C4.5				Liu Y., Wang J., Yang Y., Sun J.	A semi-automatic approach for workflow staff assignment	###	Staff assignment is of great importance for workflow manageme applications, staff assignment is still performed manually. In this automatic approach intended to reduce the number of manual st applies a machine learning algorithm to the workflow event log that each actor undertakes. When staff assignment is needed, th machine learning technique suggest a suitable actor to undertak experiments on three enterprises, our approach achieved a fairly 2008 Elsevier B.V. All rights reserved.
656	4		read	P-timed Petri nets	Petri-net: Tokens							Julia S., de Oliveira F.F., Valette R.	Real time scheduling of Workflow Management Systems based on a p-time Petri net model with hybrid resources	###	resources to solve the real time scheduling problem of Workflow proposed approach uses an activity diagram to show the main a different routings of the Workflow Process. Based on the activity Petri net model is produced by assigning a time interval to ever resource (discrete + continuous) allocation mechanisms are mo discrete transitions in order to represent the different kinds of re resources) in a more realistic way. Time constraint propagation token player algorithm is applied to the Petri net model in order corresponding to a specific sequence of activities which respects is illustrated through an example of "Handle Complaint Process" reserved.
661	4		read	workflow net	agnostic	runtime	allocation of resource to activity under constraints	constraint programming				Avanes A., Freytag J.-C.	Adaptive workflow scheduling under resource allocation constraints and network dynamics	###	Workflow concepts are well suited for scenarios where many dis collaboratively together to achieve a common goal. Today, work computerized model for business processes executed in instance Management Systems. However, there are many other applicati supported cooperative work can be captured and organized by w investigate the task of scheduling workflows in self-organizing w scenarios. Most research work in the field of workflow scheduling causality constraints. We present an adaptive scheduling algorit sequence for workflow activities by additionally considering reso dynamic topology changes. Our approach utilizes a multi-stage extend with techniques to cope with network dynamics. © 2008
679	4		And-splits, or-splits		none	Design-phase	move decision points as early as possible by analysis of execution traces	C4.5 decision tree pruning	reduce uncertainty			Subramaniam S., Kalogeraki V., Gunopulos D., Casati F., Castellanos M., Dayal U., Sayal M.	Improving process models by discovering decision points	###	Workflow management systems (WfMS) are widely used by busi administrating, automating and scheduling the business process resources. Since the control flow specifications of workflows are assumptions and errors, leading to inaccurate workflow models. a workflow graph model, determine the path chosen toward com In this work, we show that positioning the decision points at the process efficiency by decreasing their uncertainties and identifyi present novel techniques to discover the earliest positions by an transform the model graph. The experimental results show that efficient with respect to its average execution time and uncertai

8. Synthesise data

- „Data synthesis involves collating and summarising the results of the included primary studies.“ [2]

- Descriptive
  - e.g. summarizing the studies in a tabulated manner

- Quantitative
  - e.g. forest plots

- (Sensitivity analysis)

8. Synthesise data

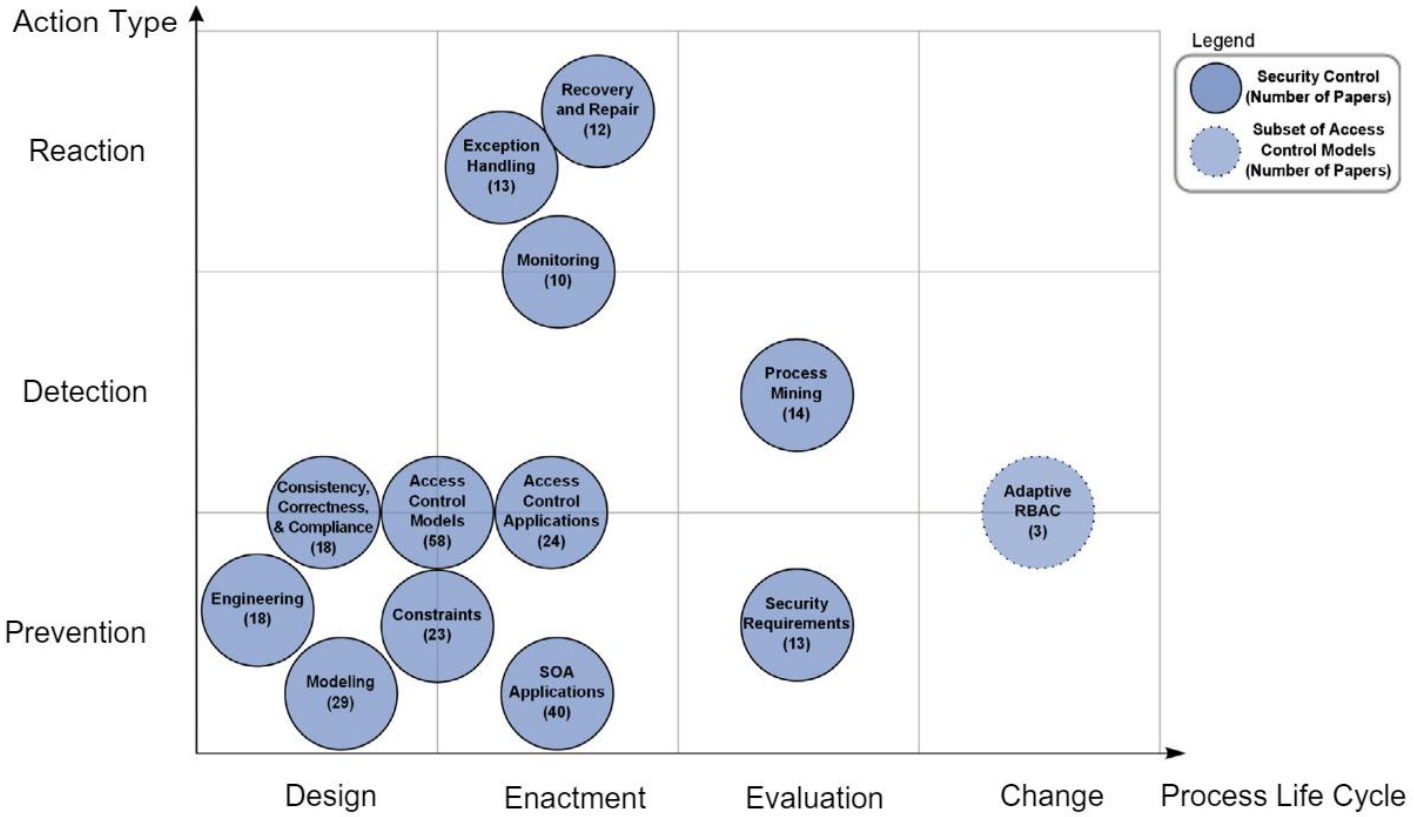
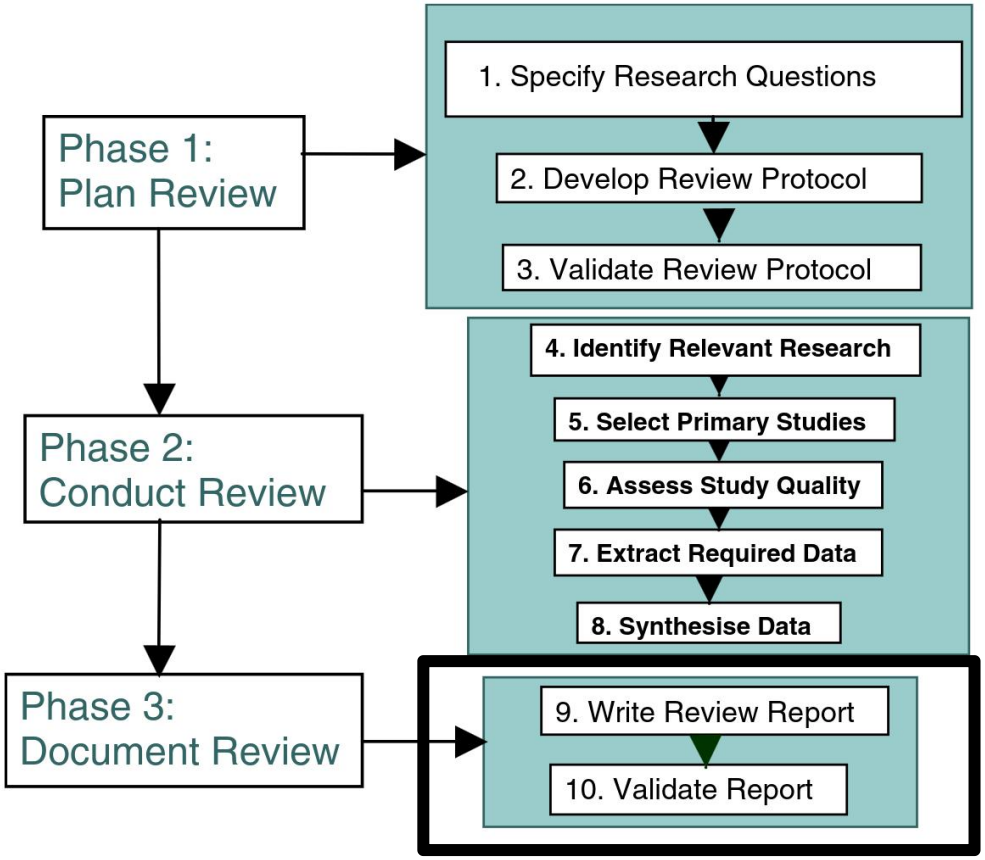


Fig. 9. Classification of controls.

Source: Maria Leitner, Stefanie Rinderle-Ma:
A systematic review on security in Process-Aware Information Systems - Constitution, challenges, and future directions. Inf. Softw. Technol. 56(3): 273-293 (2014)
https://doi.org/10.1016/j.infsof.2013.12.004

Final meeting



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from [1]

Seminar thesis structure suggestion

- Abstract

- Introduction (see kickoff slides)
- Methodology
- Results / Discussion
- Conclusion

- Bibliography

=> see also table 9 in [2]

Part III

Organizational

Organizational

- Conduct the remaining steps of the SLR process
- Prepare a concise presentation about your Systematic Literature Review
  - max. 15min
- Write your seminar thesis
  - 10-15 pages, Springer LNCS template: https://www.springer.com/gp/computer-science/lncs/conference-proceedings-guidelines
  - Submission on Moodle, latest: July 15th, 23:59 CEST

Questions?

Systematic literature review

[1] Pearl Brereton, Barbara A. Kitchenham, David Budgen, Mark Turner, Mohamed Khalil: Lessons from applying the systematic literature review process within the software engineering domain. J. Syst. Softw. 80(4): 571-583 (2007)

[2] B. Kitchenham, Procedures for Performing Systematic Reviews, Joint Technical Report, Department of Computer Science, Keele University and Empirical Software Engineering, National ICT Australia Ltd., 2004 (http://www.elizabete.com.br/rs/Tutorial_IHC_2012_files/Conceitos_RevisaoSistematica_kitchenham_2004.pdf)