Extracting Software Security Concerns of Problem Frames Based on A Mapping Study

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CONTENTS

1 BACKGROUND

Background(1/7) ——The Problem Frames

A problem frame is a kind of pattern, it defines an identifiable problem class in terms of its context and the characteristics of its domains, interfaces, and requirements[1]. And it consists of frame diagrams, domain characteristics and framework **concerns**[2].

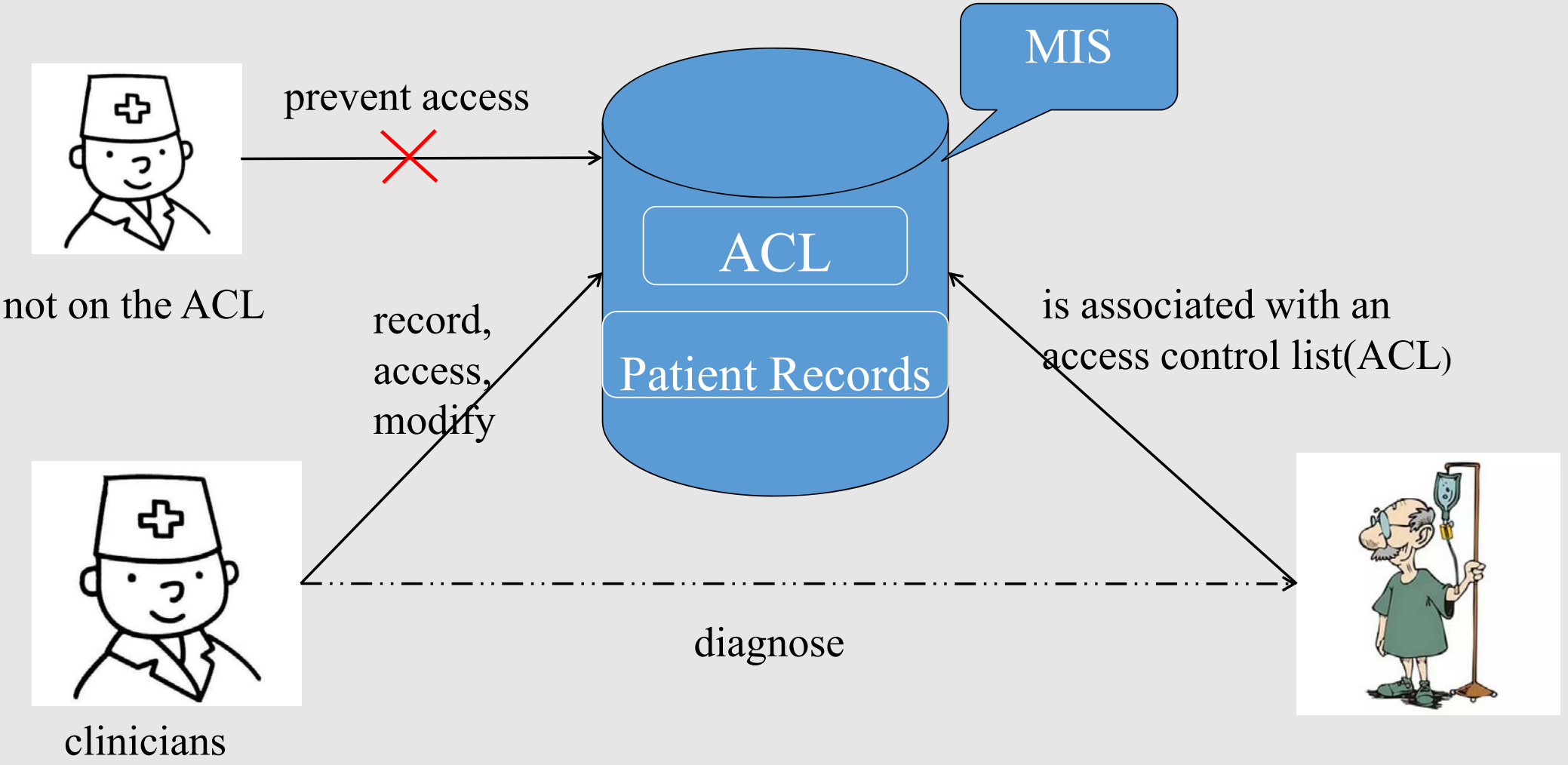
[1]Lin L, Nuseibeh B, Ince D C, et al. Analysing Security Threats and Vulnerabilities Using Abuse Frames[J]. Etaps, 2003.

Background(2/7) ——The Concern

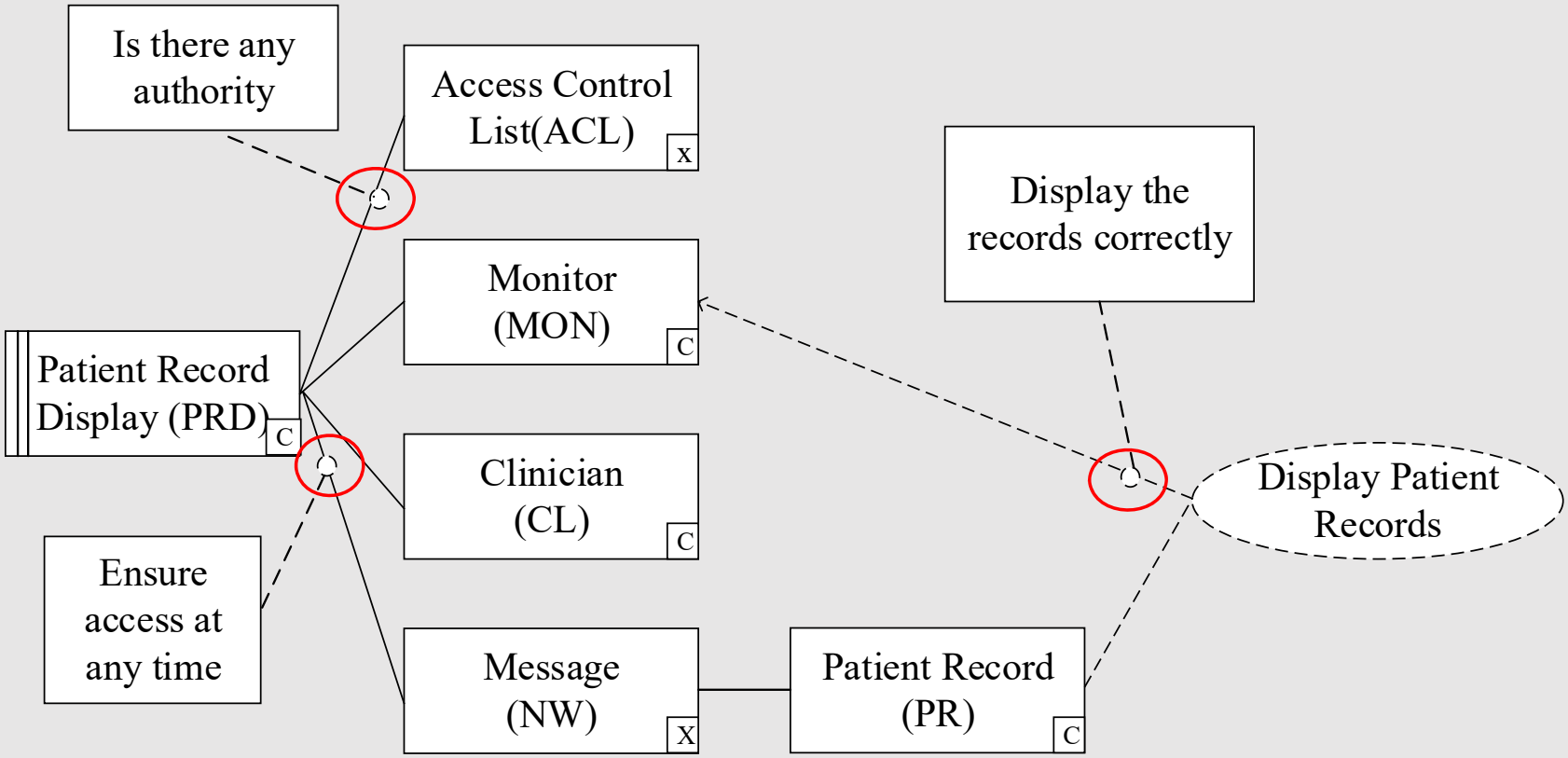
Concern is one aspect of the problem that developers need to attention[2].

[2] Jackson M. Problem frames: analyzing and structuring software development problems[M]. Addison-Wesley Longman Publishing Co. Inc. 2000.

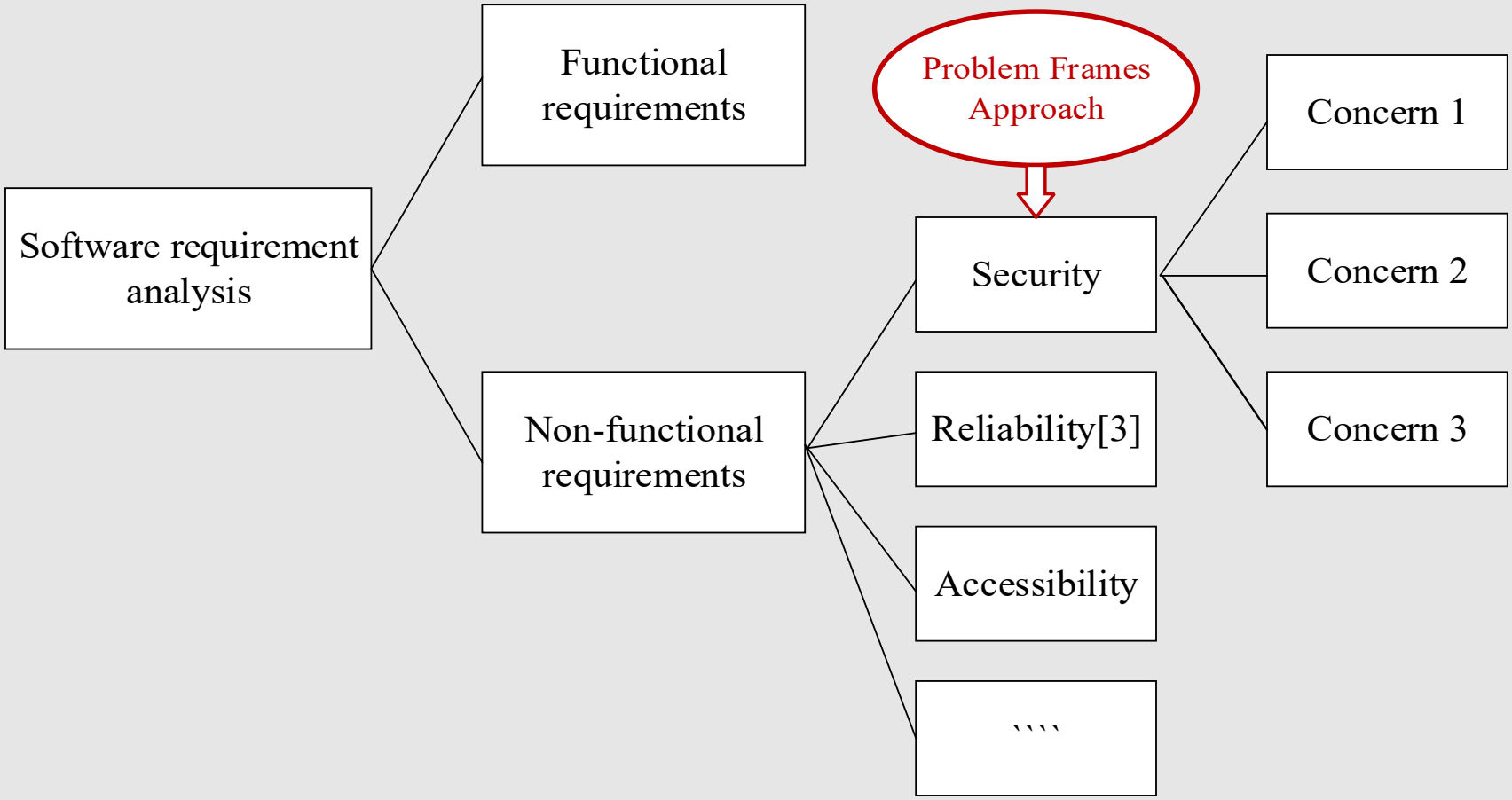
Background(3/7) —— The Medical Information System(MIS)



Background(4/7)——The Problem Context Diagram

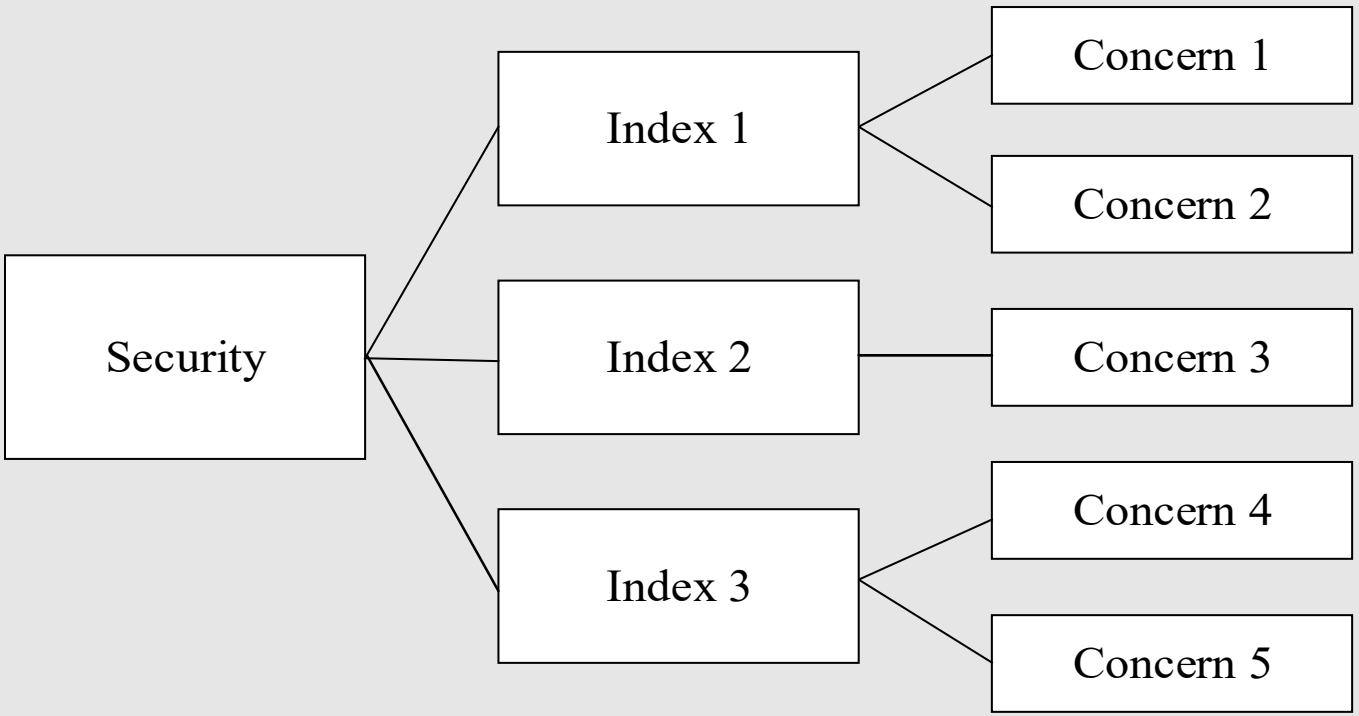


Background (5/7)



[3] Yin B, Jin Z, Zhi L I, et al. Reliability Concerns in the Problem Frames Approach and System Reliability Enhancement Patterns[J]. Chinese Journal of Computers, 2013, 36(36):74-87.

Background (6/7)



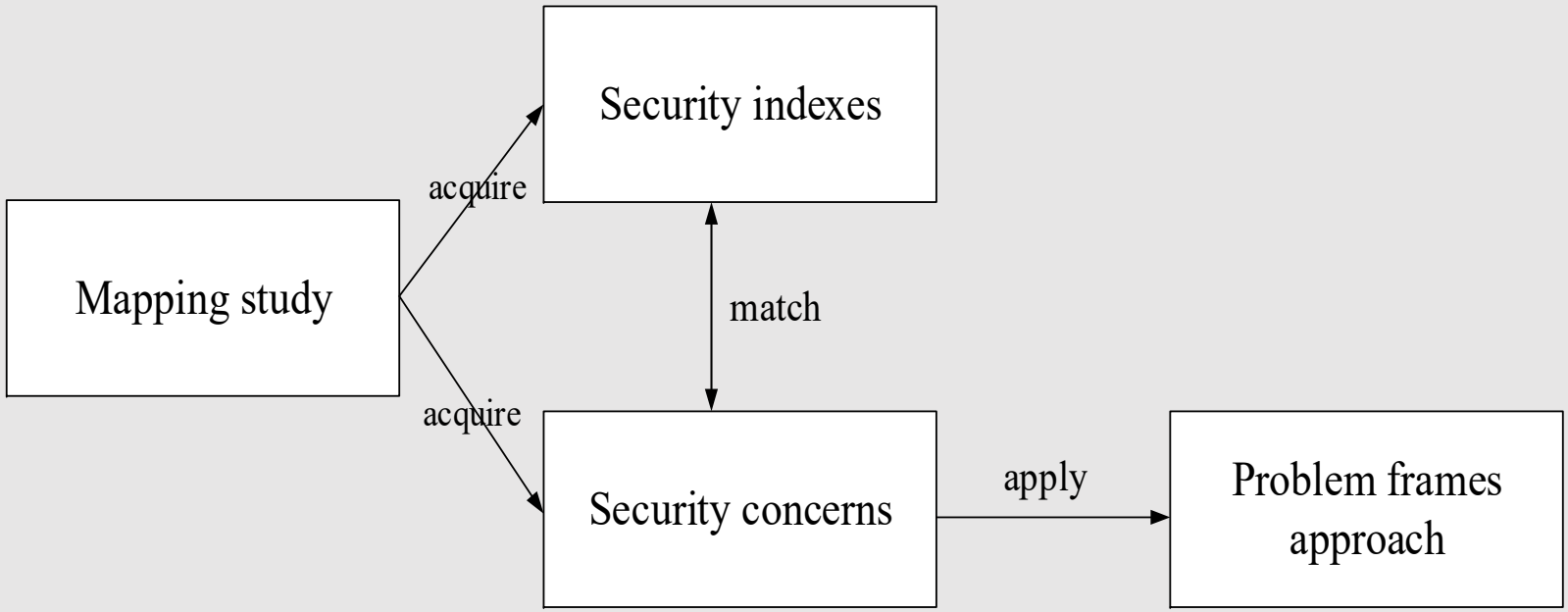
Background(7/7) ——Questions

RQ1:Whether the three security indexes can provide a good support for software security requirements and what are the security concerns of software security indexes?

RQ2:How to match security concerns correctly based on Problem Frames approach?

2 METHOD

Method(1/4) ——The Process of Research

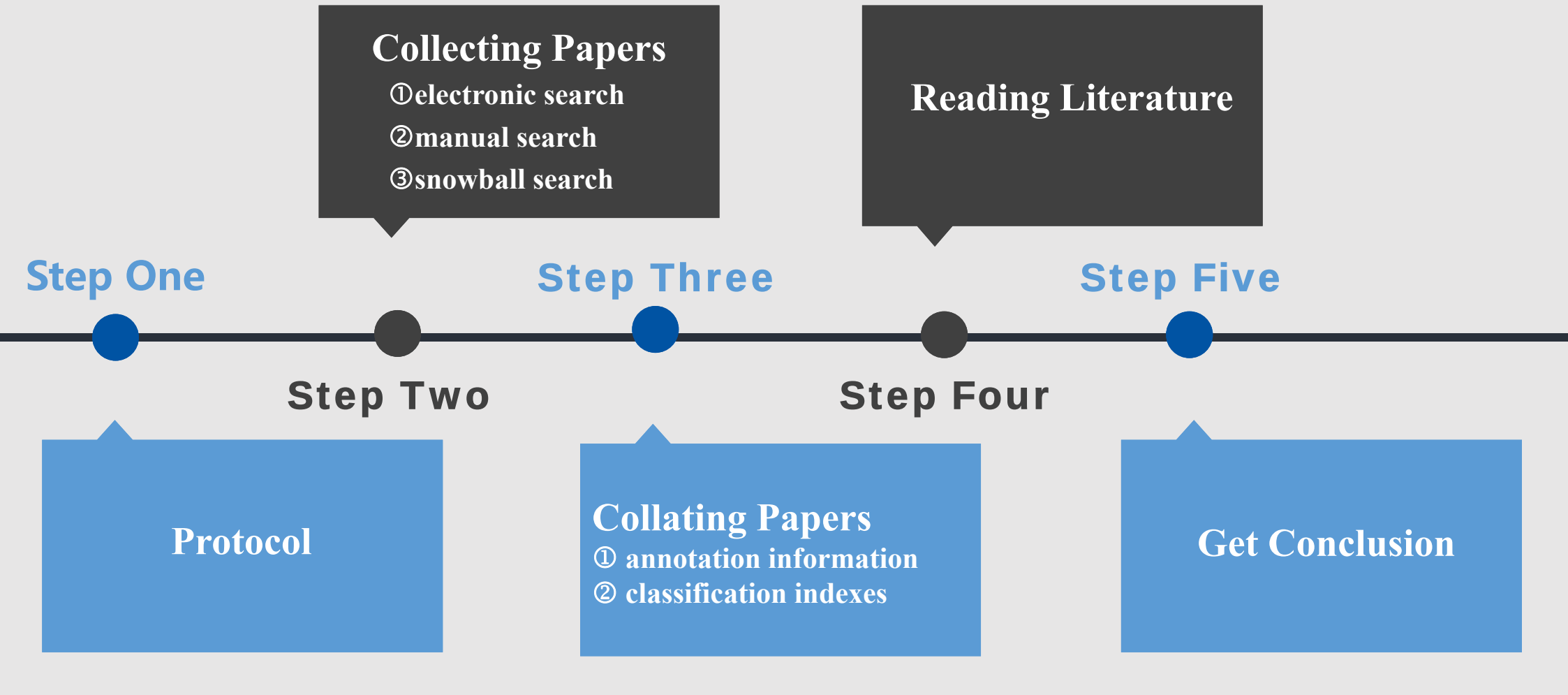


Method(2/4) —— Mapping Study

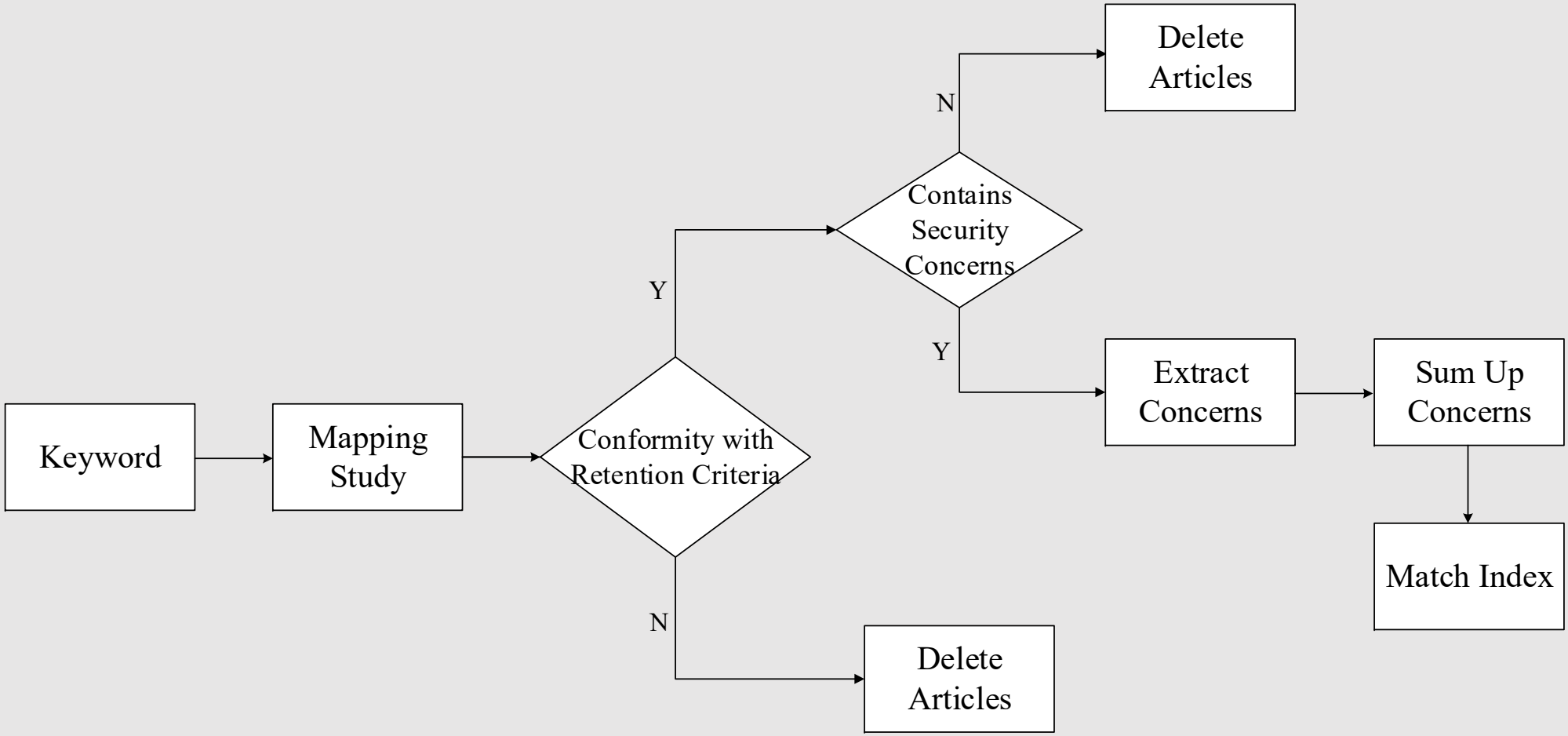
A systematic mapping study provides a structure of the type of research reports and results that have been published by categorizing them and often gives a visual summary, the map, of its results[4].

[4]Kitchenham B A, Dyba T, Jorgensen M. Evidence-based Software Engineering[J]. IEEE, 2004, 22(1):273--281.

Method(3/4) —— Primary Study

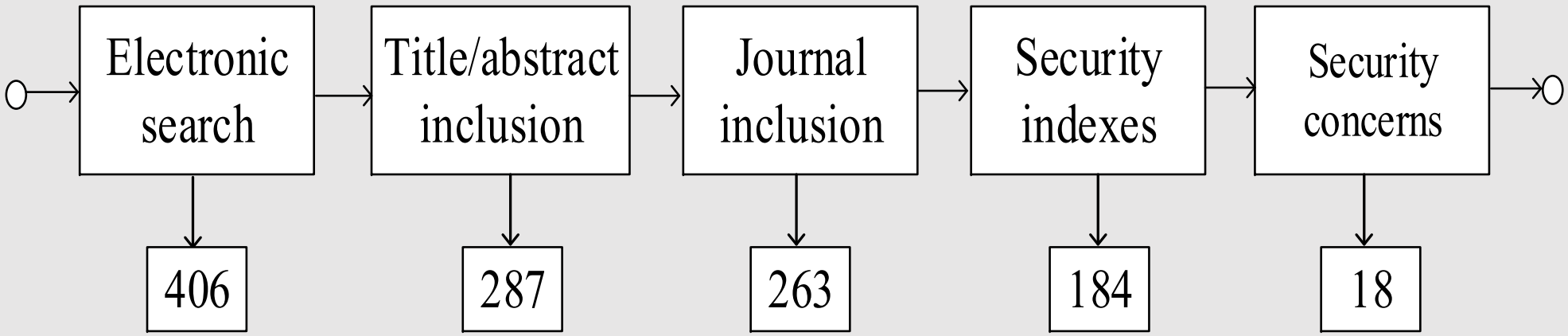


Method(4/4) —— The Extraction Process of Concerns



3 RESULTS& ANALYSIS

Results&Analysis(1/9) —— The Result of Mapping Study

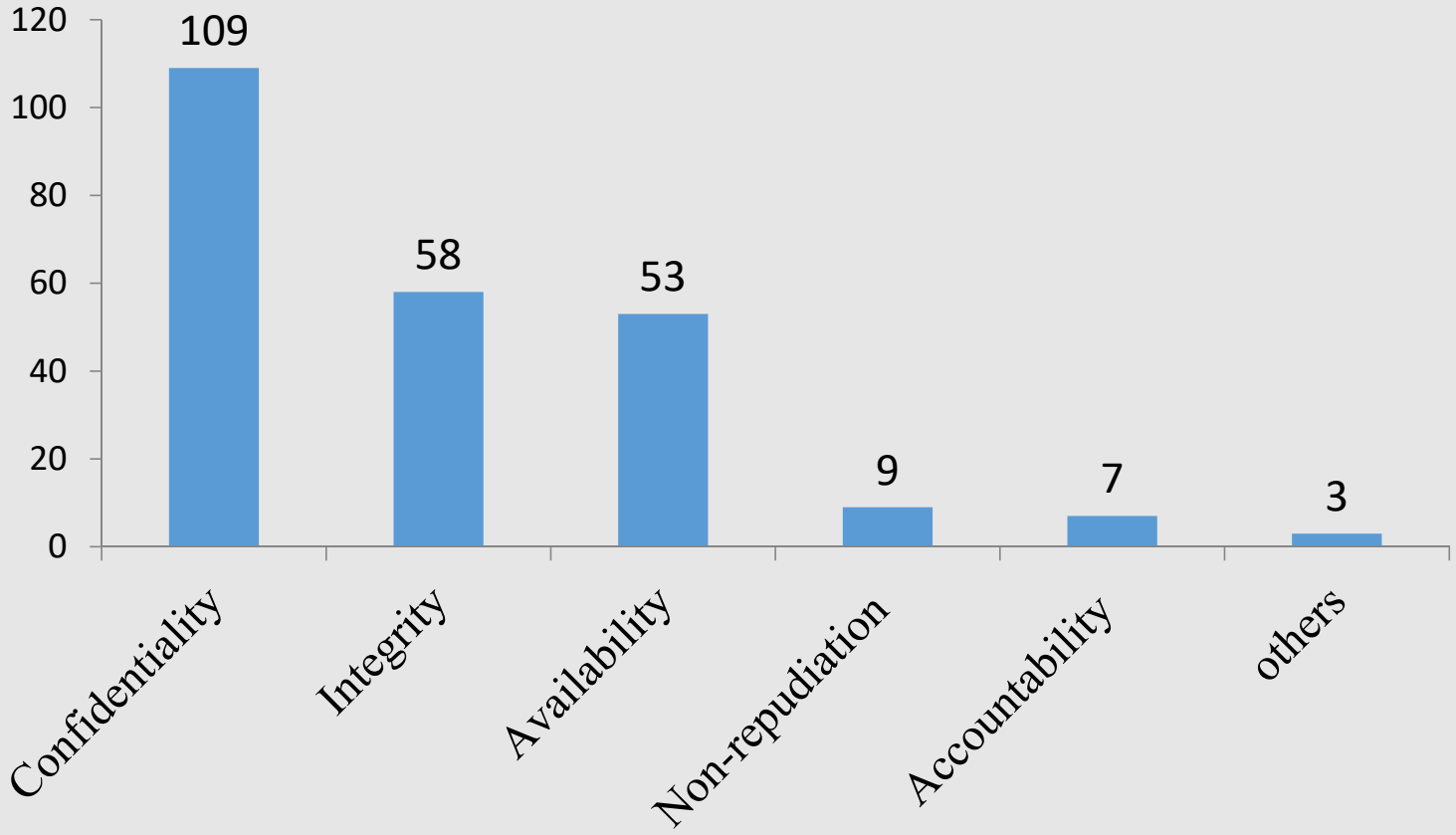


Results&Analysis(2/9) —— Question One

RQ1:Whether the three security indexes can provide a good support for software security requirements and what are the security concerns of software security indexes?

Results&Analysis(3/9) —— The Number of Indexes

We divided 184 articles with security indexes, the quantity of each index is as follows：



Results&Analysis(4/9) —— Extract Index

Security Indexes	Confidentiality	Integrity	Availability
Quantity	**109 articles**	**58articles**	**53articles**

ISO/IEC 25010-2011[5] defines the five security indexes of security requirement including Confidentiality, Integrity, Non-repudiation, Accountability and Authenticity, the Golden Triangle Framework (CIA model), and it includes three core sub-properties: Confidentiality, Integrity and Availability.

Confidentiality, Integrity and Availability are the core principles of information security and are used in many areas[6].

The basic attributes of information security are confidentiality, integrity and availability[7].

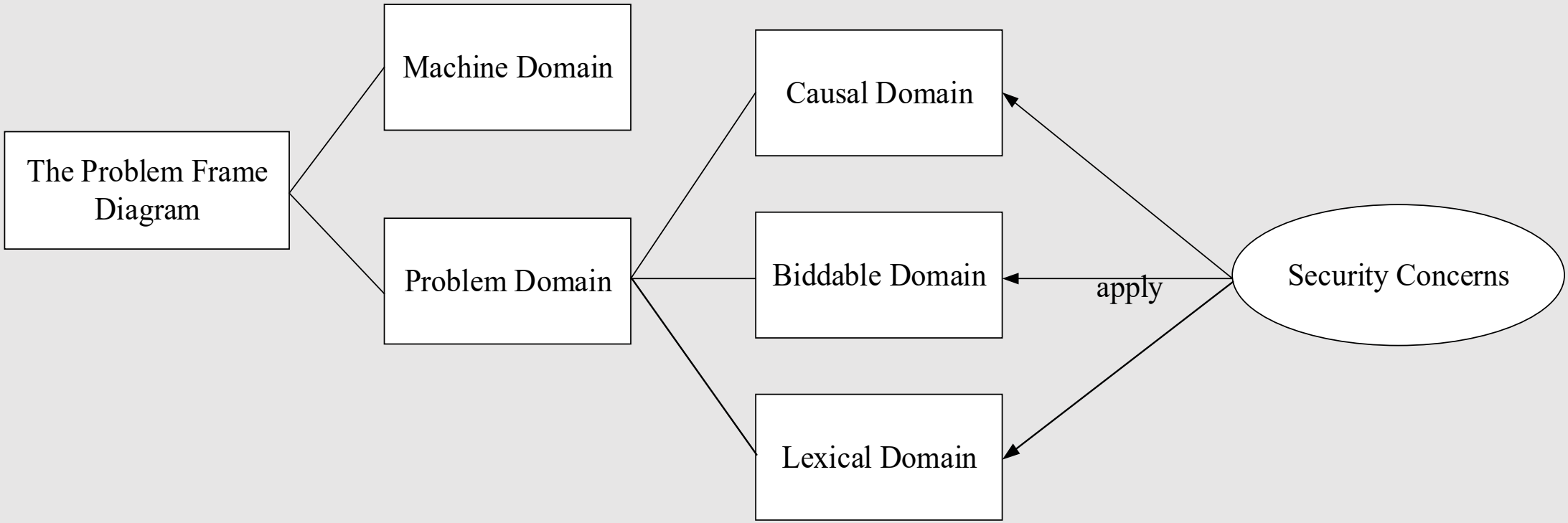
Results&Analysis(5/9) —— Extract Concerns

Security Concerns	A description of the security concerns	Representative literature
Authentication Concern	Authentication is the process that the system verifies the identities of visitors before sharing information with them.	[6][7][8][9][10][11][12][13][14][15]
Access Control Concern	Access Control is to limit access to the system resources only if the user has been authorized.	[7][9][11][13][15][16][17][18][19]
Information Encryption Concern	Data integrity is vulnerable to a variety of attacks, then we encrypt the information in order to prevent unauthorized users from stealing and tampering.	[20][21][14][15][16][17][18][19]
Storage Log Concern	We back up the data into the log.	[21][23]

Results&Analysis(6/9) —— Question Two

RQ2:How to match security concerns correctly based on Problem Frames approach?

Results&Analysis(8/9) —— Security Concerns combine with Problem Frames

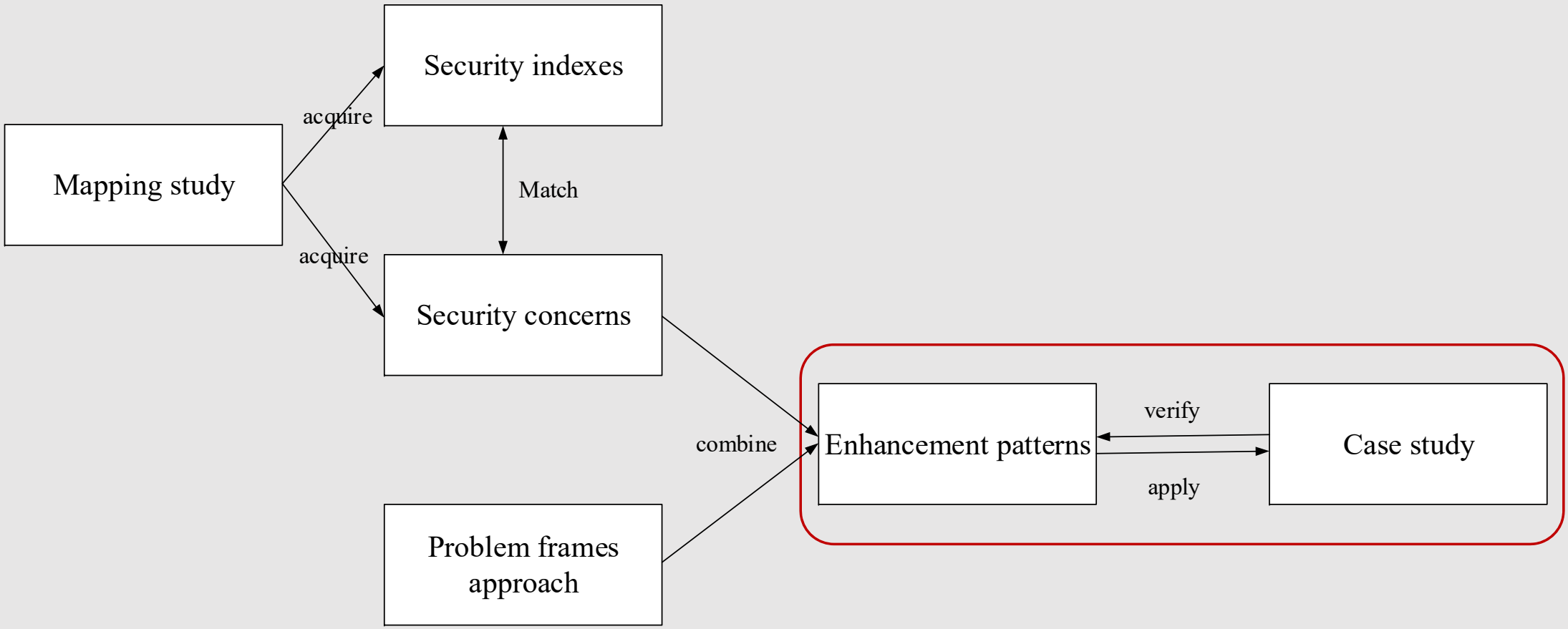


Results&Analysis(9/9) —— Combine the Problem Frame

A Description of The Security Concerns
Focus on whether the biddable domain has access competence
Focus on access authorize to machine domain and problem domain
Focus on unauthorized users tamper or forge the information to lexical domain or interface
Focus on authorizing users to access information

4 SUMMARY

Summary & Expectation



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Thank you

QUESTIONS & ANSWERS