



Agile Application Development Management Method Using Causal Knowledge

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Abstract

Agile project management methods and tools are used to improve Enterprise Application Software (EAS) development management. Our experience using Agile project management tool Atlassian "Jira" shows the lack of coordination between software development management and business management content. The method using a causal modelling approach is presented to enhance the capabilities of Agile management tools.

Causal Agile management hierarchy is developed using Management Transaction (MT) framework for business domain causality modelling. The content of feedback between two adjacent levels in the Agile hierarchy, such as theme – initiative – epic – user story, is revealed using the MT framework. By defining the internal interactions between the layers in the Agile hierarchy using MT, the obtained causal knowledge is expressed as a new component in the Agile management tool.

The developed causal Agile management method is integrated with the traditional MDA/MDD engineering methods. This enables to create an intelligent project management environment based on causal knowledge. This method ensures checking the integrity and verification of the EAS project content, using a causal knowledge repository, that contains Agile process content and business domain causal knowledge.

This causal modelling based approach is a way to reduce the misalignment between business strategy needs, business processes demands, and software development solutions.

Introduction

Agile project management practices are widely used to improve the quality of EAS project delivery. However, the rates of successful IT project deliveries are still low (Fig. 1). We believe that one of the reasons for such results is the lack of coordination content specification between the levels of Agile management hierarchy.

Category	%
Successful*	19%
Meet original goal	44%
Likely on time	30%
Likely on budget	36%

KPMG, AIPM, IPMA, 2019

Fig. 1. IT project delivery

success rates
* stakeholders are satisfied with the outcome.

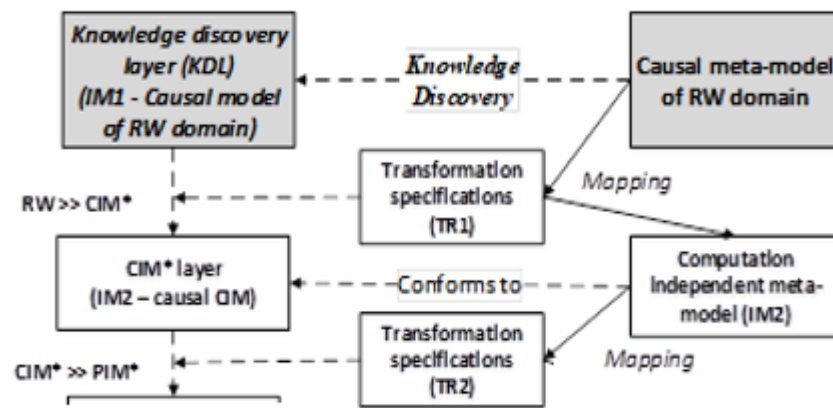


Fig. 2. Causal MDD process [1]

Model driven development (MDD) is a transformation based process where domain models are specified in a particular order and thus eventually turned in code for EAS. The project management for EAS development takes place on the basis of understanding the causality of the domain and is the basis for adequate decisions (Fig. 2).

Modified Agile Management Hierarchy

In order to evaluate the causality of the domain and ensure the EAS project content is verified against required specifications, a modified Agile hierarchy was developed (Fig. 3) that includes the content specification using the MT framework (Fig. 4). Each interaction between Agile levels are described as Management Transaction: $MT = (F, P, A, V)$ [2] which ensures the required information specification to ensure the verification of project content against the needs of the enterprise [3].

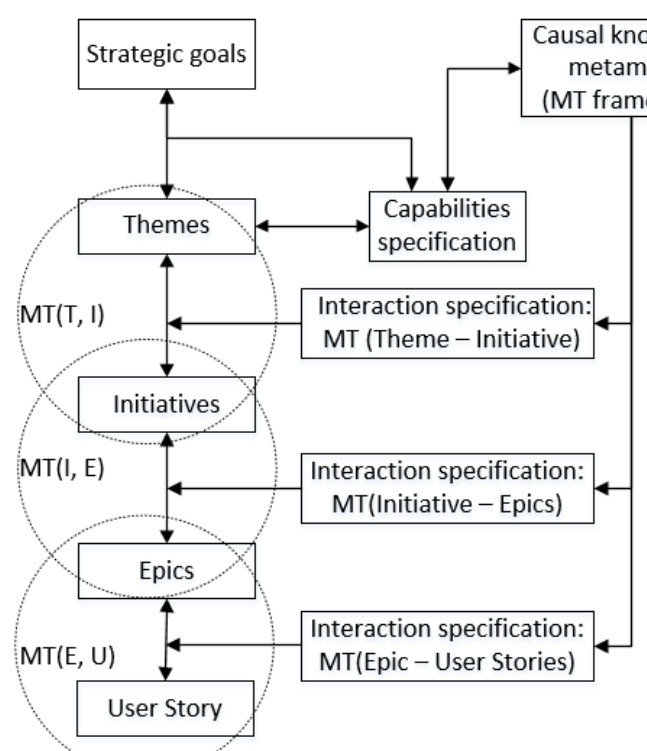


Fig. 3. Modified Agile hierarchy

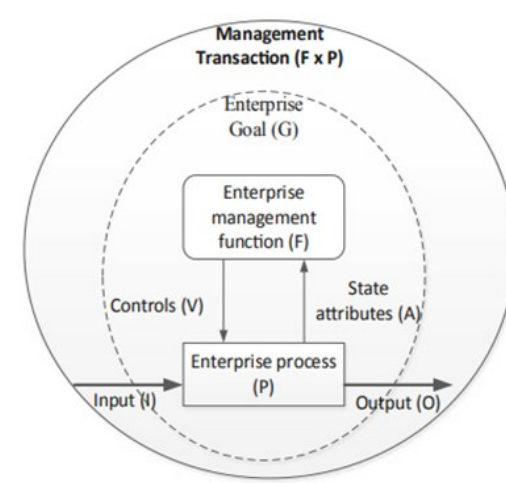


Fig. 4. Conceptual model of management transaction

Advantages of Causal Agile Project Management

Given the MT is used to capture the causal knowledge of the domain the missing links can be ensured (Fig. 5). Current state of management content from the perspective of IT project developer is presented in Fig. 5a. It shows that there is information missing on the initiative and theme level. Fig. 5b illustrates the missing information links to ensure requirements on the lowest level of Agile hierarchy are developed due to their impact for strategic business objectives defined as themes. Fig. 5c illustrates the full hierarchy of Agile activities that is the aim of our research.

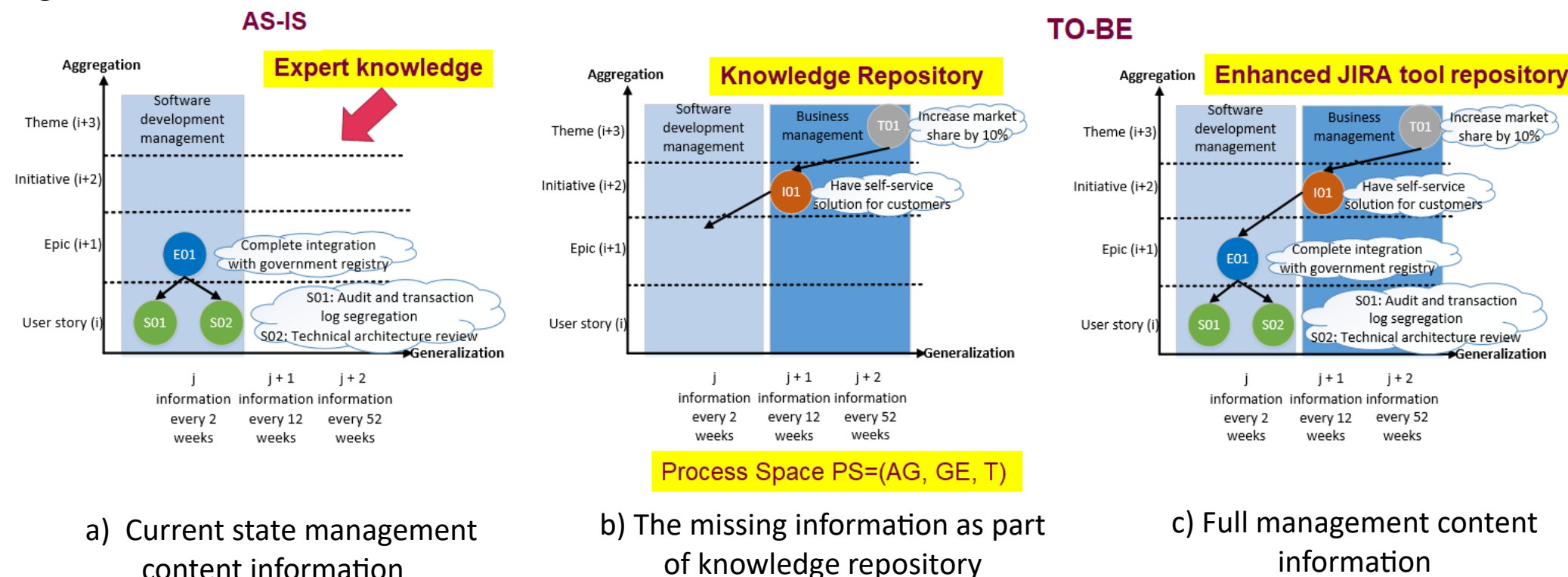


Fig. 5. Comparison of traditional EAS project management to causal knowledge based

References:

- [1] Gudas, S., Valatavičius, A.: Extending model-driven development process with causal modeling approach. In: Dzemyda, G., Bernatavičienė, J., Kacprzyk, J. (eds.) Data science: new issues, challenges and applications, SCI, vol. 869, pp. 279–296. Springer Nature Switzerland (2020). DOI: [10.1007/978-3-030-39250-5_7](https://doi.org/10.1007/978-3-030-39250-5_7).
- [2] Gudas, Saulius; Noreika, Karolis. Causal interactions in agile application development // Mathematics. Basel : MDPI AG. eISSN 2227-7390. 2022, vol. 10, no. 9, art. no. 1497, p. [1-22]. DOI: [10.3390/math10091497](https://doi.org/10.3390/math10091497).
- [3] Gudas, S. Foundations of the Information Systems' Engineering Theory, 1st ed.; Publishing house of Vilnius University: Vilnius, Lithuania, 2012

Traditional EAS Development and Agile Management

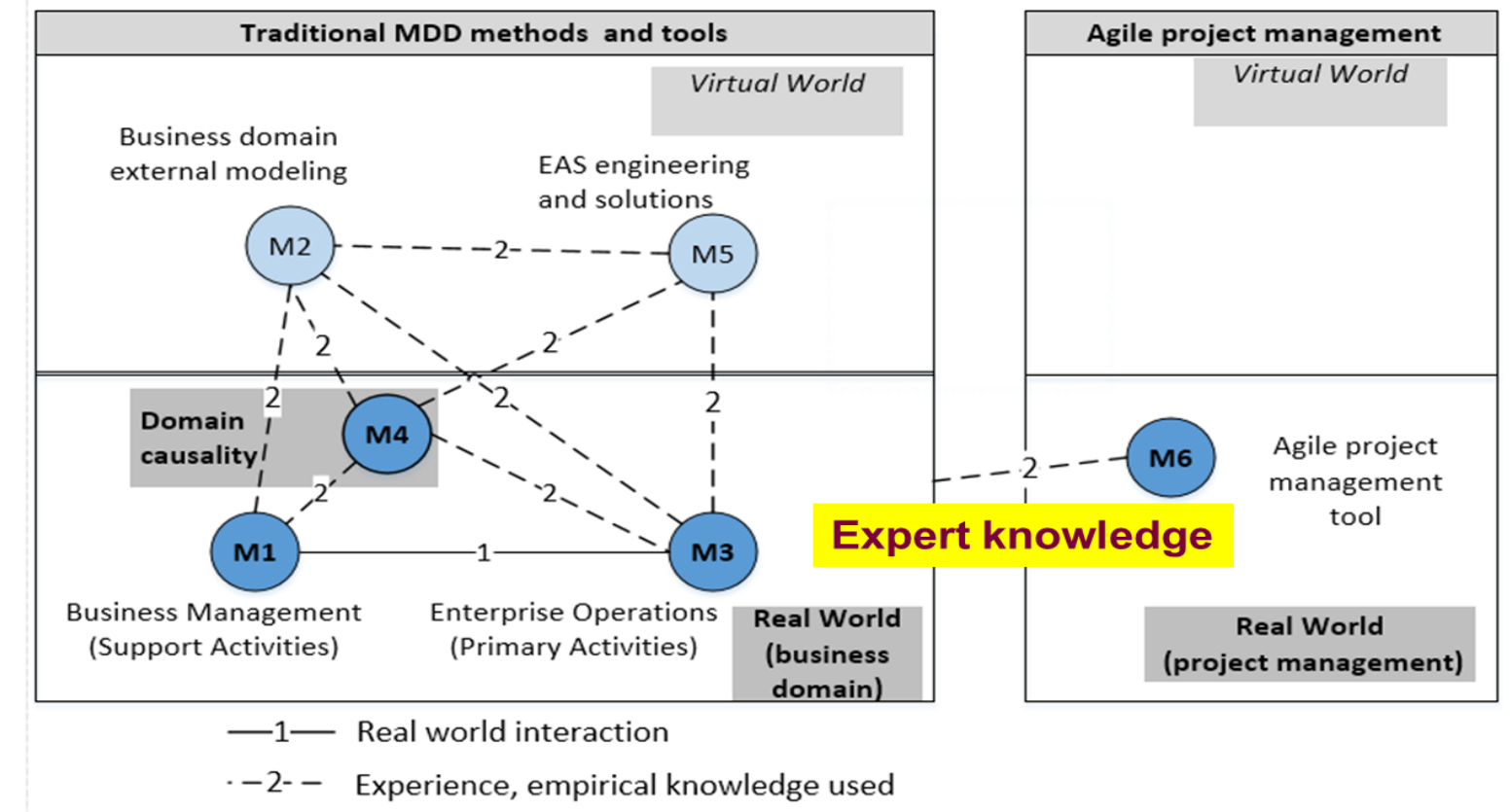


Fig. 6. Traditional EAS development and Agile management

Integration of Causal Agile Development Management and Traditional EAS Development

Virtual interaction (4) in Fig. 7 is supported by intelligent JIRA tool, developed using causal knowledge.

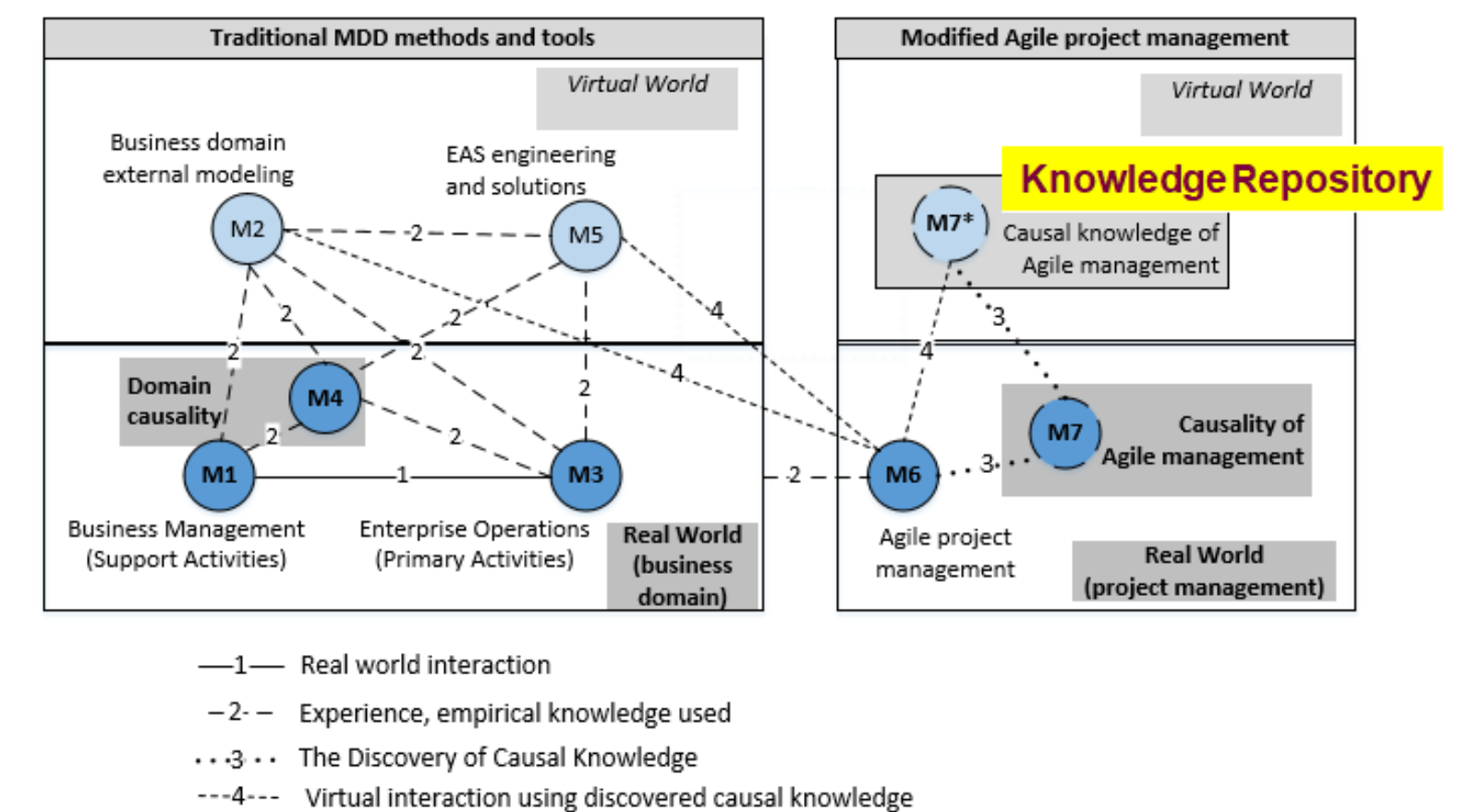


Fig. 7. Integration of Causal Agile Development Management and Traditional EAS Development

The Architecture for the Implementation of the Method

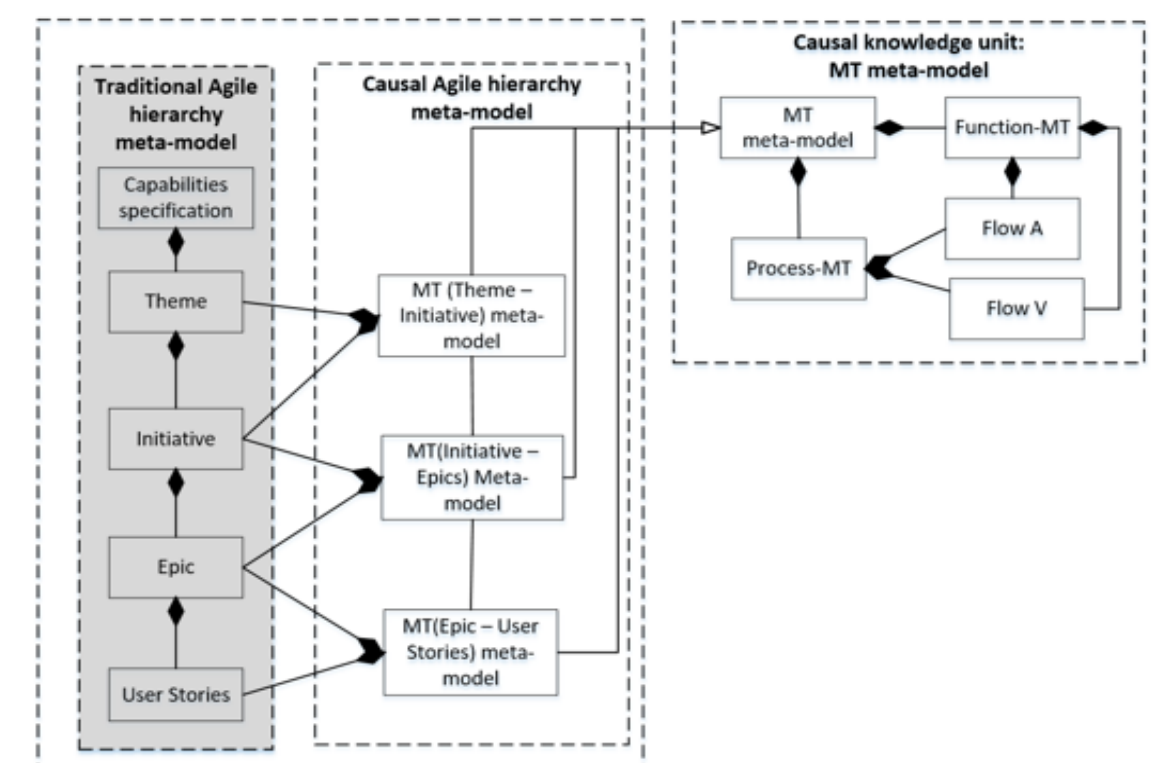


Fig. 8. The architecture for the causal knowledge based Agile application development management method

Causal Agile Management Repository Specification

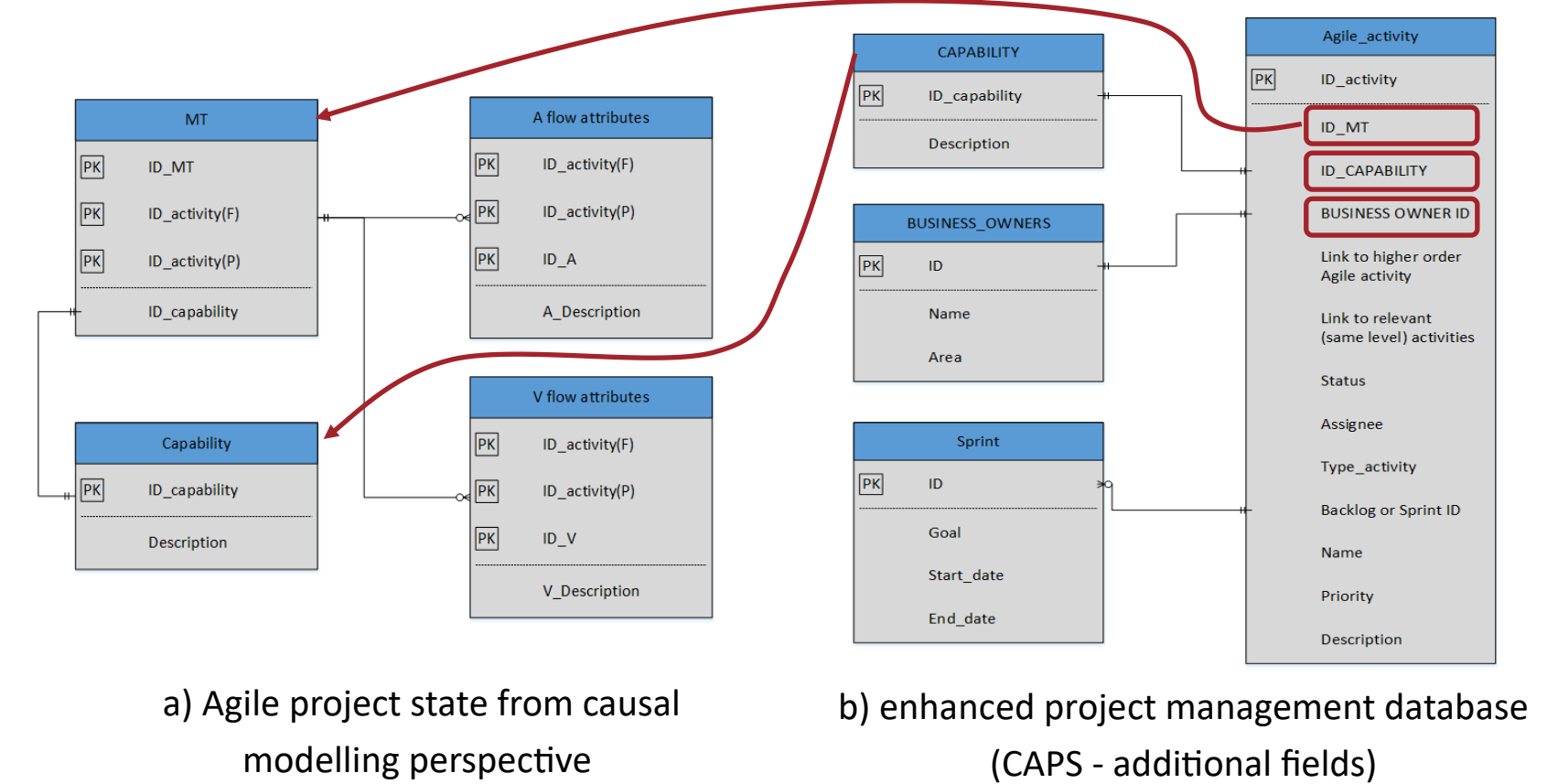
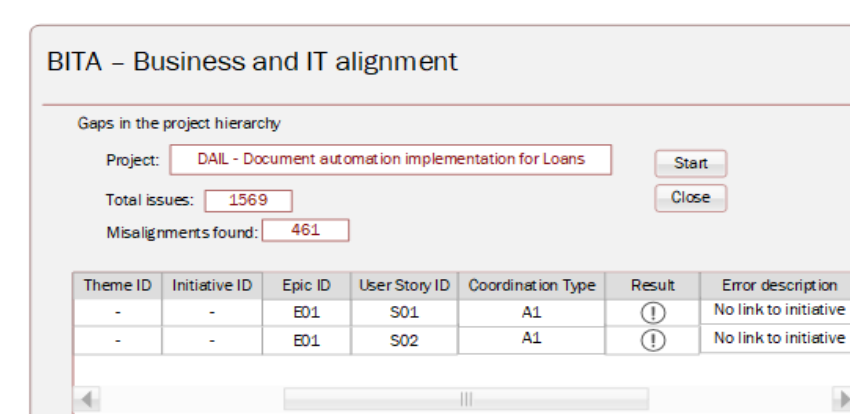


Fig. 9. Causal Agile management repository specification

Enhancing the Functionality of Agile Tools and Method Verification



a) Jira dashboard prototype

Content of the data base record of the enhanced JIRA tool.												
Theme	Initiative	Epic	User story									
		ID	F	P	A	V	ID	F	P	A	V	
N	N	E01 Technical Tasks	N	Y	Y	Y	S01 Technical architecture review	Y	Y	Y	Y	Y
N	N	E01 Technical Tasks	N	Y	Y	Y	S02 Segregate audit log and transaction log	Y	Y	Y	Y	Y

b) Jira DB record to ensure verification

Fig. 10. Jira dashboard to support business and IT alignment checking