



A Structured Systemic Framework for Evaluating Software Development Projects

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2. Background
3. Framework Development
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Introduction

Topic, Setting, and Research Interest

Topical Area: Software Development Project Performance is an area of software engineering addressed in the Software Engineering Management Process Area of the SWEBOK.

Definition: Research constrained “performance” definition to include only the development of the software and to neglect all outcomes that occur after delivery.

Setting: Standish Group’s 2002 Chaos report states that \$38B spent on cancelled software projects and another \$17B spent on completed projects that were late by greater than 82% of original estimate.

Interest: CMM/CMMI have been in place since 1990’s. Few empirical studies correlate improvements based on the uni-dimensional characteristics of the CMM/CMMI. ***Is there more to include when predicting development project performance?***

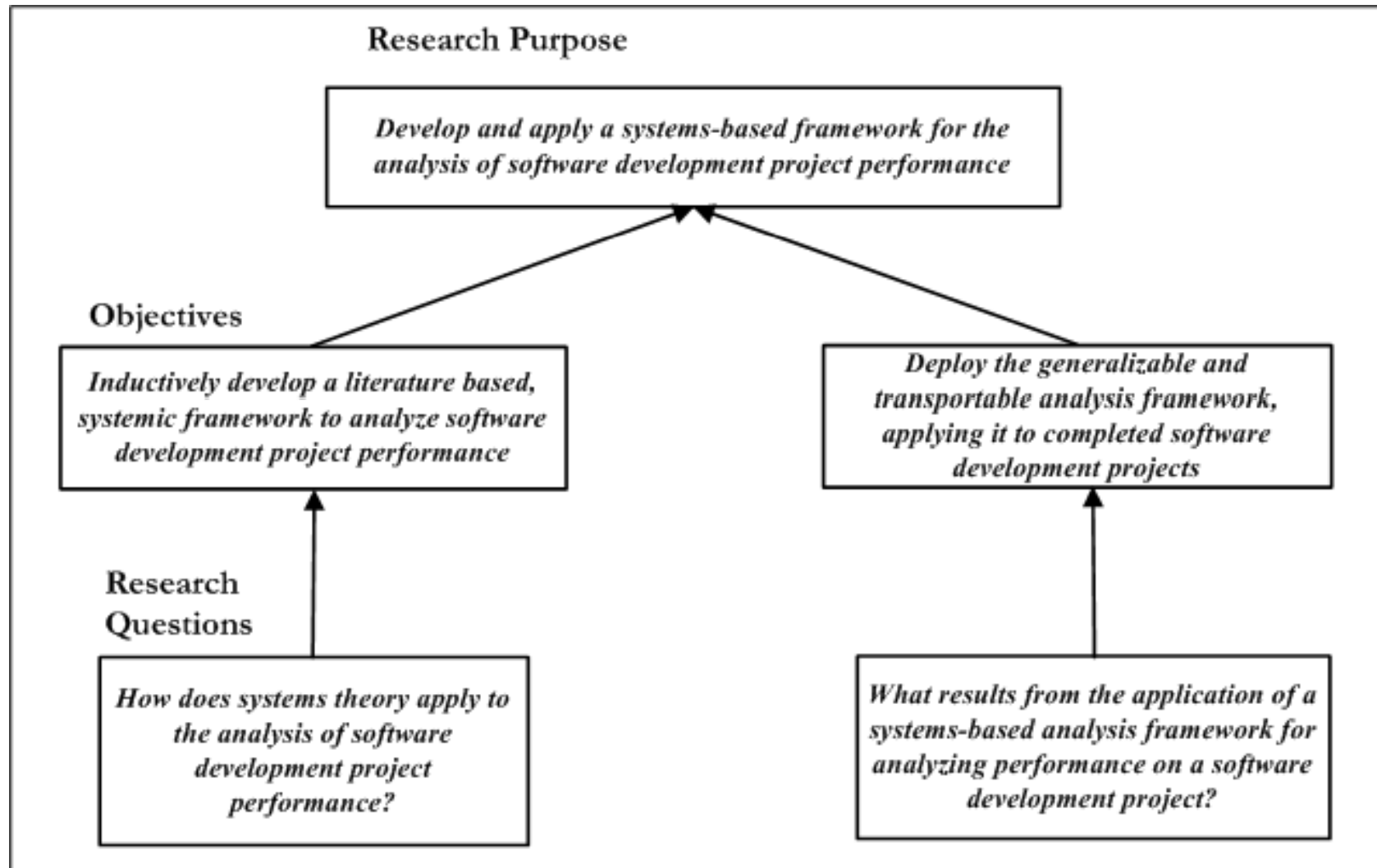


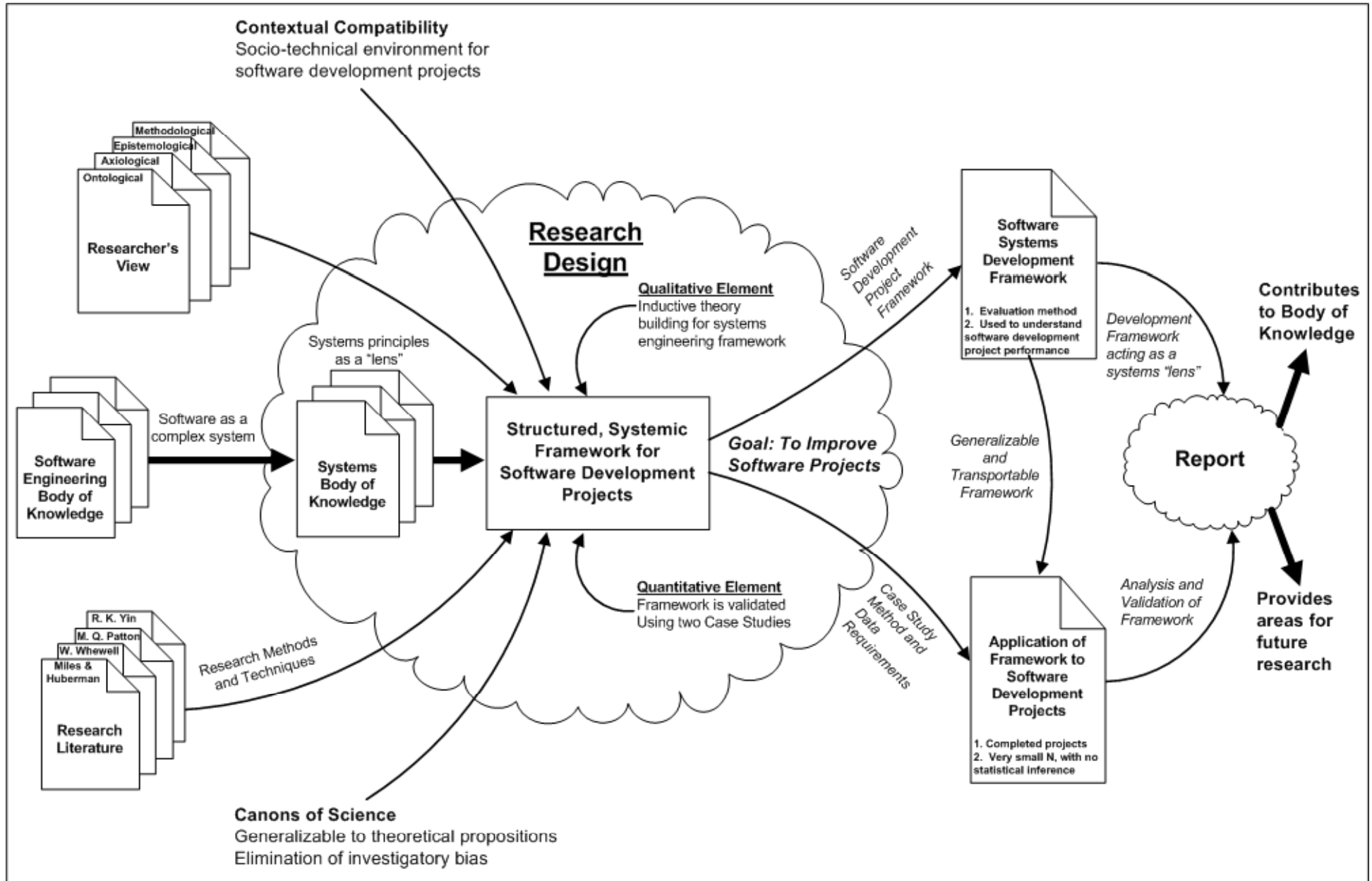
Background

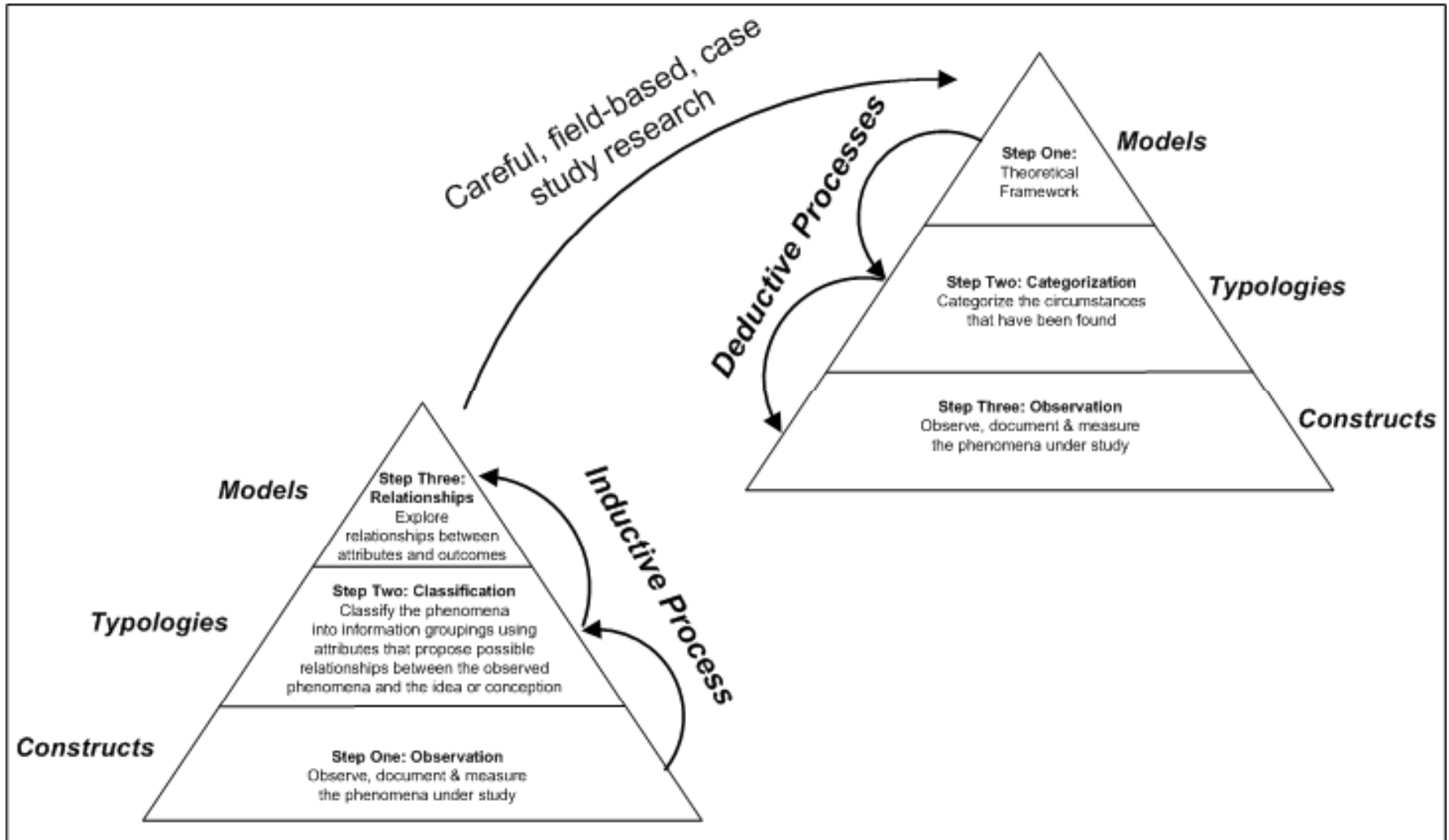
Primary Purpose of the Study

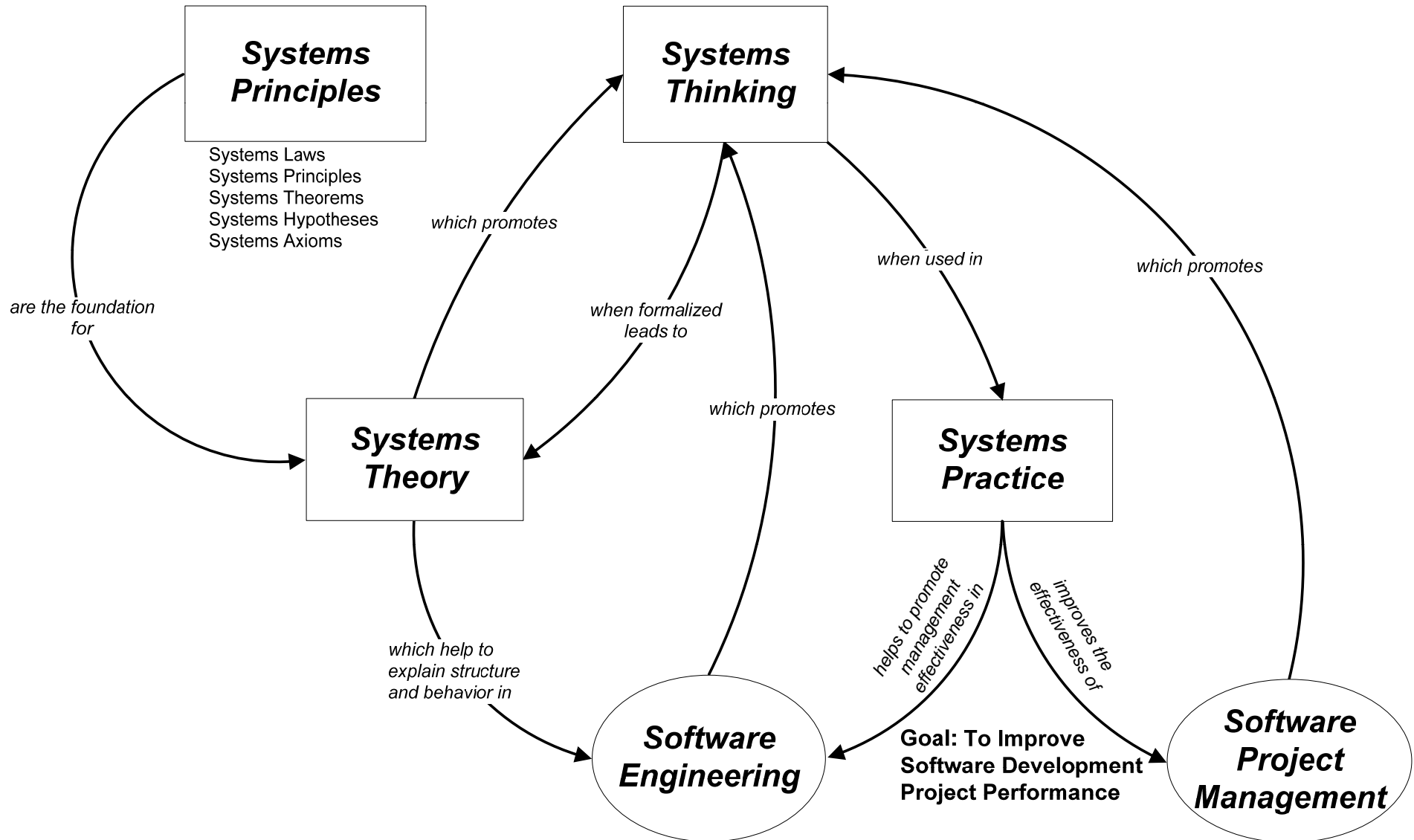
“Develop and apply a system-based framework for the analysis of software development project performance”

Study Objectives and Questions





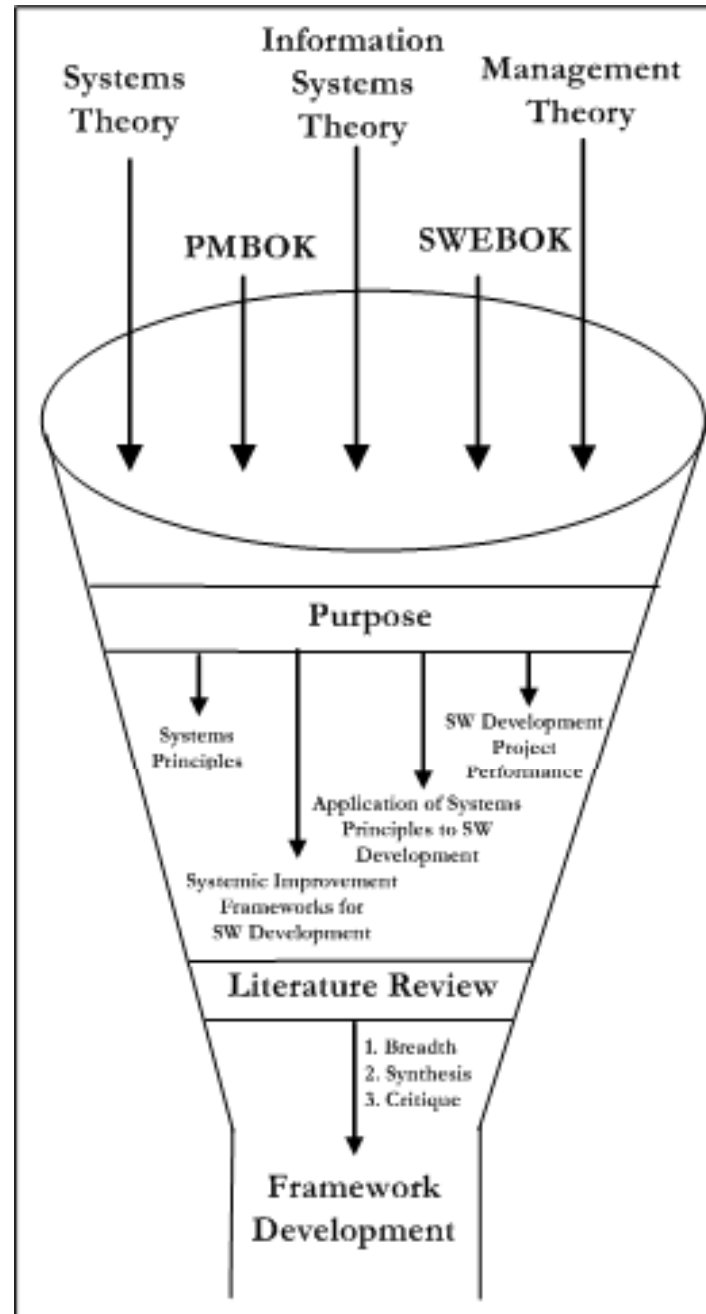


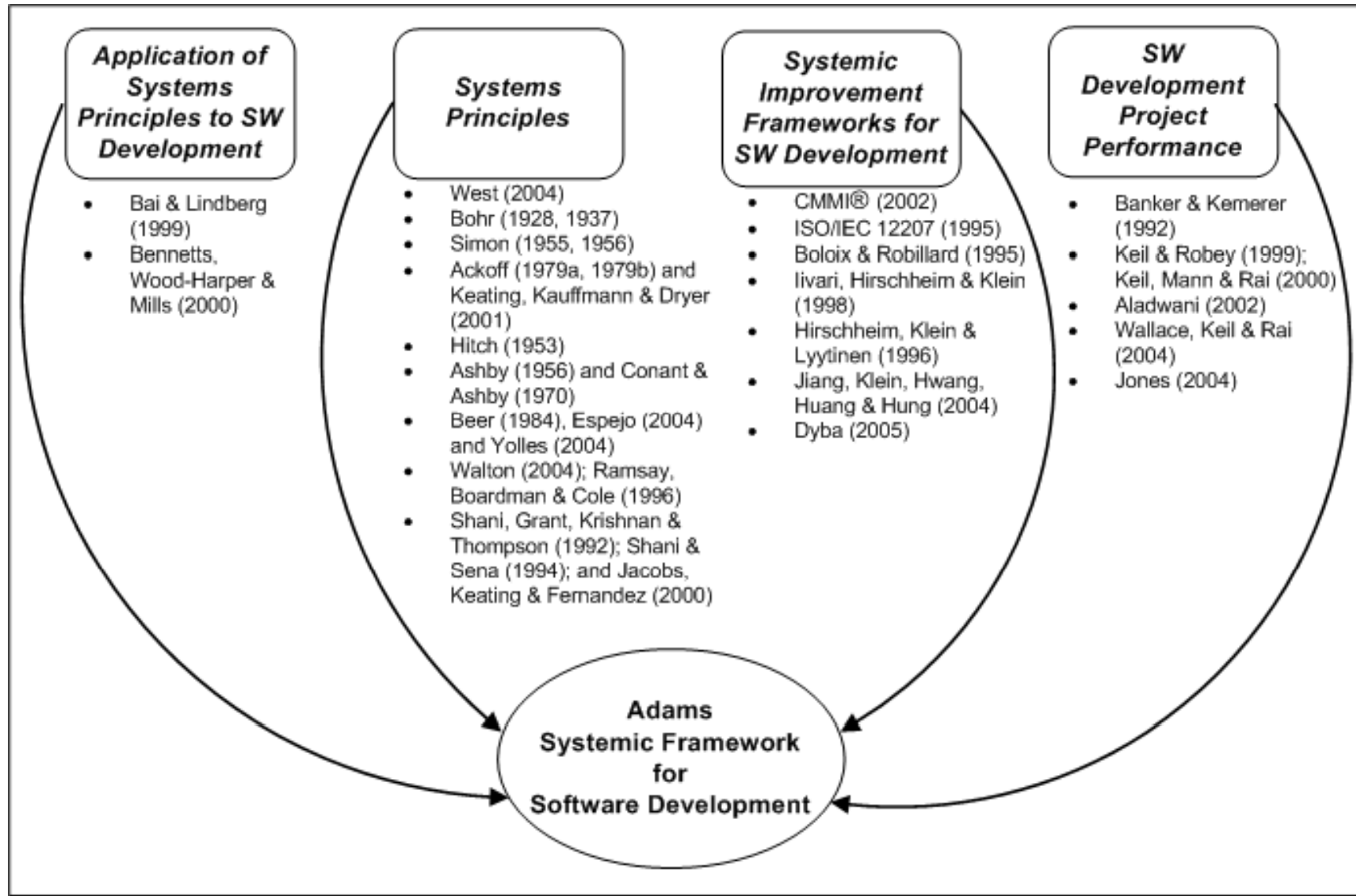


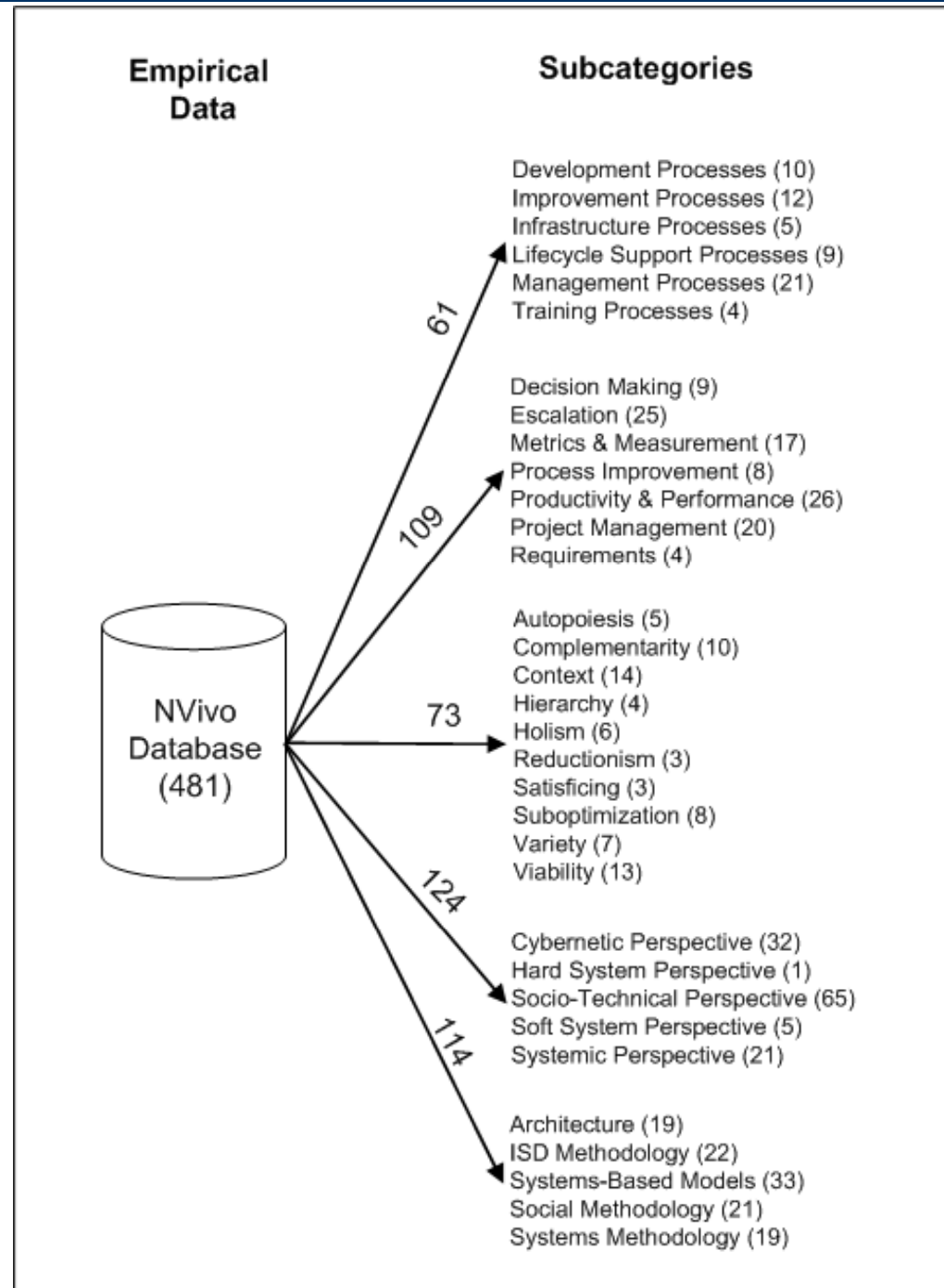


Framework Development

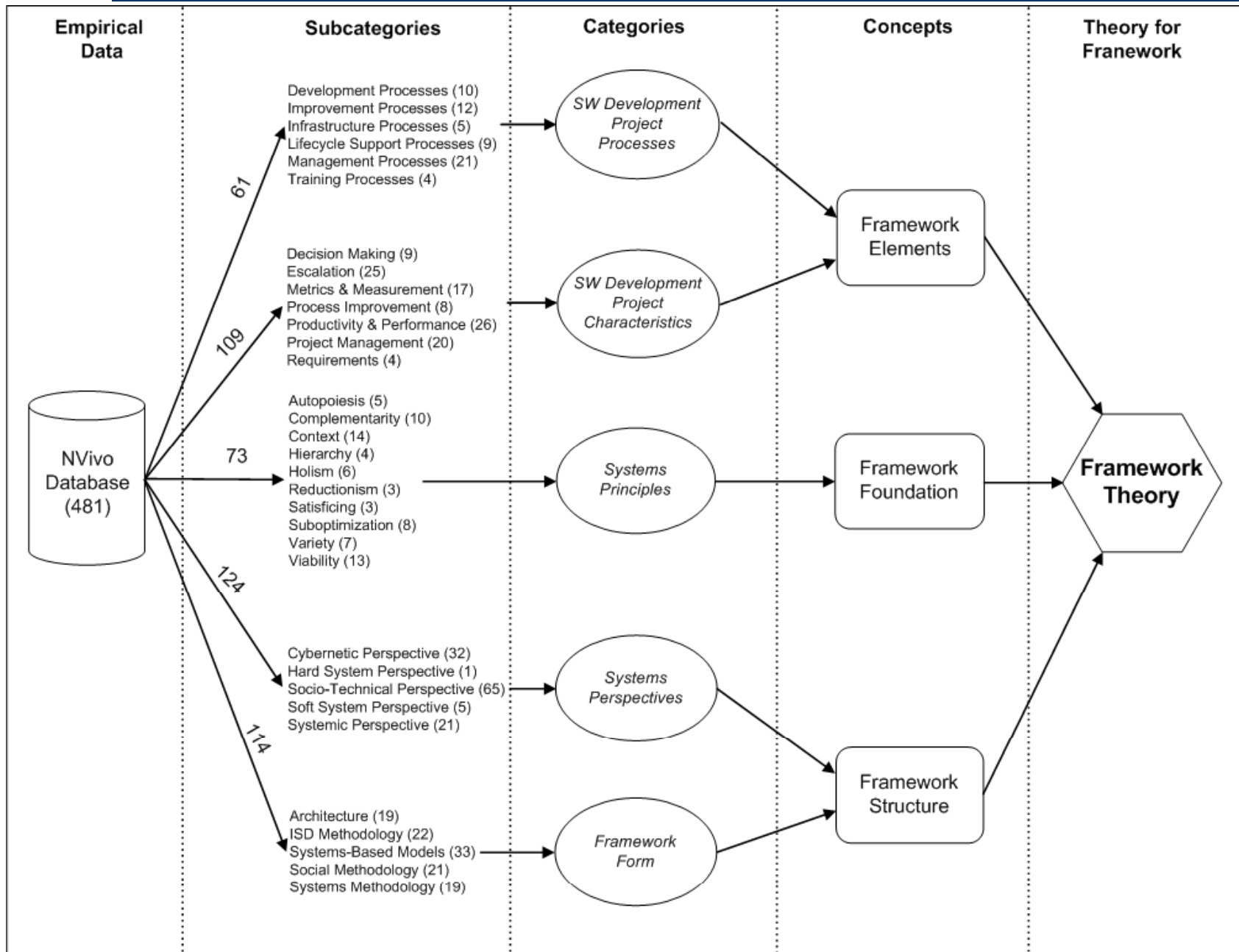
Schema for Literature Review

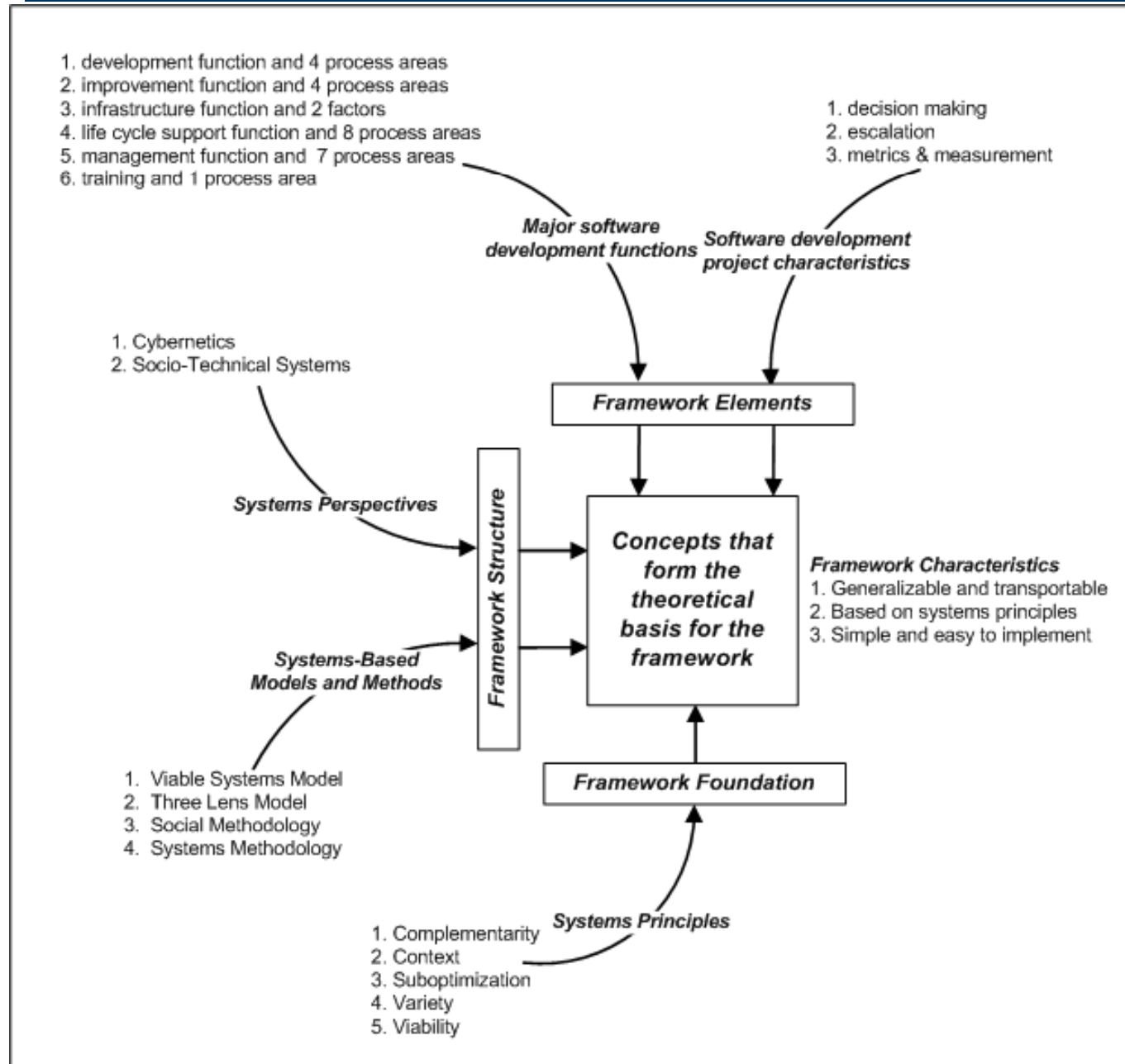




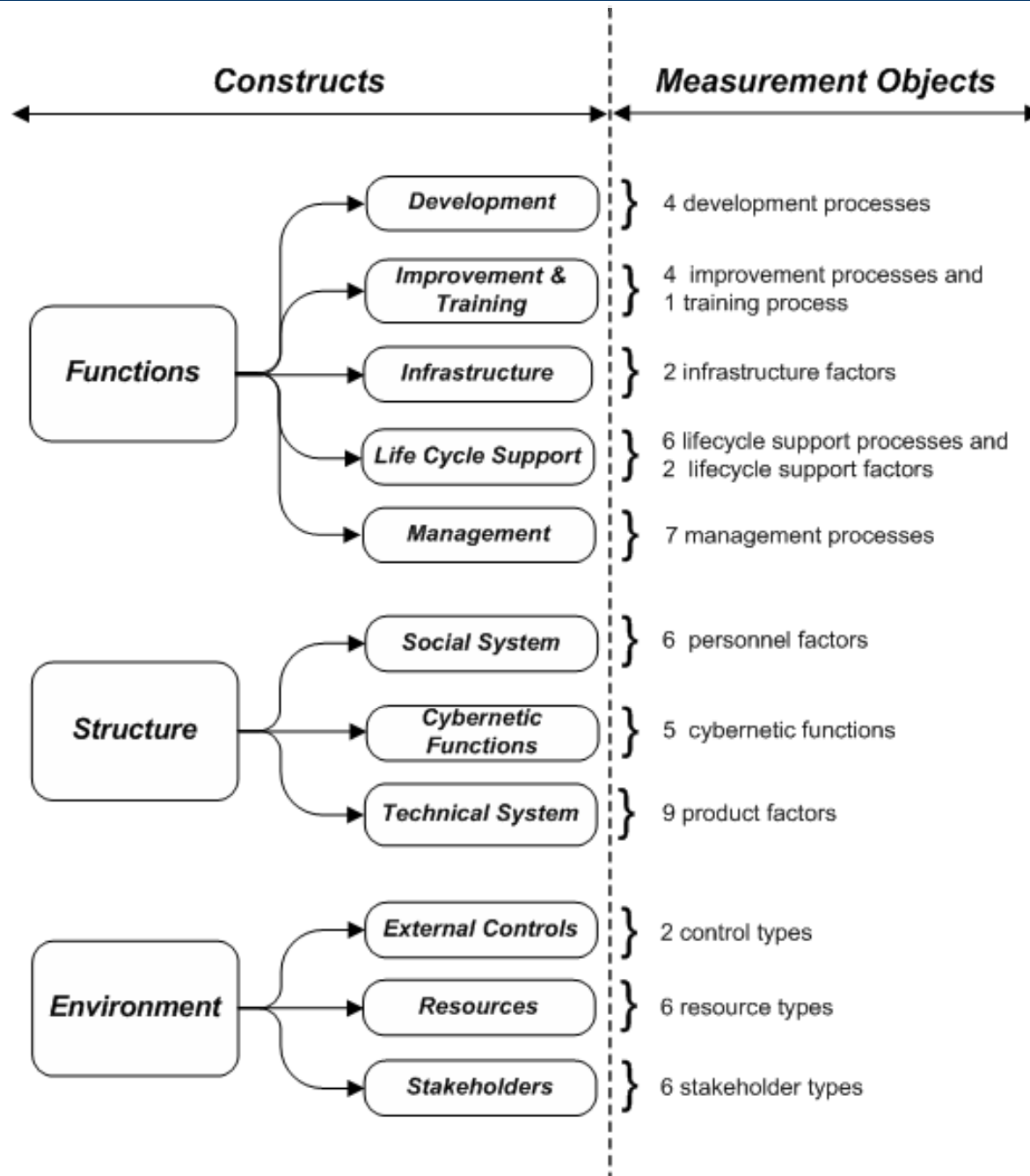


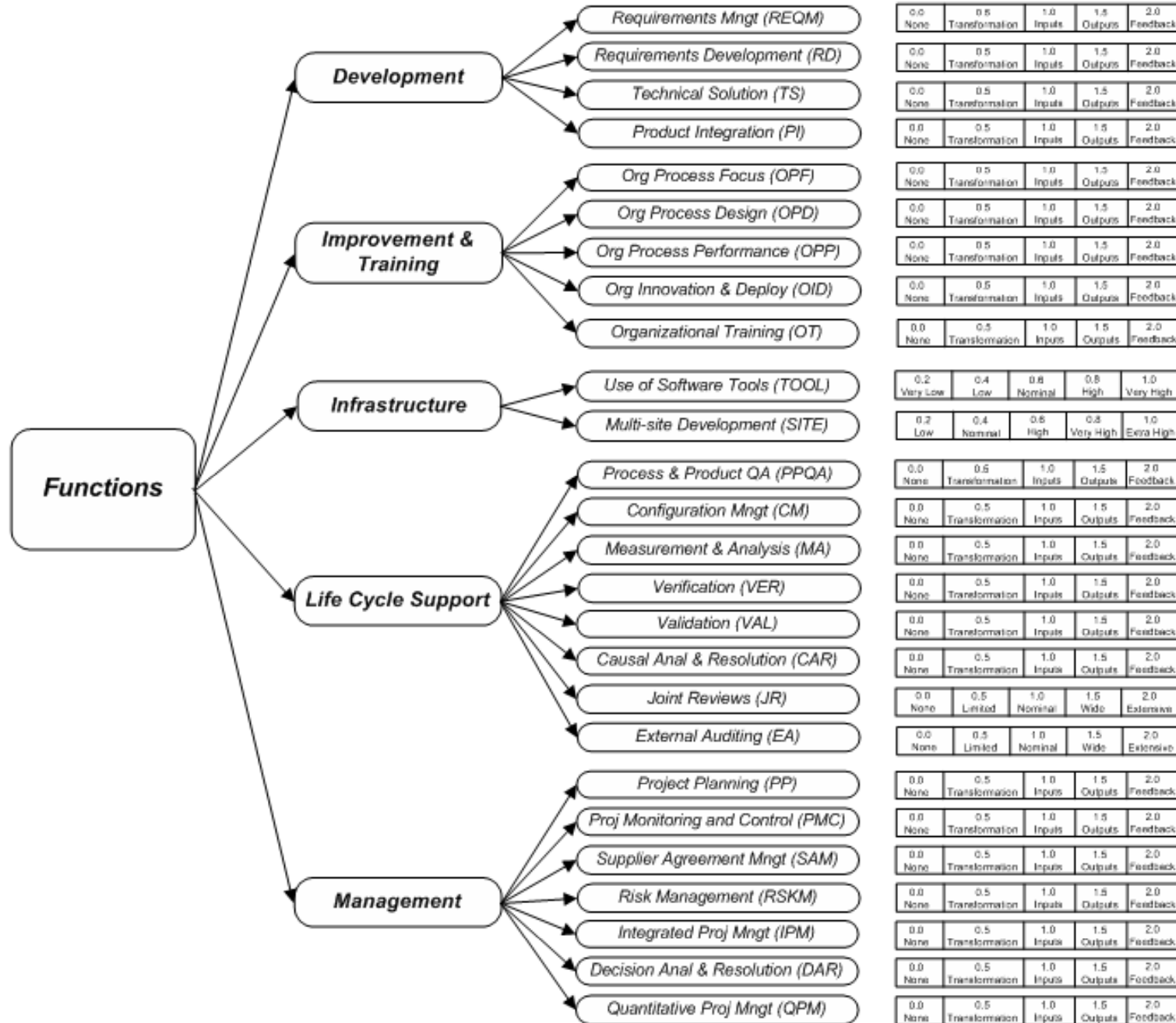
Information Reduction and Relations

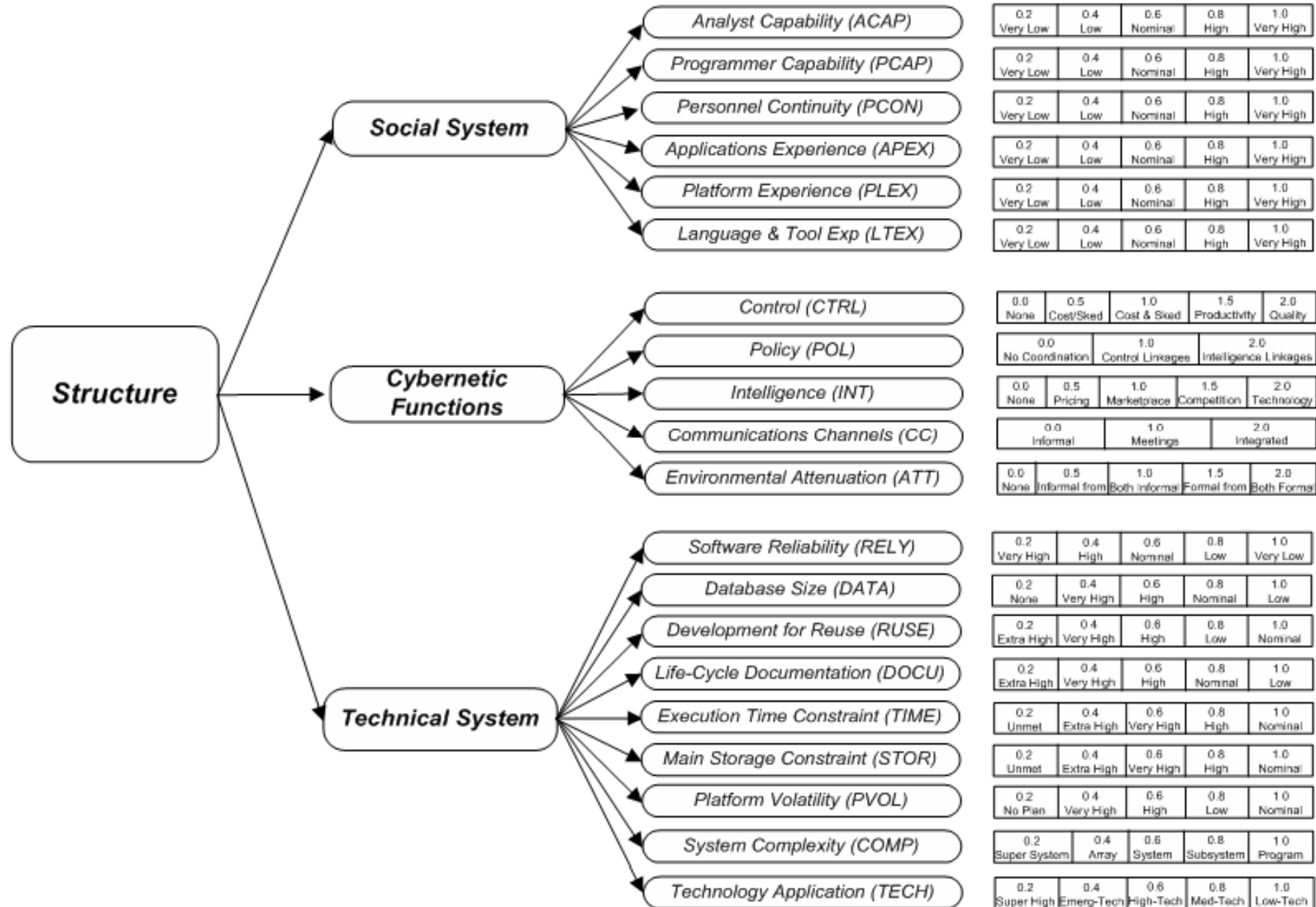


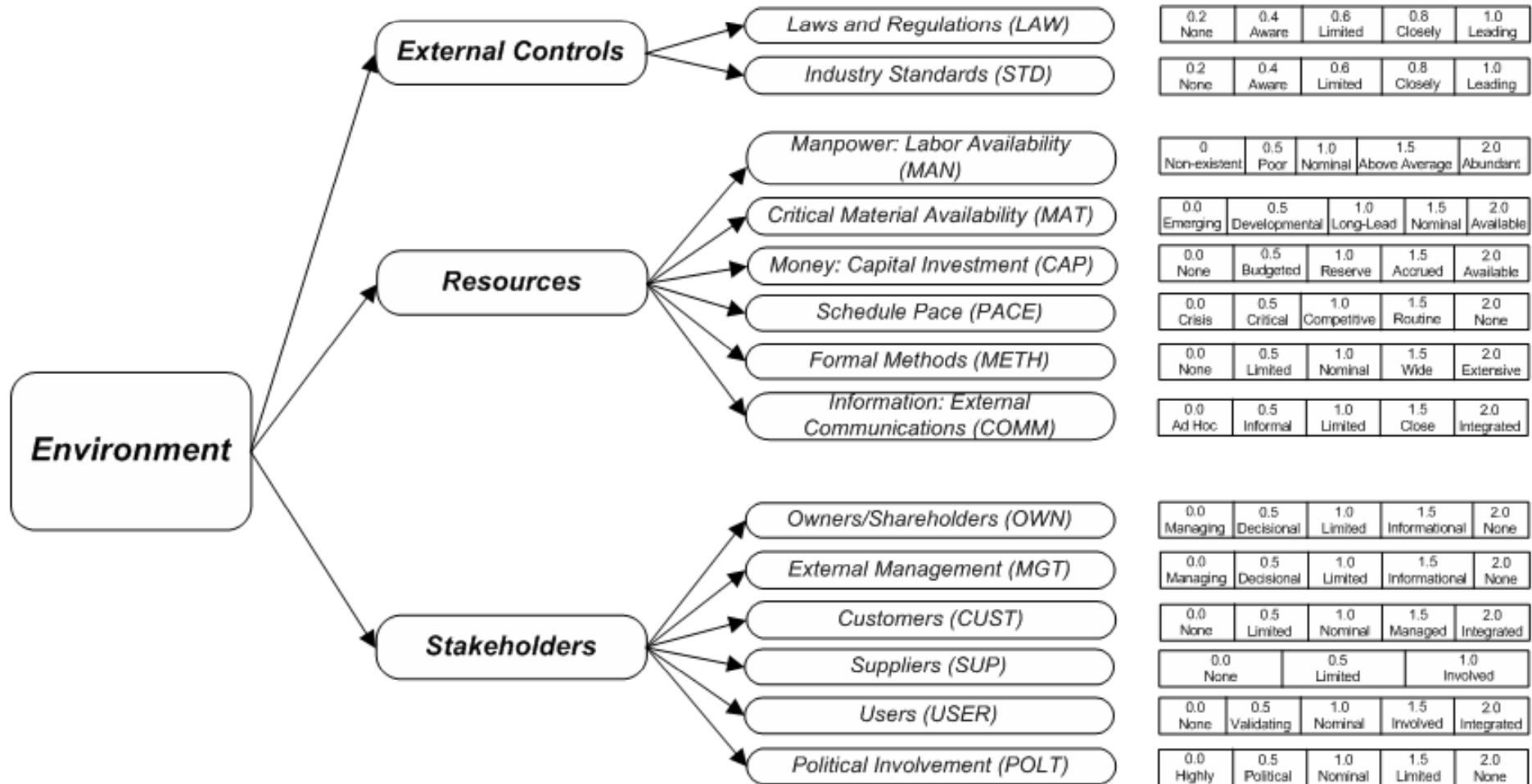


High Level View of Framework







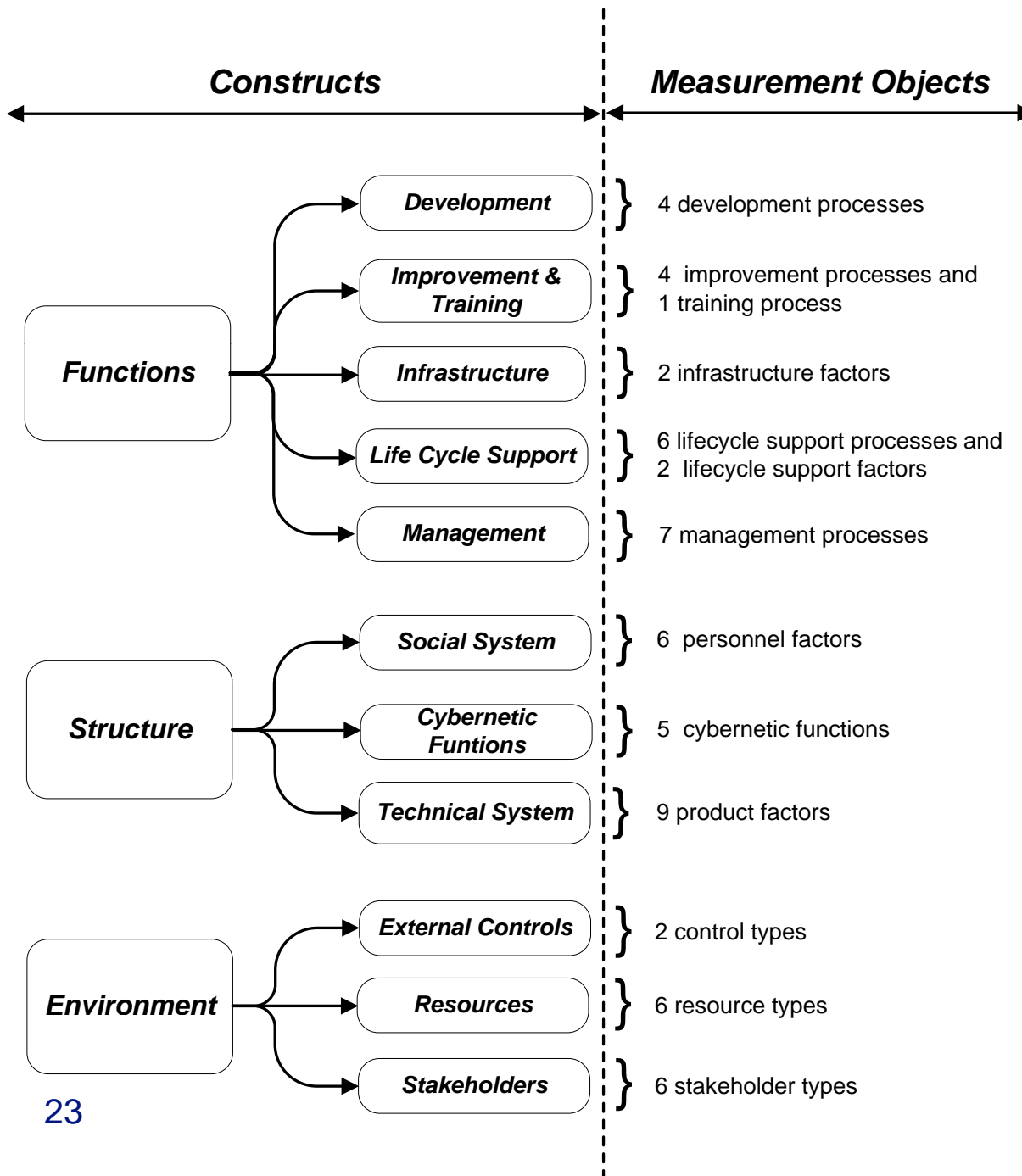




***Framework
Validation
and
Discussion***

Sources for Case Study Validation

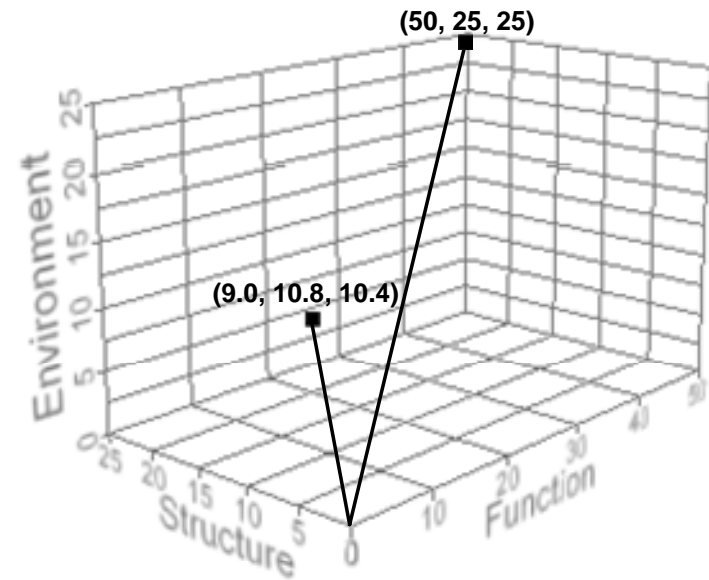
Project Type	Federal Government			Federal with 3-4 year duration	<i>FBI Virtual Case File (VCF) System</i>	
	State Government					
	Local Government		Consortium with 2-3 year duration		<i>Denver International Airport (DIA) Baggage Handling System (BHS)</i>	
	Government-Commercial Consortium					
	Commercial					
		< 1 Year	1-2 Years	2-3 Years	3-4 Years	> 4 Years
		Project Duration				



How does system theory apply to the analysis of software development project performance?

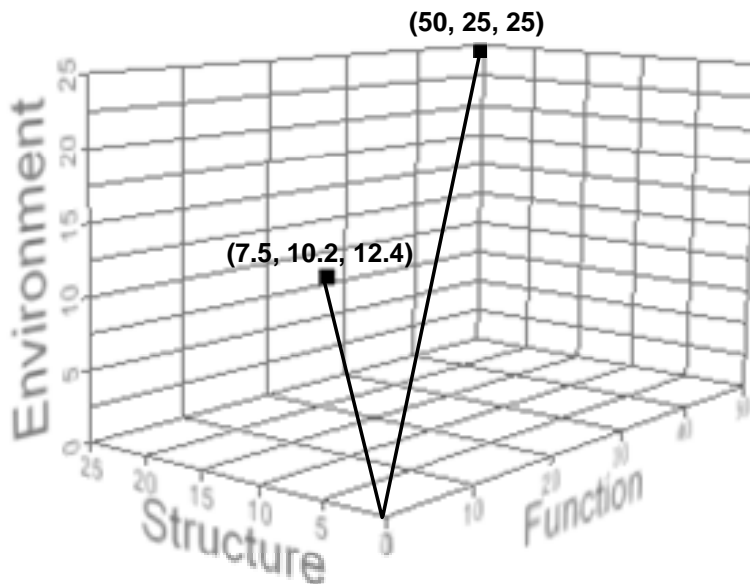
1. *Structure based on principles of variety, viability, and suboptimization.*
2. *Methodological inclusiveness based on the principle of complementarity.*
3. *Inclusion of context requires consideration of the environment.*

What results from the application of a systems-based analysis framework for analyzing performance on a software development project?



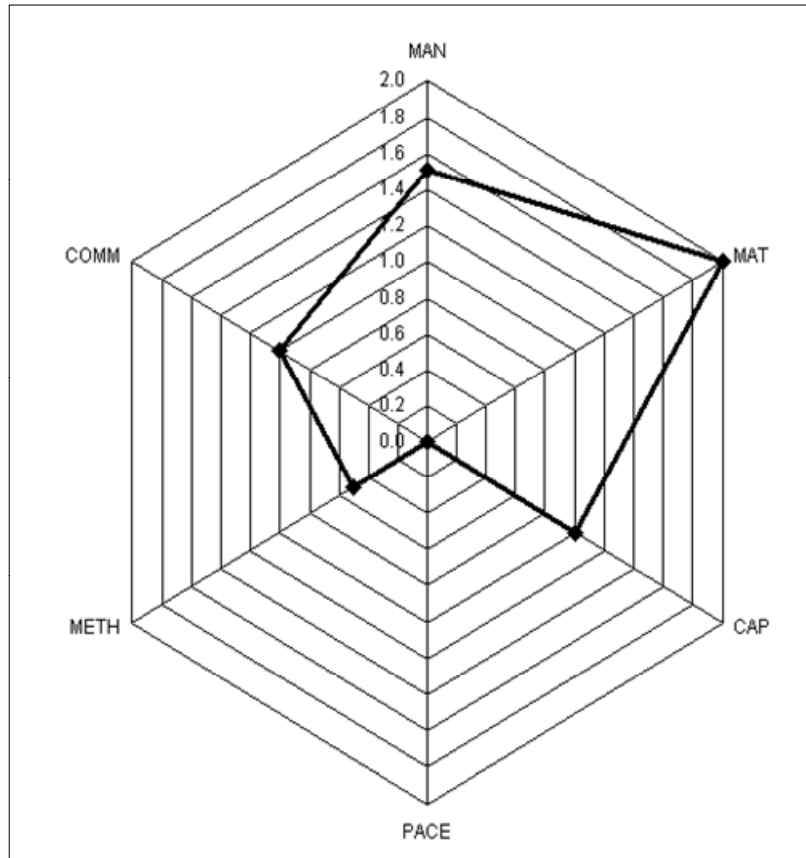
DIA BHS on the FSE Framework Grid

1. *Holistic and systemic basis*
2. *Three dimensional analysis*
3. *Hierarchy provides cascading levels and measurement criteria*

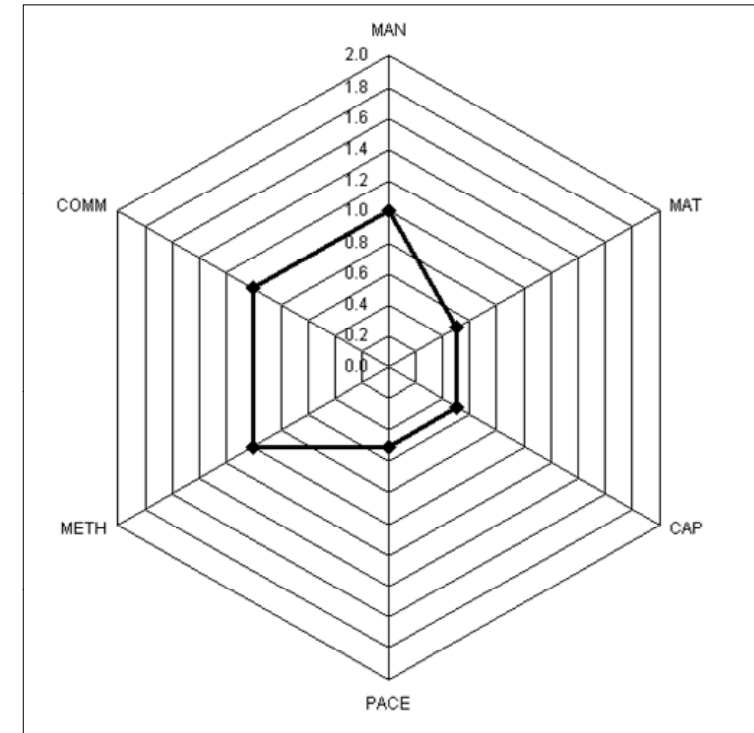


FBI VCF on the FSE Framework Grid

Neither project addressed all of the critical resource issues.



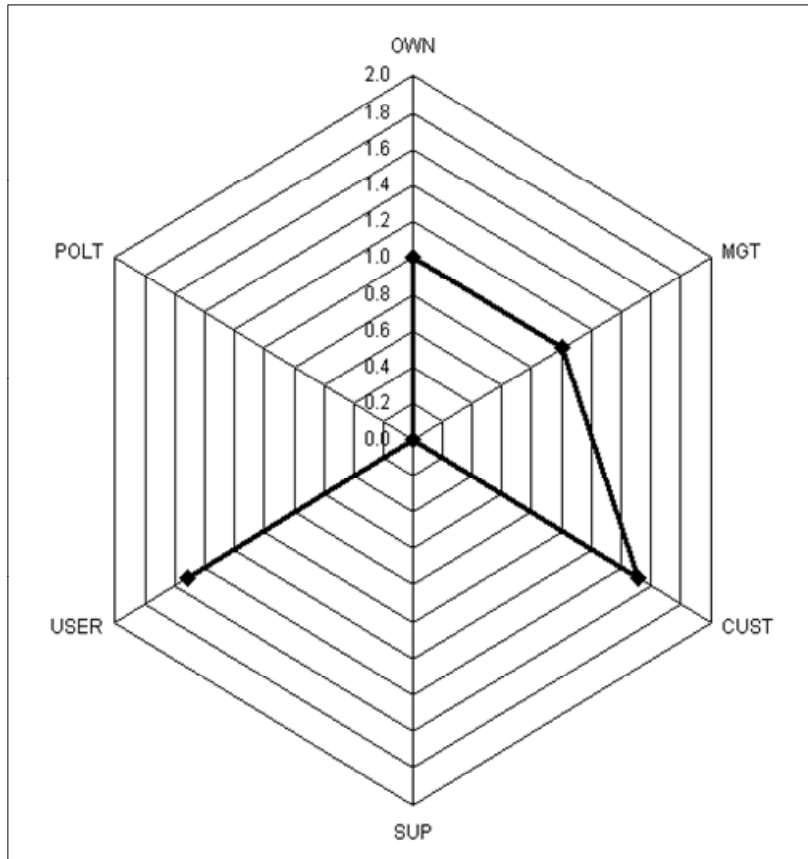
FBI VCF Resources Kiviat Diagram



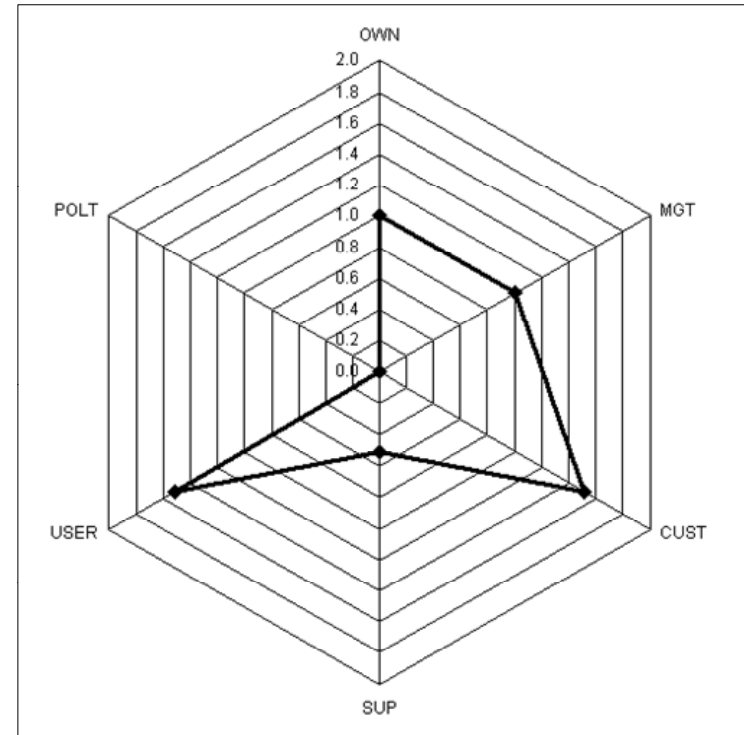
DIA BHS Resources Kiviat Diagram

Project pace and the lack of formal methods both contribute to the low score

Neither project addressed all of the required stakeholder areas.



FBI VCF Stakeholders Kiviat Diagram



DIA BHS Stakeholders Kiviat Diagram

Politics, suppliers, and external management contribute to the low scores

1. *The Function, Structure, Environment (FSE) Framework accurately predicted the problems encountered by each of the real world software development problems in the case studies.*
2. *The FSE Framework provided increasing levels of predictive analysis that may used to focus improvement initiatives:*
 - a. *Point (1) plot in 3D space*
 - b. *Three (3) analysis dimensions*
 - c. *Eleven (11) measurement areas*
 - d. *Sixty (60) measurement objects*

Ability for Generalization of Findings

1. *The FSE framework may be applied to any systems engineering endeavor by modifying the functions element to account for the particular processes being performed.*
2. *The findings in this research may be applied to projects operating in the specific domains*
 - a. *Industry consortium of 2-3 year duration*
 - b. *Federal project of 3-4 years duration*
3. *Two case studies are a start on the generalizability continuum*



Conclusion

- *The framework may be used to evaluate and predict software development project performance.*
 - *a pre-project design and diagnostics tool,*
 - *a customer-based audit tool,*
 - *a project management maintenance tool,*
 - *a post-project analysis tool,*
 - *a project-level improvement analysis tool, and*
 - *a organizational-level strategic improvement tool.*
- *The framework includes measures that address the surrounding environment, the socio-technical system, and the cybernetic functions required to ensure system viability.*

- *Can the FSE Framework be used to predict performance across all types of software development projects?*
- *Are the measurement objects included in the FSE Framework inclusive enough and parsimoniously distributed?*
- *Are the measurement object scales in the FSE framework properly calibrated? Can a better measure be developed?*
- *Can the framework be used to predict the emergence of industry specific patterns for software development?*
- *Can regression analysis be used to find correlations between framework elements in order to further clarify the size of the framework?*

15 minutes

