



Human Competency Assessment for Software Configuration Management

Syahrul Fahmy (University College TATI)

Aziz Deraman (Universiti Malaysia Terengganu)

Jamaiah Yahaya & Abdul Razak Hamdan (Universiti Kebangsaan Malaysia)



OUTLINE

- ❑ Introduction
- ❑ Competency Formulation
- ❑ Assessment Framework
- ❑ Validation
- ❑ Conclusion



INTRODUCTION (1/2)

Software Configuration Management (SCM) is used to ensure timely delivery of software products through a systematic change management process.

SCM R&D activities related to human aspects have focused on the process rather than implementation.

Lack of suitable competency assessment framework for SCM - existing ones focus more on other software engineering areas i.e. software process (PCMM/CMMi) and software quality (SwA).



INTRODUCTION (2/2)

Aim:

- Assessing the competency of software practitioners in SCM.

Challenges:

- Identifying a set of competency criteria.
- Developing a competency assessment framework.



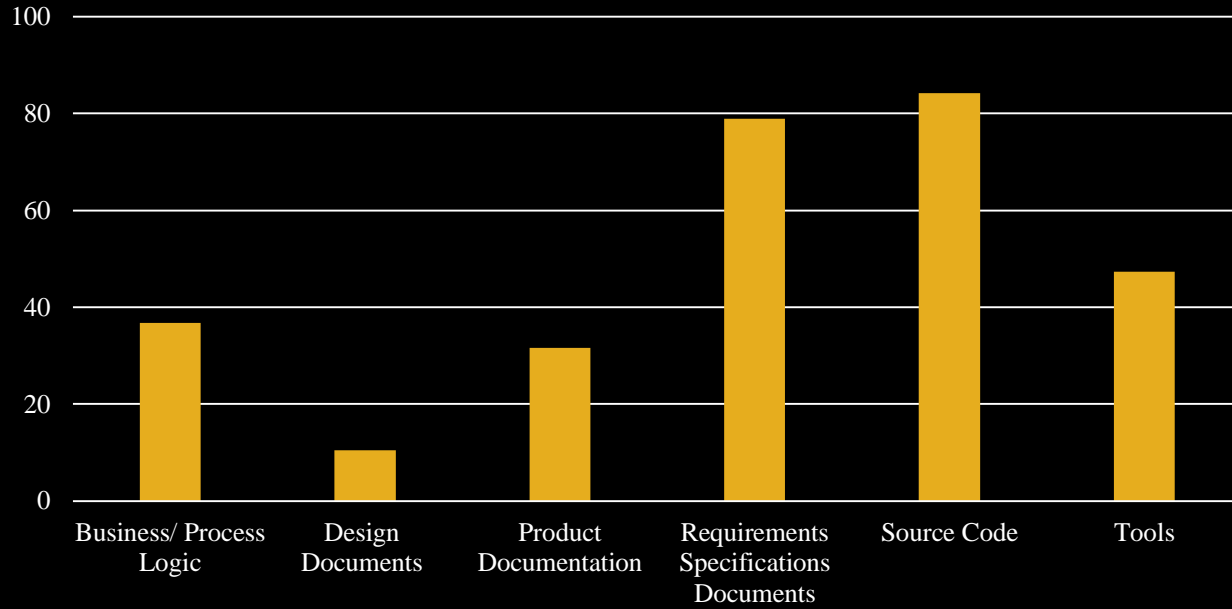
COMPETENCY IDENTIFICATION (1/3)

SCM practice in Malaysia:

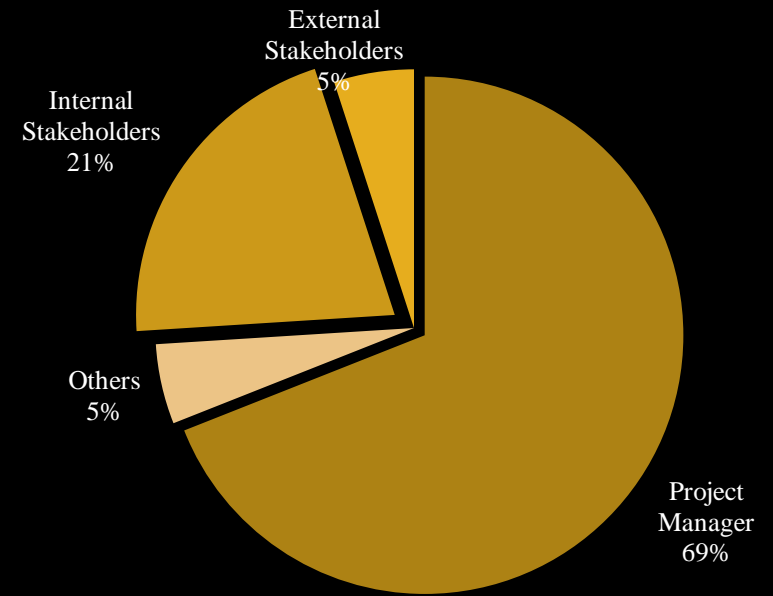
- ❑ Questionnaire (40 questions, 6 sections)
- ❑ Respondents: Software practitioners from the public sector, HEIs, and private sector.
- ❑ Results - 4 main components of SCM (*People, Process, Tools, Documentation*).



Types of Controlled Artefacts in Software Projects



Change Requests Processing in Software Projects



COMPETENCY IDENTIFICATION (2/3)

SCM success factors:

- ❑ 9 interview sessions (open-ended, unstructured).
- ❑ Respondents: 12 software practitioners from 5 HEIs.
- ❑ Results: List of factors that promote/ inhibit SCM implementation.



SCM SUCCESS FACTORS	HIGHER EDUCATION INSTITUTION					
	GROUP 1	GROUP 2	GROUP 3	GROUP 4	GROUP 5	GROUP 6
Clear Organization Direction	✓	✓	✓	✓		✓
Clear Requirements			✓			
Conformance to Directives	✓	✓	✓	✓	✓	✓
Consultant for SCM Implementation		✓		✓	✓	
Dedicated Configuration Manager	✓	✓	✓	✓	✓	✓
Dedicated Development and Maintenance Teams	✓		✓			
Easy to Use Tools		✓	✓		✓	
Efficient Communication Channels	✓	✓	✓	✓	✓	✓
Foundation of Change Control Board		✓	✓		✓	✓
High Morale of Staff			✓			
Infrastructure Support	✓	✓	✓			
Management's Commitment to SCM	✓	✓	✓		✓	✓
SCM Awareness	✓		✓			
Tools to Support SCM Implementation	✓	✓	✓		✓	
Training	✓	✓	✓	✓	✓	✓
Training for Tools Utilization	✓	✓	✓		✓	✓

ISSUES	HIGHER EDUCATION INSTITUTION					
	GROUP 1	GROUP 2	GROUP 3	GROUP 4	GROUP 5	GROUP 6
PEOPLE						
Abiding Procedures for Change Request				✓	✓	✓
Additional Task Assignments	✓				✓	
Conformance to Directives	✓	✓	✓	✓	✓	✓
Encumbering Key Performance Indicator	✓	✓	✓		✓	
Ineffective Communication	✓	✓	✓	✓	✓	✓
Management's Commitment	✓	✓	✓		✓	
Work Bureaucracy	✓	✓			✓	
PROCESS						
Ambiguous Requirements	✓	✓		✓		✓
Frequent Restructuring Exercise	✓	✓	✓			
Inefficient Change Request Procedure	✓	✓			✓	✓
Infrastructure Support	✓				✓	✓
Lack of Dedicated SCM Manager		✓				
Manual Change Request Process			✓	✓	✓	✓
Ineffective Communication	✓	✓	✓	✓	✓	✓
Work Bureaucracy	✓	✓			✓	
TOOLS						
Target Platform (maintenance)	✓				✓	
Target Platform (testing/implementation)	✓	✓				
Technological Change	✓	✓		✓	✓	
Tools Suitability	✓	✓			✓	
Tools Utilization	✓				✓	
Vendor Support				✓	✓	
DOCUMENTATION						
Lack of Dedicated SCM Team	✓	✓			✓	
Ineffective Communication	✓	✓	✓	✓	✓	✓
Lack of Understanding (SCM)	✓			✓		
Poor Documentation		✓	✓		✓	
Vague Organization Direction	✓		✓			
Responsibilities of SCM Mgmt/ Implementation		✓	✓	✓		



COMPETENCY FORMULATION (3/3)

Competency criteria:

□ Survey results:

➤ Filter out non SCM-specific factors

➤ Combine similar factors

❖ 10 main factors specific to SCM

❖ Represented by 5 competency criteria
(*Knowledge, Experience, Professionalism,
Training, SCM Skills*)



SCM ISSUES AND SUCCESS FACTORS	COMPETENCY				
	Qualification	Experience	Professionalism	Training	SCM Skills
Awareness	✓	✓	✓		
Change Request Procedure	✓	✓	✓		✓
Communication		✓	✓		
Competency	✓	✓	✓	✓	✓
Documentation	✓	✓	✓		✓
Infrastructure Support	✓	✓		✓	✓
Management's Commitment	✓		✓		
Requirements	✓	✓	✓	✓	
Technological Change	✓	✓	✓	✓	
Tools	✓	✓	✓	✓	✓

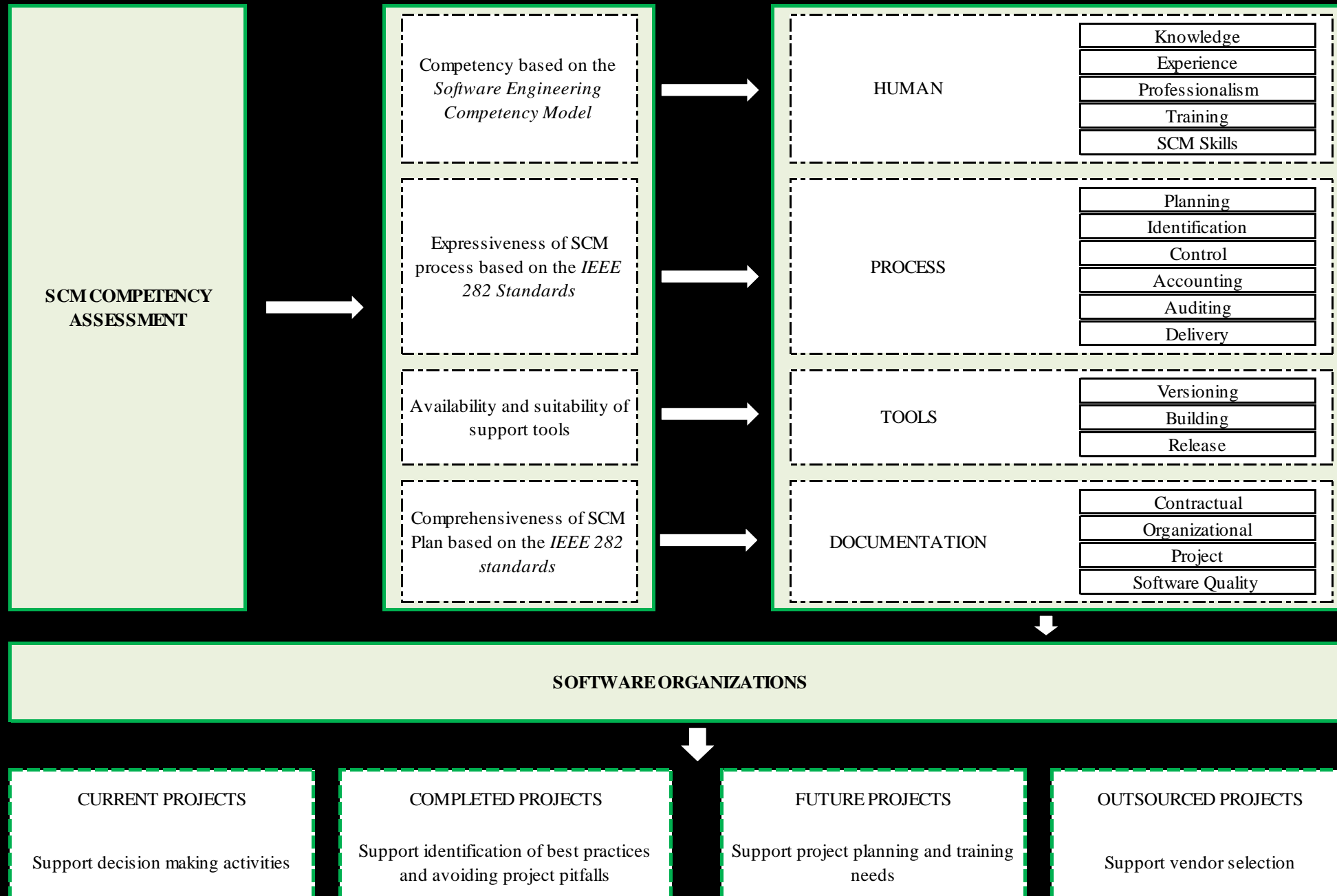


FRAMEWORK DEVELOPMENT (1/1)

Refinement of criteria and identification of metrics:

- ❑ Software Engineering Competency Model
- ❑ IEEE 828
- ❑ Software Engineering Code of Ethics and Professional Practice
- ❑ Malaysian Qualifications Framework
- ❑ Malaysian Qualification Agency Program Standards for Computing





VALIDATION (1/2)

Subject Matter Expert (SME) reviews

- ❑ Semi-structured interview and questionnaire
- ❑ Respondents: international software practitioners (2) public sector (2), HEIs (4), and the private sector (3).



	Competency contributes to successful SCM	Competency is associated with: Education	Competency is associated with: Experience	Competency is associated with: Professionalism and Teamwork	Competency is associated with: Training	Competency is associated with: SCM Skills
SME 1	5	4	5	5	3	3
SME 2	4	4	4	4	4	4
SME 3	5	4	4	5	3	4
SME 4	5	5	5	5	3	3
SME 5	4	4	4	4	3	4
SME 6	5	4	5	4	4	4
SME 7	5	4	4	5	4	5
SME 8	5	4	5	5	5	4
SME 9	5	4	5	5	3	4
SME 10	5	4	5	5	4	5
SME 11	4	4	5	4	3	5
AVERAGE	4.7	4.1	4.6	4.6	3.5	4.1

	SCM assessment would benefit new projects	SCM assessment would benefit existing projects	SCM assessment would benefit completed projects	SCM assessment would benefit outsourced projects
SME 1	4	4	5	4
SME 2	4	4	3	4
SME 3	4	4	3	4
SME 4	4	5	4	4
SME 5	4	4	5	4
SME 6	4	4	3	4
SME 7	5	5	4	4
SME 8	5	5	4	5
SME 9	5	5	4	4
SME 10	4	4	3	4
SME 11	4	3	4	4
AVERAGE	4.3	4.3	3.8	4.1



VALIDATION (2/2)

Results confirmed:

- SCM components (*Human, Process, Tools, Documentation*)
- Competency criteria (*Knowledge, Experience, Proficiency, Training, Professionalism*)
- Competency assessment framework in different project types (*new, existing, completed, outsourced*).



CONCLUSION

Shed light to the roles played by human (competency) in SCM.

Identified a set of competency criteria for SCM, through 2 surveys.

Developed a competency assessment framework based on international standards and best practices.

Validated by means of SMEs and case studies at 5 different organizations.



THANK YOU!



WE ARE IN THIS TOGETHER.

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