

An Approach to Reconcile the Agile and CMMI Contexts in Product Line Development

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Agenda

- **Motivation**
- **Study phases**
 - SPL Processes
 - Process maturity in SPL
 - Agile methods in SPL
- **Common point between agile and CMMI context**
- **Agenda research**
- **Conclusions**

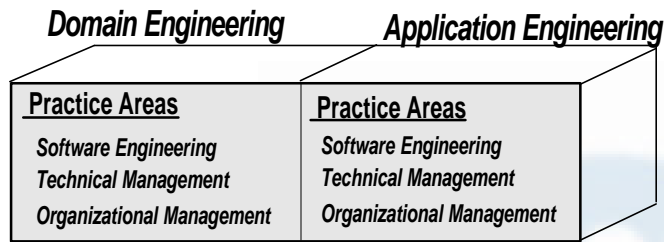
Motivation

- **Balancing between two main software engineering contexts**
 - Capability Maturity Models (CMMs)
 - Contains the essential elements of effective and disciplined software processes.
 - In the capability context, the process areas refer to “what to do” rather than “how to do it”.
 - Agile Methods
 - agile approaches have practices based on time-boxed iteration, evolutionary development, adaptive planning, evolutionary delivery, and inclusion of other values and practices that encourage agility in software development context
 - Suggests the best practices to specify “how” the software development could be driven to obtain agility
- **Software Product Line (hereafter, SPL) are addressed to provide customizable products at reasonable costs to satisfy the needs of the market.**

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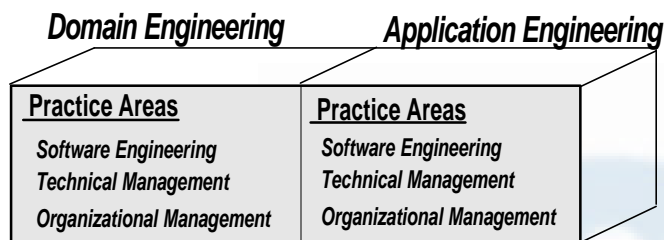
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SPL Processes



- **Domain engineering:** *are the set of processes specified to define the commonality and the variability of the SPL.*
- **Application engineering:** *these sets of processes are responsible of reusing the domain components and the artifacts.*

SPL Processes (2)



- **Software engineering:** *embrace all technical activities necessary to create and developing products.*
- **Technical Management:** *represents all the management activities that are necessary to support the right way to develop the software engineering activities*
- **Organizational Management:** *its responsibility is addressing the organization around the SPL processes coordinating the management activities*

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Process maturity in SPL

- CMMs models in SPL life-cycle could help us achieving a strategic discipline to address the processes improvement in SPL

Product Line Practice Areas	CMMI Process Areas
Software Engineering Practice Areas	
Component Development	Technical Solution
COTS Utilization	Supplier Agreement Management
Software System Integration	Product Integration
Understanding Relevant Domains	(none)
Technical Management Practice Areas	
Data Collection, Metrics, and Tracking	Measurement and Analysis/ Project Monitoring and Control/Integrated Project Management
Make/Buy/Mine/Commission Analysis	Decision Analysis and Resolution/ Supplier Agreement Management
Organizational Management Practice Areas	
Developing an Acquisition Strategy	Supplier Agreement Management
Market Analysis	(none)
Organizational Risk Management	Risk Management
Structuring the organization	(none)

Taken from [Clements, P., and Northrop, L.]

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Agile methods in SPL

Product Line Practice Areas	Agile Principles											
	A	B	C	D	E	F	G	H	I	J	K	L
Software Engineering	+	+	+	+	+	+	+	+	+	—	+	+
Technical Management	+	+	+	+	+	—	+	+	+	—	+	+
Organizational Management	+	+	0	+	+	+	0	+	+	—	—	+

- A. ***Our highest priority is to satisfy the customer through early and continuous delivery***
 - “—” in SPL there is not a unique customer to be satisfied,
 - “+” but is important that the SPL can be driven to satisfy the multiple variability of grouped customers.
- B. ***Welcome changing requirements, even late in development. Agile processes harness change for the customer’s competitive advantage***
 - “—” in some practice areas the requirements are freezing, e.g. in the core asset design,
 - “+” but the architecture must be flexible to support the changing requirements of grouped customers to develop a product-specific

Agile methods in SPL (2)

Product Line Practice Areas	Agile Principles											
	A	B	C	D	E	F	G	H	I	J	K	L
Software Engineering	+	+	+	+	+	+	+	+	+	-	+	+
Technical Management	+	+	+	+	+	-	+	+	+	-	+	+
Organizational Management	+	+	0	+	+	+	0	+	+	-	-	+

- C. ***Deliver working software frequently, from a couple of weeks to a couple of months, with a preference to the shorter time scale***
- “0” this principle focuses in the software development,
 - “+” although some practice areas need to develop software for a successful integration of COTS components (e.g., *glue code*) and to deliver specific software products.
- D. ***Business people and developers must work together daily throughout the project***
- “+” many disciplines must work together in a SPL, to obtain a knowledge shared between the teams,
 - “-” but the geographic distribution of SPL teams can avoid a fluid communication.

Agile methods in SPL (3)

Product Line Practice Areas	Agile Principles											
	A	B	C	D	E	F	G	H	I	J	K	L
Software Engineering	+	+	+	+	+	+	+	+	+	-	+	+
Technical Management	+	+	+	+	+	-	+	+	+	-	+	+
Organizational Management	+	+	0	+	+	+	0	+	+	-	-	+

- E. ***Build projects around motivated individuals. Give them the environment and support they need, and trust them to get the job done***
- “-” the SPL is market-driven, for this reason, it isn’t easy to embrace individual expectations of specific customer to build a SPL project,
 - “+” although all practice areas needs well formed teams to achieve the goals project.
- F. ***The most efficient and effective method of conveying information to and within a development team is face-to face conversation***
- “-” in SPL it’s common that different teams works in separate places,
 - “+” but for the successful develop of practice areas it is necessary to have into account flow communication.

Agile methods in SPL (4)

Product Line Practice Areas	Agile Principles											
	A	B	C	D	E	F	G	H	I	J	K	L
Software Engineering	+	+	+	+	+	+	+	+	+	—	+	+
Technical Management	+	—	+	+	—	—	+	+	+	—	+	+
Organizational Management	+	+	0	+	+	+	0	+	+	—	—	+

G. *Working software is the primary measure of progress*

- “0” this principle focuses in software development,
- “+” although in SPL, delivering software for product-specific it is necessary,
- “—” but maybe, would be necessary using others measures in specifics practice areas to obtain the project progress.

H. *Agile processes promote sustainable development. The sponsors, developers, and users should be able to maintain a constant pace indefinitely*

- “+” in SPL context many disciplines and roles have to communicate between them.

Agile methods in SPL (5)

Product Line Practice Areas	Agile Principles											
	A	B	C	D	E	F	G	H	I	J	K	L
Software Engineering	+	+	+	+	+	+	+	+	+	—	+	+
Technical Management	+	+	+	+	+	—	+	+	+	—	+	+
Organizational Management	+	+	0	+	+	+	0	+	+	—	—	+

I. *Continuous attention to technical excellence and good design enhances agility*

- “+” the technical excellence in SPL process helps to achieve well-defined processes for the domain engineering and application engineering.

J. *Simplicity--the art of maximizing the amount of work not done--is essential*

- “—” the SPL process embraces complex activities for this reason it is difficult reconciling simplicity with the practice areas.

Agile methods in SPL (6)

Product Line Practice Areas	Agile Principles											
	A	B	C	D	E	F	G	H	I	J	K	L
Software Engineering	+	+	+	+	+	+	+	+	+	-	+	+
Technical Management	+	+	+	+	+	-	+	+	+	-	+	+
Organizational Management	+	+	0	+	+	+	0	+	+	-	-	+

- K. *The best architectures, requirements, and designs emerge from self-organizing teams*
- “-” a good definition of SPL structure depends on a lot of factors behind the self-organizing teams,
 - “+” but practice areas need well-formed teams to define the main aspects to develop the SPL successful.
- L. *At regular intervals, the team reflects on how to become more effective, then tunes and adjusts its behavior accordingly*
- “+” the SPL involves different disciplines that need shared knowledge, the regular reflections can improve the behaviour of SPL teams,
 - “-” but is not clear that the regular reflections can be applied over all SPL process.

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Common point between agile and CMMI context



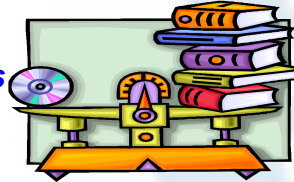
CMMI-AM



Agile Methods

**Adress SPL processes
WHAT**

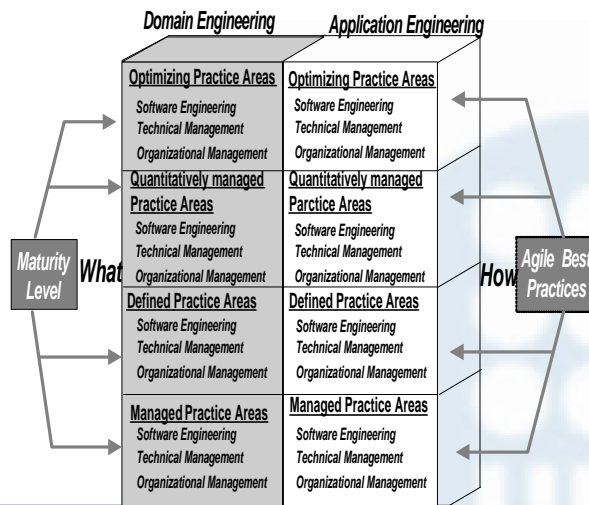
**Best Practices
HOW**



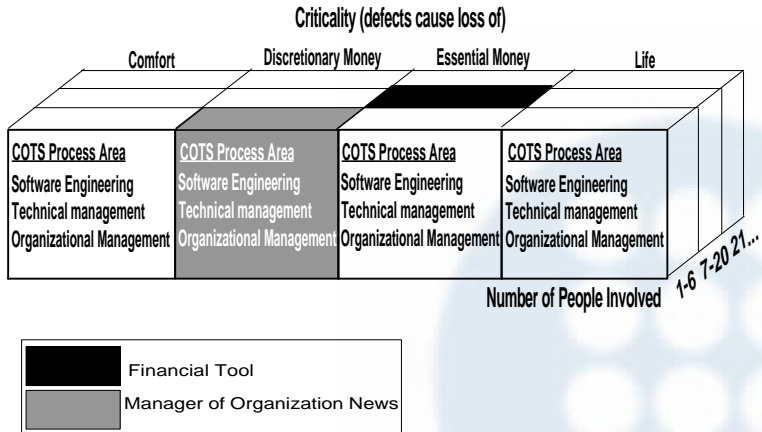
Starting Point

Agile – Discipline

Common point between agile and CMMI context (2)



Common point between agile and CMMI context (3)



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Agenda research

- **Design a new SPL development method based in agile principles and CMMI foundations, highly customizable to particular types of SPL projects, where we take advantage of two contexts.**
- **Pending to make real validation planning**

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Conclusions

- SPL development require activities and roles to apply coordination, discipline, and commonality, besides it is necessary to share the knowledge generated among different disciplines, with the purpose of creating a family of products that satisfies the necessities of grouped customers.
- An starting point of reconciliation and balance among the necessary discipline required to develop a process SPL and the agility that we are able to provide to develop a SPL, it is possible.
- Both contexts can be applied over SPL development in a suitable or unsuitable way, having into account the necessity of ceremony or formality that are required in SPL processes, helping us to define *what we can do* and *how we can do it* to develop a SPL satisfactorily.