Guideline for Sizing Agile Projects with COSMIC

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IWSM-Metrikon-Mensura 2010
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Pyxis Technologies: 10 years already!

80 employees
3 CSM francophone trainers
1,500++ trained ScrumMasters

1st Canadian company to partner with Scrum.org (Ken Schwaber)

• To offer “Professional Scrum Developer” training course in Canada and France
Engineering: At a glance

The first Italian ICT player
- more than 730 M/€ revenues
- 1000 clients
- 6,300 IT specialists

<table>
<thead>
<tr>
<th>Research and Development</th>
<th>PA &amp; HC</th>
<th>Finance</th>
<th>Industry</th>
<th>TELCO</th>
<th>Utilities</th>
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<tr>
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Managed Operations
- ERP
- IT Security
- Plant Management System
- ECM
- Broadband & Media

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www.eng.it
Agile project requirements and measures

Measurement context of Agile projects

Applying COSMIC in Agile projects

Frequent resistance behaviours from Agile team members to FSM

Case study results

Conclusion & perspectives

Q & A
A bit of humour …

EXTREME PROGRAMMING
I CAN'T GIVE YOU ALL OF THESE FEATURES IN THE FIRST VERSION.

AND EACH FEATURE NEEDS TO HAVE WHAT WE CALL A "USER STORY."

OKAY, HERE'S A STORY: YOU GIVE ME ALL OF MY FEATURES OR I'LL RUIN YOUR LIFE.

WE'RE GOING TO TRY SOMETHING CALLED AGILE PROGRAMMING.

THAT MEANS NO MORE PLANNING AND NO MORE DOCUMENTATION. JUST START WRITING CODE AND COMPLAINING.

I'M GLAD IT HAS A NAME. THAT WAS YOUR TRAINING.

WE NEED THREE MORE PROGRAMMERS.

USE AGILE PROGRAMMING METHODS.

AGILE PROGRAMMING DOESN'T JUST MEAN DOING MORE WORK WITH FEWER PEOPLE.

FIND ME SOME WORDS THAT DON'T MEAN THAT AND ASK AGAIN.
The Agile Manifesto (2001): Values

- Individuals and interactions over processes and tools
- Working software over comprehensive documentation
- Customer collaboration over contract negotiation
- Responding to change over following a plan

That is, while there is value in the items on the right, we value the items on the left more.

Kent Beck  
Mike Beedle  
Arie van Bennekum  
Alistair Cockburn  
Ward Cunningham  
Martin Fowler

James Grenning  
Jim Highsmith  
Andrew Hunt  
Ron Jeffries  
Jon Kern  
Brian Marick

Robert C. Martin  
Steve Mellor  
Ken Schwaber  
Jeff Sutherland  
Dave Thomas
Two categories of Agile methods

**Agile Project Management (APM)**
- Kanban
- DSDM
- SCRUM
- FDD

**Agile Software Development (ASD)**
- TDD
- Crystal Clear
- XP
- DDD
Documenting requirements

Could take any form:

- Use cases
- IEEE Std-830
- User interface mock-ups
- Data models
- In-house methods

But User Stories (US) are popular

As a <user type>,
I want to <feature or functionality>
So that <value or expected benefit>
User Story and COSMIC: an example

#9  Search books by title

As a library_user, I want to search for books by title, with speed and ease-of-use, so that I can find all books with similar titles.

Library_user (LB)

! Request search by title

Entry 1  LB.Book_Title

Read 1  Book

Search Books by Title

LB.Book_List 1  eXit

Sub-totals:  E  +  X  +  R  +  W  =  Functional size:

1  +  1  +  1  +  0  =  3  cfp

List of tests on back: FUR & NFR

Source: Grant Rule, Sizing User Stories with the COSMIC FSM, http://www.cosmicon.com
Current measurement practices of Agile projects (1 of 2)

Backlog items relative size and complexity (in USP)

- Benchmarking

Velocity (in USP/iteration)

- Estimation
Current measurement practices of Agile projects (2 of 2)

Task effort (in hours)

Burndown

User Story | 5 USP
--- | ---
Task #1 | 3 hrs
Task #2 | 15 hrs
Task #3 | 10 hrs
Task #4 | 12 hrs
Task #6 | 4 hrs
... | ...
Task #n | 2 hrs

Tracking actual cost

Estimated only!

| Days | Remaining
<table>
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<tbody>
<tr>
<td>1</td>
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</table>

Ideal
Remaining

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Upfront and total project estimation

Software (Product) Requirements

Functional

Non Functional

# USP

Known velocity?
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Reasons for measuring Agile projects with COSMIC

- Estimation
- Benchmarking
- Process improvement
- Governance
  - Alignment
  - Change
  - Quality
  - Compliance
  - Service
  - Cost
What is included in your measurement scope?

- Project start date
- Project end date
- Project end date
- Project end date
- ∆ Size
- ∆ Size
- ∆ Size
- ∆ Size
- ∆ Size
What is included in your measurement scope?

Application A
- Lt.1
- Lt.2
- Lt.3
- Lt.4
- Lt.5
- Lt.6
- Lt.7
- Lt.8
- R 1.4
- R 2.0
- R 2.1
- R 2.2

Application B
- Lt.1
- Lt.2
- Lt.3
- Lt.4
- Lt.5
- Lt.6
- Lt.7
- Lt.8
- R 4.0
- R 4.1

Application C
- Lt.1
- Lt.2
- Lt.3
- Lt.4
- Lt.5
- Lt.6
- Lt.7
- Lt.8
- R 6.4
- R 7.0
- R 7.1

△ Size
What is included in your effort?

<table>
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<tr>
<th>SW</th>
<th>Manage</th>
<th>Analyze</th>
<th>Design</th>
<th>Build</th>
<th>Test</th>
<th>Deploy</th>
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<tr>
<td>FUR</td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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</tr>
</tbody>
</table>

Scope of COSMIC

Black box

Scope of effort

Parameterization, usability, etc.

White & grey box

Nominal unit cost = effort / size $\rightarrow$ NFR impact unit cost
Required inputs

\( \Delta \text{Size} \)
- Added
- Modified
- Deleted

Iteration
- Purpose
  - Iteration planning and estimation
  - Release planning and estimation

Release
- Process improvement
- Governance on maintenance cost

Application
- Effort
  - Upfront estimation
  - Benchmarking
  - All activities your process requires to deliver the scope of measured FUR and related NFR

Project
Trap to avoid: bad Agility practices

✖ Cumulating technical debt

- Anything included in the “DONE” definition but not performed within the same iteration as its related functionality:
  - Bugs
  - Documentation
  - Specific test types
  - Etc.

- Often resulting from bad/inadequate engineering practices

Size = 0 → Impact on unit cost!
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Current satisfactory practices

- USP can stimulate a richness of discussion and collaboration
  - But USP is not a portable measure, only a relative value agreed upon
- FSM (standardized sizing mechanism) required at the organizational level
- External personnel can contribute to sizing and estimation processes with low impact on the project team
  - Size delivered to be confirmed at scope end for benchmarking
- Simple statistical analysis facilitate upfront sizing and estimation
  - Average size per added or modified FP
  - Links between USP and CFP could be made in specific contexts
‘Productivity’ is a taboo word!

- People don’t like to be measured for ‘productivity’
- But FSM is used for process productivity
- Use “Velocity” instead, since more accepted by “Agilists”
- Communication is important
  - Use a team’s productivity as input to their retrospectives
- Measurement must be made for improvement, NEVER for blaming!
Lack of motivation

- Not all work in a project can be sized (e.g. NFR)
- Team members will gain better understanding of US if measured
- Awareness or training sessions required on the chosen FSM method

Few figures from experience for convincing them:
- Learning curve to perform FSM absorbed after ~10 FP
- Sizing can contribute to identify ambiguities
- FSM results can contribute to refine estimation models using historical data
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Case Study #1: incomplete requirements

Project information:
- Re-development project adding functionalities
  - Measurement was done considering the new scope
- Scarce documentation available (lost/undocumented)
  - Analysts had knowledge on functional behaviour and data model
- Single release at project end
- Historical data
  - effort data carefully collected for years but...
  - ...no data available on FSM results of other projects

Thus:
- Collecting software functional size for any release is intended to establish a unit cost baseline
Case Study #2: early estimate in Telco projects

Project information:
- 3-months duration enhancement Telecom projects
- Requirements produced by UML Use Cases (UC) (that aren’t US!)
- At least two iterations per project (1 for the setup, 1 for funct.)
- From FUR with UML UC, estimation of # FP
- ISBSG dataset used: COSMIC subset for Java projects

Two main improvement actions:
- Refinement of the project historical database gathering data at BFC level → improvements for predictability of estimation model
- Estimated effort split by SLC phases and by nature of requirements (FUR; NFR) using CMMI-DEV process

Thus:
- Collecting data at the proper granularity level was the key, also for FSM
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Conclusion

Agile methods
- ASD ≠ APM
- Current measurement valid on local basis
  - USP, velocity, backlog size, burndown trend

Developed and enhanced software through Agile projects are measurable with COSMIC:
- Objective way to size FUR and to refine estimation using historical data → minimal couple (size; effort) required
- Sizing US with a FSM method can improve planning and schedule across iterations, providing an objective criteria for prioritizing US
- Keep historical data of size and effort at proper granularity level
- Governance

Measurement scope and purpose have to be well defined
- Use FUR at ‘iteration’ level for sizing (more accurate)
- Do not forget the ‘other side of the story’ (NFR)

Combine with other COSMIC guidelines for sizing specific application types
Perspectives

- Draft Guideline to be reviewed by COSIC MPC
- Advanced topics to be added
- Seeking for your contribution!
Where to find the new Guideline?

www.cosmicon.com
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Q & A
Questions, comments, or violent reactions?

Vielen Dank für Ihre Aufmerksamkeit!
Thanks for your attention!
Thanks for your attention!