Management of interdisciplinary research groups: a comparison of traditional and agile approaches

Management of interdisciplinary research groups: a comparison of traditional and agile approaches

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Background

The use of Agile Management practice in research projects is quite limited. (Hicks & Foster, 2010) present one of the few case studies made public about the adaptation of agile techniques into research projects. The purpose of this study is to compare a set of practices that could best be suited to manage an interdisciplinary, multi-cultural and distributed research team. The study contrasts traditional "waterfall" management techniques against agile methodologies such as SCRUM and Kanban. Both methods were tested in real practice in a distributed, multi-cultural, and inter-disciplinary team known as the CEA team [1] for one year.

Method

The study compares the performance of the CEA team during:

1. A Traditional Management period (01.01.16 - 15.07.16) and,
2. An Agile Management period (15.07.16 – 15.12.16).

The traditional management period incorporated the next main artifacts or mechanisms of project management:

1. One-time general planning meeting
2. **No** Monthly planning and review meetings,
3. **No** daily stand-up meetings.
4. Weekly report meeting all wok-package leaders.
5. Concrete 6-month evaluation period.

The Agile management period incorporated the next main artifacts or mechanisms of project management:

1. **No** one-time general planning meeting
2. Monthly planning and review meetings,

[1] The CEA team consists of a group of eight researchers with domain-knowledge in the areas of engineering, architecture, and computer science, who are nationals of European, Asian and American countries, and are located between Zurich and Singapore. See more details in https://cityenergyanalyst.com/community

3. Daily stand-up meetings.
4. Weekly report meeting all wok-package leaders.
5. **No** concrete 6-month evaluation period.

Two surveys, one at the end of each management period, were filled by every CEA team member. The survey was divided into four thematic areas:

1. Productivity and organization (PART-I),
2. Internal communication (PART-II),
3. Motivation (PART-III), and
4. Project management (PART IV).

Each thematic area included 3 to 5 single-choice questions which each team member had to rank from 1 (low) to 5 (excellent). See Annex for an example of the Survey.

Results

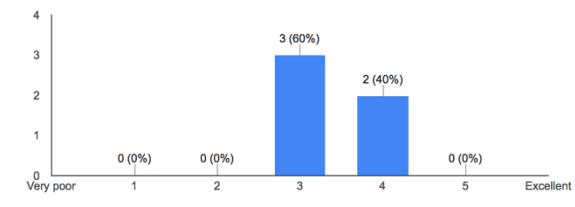
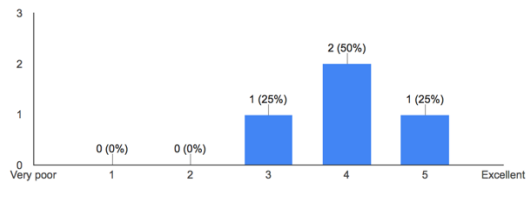
PART I: productivity and organization

Changes in the organization: the Traditional Management period offered equal or higher levels of organization for researchers at CEA in comparison to previous projects. The Agile Management period increased, even more, the levels of individual organization of team members.

Changes in individual productivity: the Traditional Management period offered most of the time higher levels of productivity for researchers at CEA in comparison to previous projects. The Agile Management period increased productivity for half the team and decreased it for the other half. However, the level of productivity was higher than during the last period.

Changes in team's productivity: the Traditional Management period offered, most of the time, higher levels of team work in comparison to previous projects. The Agile Management period kept these levels constant.

Changes in research experience: the Traditional Management period offered a mostly indifferent research experience in comparison to previous projects. The Agile Management period neither improved it nor made it worse.

Level of individual organization	**INCREASED**
	

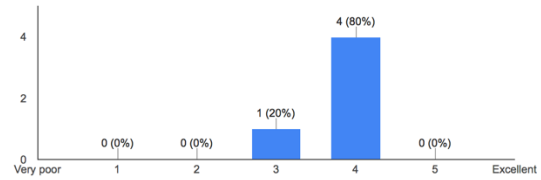
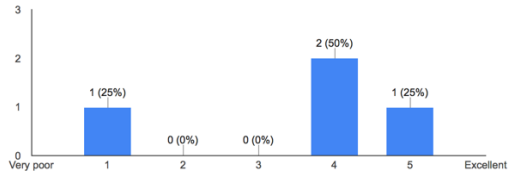
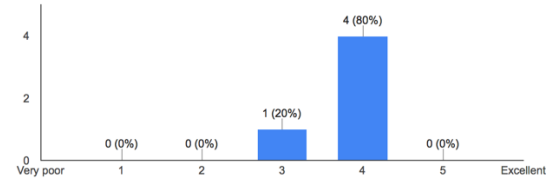
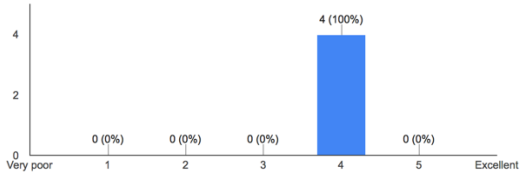
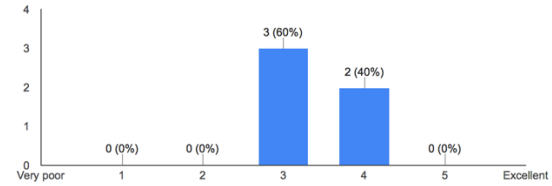
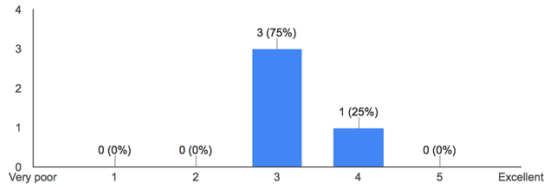
The individual level of productivity	**VARIABLE**
	
Team's level of productivity	**INCREASED**
	
Overall research experience	**CONSTANT**
	

Table 1 Feedback on productivity

PART II: internal communication

Changes in communication with fellow students: the Traditional Management period offered higher levels of communication within the team for researchers at CEA in comparison to previous projects. The Agile Management period kept these levels constant.

Changes in communication with project manager: the Traditional Management period offered higher levels of communication with the PM for researchers at CEA in comparison to previous projects. The Agile Management period kept these levels constant.

Changes in communication with advisor: the Traditional Management period offered most of the time higher levels of interaction with the principal advisor of researchers at CEA in comparison to previous projects. However, communication decreased for one student during the Agile Management period. Potential causes are the constant absence of her supervisor in group meetings.

Changes in communication with the team overseas: the Traditional Management period offered most of the time higher levels of interaction with ad-hoc team members for researchers at CEA in comparison to previous projects. These values decreased

especially for one student during the Agile Management period. The overall communication remained positive.

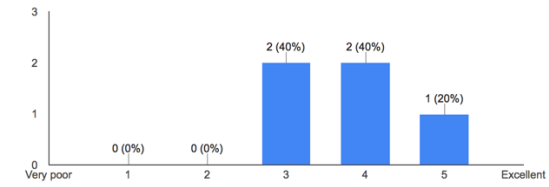
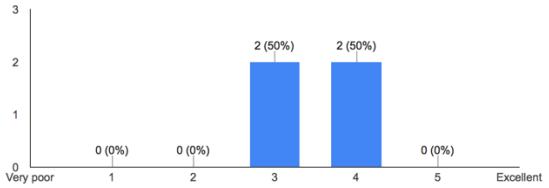
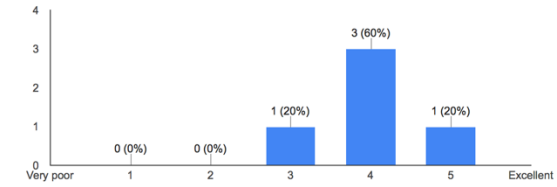
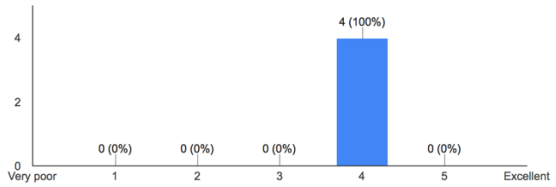
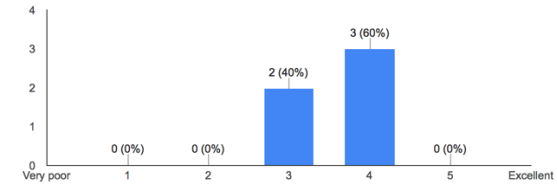
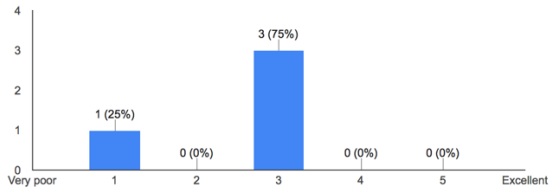
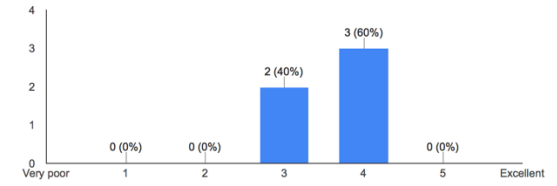
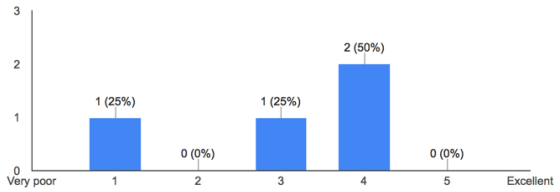
Waterfall Management period	Agile Management period
On the quality of interaction with fellow students	**CONSTANT**
	
Quality of interaction with project manager	**CONSTANT**
	
Quality of interaction with advisor	**DECREASED**
	
Quality of interaction with the overseas team	**DECREASED**
	

Table 2 Feedback on the quality of interactions

PART III: motivation

Changes in motivation for doing research: the Traditional Management period offered higher levels of motivation for doing research in comparison to previous projects. These values decreased especially for one student during the Agile Management period. The motivation remained positive for most researchers.

Changes in motivation for doing teamwork: the Traditional Management period offered higher levels of motivation for teamwork for researchers at CEA in comparison to previous projects. These values decreased especially for one student during the Agile Management period. The motivation was kept positive for most researchers.

Changes in motivation for individual work: the Traditional Management period offered higher levels of motivation for individual work for researchers at CEA in comparison to previous projects. The Agile Management period decrease this motivation, especially for one student. The individual motivation was kept positive for most researchers.

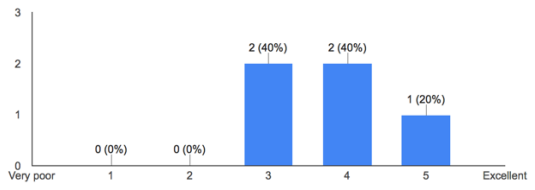
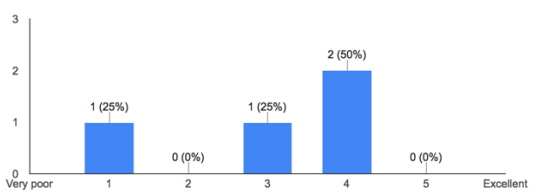
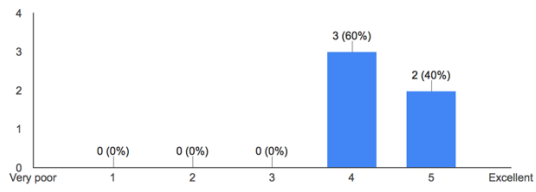
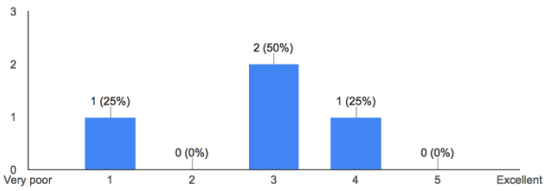
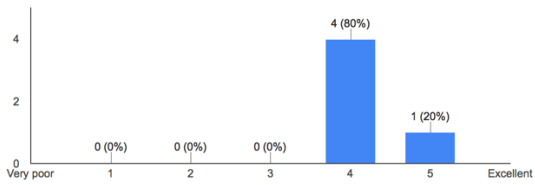
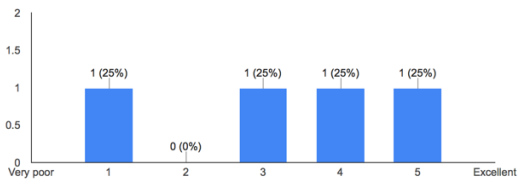
Waterfall Management period	Agile Management period
Level of enthusiasm to do research	**DECREASED**
	
Level of enthusiasm to work in a team	**DECREASED**
	
Level of enthusiasm to work individually	**DECREASED**
	

Table 3 Feedback on motivation

PART IV: Project management methods and tools

Regarding the project management methods of Table 4:

The good: the Traditional Management period brought about a supportive team, very transparent communication, good team cohesion. The Agile Management period brought more organization, better time allocation, fast problem solving, clearer tasks and more focus.

The bad: The Traditional Management period turned out to have vague goals, inflexibility at the individual level, and troublesome planning for upcoming events and

new projects. The Agile Management period brought less flexibility in new tasks, stress, and meetings useful for reporting and feedback but not for collaboration.

The potential improvements: these are described in Table 4.

Waterfall Management period	Agile Management period
The good • *"...The diverse background. I feel more equipped to do things that I would never be able to as a designer. When I have questions, I can ask...".* • *"...The personality of the group members is so nice. Really nice environment to work in. People are always willing to help..."* • *"...Diverse, good and engaged team, motivated project lead with ideas to improve and support..."* • *"...Very transparent communication..."* • *"...Fast progress as a group, each group member has a good understanding of each other's work...".* • *"…Good team cohesion/focus…"*	**The good** • *"…It was nice to see that stuff was going and was organized…"* • *"…Tasks are clear; progress is evident..."* • *"…Better time allocation, only devote time on tasks that will contribute to the end goal…"* • *"…won't be stuck on one problem for too long…"* • *"…Fixed time for meetings every day. Working towards more or less clear goals…"* • *"…More focus…"* • *"…Daily stand-up meetings helped to solve urgent matters, especially during the delivery period…"*
The bad • *"…Goals/"instructions" are sometimes vague…"* • *"…Meetings/events could be planned a bit more in advance…."* • *"…Many fixed deadlines/milestones as a group, which gave little flexibility for individual progress…"* • *"…Singapore / Zurich split makes communication harder than it could be…"* • *"…Distance SG-CH still challenging to keep up with team development and supervision…."* • *"…Not sure if focusing too much on measuring productivity is a good thing for research experience or not…."*	**The bad** • *"…So far, it is still like a reporting method to the coordinator. Others' progress do not particularly relate to mine/me…"* • *"…Less flexibility in taking in new tasks. Less comfortable to allocate time for self-development (following courses, learning new skills...)…"* • *"…General feeling of stress and rushing through things…"* • *"…About stand-up meetings: 15min meeting time is probably not detailed enough for research…."* • *"…Kanban per every project (i.e., papers, education, personal etc.) is difficult to track. Many tasks remained idle. This is partly due to lack of group's rigorousness…"* • *"…The burn-chart is difficult to track as many new tasks were integrated in the projects. Once the deadline changed*

	the burn-chart did not work anymore in its physical form…" • **"…The daily stand-up was more about reporting and feedback from coordinator. However, 15 min did not seem sufficient. It could work if there is a collaborative project among the team. But it is more individual work now. The meetings brought too much load to the coordinator…"* • **"…Weekly meetings were good only when there was a chance to receive group feedback about somebody's work. Otherwise they are long meetings focused on reporting to Zurich…."*
The advice • *"…Better use of calendar and outlook events for meetings…"* • *"…Clear assignment of the responsible person for group tasks…"*	**The advice** • *"…Milestone and task oriented. The deadline is the first driving force…"* • *"…Set realistic goals/ keeping the targets of the work packages and individual researches in the same line…."* • **"…One Kanban per Work-Package of the CEA project rather than multiple. We could sort out tasks to others in one single Kanban per project…."* • **"…Take out Burn-chart which is not part of Kanban method anywise but scrum. It will allow working on a milestone and deadline basis keeping up to the flow of new tasks…"* • **"…Stand-up meetings to report status not that often and raise urgent issues…."* • **"…Have a brainstorm session where each one can present their work and receive advice in detail…."* • **"…Dedicate group meetings to perform work in detail…"*

*Table 4. Feedback concerning project management methodology.. *data obtained through group discussion around the topic.*

Regarding the project management tools of Table 5:

Benefits of One-time Planning meeting and planning document debriefing: The practice received positive feedback during the Traditional Management period and should be kept for future projects. Especially, during their initiation phase.

Benefits 6th month evaluation day: The practice received positive feedback during the Traditional Management period and should be repeated.

Changes of benefits of weekly meetings: The practice received positive feedback during the Traditional Management period for most of the researchers at CEA. It increased during the Kanban period due to the ability of researchers to present their work in periods of 15 to 20 min

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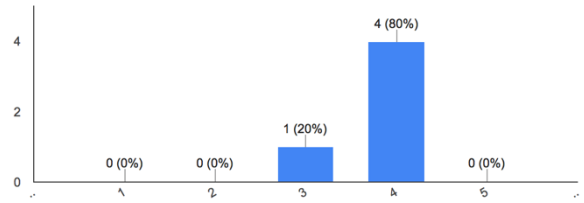
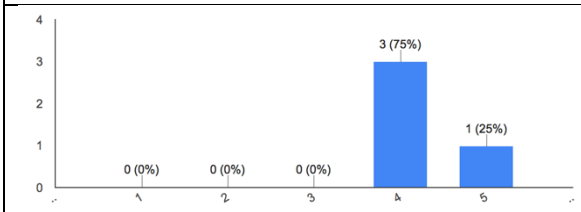
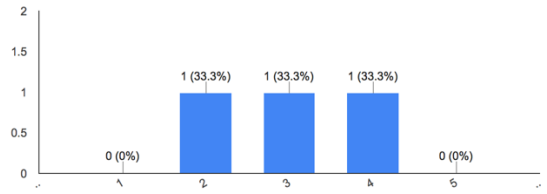
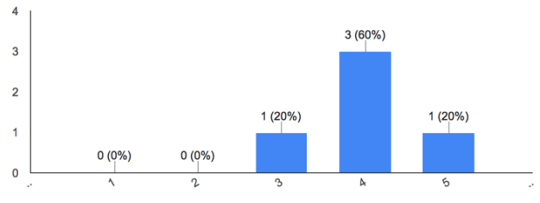
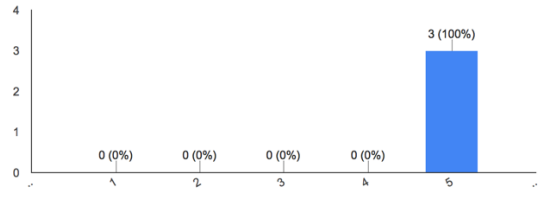
Waterfall Management period	Agile Management period
Benefit of survival guides	**GOOD**
	
Benefit of 6-month evaluation day	**GOOD**
	
Benefit of daily stand-up meetings	**INDIFFERENT**
	
Benefit of weekly meetings	**INCREASED**
	

Table 5 Feedback on PM tools

Conclusions

The key conclusions of the surveys were:

1. Traditional methods are helpful to set a vision, long term targets and discretize main functions of team members.

2. Agile methods allow to easily enhance this vision according to ongoing research findings, increase communication, accountancy and balance group functions.

3. Elements of both methods could be combined at their best for the successful management of research groups.

4. This study limited to a rather small group of participants and they may change for bigger group sizes. Indirect costs are excluded as they are constant with both methodologies for the case study.

References

Hicks, M., & Foster, J. S. (2010). Adapting Scrum to Managing a Research Group. *Communications of the ACM*, (October), 1–9. Retrieved from http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.147.8008&rep=rep1&type=pdf

How to fill this form in:

1. Answer each question by comparing your experience during the period of JULY - DECEMBER 2016 in relation to that of the period JANUARY - JULY 2016.

2. Basically a comparison of our first use of Kanban Vs. non-Kanban inside the CEA Project

e. Ask for help if needed.

* Required

1. **What is your role in the MuSeS team** *
   Mark only one oval.

   - ◯ PI
   - ◯ PM
   - ◯ PhD
   - ◯ PhD
   - ◯ PhD
   - ◯ Ad Hoc team member
   - ◯ Other: _____

I. Questions on communication

Please answer the next questions with this grading:

1: Very poor
2: Not bad
3: Just fine
4: very good
5: Excellent

2. **A. What is the quality of your interaction with your fellow students / team members? (in comparison to not using Kanban)**
   Mark only one oval.

	1	2	3	4	5	
Very poor	◯	◯	◯	◯	◯	Excellent

3. **B. What is the quality of your interaction with your project manager / supervisor? (in comparison to not using Kanban)**
   Mark only one oval.

	1	2	3	4	5	
Very poor	◯	◯	◯	◯	◯	Excellent

4. **C. What is the quality of your interaction with your advisor / professor? (in comparison to not using Kanban)**
   Mark only one oval.

	1	2	3	4	5	
Very poor	◯	◯	◯	◯	◯	Excellent

5. **D. What is the quality of your interaction with ad-hoc team members? (in comparison to not using Kanban)**
   Mark only one oval.

	1	2	3	4	5	
Very poor	◯	◯	◯	◯	◯	Excellent

II. Questions on motivation

Please answer the next questions with this grading:

1: Very poor
2: Not bad
3: Just fine
4: very good
5: Excellent

6. **A. How is your level of enthusiasm about doing research? (in comparison to not using Kanban)**
   Mark only one oval.

	1	2	3	4	5	
Very poor	◯	◯	◯	◯	◯	Excellent

7. **B. How enthusiastic are you about working in a team? (in comparison to not using Kanban)**
   Mark only one oval.

	1	2	3	4	5	
Very poor	◯	◯	◯	◯	◯	Excellent

8. **B. How enthusiastic are you about working individually? (in comparison to not using Kanban)**
   Mark only one oval.

	1	2	3	4	5	
Very poor	◯	◯	◯	◯	◯	Excellent

III. Questions on working experience

Please answer the next questions with this grading:

1: Very poor
2: Not bad
3: Just fine
4: very good
5: Excellent

9. **A. How is your level of individual organization? (in comparison to not using Kanban)**
   Mark only one oval.

	1	2	3	4	5	
Very poor	◯	◯	◯	◯	◯	Excellent

10. **B. What is your individual level of productivity, i.e., achievements per month? (in comparison to not using Kanban)**
    Mark only one oval.

	1	2	3	4	5	
Very poor	◯	◯	◯	◯	◯	Excellent

11. **C. What is your overall team's level of productivity, i.e., achievements per month? (in comparison to not using Kanban)**
    Mark only one oval.

	1	2	3	4	5	
Very poor	◯	◯	◯	◯	◯	Excellent

12. **D. How has your overall research experience been? (in comparison to not using Kanban)**
    Mark only one oval.

	1	2	3	4	5	
Very poor	◯	◯	◯	◯	◯	Excellent

IV. General feedback I

Please provide an answer to the next question. Some bullet points will be fine as well.

13. **A. Please elaborate on GOOD THINGS of your overall research experience (in comparison to not using Kanban)**

14. **B. Please elaborate on DRAWBACKS of your overall research experience (in comparison to not using Kanban),**

15. **C. How could your overall research experience and team's productivity be improved?**

V. General feedback II

1: I strongly disagree
2: I disagree
3: indifferent
4: I agree
5: I strongly agree

16. **D. Did the "daily stand-up meetings" contributed to enhance your overall research experience?**
Mark only one oval.

	1	2	3	4	5	
Strongly disagree	◯	◯	◯	◯	◯	Strongly agree

17. **D. Did the "weekly meetings" contributed to enhance your overall research experience?**
Mark only one oval.

	1	2	3	4	5	
Strongly disagree	◯	◯	◯	◯	◯	Strongly agree

18. **D. Did "Slack for communication" contributed to enhance your overall research experience?**
Mark only one oval.

	1	2	3	4	5	
Strongly disagree	◯	◯	◯	◯	◯	Strongly agree

19. **D. Did "Github for software development" contributed to enhance your overall research experience?**
Mark only one oval.

	1	2	3	4	5	
Strongly disagree	◯	◯	◯	◯	◯	Strongly agree