

## Appendix G: Questionnaire after Phase II implementation

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1. The phase 2 changes in the extension part only would have following results on phase 1 implementation?
  - ☒ a. No effect
  - b. Applications did not run properly
  - c. Applications throw exceptions
  
2. Overall to integrate phase 2 application changes into phase 1 changes, you need to make to the following code modifications?
  - a. No change in implementation was required
  - b. Need major changes such as creating new classes
  - ☒ c. Need moderate changes such as creating new methods and variables
  - d. Need minor changes such as modifying few existing methods and variables
  - e. Overall scattering or tangling increased due to phase 2 application changes
  - f. None of the above
  
3. To integrate phase 2 extension changes into phase 1 changes, you need to make the following code modifications?
  - g. No change in implementation was required
  - h. Need major changes such as creating new classes
  - i. Need moderate changes such as creating new methods and variables
  - ☒ j. Need minor changes such as modifying few existing methods and variables
  - k. Overall scattering or tangling increased due to phase 2 application changes
  - l. None of the above

4. While implementing the phase 2 features for phase 1 applications, which of the following did you find the most difficult?
- a. Adding crosscutting concerns to the applications design
  - b. Deciding how to share data between previously existing sample application code and new code
  - ☒ c. Debugging the applications with crosscutting concerns
  - d. Working with the Java implementation language or the IDE
  - e. Managing the complexity of the application
5. While implementing the phase 2 application changes, which of the following did you find the most difficult?
- a. Deciding how to share data between previously existing sample application code and new code
  - ☒ b. Debugging the applications with crosscutting concerns
  - c. Working with the Java implementation language or the IDE
  - d. Managing the complexity of the application
6. Which of the following was the most time consuming during implementation of phase 2 feature changes?
- a. Understanding the original applications and analyze the new requirements
  - b. Designing the solutions
  - c. Implementing the solutions
  - ☒ d. Debugging the solutions
  - e. Learning the tools (e.g., Java, an IDE)
  - f. Learning AOP (not applicable for group 1)

- g. Learning CommJ (not applicable groups 1 and 2)
7. Which of the following was the most time consuming during implementation of phase 2 application changes?
- a. Understanding the original applications and analyze the new requirements
  - b. Designing the solutions
  - c. Implementing the solutions
  - ☒ d. Debugging the solutions
  - e. Learning the tools (e.g., Java, an IDE)
8. While implementing your phase 2 changes in both applications and features, did you come across any of the following situations? (Select all that apply)
- ☒ a. Your changes introduced new bugs
  - b. Your changes introduced new dependency among existing application components
  - c. Tangling and scattering increased
  - d. None of the above
9. If you were asked to refactor the phase 2 changes so it could be reused by other applications, which of following would you do?
- a. Redesign the application's structure, making major changes in the classes, their relationships, and responsibilities
  - b. Refactor the code to make minor improvements to the classes, their relationships, or responsibilities
  - ☒ c. Improve the implementation of individual methods, independent of changing the structure of the application, to improve readability or maintainability
  - d. Nothing – the implementation is ready for reuse

10. In general, in order to implement your applications for phase 2 you made?

- a. Major changes
- ☒ b. Minor changes
- c. No different

11. In general, in order to implement your extensions for phase 2 you made?

- d. Major changes
- ☒ e. Minor changes
- f. No different

12. Would your application be able to run standalone again if you remove the phase 2 extension changes from sample application code?

- ☒ a. Yes
- b. No
- c. Not sure

13. Would your application be able to run standalone again if you remove the phase 2 application changes from sample application code?

- ☒ a. Yes
- b. No
- c. Not sure

14. [For CommJ Group] In order to implement the change in requirements for the extension part such that a conversation is no more an RR/OWS/OWR sequence but a MS sequence, what are the following changes you made in your implementation?

- a. Need to introduce major changes in the original application code
- b. Need to introduce new pointcuts
- c. Need to define new data structures to keep track of conversation
- d. Lines of Code (LoC) and complexity of sample application may increase
- e. Tangling and Scattering of sample application may increase
- f. Require only minor change in implementation
- g. Only need to modify some rules i.e., state machines etc., to accommodate new conversations
- h. May expect some new bugs in the program
- i. Overall debugging time would dramatically increase
- j. Can reuse existing code to implement new changes

15. [For AspectJ Group] In order to implement the change in requirements for the extension part, what are the following changes you made in your implementation?

- k. Need to introduce major changes in the original application code
- l. Need to introduce new pointcuts
- m. Need to define new data structures to keep track of conversation
- n. Lines of Code (LoC) and complexity of sample application may increase
- o. Tangling and Scattering of sample application may increase
- p. Require only minor change in implementation
- q. May expect some new bugs in the program
- r. Overall debugging time would dramatically increase
- s. Can reuse existing code to implement new changes

16. In order to implement the change in requirements for the application part only what are the following changes you made in your implementation?

- t. Need to introduce major changes in the original application code
- u. Need to define new data structures to keep track of conversation
- v. Lines of Code (LoC) and complexity of sample application may increase
- w. Tangling and Scattering of sample application may increase
- ☒ x. Require only minor change in implementation
- y. May expect some new bugs in the program
- z. Overall debugging time would dramatically increase
- aa. Can reuse existing code to implement new changes

17. From scale 1-5, how would you rank the overall application after changes you implemented in Phase2 for code tangling (1 means fully tangled and 5 means two are totally independent)?

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18. From scale 1-5, how would you rank the overall application after changes you implemented in Phase 2 for code scattering (1 means fully scattered in all classes and 5 means no scattering)?

2

19. How many hours did you spend to implement phase 2 extension changes?

2

20. How many hours did you spend to implement phase 2 application changes?

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