

Motivation in Software Architecture and Software Project Management

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Abstract—Software architecture (SA) is considered an active research area nowadays, although it is not a new activity while developing software. Software architecture is a structure represented using Architecture Description Languages (ADLs) and graphical diagrams of the system, showing different components and relationships among them. Software Project Management (SPM) pertains to the management and controlling activities involved in Software Development Life Cycle (SDLC) and includes planning, organizing, staffing, leading and controlling the software processes. This paper aims to identify the motivational factors affecting software architects and software project managers using the survey technique. We have collected results from questionnaire surveys technique which will help software project managers and software architects to understand the factors that can affect the overall quality of the software and its architecture. The last step will be to propose an updated framework for Systematic Literature Review (SLR). This new concept of using Clustering, Genetic Algorithm and Agents in SLR was proposed to produce an efficient and optimized query search strings and searches for search engines.

Index Terms—Software Architecture (SA), Software Project Management (SPM), Motivation, Systematic Literature Review (SLR) and Genetic Algorithm (GA).

I. INTRODUCTION

Software architecture and project management are both important fields which have many variants in their motivation. In this paper it has been attempted to present the point of view as perceived in motivation in the SPM and SA, with regards to the motivation using survey technique. The rest of the paper is organized as follows : research methodology is given in the 1section II, the results is presented in the section III, proposed updated SLR process framework is discussed in the section IV and section V discusses the conclusion and finally section VI discusses the future work.

II. RESEARCH METHODOLOGY

The most important issue when conducting the survey is to choose the most appropriate survey method in research. We use the questionnaire technique to perform this research. The overall survey process contains four major steps:

- 1) *Formulate the questionnaire*
- 2) *Distribute the questionnaire*
- 3) *Analyze the data using qualitative technique*
- 4) *Conclude the result*

First, we have to formulate the questionnaire. This questionnaire consists of software project management and software architecture related questions. It is only to be filled by software project managers, team leads and software architects. It will be divided into several sections, based on the type of information required for the survey. These will include:

1) *Education and Background of Participant*

- a) *Post Graduate Degree*
- b) *Graduate Degree*
- c) *None*

2) *Training level*

- a) *Certifications*
- b) *Training courses*
- c) *Conferences*
- d) *Seminars*

3) *Number of years in software field*

- a) *Number of years in other professions*
- b) *Number of projects worked on*

We performed the market survey by emailing the questionnaire to 5 yahoo groups, collecting the resulting data and analyzing that data.

III. OBSERVATIONS AND ANALYSIS

A. *Survey*

1) *Personnel who worked on the project:* We conclude from Figure 1, that for the most part, personnel who filled this questionnaire have sufficient experience of software project management.

2) *Any technical education required for project management?*

- Yes
- No

According to Figure 2, a lot of persons require technical education for project management. This means that project management is not an easy task and not everyone can perform it. It requires extra knowledge and experience.

3) *What type of Recognition would you prefer?*

- Promotion
- Appreciation • Cash

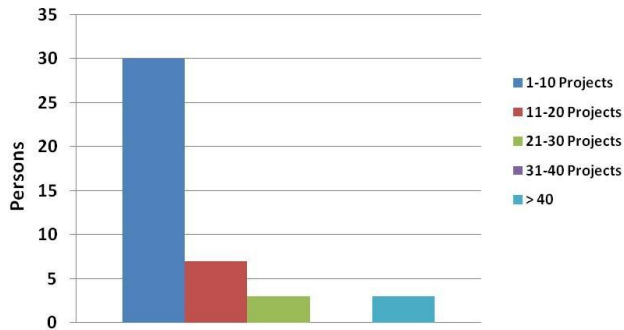


Fig. 1. Personnel who worked on the project

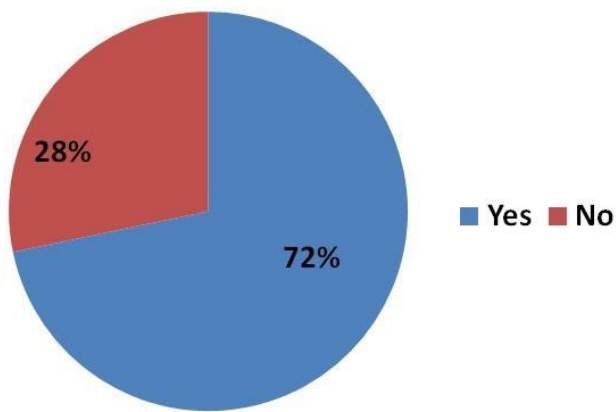


Fig. 2. Technical education requirement

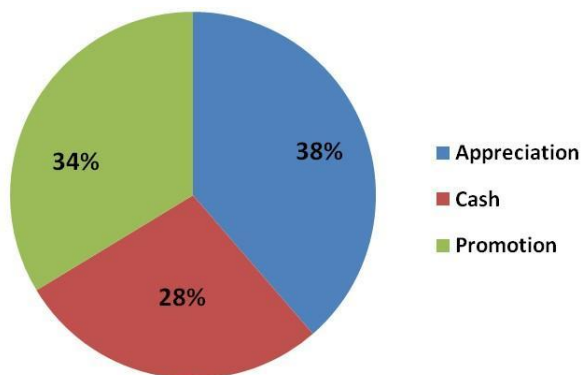


Fig. 3. Personnel Recognition likeness

According to Figure 3, most persons like rewards in the form of Appreciation, then Promotion and then Cash. We also conclude that if the project manager and software architects are recognized in the form of appreciation and promotion, then they are further motivated.

4) I enjoy challenging and creative tasks:

- Usually
- Sometimes • Never

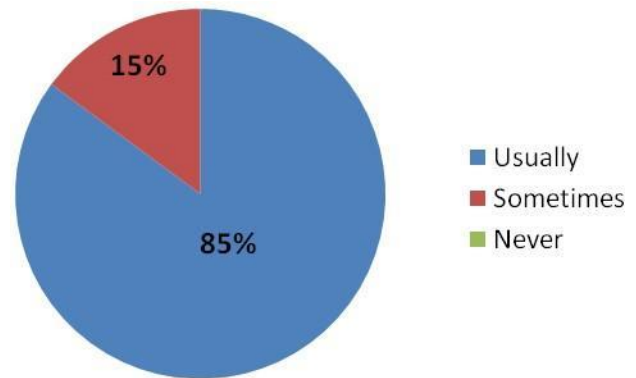


Fig. 4. Persons like creative tasks

According to Figure 4, most persons like challenging and creative tasks, so we conclude that project managers and software architects like the tasks which are creative and challenging. Personnel mostly do not like daily routine tasks.

5) I prefer to work in a team:

- Usually
- Sometimes • Never

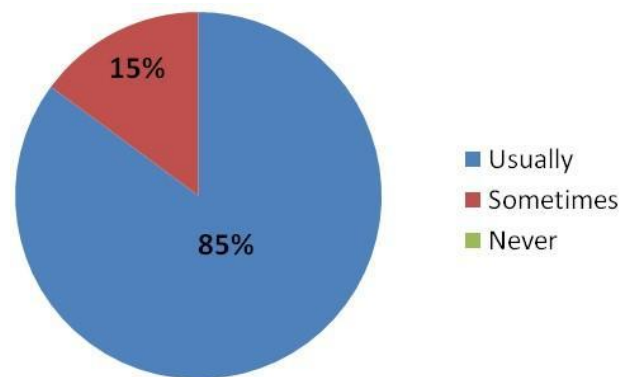


Fig. 5. Work preference in a team

According to Figure 5, most of the persons surveyed like to work in a team, but there are some who like to work in a solo environment. We conclude that project managers and software architects are motivated when they work in a team or they perform well when they are in a team.

6) I look for novel learning opportunities:

- Usually
- Sometimes • Never

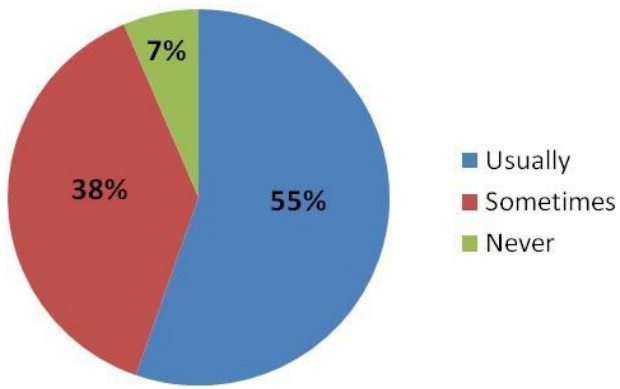


Fig. 6. Like novel opportunities

According to Figure 6, persons mostly like to work on new projects that allow them to learn and acquire new skills. It can be concluded that project managers and software architects are motivated by the opportunity to learn new skills.

7) *I delight in working on achievement-related tasks:*

- Usually
- Sometimes • Never

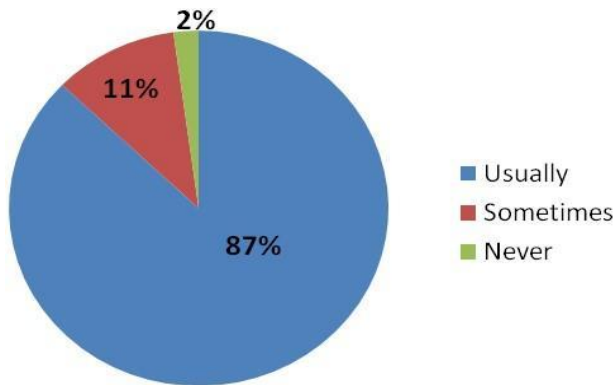


Fig. 7. Like achievement-related tasks

According to Figure 7, project managers and software architects are usually motivated to perform achievement related tasks.

8) *I like helping people and building friendships:*

- Usually
- Sometimes
- Never

According to Figure 8, persons like to work in a friendly environment where everyone is ready to help others. We conclude that project managers and software architects are

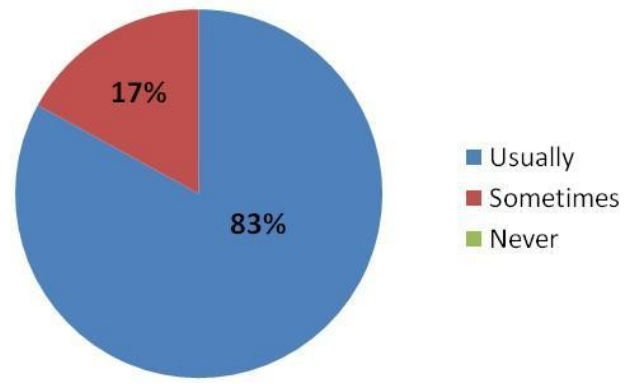


Fig. 8. Like helping people

motivated when they work in a friendly environment and where everyone is ready to help.

9) *I prefer routine work:*

- Usually
- Sometimes • Never

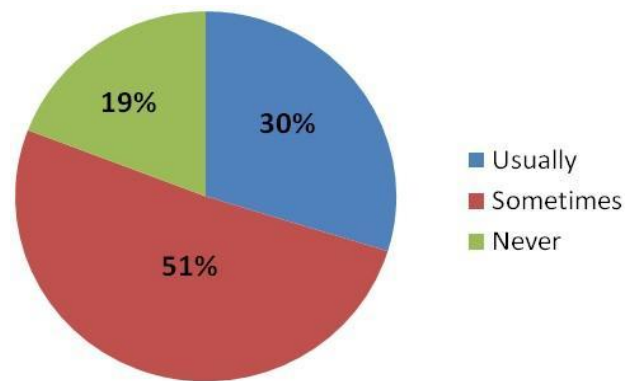


Fig. 9. Prefer routine Work

According to Figure 9, most of the project managers and software architects like routine tasks sometimes, while there is a group that does not like routine work.

10) *I can work best when I am in charge:*

- Usually
- Sometimes
- Never

According to Figure 10, most project managers and software architects perform well when they are in a managerial post. It means when they are in-charge, they work with full concentration and responsibility.

11) *I believe that my effort and skill affect the task performance:*

- Usually
- Sometimes
- Never

According to Figure 11, most project managers and software architects believe that when they work with effort combined with some skill set, then they perform well.

12) I expect to be rewarded when I perform well:

- Usually
- Sometimes • Never

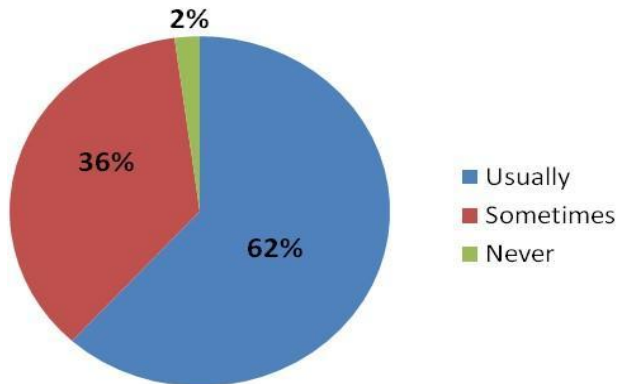


Fig. 10. Authority

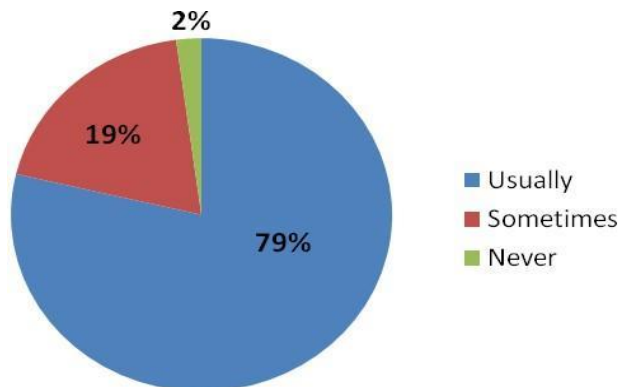


Fig. 11. Effort and skill affect the task performance

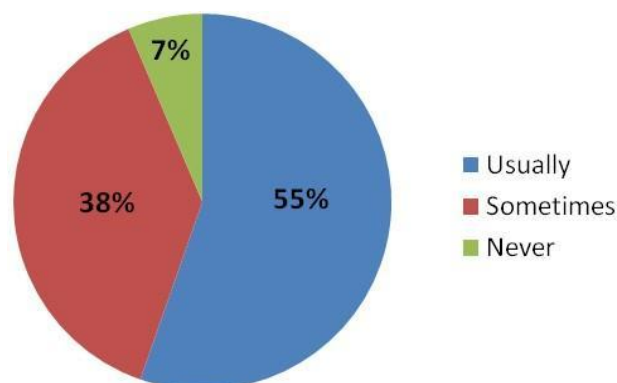


Fig. 12. Rewarded Expectations

According to Figure 12, most project managers and software architects expect that when they perform well or show outstanding results, they will be rewarded. But there are also those people or groups who do not like to be rewarded when they perform well.

13) I feel happy when others reward me for my good work:

- Usually
- Sometimes • Never

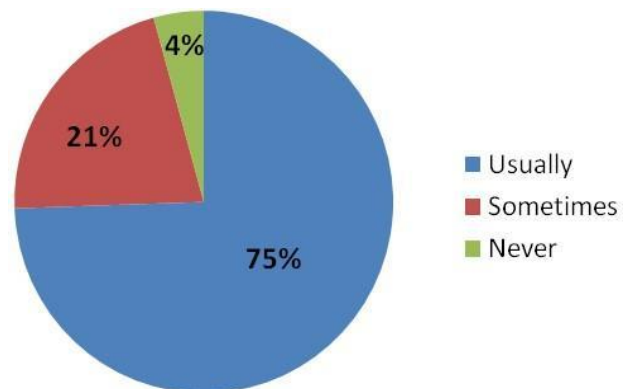


Fig. 13. Personnel's happiness when rewarded

According to Figure 13, most project managers and software architects are happy when they are rewarded by others. This is a natural phenomenon, but there are also those people who do not appreciate being rewarded by others.

14) I don't like the acknowledgment of others when I do good work:

- Usually
- Sometime • Never

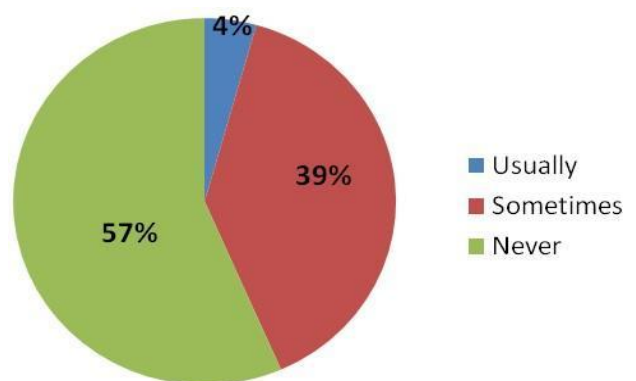


Fig. 14. Acknowledgment of good work by others

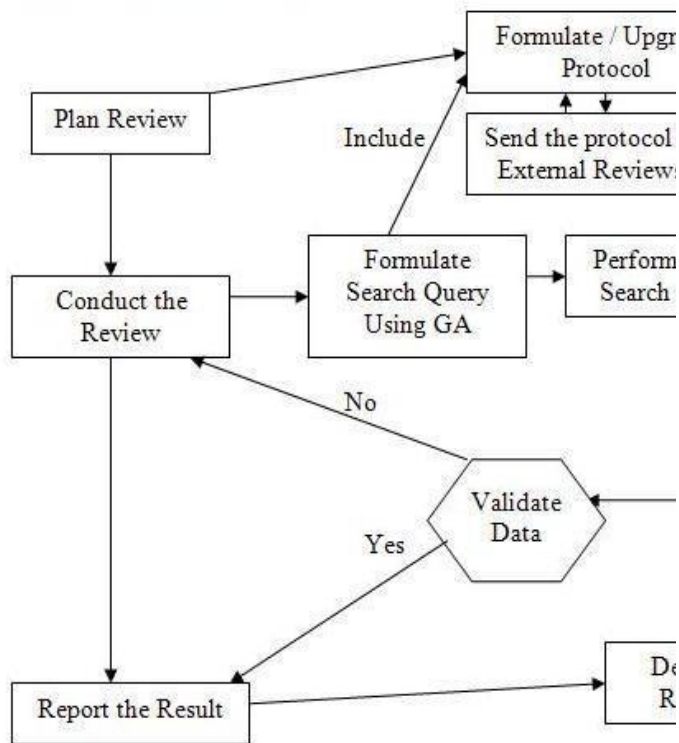


Fig. 15. Updated f

According to Figure 14, some project managers and software architects do not like the acknowledgment of others when they perform well. There is also a large group that likes to be acknowledged, while there are others who sometimes appreciate recognition.

IV. PROPOSED UPDATED SLR PROCESS FRAMEWORK

The framework proposed how SLR process can be automated using the concept of genetic algorithm and distributed agents. The updated Systematic Literature Review framework is shown in figure 15. It contains the three major steps named, plan the review, conduct the plan and document the results. To perform literature based survey, we propose the use of automated SLR technique to collect the survey results. It's working details as follows:

- The first step is to plan the review. In this, one has to formulate the protocol for the problem/question, which contains the detail of each and every step of the process to be performed during the systematic literature review. Identification of research questions to formulate protocol in SLR. The following are two new points that are suggested to formulate an efficient protocol document:
 - We suggest grouping similar research questions in a cluster and prioritizing them. At next level, checking the impact of one cluster on the other.

- Formulation of the search queries with the help of genetics algorithm. Using the genetic algorithm, we can achieve good search results in a short time.

- Following the planning phase, the next step is of plan execution. To perform searches on different search engines we have suggested using the concept of the multi agent system to automate this process. Agents are assigned to the different search engines and they execute the search queries generated using GA. After searching, the agent stores them in the repository.
- The next step will be of data synthesis.
- This is followed by data validation. If the data is up-to the-mark, then the last step i.e., reporting the result, will be carried out otherwise we will start again by conducting the review.
- The last step in SLR is reporting the result by developing and reviewing the reports.

V. CONCLUSION

The following points can be concluded from the survey:

- It is important for the software architects and software project managers to be motivated as this affects the end results.
 - Companies should not underestimate the importance of motivation and how it can affect performance and growth.
- The persons responsible for developing software must take adequate steps to motivate his fellow members.
- Companies make sure that with the system evolution system architecture also evolves and is properly documented. • Project management is not an easy task and not everyone can perform this. It requires an extra skill set, knowledge and experience.

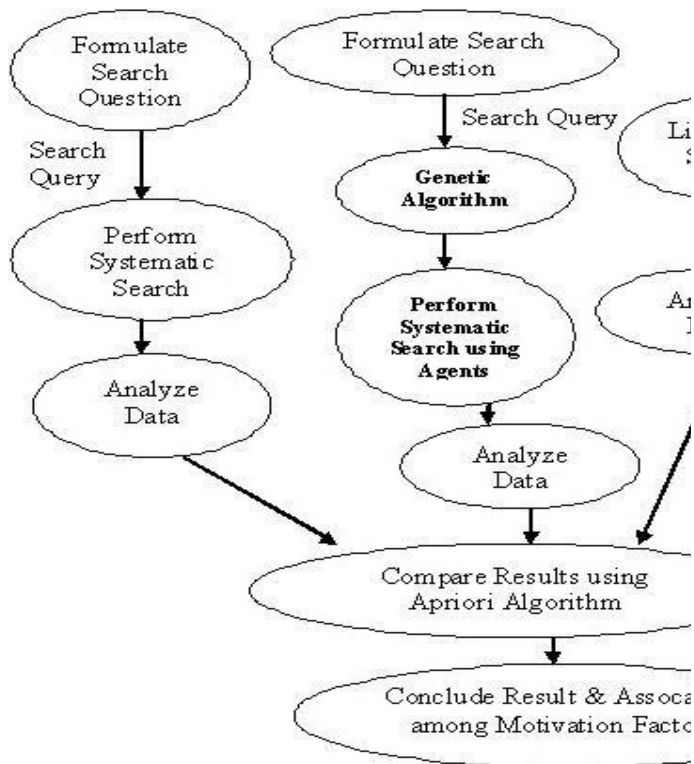


Fig. 16. Overall Survey Process

- Mostly, persons like reward in the form of Appreciation, then Promotion and then Cash.
- Most persons prefer challenging and creative tasks.
- Project managers and software architects are motivated when they work in a team or they perform well when they are in a team.
- Project managers and software architects are usually motivated to perform achievement-related tasks.
- Persons like to work in a friendly environment where everyone is ready to help others.
- Most persons prefer routine work some of the time.
- Mostly people think that their effort and skills affect task performance.
- Mostly people expect to be rewarded when they perform well.
- Mostly people experience that they are treated fairly.
- Mostly people like the acknowledgment of others when they do good work.

VI. FUTURE WORK

We also plan to conduct SLR, automated SLR and simple Literature Survey. Figure 16 describes the overall survey process. We will compare the results with the survey results mentioned in this research paper using apriori algorithm to identify the impact of one factor on another.

This overall survey process will contain the following five major steps:

- (1) Survey [complete]
 - (a) Formulate the questionnaire.
 - (b) Distribute the questionnaire.
 - (c) Analyze the data using qualitative technique.
 - (d) Conclude the result.
- (2) Literature Survey
 - (a) Perform Literature Survey.
 - (b) Conclude the Result.
- (3) Systematic Literature Review
 - (a) Identify search question(s).
 - (b) Formulate structured question(s).
 - (c) Formulate search string(s).
 - (d) Formulate search string(s) for search engine.
 - (e) Perform searches and enter data in data extraction form.
 - (f) Conduct the data synthesis process.
 - (g) Conclude the result.
- (4) Automated Systematic Literature Review
 - (a) Identify search question(s).
 - (b) Formulate structured question(s).
 - (c) Formulate search string(s) using GA.
 - (d) Formulate search string(s) for search engine.
 - (e) Perform searches and enter data in data extraction form using Agents.
 - (f) Conduct the data synthesis process.
 - (g) Conclude the result.
- (5) Comparison

- (a) Compare the results from SLR, automated SLR, literature review and survey. The last step will be identifying the correlation/association between motivation factors and the results collected using different research techniques by applying the Apriori Algorithm.

REFERENCES

- [1] J. Matevska-Meyer, W. Hasselbring, and R. Reussner. *Software Architecture Description supporting Component Deployment and System Runtime Reconfiguration*. Ninth International Workshop on ComponentOriented Programming (WCOP), 2004
- [2] E.Mettala and M. H. Graham. *The domain-specific Software Architecture program*. Technical Report CMU/SEI-92-SR-9, CMU Software Engineering Instixtute, June 1992.
- [3] E. Rehtin, *Systems Architecting: Creating and Building Complex Systems*, Prentice Hall, 1991.
- [4] D. E. Perry and A. L. Wolf. *Foundations for the study of Software Architecture*. ACM SIGSOFT Software Engineering Notes, 17(4), 1992.
- [5] R.C. Malveau and T.J. Mowbray, *Software Architect Bootcamp*, 2nd ed., Prentice Hall, 2000.
- [6] B. Witt, F.T. Baker, and E. Merritt, *Software Architecture and Design: Principles, Models, and Methods*, Van Nostrand Reinhold, 1994.
- [7] C. Hofmeister, R. Nord, and D. Soni, *Applied Software Architecture*, Addison-Wesley, 1999.
- [8] D.M. Dikel, D. Kane, and J.R. Wilson, *Software Architecture: Organizational Principles and Patterns*, Prentice Hall, 2001.
- [9] P. Clements, R. Kazman, and M. Klein, *Evaluating Software Architecture*, Addison-Wesley, 2002.
- [10] E. Rehtin, *Systems Architecting: Creating and Building Complex Systems*, Prentice Hall, 1991.