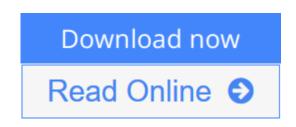# Software Systems Architecture: Working With Stakeholders Using Viewpoints and Perspectives

By Nick Rozanski, Eóin Woods

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Software Systems Architecture is a practitioner-oriented guide to designing and implementing effective architectures for information systems. It is both a readily accessible introduction to software architecture and an invaluable handbook of well-established best practices. It shows why the role of the architect is central to any successful information-systems development project, and, by presenting a set of architectural viewpoints and perspectives, provides specific direction for improving your own and your organization's approach to software systems architecture.

With this book you will learn how to

- Design an architecture that reflects and balances the different needs of its stakeholders
- Communicate the architecture to stakeholders and demonstrate that it has met their requirements
- Focus on architecturally significant aspects of design, including frequently overlooked areas such as performance, resilience, and location
- Use scenarios and patterns to drive the creation and validation of your architecture
- Document your architecture as a set of related views
- Use perspectives to ensure that your architecture exhibits important qualities such as performance, scalability, and security

The architectural viewpoints and perspectives presented in the book also provide a valuable long-term reference source for new and experienced architects alike.

Whether you are an aspiring or practicing software architect, you will find yourself referring repeatedly to the practical advice in this book throughout the lifecycle of your projects.

A supporting Web site containing further information can be found at www.viewpoints-and-perspectives.info

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Editorial Review

From the Back Cover

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About the Author

Nick Rozanski is an enterprise technical architect at Marks and Spencer, where he focuses on integration and workflow. During his more than twenty years of experience he has worked for companies such as Logica, Capgemini, and Sybase. His technology experience covers enterprise application integration, relational databases, and object-oriented software development. He is also an experienced technical instructor and certified internal project auditor.

Eoin Woods is a principal consultant at Züehlke Engineering in London, where he works as a consultant software architect focusing on trading and investment management companies in the financial markets. He has worked in the software engineering field for fifteen years with a number of companies, including Ford Motor Company, Groupe Bull, InterTrust Technologies, and Sybase.

The authors of this book are both practicing software architects who have worked in this role, together and separately, on information system development projects for quite a few years. During that time, we have seen a significant increase in the visibility of software architects and in the importance with which our role has been viewed by colleagues, management, and customers. No large software development project nowadays would expect to go ahead without an architect--or a small architectural group--in the vanguard of the development team.

While there may be an emerging consensus that the software architect's role is an important one, there seems to be little agreement on what the job actually involves. Who are our clients? To whom are we accountable? What are we expected to deliver? What is our involvement once the architectural design has been completed? And, perhaps most fundamentally, where are the boundaries between requirements, architecture, and design?

The absence of a clear definition of the role is all the more problematic because of the seriousness of the problems that today's software projects (and specifically, their architects) have to resolve.

- The expectations of users and other stakeholders in terms of functionality, capability, time to market, and flexibility have become much more demanding.
- Long system development times result in continual scope changes and consequent changes to the system's architecture and design.
- Today's systems are more functionally and structurally complex than ever and are usually constructed from a mix of off-the-shelf and custom-built components.
- Few systems exist in isolation; most are expected to interoperate and exchange information with many other systems.
- Getting the functional structure--the design--of the system right is only part of the problem. How the system behaves (i.e., its quality properties) is just as critical to its effectiveness as what it does.
- Technology continues to change at a pace that makes it very hard for architects to keep their technical expertise up-to-date.

When we first started to take on the role of software architects, we looked for some sort of software architecture handbook that would walk us through the process of developing an architectural design. After all, other architectural disciplines have behind them centuries of theory and established best practice.

For example, in the first century A.D., the Roman Marcus Vitruvius Pollio wrote the first ever architectural handbook, *De architectura libri decem* ("Ten Books on Architecture"), describing the building architect's role and required skills and providing a wealth of material on standard architectural structures. In 1670, Anthony Deane, a friend of diarist Samuel Pepys, a former mayor of the English town of Harwich and later a member of Parliament, published a ground-breaking textbook, *A Doctrine of Naval Architecture,* which described in detail some of the leading methods of the time for large ship design. Deane's ideas and principles helped systematize the practice of naval architecture for many years. And in 1901, George E. Davis, a consulting engineer in the British chemical industry, created a new field of engineering when he published his text *A Handbook of Chemical Engineering*. This text was the first book to define the practical principles underpinning industrial chemical processes and guided the field for many years afterward.

The existence of such best practices has a very important consequence in terms of uniformity of approach. If you were to give several architects and engineers a commission to design a building, a cruise liner, or a chemical plant, the designs they produced would probably differ. However, the processes they used, the ways they represented their designs on paper (or a computer screen), and the techniques they used to ensure

the soundness of their designs would be very similar.

Sadly, our profession has yet to build any significant legacy of mainstream industrial best practices. When we looked, we found a dearth of introductory books to guide practicing information systems architects in the details of doing their jobs.

Admittedly, we have an abundance of books on specific technologies, whether it's J2EE, CORBA, or .NET, and some on broader topics such as Web services or object orientation (although, because of the speed at which software technology changes, many of these become out-of-date within a few years). There are also a number of good general software architecture books, several of which we refer to in later chapters. But many of these books aim to lay down principles that apply across all sorts of systems and so are written in quite general terms, while most of the more specific texts are aimed at our colleagues in the real-time and embedded-systems communities.

We feel that if you are a new software architect for an information system, the books that actually tell you how to do your job, learn the important things you need to know, and make your architectural designs successful are few and far between. While we don't presume to replace the existing texts on software architecture or place ourselves alongside the likes of Vitruvius, Deane, and Davis, addressing these needs was the driving force behind our decision to write this book.

Specifically, the book shows you

- What software architecture is about and why your role is vitally important to successful project delivery
- How to determine who is interested in your architecture (your *stakeholders*), understand what is important to them (their *concerns*), and design an architecture that reflects and balances their different needs
- How to communicate your architecture to your stakeholders in an understandable way that demonstrates that you have met their concerns (the *architectural description*)
- How to focus on what is *architecturally significant,* safely leaving other aspects of the design to your designers, without neglecting issues like performance, resilience, and location
- What important activities you most need to undertake as an architect, such as identifying and engaging stakeholders, using scenarios, creating models, and documenting and validating your architecture

Throughout the book we primarily focus on the development of large-scale information systems (by which we mean the computer systems used to automate the business operations of large organizations). However, we have tried to present our material in a way that is independent of the type of information system you are designing, the technologies the developers will be using, and the software development lifecycle your project is following. We have standardized on a few things, such as the use of Unified Modeling Language (UML) in most of our diagrams, but we've done that only because UML is the most widely understood modeling language around. You don't have to be a UML expert to understand this book.

We didn't set out to be the definitive guide to developing the architecture of your information system--such a book would probably never be finished and would require the collaboration of a huge number of experts across a wide range of technical specializations. Also, we did not write a book of prescriptive methods. Although we present some activity diagrams that explain how to produce your deliverables, these are designed to be compatible with the wide range of software development approaches in use today.

What we hope we have achieved is the creation of a practical, practitioner-oriented guide that explains how to design successful architectures for information systems and how to see these through to their successful implementation. This is the sort of book that we wish had been available when we started out as software architects, and one that we expect to refer to even now.

You can find further useful software architecture resources, and contact us to provide feedback on the book's content, via our Web page: www.viewpoints-and-perspectives.info. We look forward to hearing from you.

Users Review

From reader reviews:

Louie Laforge:

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