

A Pragmatic Guide to Business Process Modelling

SECOND EDITION



Jon Holt

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A Pragmatic Guide to Business Process Modelling

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Jon Holt



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This book is dedicated to my beautiful wife, Rebecca

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Author

Jon Holt obtained his PhD from the University of Wales Swansea in 1991 in the field of real-time systems modelling. Since then, Jon has worked extensively in a wide variety of industries applying modelling techniques to many types of systems, including: requirements, process modelling, enterprise architecture, competencies and education systems.

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Jon currently lives in Swansea with his wife, three children and two cats. When not working, his interests include writing, martial arts and performing magic.

Foreword

Organizational design is one of the biggest challenges facing business in the 21st century. In the knowledge economy, the ability of the human intellect to solve problems and add value is the key source of competitive advantage. But most of the organizational structures in existence today were designed to add value through the processing of physical assets by labour. So how do you organize for success when your primary resources are intangible? How do you unleash the potential of knowledge workers to transform ideas into value? With so many mutations of organizational forms into networks, communities and collaborative ventures what will the organizational forms of the future look like? No one can be sure of the answers to these questions. But one thing is certain. Whatever the structures and forms of the organizations of the future, people will come together as stakeholders to apply their minds and efforts to the transformation of assets. In other words, they will take part in business processes.

The organizations of the future will face increasing complexity in the external environment. The speed of change will continue to increase as global markets open up all value propositions to ever faster cycles of innovation and imitation, fuelling fast, effective and aggressive competition. Demands on organization from stakeholders will also build. Sometimes it will be expressed through regulators; sometimes through more direct channels. Faced with this growing external complexity, organizations will require highly evolved internal and inter-organizational processes to cope with managing and balancing these multiple demands in transparent, effective and systemic ways. Achieving this will require a language that is up to the task and a discipline that has proven value.

Until recently the languages available for modelling processes were rather inadequate for this task. Neither was there a systematic discipline or approach that promised much. As a result, business process modelling has, to date, greatly underachieved its potential. The ground was ripe for an innovation. In Jon Holt's first book, *UML for Systems Engineering*, he delivered that innovation by taking a language forged in the rigours of software development and opening our eyes to the potential of this language in a creative yet robust modelling approach. A lot of good work followed this innovation and the modelling approach has since been applied to processes as diverse as fishing, taxation, and the management of biodiversity.

In this new volume, Jon builds on this experienced success and takes us further into a modelling approach that should have broad appeal to those with a stake in business processes. The book is a lesson in good practice on business process modelling with relevance to important areas such as risk management, dealing with complexity and the modelling and application of key business standards. Jon's clear and engaging style makes a potentially difficult subject highly accessible and the reader's progress is helped along by the mixture of good examples, humour and flair for explanation that we have come to expect from this author. A book that demonstrates what can be achieved with business process modelling would have been welcome in itself, but a book like this that teaches, inspires and gives real insight into the field will be a valuable catalyst for modelling businesses in all sectors and geographies.

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Head of Professional Services, BSI

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Finally, all my love goes to my wife Rebecca and my three children: Jude, Eliza and Roo. Unfortunately, my evil cat has died since the last edition, so a brief mention for Olive and Betty who have big cat-shoes to fill.

Abbreviations

BPMI	Business Process Modelling Initiative
BPML	Business Process Modelling Language
BPMN	Business Process Modelling Notation
BSI	British Standards Institution
CMM	capability maturity model
CMMI	capability maturity model integrated
CORBA	Common Object Request Broker Architecture
eGIF	Electronic Government Interoperability Framework
EMC	electro-magnetic compatibility
EN	European Normative
ESA	European Space Agency
HMRI	Her Majesty's Railway Inspectorate
HSE	Health and Safety Executive
IEC	International Electrotechnical Commission
ISO	International Standardization Organization
PAPS	pen and paper system
PBV	process behaviour view
PCV	process content view
PGI	process group index
PGR	process group ratio
PI	process index
PMI	process model index
PR	process ratio
RACI	responsible, accountable, consulted and informed
UML	Unified Modelling Language
XMI	XML modelling interchange
XML	extensible markup language

Glossary

Activity The behavioural steps involved in a process that produce and consume artefacts and that are owned by stakeholders.

Artefact Anything that is produced or consumed by a process or activity.

Assessment A review of a process that is based on a standard. Assessments may be formal or informal and carried out either internally or externally to the organization.

Audit A formal review of a process based on a standard. Audits are carried out by independent, third-party auditors.

Business process management The coordination and management of a business process which will, invariably, involve some sort of business process modelling.

Business process modelling Any process modelling exercise that is performed in order to enhance the overall operation of a business.

Business process re-engineering Used specifically when business process modelling is applied to existing processes as part of a process improvement exercise.

Class Used as template for something and usually a noun. For example, the class 'Person' would represent all people generally, rather than a specific person. Classes are represented graphically by rectangles and can be further described by identifying attributes and operations. Classes form the basic nodes in the class diagram.

Hazard Anything that occurs that can lead to a risk. The terms 'hazard' and 'risk' are often confused, but there are subtle differences between them. It is possible for many hazards to lead to the same risk. For example, there is a risk in a hospital that a power failure will lead to many problems, perhaps even endangering the lives of some patients. There are, however, many hazards that may lead to this risk manifesting itself, such as: a lightening strike, terrorist action, not paying the utility bill, lack of maintenance, and so on.

Instance A specific item within a class. A specific person, for example, Fred Smith, would be an instance within the class 'Person'.

Iteration A self-contained set of process executions within a process. For example, different teams working on the same project will have their own iterations within the same process.

Model This book uses the classic UML definition of a model, which is ‘a simplification of reality’. In this way, a model may be an equation, a diagram, a physical model, a piece of text or any verbal description.

Operation Usually represented by a verb that signifies something that a class does.

Operations management Often used in the context of business and management courses and, although it has a wider scope than just process modelling, contains, and relies very heavily upon, process modelling.

Process An approach to doing something that consists of a number of activities, each of which will produce and/or consume some sort of artefact. Each of these activities is the responsibility of a single stakeholder role.

Process group A container for processes that is defined based on functionality of processes, rather than phases in a life cycle. Process groups are often abstract.

Process mapping Refers to relating different processes to one another and forms an integral part of any audit or assessment exercise. Of course, in order to map effectively, all processes must be modelled in some way.

Process meta-model A meta-model is a model of a model, and the process meta-model is a model of a model that is used for process modelling.

Process re-alignment Often applied to existing processes that have, over a period of time, gone out of date for some reason – usually because the requirements for the process have changed and the process is no longer fit for its original purpose.

Relationship Represents the identification of a conceptual relationship between one or more classes. A relationship is represented graphically by variations on a line, depending on the type of relationship. There are four types of relationship used for process modelling: the association, the aggregation, the generalization/specialization and the dependency. Relationships form the basic paths in the class diagram.

Risk A product of the likelihood, or probability, of the risk occurring and the effect of the hazard. In many scenarios, risk is defined by a simple mathematical formula, where $risk = probability \times severity$, or it is defined in terms of a simple matrix that has one axis defining the likelihood in words and the other axis defining the severity of the outcome.

Role Part played by a person, place or thing that has an interest in the system or project. The term is often used interchangeably with the term ‘stakeholder role’.

Stakeholder Refers to the *role* played by a person, place or thing that has some sort of interest in the system or project. Stakeholders should not be confused with people, as it is possible for a single person to have more than one stakeholder role and, conversely, it is possible for a single stakeholder role to have a number of individuals' names against it. Stakeholders are often not actually people, but the roles of organizations, the environment, places, things, and so on.

Stereotype A way of tailoring the UML language for a particular application.

System Any entity or collection of entities that collaborate in some way to meet a set of requirements. In this way, a system can be a person, a group of people, a family, a computer, a network of computers, mechanics, electronics or just about anything else.

Swim lane An area on an activity with a defined border, the contents of which are associated with a stakeholder. The stakeholder is then responsible for all activities within the swim lane.

UML meta-model A UML model of the UML. This term is fully defined in the UML standard (see www.omg.org).

Validation Refers to something that meets its original requirements or, to put it another way, that does what it's supposed to do. In order to understand validation, the question 'am I building the correct system?' may be asked. It is possible and, indeed, not uncommon for a system to be built that works but that does not meet the original requirements, which makes the system useless.

Verification Refers to something that works correctly and without error. For example, this could be a system that has been tested and runs in an error-free fashion. In order to understand verification, the question, 'am I building the system correctly?' may be asked.

Useful Websites

www.bcs.org

The website of the British Computer Society, which provides useful information and from which you can purchase books on subjects related to process modelling.

www.bpmi.org

The website of the Business Process Management Initiative.

www.bsi-global.org

The website for the British Standards Institution, where standards may be purchased and from which there are links to other standards sites.

www.govtalk.gov.uk

The website of the UK Cabinet Office, which provides information on policies and standards for e-government.

www.iso.org/iso/en/ISOOnline.frontpage

The website of the International Organization for Standardization, from which you can order copies of the ISO standards referenced in this book.

www.omg.org

The Object Management Group website, from which you can download the original UML standard.

www.sei.cmu.edu/cmmi

Information about CMMI provided by the Software Engineering Institute.

<http://tarpit.rmc.ca/cficse/2000/resources/stsc-framework.pdf>

The Systems and Software Consortium software quagmire.

Preface

Processes form the heart of any organization, regardless of its size, type or age. Any organization that actually does anything will, whether it realizes or not, follow processes. These processes may be formal, documented processes or may be informal processes that exist only inside people's heads. Regardless of the nature of the processes, they will all exhibit three features: they will be complex, require a deep level of understanding and will need to be communicated. This is where the modelling fits in.

The process modelling approach adopted in this book is based on the most popular and widely used modelling language in the world – the UML (Unified Modelling Language), which was created as an open standard and is now an ISO standard.

The approach detailed in this book is the result of ten years of definition, refinement and application of such modelling techniques to all aspects of process modelling and to all types of process. This approach has been implemented in many fields, including: defence, government departments, transport, manufacturing, finance, food, IT, communications, education, aerospace and many more.

Process modelling is by no means a simple task and, therefore, to approach such a project requires the use of appropriate and powerful tools. The approach in this book provides a set of 'sharp tools' that may be employed in any process initiative.

1 Introduction

'Process and procedure are the last hiding place for people who don't have the wit or wisdom to do their jobs properly.'

David Brent, *The Office*, BBC

THE MAGIC OF PROCESSES

Processes are an integral part of everyday life. Every time we, as human beings, perform any kind of action, we are actually carrying out a process. This may vary from the way that we get dressed each morning, the way we cross the street on the way to work, to the way that we cook our food in the evenings. The key word used here is 'way' as, in essence, a process simply describes the way to do something or, to put it another way, an 'approach'. It is possible to identify and relate processes for every single action that we take in life. However, this would clearly be a very large number, if not infinity!

Using processes effectively, however, is often not quite so straightforward. There is a big difference between observing a process and performing a process effectively. Consider the example of a magic trick being performed by a magician who is, quite clearly, following some sort of predefined process. It is easy to watch and follow a magic trick, such as a card trick. The magician shuffles the cards and asks a member of the audience to choose one. The audience member selects the card, memorizes it, shows it to the rest of the audience and then places back into the pack. The deck is then shuffled. After a few clever words and a bit of showmanship, the card reappears underneath a vase, or in a pocket or on the other side of the room. The crowd are impressed and give their applause, much to the pleasure of the magician.

A trick such as this is one that everyone can follow and appreciate, but one that most people cannot actually perform themselves. In fact, it is possible for someone to follow the *exact* steps that were carried out by the magician, but to fail utterly in producing the chosen card. There are a number of possible reasons for this:

- The layman, when trying to perform the trick, simply does not understand what has actually gone on. There is a big difference between what is perceived by an observer and what actually occurs. Invariably, this is deliberate on behalf of the magician but something that can be quite clear to a fellow magician who has the relevant domain knowledge. Such trickery may involve a deck that is

arranged into a particular order, the use of false cards or the pre-placing of copies of cards around a room.

- The trick itself is far more complex than it first appears. There are subtleties and nuances of the activities carried out by the magician – false cuts, double lifts, palmed cards and the like. The deception is not just limited to the cards themselves, but may also include sneaking looks at various cards, distracting the attention of the audience by waving the hands or orally catching people's attention. All of these activities are designed to look like natural actions to a casual observer.
- The information conveyed by the magician is not the true reality of what has actually happened. Deliberate distractions and misdirection techniques can be employed to send the wrong information to the audience.

The effective manipulation of processes is very much like the manipulation of playing cards, albeit without the deliberate intention to mislead. To capture a process is very often not as simple as just watching somebody perform a task and then copying the perceived actions. Without a good knowledge of what is actually going on, this task can be very difficult. If the process is not captured effectively and accurately, then it will be impossible to reproduce the results of the process. There are a number of ways to ensure that the process is captured correctly:

- The trick must be looked at from several points of view, rather than purely from the point of view of a casual observer. In fact, with a rigorous and structured approach to observing what is going on from a number of different perspectives, almost any trick can be worked out to some degree.
- The end result must be related back to the initial conditions of the trick and full traceability established. How is it possible to go from one set of conditions to another – if it does not seem possible then there is some key information missing.
- The role of all the participants must be examined, including the audience members and the magician. But it is not good enough to stop there, as there may be several other roles that exist that are not obvious – what about the possibility of the magician having an accomplice either in the audience or on the other end of a phone line or radio link? These are techniques that are regularly employed by magicians.
- Finally, and perhaps most importantly, it is essential to understand what the overall intention of the trick is and what effect it will have on the audience.

The intention of this book is to help you to master the magic of processes. It will increase your understanding of processes, enable you to

control complexity and to communicate your ideas effectively. This is achieved by identifying a number of 'views' that are required in order to model a process completely and fully. Seven views are identified and each one is described in detail. This approach has become known as the 'seven views' approach process modelling.

BACKGROUND

It is not just people that follow processes, as every organization in existence, whether it is a single-person company or a multinational organization, will rely on a number of processes to function effectively. Depending on the size of the organization and the complexity of its set up, the number of processes that a company uses can be huge – almost infinite, again.

Process modelling is arguably one of the most important aspects of any organization in terms of the management and control of all of the organizational activities. These activities will range from the high-level business activities, including mission statements, business processes and requirements, right down to very detailed technical processes that may be executed on a daily basis within the organization.

Business process modelling goes under many different names and labels so, in order to keep things simple, the term *process modelling* in this book may be replaced by any of the following terms:

- **Business process modelling:** any process modelling exercise that is performed in order to enhance the overall operation of a business.
- **Business process management:** the coordination and management of a business process which will, invariably, involve some sort of business process modelling.
- **Business process re-engineering:** used specifically when business process modelling is applied to existing processes as part of a process improvement exercise.
- **Operations management:** often used in the context of business and management courses and, although it has a wider scope than just process modelling, it contains and relies very heavily upon process modelling.
- **Process mapping:** refers to relating different processes to one another and forms an integral part of any audit or assessment exercise. Of course, in order to map effectively, all processes must be modelled in some way.
- **Process re-alignment:** often applied to existing processes that have, over a period of time, gone out of date for some reason – usually because the requirements for the process have changed and the process is no longer fit for its original purpose.

This book covers all of the above definitions at various points but, as should be clear from this list, all of these different concepts rely heavily on the fact that processes can be modelled in some way. As the book focuses on business process modelling, the modelling techniques can be applied to any or all of the above areas.

SOME BASIC DEFINITIONS

This section presents some definitions for the basic terminology that is used in this book.

- **Process:** although a term that is very widely used, the term 'process' is also one that, depending on the source, has many different interpretations. The following list contains just a few definitions:
- a series of actions, changes, or functions bringing about a result (*Oxford English Dictionary*, 2002);
- a series of operations performed in the making or treatment of a product (*Oxford English Dictionary*, 2002);
- a set of interrelated activities, which transforms inputs into outputs (ISO/IEC 15504, 2004).

For the purposes of this book, a process is simply *an approach to doing something that consists of a number of activities, each of which will produce and/or consume some sort of artefact. Each of these activities is the responsibility of a single stakeholder role.*

There are many types of process that are defined, such as operational processes, business processes, technical processes, natural processes, biological processes, political processes, financial processes, and so on. For the purposes of this book, the term 'process' may be applied equally to any or all of these types of process.

- **System:** any entity or collection of entities that collaborate in some way to meet a set of requirements. In this way, a system can be a person, a group of people, a family, a computer, a network of computers, mechanics, electronics and just about anything else.
- **Artefact:** defined as anything that is produced or consumed by a process or activity.
- **Stakeholder:** refers to the *role* played by a person, place or thing that has some sort of interest in the system or project. Stakeholders should not be confused with people, as it is possible for a single person to have more than one stakeholder role and, conversely, it is possible for a single stakeholder role to have a number of individuals' names against it. Indeed, stakeholders are often not actually people, but the roles of organizations, the environment, places, things, and so on.

- **Model:** in this book, the definition of ‘model’ is taken from the classic UML (Unified Modelling Language) definition, which is ‘a simplification of reality’. In this way, a model may be an equation, a diagram, a physical model, a piece of text or any verbal description.
- **Verification:** refers to something that works correctly and without error. For example, this could be a system that has been tested and runs in an error-free fashion. In order to understand verification, the question ‘am I building the system correctly?’ may be asked.
- **Validation:** refers to something that meets its original requirements or, to put it another way, that does what it is supposed to do. In order to understand validation, the question ‘am I building the correct system?’ may be asked. It is possible and, indeed, not uncommon for a system to be built that works but that does not meet the original requirements, which makes it useless!

Some of these terms will be redefined at other points in this book, as they are so fundamental and important to understanding process modelling, that they can never be defined too often.

RISK

Risk is something that affects every person, every day of their lives. Most activities carried out in life have some sort of inherent risk associated with them, for example, crossing the street, eating or travelling.

Businesses can be threatened in many ways, whether it is through physical means, such as acts of nature, sabotage or terrorism, or by more subtle means, such as financial mismanagement, lack of competence or basically getting everyday project activities ‘wrong’. In order to address these threats, there are several possible courses of action:

- **Elimination:** in some cases it is possible to eliminate the risk altogether. For example, if there is a risk involved with dealing with new companies for contracts with a value of over £10,000, then the simple way to eliminate this is, of course, simply not to deal with such organizations. Caution must be exercised, however, as very often one risk may be replaced by another. In the example above, there may then be a risk that it would be difficult to keep up-to-date with key technologies, as only new, dedicated companies, are exploiting them.
- **Replacement:** it is often the case that a risk may be addressed by replacing it in some way. This may be through the use of a different technology; for example, if there is a risk involved with using a specific design notation, due to possible obsolescence or limited expertise available, then replace the technique used with one that is more readily acceptable and accessible (such as the UML) which will address this problem.

- **Control:** in many cases, the risks may not be able to be eliminated nor reduced by replacement, in which case it is necessary to minimize the risk by introducing controls. These controls will vary enormously, depending on the type of risk, for example, wearing appropriate safety clothing, taking regular breaks, using only established technologies, only dealing with preferred suppliers, and so on.
- **Transfer:** transferring the risk onto a third party is considered by many as the easiest way to address risk. Although this seems like a good idea, extreme caution must be exercised, as the risk still exists and, regardless of who takes the rap, the project may fail anyway. For example, when using a financial software package for doing company accounts, there is a risk that the software will not perform the calculations correctly, in which case who takes the blame – the users or the software producers? Even in the scenario where the software producers are guaranteeing that the software will be fit for purpose, does it really help the company stay in business if the accounts system fails?

There are several key terms that must be defined so that risk management can be fully understood, managed and implemented, and these are:

- **Hazard:** anything that occurs that can lead to a risk. The terms 'hazard' and 'risk' are often confused but there are subtle differences between them; it is possible for many hazards to lead to the same risk. For example, there is a risk in a hospital that a power failure will lead to many problems, perhaps even costing the lives of some patients. There are, however, many hazards that may lead to this risk manifesting itself, such as: lightening strike, terrorist action, not paying the utility bill, lack of maintenance, and so on.
- **Risk:** defined as a product of the likelihood, or probability of the risk occurring and the effect of the hazard. In many scenarios, risk is defined either as a simple mathematical formula, $risk = probability \times severity$, or in terms of a simple matrix that has one axis defining the likelihood in words and the other defining the severity of the outcome.

An important aspect of risk is the responsibility associated with it. For example, if you started smoking in the 1920s and later, as a result, developed cancer, the responsibility for the risk, it may be argued, lies with the tobacco companies. This may be argued whether or not the tobacco companies were actually aware of the risks, as everyone has a duty of care to provide safe products. The argument is that when cigarettes were sold to the general public in the 1920s, the health risks were not known and potential smokers did not think it would cause any harm. Today, however, if someone starts to smoke and develops a smoking-related illness, the responsibility is firmly on the shoulders of

the smoker, as all cigarette and tobacco products now carry a government health warning that describes the risks involved in smoking.

In the UK, the Health and Safety Executive (HSE) identify five steps that are essential for any sort of risk assessment:

1. **Identification of hazards:** this can never be a complete and exhaustive list of hazards, as there are simply too many in most situations – even the most unlikely and improbable events may lead to problems. Take the smoking example: hazards will include smoking, being with smokers and being in smoky environments.
2. **Identification of who and how:** it is important to identify who or what is at risk and then to ascertain how they will be at risk. For instance, in the smoking example, the smokers will be affected directly, but what about other people who may suffer the effects of indirect passive smoking? Also, what about expectant mothers smoking and affecting their unborn children?
3. **Risk evaluation and control setting:** risk evaluation and control involves asking the question, ‘how serious is the risk and is there anything that can be done to minimize it?’ Consider the difference between someone walking through a smoky room, where the risk may be relatively small, compared to, say, spending three hours in a train carriage full of smokers with the windows closed. In terms of controls, consider air conditioning, opening windows, not inhaling (not recommended), and so on.
4. **Record findings:** it is important to be able to look at risks and learn from them in some way. In terms of smoking, many public places have now outlawed smoking from the premises (notice that they have not outlawed smokers, just the actual smoking activity), which is often due to customer responses, research suggesting health implications, and so on.
5. **Review:** it is important that all activities are reviewed periodically, as the hazards associated with risk often change along with the nature of the risk itself. As a final consideration of the smoking example, the hazards of smoking have shifted dramatically in the UK since the introduction of the country-wide smoking ban in public places. This means that whereas before the ban it was relatively safe to sit outside a pub in the fresh air leaving the smokers to their fume-filled interiors, the situation is now reversed. Pub gardens are now the places where the smokers are forced to lurk, whereas people with families are now often forced to go inside the pub itself to avoid them, hence, acclimatising their children to going into pubs from an early age and increasing the chance of them drinking heavily. It never rains, yet it pours.

One way to reduce risk is to improve the way that things are done – or the approach. There are many approaches to solving a single problem, some of which will be higher in risk than others. If these different approaches

can be captured in some way, then it is possible that they can be compared and reviewed. In fact, the way to minimize or control a risk is very often to define processes on how to avoid the risk in the first place or, when necessary, define processes concerning what to do when the risk manifests itself. Therefore, process modelling is an essential part of any risk management exercise as the solutions are often the processes that are necessary to keep everyone safe and well.

THE PROCESS

Standards, processes, procedures and guidelines

In real life, processes can manifest themselves in many different shapes or forms. When a process is written down in some way, it will often take the form of, for example, a standard, a procedure, a set of guidelines or work instructions. Although there are no absolute, globally accepted definitions for any of these terms, it is important to consider the underlying concepts and to understand them. In fact, the difference in terminology often relates to the level of detail in the process itself. Consider the following:

- Very high-level processes, such as international standards: there are many international standards bodies, such as the International Standards Organization (ISO), International Electrotechnical Commission (IEC) and European Normative (EN). Some national bodies have also obtained recognition globally and sit at the same sort of level, such as the British Standards Institution (BSI).
- High-level processes, such as industry standards: an industry standard is one that is driven by the actual industry and does not have the formal recognition of international and national standards. An industry standard may have international recognition, such as the UML or Common Object Request Broker Architecture (CORBA), or may simply be two organizations agreeing to work in the same way.
- Medium-level processes, such as in-house company standards and processes: many companies, particularly large ones, have very welldefined process models and standards and, in some cases, these may even be published, as in the case of the European Space Agency (ESA) (Mazza *et al.*, 1994).
- Low-level processes, such as in-house procedures: a typical procedure will describe how a process may be implemented. Indeed, it is possible for a single process to be implemented in different ways using different procedures.
- Very low-level processes, such as guidelines and work instructions: these will typically show a preferred or best-practice approach to carrying out a procedure. These may include specific methods and methodologies that may be applied, whether they are in-house, bespoke or commercial approaches.

The preceding list is not intended to be exhaustive, but provides a general idea of the scope of this book. The process modelling approach advocated in this book may be applied to any or all of these different types of processes.

Problems with processes

There are many problems associated with processes, which, unfortunately, often turn people off to the whole world of process modelling. In fact, mentioning processes or standards is often greeted with groans and sighs from people whose only experience has been one (or many) of disappointment. This really just goes to reinforce the fact that the whole world of process modelling is very badly affected by the three ‘evils of life’, described in detail in Chapter 4: complexity, lack of understanding and poor communications. So why are processes and standards so badly thought of by many people, and is this feeling justified? These two questions will be answered separately. Some of the reasons why people feel this way are discussed below:

- **Too long:** Some process descriptions are very long which, on first appearance, can be very off-putting to any potential users of the process. In fact, the length of the process description can often be misleading, as the number of pages is often not an indicator of the complexity of a process description, and it is the complexity of the process description, rather than the length of it that causes problems. However, this aside, being faced with a process description of several hundred pages is soul-destroying, regardless of how well written it may be. For example, two standards associated with process improvement are ISO 15504 (process assessment) (ISO/IEC, 2004) and CMMI (capability maturity model integrated) (Carnegie Mellon Software Engineering Institute, 2002), both of which stand at several hundred pages in length. The standard for the UML is also several hundred pages long. Although all of these standards are well written, bear in mind that, when printed out as hard copies, they each fill several volumes of folders. It is important, therefore, to be able to have a simplified representation of such a description that can be understood, at a high level, in a single glance. This will be supported by a number of other simple views, each of which can also be easily understood.
- **Too short:** Some process descriptions are very short and stand at only a few pages. Although, at first glance, such process descriptions can appear to be simple, this is often not the case. Take as an example ISO 9001 (ISO, 2000), which applies to quality systems for just about any type of organization that exists. When the standard is reduced to its actual contents (excluding front sheets, and so on) it stands at only 17 pages in length. The very fact that the standard

applies to many applications means that it needs to be generic, which leads to ambiguity, an indicator of the three 'evils of life'.

- **Written by committee:** according to the old adage, you can't keep all of the people happy all of the time, which is the *raison d'être* of committees. One of the basic requirements of a committee is that it represents the viewpoints of different stakeholders. Unfortunately, this has the potential to cause as many problems as it solves and too many different viewpoints, when expressed in an unstructured way, can lead to a fragmented, ambiguous and often inconsistent process description.
- **Too many:** it is very rare indeed to find a single process model that does not relate to, or rely on some other process model. In fact, it is also rare to find a process model that relates to one or two other process models as, in real life, the number of related process models tends to be very high. Consider the situation where a process model is being created for a particular industry. For the sake of the example, let's consider a process model relating to the rail industry, but it should be borne in mind that these same principles apply to any another process model, for example, the healthcare industry. In the case of rail, the process model may have to be compatible with generic international standards, such as ISO 9001 (ISO, 2000). Also, the process model will also have to be compatible with various national and international industry-specific standards. Alongside this, consider any government or country-specific standards, safety or security standards, best practice standards and legal requirements that may have to be met. Also, we have not yet even considered any standards or procedures within the organization itself, such as Her Majesty's Railway Inspectorate (HMRI) in the UK.
- **Unrealistic:** many process descriptions have little connection to reality, which often results in a process description 'gathering dust' on a shelf through lack of use. This may be because the process is asking for too much work to be done on top of the existing working practices, such as excessive documentation, replication of existing information or requiring too much input from too many different people. If the new process differs significantly from the existing process (even if it is an informal, undocumented one), there will be a natural level of resistance to the changes. It is essential that any new process definitions are connected to existing practice wherever possible.
- **Language:** the language used by the process definition must be the one that is already used by the organization. Many companies offer 'off-the-shelf' process descriptions which, in almost all cases may be destructive unless tailored appropriately for the organization. Terminology, technical nomenclature and even marketing

words and phrases must be embedded into the core process model wherever appropriate to ensure that the maximum number of people can understand the process in an unambiguous way.

- **Awareness:** for people to use a process, they must be aware of the process in the first place. This sounds like basic common sense, but the simple fact is that if a process description is printed out and left on a shelf then, in many cases, that is exactly where it will stay. With today's technology and the ubiquitous nature of the internet and web browsers, it is a relatively simple matter to make process descriptions available to people via their desktops. Of courses, this will only work in places where people sit at computers but, even if people do not have computer access, the fact remains that the process descriptions must be readily available to the people who are supposed to using them. The process descriptions should also make people's lives easier, rather than being an overhead (in terms of time). It is not until people can see the benefit of having this information to hand that they will truly start to adopt the whole process ethos effectively.
- **Fear of failure:** a common complaint when it comes to any sort of process modelling and process description is that the whole exercise is a waste of time because 'we tried it three years ago and it didn't work'. Just because something has been attempted once and failed, does not mean that it will never work. The actual underlying cause of these failures needs to be investigated. In almost every case where this has happened, it is relatively simple to see that all the information required for the process description was not present or that the problems discussed in this section have occurred. One of the main aims of this book is to introduce and define a process meta-model that can be used as a checklist for ensuring a complete and effective process description. By using this meta-model as a basis for an investigation, it is very common to see exactly why the previous process exercise has failed – one or more of the views required by the process meta-model is missing or incomplete.
- **Perception:** the perception of the process is key. People must be aware of the value of effective processes. A lack of understanding here may be due to poor education in the application, use and consequent benefits of the process.

These are just some of the common reasons why the process modelling exercise fails. This book intends to minimize the potential time and effort that is wasted by many organizations in pursuit of their process modelling requirements. Remember, process modelling is not magic, but nor is it a mundane task. There is a deep level of understanding required in order to produce an effective process model and description.

Modelling techniques

There are many modelling techniques that have been used extensively, and with varying degrees of success, for many years. Many of these techniques are based on visual techniques or, to put it another way, drawing diagrams to represent processes. The list of these techniques includes, but is not limited to:

- **Flowcharts:** the classic graphical modelling language that most people have come across at some point in their lives, even if it has nothing to do with software. Although widely used, flowcharts are frequently misused and are poorly understood. The biggest problem with flowcharts, however, is that they only realize a single view of the process model and, as discussed later in this book, there are seven views required for effective and complete process modelling. See Chapter 8 for a more in-depth description of the application of flowcharts for process modelling.
- **RACI matrix tables:** RACI stands for ‘responsible’, ‘accountable’, ‘consulted’ and ‘informed’ and RACI matrix tables are used to relate process activity to stakeholder roles. According to the RACI approach, any activity within a process will have a number of stakeholder roles associated with it, and these roles may be responsible (they do the work for the activity), accountable (they are responsible for the success or failure of the activity), consulted (they are asked to participate in the activity) or informed (they have information concerning the activity distributed to them). Basic RACI matrix tables are just that – a simple table for cross-referencing between the roles and the activity. However, these tables are often used in conjunction with flowcharts but are often contorted to include some sort of behaviour which makes the tables more complex and adds little value.
- **BPMN:** the business process modelling notation. The BPMN is the result of the business process modelling initiative (BPMI), whose aim is to provide a notation that can be readily understood by all business users and that ensures that various business execution languages can be visualized (BPMI, 2002). The three main aims are to define the notation and its association semantics and to amalgamate all best practice modelling notations (interestingly enough, including the UML). Although this is an excellent initiative that has yielded very good results, the BPMN is far too narrow to meet the stringent requirements for process modelling identified in this book. The notation itself focuses entirely on the behavioural aspect of the process model which, although adequate for the scope identified in the BPMI, is not considered wide enough for the purposes of this book. Indeed, the introduction of the process meta-model will show that there are seven views that need to be

considered – four of which are realized by structural diagrams, for which the BPMN has no facility. Also, the BPMN does not consider the requirements for a process that are essential for any sort of process validation. This means that, in total, the BPMN could only be used to realize two of the seven views required for effective and complete process modelling. See Chapter 8 for a more in-depth description of the application of the BPMN for process modelling.

This is just a small sample of some of the techniques that are available for use. Although the technique adopted in this book is the UML, the main focus of the book is a series of concepts that can be realized using ‘any single notation or, indeed, combination of modelling notations’ that is capable of meeting the modelling requirements of the process.

The UML

This book uses diagrams to help to visualize and understand processes at many different levels. These diagrams are not random and are actually part of a larger ‘language’. The language chosen is the UML, which is a *visual modelling language*:

- **visual:** the results can be seen graphically or, to put it another way, it is a language of diagrams containing symbols;
- **modelling:** reality is simplified in some way so that it can be more easily understood;
- **language:** it is a means of communication.

The choice of the language itself has a certain rationale. The UML is the most widely used modelling language in the world today. Although the UML has its roots firmly in the software world, it is increasingly being used for wider, more systems-based applications.

There are also several pragmatic reasons for choosing the UML:

- **Widespread use:** the UML is the most widely used modelling language in the world. Up until relatively recently, there were more than 100 visual modelling techniques and notations available to software engineers. However, the UML has now superseded all of them – with the full assent of every methodologist in the world. Although the UML originated in the software world, the notation itself can be applied to almost any form of modelling.
- **Accepted internationally:** the UML is not just limited to a particular country or continent, but is a truly world-wide standard that is accepted just about everywhere. This means that when working with colleagues in different countries, there is a common medium on which to base discussions.

- **ISO standard:** the UML is now an ISO standard – ISO 19501 (2005), which gives it more credibility than it just being an industry standard. Many of the criticisms that were aimed at the UML were concerns about its lack of international credibility, which are now resolved.
- **UK government mandate, via eGIF:** as the UML becomes more widely accepted, it also becomes more formally accepted by world organizations, such as governments. One example of this is in the UK, where there is an initiative named *eGIF: The electronic government interoperability framework* (Cabinet Office, 2004). The main aim behind the eGIF is to define the technical policies and specifications governing information flows across government and the public sector. It covers interconnectivity, data integration, e-services access and content management. This initiative will apply not only to organizations who deal directly with government bodies, but also many of their subcontractors.
- **Intuitive:** the notation used by the UML is, when used properly, simple and intuitive. Some aspects of the UML are more intuitive than others, which is due in part to some elements of the UML looking like previous techniques, such as flowcharts and data flow diagrams. This familiarity increases the perception that something is easier to understand.
- **Extensive use in other aspects of the organization:** this final advantage of using the UML is often overlooked but can have a massive impact on issues such as training. Consider an organization where there are managers, engineers, technicians, quality assurers, marketers, directors and sales teams. If each of these has a very basic idea of the core elements of the language and is familiar with one or two of the diagrams, then there is a massive increase in communication effectiveness. Of course, different people in different jobs will naturally use different techniques and tools to perform their work, but if the core *knowledge* behind the work is defined in a common language, then this knowledge can be turned into effective value in the business. For example, using a single core notation in training will decrease the number of different techniques being used, hence enabling a single, common view to be communicated by and to all members of staff by an effective training unit or partner. Also, in the case of process modelling, if the core company knowledge is captured in a process model, then there is a ready-made training course for anyone who understand the basics of the UML language. After all, what better source for training material than the actual knowledge itself! The concept of modelling all parts of the organisation into a single entity is known as Enterprise Architecture and is discussed in more detail in Chapter 7 where it

will be seen that the same modelling techniques can be employed for both process and enterprise modelling.

Therefore, the notation used in this book is the UML. You do not have to be an expert in UML to appreciate how it is used, nor to start using it – the expertise will come with time. Also, the use of UML in this book is limited to a very small subset of the actual language, which minimizes the learning curve. Providing that the core concepts of the rationale for modelling is understood, the use of the notation is relatively straightforward.

CONCLUSIONS

This chapter introduced and explained the background of process modelling. It briefly explored the concept of risk and introduced the application of process modelling to control risk. Central to this, the chapter discussed the idea of processes and why they are so important, together with some problems that are often associated with processes. In fact, processes are far more complex than meets the eye; hence, the need for process modelling. If processes are going to be modelled, an appropriate language is required and, from the various languages and notations available, the Unified Modelling Language, or UML, was identified as the one used for the modelling in this book.

The remainder of this book builds on these foundations to create an entire approach to pragmatic business process modelling that is based on best modelling practice and uses an internationally recognized standard notation for its realization.

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About the author

Jon Holt is the founding director of a systems engineering consultancy and training company. He is an international award-winning author and public speaker and is a Fellow of the BCS and the IET. He has held various academic positions in the UK and the USA.

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