Chapter 2
The Four "P"s of Enterprise ICT

A holistic quality approach is founded on a certain view on enterprises and their ICT. Characterising enterprises and their ICT is a complex task and many disciplines and people have done excellent work on it. It is not our goal here to provide another theory of Business Administration, Computer Science, ICT Management or the like. But we do aim to present a holistic approach for quality issues that are vertically and horizontally aligned with the enterprise's organisation. Such an approach affects the people that work there, the implemented processes, the implemented ICT products and applications, and the defined ICT programmes and projects. We call this the four "P"s of enterprise ICT.

Before we discuss the four "P"s in subsequent sections we will shed some light on enterprises and their ICT. We will discuss enterprises as black boxes and depict the relevant objects of enterprise ICT. From this chapter on, we will focus only on the ICT world and discuss our concepts in the context of ICT systems and products.

2.1 Our View on Enterprise ICT

Business today is heavily dependent on ICT systems, which not only collect and provide data and information to their end users, but also play an increasingly active role in decision processes. Remember the example, for instance, where in August 2013 the NASDAQ fell into trouble because the trading software made decisions based on "a confluence of unprecedented events", as they claimed (Stafford 2013). What we would like to demonstrate with this example is not that ICT systems sometimes fail to deliver as expected but that those systems take decisions and actively initiate business processes with impacts at the expense of third parties. Sometimes these systems act together with humans and sometimes they act in isolation because the corresponding rules and instructions have been implemented in the system's software. In the latter case, we need to rely on the system's behaviour and need to ensure upfront that it is safe and reliable. As we know, it is not always easy to define precisely what correct behaviour is, but without the right

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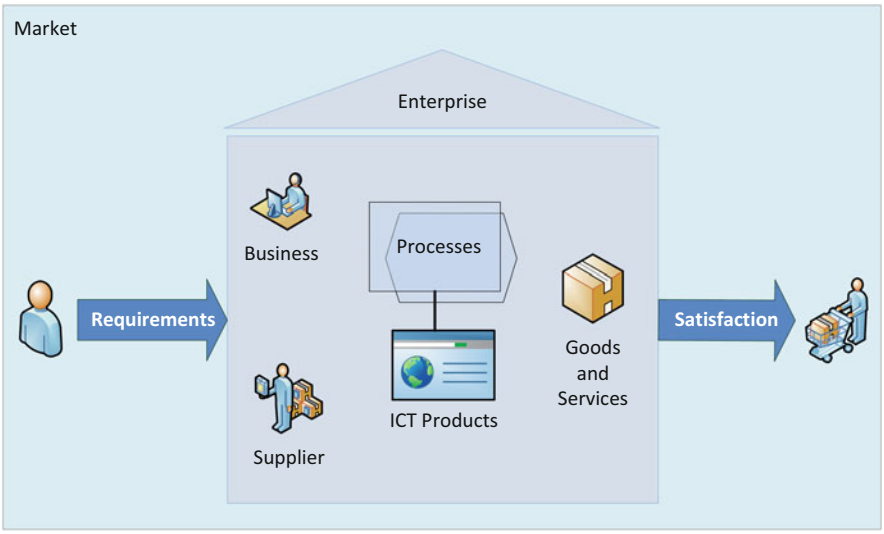


Fig. 2.1 An abstract view on enterprises

quality, it becomes a game of pure chance. This should not be a goal to which enterprises and their leaders aspire.

Let us start our construction of a holistic enterprise ICT quality approach with a small illustration characterising an enterprise in its market. In our systemic view, an enterprise can be regarded as a black box, located within markets and getting requirements from their markets, customers, and potential customers and being able to satisfy their customers' needs. Looking into this black box, it is usually driven by experienced and intelligent people using powerful ICT products to efficiently conduct the corresponding processes for building and offering the enterprise's products, i.e. goods and/or services. It is a view that Richard Barrett calls a "machine with a mind" (cf. Barrett 1998). This is schematically depicted in Fig. 2.1.

There are people who work in management, administration, business domains and ICT. They are permanent staff, external consultants or suppliers. They are recruited or assigned at some point in time best suited for the appointed position. Processes mostly break down into business processes, management processes, ICT processes and project processes. Processes provide a proven systematic way of performing various tasks in the respective domain of an enterprise. A process is defined through its goals, preconditions, inputs, outputs, sequence of activities together with the intermediate artefacts and final products and also employs methods and tools. Powerful ICT products or parts of these products are important resources for people to perform their business processes efficiently. Last but not least we have the business products to be offered and sold to customers. The business products are goods or services or combinations of both. Projects are started as an organisational structure with fixed targets, like building new products or maintaining existing ones, and are limited in time and budget.

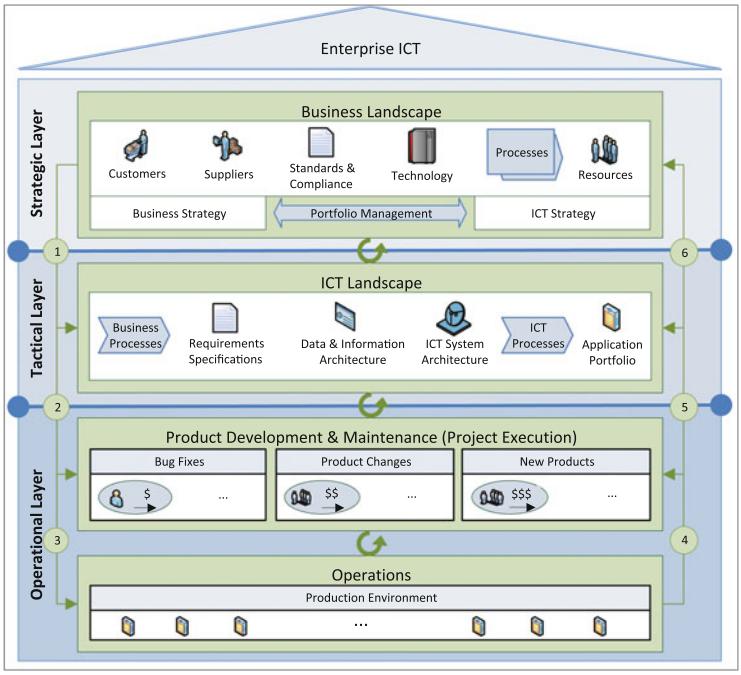


Fig. 2.2 Enterprise ICT

Of course, quality of ICT products is always presupposed and sometimes ICT quality is actually in place. The question frequently is, to what degree? Looking at an enterprise in more detail, three organisational layers can be distinguished: the strategic, the tactical and the operational layer. To align ICT with business demands it is necessary that ICT as a whole and ICT quality in particular are represented at all three layers. Following the ideas of information management and information engineering (cf. for example Hares 1992; Heinrich and Lehner 2005; and Krcmar 2005) our view on enterprise ICT is depicted in Fig. 2.2.

Enterprise ICT and its quality is a strategic, tactical and operational topic. On a strategic layer we have the business landscape of the enterprise, comprising the strategies for business and ICT, standards and compliance with external laws and regulations, such as Basel III and SEPA, national and international ICT-related standards, trends in technologies for effective and efficient enterprise ICT and the business processes of the enterprise. This is also the layer where responsibility for governance lies (see Chap. 4). This list is not exhaustive, but it gives a good summary for our purposes. The next layer, i.e. the tactical one, consists of the ICT landscape comprising all the ICT products (ICT systems). It is the layer where the implementation of the ICT strategies, planning, monitoring and control of ICT infrastructure and ICT projects is done. For the next and lowest layer we make a distinction between product development and maintenance (projects) on the one hand and operations on the other hand. Typically, operations comprise the running

of ICT products, including all hardware, software, infrastructure and user (customer) support. The service quality of operations is defined through service layer agreements. Business continuity has to be guaranteed on the basis of these SLAs. The arrows between the three layers on the left and right side define top-down and bottom-up mechanisms implementing a feedback loop to ensure that the targets from the upper layer are fulfilled by the lower layers and that the lower layers report on fulfilment. There is another iterative process in place between two layers, denoted by the symbol "↻". For example, the strategy of an enterprise is developed in several steps where the strategic and tactical layers cooperate.

As in Chen (2009) or Spring (1992), although with different goals and interpretations, the foundation of our enterprise ICT model is given by the four "P"s of People, Processes, Products, and Projects and Portfolio. We will discuss them in more detail further on.

2.2 First "P": People

The first "P" stands for People, in this case management, members of staff and stakeholders. Generally speaking it is the "who" of reaching a particular goal. People have different roles in daily business. Roles like board member, executive manager, product owner, project manager and project member, team leader and team member are defined within an enterprise. All people are internally driven by their own values and beliefs and externally noticed by their actions and behaviours (cf. Barrett 2006). In this sense, they form a human system as part of an enterprise and constitute the "mind of the machine" as referred to above. The success of an enterprise strongly depends on an efficient interplay between all the four "P"s. Therefore, it is important to know people's motivation and goals, and not only to measure, monitor and improve their actions and behaviours.

Internal to the enterprise, know-how and experience of management and staff members is as important as profound knowledge about the stakeholders' views and interests. Because of cost requirements the number of adequate people for the different roles is mostly limited. Take a simple example with great impact from the auditing field:

> *Due to a warning resulting from an external audit, an enterprise had to show what it had done to ensure quality of the central accounting system. Because of missing test and quality reports the enterprise defined a project to establish quality assurance in the form of a so-called test case portfolio for every ICT system. To build the portfolios, key users from the business departments had to be involved. But as is most often the case a key user—as the name indicates—has more than one task. Other people with adequate know-how were not available and so the project was delayed.*

Is this normal business practice which we simply have to accept or can we eliminate such situations through preventive actions? What are the options we have? From our viewpoint, qualifying more people in the same topics to relieve the key users in any situation is one option; getting experienced people from outside

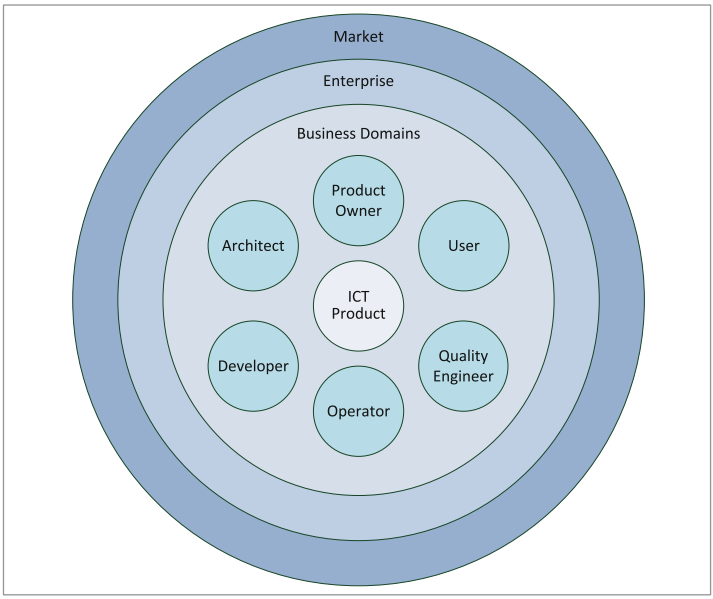


Fig. 2.3 Enterprise staff and stakeholders

the enterprise is a second option; and making the processes more productive is a third option. The latter then directly leads to questions like “what is the enterprise’s core competency”, “is it possible to outsource all non-core tasks”, and “what are the preconditions for such transformations”. For process concerns we refer to the Process “P” below. From the people’s perspective, organisational change and transformation is always a question of aligning the people’s interests with the interests of the enterprise. Therefore, we will look at different stakeholders of ICT products.

Different stakeholders have different views and expectations on correctly functioning ICT, which are applied in alignment with the business demands and which support daily business process execution. Also, their view on the quality of such ICT systems is determined by individual requirements and may change over time. Relevant stakeholders are first of all customers and market competitors. At enterprise level we have shareholders, board members and business domains. When going into more detail and looking especially into product development and maintenance, as well as operations, we have stakeholders like the internal user, the product owner, the quality engineer, the business and system architects, the developer and last but not least the operator in the production centre. They all have their roles in the enterprise, as depicted schematically in Fig. 2.3. The question that remains is what are the stakeholders’ views and expectations on quality of the ICT systems in use?

What are the stakeholders’ requirements for quality and what happens if the required quality is missing?

1. Market
   - Customers—require and accept the quality of the corresponding products and the quality of the buying channels;
   - Competitors—may gain an advantage on the market if the product or channel quality is poor.
2. Enterprise
   - Shareholders—missing quality of the ICT systems or channels may lead to decreasing revenue and subsequently to falling stock price and loss of money;
   - Board members—have overall responsibility for the quality and reputation of the business and decide on investment in quality;
   - Administrative departments—support the business and ICT, such as financial administration and human resources;
   - Enterprise academies—provide and organise internal and external seminars.
3. Business domains
   - (Business domain) Managers—have responsibility for the requirements for the ICT systems, including the detailed quality characteristics, and must accept ICT quality afterwards;
   - Key users—need quality for their daily work and therefore define requirements, including the detailed quality characteristics, and verify the quality during acceptance.
4. Product-related
   - Product Owner—is responsible for a product and its quality;
   - (Internal) End users—are affected in their daily work by missing quality and are interested in achieving stable and reliable systems with good performance and security;
   - Quality engineer—refines high-level quality characteristics down to design and code level and validates and verifies them to find out where the errors and causes lie before the system goes live;
   - Architect—refines requirements to design level as technical specifications for the developer;
   - Developer—implements the systems or changes with a certain quality using the functional and technical specifications;
   - Operator—has responsibility for operating all systems in the enterprise's ICT landscape and is therefore responsible for business continuity if missing quality leads to business disruption.

One question remains: who is responsible for the whole ICT systems landscape? Have we forgotten a key stakeholder? Or are they included in one of the above-mentioned roles? Or is this mostly not defined? We believe that the overall responsibility for ICT strategy and ICT landscape is given to the CIO or ICT Director at board level.

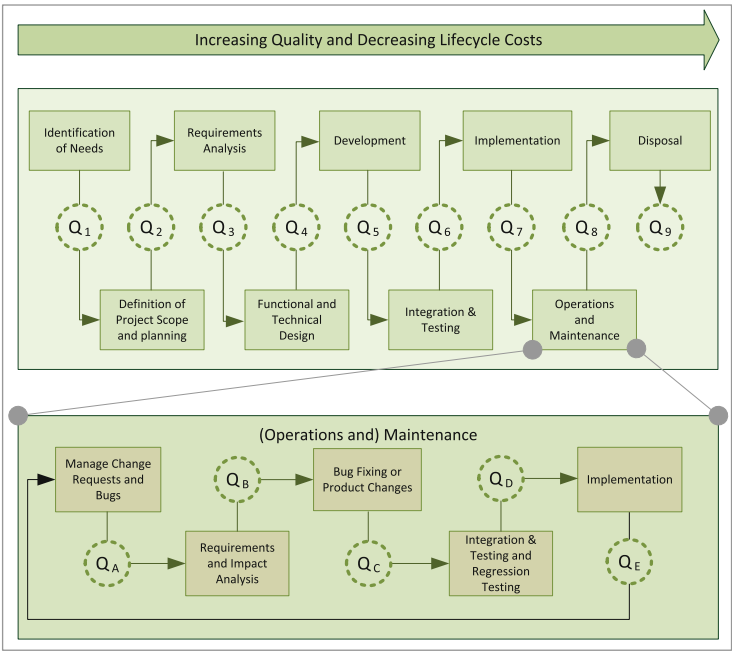


Fig. 2.4 Product lifecycle model

2.3 Second "P": Processes

The second "P" stands for Processes, which constitute the relationship between technology, methodology and people. Generally speaking it is the "how" of reaching a particular goal. Enterprise processes can be broken down into business processes, management processes, ICT processes and project processes. In the first instance, we are interested in processes in a product lifecycle. Our preferred model is presented in Fig. 2.4. It is a closed box that has a starting point, where product needs evolve, and a terminal point, where that same product is taken out of operation. The lifecycle is amended by so-called quality gates after each phase. Let us briefly discuss the basic model, encompassing nine phases, where "operations and maintenance" is again subdivided into five further phases. The phases are similar to the lifecycle model in (US Department of Justice 2003) but not identical and are complemented by quality gates. Note that all phases require more or less interaction between business and ICT.

1. **Identification of needs**: This phase starts when a business need or opportunity is identified. The needs and opportunities are documented in a concept proposal. This phase ends with the approval of the concept proposal in quality gate Q_1.
2. **Definition of scope and project planning**: Feasibility and appropriateness of the concept proposal are reviewed, the scope of the planned system is identified

and the general funding is approved. The concept is further developed to describe impacts on the business, staff and costumer privacy. To ensure the systems provide the required capability on-time and within budget, project resources, activities, schedules, tools; and quality assurance are defined. Additionally, a suitable product quality model is defined, including security certification and high-level vulnerability assessment. This phase ends with the approval of the system concept and planning document in quality gate Q_2.

3. **Requirements analysis**: Business and system requirements—functional and non-functional by nature—are formally defined and delineate the requirements in terms of the product quality model; e.g. system performance, security and maintainability requirements. All requirements need to be measurable and testable and relate to the business needs and opportunities identified in the first phase. This phase ends with the approval of the detailed requirements document in quality gate Q_3.
4. **Functional and technical design**: Functional and technical characteristics of the system are designed, the operating environment is established, everything requiring user input or approval must be documented and reviewed by the user, physical characteristics of the system are specified and a detailed design is prepared. This phase ends with the approval of the detailed design document in quality gate Q_4.
5. **Development**: The detailed specifications of the design document are translated into hardware, communications, and executable software. The software must be unit tested, integrated, and retested in a systematic manner to conform to the product quality model. Hardware is assembled and tested to conform to the product quality model. This phase ends with the approval of the detailed test completion report in quality gate Q_5.
6. **Integration and testing**: The various components of the system are integrated and systematically tested to conform to the product quality model. Here, functional as well as non-functional requirements have to be satisfied. Prior to installing and operating the system in a production environment, the system must undergo certification and accreditation, if necessary. This phase ends with the approval of the detailed integration and test completion report in quality gate Q_6.
7. **Implementation**: The system is installed and made operational in the production environment. This phase continues until the system landscape is operating in production in accordance with the defined requirements. This phase ends with the statement of acceptance approved by the Operations department in quality gate Q_7.
8. **Operations and maintenance**: This phase breaks down logically into two different activity clusters; system operation, which is an ongoing task ending with the disposal of the system in the last phase, and system maintenance, which is a task performed each time a corresponding request appears. In the Operations department, the system is monitored for continued performance in accordance with user requirements, and necessary system modifications are incorporated. The operational system is periodically assessed through In-Process Reviews to

determine how it can be made more efficient and effective. Operations continue as long as the system landscape can be effectively adapted to respond to an organisation's needs. When modifications or changes are identified, the following sub-phases are entered. This phase ends with the end of system operation in quality gate Q_8;

(a) **Manage change requests and bugs**: Similar to phases 1, 2 and 3 above, failures and change requests lead to additional development, integration and testing activities. This must be planned, set up and monitored at the operational layer. This phase ends with the approval of the concept proposal, the system concept changes and the planning document in quality gate Q_A;
(b) **Requirements and impact analysis**: Similar to phases 4 and 5 above, the required changes need to be analysed and their impact on the existing functional and technical designs has to be considered and incorporated. This phase ends with the approval of the modified detailed design document in quality gate Q_B;
(c) **Bug fixing or product changes**: Similar to phase 5 above, the modifications of the detailed design document have to be translated into hardware, communications, and executable software. The modified software must be systematically retested to ensure its components and integration satisfy the product quality requirements. If necessary, hardware is re-assembled and re-tested to conform to the product quality model. This phase ends with the approval of the detailed test completion report in quality gate Q_C;
(d) **Integration & testing and regression testing**: Similar to phase 6 above, the various components of the system are integrated and systematically tested to conform to the product quality model. Here, functional as well as non-functional requirements have to be satisfied. Before installing and operating the system in a production environment, the system must undergo certification and accreditation activities, if necessary. This phase ends with the approval of the detailed integration and test completion report in quality gate Q_D;
(e) **Implementation**: Similar to phase 7 above, the system is installed and made operational in the production environment. This phase continues until the modified system landscape is operating in production in accordance with the defined requirements. This phase ends with the approval of the acceptance by Operations in quality gate Q_E.

9. **Disposal**: Disposal activities ensure the orderly termination of the system and preserve vital information about the system so that some or all of the information can be reactivated in the future if necessary—also known as "digital preservation". Particular emphasis is given to proper preservation of the data processed by the system, so that the data is effectively migrated to another system or archived in accordance with applicable records management regulations and policies, for potential future access. This phase ends with the approval of the long-term archive of the system—removed from the production environment—by Operations in quality gate Q_9.

Note that this model does not in any way presuppose a particular development model. It could be Agile, waterfall or any other suitable model. But we strongly believe that a lifecycle is always sequential and closed because it starts with the needs for a product and ends with its disposal. In between, we may have iterations, cycles or sprints. The corresponding processes within such a lifecycle model can be adapted and tailored from SPICE (ISO 2011), CMMI (Chrissis et al. 2011), ISO 9001 (2008), EFQM (2012) or even a combination of these.

For further discussion, it is also important to bear in mind that the impact of not having the right quality in place increases from left to right.

2.4 Third "P": Products

The third "P" stands for Products, which usually mean the goods and services offered by an enterprise (cf. Fig. 2.1). Generally speaking it is the "what" of reaching a particular goal. In our case the term product will be used as it is in manufacturing; products for us are the input and output artefacts of the whole lifecycle. Therefore, it could be software offered by software companies or developed by an enterprise itself and implemented afterwards; it could also be apps from an app-store or even a complete ICT systems landscape of a global enterprise. What it really means in given situations depends on the goals and perspectives of the observer. We will discuss our product view along two lines, the lifecycle (horizontal structure) and the vertical structure of enterprise ICT. In doing so, we will restrict ourselves to the most relevant products from a quality perspective. Of course, those products have to be validated or verified. This will be discussed later on.

***Along the lifecycle (cf. Figure 2.5)*:** Remember that phases 3–7 are mostly organised in a project setting with clear targets, scopes and schedules.

Therefore, project order, project charter and project plan are sample products generated by phase 2. Projects that are not organised using traditional methods, like PMI (2013), but those like Scrum (Pilcher 2008), will still produce the same products, even if the corresponding products are named differently. In an ICT project (phases 3–7) the requirements specification, the functional design, the technical design, the software, the test-ware and the implementation guide are the most important products. They also need right quality for future modifications and strongly influence the costs of operations and maintenance. As it concerns the development and maintenance phase of the whole ICT landscape, the products of phase 8 are similar to the products of a project (see above). The particular products affected depend on the type of task that has to be undertaken; bug fixing, implementation of change requests or implementation of new products. For example, bug fixing has mostly no project organisation, whereas the development and implementation of new products that result from change requests are organised in projects.

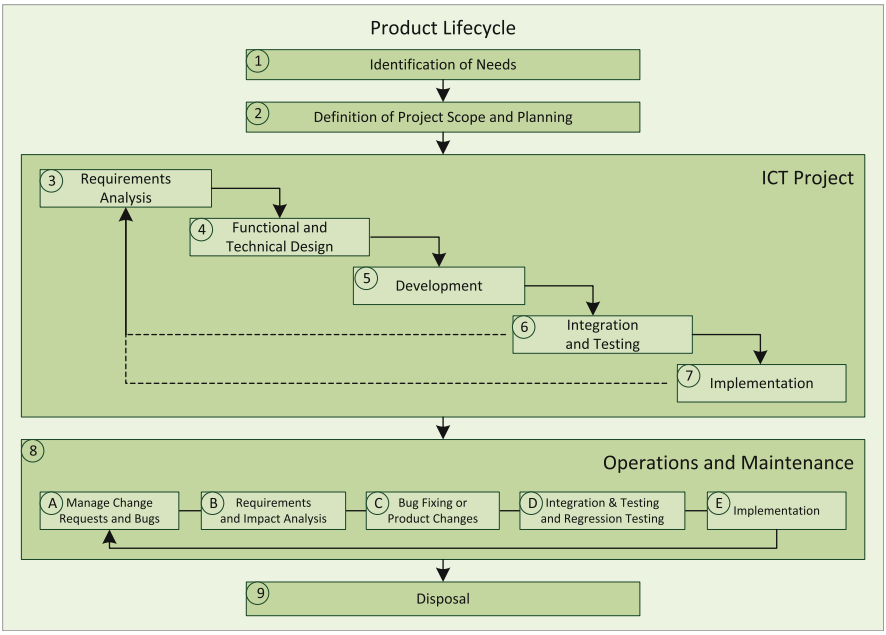


Fig. 2.5 Products along the lifecycle

Along the vertical structure of enterprise ICT (cf. Figure 2.6): Remember from above discussions that the vertical structure is a layered one consisting of the strategic, the tactical and the operational layer.

At the strategic layer we have products like the business processes mentioned above, which are clustered into business domains depending on the enterprise markets and target groups. Also included from a business perspective are the marketing and sales channels, through which a customer or user has access to the offerings and services of an enterprise. Different types of channels, so-called interaction levels, are well known (cf. von Lucke and Reinermann 2000): (1) *information type*, i.e. collecting data and information and providing it to the customers and users through applications like enterprise portals; (2) *communication type*, i.e. exchange of data and information between customers or users and the enterprise using additional services like blogs, forums, e-mail and video conferencing; (3) *transaction type*, i.e. order execution including the whole order processing and fulfilment using services like tracking and electronic payment. The object list at the strategic layer comes from portfolio management and especially from business process management. At the tactical layer we have products, like service architecture, consisting of service clusters, services and service components. The latter are often used not only in one but in many services or service clusters. The object list comes from application portfolio management and especially from enterprise architecture management. The business channels are handled by services

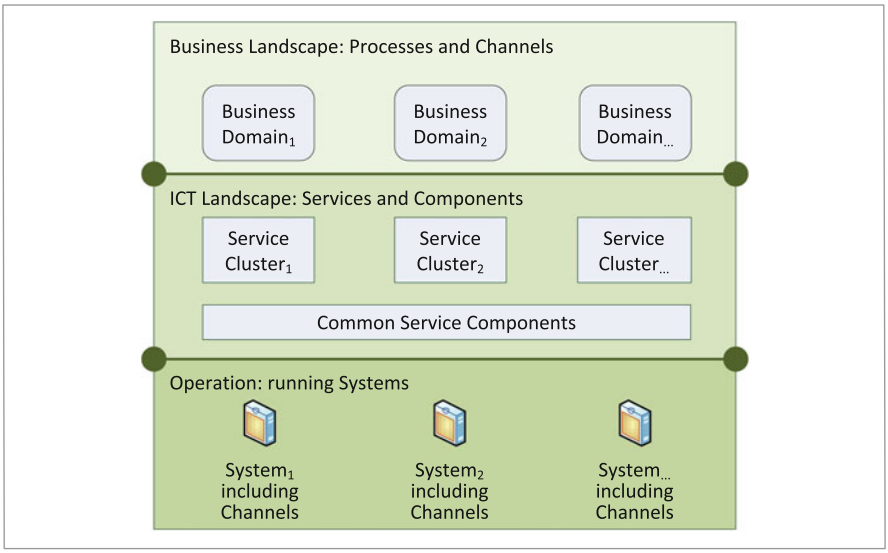


Fig. 2.6 Products along the vertical structure

and service components. The products at the operational layer are real-world objects, like an ICT system or application which serves the business channels by means of smartphones, tablets, laptops or PCs. Different types of channels need different types of implementations. The traditional type is implemented by an office or a branch. An example from retail banking might illustrate this vertical structure in more detail (cf. Fig. 2.7).

At the top level we have the customers, who choose a particular channel to get access to the services of a bank. Suppose the customer wants to take out a loan. In that case the corresponding "Retail lending" business process is performed through the selected channel. This process cluster is subdivided into three processes ("Loan origination", "Loan servicing" and "Loan closure"). Note that not all services are valid for every business channel. For example, "Receive application" is a service that is performed in the branch but not through internet.

Going down to the tactical layer we have the services and service components. Going down from this layer we reach the operational layer, where the corresponding systems run. This provides us with suitable object lists at the various layers of an enterprise. Hence, defining the right quality for every layer becomes possible and the corresponding methods, procedures and tools of quality governance, quality management and quality engineering can be applied. The question of how the required quality defined by the upper layer is to be validated and verified is then answered at the lower layer.

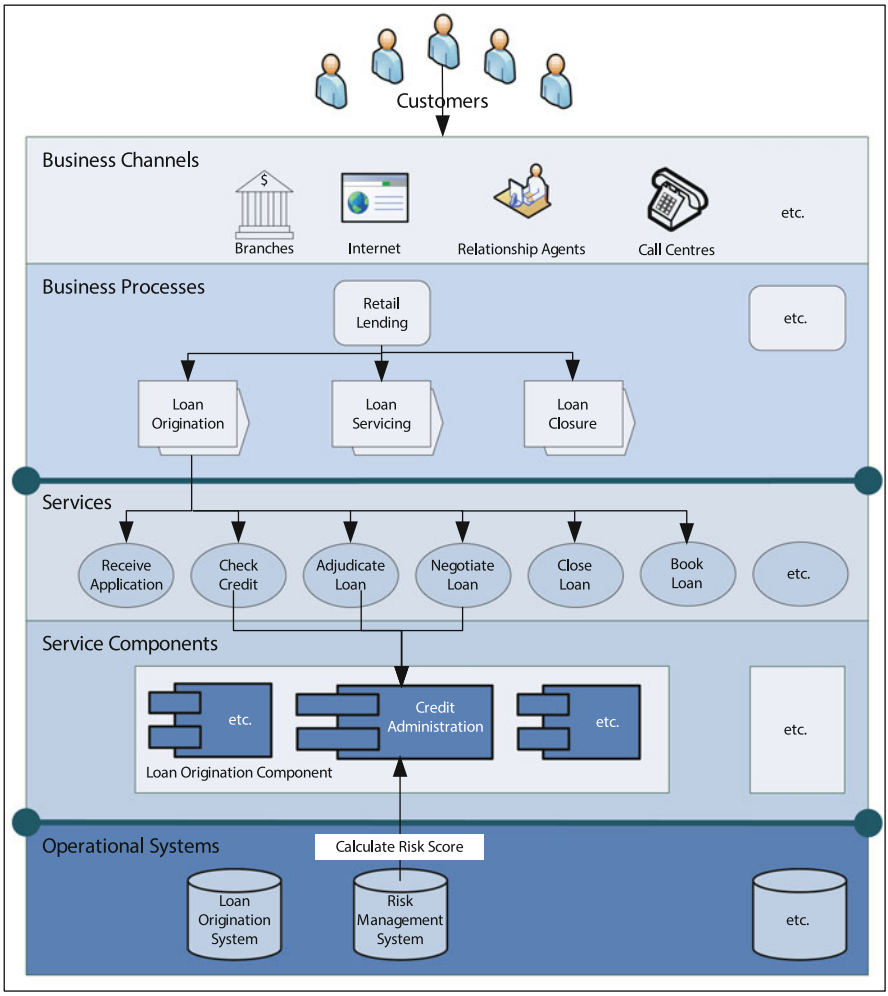


Fig. 2.7 An example from retail banking

2.5 Fourth "P": Projects and Portfolio

The fourth "P" stands for Projects and Portfolio. Projects are of set up, have certain goals and are limited to a planned budget. Generally speaking it is again the 'how' for reaching a particular goal. In our product lifecycle model (cf. Fig. 2.4) the phases from the beginning up to implementation normally make up at most 30 % of the effort to be spent on the product during the whole lifecycle. The rest of the effort, 70 %, is dedicated to the "operations and maintenance" phase. Usually the phases from requirements analysis up to implementation are organised in projects. Likewise, some tasks from the "operations and maintenance" phase will be



Fig. 2.8 Project elements for consideration

organised in projects. A proposal of lean maintenance for manufacturing (Harsey and Yusof 2011) can also help to improve this phase, but it is not our intention to discuss it here.

From project management methodologies like PMI (2013) we learn that many issues have to be considered before execution, although only a few of them are well known. Figure 2.8 provides examples of project elements that have to be taken into account when starting (cf. Sterrer and Winkler 2006 for a similar picture).

Due to the general complexity of projects, and failure rates far beyond 20 % for ICT projects specifically, new methodologies have appeared during the last decade. The Agile development paradigm, in particular, has heavily influenced planning and execution of projects (cf. for example Beck et al. 2001; Sutherland 2004; Sutherland 2005; and Pilcher 2008).

If we look for quality issues in such project management methodologies we find that most of them are rarely defined; no minimum quality requirements are

predefined. Take for example the question of how much to invest in quality. Often it is less than budgeted, because the project lead decides to spend more money on development than on quality assurance, and it is less than needed, because quality is not regarded as a lifecycle issue (although everybody knows that costs dramatically increase in later phases of the lifecycle).

A far worse situation for many organisations is that project managers take a lot of heat when project management does not deliver "organisational nirvana". This is typical when executive leadership does not invest in the right selection of projects through the process of Project Portfolio Management.

Thus, the most common problem faced by project-oriented organisations is having too many projects relative to their capacity. Therefore, one of the first requirements is to determine what can be done; i.e. determine what should be done and what should not be done.

The Programme Management Survey 2002 (KPMG 2002) showed that 56 % of companies had a failed project within the preceding year at an average cost of £8 million. Other surveys indicate that up to 87 % of projects fail to deliver expected benefits. The problem is huge and yet companies are failing to address this issue effectively.

What we have found with our customers is that they have too many projects relative to their capacity and their approaches to the problem are:

- A piecemeal solution;
- Failure to appreciate and manage this at the portfolio level;
- Absence of corporate change culture;
- Absence of overall quality assurance.

The lack of coordination of strategic projects—also failing to recognise some initiatives as projects—leads to a dilution of resources, conflicting project objectives and ultimately not meeting their strategic objectives. We have found that companies need to understand that projects, programmes and portfolio need to be managed and supported in line with their development capability, as shown in Fig. 2.9, and this has to be supported across processes, people, tools and techniques.

Therefore, one of the first things is to determine what can be done; i.e. determine what should be done and what should not be done. Our experience tells us that organisations need Project Portfolio Management when there are:

- Too many projects in progress or uncertainty on how many there are;
- Uncertainty with regard to how projects support organisational strategy;
- Lack of priority balance; e.g., risk vs. timeframe;
- Questionable project value or project's value is disproportionate to investment;
- Resources working overtime while other resources are under-utilised;
- Lack of understanding of project interdependencies;
- Consistent failure to meet project cost, schedule, and technical milestones.

Research by Cooper, Edgett, and Kleinschmidt (1998) shows that the primary cause of business underachievement lies in failing to manage the collection of all projects as a portfolio. This problem is a direct result of the lack of an adequate

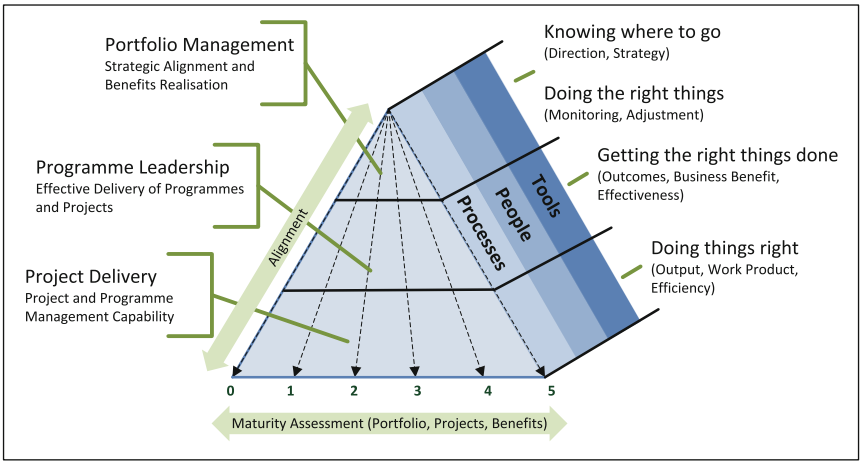


Fig. 2.9 Portfolio management

portfolio management process supported by enabling software. In our experience most companies do not have processes or tools that provide the information needed to make fact-based decisions about their portfolio of projects. As a result, senior executives are in a constant dilemma and cannot answer the following questions with confidence (or can confidently answer in the negative):

- Is my organisation working on the right projects and programmes?
- Are we working on the right number of projects and programmes?
- What resources do I need to complete the programmes as planned?
- Do we have effective processes in place to select and accomplish the programmes?
- When can I start a new programme?
- What is the impact of a new or modified programme schedule on lower priority programmes?
- What is the status of each project and programme?
- What is the history of schedule prediction vs. performance?

Another way to look at the problem is that most companies do not have fully effective processes for making decisions about the portfolio of projects and most companies do not have the supporting processes or tools that provide the information needed to make fact-based decisions about the portfolio of projects.

Benefits of Project Portfolio Management Concerning ICT Quality

There are many benefits of implementing Project Portfolio Management; however, there are three primary reasons why even the rank-and-file of project management should not only welcome PPM initiatives, but actively promote them at the grass-roots level:

1. **PPM brings realism to an organisation's planning processes**. The Balanced Scorecard Collaborative estimates that upwards of 80 % of corporate strategies are never implemented. While the reasons for this are complex, at least part of the problem is that "strategic thinkers" dream up initiatives that the company has no hope of carrying out. Likewise, the hammering project management takes for "bad estimates" and project failure often begins in the executive suite with unrealistic targets, deadlines, and budgets. PPM aligns what an organisation wants to do with the resources—money, hours, people, time, and equipment—required for getting it done.
2. **PPM brings rationality in the allocation of resources, both human and financial**. After project inventory, the next important step in creating and executing a PPM process is to establish budgets (money and human resources), and define start and finish dates for these initiatives. Future projects or programmes are also forecasted and added to the organisation's potential portfolio of work. Also, at this stage, good PPM processes count heads. For some customers, the scarcest resource is not money but project managers. A critical factor in project selection is therefore: do we have a project manager who can manage it? This brings us to the third reason.
3. **PPM brings visibility of project work and project people.** The recent trend towards improved resource tracking and levelling functionality in project management software is a great boon to the project portfolio manager. In fact, without a system for knowing what each person in the pool of potential project staff is capable of, and when they will be available, you cannot really be said to manage a portfolio of projects.

So the fundamental task of ensuring the organisation launches the right quality initiatives requires first that the organisation aligns the projects with its business strategy. This is exactly what is achieved through the portfolio management process. The second step is creating checkpoints (quality gates) along the project lifecycle, where governance and exit criteria are in healthy balance. This results in an approach which we will call Portfolio Quality Management, as depicted in Fig. 2.10. For more details on portfolio management we refer to Rajegopal (2013).

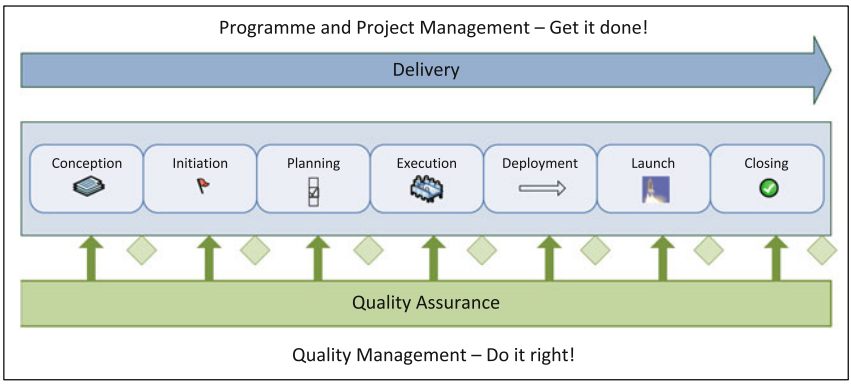


Fig. 2.10 PQM—Get it Done and Do it Right

References and Links

Barrett R (1998) Liberating the corporate soul: building a visionary organization. Butterworth-Heinemann, Woburn

Barrett R (2006) Building a values-driven organization: a whole system approach to cultural transformation. Elsevier, Oxford

Beck K et al (2001) The Agile Manifesto. http://www.agilemanifesto.org. Retrieved 7 Nov 2013

Chen K (2009) Product, project, process, and people: The four Ps of PLM analytics. http://www.technologyevaluation.com/research/articles/product-project-process-and-people-the-four-ps-of-plm-analytics-19934/. Retrieved 7 Nov 2013

Chrissis M, Konrad M, Shrum S (2011) CMMI for development: guidelines for process integration and product improvement, 3rd edn. Pearson Education, Boston, MA

Cooper R, Edgett S, Kleinschmidt E (1998) Portfolio management for new products. Perseus Books, Cambridge, MA

EFQM (2012) EFQM excellence model 2013. European Foundation for Quality Management (EFQM), Brussels

Hares J (1992) Information engineering for the advanced practitioner. Wiley, Chichester

Harsey F, Yusof S (2011) Continuous Improvement through an integrated maintenance model. In: Contemporary engineering sciences, vol 4(8). Hikari Ltd, Ruse Bulgaria, pp 353–362

Heinrich L, Lehner F (2005) Informationsmanagement: Planung, Überwachung und Steuerung der Informationsinfrastruktur. Oldenbourg Verlag, München

ISO (2011) Information technology—process assessment, ISO/IEC 15504. International Organization for Standardization (ISO), Geneva

ISO 9001 (2008) Qualitätsmanagementsysteme—Anforderungen, ISO 9001:2008. International Organization for Standardization (ISO), Geneva

KPMG (2002) Programme management survey. KPMG, London

Krcmar H (2005) Informationsmanagement. Springer, Berlin

Pilcher R (2008) Scrum—Agiles Projektmanagement erfolgreich einsetzen. dpunkt.verlag, Heidelberg

PMI (2013) The standard for program management, 3rd edn. Project Management Institute, Newtown Square, PA

Rajegopal S (2013) Portfolio management—how to innovate and invest in successful projects. Palgrave Macmillan, Basingstoke, Hampshire

Spring M (1992) People, processes, products and productivity—an address to EDGE International. http://www.sis.pitt.edu/~spring/papers/pppp.pdf. Retrieved 13 Nov 2013

Stafford P (2013) Nasdaq blames software flaw for trading outage. http://www.ft.com/intl/cms/s/0/138ccd6c-10c7-11e3-b5e4-00144feabdc0.html#axzz2l04nskPC. Retrieved 7 Nov 2013

Sterrer C, Winkler G (2006) Let your projects fly. Goldegg Verlag, Wien

Sutherland J (2004) Agile development: lessons learned from the First Scrum (The article was published by the Cutter Agile Project Management Advisory Service. Executive Update, Vol. 5, No. 20. Contact service@cutter.com for reprints)

Sutherland J (2005) Future of Scrum: parallel pipelining of sprints in complex projects. In: AGILE 2005 conference, Denver

US Department of Justice (2003) Information resources management—the Department of justice systems development life cycle guidance document. http://www.justice.gov/jmd/irm/lifecycle/table.htm. Retrieved 13 Nov 2013

von Lucke J, Reinermann H (2000) Speyerer Definition von Electronic Government. http://foev.dhv-speyer.de/ruvii/Sp-EGov.pdf. Retrieved 18 Nov 2013



http://femgineer.com/wp-content/uploads/2010/03/Shuttle_launch.jpg. Retrieved 21 Dec 2013



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