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The Future of Testing

Strategic investments in tough times – where testing organizations should invest

by Klaus Haller

Harry Potter is lucky. He can always look into a crystal ball when he needs more information. He sees scenes from the past, present, and future. And as we know from the movies, the predictions are correct. Predicting the future of testing is more challenging. First, I want to explain the scene I see in my crystal ball. I do not focus on methodologies such as Agile versus V-model, on tools, or testing domains. I do not focus on test consulting or test service providers. I focus on the testing organization in banks (many statements are valid for other sectors, too). Banks with a state-of-the art IT organization rely on a central test organization, often with one head of testing with few or many disciples: test managers, test engineers etc. They provide services for the IT department and the bank. In return, they get funding. In this article, I point out, first, structural changes in banks and their IT departments in the next few years. Second, I discuss the impact on the testing organization and their priorities today.

The IT infrastructure changes. There is the emerge of the cloud. There is the concept of service-oriented architectures (SOA). There is the more hidden, but high-impact trend towards multi-tenant applications. Multi-tenancy is about one application installation serving ten, hundred, thousand, or millions of customers. The application shields the customers and their data from each other. Multi-tenancy allows for economies of scale. Swisscom, for example, hosts core-banking installations for various banks. One large group of them, though legally independent, shares one installation. Such **economies of scale of multi-tenancy** change IT. They change the provisioning of IT and business services. The cloud (e.g., Amazon Elastic Compute Cloud or Windows Azure) provides unlimited scalability. If a multi-tenant application is implemented for the cloud, it scales if the customer base doubles or multiplies by thousand. Also, SOA and web services play their role. They are the glue for coupling a bank with various service providers and their multi-tenant systems.

SOA and multi-tenancy enable outsourcing applications to various vendors. This catalyzes the **commoditization of IT services**, a trend ongoing for decades. There are five stages: custom software, commercial-off-the-shelf software (COTS), application service provisioning (ASP), full application service provisioning (Full-ASP), and business service provisioning (BSP). The tasks associated with each application or process are (see Figure 1), first, the task **business requirements** with the business-IT-alignment aspect. Second, the engineering tasks are *system requirements, architecture, design & specification, and coding*. This reflects classic software development, e.g., with J2EE. It subsumes also the parameterization for COTS such as SAP. Third, the testing related tasks are *component (unit) test, component (unit) integration test, system integration test, and acceptance test*. We added *business readiness test* as a check whether the ASP or BSP provider fulfills the promised services. The task *application management* reflects managing the lifecycle and various releases, running the software on a server, and providing user support. Finally, *business process execution* is executing the business activities, e.g., bank transfers submitted to the bank by its clients.

It depends on the stage of the commoditization process which tasks are done in-house:

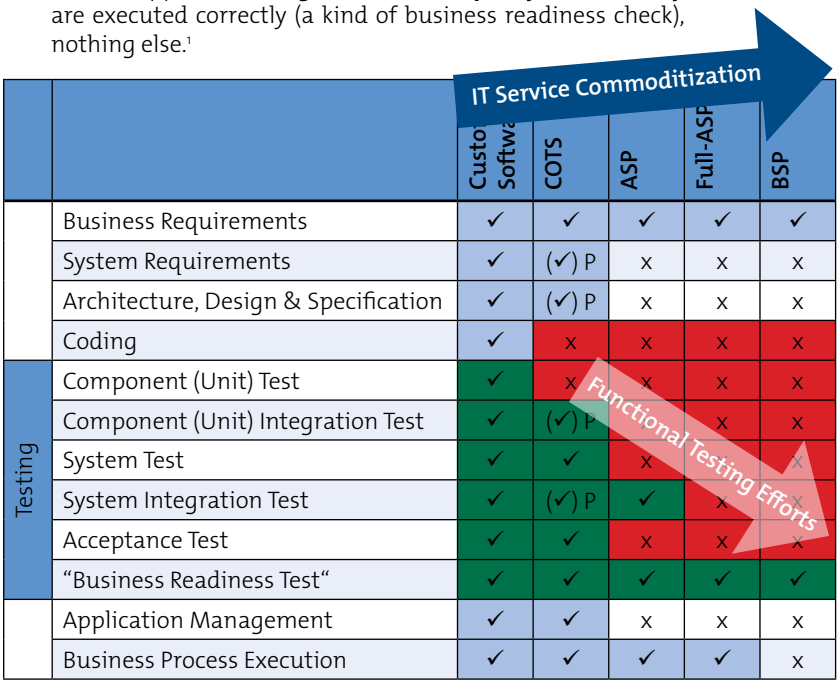
- Custom software: All tasks are done in-house.
- COTS: The bank buys standard software, e.g., a core-banking-system or a printing system from a vendor. There is no in-house software development. Only parameterization is needed and the integration into the IT landscape.
- Application Service Provisioning (ASP): The service provider implements and configures the / one application and provides the application management. The bank defines only the business requirements and integrates the ASP services into its IT landscape via software interfaces.
- Full Application Service Provisioning (Full-ASP): In contrast to ASP, the service provider manages the complete IT infrastructure and all interfaces of the bank. The bank defines only the business requirements.
- Business Service Provisioning (BSP): The bank does not see the application used for the business process. Even the execution of the business processes is now outsourced.

There is one reason banks push commoditization forward: the application or process has no strategic value. Some years ago, Carr asked and stated "Does IT matter?" and "IT doesn't matter" [1] , [2]. Today, we ask "Does this application/process matter?". In other words: Does the application or process help to impress your customers ("differentiator")? Or is the best you can achieve not to annoy him ("commodity")? A bank transfer must work. Nobody

applauds if a bank performs bank transfers correctly. But everybody complains heavily if one single bank transfer fails. So payment applications and processes are commodities. Not surprisingly, Deutsche Bank outsourced this area [3]. To give an example for a differentiator: a tax consulting application supporting bank staff when advising wealthy customers.

Commodity processes and applications are under threat for further commoditization towards ASP and BSP. When the bank starts grouping their processes into differentiators and commodities or when the IT department do this for their applications, this can be the beginning of a new round. All progress in commoditization has **consequences for the testing** (Figure 1, red and green cells):

- Custom software to COTS: Component and component integration tests become obsolete, such as the development itself. These are development tasks, i.e., this does not affect the testing organization. Developers perform such tasks, i.e., there is no influence on the testing organization. The system integration test for testing the interfaces and integration into the IT landscape remains with the testing. However, system and acceptance tests need less effort. They test only the COTS parameterization. They do not test the correctness of the complete application. Also, we observed in core-banking implementation projects that consultants of the parameterization team take over certain tests. They work highly iteratively and are responsible for requirements, parameterization, and some tests. This leaves less work for classic testing teams. It might be marginalized to setting up automatic regression tests.
- From COTS to ASP: Acceptance tests become obsolete. Clarifying the service and features is part of the selection of the ASP provider. What remains is the system integration test. It checks how the ASP system collaborates with the bank's IT landscape. There is also a need for a business readiness test, though the business can perform parts of it by itself.
- From ASP to Full-ASP: The complete IT is outsourced. No classic tests are left, not even system integration tests. There might be only some business readiness tests left.
- From ASP/Full-ASP to BSP: The bank simply routes all processes to a supplier. One might make some quality checks if they are executed correctly (a kind of business readiness check), nothing else.[1]



		Custo Softwa	COTS	ASP	Full-ASP	BSP
	Business Requirements	✓	✓	✓	✓	✓
	System Requirements	✓	(✓) P	x	x	x
	Architecture, Design & Specification	✓	(✓) P	x	x	x
	Coding	✓	x	x	x	x
Testing	Component (Unit) Test	✓	x	x	x	x
Testing	Component (Unit) Integration Test	✓	(✓) P	x	x	x
Testing	System Test	✓	✓	x	x	x
Testing	System Integration Test	✓	(✓) P	✓	x	x
Testing	Acceptance Test	✓	✓	x	x	x
Testing	"Business Readiness Test"	✓	✓	✓	✓	✓
	Application Management	✓	✓	x	x	x
	Business Process Execution	✓	✓	✓	✓	x

Figure 1: Commoditization of services and the input of testing: ✓ task to be performed internally, ✓(P) tasks performed internally, for parameterization only (not the application), ✓ no internal activities. The tasks are based (mostly) on the V-model.

Our insights into the financial industries show that many small banks are (mostly) on the "COTS" level. For larger ones, the "Custom Software" stage is still strong. The trend towards ASP or BSP is slowly gaining momentum. More ASP and BSP means a storm, i.e., a drop in work to come for (functional) testing. And now, after the discourse on IT trends and corporate strategy, I am at the heart of strategic investment decisions in the testing organization. I talk about **managing downsizing**. No testing organization wants to learn they invested into the testing of applications and processes which become obsolete due to ASP or BSP. Thus, each head of testing must know the future core-business of the bank. Next, he must identify applications and processes that are differentiators. If he has to cut costs and staff, he is not forced into hair-cut-style or random cuts. He knows where we want to invest and to improve proactively. He also knows where to invest only the minimum or to cut costs.

The future of functional testing is not a grow story. But there is hope for testing in other areas. This demands **redefining the mission of the testing organization**. Is the aim of the testing organization to deliver efficient testing services at adequate costs? Or is the soul of testing being keeper of the Grail of a functioning IT system that is not harmed by (newly deployed) software?

Load and performance testing are well established in many testing organizations. It is an example for a niche the testing organization has occupied. More niches exist. There is **data privacy**: companies do not want that testers or certain users see data they are not supposed to see. Who is taking care of this topic? The legal department or testing? **Synthetic test data** or **masking production data** are closely related [5]. Another topic is **compliance testing** (also named "regulation testing") [6]. It checks whether legal or company-internal regulations are enforced in or with the help of IT systems. Should the compliance officer, auditors, or testing take care of this topic? Compliance testing might be the next big thing due to outsourcing. Banks must check their outsourcing providers. Outsourcing providers should respect banking regulations and codes-of-conduct of the bank.

Anybody thinking that he/she can ignore what their suppliers do, should remember Apple, Dell, and HP. They get bad press due to suicides of Chinese workers at Foxconn, one of their main suppliers [7]. Banks are in a worse position. There are not only customers, they also deal with regulators.

Another niche is **security** or **penetration testing**. Today, this is often done outside the testing organization. Is the lobby of the testing organization not strong enough? Or is testing not interested? And who takes care of SLAs, such as response times in case of ASP and BSP? Is it done by the **monitoring** team in the server group, because these tests are continuously performed– or are there synergies with the load and performance testing team?

1 *A remark to BSP and Full-ASP. There is Full-ASP, meaning that a company gets rid of (nearly) its complete IT*

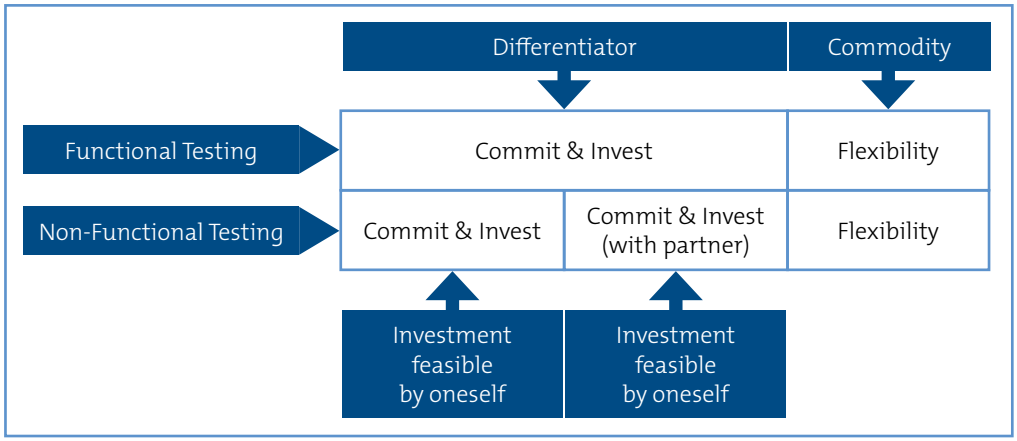


Figure 2: Strategic Investment Matrix for Testing Organizations – Commit & Invest: proactive maintenance of test artefacts, high ration of internal testers, Flexibility: low ration of internal testers and/or emphasis on outsourcing

What is exactly going to happen in the area of non-functional testing and quality assurance? This question is the point at which to remember Harry Potter and his crystal ball. The outlook for functional testing is pretty clear. The non-functional aspects are blurred. And, as in the movies, the crystal ball becomes suddenly dark. Harry has to start his next adventure. And so does the head of testing; he has to make every-day operational decisions. They shape indirectly the future of the testing organization. **Our strategic investment matrix for testing organizations** (Figure 2) might help.

However, one point must be clear: If an area requests testing services, the testing organization must provide them. They must keep the software quality high and the IT landscape stable. But even in such situations, the testing organization has two options: investing proactively or acting in a more reactive way. Commit & invest means staffing projects with internal testers. They develop and keep their domain and application know-how. It means maintaining the testing artifacts proactively. It means improving the test processes and testing tools. The other option, *flexibility*, avoids long-term investments. It allows for quick and easy cost-cuts when the work vanishes. The key is outsourcing and/or a high ration of external testers.

The testing organization has little influence on what to test, but there is always the choice to *commit & invest* or to stay flexible. In case of functional testing, the strategic investment matrix suggests:

- A process or application that is a differentiator is a candidate for *commit & invest*: proactively ensuring internal know-how by a high ration of internal testers, up-to-date test artifacts, and state-of-the art tooling.
- If it is a commodity, the commoditization might move on. This is a negative mid- to long term outlook for test efforts. The testing organization must still ensure the quality of the software[2], but there are no long-term investments. Flexibility is key. A high ratio of external testers or outsourcing testing eases shutting down test teams if the commoditization moves on to ASP and BSP.

In case of non-functional testing, the absolute costs influence decisions. In contrast to functional testing, there are nearly no synergies with the banking business. Instead, testers need more and more specialized technical know-how. Thus, certain non-functional testing areas are too costly for a bank to invest alone. We recommend:

- If the service is a commodity, it is the first candidate for the *flexibility* model, i.e. a high ratio of external staff and outsourcing.
- If the service is a differentiator and the bank can afford the investment, the testing organization should *commit & invest*. The bank can build up this topic on its own.
- If the service is a differentiator but the costs are too high for one bank, the bank should *commit & invest*. Due to the costs, the bank should look for an *innovation partner* and run the project with him.

These advices and the underlying matrix help to prevent hair-cut-style or random cuts in tough times. In good times, the matrix helps investing into projects with long-term benefits. But the matrix only helps if the testing organization does some homework. It must, first, understand the business strategy of the bank. Second, it must categorize their testing areas into differentiators and commodities.

My personal expectation for testing is **downsizing and border war**: (controlled) downsizing for functional testing and "border wars" within the IT department or with legal and compliance offices. They must clarify who is responsible for which non-functional test.

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2 *Being able to deliver today might imply high or higher short-term investments. Reasons might be currently insufficient testing coverage or new major releases and much new functionality.*

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