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## **CROWDTESTING WITH TESTCLOUD**

# MANAGING THE CHALLENGES OF AN INTERMEDIARY IN A CROWDSOURCING BUSINESS MODEL

## **TEACHING CASE DESCRIPTION**

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# Abstract<sup>1</sup>

Software testing has become highly expensive in terms of time, money and other resources. Further, the classical in-house testing is restricted to the knowledge of a small set of solvers and thus is limited in terms of quality and efficiency. Recognizing this, the German start-up company, testCloud, implemented a crowdsourcing business model offering software companies the possibility to outsource their testing activities to a certain crowd. With this so-called 'crowdtesting,' testCloud facilitates companies in accessing a great number of cost-effective resources and using the collective intelligence of crowds. However, as an intermediary in a crowdsourcing business model, testCloud faces challenges from various directions: In its current form, testCloud's testing offerings are too narrow as customers demand for testing services not solely around internet-based software but also for other kinds of software. On the other side, new mechanisms are necessary to keep the motivation of the continuously growing crowd high. The management of testCloud has decided to alter various aspects of their settlement process in order to be able to address the rising issues. By illustrating how testCloud currently manages its business process, this teaching case helps in understanding and analyzing the challenges of an intermediary in a crowdsourcing business model.

Keywords: teaching case, crowdtesting, crowdsourcing, crowdsourcing business model, software testing.

<sup>&</sup>lt;sup>1</sup> The teaching case was developed based on a case study conducted at testCloud in 2012. We thank the testCloud company and especially testCloud's Chief Sales Officer Thomas Grüderich who allowed us to obtain deep insights on the functioning and operating procedures of the crowdsourcing intermediary testCloud.

### 1 Introduction

"I heard the testing project that you ran with the online computer shop went very well, Mr. Grüderich. That's what the firm's Manager Peter, who is an old acquaintance of mine, told me," says Christine Hauer, head of a German company that offers software applications for small and medium sized businesses. "That's right," Thomas Grüderich, who is the CSO (Chief Sales Officer) of a German start-up company from Berlin, called 'testCloud,' which offers crowdsourced software testing services, responds. "We were very satisfied with the testing results. Our testers from the crowd were able to identify 144 bugs on the computer shop's website, 22 of these bugs were very critical. Especially the latter ones would have disrupted the payment process,"

Christine nods and says, "That sounds great. I have to admit that I was a little skeptical when I first heard of your firm's concept of testing software by a bunch of 'regular' internet users. But I now recognize that it can be a very effective way of testing, at least concerning websites. But as far as I have heard, you have only tested websites. However, our company develops software applications for businesses. Do you test this kind of software, too? And have you had any experience with it?" Thomas responds: "Well, our focus has been only on website testing so far, but I think that testing that kind of software could be done by our crowd, too."

Christine looks rather skeptical and says, "Well, that is highly questionable. Our company offers software not only for main street consumers, such as gaming and other desktop applications, but also for business customers such as software for business analysis or accounting, considering the B2B realm. I think that the testing of software applications for businesses is different from testing of website or gaming applications – it is much more complex. I am intrigued by letting our software be tested by a crowd, and I know that that might be much more effective than having the software tested by only a few in-house testers. At the same time, our in-house testers are 'experts,' and for testing this kind of software, we need people that are experienced in testing - not just 'average' users. This would be a major requirement for the testing of some of our software. If you are able to assemble a crowd that consists of experienced testers – be it twenty testers or fifty testers – I would be willing to work together with you in several projects." This kind of discussion is not new for Thomas. Within the last two weeks, he has had meetings with other potential customers as well, who had enunciated quite similar demands. After discussing minor points regarding crowdtesting, in general, Thomas takes leave of Christine and conclusively says, "I will have a discussion with my team and I am sure that there is a way how we will be able to address your concerns."

It is late on this Tuesday afternoon in April 2012 when Thomas Grüderich heads back to his office in Berlin after this defining meeting. On the way back, he realizes that his colleague who is the COO (Chief Operating Officer) of testCloud, Carsten Neptik, had spoken on his mailbox: "Hi Thomas, I know that you are in a meeting right now. Regardless how long the meeting takes, please come to the office afterwards because I set up a meeting with the whole team for this evening. The reason is that I just finished evaluating the survey we conducted with our crowd and there are some outcomes we all have to talk about. Plus, Jan has some concerns he wants to talk about, too." For Thomas that sounds like there might be some unfavorable results. In the light of this and the foregoing meeting, Thomas thinks about how to face the upcoming challenges of testCloud in the months ahead. He is quite proud of the progression of testCloud within the first months of its existence. Since commencement of business, testCloud and its underlying business concept has been a subject of discussion within the internet start-up scene. Although they started their business very spontaneously, the testCloud team has won the "Bitkom Innovators Pitch" award for the "Best Digital Life Innovation in 2012." The innovative idea behind the business concept is: Utilize the 'collective intelligence' of many or the 'wisdom of crowds' in order to conduct software testing. testCloud has been able to establish a big crowd and has already conducted some tests for several customers. However, the customer base remains at the same level and the first signs of growth limits are appearing. Thomas thinks about this issue the whole way back.

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As soon as Thomas arrives at the location of testCloud in Berlin, testCloud's management team meets up to discuss the issues that have emerged. Thomas speaks first, "As we all know, there are some different issues that have come up. I suppose that each of us brings up his concern and afterwards we discuss the issues. I will start with what I have experienced the last weeks and then you go on. I just had a meeting with a potential customer today, who was arguing almost exactly like other potential customers I meet within the few last weeks. These companies were no online-based businesses but software providers. They like our services very much but they want the services – which is testing by a crowd – to be tailored for their specialized business software. Up to now, we have only tested websites. They think that specialized software is more complex than website testing and that, therefore, a crowd can't accomplish that. And I have to agree at least with respect to the point that the testing of specialized software is different, maybe more complex, than website testing. For instance, they want a lot of external testers to test their software, but they don't want the whole crowd. Hence, they ask for experienced testers or testers that have special competencies. So, I ask myself if we really could expand our services and go beyond pure website testing. That's the issue I would like to discuss further."

"Thomas you just referred to our customers," Carsten continues. "However, my focus lies on the other side – which is the crowd that we have to manage. The results of the survey show that we have a diverse crowd and that, on average, the members are satisfied with our offerings. However, there some major issues that have been brought up by several members. First, most of our experienced members, who have basically been part of the crowd from the beginning, wish for some further development of our testing platform. They are highly involved in testing and wish for more interactions with us as well as with other crowd members. Most of those users feel not challenged enough in the course of the offered testing projects and have in mind of leaving the community or at least becoming less active if nothing changes. On the other hand, an aspect that applies to almost all crowd members is the wish to be invited to testing projects that 'fit' to them and their experience. These are the two main issues I would like to scrutinize. I think that these aspects are highly relevant and need to be addressed because the crowd is the base for our business concept. Thus, the crowd members need to be supported so that they are perpetually highly motivated to do effective testing."

"That's right, Carsten," Jan Schwenzien, the firms' CTO (Chief Technical Officer), responds. "But speaking of the crowd, there is another problem: The crowd is becoming too large. That is, of course, a positive aspect. However, if we do not generate corresponding testing projects, testers won't have any assignments. I suppose we need to generate more customers but we also need some mechanism with which we can manage the growth of the crowd. Further, as you know, we have to control every bug that is reported ourselves to reassure that it really is a bug. That is a really important task that we do in order to be sure that we exhibit our customers only bugs that really exist. However, checking bugs is the only thing we have been doing for the past weeks. Because of that, we have not been able to concern other tasks."

Thomas and Carsten agree. Since there are no further concerns raised by the testCloud workers, Thomas takes the word again. "All in all, we have several issues that concern different aspects of our business model. As far as I see, we have to discuss about crowd-management, on the one hand. On the other hand, we have to address the issues raised by our demanders because we know that our success depends on them. Last but not least, we obviously have to think about further development of our testing platform because this is linkage between our customers and our crowd."

Thomas knows that, considered in isolation, each particular issue could not jeopardize testClouds' existence; however, considered altogether they depict a major challenge – a challenge that is typical for an intermediary in a crowdsourcing business model and that needs to be addressed consequently in order to maintain the young firm's viability.

Thomas realizes that it has become late and concludes, "I suppose we call it night for today. I would suggest that we split up and I will come back to each of you to discuss the matters more in detail."

## 2 Company Background: Test Cloud

testCloud is a German start-up company founded in August 2011 as a service provider that offers software testing services for companies that want to partly or fully outsource their testing activities to a certain crowd. testCloud denotes the service they offer as "crowdsourced software testing." In its service portfolio, this company offers functioning and quality tests for all types of web applications, ranging from pure website scanning to different flash applications. This, for instance, includes the testing of e-commerce websites, social web portals, and online retail stores, as well as sales and distribution software. In contrast to existing software testing to a crowd of testers instead of performing the testing itself. Thus, testCloud operates as an intermediary in a crowdsourcing business model, as it brings together a vast number of testers (i.e., the crowd) with firms that aim at outsourcing the testing of their developed software (Figure 1). In this model, the crowd is testCloud's human resource for conducting the testing, whereas the outsourcing firms can be considered as the firm's customers. By leveraging the capabilities of the Internet, testCloud enables its customers to link with a vast pool of solvers, thereby utilizing the potentials of collective intelligence.



*Figure 1. Intermediary model in crowdtesting.* 

The testCloud start-up team consists of three members drawing on their experiences from different fields. As the firm's CSO (Chief Sales Officer), Thomas Grüderich is responsible for marketing, sales, client services, public relations, publisher network and event management. The recruiting of customers as well as of testers, who become part of the crowd, is also managed by Thomas. After recruitment, the customers and testers are supervised by Carsten Leptig, who is responsible for account management and finances as testCloud's COO (Chief Operating Officer). The IT-Infrastructure and the technical background of the test Cloud Internet platform is set up and managed by Jan Schwenzien (CTO – Chief Technical Officer). This start-up team is further supported by Frederick Fleck and Max Moldenhauer, who have assisted and funded the emergence and the development of testCloud as Business Angels – i.e., business people with practical experience who support young entrepreneurs.

The market testCloud competes in consists of several "classical" IT-Service companies that predominantly offer automated software and website testing; however, testCloud positions itself as the first company in Germany that offers website testing by the crowd. The company performs the business process through the Internet and is active in Germany, Austria and Switzerland. By March 2012, testCloud had gathered a crowd that consisted of over 2,000 testers. Currently, testCloud has initiated and fully processed 21 crowdsourcing projects, thus maintaining a customer base consisting of multiple small and mid-sized, as well as a few large-sized, companies. testCloud offers their customers the possibility of testing their website applications in different stages of development (alpha or beta version), whereas the software is tested under real conditions. Due to the circumstance that the need for testing of companies varies, depending on the urgency or the development stage of a software product, testCloud offers their customers "on-demand" solutions to guarantee a flexible service: The

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actual testing by the crowd can be conducted not only during business hours but also throughout the weekend or overnight. Further, customers can decide either to have their website applications tested in the fastest possible manner, where testing takes only several hours, or they can choose the test-phase that is conducted long-term, where the website applications are tested to the smallest detail by a large part of the crowd. In line with this, testCloud's customers are offered various "scales" of testing, as they can decide on the size of the crowd that can be assigned for testing. Finally, customers can alter the time-frame as well as the breadth of testing throughout the whole process, as they are constantly kept informed of the progression of the testing.

## 3 Crowdsourced Software Testing as a Business Model

On the next day, Thomas immediately schedules a meeting with Frederick and Max. He intends to talk with them about testCloud's existing service portfolio and clarify whether testCloud should expand its offerings. He suggests that Frederick and Max are most appropriate for talking about this issue since they are the ones who have the most customer contact.

Thomas begins, "I suppose that when facing a management problem, it is best to start with the basic questions: What is the basic idea behind our business? What do we offer our customers? That way we can progress and see if changes are possible." Frederick and Max listen attentively while Thomas continues. "Actually, you two know well how the idea for our business emerged: We were thinking if even companies such as Amazon and Facebook place high value on the testing before releasing new features or applications on their websites, then there is obviously a high demand on qualitative testing. However, even big companies always complain about the increasing costs of testing. So we asked ourselves how we could create and offer a new way of testing that is perhaps less costly in terms of time and money."

"That's right," Frederick interjects. "Considering the hype around crowdsourcing and the emerging crowdsourcing-platforms, such as Amazon Mechanical Turk and TopCoder, we thought that this concept might be promising for testing tasks as well."

Thomas and Frederick had worked for several years as Quality Assurance Managers in a software engineering firm; always struggling with the challenges that occur within software development: high costs, long development cycles, low quality, respectively, bug-loaded software. Over the last years, they had noticed the rise of several internet-based companies that offer their customers the opportunity to outsource their tasks to a crowd (i.e., crowdsourcing). Thomas and Frederick were intrigued by this concept whereby the capabilities of numerous people – or 'wisdom of crowds' – is used for task completion. Hence, they decided to start up a company which offers crowdsourcing for testing activities.

From the start, testCloud has targeted upper small and medium sized, as well as large companies. However, testCloud members decided to exclude micro enterprises and very large companies as potential customers. This selection was based on the argument that very small business in most cases would not be able to afford a crowdsourced testing project. Additionally, the testing effort is most often too excessive, e.g., the developed website contains too many bugs since very small companies do not have the capacities to conduct upstream tests. At the top of the scale, business dealings with very large companies are also not profitable since, in these cases, the sell-cycle requires too much time and effort. This is most often on account of large companies having very tedious decision-making processes.

testCloud's first client was NETFORMIC Inc., which is an Internet agency offering its customers holistic online business solutions (see Exhibit 1). testCloud was hired to test an online platform that NETFORMIC created for one of its customers. Shortly after, testCloud received orders from several internet-based companies such as dating communities, social networks or online shops. In these kinds of testing projects (i.e., website-testing), the crowd usually has to conduct walkthroughs to test all the functions (e.g., the registration process or the payment transaction) of the specified platforms. Usually,

most of testCloud's customers continuously, rather than just once, perform testing projects with testCloud. On the one hand, this is due to the fact that existing website applications are continuously upgraded and, thus, need to be tested perpetually. On the other hand, multiple testing projects are conducted because testCloud offers testing on different stages of the website development process.

Frederick continues, "However, we wanted to focus only on website testing. We knew that websites, naturally, contain bugs; especially when they have to be upgraded and so on. And we knew that 'testing' is not a core competency of various companies. Further, testing has become very expensive and we all know that testing is, more or less, an 'unloved' task. So we offered the service of testing the platforms for them. And not only the 'usual' testing, but testing conducted by end consumers – by a whole crowd of end consumers."

Thomas nods and says, "But, based on my discussion with several managers within the last weeks, I can say that these aspects you mentioned, Frederick, also apply for companies that develop other kinds of software – e.g., for business analysis or accounting software, if we consider the B2B realm. Same applies to software for main street consumers, such as gaming and other desktop applications. Thus, why don't we consider to crowdsource the testing for these kinds of software, too?" Frederick counters with, "But does that really work? Yesterday you already said that testing specialized software is much more complex than website testing- there are different testing tasks and so on. Can a crowd really accomplish these kinds of tasks?"

Max faces both Thomas and Frederick, "Expanding our crowdtesting services for these kinds of software would, of course, also expand our customer base. Considering this from the technical viewpoint, I would say that it is possible to handle these kinds of software testing projects. But, as you said, the first questions are: Is it possible to crowdsource the testing for these kinds of software? On which criteria such decisions must be based? And would we have to change something on our business process? I suppose we will have to consider our business process for being able to address these questions."

The three of them agree on that and decide on further elaborating these issues after they have possible solutions.

#### testCloud's Business Process

The critical starting point of a crowdsourced testing project, in general, is the determination of a customer's test requirements. At the very beginning, the customer presents the targeted website or web-application to the testCloud project manager. Next, the assigned testCloud manager and the customer elaborate on the test requirements together: First, they determine what quality aspects are to be tested by the crowd. The web application can be tested regarding different quality aspects, such as functionality, performance, loads, and security. Further, the usability as well as the interaction design can be evaluated by the crowd. The second aspect of test requirements is that the devices (e.g., Mobile Phone, Tablet PC, Notebook), the operating systems (e.g., Windows, Linux, Mac OS), and, if necessary, the browsers (Firefox, Internet Explorer, Google Chrome) on which the testing will be conducted have to be appointed. Most often, tests are driven across all kinds of devices, operating systems and browsers, since experience shows that a web application that runs on one system might not work at all on another system. For instance, while testing the functionalities of a dating community, the crowd found that "signing in" was completely trouble-free when using a Notebook or a PC, whereas the testers were not able to sign in while using a Smart Phone – regardless of whether an Android-based phone or an iPhone was used. The third aspect that has to be determined in the initial step is the scope of the website testing. The client decides how long and with how many testers from the crowd the testing phase will be conducted. Based on the requirements, the testCloud manager and the customer elaborate 'testing guidelines' which determine the framework of the actual testing.

Subsequently, testCloud activates and announces the specific website test on the "testing platform" (i.e., the testCloud-platform). The testing platform is a common interaction platform for the testCloud manager, the customers and the crowd. Here, the web application to be tested is uploaded and made

accessible for the crowd to test. Once a website test is activated, people from the crowd (i.e., testers) are allowed to walkthrough the software and identify bugs or evaluate the design and usability of the underlying software. Once a tester detects a bug, it has to be recorded and subsequently submitted. The crowd members can also make suggestions for improving the underlying website (e.g., "the color should be more brightly and the lines written in a much smaller size").

In the next step, the identified bugs, as well as comments and suggestions regarding the design and usability, are checked by the testCloud manager in collaboration with the customer. They decide which bugs will be incorporated and which ones will not. Every bug that is reported is, thus, first controlled by the testCloud manager in order to be assured that it really is a bug. This is a very important task to ensure that customers review only bugs that actually exist. Reviewing all submitted bugs, as well as improvement suggestions, is time-extensive for testCloud workers; however, this task is indispensable for establishing high quality testing. Finally, the customer receives a bug report in which all identified bugs are registered. The results can then be exported to any issue-tracking system such as JIRA, Redmine, or Bugzilla.

Customers are offered the possibility to trace the whole testing process and also intervene by altering their test requirements. Thus, customers are able to continuously overview and indirectly control the testing process. Figure 2 graphically depicts the entire settlement process.



Figure 2. Business process.

# 4 testCloud's Crowd

Later that day, Thomas meets up with Carsten and Jan in order to discuss the outcomes of the survey and corresponding implications, as well as to scrutinize the issue of the continuously growing crowd. On his way to the meeting room, Thomas realizes that Christine Hauer – the potential customer from the meeting on the previous day – has left a message on his mailbox: "Dear Mr. Grüderich, there is one more aspect I am concerned about when I think about outsourcing of software testing to a crowd, and that is 'secrecy.' For us, it would be undesirable to somehow be associated with failures within our software development process. I just thought that I should bring up this important issue as well. Thank you and have a nice day." Thomas decides to bring up this concern in the subsequent meeting.

Having arrived in the meeting room, Thomas starts the conversation. "Yesterday, you were talking about a special group of our testers, Carsten – let's say about the more experienced testers among the crowd members – and their decreasing motivation of participating in testing projects. That's very undesirable since we know that these testers are very important for us. Most of them have been a part of our crowd from the beginning and have thus built up relevant testing competencies. They are the ones who find the most critical bugs, and they are the ones who find those kinds of bugs that an average tester would not be able to identify. So, we can't afford them showing less activity on our platform, especially the experienced testers."

At testCloud, all testers are paid per identified bug or per improvement suggestion – that is, once the testing project is finished and the bugs and improvement suggestions are approved by the testCloud manager and the customer. The amount that the testers are paid depends on how "critical" the identified bug is or how "appropriate and helpful" the improvement suggestion is. A bug such as "(...) payment per direct debit worked, but once I selected credit card payment, the website broke down (...)" is regarded as very critical, whereas identified spelling mistakes on a website are rather uncritical. Obviously, the more critical a bug is, the higher the payment. However, testers are only paid if the bug they have found has not previously been identified by any other tester. The policy is "first come, first served." Thus, testers are motivated to be the first to find different bugs in order to earn more money. The testCloud workers know that extrinsic motivation plays a relevant role and that the testers are thus motivated by monetary rewards. However, based on the survey that was conducted within the crowd, they found that intrinsic motivation is as well important: Many testers report that they actually do the testing because they have fun doing it or because they like the challenge. Others like to solve problems and like the satisfaction of having solved problems. For those, who are predominantly intrinsically motivated, the earned money is just a side effect. Thus, for some people in the crowd, testing at testCloud is considered to be a side job, for others it is rather a hobby they pursue. However, the survey showed that for most people in the crowd, testing is a part-time work and a hobby at the same time.

"I agree," Carsten responds. "We have to keep all our crowd members highly motivated, especially the experienced testers. That's why we should thoroughly think about our incentive structure. That's the mainspring if we discuss about high motivation. For right now, we offer only monetary rewards hoping that that is enough. However, some crowd members are highly involved in testing and conduct testing because they have fun doing it. Some of these users have expressed their desire to be even more involved in our testing processes. In addition, there might be other motives as well that cannot be addressed by extrinsic rewards. Thus, we need to think about possible changes within our testing platform."

"That's right," Thomas encounters. "Hence, we have to think about our incentive structure and make sure that it is appropriate, for example, for the Quality-Assurance Manager who is a member of our crowd because testing is his passion, and for the housewife who intends to comfortably earn money from home. Our strength is, and will be, that we have a diverse and large crowd!"

In order to generate a diverse crowd, testCloud had advertised in job pages of different newspapers (e.g. weekly papers) but also in subject-related magazines and online forums (e.g. computer magazines), as well as directly in universities (e.g. in the departments of informatics and information sciences). By April 2011, testCloud had established a crowd that includes about 2000 testers characterized by different backgrounds, personal and professional situations, experiences and testing expertise, and coming from all over Europe; however predominantly from Germany, Austria and Switzerland. Some people from the crowd have never tested a website or something similar, whereas there are also very advanced testers who have taken part in several testing projects offered by testCloud, or who are vocational testers. The conducted survey (see Exhibit 2) has, for instance, shown that 22% of the crowd members have had 2-5 years of experience in testing, whereas 12% have been conducted software testing for more than 5 years. 42% of the testers are students, 18% freelancers, and 26% are fulltime employed. A testing project activated by testCloud is thus exposed to a vast number of critical testers with a wide range of expertise and skills not possibly available within any firm.

"That's true, for us as a crowdsourcing intermediary, the crowd and its characteristics are very crucial," Carsten responds. "But, we have to guarantee that our crowd testers generate good testing results. You might all remember our testing projects with the e-shop for electronic devices, where our crowd was not able to identify all bugs and the test reports of our testers were not filled out appropriately. Especially our new testers have had starting problems. We must assure that something like that won't happen again! We have to identify appropriate mechanisms in order to avoid such pitfalls. And I suppose that we can realize those mechanisms only via our platform."

### 5 testCloud's Crowdsourcing Platform

testCloud's entire business process is managed via the web-based platform, which based on Ruby on Rails.<sup>2</sup> Hence, the testCloud platform builds the basis for the management of crowdtesting initiatives. The platform has been constructed based on the processes that it needs to support - i.e., offer targetgroup oriented user-interfaces within the platform. People that apply to become a tester for testCloud have to register on the testCloud Internet platform and go through the registration process. First, applicants have to declare their demographics, as well as the browsers (e.g. Firefox) and the devices and operating systems that they will use for testing. Second, testCloud has to ensure that the incomes of crowd members are taxed. Only individuals who prove that the incomes coming from testCloud will be recorded for tax purposes (most often on a freelance basis) are granted access to the crowd. Once the applicants are registered on the platform, they are provided a 'personal profile' which includes different functions. On their personal profile, the applicants – who then become crowd testers – can alter their personal data and have an overview of the current testing projects offered by testCloud. Here, they can select the current project(s) they work on or search for new testing projects. Further, members have an overview of identified bugs that have not been 'paid' by testCluod yet. The reason for this is that the identified bugs have to be approved by testCloud and the customer before they are paid. On their profile, the testers are also offered a 'dashboard,' which visualizes a crowd tester's bug statistics – for example, the amount, and the type, of tests that have been successfully completed (Figure 3).



Figure 3. Web-interface for crowd testers – Dashbord.

 $<sup>^{2}</sup>$  Ruby on Rails is a framework for the Ruby programming language. It is used to program various web applications. For more information see Hartl (2012).

Similar to the crowd testers, testCloud's customers are provided a (company) profile as well (Figure 4). Here, they can prepare and initiate a testing project. For testCloud's customers the definition and coordination of test requirements are highly important. Hence, customers are offered functions where they can note their specific requirements: They can determine the testing context (e.g., only on Apple devices), the scale of testing (complete walkthrough; check links and spelling, check flash applications) as well as the testing procedure (i.e., amount of testers, begin/end of project).

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Test requirements

#### *Figure 4. Web-interface for customers – Dashboard.*

Jan, who manages the profiles of the crowd testers and controls the bug reports provided by the testers, agrees with Carsten and continues the conversation, "However, coming back to the size of our crowd: It is growing very fast – too fast, if we compare it with the steady customer base. Now, we can't go and deny access for new applicants. That would be too dangerous since in the future we might need more members because of more testing projects or because of leaving members. Further, that way we might lose or not get in touch with highly skilled testers out there that are not part of our crowd right now."

"I understand. Therefore, we need to figure out how to effectively control the registration quote. We also have to make sure that we do not lose skilled testers. For the long term, our goal should be to have a better skilled crowd – in comparison to now – whose size matches the testing demand," Thomas responds. "I agree!" Jan responds and continues with, "The other issue is that I wanted to bring up is that reviewing submitted bugs, as well as the improvement suggestions by the crowd. This has lately been very time-extensive for us, due to the high amount of projects. So, how are we going to face this problem?"

With an approvingexpression Thomas responds, "That's a good question. We definitely have to elaborate on that, too! And there is another issue: Just before this meeting I listened to a message that Christine Hauer had left on my mailbox. She was concerned about secrecy issues. For software companies, testing is a very 'sensitive' subject, since no company wishes to be associated with 'bugs' or 'failures in the software development'."

The meeting slowly comes to an end. After discussing some minor operative issues, Thomas concludes, "Well, then our assignment is to figure out how to exactly manage the raised issues!"

# 6 Getting Going

After having talked with the different team members about the upcoming issues, Thomas assigns a meeting with all testCloud workers for the following day. He wants to sum up the discussed matters and work out an action plan.

Thomas and all the other testCloud workers have realized that their business skills are most required now. They have successfully managed the startup of their small firm; however, the greatest challenges are to come up. Managing an intermediary in a crowdsourcing business model requires the management of customers, the crowd, and the interaction platform as well. In the meeting on Thursday, the testCloud workers agree that different aspects have to be tackled and altered in order to keep their business promise: ensure cost-efficient and qualitative testing by the crowd.

"I suppose the challenges we face are manifold. However, I assume that other crowdsourcing intermediaries have or have had similar issue. Thus, I think that we can learn from similar cases how to solve some problems. On the other hand, we have some case-specific issues for which we need to generate appropriate solutions. So, let's go guys! There are a lot of things to do!" Thomas encourages his colleagues.

### References

Hartl, M. (2012): Ruby on Rails Tutorial: Learn Web Development with Rails. 2<sup>nd</sup> revised edition. Addison-Wesley Longman. Amsterdam.

### Appendix

#### Exhibit 1: NETFORMIC showcase project

#### Background

FASHION5 (www.fashion5.de) is a new clothing brand as well as online shop for textiles and is part of the brand portfolio of the Authentic Style Sale GmbH & Co. KG. Authentic Style is the largest young fashion-stock in Europe with over 30,000 square meters. It produces around 20 million parts per year. The FASHION5 online shop targets trendy and stylish individualists – predominantly young people. Further, FASHION5 understands itself as an event brand. Therefore, it goes regularly on tour with his 'FASHION5 dancers' through the cities of the republic.

#### Challenges

Error free: Competition and crowding-out pressure in textile online trading is fierce. Therefore, a website without bugs is a necessary to assure a trouble-free selling process - especially for a young player such as Fashion5.

In April 2011, the mission for FASHION5 was defined: Create a new trendy, cool and stylish fashion brand for young people, who are familiar with the online world. The young founders started to plan the website for the online shop together with the internet agency NETFORMIC Inc. from Stuttgart. Within a couple of months, NETFORMIC constructed the website for FASHION5. However, it became apparent that FASHION5 and NETFORMIC had not enough time for planning and conducting the tests, since the complete FASHION5 online shop was to be online within the subsequent days. For quality, as well as time-based reasons, NETFORMIC therefore forwarded the testing to testCloud in order to assure the quality of the online shop.

#### Project

Shortly before the launch of the online shop on 14 November 2011, NETFORMIC entrusted testCloud to carry out two tests. NETFORMIC assigned testCloud to test each and every function on the website – from the log-in-process up to the installed online forum, where registered users can exchange experiences with different products.

On the following day, testCloud released this testing project on its platform. The testers were asked to walkthrough the platform and report either kind of pitfalls. A total of 39 software testers examined the FASHION5 website. More than 200 bugs were discovered overnight through exploratory, functional and cross-browser tests. 19 of these bugs were critical. For instance, one of the critical errors occurred within payment transaction.

At the end of the testing project, testCloud delivered the generated bug-reports including screenshots, bug URL and the classification of the bugs (low, high, critical).

"Together with testCloud we discovered bugs and problems – which occurred while going through the website – within two test runs. The website of FASHION5 therefore became a great success!" Timo Weltner, Manager of NETFORMIC Inc.

#### Exhibit 2: Descriptive results of the tesCloud survey - Characteristics of the Crowd



Gender (in percent)

Age of testers (in years)



## **Current profession**





**Experience in testing (in years)** 

**Registered profiles in Social Networks (in percent)** 



## Usage of Browsers (in percent)

