



Teaching case

# Fixing the payment system at Alvalade XXI: a case on IT project risk management

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## Abstract

This case describes the implementation and subsequent failure of an innovative system installed in the bars of Alvalade XXI, the recently built football stadium in Lisbon, Portugal. Casa XXI, the company running the bars, had entrusted the project to an IT supplier who had limited experience with large systems. During the inauguration, the system failed spectacularly creating a chaotic situation. The fiasco meant not only a financial loss, but also a blow to the reputation of the company. The management blamed the supplier for the failure. The supplier, however, claimed that the problem was not technical but organizational, that is, poor planning of operations. Subsequent tests were inconclusive and failed to restore trust. At the end of the case, the CEO is considering the possibility to switch to an alternative supplier. He also wonders what they could have done to manage the project and the associated risks more effectively. The case highlights risk and project management issues in large systems implementations. The discussion can be structured around cost/benefit analysis, risk assessment, and project management. Relevant dimensions include: company operations, project scope, degree of innovation, technology used, system architecture, supplier selection, and project organization. In addition, the case raises governance questions: Who is responsible for the project? Even if the project is outsourced, how should the roles and responsibilities be apportioned between the company and the IT supplier(s)? What mechanisms should be used to plan and execute IT projects, and control their risks?

*Journal of Information Technology* (2007) **22**, 399–409. doi:10.1057/palgrave.jit.2000116

**Keywords:** risk management; project management; innovation adoption; systems implementation; governance; outsourcing

## Introduction

In August 2003, while many Europeans were heading to the beaches to mitigate the effects of the worst heat wave on record, José Eduardo Sampaio, the CEO of Casa XXI, was faced with another kind of heat.<sup>1</sup> Cartão 21, the innovative payment system of Casa XXI that he had personally conceived and subcontracted, had dramatically failed on 6 August during the high-visibility inauguration of Alvalade XXI, the newly built football stadium of the Sporting Club of Portugal.

Casa XXI had been granted the rights to exploit all the bars and restaurants in the stadium. Based on pre-paid cards, the new payment system was supposed to make bar operations more efficient by eliminating the use of cash. In addition, the system was supposed to give Casa XXI an

image of innovation and modernity enhanced also by all the free publicity it received in recent newspapers articles covering the inauguration.

The failure of the system represented not only a significant financial loss for Casa XXI but also an embarrassment for the Sporting Football Club as well as a major blow to the reputation of Casa XXI and to the credibility of José Eduardo, himself a former football player.

José Eduardo was quick to point the finger at Meag, the company with whom he had contracted to design and implement the system. But José Almeida, Meag's manager, claimed that the system worked fine. In his opinion, the nature of the problem was organizational.

He believed the mishap had to do with the late activation and distribution of the cards, as well as the lack of training of the bar staff; and these were responsibilities of Casa XXI, not his.

But it was difficult to know what went wrong and whom to blame. In reality, the system had never been fully deployed and tested before the event. The construction of the stadium had been completed just a few days before the inauguration, and neither Casa XXI nor Meag had prior access to the stadium. Thus, nobody knew whether the installed configuration actually worked. With such uncertainty and the next match just days away, José Eduardo demanded a comprehensive system test. By the end of August, Meag conducted such a test in the presence of Casa XXI's management team. The results were discouraging: the system failed to operate properly. Casa XXI lost faith in both the system and the supplier.

Then José Eduardo began considering the possibility of switching to another IT supplier. But, he was also pondering whether a new supplier and a new system would not bring new problems, and additional delays. Should he give Meag another chance or should he drop them? He knew he would have to weigh the risk of litigation by Meag against the relative advantage and costs of a potential new supplier. He then approached other suppliers and requested new proposals. Three suppliers were selected and invited to present their solution to Casa XXI's management team.

By 2 September José Eduardo was reviewing these new proposals and trying to understand the costs, benefits, and risks associated with each alternative. He had to make a decision and wondered what criteria he had to use. He could not afford to make another mistake. He was also reflecting on the factors that led to the present situation. He wondered if there was something that Casa XXI should have done differently to identify and manage the risks in a more effective manner. José Eduardo knew that he was running out of time: the date of the next match was fast approaching.

## Background

In 2003 Portugal had been frantically building 10 new football stadiums for Euro 2004, the European football championship organized by UEFA.<sup>2</sup> The Portuguese Football Federation had to ensure that 10 football stadiums would be available to host the final round matches of Euro 2004. The renovation of five existing arenas and the building of five new stadiums were being carried out with the support of the government. In total, the overall cost was estimated to be 500 million euros. The government and the football federation had formed a joint venture to oversee the preparations. Along with the stadiums, the projects included motorways, revamping airports, new urban and regional railways and upgrading ports. The airports authority spent 350 million euros upgrading terminals at Lisbon, second city Porto and Faro in the Algarve area. Hosting of Euro 2004 was bringing many other benefits to the country. New investments were being attracted to Portugal, many monuments were being restored, and new hotels were being constructed.

One of the new arenas was the new José Alvalade stadium in Lisbon, also known as Alvalade XXI. Home of the



Figure 1 José Alvalade stadium, Lisbon.

Sporting Club de Portugal, Alvalade XXI was a first-class stadium that would host five matches of the Euro 2004 championship. It was designed by architect Tomás Taveira who also worked on other Euro 2004 stadiums in Portugal. The vibrant colors (mainly green and yellow) and wave-like roof are features of the new stadium (as seen in Figure 1).

The stadium seated 52,000 spectators. Its modern design included full covering for all seats. The stadium was part of a larger complex, which included restaurants and bars, a cinema multiplex and bowling alley, as well as a medical center and a health club. Located in an urban zone adjacent to the current stadium, the new project was integrated within a larger complex with sports and residential components, the latter including housing, shops and services.

## Casa Vinte e Um (Casa XXI)

The restaurants and bars of the new Alvalade stadium were run by Casa XXI, a company of the group Casa do Marquês S.A., the largest catering company in Portugal specialized in banquets for corporations, governments, or large private parties (Figures 1 and 2).

Casa do Marquês was founded in 1989 by José Eduardo Sampaio, Fernanda Seijo and Florbela Bem. José Eduardo was a well-known former player of Sporting and had many contacts in the sports world. Fernanda Seijo had been associated with the restaurant business all her life. She came from a family of caterers. Her father had the largest catering company in Portugal during the 1980s. The three knew each other from the time they worked together in the business of Fernanda's father.

Casa do Marquês was run by three of them. Fernanda oversaw the production, decoration and logistics of the events; Florbela was responsible for sales; and José Eduardo was the general director (CEO) of the group.

The company reached a partnership agreement with the Sporting Club to become the exclusive operator of catering services and special events at the Alvalade stadium for a period of 15 years. The result was the creation of a new company, Casa XXI, which was established for the exploitation of the business at the Alvalade complex. The agreement with the Sporting Club granted Casa XXI the rights to exploit the following areas:



Figure 2 Examples of banquets provided by Casa do Marquês.

- Prestige – 1000 m<sup>2</sup> space that includes a restaurant for 800 persons
- Corporate Club – 400 m<sup>2</sup> space for 126 persons
- Sport 21 – 500 m<sup>2</sup> space, split into two floors, includes a restaurant for 400 persons
- Restaurant Casa XXI – 250 m<sup>2</sup> space with capacity for 150 persons, open daily, an upscale alternative for employees of companies in the area
- Cafeteria – located at the entrance of the stadium
- Refeitório – canteen for the employees of Sporting
- Camarotes – loges for Sporting group companies and other partner companies
- Kiosks – 15 kiosks associated with brands
- Bars – 26 bars scattered all over the stadium in different sectors
- Venta ambulante ('moving' sales) – 50 waking salespersons

### Cartão 21: an innovative payment system

An important aspect of the operations at the bars and other points of sale was the use of an innovative payment system based on pre-paid cards ('Cartão 21'). Each card was worth a given cash value (i.e. 20€, 15€, 10€, 5€ or 2.5€) and had a unique serial number (the bar code) that identified it. A scanner was used to read the code, check the money left on the card, and debit the value of the card according to cost of the sale. The cards were sold at special kiosks inside the stadium and by special sales staff walking about the bars. The cards could be used during several matches, and their validity was 2 years.

The system was meant to avoid the use of cash thereby shortening the time it took to execute payment transactions. For clients, this meant shorter queues at the bars. For Casa XXI, it meant more productivity of their bar personnel, faster turnaround, and more sales at peak times. In addition, it reduced the need for controlling cash registers and bartenders (Figure 3).

The cards had pictures of famous sportsmen (e.g. legends of Sporting's history). Many people would want to buy and collect them because of their historic value. In fact, the publicity and the articles in the press referred to the cards as items to 'collect history' ('Cartões para colecionar historia').

The payment transaction was executed through a real-time connection to a central database that kept track of the



Figure 3 Example of the early card design.



Figure 4 Point-of-sale (POS) terminal.

value of all the cards. The communications between the point-of-sale terminals (POSs) and the central server (the card database) used a fiber-optic network. This network had been installed by IBM as part of the stadium's infrastructure and was being used by other applications, for example sales of tickets for football matches. When a client made a payment with a given card, the POS scanned the code of the card, the system then checked the 'amount of cash' left in the card, and debited the card according to cost of the item ordered.

The overall system architecture comprised two modules: the front office and the back office. The front office supported the sales process and client interaction including the Cartão 21 payment system. The back office supported food and beverage operations (inventory management and purchasing). The data corresponding to all the transactions (sales, purchases, inventory) were recorded and sent to an external accounting application.

The software was a standard application provided by Wintouch, that is, wSIR (Sistema Integrado de Restauração), which had been installed in many other companies in the restaurant business. It ran in a decentralized way, that is, every bar had two or more POSs connected to a local server with the software running on it in order to manage and record all the transactions.

The front office software supported the work of the sales staff in the restaurants and bars (Figure 4). A client wanting to buy an item at a bar, had to go firstly to the bartender at a POS, tell what he/she wanted to order and give his/her Cartão 21. The bartender then clicked the order on the tactile screen and would slide the card through the bar code reader for the payment. Then the POS printed a ticket (receipt/order confirmation) that the client subsequently had to show to collect the ordered item from another staff member (normally in the central section of the bar). Thus, in busy moments, customers had to queue a second time to get the items they had ordered (see Figure 5).

The front office also supported the 'vendedores ambulantes' (walking salespeople) in the spectator areas of the



Figure 5 Bars in operation.



Figure 6 'vendedor ambulante' or walking seller.

stadium (terraces, stands) (Figure 6). These walking sellers carried a transparent plastic tray with a limited assortment of products. They used hand-held wireless terminals running a customized version of the software to record sales and accept Cartão 21 payments 'on the move'.

The Cartão 21 system had been conceived by Casa XXI, but the design and implementation had been subcontracted. Several international IT services companies responded to the call for tender, but the project was awarded to Meag, a Portuguese firm. Meag was a wholesaler of office and computer supplies that had extended its business into computer system installations. Their experience with large systems implementation was, however, limited.

Meag was in partnership with another IT supplier, Wintouch, which provided the software. Meag brought in all the hardware and did the overall installation and configuration. Meag acted as the prime contractor and had overall responsibility for the project. Table 1 provides the breakdown of the system elements and the costs according to Meag's offer to Casa XXI at the time when the system was being considered.

Table 1 Meag's proposal (April 2003)

<i>Points of Sale (PQSs)</i>	
54 POS – SNS 3030 premium touch	€ 67.500,00
54 Ticket printers Epson TM 88 III	€ 20.520,00
54 Cash registers RJ11 ELT ML	€ 3.672,00
54 Displays LCD 2 × 20 FG23	€ 7.506,00
54 Bar code readers Laser BI	€ 10.260,00
<i>Workstations</i>	
7 Workstations (Warehouse)	€ 5.600,00
3 Workstation (Administration)	€ 3.600,00
Racks	€ 3.216,00
Servers	€ 4.000,00
<i>Equipment for walking salesmen</i>	
Antennas	€ 2.402,20
15 Terminals XS4 XRT503 Laser	€ 15.797,25
<i>Software</i>	
Wintouch WSIR back Office (SQL) OLP	€ 2.500,00
Wintouch WSIR front Office (SQL) OLP	€ 15.000,00
Wintouch WebCOM (FTP) OLP	€ 250,00
Installation and configuration	€ 1.500,00
Total (exclusive VAT)	€ 163.323,45

### The inauguration

The inauguration of the stadium on the 6th of August 2003 was an important event not only for the Sporting Football Club, but also for Portugal. The spectacle included a laser show, the Sporting anthem sung by the popular Portuguese singer Dulce Pontes and the official opening by the President of the Republic, Jorge Sampaio. The jubilation was taken down a notch with a minute's silence before the kick-off, in remembrance of those who had lost their lives in the recent spate of forest fires in the country. A friendly match between Sporting and Manchester United followed the official inauguration.

But it was not all jubilation at the stadium that day. Casa XXI was 'inaugurating' Cartão 21, its innovative payment system, and the experience turned out to be a nightmare. A couple of football fans recalled the incidents:

We were not allowed to enter the stadium until 30 minutes before the match. We had been waiting outside the stadium for hours in the scorching heat. When we finally got in, the first thing we wanted to do is to go to the bar and drink a cold beverage. But of course, we were not alone. We had to fight our way through the crowd to reach the bar area. There, we learned that we had to have one of those cards (Cartão 21) to be able to order and pay. To acquire it, we had to go to a kiosk some 50 meters away. But the staff there had no cards. They told us to wait because the cards 'were on their way'. After a few minutes, we could finally buy one of these cards. We then returned to the line for the bar. When we finally reached the bar, the bartender told us that my card was not



working. He couldn't tell whether the problem was with my card or their system. We then wanted to pay with cash, but he told us that this was not possible. I said we just wanted a bottle of water! We had no time to go and get a new card. I begged him. Faced with the same problem, some people next to us were getting really angry and started shouting. The bar staff didn't know how to react. Some looked in another direction pretending not to hear anything, as if nothing happened! Then the start of the ceremony was announced through the loudspeakers. The crowd behind us got really impatient and started complaining too. Some of the bartenders then began accepting the cash. Others gave away soft drinks to appease the angriest. Seeing this, many people then tried to grab water bottles and run to their seats not to miss the start of the ceremony. It was chaos!

One of the bartenders explained what he experienced:

When the stadium opened its doors, an avalanche of thirsty people who had been waiting outside the stadium rushed to the bars to buy drinks, specially water. This collapsed the bars. The pre-paid cards were supposed to have been activated at designated POSs, but this proved impossible because we were extremely busy coping with the avalanche of thirsty people trying to get water. When they tried to pay, their cards did not work because they had not been activated. Then they wanted to pay with cash, but the POS had not been programmed to accept cash payments. The drawer in the cash register would not open. It was frustrating. We didn't know what to do. There wasn't much we could do away!

Miguel Seijo, responsible for bar operations at Casa XXI, explained

The cards were sold at special kiosks in the corridors of the stadium and by walking salespeople. We were afraid that, if the cards were activated before making them available to the kiosks and to the walking salespeople, hooligans might want to steal them. The monetary value of all these (activated) cards is huge. So, for security reasons, we had decided to activate them as late as possible, i.e. just when the clients are using them for the first time at the bars. But this proved impractical. We could not foresee the initial avalanche of people at the bars. In those circumstances, the obvious alternative was to resort to cash payments. But, that did not work because the POS were not ready to accept cash.

Ready or not, clients and bar staff had no choice but to resort to cash when the pre-paid cards were not working. The salespeople, therefore, tried to work around the system: they started selling without recording the sale, and accepting cash without recording the payment. And, in some cases even selling without accepting any payment as angry customers claimed they had already paid for the cards. As one salesperson pointed out:

We had to use shoe boxes instead of the cash registers to put the money because the cash register would not open!

We were registering the sales manually: scribbling on a piece of paper. We didn't look too professional, to put it mildly!

And as Miguel Seijo pointed out, shoe-boxes are far less secure than cash registers:

Controlling was impossible. We caught people taking money out of the shoe box and giving it to others! We really caught them!

It turned out that the system was able to accept cash payments if properly configured. In principle, bar managers could have changed the configuration, but they needed a special password to do so. The passwords had not been distributed in advance, and the bar managers had not been trained to handle the situation. Miguel Seijo added:

The POSs were not able to accept cash payments because the bar managers had not received the codes nor the instructions that would have allowed them to use the cash registers. In the midst of the initial chaos, Meag staff, had to run from bar to bar to reconfigure a total of 42 POSs. They had only two persons to do the job! They had no idea how big the stadium was, and how long it takes to walk from one end of the stadium to the other end! When they arrived, it was too late. The damage was already done

But there were other problems. Even in the few cases where the POSs were reconfigured to accept cash payments, the system was not able to take orders for one of the most requested products: Water! Seijo explained:

It turned out that the price of water bottles had not been entered in the database, and the POS could not sell a product whose price was not in the product database. On top, prices could not be entered manually. It was really a problem. Some salespeople at the bars were smart enough to key in the code of another product with the same price (e.g. a coffee instead of a bottle of water). Others ended up giving away the bottles of water without registering the sale or even collecting the cash.

Another issue that worried Miguel Seijo was the relatively long time it took for the system to complete a transaction and its effect on operational efficiency at the bars:

During the inauguration and in subsequent trials, we discovered that the cycle time to complete a sales and payment transaction was too long. The sequence – going through the menus on the screen, finding the product, clicking to register the order, and scanning the card to pay – took in total some 45 seconds. This was an extremely long time. Even if everything else had worked OK, this long transaction time would have created a serious bottleneck. It certainly slowed things at the few POSs that managed to work that day.

To make things worse, the wireless terminals did not work at all. It turned out that the transmitters malfunctioned

because of the unusually high temperature. They had been placed on the roof of the stadium where the structure reached temperatures higher than 50°C. As a result, the walking salespeople could not use the system. They had to record things manually and accept payments in cash. Like their colleagues at the bars, they were caught unprepared.

José Eduardo, the CEO, reflected on the whole episode:

We could try to find excuses in the difficult circumstances we had to operate... We could say that the stadium was not finished until the eleventh hour... But the reality is that on the day of the inauguration, with so much heat, the public needed to consume beverages, to drink water, ... and we failed them! The fact remains that our system did not work. It was chaotic. It was embarrassing!

The day ended up on a positive note, however, with Sporting beating Manchester United 3-1. The public was jubilant. They seemed to have forgotten the problems they encountered when they entered the stadium and went to the bars. Sporting's victory over Manchester United helped shares of the club jump the next day by 4.03% on the Portuguese stock exchange. For Casa XXI, however, the picture was much darker. José Eduardo had more than one reason to be concerned.

### Damage assessment and responsibilities

With things literally running out of control, it is not surprising that at the end of the day Casa XXI lost a lot of money. Only through an inventory audit a few days later could the management figure out how much it had really been sold during the event and how much money 'evaporated' in the process. Miguel Seijo calculated that under normal circumstances the revenues should have been five times more.

The loss for Casa XXI, however, was not only monetary. The articles published in the newspapers in the days preceding the inauguration had created big expectations. José Eduardo commented:

The inauguration was an important event for everybody, not just for Casa XXI. Alvalade XXI was the first of Euro 2004 stadiums to be inaugurated. It was something big that transcended the Sporting and Casa XXI. It was something grandiose that we wanted to do very well. We had important guests from all over the world. The expectation was high. We (Casa XXI) had made publicity. We said we had a very innovative system. So, everybody came here wanting to see and experience our innovation.

But all the publicity that had helped create an image of Casa XXI as a modern and innovative company began backfiring. The press now was being negative. They picked up on the troubles and wrote negatively about the failure of the much-expected system. The image and reputation of the company were at stake. The situation was indeed serious, and José Eduardo was very worried.

Until now our company had an excellent reputation. We had a good image towards our clients, our employees, our suppliers, and the Sporting Club. In our business, prestige is very important. But this situation has damaged our reputation. And for me personally it is a huge embarrassment.

After the fiasco of the inaugural day, the trust between Casa XXI and the technology supplier (Meag) began deteriorating. Whereas the management of Casa XXI pointed out that the system had clearly failed, Meag claimed that the system had worked fine.

Many questions were being asked. What caused the problem? Who was to blame for the failure? What should be done now? José Eduardo wondered whether or not the problem was technical. It seemed that the circumstances during the inauguration were so exceptional that they could have rendered a perfectly working system useless anyway. That was certainly Meag's viewpoint. In the words of José Almeida, Meag's director:

There was no failure really. The system worked fine. It all had to do with an organization problem.

José Eduardo remained unconvinced. He became increasingly critical of Almeida:

An 'organizational problem'? So what? Does this exonerate him from responsibility? We delegated the management of the project to him. Almeida should have alerted us if he considered that there were risks or potential problems, especially if these were 'organizational' because we, Casa XXI, could have managed the organizational problems. For example, we could have been better prepared: have an alternative plan (a 'plan B'), and train our salespeople for different contingencies. But, the only thing that we kept hearing was: 'do not worry, do not worry. There is no problem. Everything will be fine.'

According to José Eduardo, Meag did not seem to be willing (or capable) to deliver beyond the technical questions surrounding the installation and test of the system.

### What went wrong?

In the days after the event, Meag was particularly interested in establishing whether or not there had been technical problems with the system during the inauguration. Almeida was hoping to prove his claim that there were no technical problems. Did the POS not operate properly? Were the POS terminals not able to communicate and access the pre-paid cards database? Were they not able to accept pre-paid card payment?

Meag brought some experts from Wintouch (the software vendor) to analyze the files in the back office that contained the activity logs of the POSs. Almeida examined these logs on a computer screen, and produced print-outs of the activities of several POSs. Apparently some POSs had managed to record orders and accept payments. Some of these payments were done with cash and some with pre-paid cards. This evidence suggested that perhaps the

problem might not have been a technical one after all as Almeida was quick to point out.

An independent advisor hired by José Eduardo reviewed the facts and tried to uncover what Almeida had labeled as 'organizational' issues. The following factors seemed to have played a role:

- The construction of the stadium was completed with a significant delay. As a consequence, the system could only be installed a few days before the inauguration. There was very little time to test the system in the stadium. The IBM network, for example, had been completed only the night before the inauguration.
- The day of the inauguration was unusually hot (temperature was almost 40°C). The antenna and the communication equipment for the wireless terminals, which was installed on the roof of the stadium, could not stand the extremely high temperatures and stopped working. The wireless terminals became useless.
- The POS could not accept payments in cash because the system would not allow it. Some special access codes (passwords) were required for the system to allow salespeople to accept cash payments. The salespeople at the bars did not have them and, in any case, they had not been trained to operate with cash.
- Many pre-paid cards did not work because they had not been activated. The cards were bought at the kiosks and were supposed to have been activated at the bar. But this proved impossible because the bars had to cope with the initial avalanche of people. In addition, many cards had arrived at the kiosks too late for people to buy them anyway (the people were already at the bar trying to buy and pay with cash).
- The personnel at the bars lacked proper training. They were unprepared for the contingencies experienced during the inauguration. They did not know how to react, and had no instructions to follow.
- An additional factor was the transaction time. It took far too long for the terminals to complete the ordering, and payment cycle. At 45 s, it had the potential of becoming a serious bottleneck especially during the 15 min break between the first and the second half of the match.

In essence, there had been organizational problems and some technical problems. The organizational problems had been identified and Casa XXI could now take the lead in addressing them for subsequent matches. With respect to technology, the situation was less clear. The only certain thing was that the wireless transmitter had to be replaced and a better cooling system had to be installed. Further tests were needed to determine that the system was 100% trouble free both for the mobile sales and the bars. The fact that some POSs seemed to have worked during the inauguration, did not guarantee that the overall system was reliable. In fact, the system had never really worked at full load, that is, with all terminals concurrently accessing the cards database. The uncertainty remained.

### Action plan

By August 13, José Eduardo was wondering: 'what do we do now?' With its reputation at stake and all eyes on the new payment system, Casa XXI could not afford to make

another mistake. The next game was on August 23 and, given the short time available, the options were really limited.

Although Casa XXI had serious doubts about the management capability of Meag, the possibility of looking for another supplier at that stage seemed far-fetched. After all, there was some hope that the system was going to work the next time if, as it seemed, the problems could be solved. The management of Casa XXI felt that if the problem had to do with non-technical factors (e.g. training of the salesmen, shortening of the transaction time, pre-activation of the cards, ability to switch to cash payments), then they should be able to prepare effectively and handle the situation the next time. The question remained on the technical side. Thus, it was critical to ensure that the system was technically in good order. An action plan was devised to that effect.

The plan included the installation of a new wireless communication system and new antennas (with cooling system) and, subsequently, two major tests: one with the walking salesmen ('ambulantes') to test the wireless terminals, and another with all the sales staff to test the whole system with a full load. In parallel, the salespeople at the bars would be thoroughly trained on the operation of POS terminals and given instructions on what to do if, at the last minute, they had to resort to cash payment. If the results of the tests were not satisfactory, the management of Casa XXI was ready to switch to cash payment for the next game in order to avoid more bad publicity. This would also allow more time to solve technical problems.

Another issue had to do with the logistics of the cards. Since the network was not available at the kiosks where cards were sold, the cards could not be activated at the moment they were sold. In the original design, they were supposed to be activated at the bar the first time they were used. But, as the experience with the inaugural match showed, this was not practical. In order to avoid bottlenecks at the bars, the solution was to have the cards activated before being distributed to the kiosks and sold to the clients. This involved some financial risk, in case cards were stolen before being sold. Another solution would be to extend the network to the kiosks and do the activation there at the very moment the cards were being sold. This was a solution envisaged for the future, but not possible for the next match just a few days away.

### A decisive test

The 'full load' test was crucial to decide whether or not to go ahead with the pre-paid card system for the next match. The full load test had been decided the week before, with the agreement of all the parties. The main objective was to ensure that everything would be working properly in order to avoid problems with costumers, the Sporting and the press. José Eduardo explained:

Meag had promised us that the system would be fully operational for the second match. But, I did not trust them. I demanded to see the evidence that it would work, that is a comprehensive test with many people using the POSs, accepting orders and making payments with Cartão 21 concurrently in order to simulate the same

transaction environment as during the match. The test was supposed to take place ten days before the second match, but they kept postponing and postponing it. We had only four days left before the next match, and then I told them: 'ready or not, you do the test tomorrow'. That's it. Either it works, or it doesn't!

And it did not work. When the test finally took place, both the results and conduct of the test itself were disappointing. Meag seemed to have overlooked key operational details, for example some hardware elements were not switched on, and some terminals were not properly configured. The following problems were reported:

- Printers without proper connection or malfunctioning
- The system printed invoices showing products that had not been requested
- Equipment without proper configuration (i.e. different points of sale were configured in different ways.)
- Some displays were not connected or even working

Commenting on the printer problems, Miguel Seijo added:

Meag didn't do an analysis of critical incidents. For example, when you slide the card through the reader after having keyed in the order, the POS normally prints a ticket. But, if the printer runs out of paper, then nothing happens. You think that the scanner cannot read the card (some cards were difficult to read). Then the tendency is to try again. You slide the card a second time. Although the printer does not print anything, the system takes money from the card (the client is charged twice!). But the printer remains still. Nothing happens. What do you do? You slide it again (and the card is charged yet a third time), but the printer does not react. You get impatient, and repeat it four or five times. Then what happens? Well, ... the POS hangs up! This is the result of a technical problem. The printer is connected through a parallel port and cannot send a signal back to the POS saying 'I am out of paper, I cannot print, put more paper'. We had to address this critical incident because it could compromise seriously the operation of the system.

The crucial test, which was supposed to provide reassurance, only increased the level of anxiety. Under the circumstances, and with only 3 days left before the next game, the fear that something would go wrong escalated.

### A match without cards

The management of Casa XXI decided not to subject itself to further risks for the match on 23 August. José Eduardo explained:

I decided we would not use the Cartão 21 for the next match. We could not run the risk of having a second failure. All the eyes were on us: the public, the press, the Sporting Club. They were all waiting to see what happened with the Cartão 21 payment system. So, we resorted to the 'plan B', i.e. cash payments. I explained to the press that we at Casa XXI were taking the time to

resolve all technical problems to ensure that next time the Cartão 21 system will work flawlessly

In the meantime, and in preparation for the next match, Casa XXI addressed the other organizational problems that were not related to Cartão 21. For example, the salespeople were given extensive training, including how to operate the POS to accept cash payments. The transaction time was reduced from 45 to 8 seconds. This was achieved by limiting the product range (i.e. number of items available for sale at the bar) and also by simplifying the menu structure and the number of screens (i.e. all products appear now in one single screen).

On August 23, the second football match of the season took place. As planned, all the products sold by Casa XXI on that day had to be paid in cash. The bar staff and the walking salespeople system had to tell clients to hold their pre-paid cards for the next event.

In the end, the result was positive. No major incidents were reported. All the bars were able to sell all products to all clients and accept cash payments. The experience demonstrated that the Wintouch software was able to work properly with the configuration in the stadium. It became clear that the problem was now confined to the part of the system dealing with the Cartão 21 payment system. But, what was wrong with the payment system?

### Technical audit

In an attempt to clarify what was wrong with the payment system, Wintouch asked help from one of its partner companies, Processos Criativos, which had substantial experience with Wintouch installations.

The assessment by Processos Criativos revealed some facts that could have had a negative impact on the overall performance of the payment system running at full load during a match. One of the potential problems had to do with the way Meag had configured the Wintouch software and how it communicated with the back office database to record the transactions. This was cumbersome and took too long. But, the most significant finding was that the system was not using the right version of the SQL server. The SQL server was the core of the Cartão 21 payment system, that is, the database for keeping track of the value of all the pre-paid cards.

Meag had installed a configuration that was running the 'MSDE' version of the SQL server. This was a desktop version intended to be used by software developers to program and test systems, but not to run full-scale configurations. Apparently Meag had not acquired the proper Microsoft software licenses, that is, the SQL Server 7.0 Standard Edition or SQL Server 7.0 Enterprise Edition (for details see Table 2).

A key limitation of the MSDE version is that the maximum number of concurrent users is only five. This constraint could explain why the system did not perform when operating at full load (the potential number of concurrent users at the stadium was around 70). It could certainly have been the reason why the system failed on the day of the inauguration.

This finding contributed to further discredit Meag. The patience of José Eduardo was running thin, and he was



**Table 2** Feature comparison of SQL Server 7.0 and MSDE 1.0

Feature	SQL Server 7.0 enterprise edition	SQL Server 7.0 standard edition	SQL Server 7.0 desktop edition	MSDE 1.0
<i>General (depends upon hardware platform and application requirements)</i>				
Theoretical maximum database size	Unlimited	Unlimited	Unlimited	2 GB per database
Theoretical maximum number of concurrent users	32,767	32,767	5	5
Theoretical maximum number of processors	32	4	2	1

wondering how to proceed. His key concern, however, was to get the payment system to work, and soon.

With a substantial investment already made, with all the publicity, and with Casa XXI's credibility at stake, he strongly felt that the project could not be aborted. There was too much at stake, including his personal reputation. The system had to go ahead in one way or another. Achieving success with the new pre-paid card payment system was crucial. But, should the future plans include Meag?

### Considering other alternatives

José Eduardo wanted to consider other suppliers, but he was facing a considerable time pressure. Based on previous contacts, three other suppliers were contacted: Processos Criativos, SVDI, and Restinfor.

Each candidate supplier was asked to make a separate presentation on 1 September. Typically, each presentation highlighted the company's business background, the financial strengths and the expertise that would qualify them for the job, including examples of projects and clients in the catering sector. Following this introduction in which they established their credentials, the companies presented their particular solutions for the payment system for Casa XXI. In some cases, the presentation ended with a proposed action plan contemplating the practical issues of a possible implementation.

The day after the presentations, the candidates and their solutions were assessed by members of the management of Casa XXI with the help of an external advisor. The alternatives were examined from the perspective of four key criteria: technological solution, project management, company background and expertise, and costs involved. A multi-criteria evaluation sheet was developed (see Table 3).

The criteria included several questions and each question was given a specific weight. Each alternative was reviewed against these questions, and each question received a score. The total score was computed by adding the weighted scores of the individual questions. Unfortunately, the result of the exercise showed no clear winner. The differences in the final score were too small and were regarded as insignificant for decision-making purposes. Then, to move beyond the mechanics of the method and the numerical results, a special meeting was convened. The team contrasted the alternatives and discussed the pros and cons of each of them.

The three alternatives were very different with respect to technology. Processos Criativos was ready to use the

existing installation and software, whereas the other two alternatives implied new hardware and/or software. Since Processos Criativos had worked in other installations with Wintouch, they had an in-depth knowledge of the front office software and how to configure it. The company had some reservations about the use of Microsoft Access as the database in the back office and proposed to migrate (at a later stage) to another database system. Processos Criativos, however, was willing to audit the existing configuration, and work with the installed hardware and software.

SVDI proposed a solution based on the architecture of large real-time reservation systems (e.g., those used in the tourism industry). It would imply changes both in hardware and software. Although the team looked experienced and competent, it was not clear that the proposed solution could be developed in time for the next match. The proposal did not include any cost data, and this made the comparison with the other proposals difficult. SVDI claimed that they not had enough time to prepare a formal bid. An advantage of SVDI was their involvement in the development of the other payment systems at the stadium (i.e. sale of tickets for the football matches and access control at the gates of the stadium) as well as their knowledge of the operating environment at the stadium and their experience with the IBM fiber optic network.

Restinfor proposed a solution based on state-of-the-art technology. The POS would be based on Aquapad terminals (see specifications in Figure 7). These were battery-operated terminals running the Linux operating system (an open source standard that is increasingly gaining acceptance with large companies) and the WinRest front office software. A special hardware feature of these terminals was the exclusive use of flash memory (instead of a hard disk) to store data and programs. Flash memory meant much higher reliability than hard disks, which are electro-mechanical devices and have a higher failure rate. Since the Aquapad was battery-operated, the POS would require no UPS (uninterrupted power supply) to protect against the risk of a power failure. And, in the unlikely event of a hardware failure, a terminal could be replaced by a new one easily (Aquapads were very portable) and could be configured in a matter of seconds. In this configuration, the pre-paid card payment system would be based on an Oracle database, which would allow very fast transactions (order and payment in less than 5 seconds). The company had experience with similar installations (although in a smaller scale) and was confident that could get the system to work within the required time frame. From the viewpoint



Table 3 Evaluating potential suppliers

Guidelines	Processos Criativos	Winrest	SVDI
<i>Technology</i>	50%		
Configurations/design (reliability)	15%		
Software (proven/performance in network environment – 100 terminals)	15%		
Degree of required customization	5%		
Back to back solution (no subcontractors needed)	5%		
Additional infrastructure requirements	5%		
Level of complexity/innovation	5%		
<i>Project management</i>	30%		
Project management			
Project manager (profile)	3%		
Project staffing (junior/senior) (full time–part time)	3%		
Timing	3%		
Familiarization	3%		
Test plan (demonstration of performance/final go ahead)	9%		
Risk management	6%		
Back to back responsibility	3%		
<i>Company</i>	20%		
Size	2%		
Reputation/financial status	2%		
Experience in this kind of business	4%		
Reference sites	2%		
Experience in this kind of project (size)	4%		
Ease of doing business	2%		
Professionals?	2%		
Quality control	2%		
<i>Cost</i>			
Software/hardware			
Licenses cost (early cost/recurrent cost)			
<b>Total</b>			

of cost, the alternative was more expensive than Processos Criativos because it included new hardware (the POS Linux-based terminals), and the Oracle licenses.

### The decision

By 2 September, José Eduardo was considering the following alternatives: Should he give Meag another chance? Or should he get rid of Meag right away? If he fired Meag, how would Almeida react to the apparent 'breach of contract'? And, would the new supplier and the new solution not bring problems of their own (technical or organizational), and further delays? Which of the three potential new suppliers (Processos Criativos, SVDI, or Restinfor) should he select?

The technology of Restinfor was state of the art, appealing and seemed more reliable than the installed hardware. But on the other hand, the technology was perhaps too new. Would the Wintouch software run reliably on the Linux-based Aquapad terminals? In addition, the cards database would have to be migrated to Oracle. SVDI was proposing a proven technology, but their

solution would imply changing the hardware and the software. It was likely to be expensive. Was it worth giving them more time to make a more detailed proposal including the cost data? Processos Criativos was not too happy with 'inheriting' the existing configuration and had proposed to migrate the software in the medium term. But in the short term, they could focus on trying to properly implement what was already installed. Their costs included charges only for consulting work, not hardware and software. Thus, the cost comparison with other alternatives was not straightforward.

José Eduardo was trying to understand all the trade-offs, including the risk of litigation by Meag. He wondered how to weigh the different criteria and reach a final decision. Meanwhile, the clock was ticking and he was feeling the heat. The next match was less than 2 weeks away.

### Notes

- 1 This case was sponsored by the Division of Research of IESE Business School. It was prepared by Professor Ramon O'Callaghan as a basis for class discussion. Cases are not intended to



The 2.5lb AquaPad is a medium sized portable device centered around an 800x600 pixel TFT touch sensitive screen. The device is larger than a PDA, but smaller than a laptop.

The smooth blue and silver AquaPad has several ports for expansion cards, but not much else, and fits easily into the left hand. The unit is encased in a Magnesium alloy shell that is lightweight and sturdy.

The operating system is designed especially for low-power mobile devices and works off of a RAM based file system that can reside in everyday memory. Under the terms of GNU General Public License, Midori Linux has been open sourced, so it is an ever evolving free operating system which Transmeta indirectly supports.

#### Features & Specs

##### FIC AquaPad:

WLAN connected webpad based on a 500MHz Crusoe processor and Midori Linux OS.

##### Features:

TM5400 500MHz Crusoe  
8.4" TFT 800x600 display  
3200mAh Lithium battery  
Built-in IrDA, speaker, mic  
3.0 hours battery life  
Magnesium enclosure

##### Technical Specs:

128MB SODIMM SDRAM  
1x PCMCIA bay  
2x USB ports  
1x Compact Flash Bay  
Midori Linux OS

##### Dimensions:

274x164x27mm  
(l x w x h)

##### Weight:

2.53 Lbs

#### SUMMARY

The FIC Aqua Pad is mobile [internet access](#) device connected by a wireless PCMCIA card. Battery life is about 3 hours and the unit boasts an 800x600 TFT touch sensitive screen.

[FIC website](#)

Figure 7 FIC Midori Linux AquaPad.

serve as endorsements, sources of data, or illustrations of effective or ineffective management.

- 2 UEFA – the Union of European Football Associations – is the governing body of football (soccer) on the continent of Europe. Its mission is to safeguard the development of European football at every level of the game and to promote the principles of unity and solidarity.

#### About the author

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