BUSINESS CASE

Toll Collection System Migration at N.V. Westerscheldetunnel

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The Company

N.V. Westerschelde tunnel is a public limited company that was founded on November 11th, 1998 for the purpose of building and exploiting the Westerschelde tunnel. Construction was successfully completed by 2003, and ever since March 14th, 2003, the company has been responsible for managing and maintaining the Westerschelde tunnel, handling traffic and incidents in and around the structure, and collecting toll. While the company was initially set up by the Dutch government and the provincial authority of Zeeland, all shares have been transferred to the province since July 1st, 2009.
The Westerschelde tunnel has a total of 14 lanes, seven northbound and seven southbound. Each side counts three attended lanes with toll booths, three card payment lanes, and one lane for On Board Units (OBU). Every lane is fitted with roadside equipment and a dedicated lane workstation referred to as the front-office. That workstation forwards the transactions generated by each passing vehicle to the back-office, a centralized database in which transactions are handled, can be consulted and reported on.

Development and approval of the new systems had to be managed in a mock setup at one off-site facility in order to mitigate risk and allow for sufficient adjustment opportunities. Once the systems had been approved off-site, the migration was initiated with the upgrade of the first two lanes.

The entire migration did entail more than just the upgrade of the old lanes and the replacement of the existing hard- and software. It also comprised the conversion and migration of all data collected since the official opening of the tunnel in 2003. The main provision was that the toll collection process had to carry on unimpeded 24 hours a day, and that no transactions could go missing. Further, only one lane would be allowed to be inoperative for upgrade in each direction at any given time. Finally, the migration plan had to be coordinated in a way that end users would not have to work with both back-office systems in parallel.

The migration was deemed the most precarious operation of the entire project.
**The Solution - The T2S Migration Platform**

N.V. Westerscheldetunnel made the choice to have the data migration executed by a specialized team of Type 2 Solutions consultants, using the T2S Migration Platform (T2S MPF) instead of a decentralized approach with dedicated migration teams per target system. By doing so, analysis of the source data and systems was done in a single pass and did not have to be repeated by each team. Further, all data handling could be done centrally.

Because of the waning technical integrity of the GEA toll collection, data quality and consistency were severely off-chart. The chosen approach to tackle this issue was to correct all inconsistencies in the source system by adhering to specific standards that would be used to validate, and if necessary automatically correct, the data in the toll collection system. The selected standards were enforced by consulting external references.

An XML-based exchange format was established in collaboration with the vendors of the new systems. The individual topics were modeled into separate XML feeds which were validated by means of an XML schema (XSD), the XSD being comparable to a contract with which the data in the XML file has to comply.
The use of XML feeds and XSDs allowed for a parallel approach: the team in charge of extracting and converting data from the old system could work towards the agreed XSD, while the team in charge of importing the data into the target systems could use the XSD as their departure point.

This gave the migration team the assurance that the target system, which was still in development at the time, and therefore could be compared to a moving target, would be able to process the supplied XML feeds as long as they could be validated against the XSD. By managing the process in this fashion, T2S MPF configuration more or less coincided with the completion of the target system.

The migration strategy also entailed full test migrations, allowing for thorough evaluation of the migration code and a realistic estimate of the processing time and performance of the target system. Further, this migration strategy offered the possibility for testing the back-office system and TIPS, which were still under development, using meaningful and familiar data.
After successfully completing user acceptance and end-to-end tests, the back-office, two lanes fitted with front-office systems and the TIPS system were simultaneously taken into production. Relevant data going back to 2003 was converted by the T2S MPF and moved from the GEA back-office to the new back-office and TIPS. This onetime conversion was termed the "initial load", and was followed by a backup of the source systems for future reference and compliance reasons.

Unlike in the old situation at the Westerschelde tunnel, Movvenience B.V.’s new subscribers would not be asked for a deposit for using their t-tag. Therefore, 45,000 subscribers had to receive a refund, a process that was also handled by Type 2 Solutions. The T2S MPF was used to analyze and extract all data related to the roughly 60,000 t-tags in use, and to generate correctly formed Dutch and Belgian direct debit order batch files (respectively CLIEOP and DOM80 files).

After the initial load, the twelve remaining lanes, which were still fitted with GEA front-office workstations, were connected to an uncoupled copy of the GEA back-office. Since there were no more connections to external systems, it was physically
impossible for the GEA back-office to issue credit card and direct debit orders. From that moment on, these tasks became the responsibility of the new back-office and TIPS. The first phase of the migration, which was initiated on March 11th, 2010, was successfully completed 4 days later, on March 15th.

Subsequently, the T2S MPF switched from manual batch mode to operate in unattended interface mode. By doing so, the delta load phase was entered. In this project phase, the T2S MPF would forward all the transactions spawned after the initial load to the new back-office system in real-time. This was done in a similar manner to the initial load, using XML feed files validated against an XSD, and by subsequently dispatching them to the new back-office.

Since it was necessary to authorize a means of payment in both the new as well as the old lanes, up-to-date lists of valid t-tags, stored in TIPS, and of banned credit cards, stored in the new back-office, had to be distributed to both lane types. The T2S MPF was once more used to handle the conversion of these files to the proprietary format expected by the GEA lanes, and their distribution.

Data flaws that could not be corrected by the T2S MPF without human intervention, and therefore would have caused the feed file to fail validation against the XSD and upload into the back-office were excised and communicated to monitoring tools that would immediately forward an email and SMS notification to the support organization at Type 2 Solutions. During the delta load phase of the migration
project, the migration platform handled roughly 1.2 million transactions, and there was only a single occurrence of such a notification.

After the successful delivery of the XML feed files to the new back-office system, the files were compressed, together with the matching log files, and archived per calendar day. Archiving all feed files was a contingency measure that would allow to submit them again to the back-office, should that need arise.

The Result

The last GEA lane was upgraded on June 17th, 2010, making the T2S MPF redundant. After the usual backups of the systems involved in the migration, for the same future reference and compliance reasons, these systems were phased out and the replacement of the initial toll collection system of the Westerscheldetunnel was a fact.

“Type 2 Solutions has handled this job to our fullest satisfaction. Their approach has been utterly professional and thoroughly organized. Another important fact is that they really got into our business processes.”

Patrick Dankaart, Operations Manager at N.V. Westerscheldetunnel
CLEAR VISION ON DATA

Type 2 Solutions specializes in data migration, integration and the development of interfaces and reporting for IT systems.

Through our services and products, we enable our clients to get more insight in their most important asset, their data, empowering them to adapt more easily to process or market changes.

Type 2 Solutions is located in Ridderkerk, the Netherlands and its client portfolio consists of medium- to large-sized corporations with global operations.