



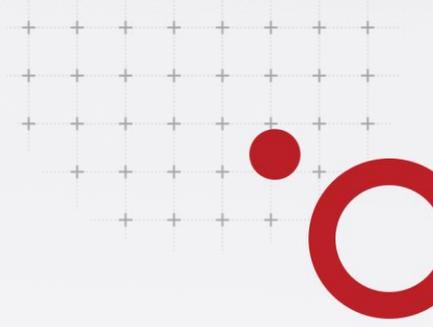
Reference case

Mobiliteit & Openbare Werken (MOW)

Digitalization of a centrally controlled examination question system, including the following responsibilities:

- Installation of an infrastructure
- Development, management, maintenance and operation of software applications.

The objective of this project was the digitalization, installation of the infrastructure and development of the software applications (including management, maintenance and operations) of a centrally controlled examination question system, the management of accreditation of examination institutions and training centers and the follow-up of training followed in the context of the professional competence of professional drivers.



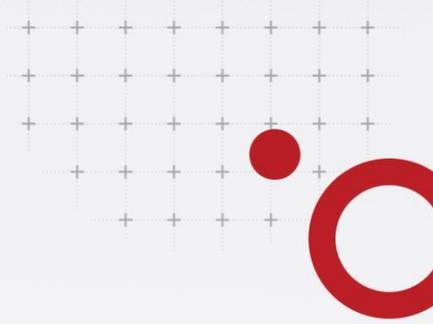
The assignment was carried out for three different directorates of the FPS Mobility and Transport: the “inland navigation’ directorate, the “exceptional transport” directorate and the “road safety’ directorate. For the latter, the management of the accreditations of examination centers and refresher training centers and the follow-up of the training received in the context of professional competence must also be taken into account.

After the sixth State reform, the application was transferred to the three regional authorities.

Project Challenges

The biggest challenge of this larger project was the very short turnaround time with a hard deadline. The only way to achieve this cost-efficiently in a qualitative way was by applying strict control to the software development part (by means of SCRUM, see below), Where the architecture and the testing guaranteed a good quality of the delivered products from day one.

An additional difficulty was the politically unstable situation: at the time the project was awarded, there was a liberalization of the market with regard to being allowed to take driving tests. A few months later, after the fall of the government,



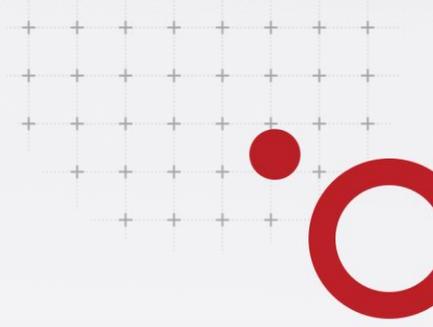
liberalization was postponed for at least a year, and there was talk of regionalization. These political changes had the necessary influence on the project and led to additional change requests that had to be realized within the already very tight time schedule.

Thanks to Slingshot's many years of experience, it was agreed in advance with the client to keep a limited budget available for these kinds of unforeseen circumstances. Together with the flexibility that Slingshot was able to demonstrate, and the good cooperation with the client that was built up in the first months of the project, it was almost impossible: Delivery of a qualitative examination question system.

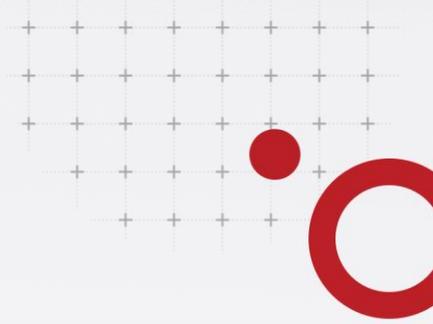
The second challenge lay in the high availability requirements demanded by the customer for the total system. Slingshot succeeded in proposing an architecture that met the high requirements and was still very cost efficient.

Achieving complex custom work at low cost is one of Slingshot's greatest strengths.

Another challenge of which the responsibility lay more with the customer, but from which Slingshot certainly benefited so much and therefore took the necessary actions, was the coordination with other parties. The most crucial was the coordination with the party that had to fill the system with qualitative examination data according to the data model that Slingshot had agreed with the customer. Setting up the necessary network connections to the examination centers that

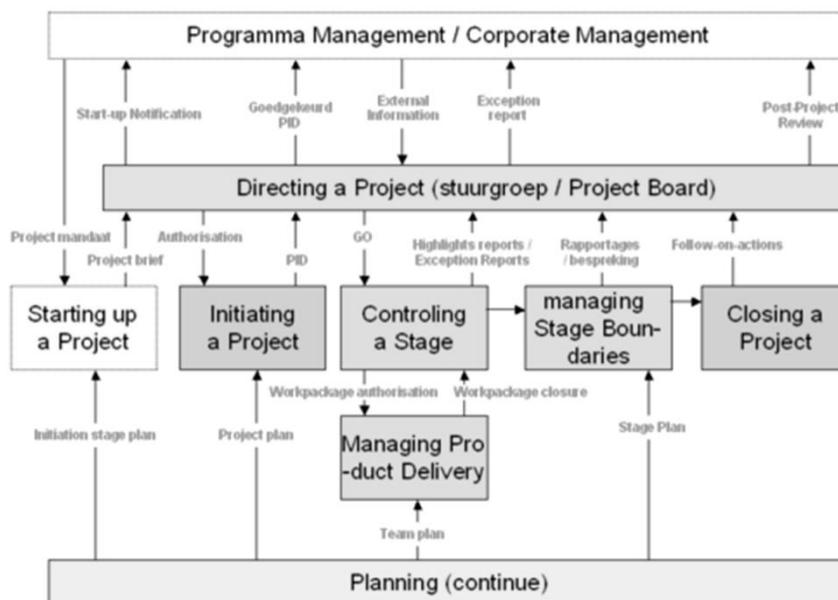


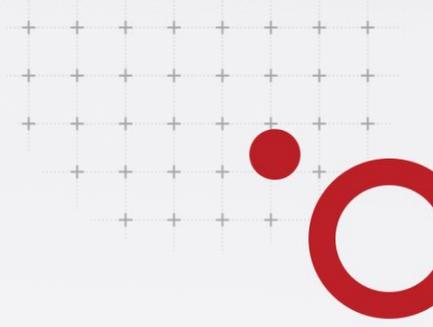
were also offered by various parties (both public and private organizations) also required a great deal of commitment from both Slingshot and the customer. During the project, an examination management system was developed for the directorate of Civil Aviation. This application serves as an examination system for access control.



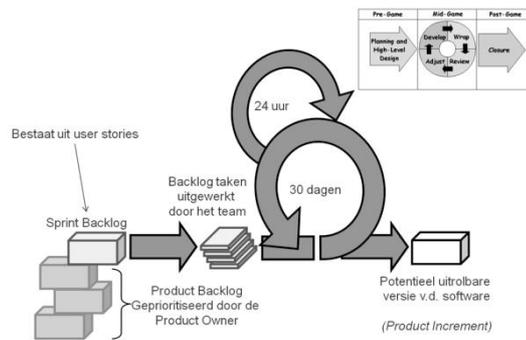
Process Methodology

Prince2 was the driving force and baseline where the Slingshot overall project leader reports monthly to the steering committee chaired by the IT director of dept. MOW and consisted of the domain experts of the departments involved.

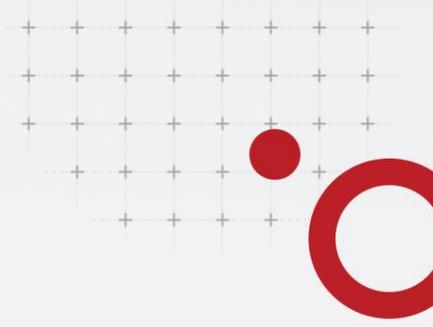




Scrum was used to coordinate the software development part. Slingshot realizes the deliveries as soon as possible, so that the customer can check as early as possible whether the delivered product meets the set requirements.

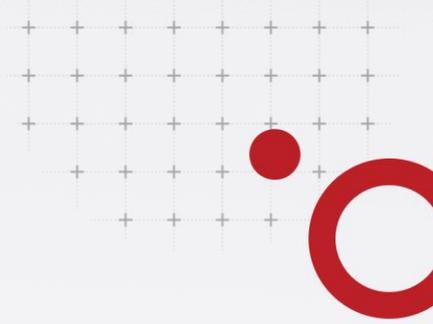


ITIL was the base for the system management. This process includes change management, problem management, helpdesk,...



Tools and architecture presentation below show the layer architecture applied in the software development part of the project. The layer that are distinguished with their respective technologies are:

- **Client:** a browser on the exam PC's.
- **Web:** a Model-View-Controller framework (Spring) that separates the business logic (Java POJOs) from the user interface (Java Server Pages).
- **Services:** services realize the business logic used by the Web Controllers to handle user requests.
- **Domain model:** An Object-Oriented data model that represents the problem domain.
- **Integration layer:** this layer is responsible for integration with external systems.
- **Data Layer:** this layer is responsible for recording the data in the database. The conversion of the data in Object Oriented format to the relational database format is done using Hibernate.
- **The Spring framework** is used to glue the layers together. An application server (Jboss with Tomcat servlet container) is used to host the Java EE application.
- **The security later** includes mechanisms for authorization as well as for shielding the client exam PC's.
- Authentication via Fedict Federal Authentication Service (FAS) (CSAM).
- **Document generation** with jacket reports.



The application architecture of this project was aligned with the general ICT strategy of the client: using open standards, open source products, industry frameworks and internet standards as much as possible. The standard products used by the customer for other projects were also used as much as possible, taking into account the evolutions on the market.

The infrastructure architecture was subject to very high availability requirements. At the request of the customer, a disaster recovery environment and duplication of all servers and data storage media was provided. Furthermore, dedicated lines up to the exam centers were provided, both for performance and security reasons. The infrastructure architecture of the project is shown schematically below.

