

European Contingent Workforce Recruitment Company

Adaptability and Agile Business Practices

Nominated by ISIS Papyrus Europe AG, Austria

1. EXECUTIVE SUMMARY / ABSTRACT

A leading European Contingent Workforce Recruitment services company, in the following called *The Company*, provides professional services in the domains of recruitment, security, cleaning, and managed services to customers around the globe. The well-established company with more than ten thousand employees serves blue chip organizations in Europe and internationally. In order to manage the contingent workforce, *The Company* utilizes a Contingent Workforce Management System (CWMS) to handle the processes involved in hiring people with the right skills, service delivery, reporting, payroll and client invoicing.

CWMS handles more than 50 thousand temporary workers and covers business operations end-to-end from recruitment, job candidate management to payroll and client invoicing. The process contains several components specific for each business perspective. Candidate management is responsible for interviewing and admitting new employees for recruitment whereas service delivery ensures that customers quickly receive their ordered contingent of workers matching the job descriptions best. Accounting covers the payment of employees and invoicing to customers.

In order to keep pace with a permanently changing market, *The Company* needs a sound, reliable and scalable CWMS at its core which is built on an Adaptive Case Management framework combining automatic service tasks and user tasks in the form of BPMN models. The system is customized specifically for the contingent recruitment needs so that *The Company* can react efficiently to the needs of many industry sectors and provide an agile temporary workforce. In particular, CWMS exchanges data with various external systems, supports users to validate data from different sources and facilitates the payroll and invoicing process. Moreover, CWMS provides management reports and monitoring capabilities to track business progress. CWMS is a unified platform allowing *The Company* to cooperate with clients and workers on mobile devices. The innovative system provides significant benefits through increased efficiency and revenues due to time savings as a result of reduced manual interventions and raises the delivered customer experience.

2. OVERVIEW

The demand for contingent workforces has increased considerably over the past years because of the benefits it brings for enterprises, such as the flexibility in type and amount of labor resources. In order to adapt quickly to market conditions, *The Company* requires a flexible and agile management system to handle the contingent workforce. CWMS provides two working environments: a mobile app for the recruitment and work shift assignment, and a desktop application for payroll management.

The recruitment and work shift assignment running on mobile devices is one of the innovative features of CWMS. The system brings a complete new and productive way to handle the complex process of recruitment and work assignment. By using the mobile app, the system can scan structured documents like job applicant passports and extract and store the data directly into the database. Once the work contract was accepted, the applicant legitimates the contract by immediately signing it on the device with an electronically recorded signature and thus, finishing the application process.

For work shift management, instead of calling one candidate after the other, the system assists users to send work offers to multiple workers at the same time by SMS or notifications to the CWMS mobile app which can be installed by the workforce candidates on their smart phones. Accepted work shifts are instantly received and stored directly into the CWMS database, which is more convenient and reliable than confirmations via phone calls or emails as in the previous system. The mobile app facilitates the communication between the company employees and contingent workers in a time and location independent way. The mobile app development has to deal with several challenges, such as the design of a compact GUI to present enough information for a complex business task.

A main feature of CWMS is computerized accounting to support *The Company* in payroll and invoicing. Batch files are used to receive inputs with thousands of data records in different formats from different data sources. Data validation is a challenge because the process needs to be precise and executed on time as *The Company* cannot afford to pay their workers too late and not to invoice their customers. To overcome this challenge, the GUI assists users to easily recognize and correct existing errors. CWMS provides intuitive GUIs for validating timesheets, client data and contingent worker data. Moreover, the system allows users to validate at the same time multiple data records. Thus, CWMS reduces the validation time as well as the errors in output data to avoid incorrect payment calculations. Besides, CWMS generates automatically all invoices and sends them to the clients.

CWMS is customized specifically for data exchange with external systems. The validated data serve as input to the external payment and accounting systems for generating pay slips and general ledgers. CWMS uses data input from these systems in order to transform them into another formats which are suitable for online representation and archiving.

3. BUSINESS CONTEXT

Recruitment and onboarding of new contingent workers

The recruitment of temporary workers requires a lot of staff because of the labor intensive manual entering and validating of data and the large number of new recruits every year (appx. 60 thousand) with a variety of working skills in different domains. The recruiters investigate the applications of candidates to find out whether the worker is eligible to work and who is able to work for which clients. The interview happens in person for each candidate. To manage the work, *The Company* used different software, which did not allow exchanging data and everything was recorded on paper and archived as such

Work assignment done with several independent systems

After receiving a request from clients, *The Company* collects and arranges a number of workers with the same specific skills and available work slots which match the requirements of clients. The company employees communicated via emails or phone calls with each worker to arrange the work assignments. Moreover, the assignment of workers to a work location at a certain time needs to be optimal and not only fit the time requests from the clients but also the holiday requests from workers. The company employees had to handle this task with several independent software for email, data management, work assignment, which consumes a lot of time and human resources.

Printing out the error records for data validation

Data validation was a heavy-duty task because of the variety of the data formats from different data sources. Running on DOS with a poor data visualization, the previous Computerized Accounting System (CAS) provides a data validation function consuming a lot of paper for printing. When the system returns a negative validation result, the employees had to print out hundreds of error records and figure out manually where the errors are. This was repeated until the validation is positive. This process took a whole week, from Thursday until early Wednesday of the next week before the payroll process could start, and consumed a lot of paper. Under the given time pressure, the data validation always required a lot of effort with the previous system.

No reporting or tracking in the computerized accounting system

Although the previous CAS provides an end-to-end payroll process, the system is not transparent for users. It seemed like a black box for users as they could not figure out at the end what was done to get the payrolls. Moreover, reporting and tracking was missing in this system. It was not possible to get the information about revenues, which clients were balancing positive or whether money was lost.

4. THE KEY INNOVATIONS

The new system provides features, which enhance the initial state of the business application as follows:

- A **mobile app** for onboarding new workers and assigning work shifts improving the communication between clients, workers and the company employees.
- Considerably **cut the time for data validation** time due to an intuitive user interface.
- Based on the data input, the **invoices can be generated** and automatically sent to clients once data validation was completed.
- CWMS **outputs different data formats** suitable for the external systems that need to process these data.
- Users can **track the process operation** with the built in BPMN designer/viewer.
- Moreover, the system produces **revenue reporting data** for each client.

4.1 Business

CWMS brings a **unified platform** in which *The Company* can interact with both clients and workers in a convenient and productive way. For workers, the recruitment is handled systematically without papers and thus, it reduces the working time and human resources. Running as a mobile app, the system optimizes the access capabilities that allow all parties to operate the business in a convenient way independent with time and locations.

CWMS **validates data in a semi-automatic way** with few manual steps. The erroneous data records are visualized on an intuitive user interface that allows users to directly correct the mistakes without printing like in the previous system. This way, *The Company* cuts efforts and previously needed materials for printing.

CWMS has **report and tracking** features that provide the company management with details at any time of the business process. Therefore, financial issues can be tracked back directly in the system and help answering the question “where the money goes”. These features were missing in the previous system and thus, highly valued by the company management.

4.2 Case Handling

Overall system architecture

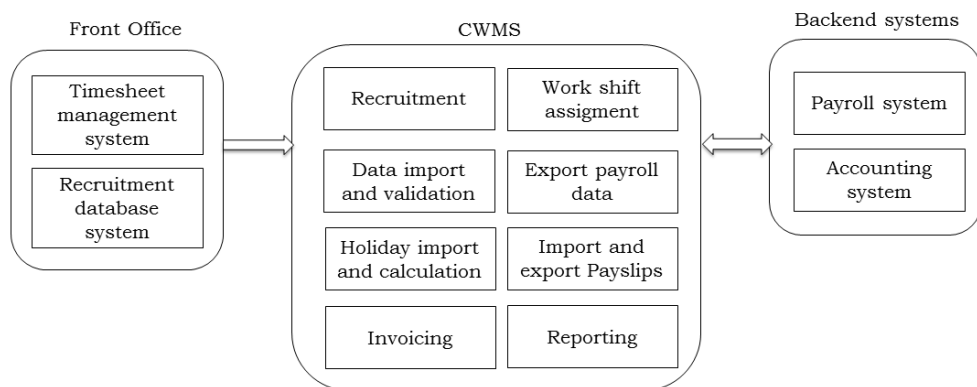


Figure 1: Overview architecture with important modules

Figure 1 shows an overview of the CWMS architecture. It provides a mobile platform for recruitment and work shift assignment. The work can be handled on the mobile devices of clients, workers and employees. The mobile app supplies a compact view with necessary information for the business operation.

For payroll calculation, CWMS contains several packages as follows.

- CWMS imports data from front office systems that provide contract information and working hours, containing client data, worker data and time-sheets in different formats. Data validation packages ensure the quality of data input, which normally contains a lot of errors and thus needs to be pre-processed.
- The “Invoicing” module generates invoices automatically after data validation was successfully completed and sends them by email to the clients.

- The “Holiday import and calculation” package manages the holiday requests and calculates the balance.
- The Payroll is calculated and exported as pay files serving as input for the Payroll system that generates pay slips and accounting data for accounts payable, accounts receivable and general ledger (AP, AR, GL).
- Pay slips are imported to CWMS and transformed to a format that is stored on a payslip portal for online access.
- The “Reporting” package provides the company management with an overview and associated details of business operations as well as allows users to track each step in the process in different graphics.

Each of these packages consists of a set of business processes that drive the business execution. These processes are predefined and organized in case templates which are automatically instantiated as soon as input files arrive in trigger folders.

Key roles assignment

- **The company employees** manage the recruitment, work shift assignment and data validation. They can handle the work on desktop or mobile devices for a location independent portable working environment. They also participate in the data validation process containing user tasks that are executed manually.
- **The company managers** assign or reassign user tasks to suitable employees. Besides, they have the view of “who does what” and can track the business operations.
- **Clients** and **workers** are external users of CWMS. Clients can send work requests to *The Company* on the CWMS mobile app. Workers can receive work offers and communicate with the employees via the CWMS mobile app or use standard SMS services.

Onboarding of new workers

Figure 2 shows the main functions of the CWMS mobile app for recruitment.

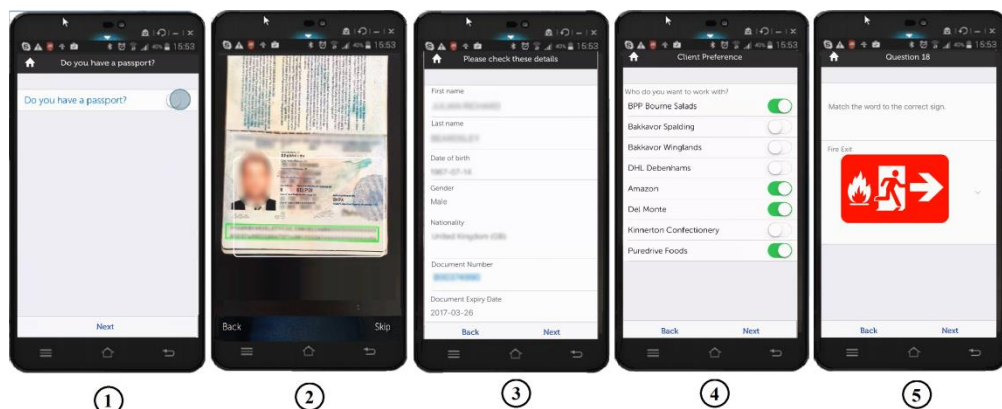


Figure 2: Candidate providing information on mobile

- Data are automatically extracted from provided input documents. For example, a candidate is asked to show the passport at the beginning of the recruitment process (1). A photo of the passport is taken and uploaded to the system (2). The data is automatically extracted with a Capture

backend process and shown in the result view (3). The candidate verifies the data extraction and can edit values if there are mistakes.

- The candidate can select from a list of companies (clients) he wants to work for (4).
- The candidate enters a qualification test (5) by providing answers to set of multimedia questions. The test will be used by the recruiter to make the recruitment decision.

Figure 3 show the main views of the CWMS interview app.

- The recruiter goes through the questions to validate the answers (1) and make the recruitment decision (2).
- If the candidate is accepted, the recruitment agreements are provided for reading (3).
- The candidate confirms the agreements by signing directly on the mobile screen facilitated by the system's e-signature support (4).
- At the end of the recruitment process, the recruiter can see how many candidates were already interviewed or still waiting at the office (5).

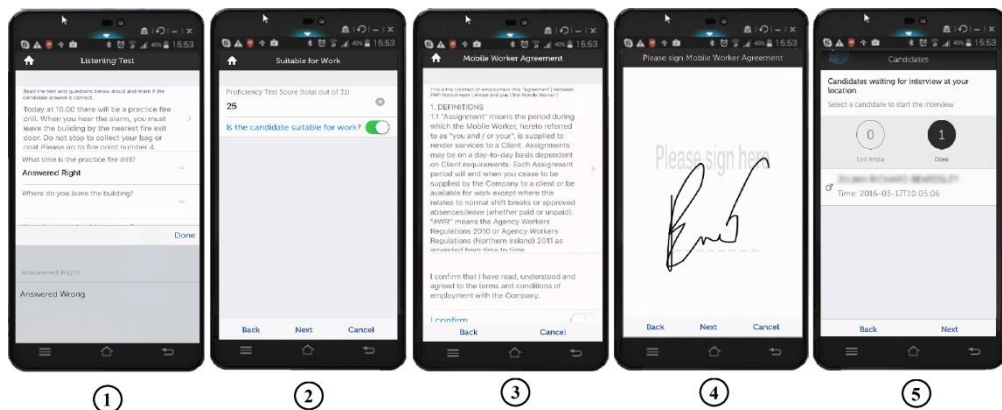


Figure 3: Candidate interviewing with mobile app support

Work shift assignment via the CWMS mobile application

The employees being responsible for work shift assignments can operate the system not only on a desktop application but also on mobile devices which significantly enhances the quality and quantity of the work. Clients, workers and the company employees can login to the system with user name and password to interact on their own mobile devices no matter when or where they are.

Figure 4 shows five main compact views of the mobile app when the company employees handle the work shift assignment. A calendar view (1) contains work shifts in different states (assigned, unassigned, cancel) which are encoded with green, red and yellow colours, respectively. The detail view (2) represents more information for work shifts, such as location, branch, period of time and the current state of the shift. The company employees can send a shift offer to multiple workers at the same time. If the workers use the mobile app, they receive the notification of the shift offer (3) right on their mobile device. The application shows the details of shift offer (4), and could even link to applications such as Google Maps to show the location of the client assignment. Workers can easily accept or decline the offer directly on the same interface (4). If the workers accept the offer, the assigned shift is automatically added to their calendar (5).

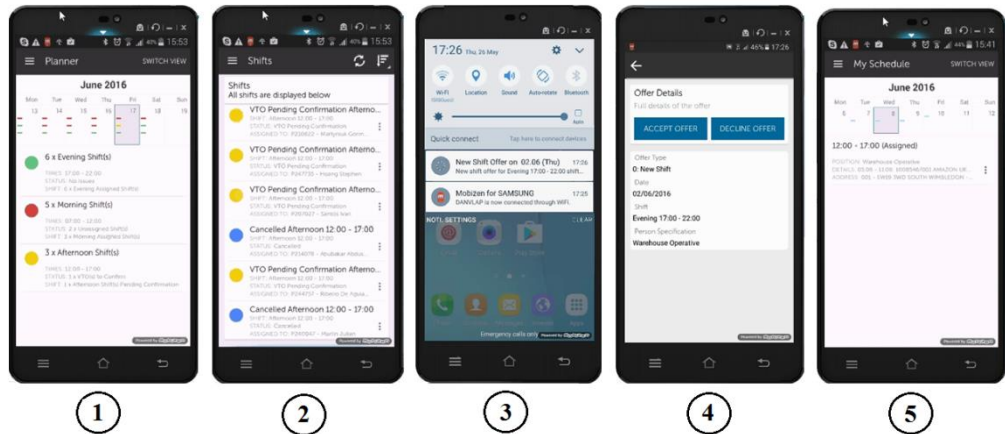


Figure 4: Work shift assignment

Figure 5 shows how a shift offer is sent via SMS. In case workers do not have smart phones to install the application, CWMS sends a shift offer to several workers via SMS (2). If they accept the offer by replying with an accept-code message, the system sends the details of the shift to the workers as SMS (3). The work shift manager can use also a larger interface (1) on the desktop application which allows more convenient interactions for the bigger amount of information.

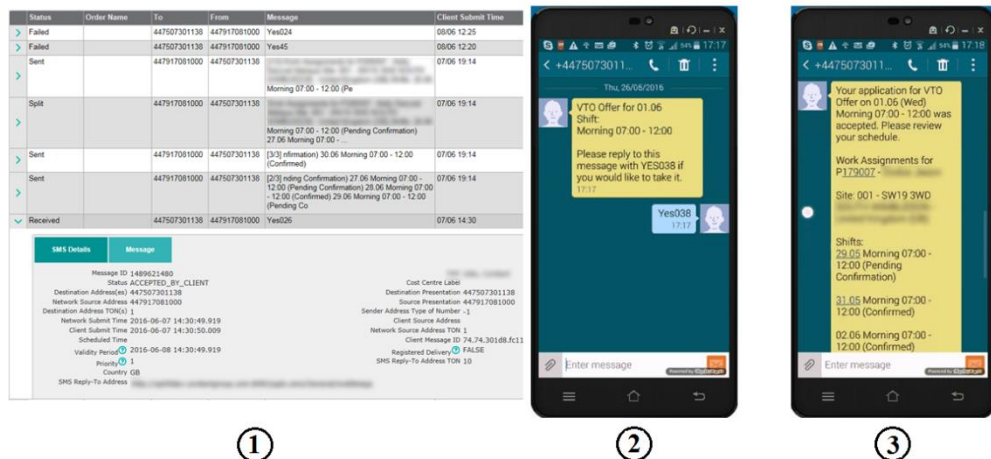


Figure 5: Work shift offers sent via SMS

Data import and validation

Right after workers finish their work at clients, *The Company* transfers the wages to the workers and sends the invoices to the clients. The data for this process usually contains errors and thus, needs to be pre-processed. This data validation aims to eliminate errors or missing information in the input data, and reduce the mistakes in payroll calculation.

Input data, which contains timesheet, client, worker information, are dropped to a trigger folder to instantiate an ACM case instance for data validation from a case template, which is predefined BPMN processes.

Figure 6 shows the data validation process model in the integrated BPMN designer which concurrently imports input data from 8 different data sources. Depending on the data type, each of the 8 sub-process is built specifically for that data source. The main process contains only service tasks and sub-processes, which can be reused in other processes.

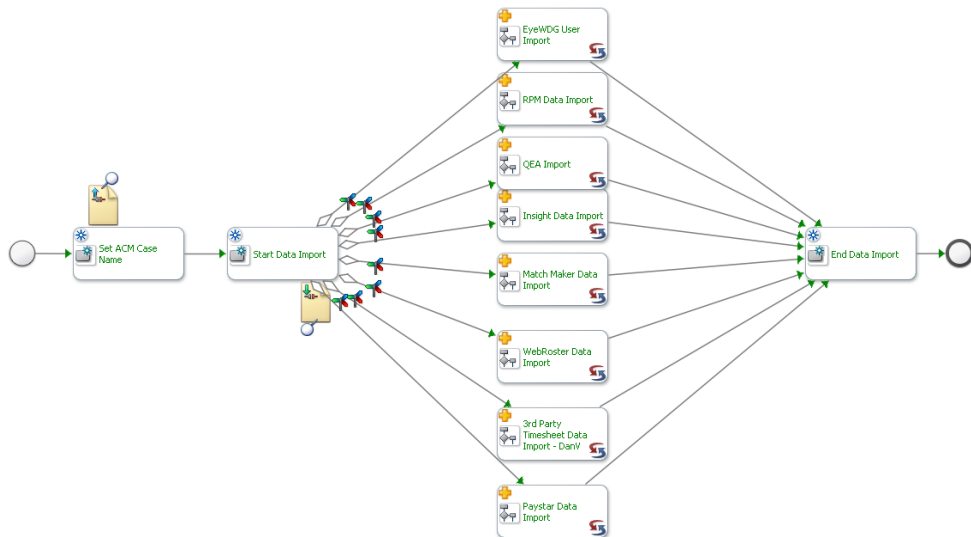


Figure 6: Data import process

Figure 7 shows a sub-process for validating data received from the front office systems. The process includes mostly service tasks to optimize the automation of data validation.

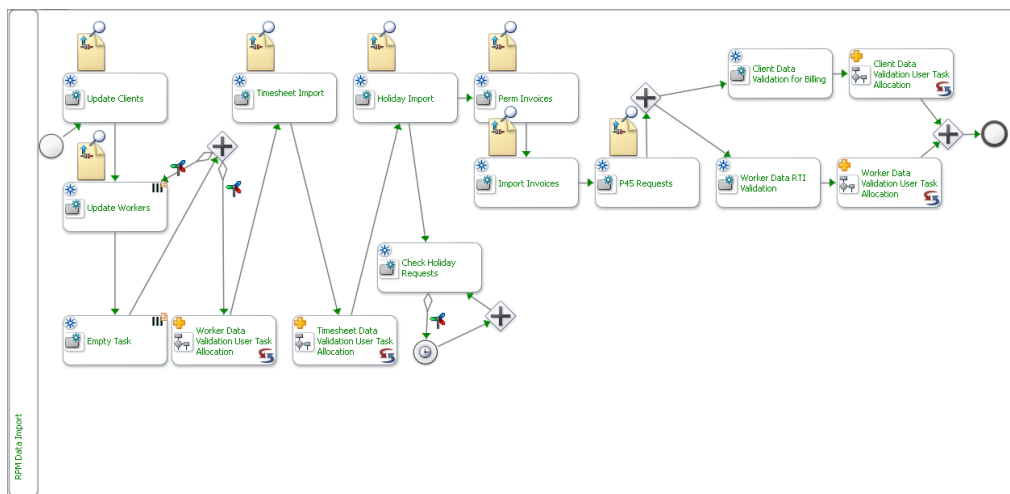


Figure 7: Data import sub-process

Although a high automation degree should be achieved, certain manual user tasks are needed and combined with service tasks into the BPMN process, such as the task “Worker Validations” in Figure 7. Based on the context-action principle, this interface is designed to reduce the actions of users and display only the necessary information and functions to complete a task without changing to other views. In particular, Figure 8 shows the user interface when working on a data validation task that is assigned to an employee. A list of workers is shown in the middle and the details are showed to the right in multiple tabs to make the view compact. For example, if there are data mistakes on the Worker Info (1), the Edit button (2) is accessible to change the data. If there are no more errors, the user clicks on the Validate button (3) to complete the data validation task.

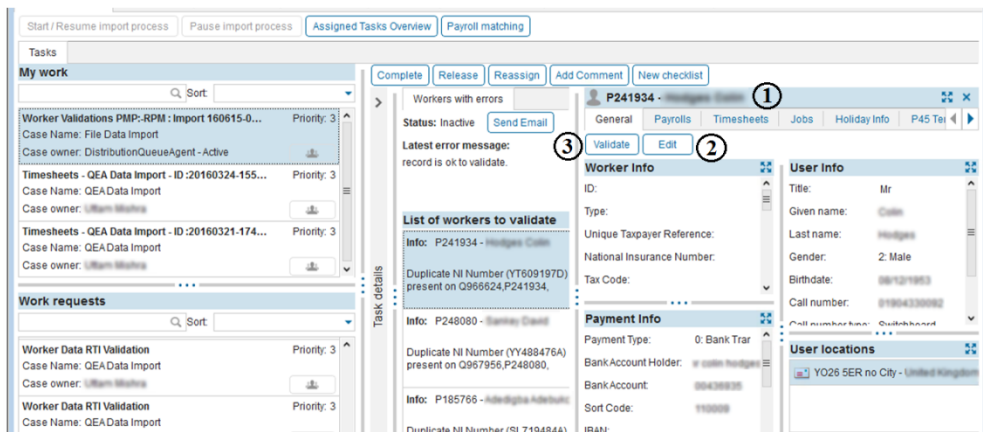


Figure 8: Typical data validation screen

Export Payroll Data

CWMS provides correct and clean data in different formats which are exported for use in the external payroll calculation system. The payroll calculation is an automatic process involving several complex parameters and different data input.

Monitoring and reporting

CWMS supports administrators and managers to check who is doing what. Figure 9 shows an example of an administration view providing the information for each employee. For example, the employees in row number 2 (1) has currently 2 assigned tasks (2). One assigned task is shown on the left (3) with the data of the task. Administrators and managers can assign or reassign (4) a task to an employee in case the currently involved employees are sick but the task needs to be continued by a different person.

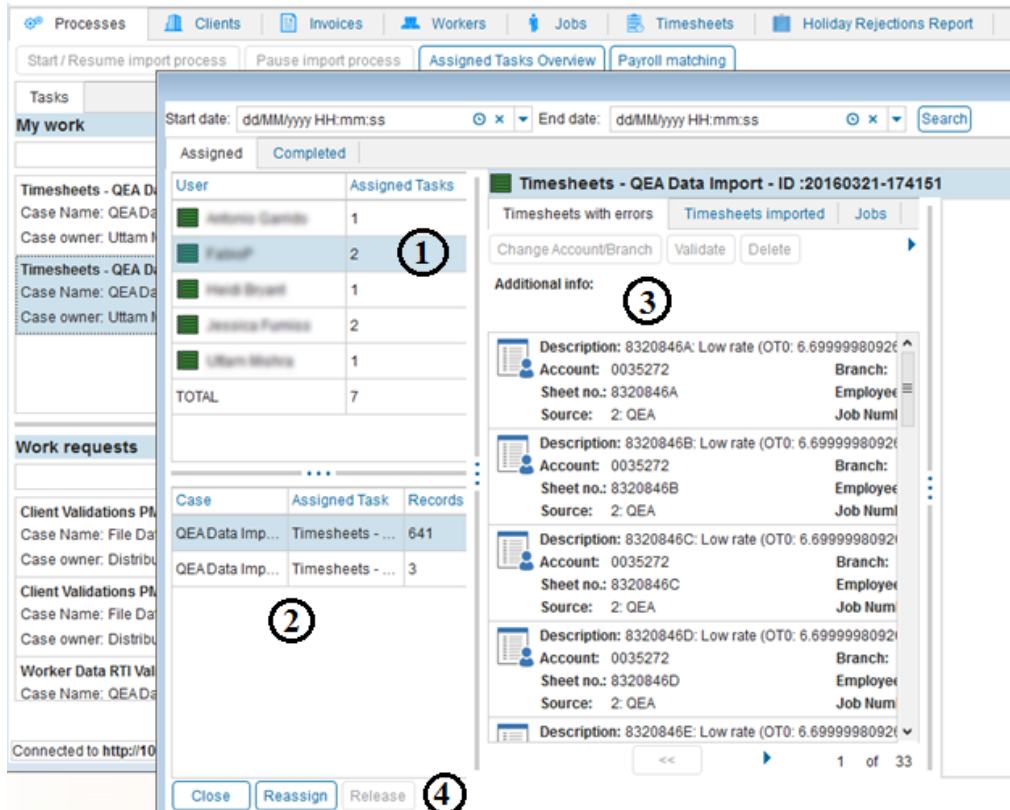


Figure 9: “Who does what”

4.3 Organization & Social

Several innovations of CWMS have an impact on the employees of *The Company* in various perspectives.

Compared to the previous system, the mobile app of CWMS innovates the way people interact with clients and workers to run the business. On one hand, the company employees interact concurrently with multiple clients and workers via mobile devices. The employees can handle their activities more quickly, efficiently and independently from time and location. On the other hand, workers and clients can run the application without complex technical settings. All business parties can access the system, share a common perspective of the situation and perform their tasks to complete the business in a convenient manner.

CWMS removes the printing step from the data validation process and thus, completely eliminates the paper consumption for data validation. Users only work with the user interfaces providing all necessary information for their work. Moreover, users can validate multiple data records by one click, which speeds up the data validation process.

The process models operated by the system are designed with the built in BPMN designer which also allows users to observe the status of all steps that have been already done. Instead of being perceived as black box as in the previous system, CWMS provides a complete overview of all business operations at any time. Moreover, the system supports the company managers to monitor who is doing what

so that they can easily assign user tasks to other employees if needed for various reasons.

5. HURDLES OVERCOME

5.1 Project implementation

Due to the fragmented legacy systems which were used by the previous solution no documentation was available and a reverse engineering approach had to be applied. As only the received data could be analyzed it was hard work to figure out under which circumstance such data were produced. A lot of time had to be invested into testing and data verification.

5.2 Management

Users needed some time to adjust to the new system. The company management had to plan for the paradigm change and promote the new system to employees by identifying the benefits in order to get a high acceptance and adaption for the daily work. Due to reduced efforts of CWMS, the management needed to care for their employees fear that the number of involved people could be reduced thus, making them reluctant to accept the new system.

5.3 Business

Invoices sent to clients can be in different formats that are suitable for the clients' business systems. For every new client, the system needs to adapt quickly to the needed data format so that invoices can be sent to client on time.

5.3 Organization Adoption

The administration of the new system requires special knowledge, especially the methodology of the underlying Adaptive Case Management components. E.g. in order to create a new process with service tasks and user tasks, users have to understand process modeling and some basics of BPMN. In order to introduce the staff, *The Company* organized two weeks system trainings before gradual involvement into daily operation tasks to take responsibility over from the project team. Due to the intuitive mobile app and business user interfaces, only a short instruction to business user's daily work was necessary for working self-sufficient in a comfortable way with the new system.

6. BENEFITS

6.1 Cost Savings / Time Reductions

- Compared to the previous system the time needed for the recruitment process would be reduced by nearly 90% from typically 75 minutes to 10 minutes.
- Digitalization of the workers HR dossier saves 50 Euros per applicant.
- The mobile app for work assignment reduces the number of employees handling the work shift arrangement by 40%.
- The data validation process needs less than two working days (Monday to early Wednesday) instead of more than a week (Thursday to early Wednesday) in the previous system.
- The new system completely eliminates the paper as no printing is needed during the data validation process.

6.2 Increased Revenues

In the first phase of the project, the revenues cannot be estimated but are expected to be significant due to the increased efficiency.

6.3 Quality Improvements

- CWMS provides a 1:1 communication for 10 thousand shifts a day via the mobile app that increase work shift assignment.
- The improved data validation process minimizes missing data for the payroll calculation.
- Invoices are produced in different formats suitable for various client systems.
- CWMS is a transparent system in which every step of the business process can be observed and traced back.
- CWMS has a high integration capability with any external systems.
- The system provides reporting and tracking functions to track possibly missing money in the payment calculation process.

7. BEST PRACTICES, LEARNING POINTS AND PITFALLS

7.1 Best Practices and Learning Points

- ✓ *Mobile app for recruitment changes the communication in person from 1:1 to 1:n*
- ✓ *Work shift management is handled on mobile which facilitates the business work and allows for a location and time independent working environment for users.*
- ✓ *User interface should be compact but still provide enough information even on a limited space like on mobile devices.*
- ✓ *The automation can be optimized by service tasks. However user tasks are still necessary and should be well combined in BPMN process models to guarantee a reliable and robust system.*
- ✓ *The system needs to be flexible and agile to deal with different data formats from various data sources imposed by the served clients.*
- ✓ *Due to the modern and sophisticated GUIs the performance and response time of CWMS is reduced compared to the previous system running on a MS DOS environment with very limited visualizations. The project is considering in the next phase to speed up the GUI.*

7.2 Pitfalls

- ✗ *To replace the previous CAS, the project team required significant research due to the reverse engineering approach. It was difficult for the business users to transfer their knowledge and experience to the project team.*
- ✗ *Observing business users operating the previous CAS system was not enough for reverse engineering. Payroll calculation involves many more different economic fields like insurance, tax, ...*
- ✗ *During the initial requirements engineering phase the user centered design approach suffered from the fact that business users could not sufficiently describe what they expected to see on the GUI for a certain user task. Thus, the GUIs had to be iteratively adapted from the feedbacks of early users.*

8. COMPETITIVE ADVANTAGES

CWMS supports *The Company* in contingent workforce management that requires highest flexibility and agility to deal with a rapidly changing market. Time is a key factor with high impact on competition with other service provider com-

panies. CWMS significantly reduces the time and needed human resources in recruitment and data validation processes. The CWMS mobile app provides a portable working environment to every user regardless of time and location.

Supporting different data formats for input and output data exchange with external systems fuels *The Company's* future market development strategy.

9. TECHNOLOGY

CWMS is built based on an Adaptive Case Management framework that provides a platform to integrate with different external systems. The ACM framework supports BPMN processes to optimize the automation of the system as well as ad hoc user tasks which can be combined with automatic service tasks. Besides, the mobile app development of CWMS uses technologies like REST, HTML, CSS, and JavaScript.

10. THE TECHNOLOGY AND SERVICE PROVIDERS

CWMS is built based on the ISIS Papyrus Adaptive Case Management framework. ISIS Papyrus offers a consolidated, end-to-end solution for inbound and outbound business communication and process management, based on standard software components and solution frameworks:

- Papyrus WebRepository
- Papyrus ACM Solution
- Papyrus Business Correspondence Solution
- Papyrus Server

ISIS Papyrus - Communication and Process Platform: <https://www.isis-papyrus.com/>