COMTRADE
SYSTEM INTEGRATION

WHITEPAPER

DOCULIBRIUM

Electronic Document Management as a Basis for Digital Economy

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DOCULIBRIUM SHORT OVERVIEW

DOCULIBRIUM ECM solution provides efficient management of all content of any organization (documents, cases, dossiers, folders, video clips, project files) during the whole content lifecycle, starting with content origination by some of the capturing channels (scan, email, fx, web pages, web services), via classification and organization, processing through wokflows, till the final short and long term archiving and disposal, according to legal regulation. Content transformation services provide different renditions of the same content by conversion services, while eletronic signature with timestamping services provide legal basis for electronic business. Security services are responsible for highest level of information security, collaboration services and tools enable efficient team work on the same document, while wokflow management capabilities provide automation, controllability and formalisation of all business processes.

Benefits of implementing Doculibrium

- Reducing company's paperwork, with direct savings
- Increased efficiency, through fast and simple documents search
- Maximum information security, in accordance with legal requirements
- Greater efficiency in processing documentation, task transparency and document flow
- Centralized repository of all documents, with classification and organization according to the rules and procedures
- More effective collaboration of multiple participants on a single document (case)
- Easier and more efficient reporting and reviews
- Minimization of risk of non-compliance with legislation

CHALLENGE

As part of the digital economy, the most valuable information, including unstructured content such as documents, video clips, or even social media content, are all in digital form. Efficient management of this type of information is the key success factor to effective business processes, high quality service, and market advantage.

In today's digital world, information with significant business value may be in different forms, such as data stored as database records, documents in various formats, presentations, pictures, video clips, projet files, all the way to web content, social media content or data generated by some connected devices in era of connected and smart devices. With application of new technologies in everyday life, it starts to be more challenging to collect, organize, classify, store, transform and process data in order to get real business value.

ENTERPRISE CONTENT MANAGEMENT (ECM)

In order to leverage these information to get real business value, there is a specialized segment of software solutions, known as Enterprise Content Management (ECM) solutions. ECM solutions manage content through all content lifecycle, from creation all the way to the long term archiving or final disposal, with wide range of various products, tools, applications or services.

In ECM system content origination may occur in different ways – by scanning of paper document, importing electronic document, creating document from template, generating from email or creation from external system by integration services.

With indexing and classification services content is defined with metadata (properties) and stored into ECM repository for further processing. During the processing, through the content lifecycle, content may be modified, edited, versioned, in a collaboration of actors in a process.

Process and task management services enable modelling of any business process into electronic workflows. Some of the examples are invoice approval process, contract management processes, or business trip approval processes. Any kind of process with document or case as subject of processing, may be implemented as electronic workflow in ECM system. Content transformation services provide different formats (renditions) of the same content, while comprehensive security services take care about security of the content and legal compliance, according to legal regulation and security policies.

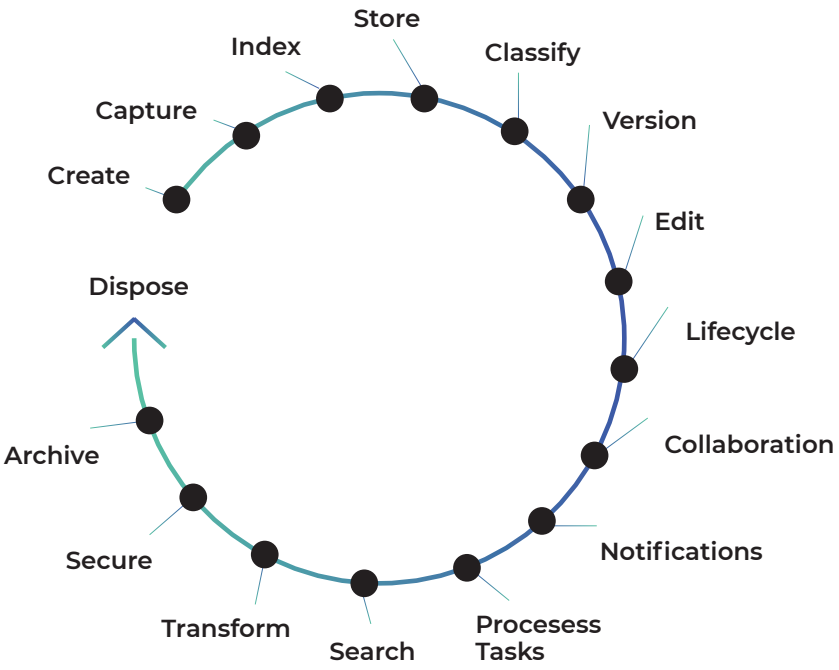

Figure 1 ECM – Enterprise Content Management

DOCULIBRIUM SOLUTION

Comtrade ECM solution, DOCULIBRIUM, provides all services and tools required for efficient content management, during whole content lifecycle in any organization. Doculibrium contains the following basic modules:

» **Electronic Registry Office** which implements the operation of the registers, according to regulations defining office business operations.

  The module contains the following submodules:

  - **Incoming submissions**, intended for receipt, recording and distribution of incoming submissions
  - **Registers**, intended for the receipt and recording of the register book of all company documents.
  - **Outgoing submissions**, intended for preparation for submission and submission to external recipients.

» **Internal delivery book (IDB)**, intended for delivery/distribution of all documents and cases among employees in various units or teams.

» **Workspaces** represent a system for managing documents, cases and folders, which implements all necessary functionalities of document management, such as authorization, lifecycles, versioning, content editing, transformations, e-signing, etc.

» **The Responsibility and Distribution Matrix (RASCI)**, enables automation of processes if creation, co-authoring and approval of documents, using simple configuration engine (matrix).

» **System for automatized business process management** (Workflow Engine, WFE), which enables modelling and processing of documents and cases workflows.

» **Notifications module** enables configurable defining of notifications to users regarding various events in the system.

» **Email integration** enables the received email from the defined email addresses to be received and saved directly in the system and submitted to processing, in a simple and expedient manner.

» **Integration services** represent a group of REST services for each system entity, which enables interaction of external applications with system objects - documents, cases, registers, etc.

All specified modules and components are realized through solutions and platforms

which fulfil all requests of the customers and represent the most efficient manner of managing all company contents:

» **Doculibrium web application**, with Electronic Registry Office as central module, with the DMS and Archive modules, as modules of the integral DMS and ECM solution.

» **Doculibrium web scanning** , module for scanning paper documentation using desktop scanner, on an unlimited number of items for scanning.

» **Alfresco ECM**, as one of the leading global ECM platforms.

» **Activiti**, as BPM platform for modelling and execution of documents and cases workflows.

» **PostgreSQL** relational database, used by Alfresco, Activiti and other components of the solution.

ARCHITECTURE OF THE DOCULIBRIUM SOLUTION

The solution architecture at the highest level of abstraction may be represented by the following illustration.

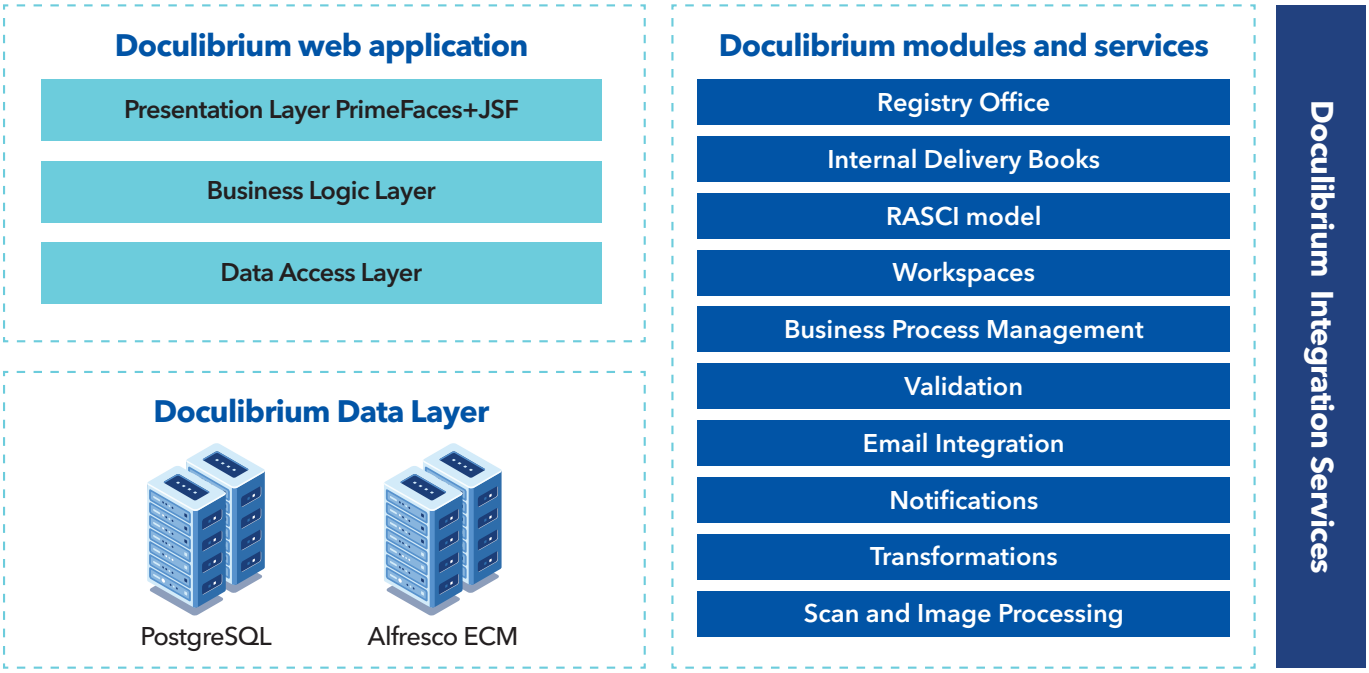

Figure 2 Architecture of Doculibrium Solution

The central point of the solution is taken by the ECM repository, with all features exposed through API. Web application represents the basic tool for the operation of all users in the system. It simultaneously uses Alfresco repository and its own persistence in the form of the relational database.

The majority of required functionalities, such as Registry Office with register books, delivery book and expedition book, as well as contract management, case management, scanning, are contained within the web application. However, there are also independent modules and services, which are rounded wholes, which may provide services to all external parties, through an integration layer of the solution.

DOCULIBRIUM SOLUTION OVERVIEW

REGISTRY OFFICE

Registry Office consists of three basic modules:

01

Input submissions, intended for recording received submission containing one or more input documents.

02

Output submissions, which enable functionalities necessary for updating (sending) submissions outside organization (company).

03

Registers, which represent registers in which all documents and cases are entered.

Registry Office, and the entire Doculibrium solution, supports operation of organizations using cases and all processes and processing are based on the case and documents within the case, as well as organization which do not use cases, rather all operations and business logic are based on a document.

Input submissions

Overview and all operations with input submissions are performed in a special module of input submission, as a special application option, which is available if there is input mail book as a special record, and if the user has the relevant rights for working with input submissions.

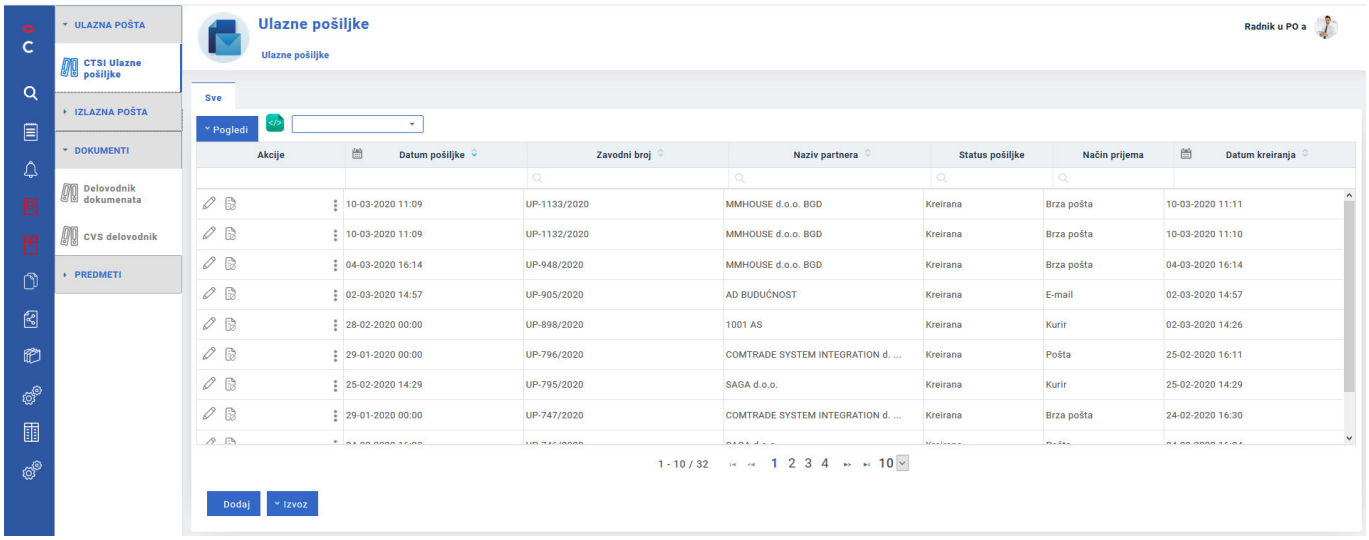

Figure 3 View of input submissions

Input submissions are divided into several groups, according to status:

- **Created** – all submissions recorded in the system, the documents of which are not downloaded by the organizational unit.
- **Returned** - recorded submission, which have registered document, and which are downloaded by the organizational unit.
- **All** – representation of all received submissions, irrespective of the fact whether they are downloaded by the organizational unit or not.

Some of operations realized within the module of input submissions are:

- **Receipt and recording of input submissions**, which implies entry of new submission in the book, marking with defined attributes and its registration. Registry records all received properly addressed mail and records basic information of the submission which is available without opening the submission: Date of submission, Information on the sender, Method of receiving submission, Urgency mark, Confidentiality degree, Sender number, etc.

  If the received submissions are marked with a higher level of confidentiality or addressed to an individual, the registry does not open, but rather only carries

out basic recording of the submission. It hands over unopened submission to the person authorized to open it. Regular or registered mail is opened by the registry and it carries out further recording of the input submission recording.

» **Recording and registration of incoming documents** includes entry and registration of documents belonging to the input submission, after its opening and recording, with the creation and registration of the case, if cases are used. Based on the content of the submission, the registry classifies documents according to internal rules. The submissions mostly contain one document, which is recorded by a clerk in the registry by special action for addition of submission documents. On that occasion, he/she records data on the document, addresses it to the organizational unit and scans the received content. The Registry selects the register book in which the document received a filing number. One submission may also contain several documents, and then the registry records and registers each individual document. Documents created in that manner are visible on the card for inspecting submission documents.

» **Input document or case distribution**, which enables further submission of the entry document or case, after completed recording and registration, to the relevant recipient in the organization unit or team.

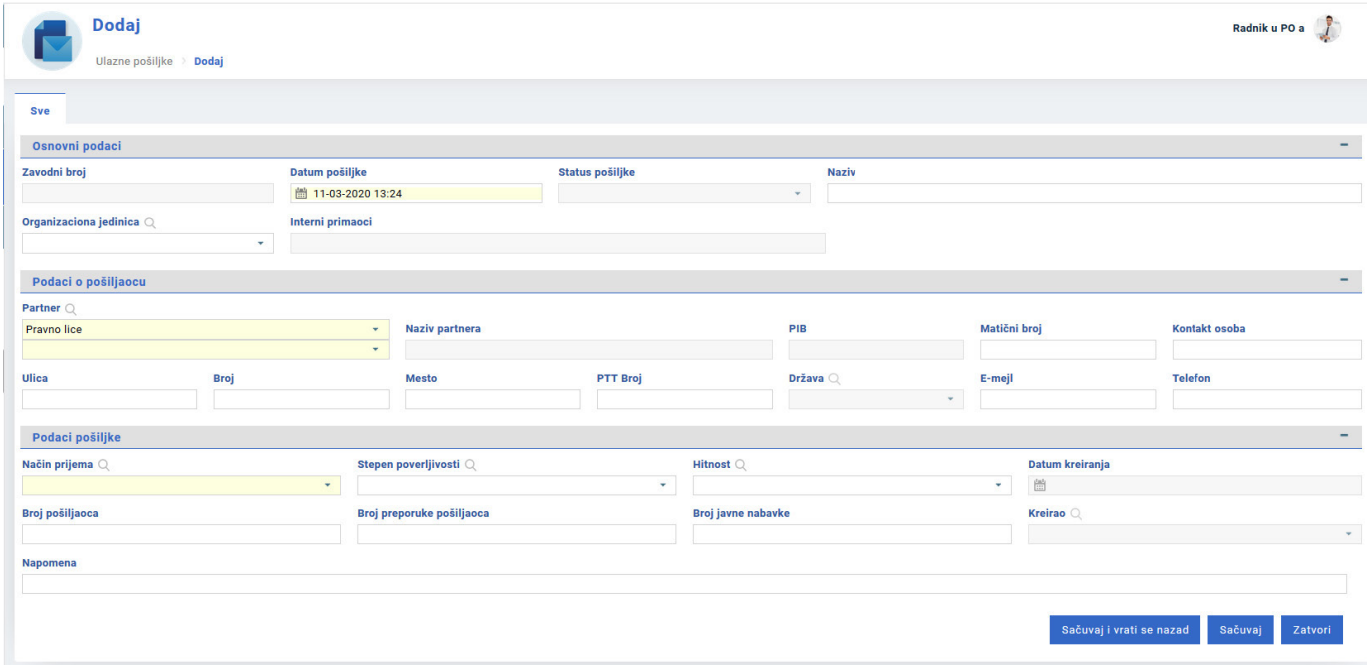

Figure 4 Recording of new input submission

Registers

Registers in the Doculibrium system enable registration and recording of all received (input) documents, which can be recorded directly through the register using the document registration action from the Input mail. All internal documentation which remains inside the organization or which is forwarded to an external recipient is also recorded in the register. Recording and registration of cases is performed in case registers. The primary role of register is to record or register a filing number of a document or case, thus Doculibrium distinguishes two main registers: Document Register and Case Register.

Register books and counter formats within each individual book are created on the basis of the client's needs. The Doculibrium system enables creation of an unlimited number of specific-purpose Registers in line with the internal business method of the client. This means that users within the Doculibrium system may separate special Registers for recording, e.g. contracts, invoices, decisions, rulings or other document types. In this manner, difference is made in the format of the document counter, which indicates the business substance with its structure.

In order to prevent recording of a certain document type into a wrong register, system, in module configuration, it enables control of a list of document types which can be entered in each individual register.

Numbers in all registers are assigned automatically, by taking the first available number, according to the counter key. If there is a need within some register book to leave a certain number of filing number, the system allows "Reservation of filing numbers".

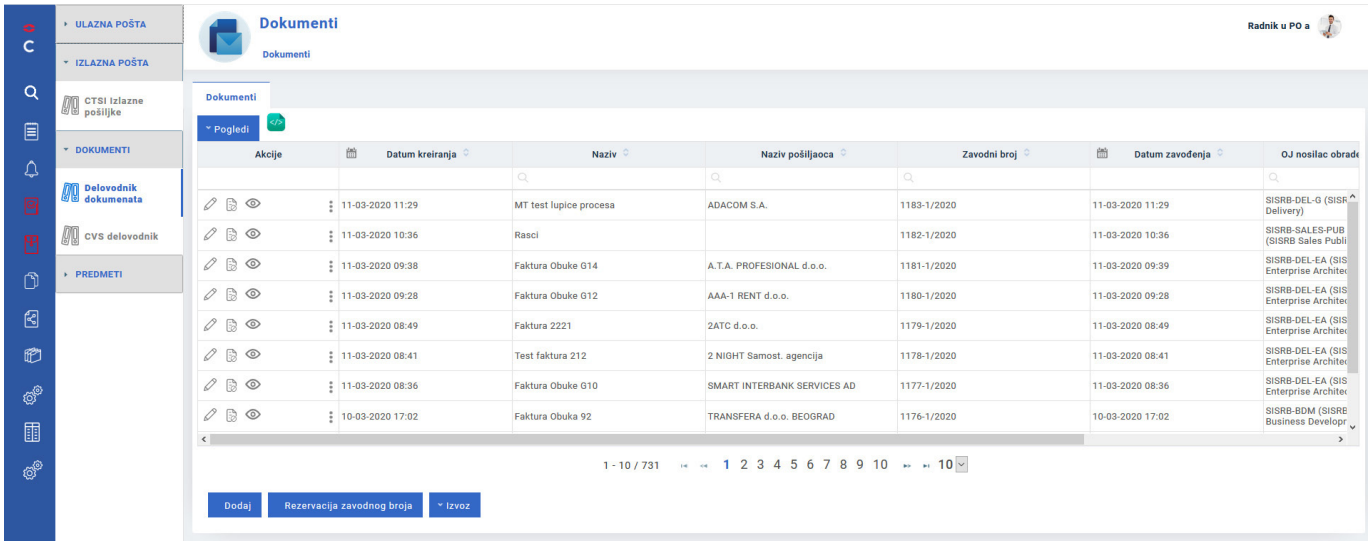

Figure 5 Overview of document register

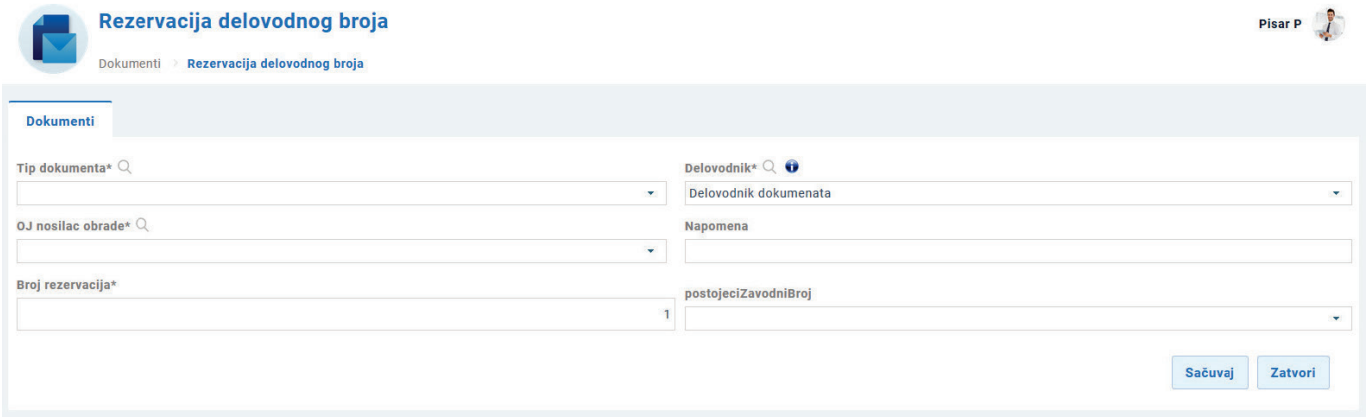

Figure 6 Reservation of filing number

In addition to basic metadata which are common for each document type in the system: "Filing data" (filing number, date of filing, organizational unit, creator), "Basic document information" (register, document type, name, processor, confidentiality degree, date of creation, note), "Party information" (type of party, name of party, TIN/JMBG, address...) and "Document content", the document form contains a dynamic section which includes all "Additional data" specific to each individual document type or group. The employer may independently add new attributes of document types, without a need for any changes to application, as the mechanism of dynamic attributes enables its use immediately according to the definition of attributes through a data modelling tool.

In addition to the basic ones, the following definitions are included in the Records: Joining documents with other documents in the system, addition of documents in the existing case, monitoring document version and history, entry and inspection of comments, etc.

Scanning paper documents

Doculibrium contains a module for scanning paper documents using a desktop scanner, during registration in the protocol. The Doculibrium scanning module has the features of zooming, annotations, rotations and some features of image processing, such as de-skew, cropping, flip, mirroring, etc.

In addition, there are also standard scanning options, such as choosing file format, scanner, resolution, choice of color scanning or black and white, etc.

The installed browser enables current insight into scanned pages, which enables immediate reaction in the event of poor scanning quality or any other reason for repeating scanning or application of image processing.

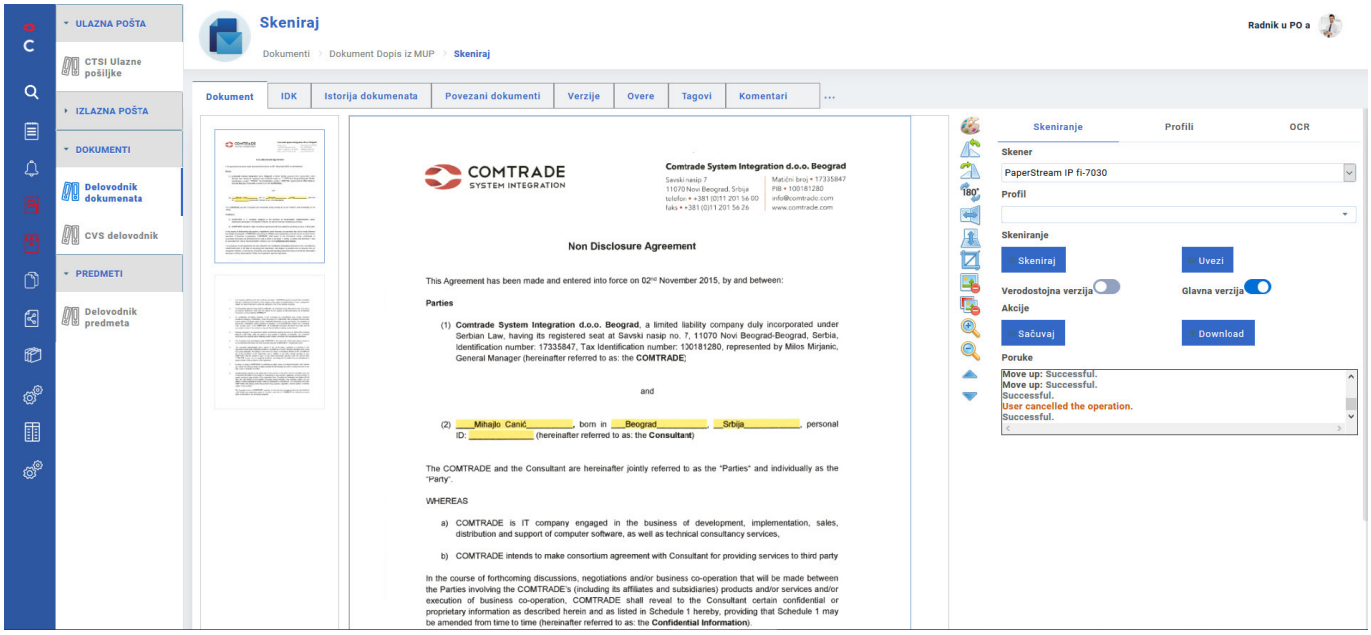

Figure 7. Doculibrium Web Scan

Import of electronic documents

Doculibrium, in addition to document scanning functionalities, enables "Content addition" from the file System. Selection and addition of any document format is performed in that manner.

Doculibrium possesses the functionality of converting any imported format into the pdf format, for further possibility of e-signing of documents

Each new addition of "Content" to the existing document initiates creation of a new document version. All previous versions with the date of version creation, information on use who initiated the version, version umber, etc. are monitored in the system.

Output submissions

"Output submissions" in the Doculibrium system serve for monitoring all internal documents marked as documents for submission. Such documents are generated during case processing or as individual documents in the system and as such remain recorded at the location of generation (case, workspace) and as new document in the Registry in the book "Output submissions".

Output submissions are divided into several groups of records:

» Documents for submission – documents created in the system over which the processor initiated the action for "Submission"

» Documents for submission – submissions created by selected on or more documents for submission. One submission may contain a number of documents in it provided that the "Name of recipient" is the same and the "Method of shipping" is the same. In addition to basic information on submission, the user can enter: Transport type, recommendation type, recommendation number and mark whether the submission has "Delivery note"

» Sent submissions - "Dispatched" submissions

» All – unified display of "Shipments for submission" and "Submitted shipments"

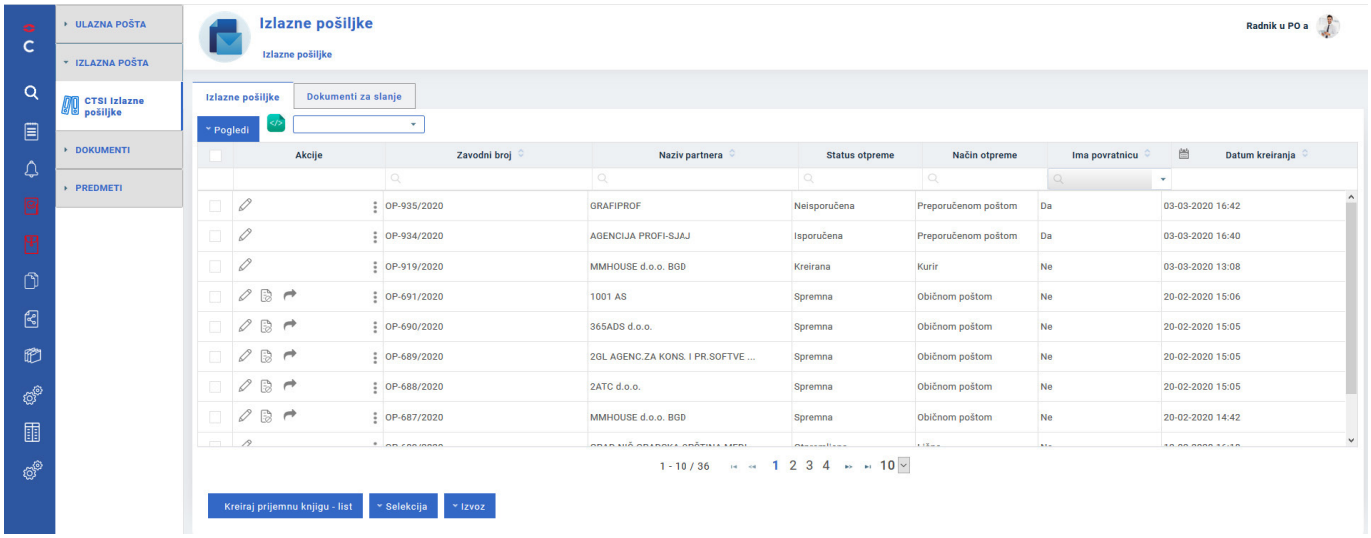

Figure 8 Output submissions

INTERNAL DELIVERY BOOK

The internal delivery book represents the central module for supporting exchange of documents and cases among system users, organizational units or teams. Through this model, all internal delivery records are recorded, which represent internal movements of registered official cases, acts, acts in processing and other submissions – to organization wholes of the company.

All internal delivery records are monitored through several views:

View **"Received, not downloaded"** – delivered IDB records.

View **"Received, downloaded"** – received IDB records

View **"Delivered"** – created IDB records ready for submission.

In each of the views the user sees corresponding IDB records (for the set search criteria) which refer to its OC.

Through the view "Received, not downloaded", the user may, after viewing an attribute and/or content of any act sent to their OU, view the same act, take it over, forward it or return it to the sender without specifying the reason for for return. After downloading, the downloaded act may be further submitted to another OU.

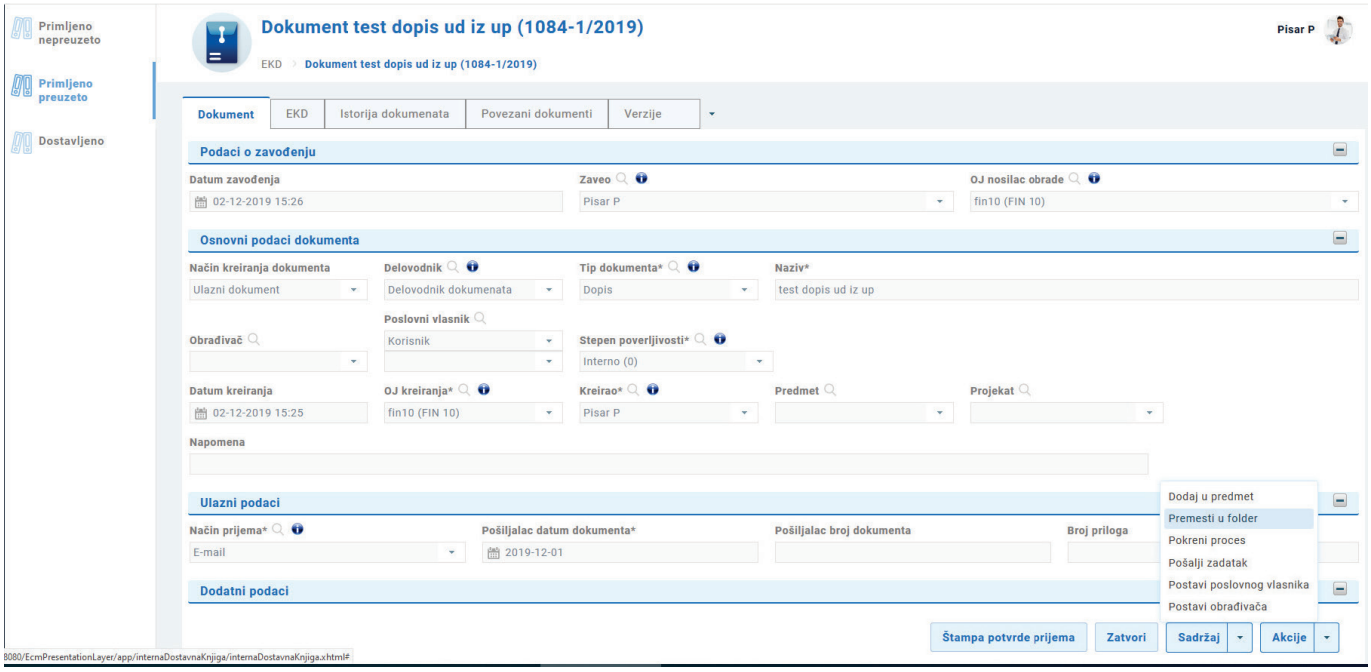

Figure 9 Internal Delivery Record

Every received and acquired document may be downloaded to some folder of any workspace user is member of, with proper access rights.

In addition to the action of downloading into workspace, user may also forward recieved document to one of the following recipients:

» Individual user, selected from the list of all users in the system

» Organization unit, selected from the organization structure

» Team, from the list of teams defined in the system

After forwarding, document appers in the view "Delivered".

TASKS (INBOX)

The module "Work tasks" represent application support to the process management module (BPM) as management of all tasks generated by processes is carried out through this module.

System tasks are generated automatically, on the basis of:

» Definition of processes modelled in the BMP tool – automatic generation of tasks representing activities of processes for which performers are defined. Performers may be individual user, user group, organizational unit or a team

» RASCI matrix, which represents a kind of document distribution matrix, according to roles (Responsible, Accountable, Supported, Consulted, Informed) and the document lifecycle status. The process management system automatically generates tasks for users, roles and groups, according to the definition in the RASCI matrix.

» AD HOC tasks are generated when sending a document for review, approval, opinion and they are not a part of any predefined process. They are created by execution of corresponding action.

Actions may include: acquiring a task, finishing a task, approval/signing or rejecting a document or data entry of any of document attributes. A list of actions and attributes is also defined in the parameter base and it may differ from one process to another.

During execution of certain actions in the application, the system generates a TASK which is sent to the inbox of the performer. The task is access from the inbox (view "Tasks"):

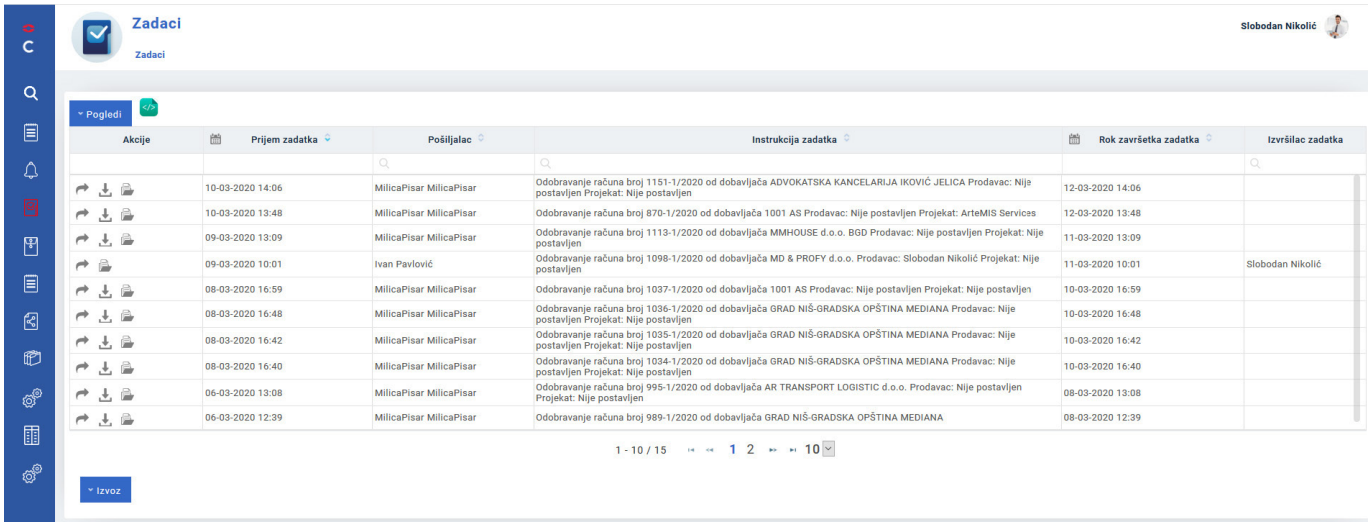

Figure 10 Task list

The view shows data on task creation, task name, set deadline until which the task must be performed, task instructions, and instance, i.e. Definition of the process on the basis of which the task is created.

Task performer, which is assigned to perform the task must have the ability to forward the task should they evaluate that they are not competent for that type of task. On that occasion, the performer initiated the

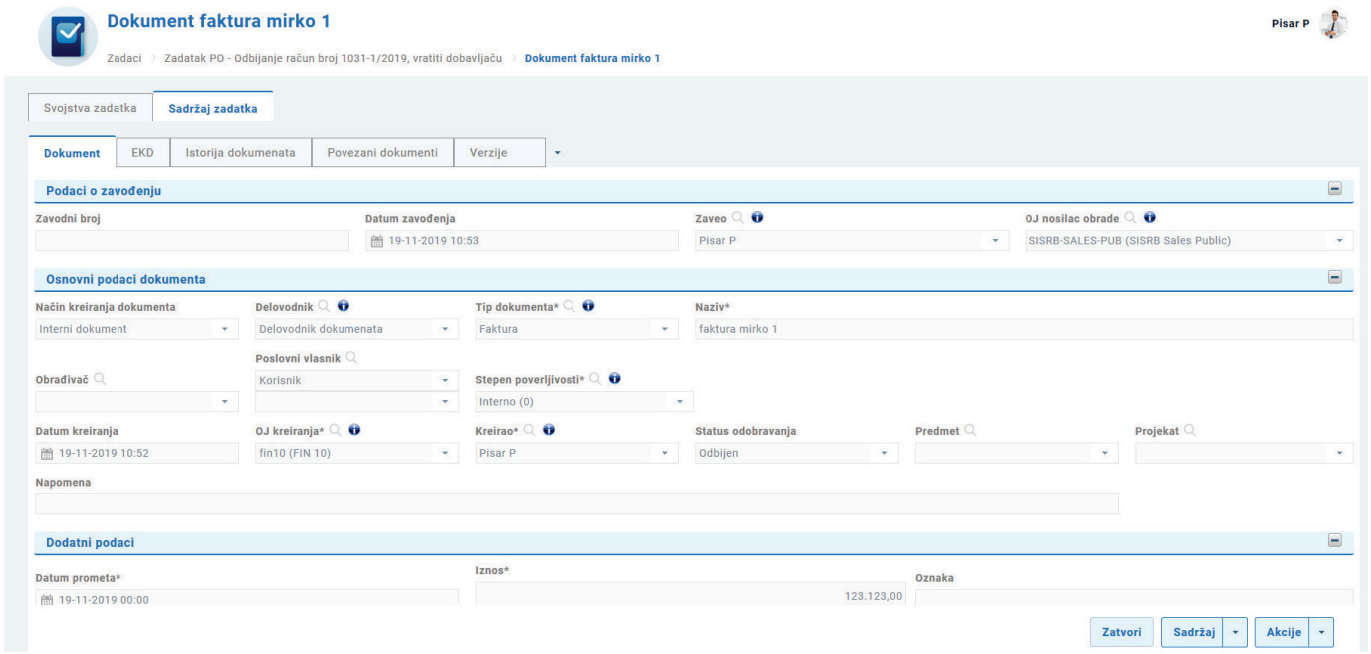

Figure 11 Review of one task

"Forwarding" action, whereby they must enter, from the list, a user to whom the task will be delegated.

The performer of the task, when working on the task, accessed the form which has, in a special section of "Task properties", unified data on a specific task assigned to them, and basic data of the document with all metadata, shown in the "Entity" section.

User from this form must have the ability to review: document history, document version, linked documents and other data visible in any document processing procedure.

WORKSPACES

Workspaces is the module of the solution which represents a central point for work with all contents and implementation of various activities over them, in line with authorization rules and the user's role in the system. Workspaces represent a document storage in hierarchical organization of folders, such as the file system, with clear overview of all information needed to the user at each moment of their work.

A workspace is defined for an organizational unit or arbitrary team, which may be a project team, commission, board, or any other formally organized group of employees.

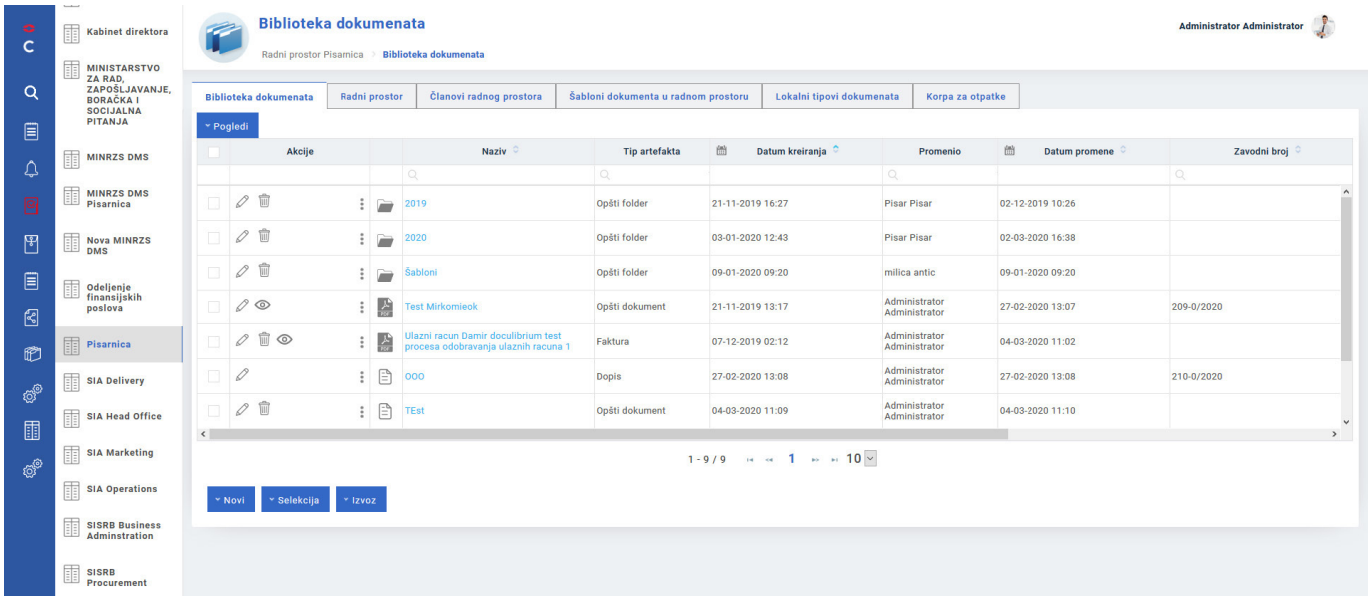

Figure 12 Workspace home page

The following is defined in each workspace:

- **Basic workspace properties** - code, name, organizational structure to which the workspace belongs, and default folders for cases and templates.
- **Workspace members** - each user may be a participant on a workspace, in addition to employees of the organizational unit or team for which the workspace is defined. Thereby, an employee may have access to a larger number of workspaces with defined rights for each of them.
- **Document templates in workspace** - this option allow defining document templates at the workspace level, which means that each organization or team, with a defined workspace, may have their own, adjusted, document templates.
- **Local types of documents** - enable the document types to be defined at the level of organization structure or team, therefore, that specific types of documents are used only in certain organizational units, without a need for them to be defined and used at the level of the entire organization.
- **Recycle bin** contains all content deleted within a workspace.

Creation and change of folders and documents are carried out within a workspace, and all actions over them, such as versioning, initiation of processing, submission and sharing, etc.

The document form contains all information on that document, for fast and simple overview, in the form of card, and all actions over a document enabled in that moment, to the current user.

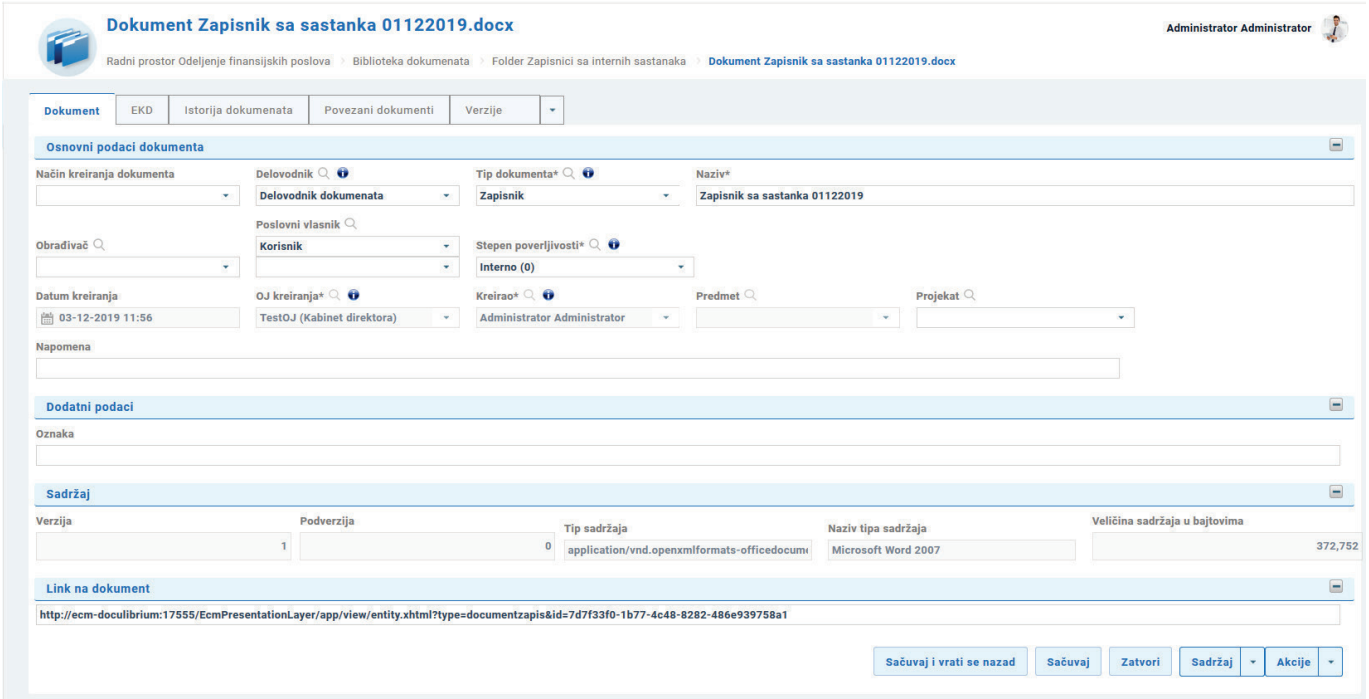

Figure 13 Document properties form

Some of information that may be seen on the document form, in addition to basic document data-attributes:

- internal delivery records, which represent previous document movements among various users and organizational units
- document history with all document changes
- linked documents
- document versions
- all classifications assigned to the document
- lifecycle states
- document access permissions
- validation errors, if validation rules are defined for that type of document
- all document approvals, including electronic signatures
- all comments on the document, of various users who participated in its preparation or alignment.

EMAIL INTEGRATION

Module for email integration enables the email to be downloaded directly to the application, from the defined email addresses. This enables fast and simple inclusion of the material received via email into system processing, starting from downloading into the workspace, through definition by indexing, filing in the register, until initiation of processes and processing in it and archiving.

Email server parameters are defined in the configuration of this module, as well as users and their email accounts. A number of accounts of email used directly from the application may be defined for every user.

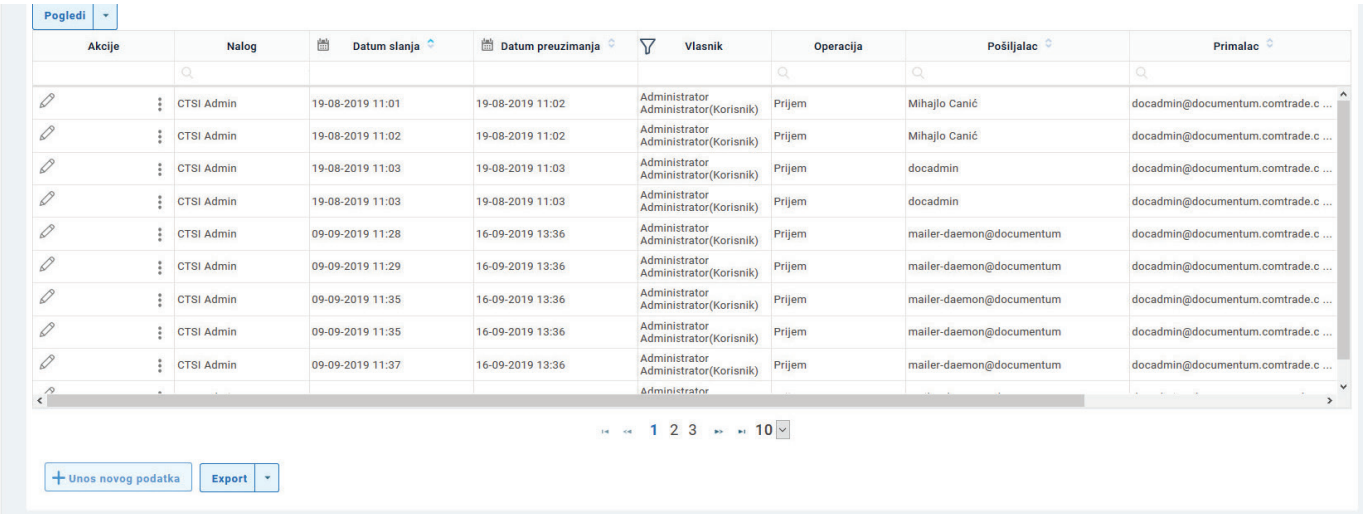

Figure 14 List of received email

NOTIFICATIONS MODULE

The notification mechanism is designed as a special module, which provides services to all modules and system users.

Each notification is related to a certain event, which produces submission of notification. Event is defined in the configuration of notifications, and each user may subscribe or unsubscribe from specific notifications.

Notifications may be defined for all system users, or for individual user. Additional options define whether email is sent with notification, level of notification priority, and other options important for the notification mechanism.

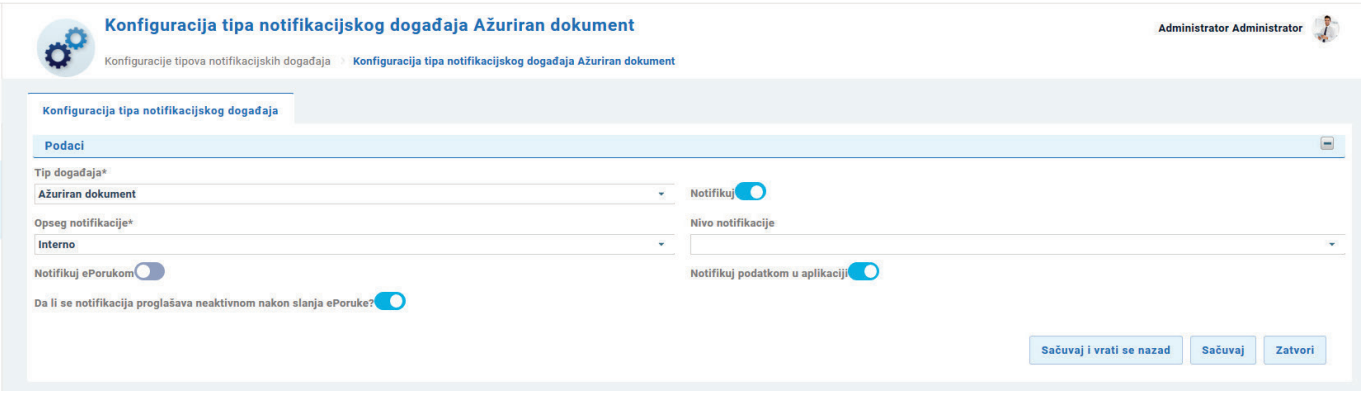

Figure 15 Example of notification for a specific user

CASES

Case in the Doculibrium system represents a record with basic information on the processing matter and as such it contains all documents (acts, submissions and attachments), related to this matter and process.

All cases in the system have defined lifecycle states through which they pass. Case states differ depending on the chosen case lifecycle.

Documents are an integral part of the case regardless of the case lifecycle. Some documents within a case may also have a specified document lifecycle (invoices, contracts, requests).

Case counter is fully configurable and created on the basis of the user's needs. Assignment of numbers within the counter is automatic, first available number is assigned, but within arbitrarily defined counter key.

Counter key may contain an organizational unit, matter class, year, and any other case attribute, depending on the user's needs.

Case type has its own standard metadata (attributes), with addition of specific metadata, related to case type. This makes definition of cases fully configurable, with no need of any code change, when defining case types and their attributes.

The user has option to connect related cases, and if the need arises, cases may be grouped into one common folder (dossier), that will contain basic information on the content inside the relevant file.

A case, as a collection of documents, also contains information on case resolutions. This functionality is completed by the case processor or, sometimes, by registrar, at the time when the case is resolved and when it is sent to the archive. The user enters information on resolution deadlines, method of resolution and determines the period of archiving (until that is not systemically predefined in classification).

The system enables monitoring of issuance of cases with check-out form, with information on the user who took the case (physical case from the Archive), date of return and status. Filters are enabled in the application on the basis of which the user/registrar controls issued cases and return deadlines.

On the case itself, it is possible to record and monitor all comments of participants during processing and assigned tasks with a status and description.

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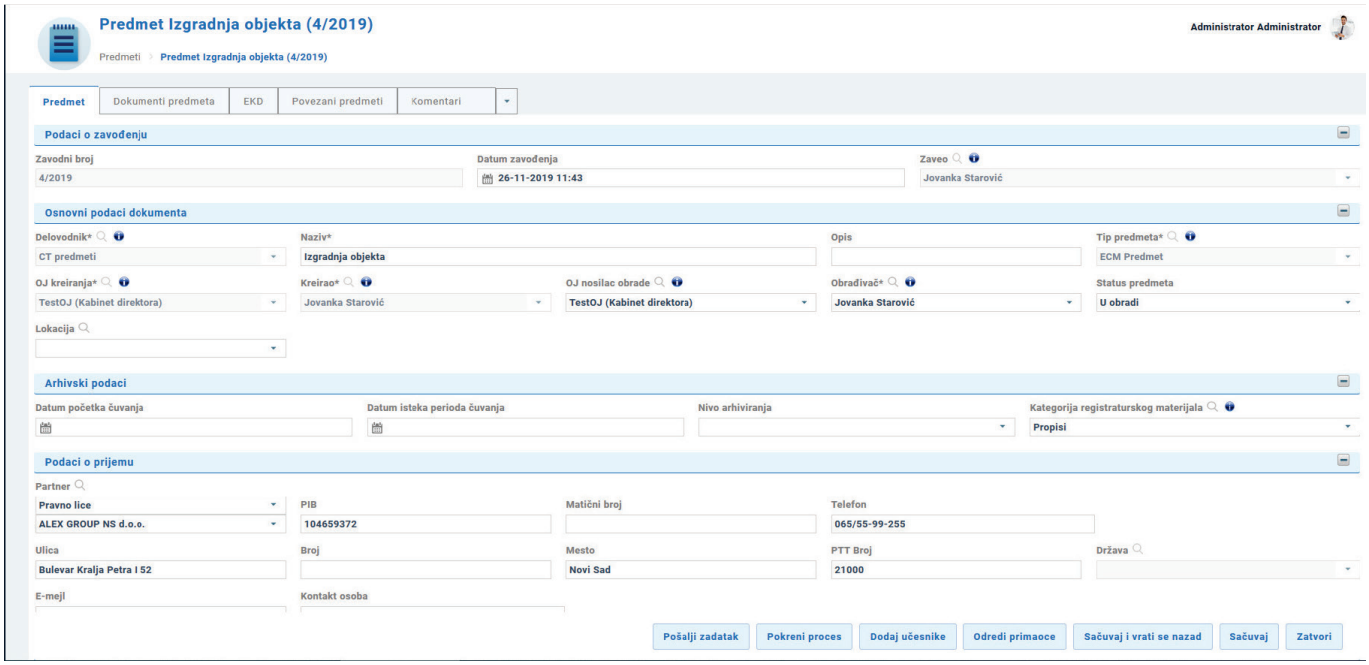

Figure 16 Case in the Doculibrium

SEARCHES

The Doculibrium solution enables a series of capabilities for fast and efficient finding of documents, cases, folders, according to various criteria. Some of the basic features are:

» search by all attributes (metadata) of object types

» search by part of document content

» fast filtering of list by columns.

During filtering of lists by column values, the user may combine several search criteria in various columns.

In addition to fast filtering of object list according to column values, advances search by all entity attributes enables selection of values for searching any attribute, with the possibility to choose a type of object being searched (case, document, folder), and document type (incoming invoice, contract, request, decision, etc.).

The search may be adjusted to specific needs of a specific employer, by adjusting the form appearance and selection of attributes being searched.

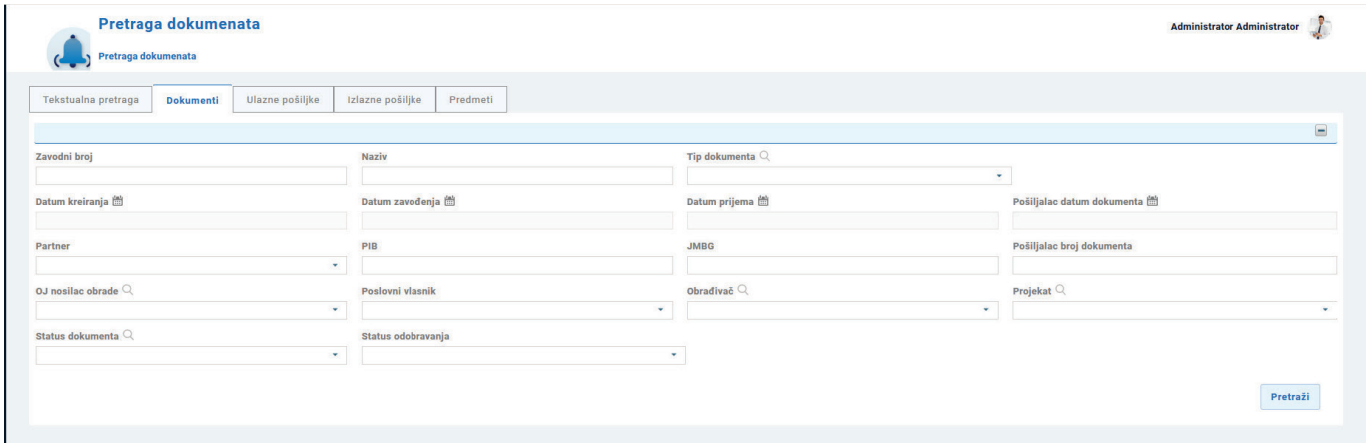

Figure 17 Filtering of object list by columns

CLASSIFICATIONS

According to legal regulations in the area of office business, each document and/or case is classified using a class from organization's classification plan. Classification plan defines the matter in detail and represent an important designation which can also be a part entity's business identifier - case and document. Classification plan is hierarchical, with unlimited number of hierarchy levels. Each artefact classified in one moment is defined by precisely one class from the classification plan.

The classification plan is linked with LCRM (List of Categories of Registration Materials) which define retention period for each matter

class. These retention periods are joined to each artefact being archived, thus control of period of retention in the archive, and extraction from the archive, are carried out according to LCRM designations.

The solution provides the ability of arbitrary creation of classifications by the system administrator, whereby no changes of the solution code are required, in order for new classifications to be used for labelling system documents.

LIFECYCLE MANAGEMENT

The object lifecycle represents a sequential series of conditions through which an object passes from its emergence until the extraction or removal from the system. Any system object, of arbitrary type, may have an attached lifecycle. The object with an attached lifecycle passes through its conditions as a result of processing, i.e. application of corresponding actions over the object.

According to conditions in lifecycle, RASCI matrix is defined for the document, which establishes duties of processing participants in each lifecycle condition, with the corresponding role and authorization rules.

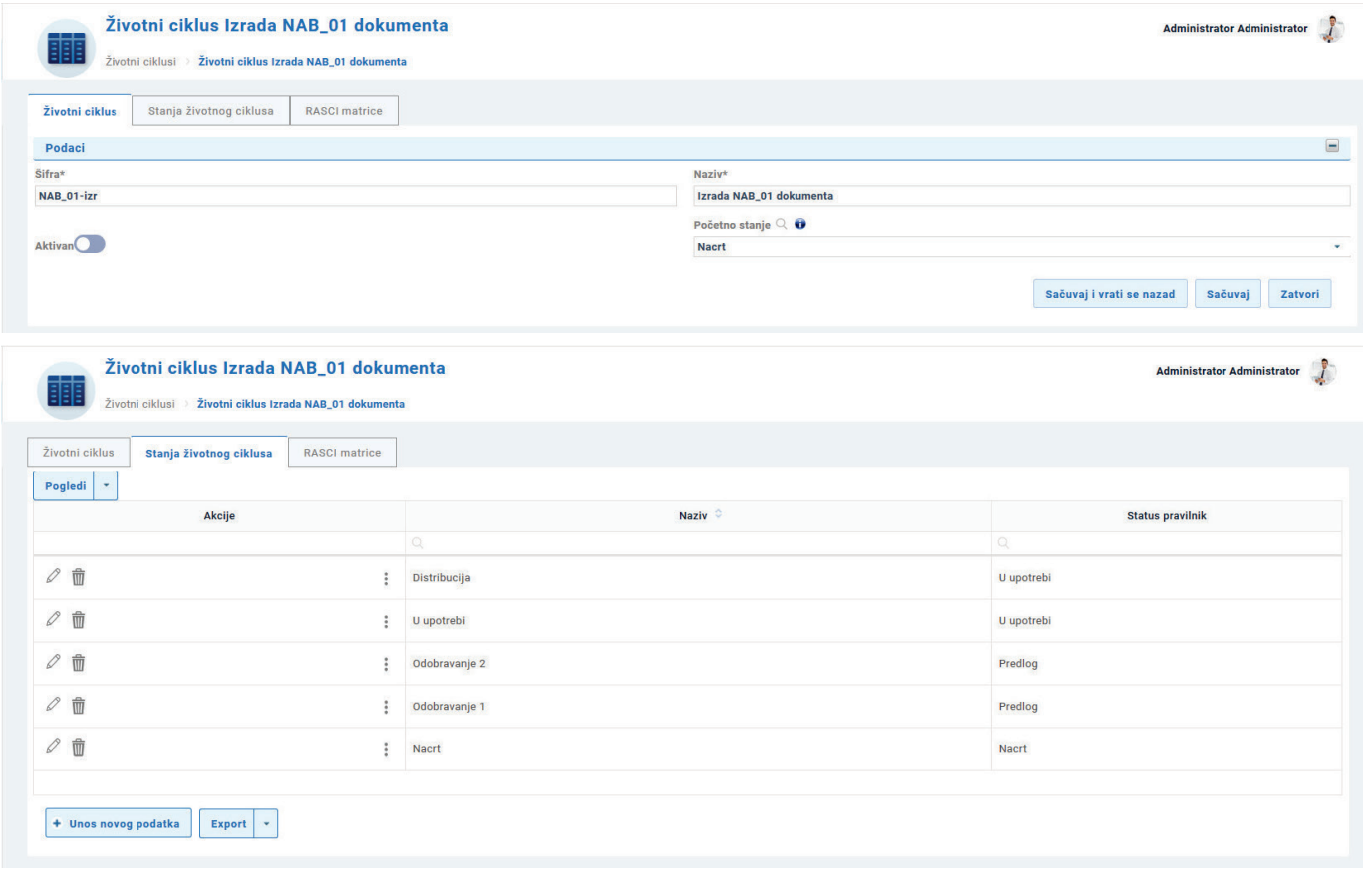

Figure 18 Example of object lifecycle

DOCUMENT CONFIDENTIALITY AND LEVELS OF CONFIDENTIALITY

Management of confidential documents is regulated by legal regulation and system is adaptable to any specific regulation in every country.

Usually, there are several basic levels of data confidentiality, such as:

Internal | **Confidential** | **Top Secret** | **State secret**

Data defined as secret, is marked with some of confidentiality levels and in that event, it may only be accessed by users who have assigned rights over the defined level of confidentiality. This is realized by defining special ACLs (Access Control Lists) for confidential objects, according to the level of confidentiality.

RASCI MATRIX

RASCI (Responsible Accountable Supported Consulted Informed) matrix is a central module of the system for defining authorization, liability and obligation regarding documents, in line with their type, class and lifecycle. The matrix aims to define who, at what time and with which duties is liable for a specific object instance during its lifecycle.

RASCI matrix, in a certain manner, provides functionalities of modelled simpler sequential processes of preparation and approval of documents. Of course, it does not replace WFE functionality, but only supplements it and provides the possibility of document processing by several users in the form of a simpler processing procedure.

Two submodules may be distinguished within the RASCI module:

- **RASCI configuration** - module which, like codebook, is in charge for the entire RASCI configuration - creation and editing of the RASCI matrix
- **RASCI API** - module which represent a program layer in charge of communication with the entire system and provision of information of the RASCI matrix to all system elements using the RASCI matrix

RASCI configuration

RASCI configuration is a module providing definition of the RASCI matrix, with capabilities for managing that definition - creation, change, deletion of records, in line with rights assigned to the RASCI matrix. Generally, the RASCI matrix defines who,

with which rights and available actions is responsible for an object instance, depending on its current conditions, class and type.

The appearance of RASCI matrix, on the example of several document types and their lifecycles, is given in the table below.

It is recommended to use roles and groups within the RASCI matrix, and not specific usernames. Depending on their position in the matrix (R, A, S, C, I), a corresponding group or role shall, in the appropriate moment, i.e. condition of lifecycle, receive a task, with relevant available actions and task instructions.

In the processing defined by the RASCI matrix, role A represent the certification authority in each stage, while role R represents the person responsible for document creation and approval. Person responsible for document creation and approval manages the process by deciding at what time the next lifecycle stage begins, on the basis of previous activities of the process participants.

Name	Artef. type	OU	LC	LC condition	R	A	S	C	I	Deadline
Service agreement	sm_agreem	01	lc_agreem	Draft	author	mgr	officemgr	legal, finance	genmgr	-
				Overview	mgr					-
				Approval	legal, finance, mgr	mgr			gendir	3
				Signing	genmgr				mgr	3
				Signed	registry				genmgr, mgr	-
				Submitted	author		officemgr		genmgr, mgr	-
Agreement of Works	sm_agreem	02	lc_agreem	Draft	author					-
				Approval	mgr, legal, finance, mgr	mgr	officemgr	legal, finance	genmgr	5
				Signing	genmgr				autor, mgr	5
				Signed	registry				genmgr, mgr	-
				Submitted	author				genmgr, mgr	-
Goods invoice	sm_agreem	03	lc_invoice	Filing	registry		officemgr			1
				Control	dirfin, sefkom					3
				Approval	dirfin, genmgr				author	2
				Liquidation	finance				dirfin	2
				Posting	accountant				dirfin	2
				Payment	finan				dirfin	-
				Paid	dirfin, sefkom				gendir, dirfin	-
				Cancelled					gendir, dirfin	-

Table 1 Example of RASCI matrix

VALIDATION MODULE

For each complex system, which consists of a number of modules and components, with modelled data flows and various data sources, it is of exceptional importance to maintain consistency, completeness, validity and alignment of data at all times during its lifecycle.

Validations are a special module, which enables simple and fast, through configuration, by trained IT personnel, addition of various validations, according to the needs of business processes and policies.

Validation enables the relation of referencing, type, specific content and order of temporally separate instances to be of set quality and according to set rules. The ECM solution will support horizontal and vertical validations.

TEMPLATE MANAGEMENT AND COMTRADE DOCUMENT GENERATOR

Module for managing templates of MS Word documents, Comtrade Document Generator, enables defining templates of DOCX document, by defining places in which appropriate information of the context will be entered, by defining FIELD and PROPERTIES elements within WORD documents. The following options are supported for mapping values of field in the template:

- other data from the same document
- data from another document in the same case
- data from case
- data from inquiry result

Module also enables the following functionalities:

- specification of formatting for the attributes of amount and date
- specification of rules for specific attributes (e.g. signatory)
- a number of templates for one type of document
- automatic conversion into PDF after automatic filling of templates
- specification of inquiries merging a number of entities
- locking fields in templates which are filled automatically

CONTENT TRANSFORMATIONS

Each ECM system has a need for services to transform content from one into another format. In a case of, for instance, approval lifecycle of a document, at the time of achieving the final version, it is transformed into PDF or PDF/A, after which it is signed electronically. The other case is automatic publishing on the portal, when transformation is needed in the format adjusted to the web portal presentation, such as HTML or again PDF.

The Doculibrium solution has a developed module for content transformations which uses LibreOffice for content transformation, thus supporting all transformation supported by LibreOffice.

The following is achieved in this manner:

» high level of similarity of the transformed content to the original content

» support for all transformation formats supported by LibreOffice.

VERSIONING

Doculibrium repository with its services enables versioning of any content. Versions are marked with a pair of number - major and minor version.

During each change of content for which versioning is enabled, it is possible to create a new version, both major and minor. During creation of new version, it becomes the current version, available through searches and views, while the old version is saved in the version storage, such as snapshot. During new version creation, the system remembers:

» new content

» version author

» date and time of creation

New version in the Alfresco system is an object with the same identifier and metadata.

By default, versioning is not enabled for every content. During creation of the object type, in the data dictionary its property VERSIONABLE is places, thereby enabling versioning of all instances of that type during any change.

At all times, it is possible to return to any of the previous versions using the REVERT action. Thereby, the version becomes current and can be viewed in the system from that point on through inquiries, views and use in processing.

Versioning operation is realized through standard CHECKOUT/CHECKIN services,

which control rights over a document edited by any user. During registration of a new version, it is also possible to enter the comment of a new version, and it is also possible to only enter a comment, without changing the content.

SIGNING AND APPROVAL

The Doculibrium solution provides two types of approval: signing, which implements e-signing according to the PAdES standard, and approval equivalent to initialing, which is carried out at the level of metadata/ attributes.

The process of approval is realized through the RASCI matrix, which may define, for each document being approved, lifecycle condition which represents approval of artefacts and type of approval - e-signing or approval (initialing). At the time when the document achieves lifecycle condition configured as approval, users defined as responsible for approval will have the option of approval enabled, unless they have already approved that document.The module for signing enables, inter alia, the following functionalities:

- e-signing of PDF content in PAdES format
- approval / initialing of content at the level of metadata
- refusal of document
- clearly shown record of refusal and approval of documents
- automatic conversion of content during first approval (DOC, DOCX -> PDF, PDF/A), according to defined rules
- submission of notifications in the event of approval and refusal, according to defined notification rules, and periodic submission of notifications-reminders in the event of pending approval

BUSINESS PROCESS MANAGEMENT (WFE - WORKFLOW ENGINE)

Specialized module for business process management, called Activiti, is used to implement electronic business processes of documents and cases. It supports BPMN 2.0 standard, which provides interoperability and compatibility, based on this standard.

Activiti is comprised of a series of applications which are integrated and make up a platform:

» **MODELER**
web-based graphic interface for process modelling, based on Signavio

» **DESIGNER**
Eclipse plug-in for process development

» **ENGINE**
BPM system core, in charge of process execution

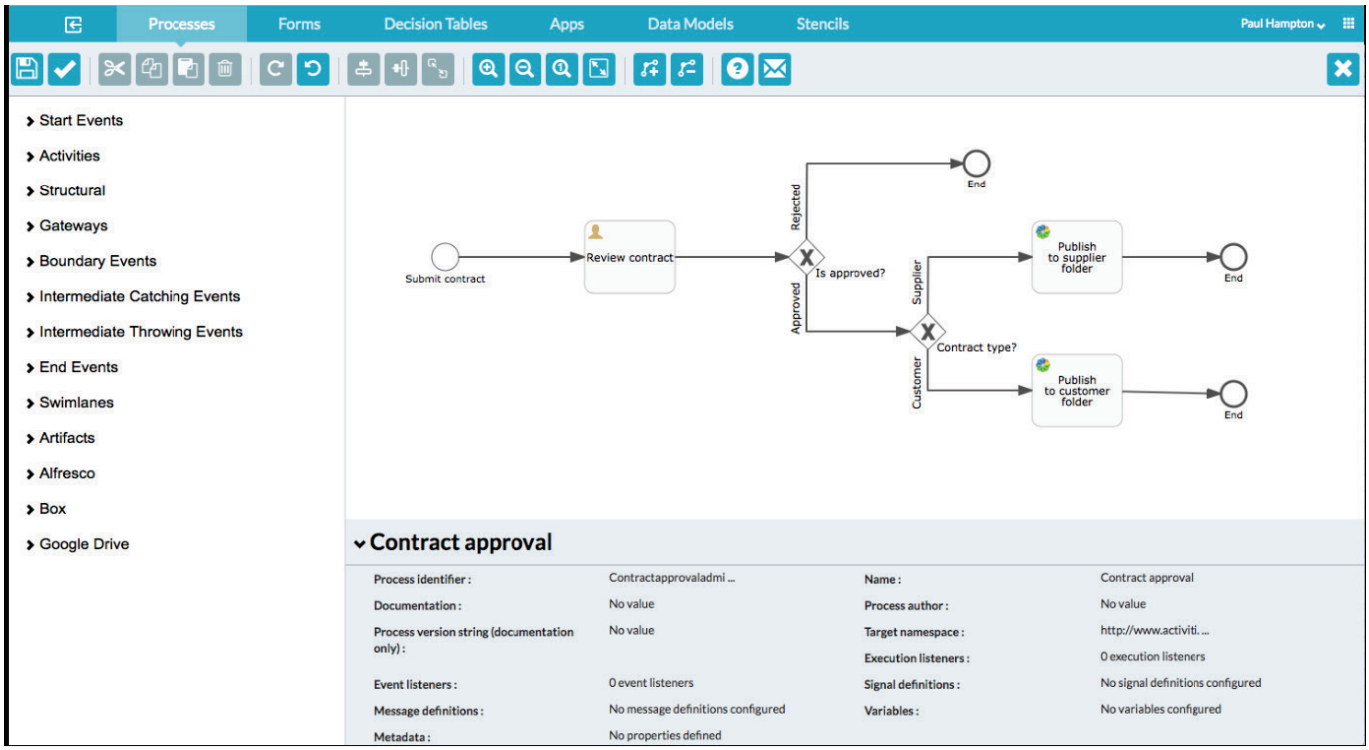

Figure 19 Activiti process example

» **EXPLORER**
web-based tool for installing process definitions, process starting and other activities enabled through the interface

The system provides a series of options for the performer of activities, which may be a group, role or user. By implementation of the application logic through activities that allow coding, it is possible to influence whether the background activity is executed on behalf of the system or application user (employee). Conditional branching may be carried out depending on a document parameter or attribute, while return branches enable return of processes into some of the previous stages. Parallel execution by a number of executors is possible, or consequential, one after another. The platform has the option of process versioning. Each process change may be saves as a new version. The platform takes care that processes initiated on a specific version are executed on that version until completion, until all new process instances may be initiated on a new version.

Activity supports BPMN 2.0 open standard, which allows import of already created processes in other systems, as well as export of processes that can be used in other systems.

Activiti provides option to define attributes for each process phase. They are displayed in a dynamic area of task form, thereby avoiding any need for code modification in a case of adding new task attributes, adding new process phases or creating new processes.

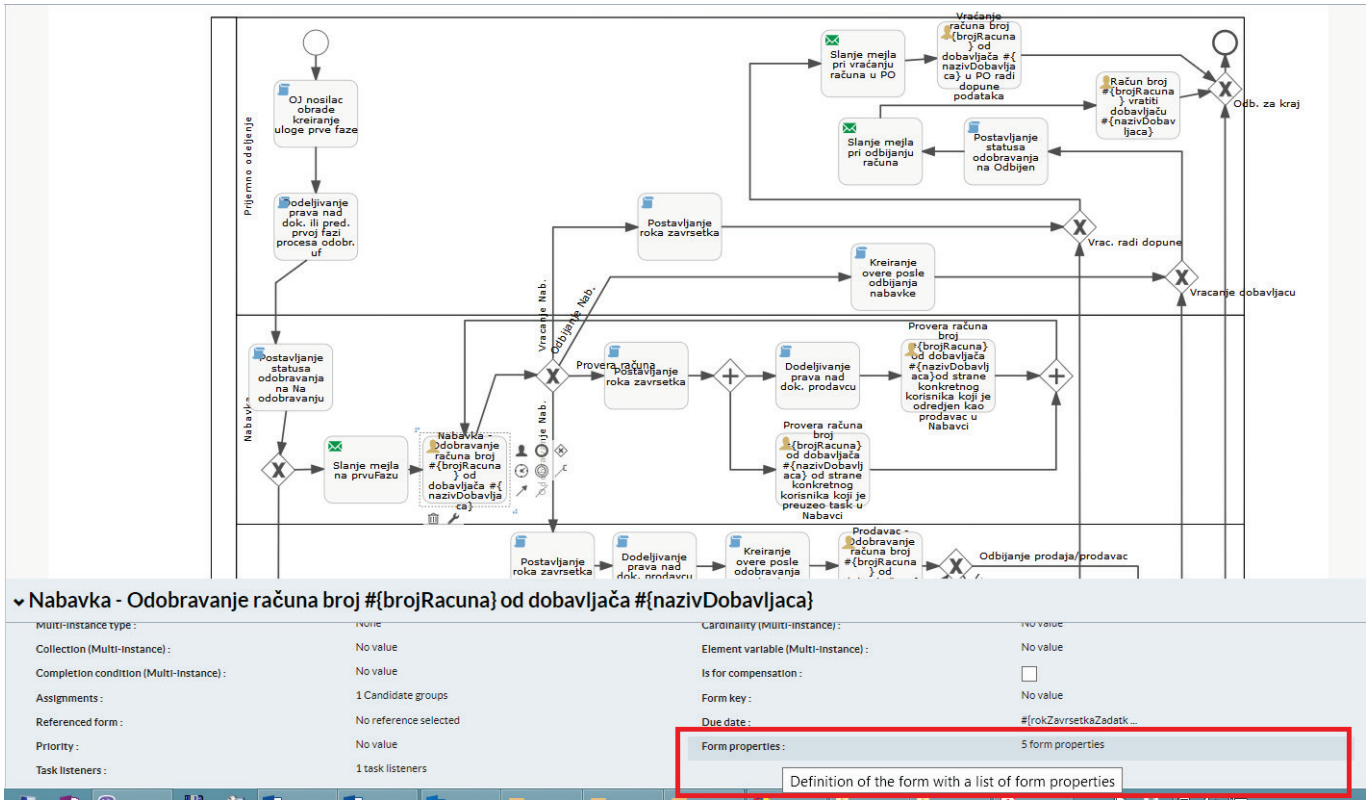

Figure 20 Activiti Process Editor

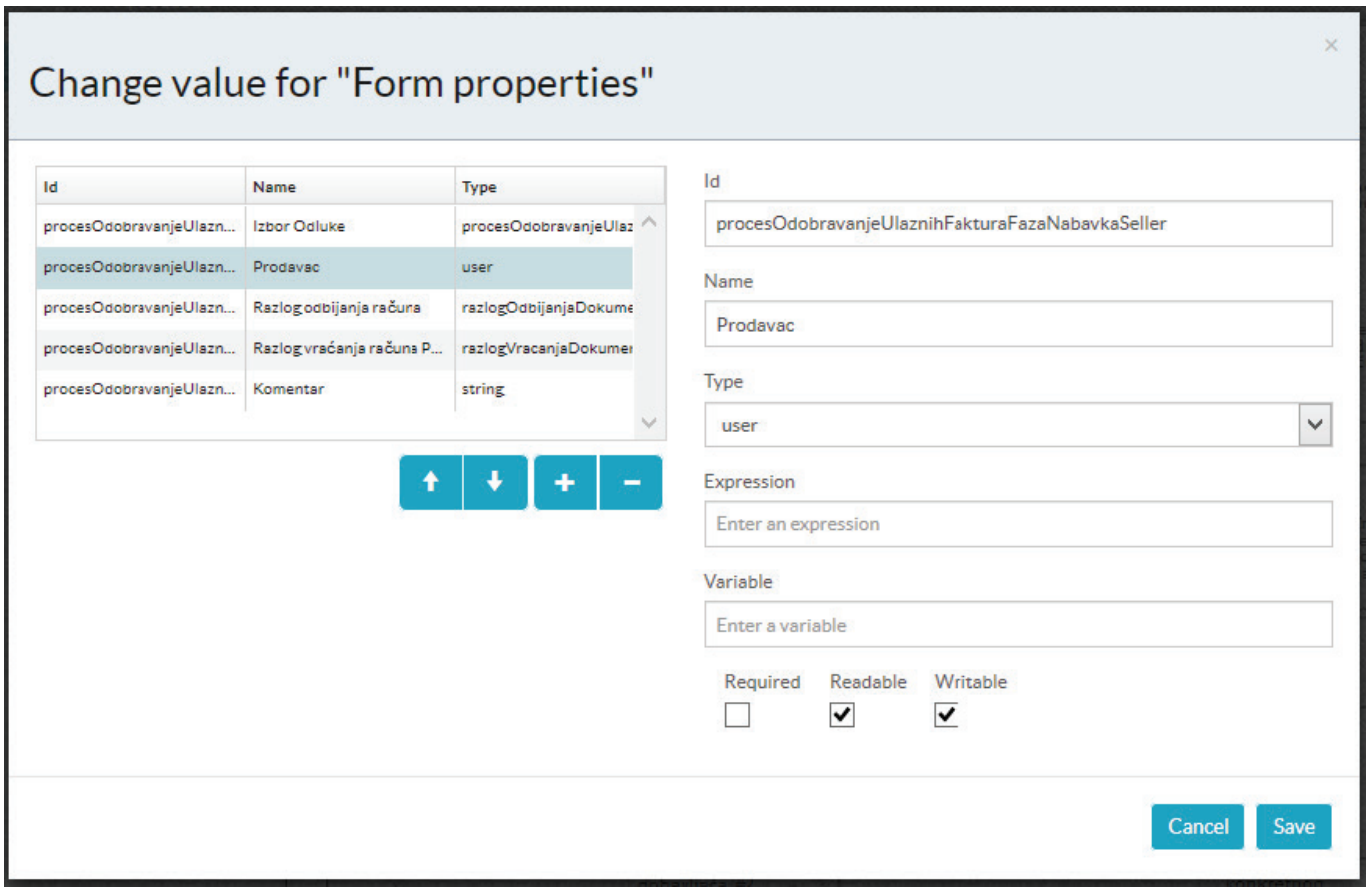

Figure 21 Activiti – Setting metadata for process phase

COMTRADE SYSTEM INTEGRATION EXECUTIVE SUMMARY

Comtrade System Integration was founded in 2001 and is part of Comtrade Group, one of Europe's largest technology companies with over 2,000 customers worldwide. We are a provider of market-leading hardware and software solutions, and digital transformation consulting services. We help companies reinvent their business models through new technology to improve operational processes, service delivery, customer experience and profitability.

Our team comprises of 200+ IT experts who leverage their deep domain knowledge, top industry certifications and industry experience to help businesses adopt digital technology more quickly than their competitors. We work with a wide range of clients: from small and medium sized businesses to big multinationals.

Comtrade SI provides strategic consulting and system integration services in order to drive business transformation across the region. Partnering with technology leaders such as Microsoft, Oracle, IBM, HPE, Cisco, HP, Open text & Dell EMC, Comtrade SI ensures that our customers receive the best IT products on the market, while at the same time offering deep expertise in design, architecture, implementation, customization and management of systems and applications.

Our experts are problem solvers with a deep understanding and passion for digital technologies, enabling our clients to simplify, accelerate and make the most out of their digital transformation initiatives. Apart from providing IT services for clients, our team makes sure to examine, understand and address their individual business and technology challenges/objectives.

Comtrade System Integration specializes in:

- Enhancing business performance and efficiency through innovative system integration services
- Accelerating and simplifying deployment of new (cloud, big data analytics) and traditional (ECM, HCM, ERP, CRM etc.) technologies
- Cloud based digital transformation
- Design, development, integration and management of systems and applications

Our achievements:

5M+ telco users
on different platforms

We are a premium content provider
for more than **80% of the banks in Serbia**

40+ public institutions
use our solutions and services

20+ TB of consolidated data
and **8M customer profiles** stored in our data warehouse

100+ successful data center
implementations region wide

0% rate of
unfinished projects

15K+ patients registered in our
Health Information Systems

Our team works around-the-clock to keep
our clients' infrastructure **up and running 24/7**

Phone: +381 11 201 5600
E-mail: info.rs@comtrade.com
www.comtradeintegration.com