Towards the Introduction of Workflow Management at the Netherlands Cadastre

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SUMMARY

The Netherlands Cadastre and Public Registers Agency promotes legal security at lowest possible costs. Quality of data, services and products is a key issue, the organisation has an ISO 9001 certificate since 2002. The Agency is using several instruments to fulfil the ISO requirements: checks in processes, audits and quality surveys.

In this moment workflows are being managed by a step by step guidance of the employees in the computerised systems supporting the cadastral update processes in the primary systems and by separated systems where the status of each individual update (triggered by incoming deeds related to land transactions) can be maintained. An Enterprise Resource Management system is available but not yet integrated with the primary systems. This integration is one of the goals of a comprehensive IT renewal strategy of the Agency.

The introduction of workflow management is expected to contribute on the further improvement of the efficiency of the Netherlands Cadastre, combined with more reliable data maintenance, and with more flexibility in management of personnel (within and between local branches) and an improvement of customer satisfaction by better output data, services and products.
Implementation of Workflow Management will be based on a step by step approach.

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1. INTRODUCTION

Kadaster promotes legal security in society's transactions in real estate at lowest possible costs, to maintain and optimize spatial databases, to supply information and provide services. Kadaster intends to base its strategy on the following five objectives:

- To perform its given public tasks as good as possible.
- To further develop its existing public task where appropriate.
- To aim for a directive role in agreement with its public task.
- To focus more specifically on the provision of information.
- To focus more specifically on the citizen / private individual.

In this moment the Agency comprises a head office and 15 regional offices. In these offices the registers are kept, the boundaries surveyed, maps maintained and information disseminated.

For all the services must be paid: the Agency is obliged to fully recover its costs. The total business costs in 2003 were about 207 million €. About 2200 people are employed, 600 in the head office (including the IT departments) and the regional offices (1600). About 250 employees thereof are active in two other tasks of the Agency: contribution to land development projects, and maintaining the GPS-net.

In this moment workflows are being managed by a step by step guidance of the employees in the computerised systems supporting the cadastral update processes in the primary systems and by separated systems where the status of each individual update (triggered by incoming deeds related to land transactions) can be maintained. An Enterprise Resource Management (ERP) system is available but not yet integrated with the primary systems. This integration is one of the goals of a comprehensive IT renewal strategy of the Agency. In this renewal strategy a lot of attention is paid to the link between processes, data and organisation. The new IT architecture will contribute to an improved link between the primary systems and the ERP.

This paper highlights the following:

- An overview of the existing cadastral update process in the Netherlands, based on an example case
- The frame work of IT renewal: strategy, components, architecture
- Example cases of a new process (parcel subdivision): electronic conveyancing, registration, publication in the digital registers of deeds, surveying, updating of the object, updating of databases

– Workflow Management

2. EXISTING CADASTRAL UPDATE PROCESSES

A normal procedure of a land transfer is as follows. If a buyer en seller agree on a sale (most likely guided by a real estate agent, a non compulsory party in the land market), a notary public (compulsory) will draw up a notarial deed of transfer, after verifying the right to dispose by the seller and the consensus ad idem and the like. After the signing of the deed by both parties and the notary, the notary public signs a copy as a true copy which is submitted to the Agency. The land registrar of the Agency checks some formal requirements, and records the deed and provides relevant evidence for this to the notary public. As the notary public is also the intermediate for the financial arrangements, the purchase prices is kept by the notary public until the evidence of recording is received, only then the purchase price is paid to the seller. A similar procedure pertains to mortgages, which secure loans on land and buildings.

In case of the transfer of a subdivided land parcel, the land surveyors of the Agency will survey the new boundaries, and assign new parcel identifiers. In the last year 410.800 deeds of transfer were recorded, and 552.500 deeds of mortgage. Land surveyors surveyed new boundaries for 98.200 land parcels. All cadastral registers and maps are in digital format. Cadastral registers are kept in the system AKR (Automated Cadastral Registers), the maps in LKI (survey and mapping information system): two separated systems with interface connection in order to appropriately co-ordinate the ongoing updating of the cadastral registers and maps.

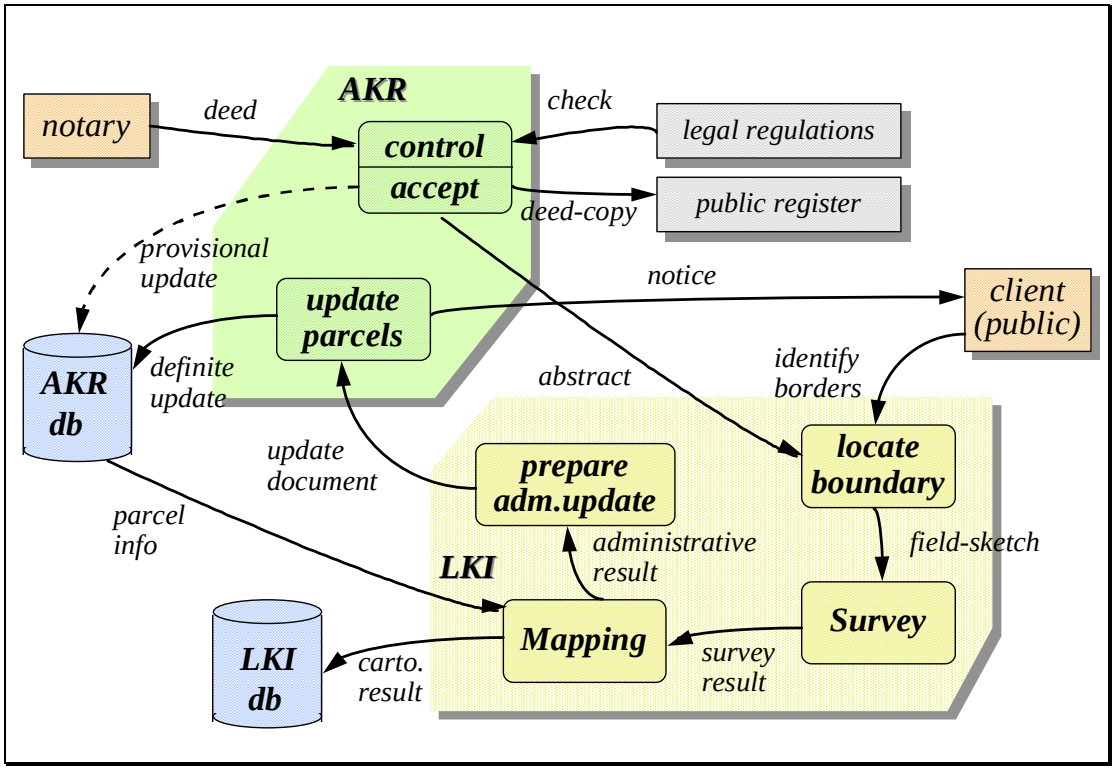

Figure 1: The existing Cadastral Update Process in the Netherlands

This schematic process-model as presented in Figure 1 describes the primary cadastral activity, the updating of the Cadastral Maps and Administration.

In this model only the transfer of a part of a cadastral parcel is explained. The transfer of a complete parcel is simpler: the deed is checked and accepted and the administrative attributes are directly updated in AKR. In this case there is no surveying required.

The process is subdivided in two parts: administrative and legal activities (updates on rightholders, rights and restrictions in AKR) and surveying and mapping activities (updates on parcel boundaries, surface area's and other geometric data in LKI). There are several interfaces between the separate activities. The update procedure is integrated, in one session the user has access to the two systems, running on different platforms and locations by a connection via a client server application.

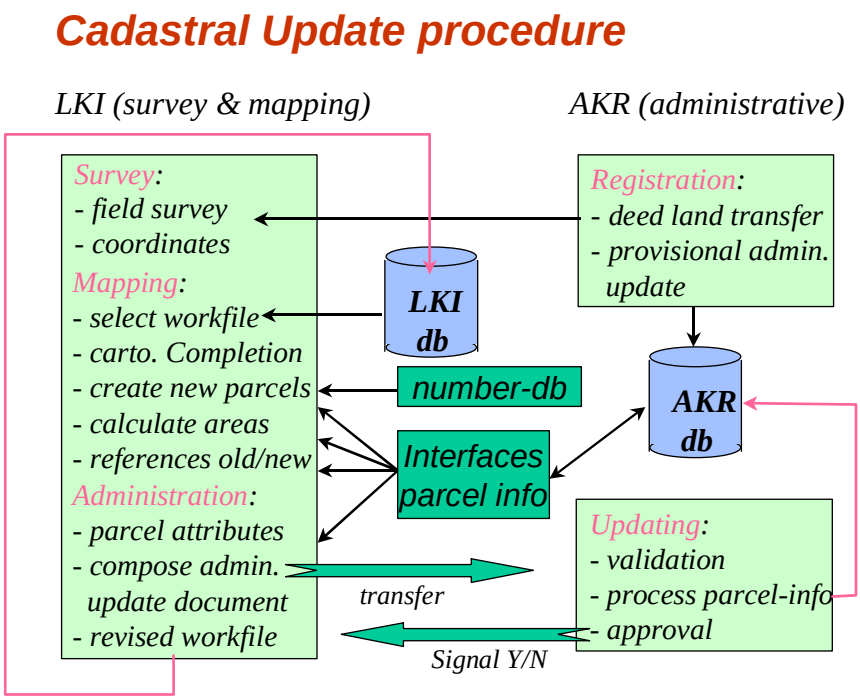

Figure 2: Procedure Cadastral Updating in relation to the existing databases

Details of the process are as follows (see Figure 2):

REGISTRATION:

- Check the incoming deed with formal cadastral rules for legal consistency.
- Preliminary update in AKR: the concerned parcels are split; each part gets a temporal or preliminary parcel-part identifier (existing ID+Dxxxx). The reason is to be able to present actual information to the public during the further update-process.

An abstract of the transaction-document is sent to the surveyor.

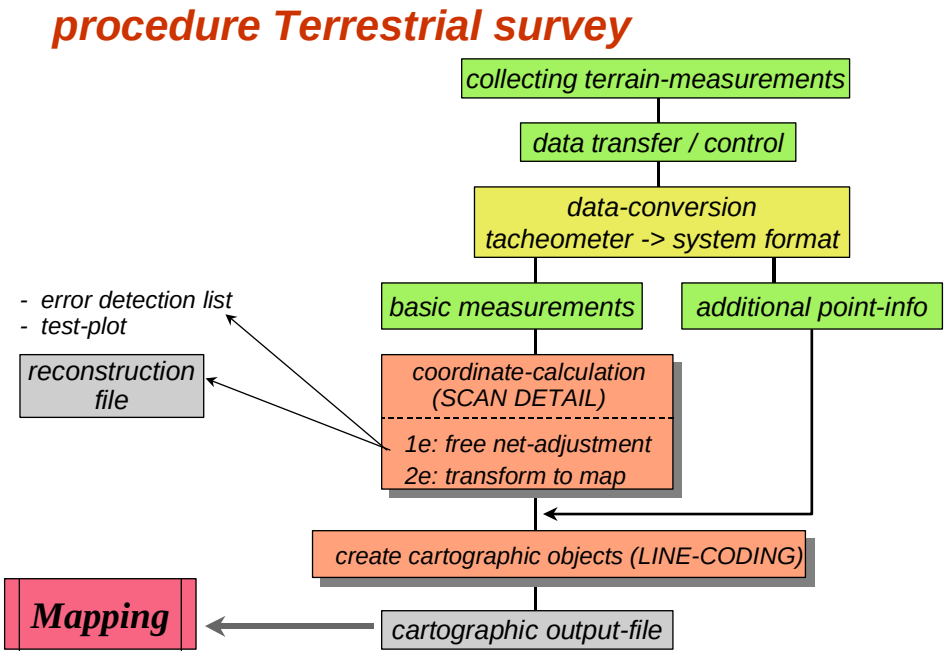

Figure 3: Procedure Cadastral Survey

SURVEY:

- The (new) owners identify the new boundary to the surveyor. The surveyor makes up a field sketch of the situation, see Figure 2.
- Collection of terrestrial observations (see Figure 3): the surveyor can use a set basic measuring types, each observed point gets a unique point identifier and a line-code and classification-code.
- Data-transfer of observations from the total station to a standard system format, errors in data-format and incorrect line- and classification codes are recognised.
- Pre-processing of the data, only basic measurements are needed for co-ordinate-calculation in SCAN-DETAIL, so they are separated from the additional point-information (line- and classification-codes)
- SCAN-DETAIL (an LKI subsystem): co-ordinate calculation in 2 phases:
  - 1e phase: free net-adjustment: the system tries to process all measurements and to calculate co-ordinates in one local co-ordinate system (1:1 accuracy). Measuring errors and point-identification faults will be detected. The result is separately stored for later reconstruction of points in the field. A test plot is being made, using line-codes and point identifiers where incomplete objects and survey errors can be detected.
  - 2e phase: adjust the new data to the existing cadastral spatial database, this is a similar calculation-process as in the 1e phase, the difference is that the co-

ordinates of re-measured existing points in the LKI cadastral spatial 'participate' in the process as observations.

- LINE-CODING (an LKI subsystem): to create objects (line-strings, circular arcs and points) based on the line-code (interpolation between points) and classification-code and to convert the object-file into a standard data-format, suitable for further cartographic processing.
- The result is a 'project file' as input for the updating process in the cadastral spatial database.
- CARTOGRAPHY:
- A workfile is selected from the LKI-spatial cadastral database. This selection is based on the existing parcel identifiers.
- 'Cartographic completion' the project-file with survey-data is transferred to the workfile, in case of surveys with classical tapes the observations have to be brought into the system now using graphical editor and a topological check is performed.
- Create new parcels:
  - The survey-result is checked with information form the deed (this information is already stored in AKR during the REGISTRATION). In LKI the user can query on-line actual parcel-information from AKR, using the automated interfaces.
  - Place preliminary (existing ID+Dxxxx) parcel-part identifiers directly from AKR in their geometrically correct position in the workfile (separate interface). It is checked in AKR if parcel-parts may be merged.
  - Delete old parcel-boundaries, automatically the corresponding parcel-identifiers are traced and deleted.
  - Locate the new parcel-numbers in the workfile. The new identifiers will be automatically received from the NUMBER-database.
- Calculate parcel-areas.
  - The system detects all areas (closed polygons) which relate to both the new and deleted parcels, at the same time the new parcel-areas are calculated, the deleted parcel-areas are re-calculated and checked with their formal parcel-area in AKR
- Compute all references between new and old parcels.

ADMINISTRATION:

- Add administrative attributes to the new cadastral parcels (parcel address, legal restrictions and rights.
- automatic composition of update-document file for AKR.

UPDATING:

- the update-file is directly processed in AKR, the revised parcel-information is again checked and validated, AKR processes the new parcel-information and deletes the old parcels
- approval: a signal is sent back to LKI
  - if errors are detected there is a 'no'-signal, in this case the LKI-process is stopped, the user has to correct the errors and start the process again.
  - if everything is alright there is a 'yes'-signal

- LKI: the revised cartographic workfile will be automatically updated in the LKI-database, in this way the AKR-DB and LKI-DB are physically updated at the same time and the revised situation in AKR and LKI will be consistent.

3. IT RENEWAL

Society changes and with it the demands for organisations that provide products and services. With respect to the Netherlands Cadastre it became clear that customers expect (all) data in digital formats; availability of data 'just in time'; customised and quickly delivered products; more actual data; integrated administrative and geometric data; improved data quality and one front-office instead of fifteen Kadaster offices. Without doubt meeting the demands as mentioned above will have enormous impact on the existing automated systems. The following questions arose:

- How long can the existing systems be maintained to fulfil the new user demands?
- Do we oversee the effects of all business demands on the system architecture?
- What is the impact of current functional changes on future functional changes?
- Are we making true investments in a good future or are we only making costs for the past?
- What happens when components in use become end-of-life?
- Will there be enough time to implement a new component, are enough resources available and can we manage the impact on business demands?

The answer to these questions required a strategy that would balance the user demands for new functionality, availability and continuity and the demands on cost management (maintenance cost, support cost for aging tools and complex ICT-infrastructure) and manageability of the renewal.

In the next years a further change and addition of functionality is required in the automated cadastral registers (AKR). Related to the strategic objectives of the Kadaster the following new functionalities can be mentioned:

- a nationwide access on rightholders and their identifiers (at the moment due to the fifteen regional offices we have, fifteen seperated registers of persons exist which are not interrelated to one another)
- access to information based on internet technology
- one automated nationwide public register of deeds
- selection of data based on areas specified by the customer,
- improved registration of apartment rights (rights in strata)
- registration of future cadastral parcels (with preliminary boundaries, yet to be surveyed) in stead of the current administrative registration of subdivided parcels
- integration of administrative and geometric data
- further automation of the processing of deeds: electronic submission, standardization and *workflow management.*

Investigations revealed that realisation of these demands within or related to the existing systems will only be possible against very high costs and will result in increased complexity.

This will increase stability and continuity risks that already occur in the current situation due to the already grown complexity, the quality of documentation and the reducing knowledge of the precise construction and working of the current systems. The functional and the technical architecture of the administrative system is unsuitable for a sustainable meeting of new demands. The current system for the administrative part of the cadastral registers (AKR) is at the end of its functional and technical lifecycle.

The LKI system with geometric data of the cadastral map is based on the same outdated design criteria as the administrative system. According to our fifteen regional offices the system is installed in fifteen places, every office has its own database and no integration with the administrative system is available. Over time a very succesfull but complex interface between the administrative and geometric system is build but the databases are still kept seperated. Because of the increasing demands for integrated data and the end-of-life situation with respect to the cartographic editor the conclusion is that the renewal of this geometric system is necessary and must be realised in line with the renewal of the administrative system.

The current systems are from a business point of view very important, heavily used and containing extensive functionality. The systems contain information about seven million parcels and three and a half million rightful claimants. Annually about 950.000 deeds are processed and about thirteen million information products are delivered electronically to the customers of the Kadaster. Together with the required improvements and the newly required functionality the renewal of such systems will be complex and will require a major effort from the complete Kadaster-organisation over a long period of time (in the range of ten years). Common sense leads to the conclusion that it's sensible to start the renewal now in a pace that can be set by the Kadaster itself. Postponement of the renewal for an undefined period of time will lead to situations were renewal must be enforced under great pressure. This will be an undesirable position since such big scale actions in a short time require extreme effort and create most likely unmanageable situations. Figure 4 shows the new architecture on which the renewal will be based.

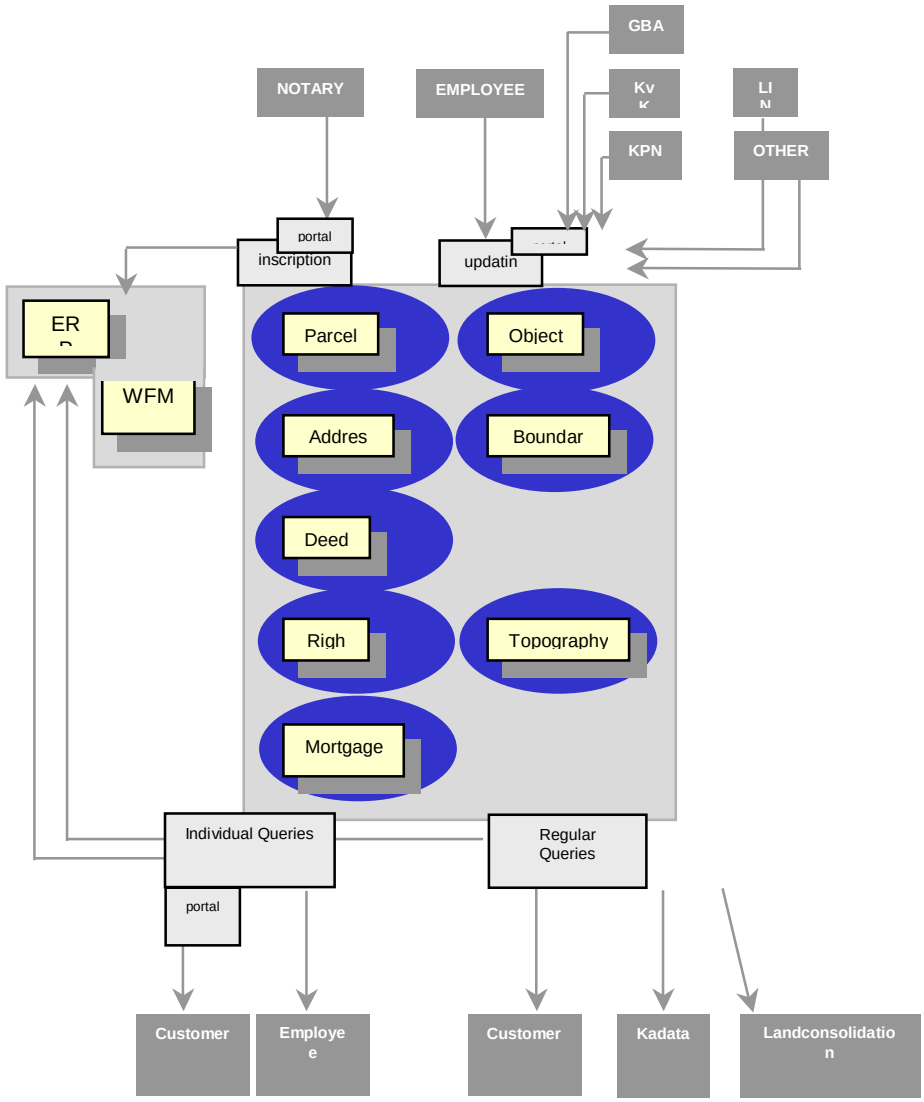

Figure 4: The new system architecture (components based)

4. ELECTRONIC CONVEYANCING

Law is pending in the Parliament pertaining to electronic submission of deeds. This opens the opportunity for the notary public to submit notarial deeds as a digital file. The concept is that notary public keeps a paper deed in his/her office as the authentic one, sends a certified true copy electronically to the Agency, which records the document in a digital work process. This allows for the creation of digital public registers. As long as the law is not passed, some parts of the system are already operational, backed by the traditional paper workflow.

The existing system is somewhat archaic.

An intensive review of the existing work-processes as a basis for the introduction of workflow management within the framework of the renewal programme resulted in the proposal to send to Kadaster an electronic copy of the deed by electronic mail. To investigate the impact of this proposal a task force has been established in 1997. This task force was

named ELAN, the abbreviation stands for ‘Electronic Delivery of Deeds'. In 1998 Kadaster reached an agreement with the group professional notaries (KNB). For the benefit of a more efficient traffic in real estate, it is desired to deliver notarial deeds at the Kadaster in electronic way. To realise this, there must be agreement on protocols, hashing techniques and key management .

Stated agreements are:

Kadaster will use the intranet of the KNB,
Until receipt at the Kadaster, the KNB is responsible for integrity of a message,
After receipt at the Kadaster, the Kadaster is responsible for integrity,
Integrity and authenticity are reached by use of hashing techniques and digital signatures,
Digital deeds will still be filmed for durability reasons.

The required functionality of the computerised system for electronic conveyancing has been analysed and agreed. Main functionality can be summarised as follows:
An incoming message from notary at Kadaster can contain four different types of requests, *combinations* are allowed:

- A request for Registration Deed (RRD)
- A request for Registration Correction (RRC)
- A request for Renewed Registration (RRR)
- A request for Cancellation (RCA)

The most common request will be a Request for Registration of a Deed.
In the case the Kadaster has asked the notary for correction, after the check on formal requirements by Kadaster, the notary can send a Request for Registration Correction.
In the situation the Kadaster cannot register a deed because of juridical issues, a notary can send a request for Cancellation. After changing the content of the deed, he must do a new request for registration deed.

In very rare cases, the notaries do not agree with the opinion of the Kadaster on juridical issues. Then we go to court. If the judge thinks the Kadaster is wrong, the notary can send a request for renewed registration. After reception of a request from the notary Kadaster can reply with one of the following messages:

- Message of Disapproval (MDA)
- Message of Non-mentioned Parts (MNP)
- Proof of Receipt (PREC) for RRD, RRC, RRR and RCA
- Denial of Request for Cancellation (DRCA))

A Message of Disapproval is only sent in case of disapproval of the complete incoming message (request). It has been agreed with the KNB that this case will always be related to a phone call. A Message of Non-mentioned Parts is only sent in case the incoming messages contain too many files; this means files are related to the request which are not mentioned in requests.

A Proof of Receipt will always be sent. These proofs contain already the reserved unique identification or a reason of disapproval. In the seldom case of a Renewed Request, we are sending the Proof of Receipt in analogous form. When the Kadaster disapproves a Request for Cancellation, it sends a denial of it. This is only done when the notary had not sent his request for cancellation within the valid response time.
After reviewing requirements for registration and processing:

- Proof of Registration (PRER)
- Request for Correction (RC)
- Information of Non-Registration (INR)
- Message of Refusal (MR)

A proof of Registration is send after Registration of a Request or Correction.
A Request for Correction is sent when correction is needed. This will always be preceded by a telephone call. An Information of Non-Registration is sent when the Kadaster could not register the deed or correction because of juridical issues. It will always be preceded by a telephone call.

After information of Non-Registration, the notary has a certain term for reaction (by sending a Request for Cancellation). After exceeding this term, the Kadaster sends a Message of Refusal. Figure 5 gives the overview of messages.

Incoming messages from notary and replies to those messages by Kadaster are composed as follows:

- forms, this means a request for Registration Deed (RRD), a request for Registration Correction (RRC), a request for Renewed Registration (RRR) or a request for Cancellation (RCA). Those forms are in eXtensible Markup Language (XML). Names of annexed files, e.g. file-names of deeds and maps are mentioned in these forms. Furthermore this form contains the name of the local cadastral branch office where the request presented on the form will be processed. XML has as an important advantage above EDI, an earlier format: you have more flexibility in changing the XML definition, because you don't have to change simultaneously. When using EDI, both sender and receiver had to implement changes at the same time. When using XML, this is no longer the case. See also chapter 6 of this paper.
- deeds, annexes, evidences and maps in Portable Document Format (PDF), this is an important choice The Notaries are using many different text processors, and of course Kadaster is not in the position to change this. This means many different formats have to be managed: e.g.: Wordperfect 4.2; Wordperfect 5.1; Lotus AmiPro; Word 6.0; Word 2000; Notepad; etc. For this reason all files are standardised on PDF, all text processors can convert documents to this standard, even systems like AutoCAD can convert maps to this standard. Another important advantage is that there is a free program, Adobe Acrobat Reader, which can be used to view PDF documents. In some cases maps are annexed to the forms, this is optional. Maps could be send by notary to represent agreements on parcel subdivision or to describe apartments in flat buildings (condominiums). About 1% of incoming deeds contains maps. Big files could be compressed (ZIP).

The availability of electronic deeds allows for the introduction of workflow management in such a way that local offices with too many employees (related to the workload) can take over work from local offices with insufficient employees. This contributes to the improvement of the overall performance of the total organisation.

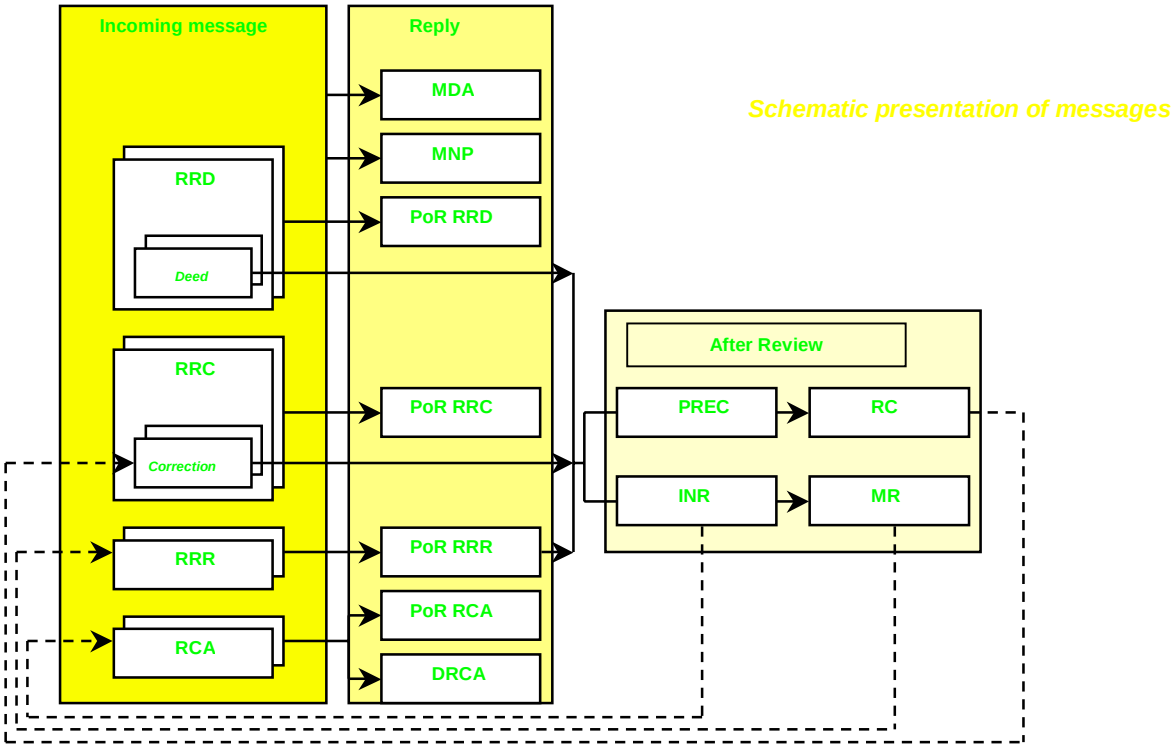

Figure 5: Electronic Conveyancing: Overview of Messages

5. TOWARDS INTEGRATED WORKFLOW MANAGEMENT

All primary business processes like the existing cadastral update process have been completely reviewed and are under redesign within the framework of the IT Renewal strategy.

The business processes will run under the umbrella of a Workflow Management System. This implies monitoring of all workflows by distribution of 'work-units' to employees, maintaining and following its status, control on time and overview of stocks. Work-units can be processed by employees in offices which are not in within the territory of the cadastral office where an update has to be processed. This allows a greater flexibility of workforces. For every process step WFM triggers the correct application (function).An example is given below: the flow related to cadastral surveying. Each workflow step can only start when the predecessor is completed.

Figure 6 gives an example: cadastral surveying.

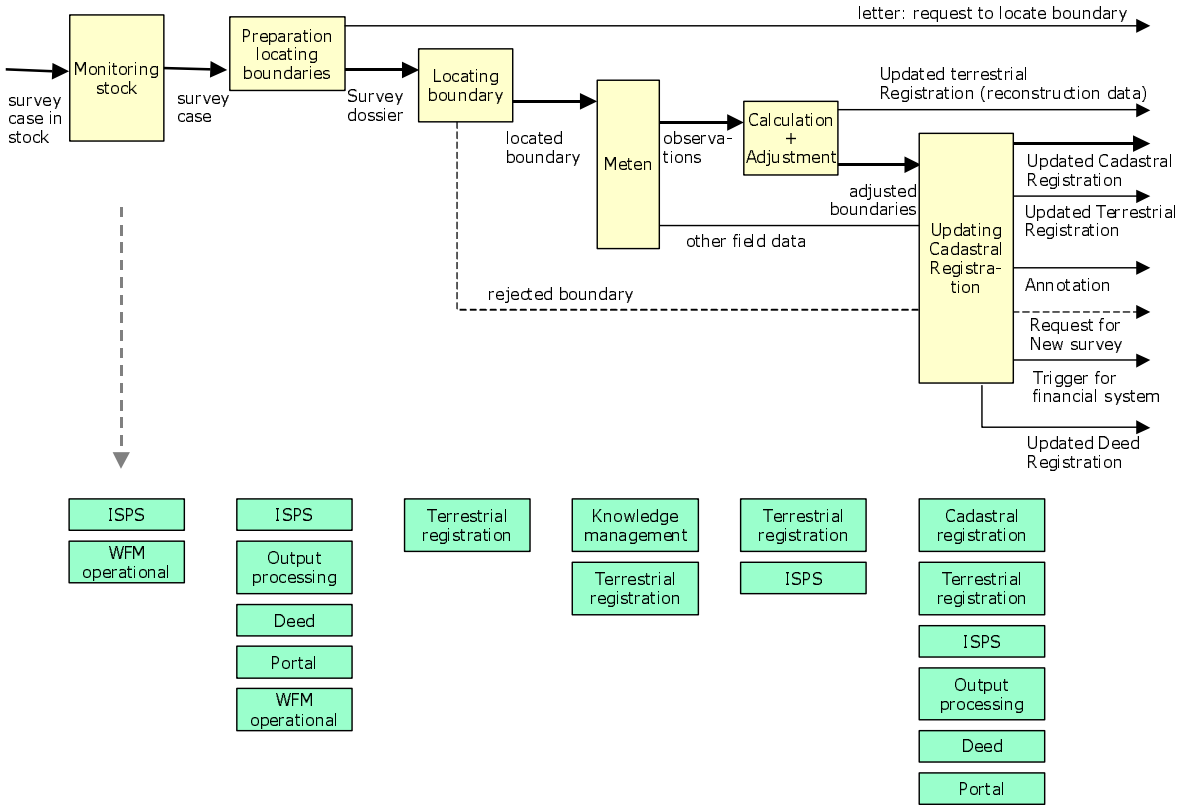

Figure 6: Workflow Cadastral Surveying, related application systems and services

In each process step (yellow) a set of services is used (green).

- Step ‘Stock Monitoring’
  - The service ‘ISPS’ (Information service primary systems) is used to localise a requested survey and to introduce relations to survey cases
  - The Workflow Management System-Operational is used to update the status of this work-unit (step)
- Step ‘Preparation’
  - The application ‘Deed’ is used to view and analyse the deed contents
  - The application ‘ISPS’ (Information service primary systems is used to query neccessary cadastral, terrestrial and topographic data
  - The service ‘Output Processing’ is used to generate letters for the new owners about the time/date of field survey
  - The service ‘Portal’ is used to send the letter in an electronic way
  - The service Workflow Management System-Operational is used to update the status of this work-unit (step)’
- Step ‘Localise Boundary’
  - The application ‘Terrestrial Registration’ (Field Office) is use to collect and record all administrative data about the new cadastral boundary
  - The service Workflow Management System-Operational is used to update the status of this work-unit (step)’

- Step ‘Survey’
  - The service ‘Knowledge Management’ is used to find the technical instructions
  - The application ‘Terrestrial Registration' is used to insert the terrestrial observations (GPS, tacheometer measurements)
  - The service ‘Workflow Management System-Operational’ is used to update the status of this work-unit (step)’
- Calculations and adjustment
  - The application ‘Terrestrial Registration’ is used to update the boundaries and its related data for eventual reconstruction of this boundary in the future (coordinate calculation and cartographic adjustment)
  - The application ‘ISPS’ (Information service primary systems) is used to query existing cadastral, terrestrial and topographic data
  - The service ‘Workflow Management System-Operational’ is used to update the status of this work-unit (step)’
- Updating Cadastral Registration
  - The application ‘Cadastral Registration’ is used for updating the data groups ‘Cadastral Object’ ‘Right’, ‘Person’, ‘Address’, ‘Cadastral Boundary’ based on the (legal + geometrical) observations in the field
  - The application ‘Terrestrial Registration’ is used for the final storage/updating of terrestrial boundary data
  - The application ‘Deed’ is used to include data related to the deed
  - The application ‘ISPS’ (Information service primary systems) is used to query existing cadastral, terrestrial and topographic data
  - The service ‘Output Processing’ is used the generate requests for change and annotations to the notary public
  - The service ‘Portal’ is used to send the request or annotation in an electronic way
  - The service ‘Workflow Management System-Operational’ is used to update the status of this work-unit (step)’

All business processes (workflows) have been worked out on this global level. The figure 7 below provides an overview of the designed primary systems and services architecture:

Each application system (or component) will be separately designed and implemented, taken into account the interfaces to other new application systems or existing legacy system (current registrations).

For each application system and service a detailed design will be made based on the data which can be updated by this application or queried by this service within the frame work of workflow management. The ‘switches’ between applications and services are controlled by the Work Flow Management System. An example is given here for the application system ‘Cadastral Boundary’. The application system Cadastral Boundary as part of the Cadastral Registration contain all functions neccessary for updating and querying of cartographic information on cadastral objects (land parcels and other cadastral features). The interfaces with other related application systems, represented by the lines in figure 7, are shown.

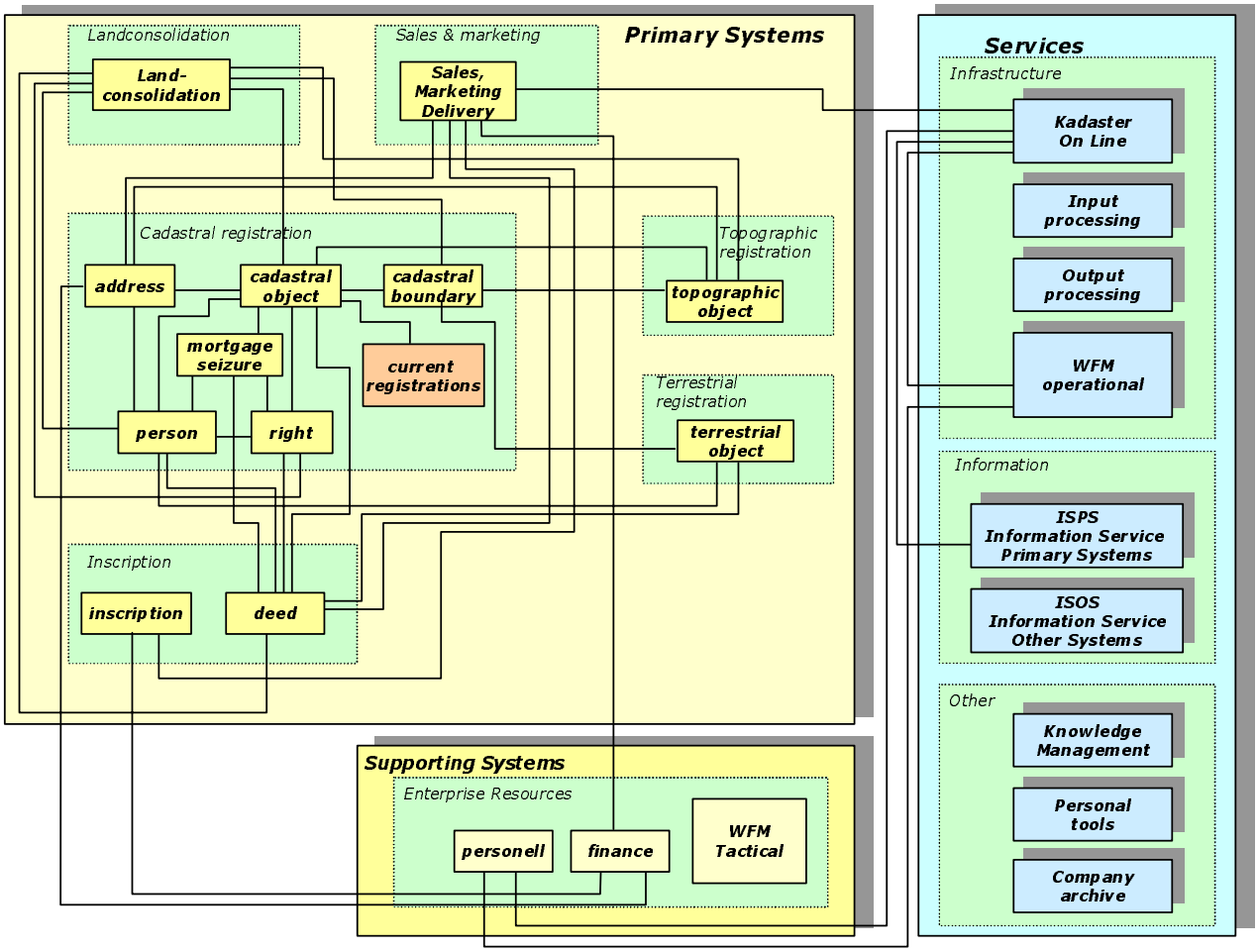

Figure 7: Systems and service architecture

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Cadastral registration: Cadastral Boundary

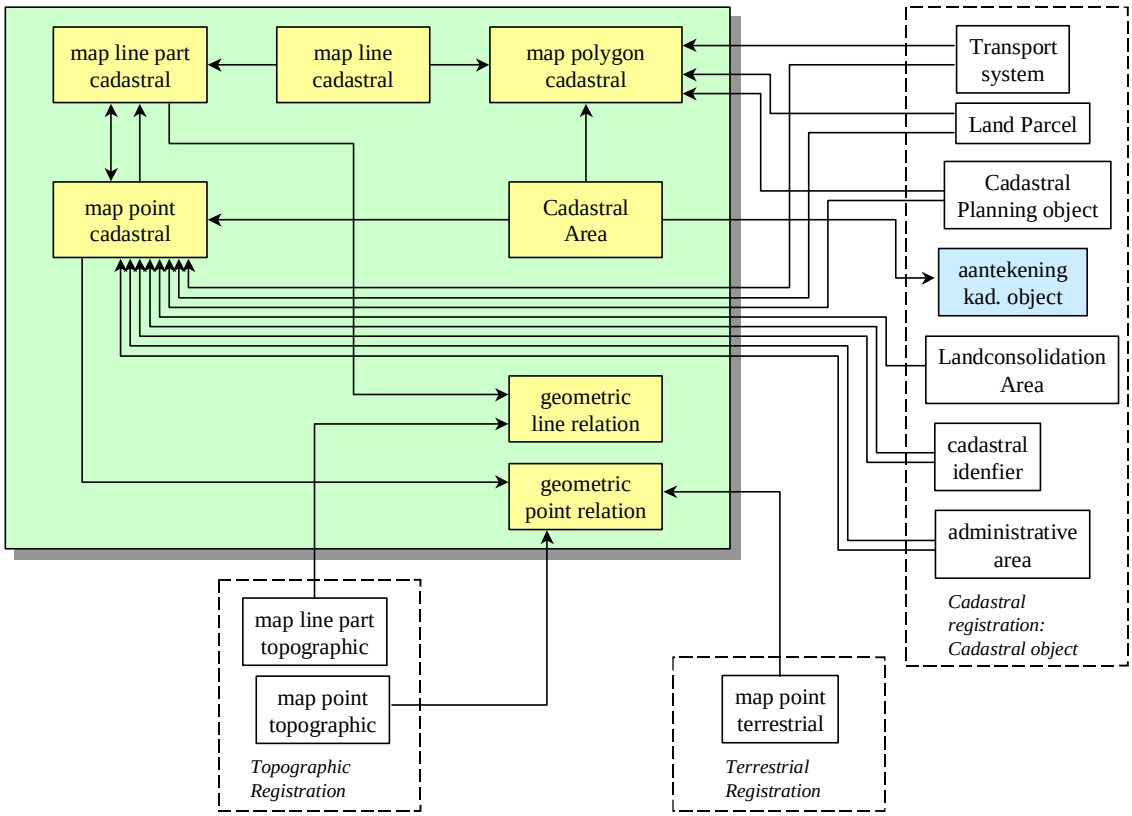

Figure 8: Application system Cadastral Boundary

The Workflow Management is strongly related to the Enterprise Resource Planning System and to the incoming requests from customers.

The implementation of the designed workflows, the application system and services architecture and also the data model will be implemented step by step as a normal yearly ICT-development program.

6. CONCLUSION

Some of Kadaster's existing and newly designed workflows have been presented on detailed level in this paper. All workflows are being re-designed on this detailed level; this will be a substantial effort. We will select a standard WFM tool in order to manage workflow on both operational as tactical (management info) levels. It will be possible to distribute work over the offices (local branches) and to change employees in running workflows.

Efficiency, flexibility in workforce and data quality is expected to be improved after the introduction of Workflow Management into the Agency.

REFERENCES

Booij, A.S. and Dijkstra, T, 'Renewal of automated information systems at the Netherlands Cadastre and Land register Agency'. Paper presented at the symposium on 'IT renewal strategy for land registry and cadastre', 8-9 May 2003, ITC, Enschede, The Netherlands. www.oicrf.org

Molen, van der, P, 'Cadastral Template, May 2003, The Netherlands'. www.cadastraltemplate.org

Osch, van, G.M., 'Cadastral Surveying and Mapping in the Netherlands', Apeldoorn, The Netherlands, 1998 (revised in 2000).

Jans, Rudhy and Van Osch, Berry, 'Information Architecture, application systems' (internal edition), Apeldoorn, the Nederlands, 2001 (revised in 2003).

Stolk, P.A. and Lemmen, C.H.J. (2003), 'Technical Aspects of Electronic Converyancing', Paper presented to the FIG 2nd Regional Conference, Marrakech, Morocco, December 2003.

Wakker, J.W., van der Molen, P. and Lemmen, C.H.J. (2003), 'Land registration and cadastre in the Netherlands, and the role of cadastral boundaries : the application of GPS technology in the survey of cadastral boundaries'. In: Journal of Geospatial Engineering : Official Publication of the Hong Kong Institution of Engineering Surveyors, 5(2003)1, p. 3-10.

BIOGRAPHICAL NOTES

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