Medical IT Pty Ltd

Dox RDS Medical Records System

Functionality & Integration

THE DOX SUITE - AUTOMATION FOR HOSPITALS AND MEDICAL PRACTICES.

- RDS electronic medical records using paper documents as the source documents. Can co-exist with eRDS.
- eRDS electronic medical records using electronic forms on Tablet PCs as the source documents.
- TMS theatre management, procedure costing and inventory & supply chain management.
- Patient Recalls used with RDS and eRDS for full automation of patient recalls.
- Digital Dictation completely integrated with RDS and eRDS.

DOX RDS - RECORDS AND DOCUMENTS SYSTEM

OVERVIEW

Dox RDS provides an electronic medical record where the forms that record the data of the record can be either paper, Dox RDS, or fully electronic, Dox eRDS, or both.

RDS offers many unique and powerful facilities for hospitals, day hospitals or ambulatory care centres, and medical practices.

- Forms may, concurrently, be either paper based or fully electronic
- Patient records can be consolidated from multiple facilities with the one patient carrying the file or UR numbers of multiple Patient Administration Systems as well as a globally unique national healthcare identifier
- The medical record is viewed or printed from a Clinical Desktop that provides personalised views with great flexibility in grouping, ordering, and filtering of content.
- Data security is assured with encryption and facilitated with *Single Sign-on / LDAP* facilities.
- Data integrity is provided by automatic systems that alert management of forms that may have gone missing in the workflow (prescriptive mode of operation) or are missing from the typical medical record profile (non-prescriptive mode of operation).

DOX RDS - PAPER RECORDS STORED AS AN ELECTRONIC MEDICAL RECORD

The classical approach of document management in healthcare has been to scan paperwork and link the images of the documents to the patient and their episode of care.

That approach relies upon all documents progressing from the clinical workflow to the scanning process. Unfortunately that can often not happen as forms may be misplaced and never make that step. Dox RDS specifically addresses that problem and others to ensure that the resulting medical record is as accurate and complete as possible.

Dox **RDS Standard Edition** in its ***prescriptive* mode of operation**, generates the documents using patient demographics drawn from the patient administration system, then tracks the documents for any loss in the workflow, and then automates their scanning and the filing of the images into the secure MSSQL database.

Because RDS generated the documents (or labels for documents) it is aware of their existence in the workflow can provide absolute alerts regarding any document that has not been scanned within allowed time constraints.

This mode of operation is most often used with the Dox RDS Standard Edition in a **day hospital setting**.

Dox RDS Extended Edition in its ***non-prescriptive* mode of operation** accepts documents as scanned images. Then, by matching the characteristics of the document image and by recognizing patient or episode identifying text in specific zones within the document, RDS identifies the document and automatically places it in the patient's medical record.

The above processes rely upon RDS recognising the document's characteristics from a library of such, as well as recognising printed or hand written characters to identify the patient admission or episode. RDS can also use absolute two factor identification - a barcode on the form identifying the form and a barcode on a label that was placed on the form which identifies the admission or episode.

Although RDS does not generate the documents in its non-prescriptive operating mode, it does however allow reporting and alert generation for admissions where the collection of documents that has been scanned does not match a typical profile, such as a profile for 'must always be there' forms for a specified type of patient admission.

This mode of operation using DoxRDS Extended Edition is **appropriate for a hospital**.

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DOX RDS - STANDARD EDITION

DOCUMENT CHARACTERISTICS

The following points expand on the functionality of the *Prescriptive* mode of operation for RDS

Document Type	Description
NN	Not Tracked for *loss* in external workflow Not Tracked for *time* sensitive data
TN	Tracked in the external workflow by setting an allowable period of time to lapse between the time of generating/printing the document and the time when the image of the form is captured in the scanning process. The document is uniquely identified by a machine readable identifier such as a barcode, as well as human readable identifiers, placed on the form by the system at the time of generating/printing the form Not tracked for time sensitive data
TT	Tracked in the external workflow by setting an allowable period of time to lapse between the time of generating/printing the document and the time when the image of the form is captured in the scanning process. Tracked for time sensitive data captured on the document (for example by the patient completing a questionnaire regarding their and their immediate family's medical condition(s) as at the date of their completing the form.

Dox RDS manages all document related parameters by placing each document into an index set that establishes management criteria and document security permissions. It's overall functionality

- Generates original documents using pre-set parameters
- Identifies self generated documents with a unique machine readable identifier
- Accepts externally generated documents Archives paper documents by accepting images produced by a document scanner
- Handles standard sized A5, A4 and A3 documents, single or double sided and carrying one or more forms paer sheet, multi-sheet documents and non-standard size and layout documents such as 6xA4 pages (3xpages per side).
- Archives electronic documents either as a file of the document in its native form such as MS Word™ or by converting it to a universally recognizable form such as Microsoft XPS™, Adobe PDF™ or TIFF.
- Manages self generated documents to detect their loss in external workflows
- Manages self generated documents to provide an alert to possible invalidity of data which may vary with time;

There are three general types of managed documents

Document Type	Characteristic
All	The generation/printing of the form is recorded in the management database as a record that the document was published and issued. Documents are generated from master templates held in the database to ensure that only the current authorized version of a document is published. Documents that have been published may be reprinted as a duplicate of a formerly printed instance of publishing that patient/episode specific provided that the original version has not already been archived into the database.
NN	Example - a patient information form providing the basis of an informed consent. There are no extra characteristics.
TN	The time allowed for circulation on the external workflow is set for each individual document template allowing different document types different degrees of tolerance.

Document Type	Characteristic
TT	Two distinct time periods are carried for each document's archive in the database. Documents (e.g. a medical history form completed the prior week) generated by automatic re-printing of an earlier version within the first period are deemed reliable; those between the two time periods are regarded as doubtful and those generated beyond the second time period are regarded as unreliable. Reliable archived images are available for printing and or display without any system intervention or alert. Doubtful archived images can be reprinted by the system but carry an additional statement explaining the need to validate the information contained in the archive image and also carry a field for the person validating the time sensitive data to sign and date the validating statement. Once validated the document automatically becomes a new version of the original with its time periods reset to run from the date of validation. Doubtful images are displayed with an alert for the user. Unreliable archived images are not allowed to be reprinted other than as a record (and are marked as unreliable) and are displayed with an alert to the user regarding their unreliable nature.

UNIQUE FUNCTIONALITY IN RDS

DOX VS CONVENTIONAL DOCUMENT MANAGEMENT

Conventional document management systems concern themselves with management of documents that are placed into an archive, the printing and viewing of archive images of the original documents and sometimes with the tracking of the document in the original hard copy form if it is issued from an archive repository.

Conventional systems can only deal with documents that were not lost while in the workflow prior to scanning.

Dox, similarly manages archived images but further extends the concept of record management to include

- the production and use of the document(s) before being archived as an image
- their tracking to detect loss in the workflow
- the validity of any time sensitive data carried on the document.

CREATION OF THE DOCUMENTS FOR THE MEDICAL RECORD.

- **System Generated**
  Documents are produced from master templates, each of which has version control with any new document always using the current version.
  The document may include fields to be completed by hand or the document may be straight text and intended as an information piece.
  Patient or episode / admission related information may be automatically merged onto the printed fom.
  The generation process assigns a unique identifying barcode for each discrete document
- **Externally Generated**
  The document is produced by another organisation or process external to the system, often by others. It may be hard copy such as a letter or electronic such as email or a data file.
  RDS prints a label for paper documents which are then scanned and processed in the normal way.
  Electronic documents are archived in their native form into the medical record.
- Document Generation
  RDS uses rules to generate and print the right mix of documents for the episode. The process of generating and printing the documents can be started from within RDS or (for most systems) started from within the Patient Administration System (PAS).

TIME SENSITIVE DATA

- Alert to potential loss
  If issued documents are not scanned within allowable time periods RDS will provide an alert. Documents tracked this way are TN.
- Document content validity
  A patient will typically have a succession of events in the course of assessment and treatment. Essential and critical data is often captured in the first encounter – for example a medical history questionnaire.
  That information can change significantly in a very short period. Type TT documents have associated validity periods which allow the document's captured data to be regarded as either reliable, doubtful or unreliable.
- Auto-generation of valid document
  The archived image of a type TT document can be automatically re-printed for a subsequent episode / admission depending on its validity status. One of three alternatives will automatically apply

Validity Status	Outcome
Reliable	The document image is printed as a part of the normal set printed for that type of episode / admission. The patient need not complete the form again and the form is available for normal use by clinical staff.
Doubtful	The document image is printed as a part of the normal setbut it has an added component explaining the need for the patient to read the previously provided data and to sign and date this new version of the document to certify it remains valid. The validity base date will re-set to this date of validation.
Unreliable	A new version of the original document type is printed and the patient will need to complete the form again.

PRESCRIBED PROCESS MONITORING

RDS provides time sensitive controls to ensure that events or processes that would normally occur for specified type of episode / admission do actually happen.

Typical examples are dictation of reports and management of a patient recall for follow-up care. If such events are detected then RDS provides alerts to the attending clinician as well as to administrative personnel.

DOX RDS - EXTENDED EDITION

OVERVIEW

RDS Extended Edition includes all of the functionality of the standard edition as well as

- Additional functionality to provide compatibility with in-patient and out-patient workflows in hospitals and large clinics
- Additional interfacing capability to allow integration with enterprise level PAS and workflow management systems
- An extended API to allow embedding of Dox functionality
- Extended IT infrastructure capabilities such as integration with Active Directory

WORKFLOW EXTENSIONS

The principal difference between the environments where the respective versions of RDS is employed is the way documents or the forms making up the medical record are issued.

In day hospitals, the admission is a very controlled process - RDS functions in a prescriptive way where the forms for the episode are generated and issued on demand. Consequently each document carries an identifier that is unique to that forms instance in that episode.

In a general hospital setting, some of the forms (principally admission or financial related documents) are handled in a prescriptive fashion. The balance of the forms however are going to be added to the chart in an uncontrolled manner. The extended edition offers several facilities to easily convert that paper chart into an EHR and also provide some quality assurance measures.

MULTI-FACTOR IDENTIFICATION

Each of the following methods can be employed concurrently across an enterprise to identify a document's unique combination of *Form Type*, patient and admission / episode..

Method	Components	Comment
Form Barcode + Admission Label with Barcode	The form carries a barcode (specific to the form e.g. MR24) that is included on the form when it is printed. The patient's association with a particular instance of the form is by a patient label carrying a barcode that is unique to the admission or episode.	The patient labels can be produced in quantity at the time of admitting and travel with the chart or they can be printed on demand. Barcodes can be placed anywhere and in any orientation. This is an absolute means of identification with strong QA benefits in identifying potential lost forms.
Automatic Form Recognition + Admission Label with barcode	RDS recognises the form (automatic de-skewing and sizing is applied) from a standard library. The patient's association with a particular instance of the form is by a patient label carrying a barcode that is unique to the admission or episode.	This is a very strong and robust means of identification with strong QA benefits in identifying potential lost forms.
Automatic Form Recognition + Zonal OCR	RDS recognises the form (automatic de-skewing and sizing is applied) from a standard library, or may use OCR to recognise the form type. RDS identifies the patient by searching specified zones for printed characters (OCR) that carry name, UR Number, etc.	This is a very convenient process as it does not change the way forms and charts are used in the workflow. If the OCR process is not confident in identifying the patient the identification will require subsequent operator intervention. Quality assurance reporting can identify the absence of forms that would typically be present in the chart for such an admission.
RDS generates the form(s) on demand.	A single barcode unique to that patient admission instance of the form.	An absolute identification process with absolute tracking of the form for loss in the workflow.

The scanning / identification processes do not require that documents of different types be separated for batch processing. Each method can uniquely identify a specific form for a specific patient

SYSTEM INTEGRATION & IT ENVIRONMENT

RDS Extended Edition provides a growing suite of functionality and interfaces to allow it to work as part of a composite HIMS environment. Some of those items are

Item	Comment
Microsoft SQL Server 2005	The database is open for reporting. Extensive use has been made of stored procedures to minimise network traffic and optimise performance.
HL7 messaging	These types are supported; A01, A03, A04, A08, A28, A29, A31, A40, S12, S13, S14, S15, S26
User Security	Active Directory, LDAP
Workflow Management	Integration with third party workflow managers via an extensive API and event triggers
Multi-Site and Multi-PAS	RDS allows for a single database to cover multiple locations with the one patient being held uniquely within RDS but possessing multiple UR or file numbers from potentially different PAS at the different locations
Data Security	RDS meets requirements of appropriate Evidence, Health Records, etc legislation as well as Australian standards for Electronic Document Management and Medical Records.
API	A COM-based API exposes all Dox functionality to third party applications, scripts, .NET, Java and any environment capable of accessing COM objects. The Dox GUI makes use of this same API for its functionality.
Web Service	The Dox document grouping and viewing capabilities are exposed via a web service for simplified embedding in other web applications.

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DOX ERDS – ELECTRONIC MEDICAL RECORD SYSTEM

Dox eRDS provides several distinguishing and valuable features as an Electronic Health record (EHR).

- The forms used to input and display the data of the EHR are user definable. System parameters ensure that core information advocated by authorities such as NEHTA is captured and retained.
- Custom data fields are automatically created in the database.
- eRDS electronic forms and RDS paper based forms can coexist. Some forms such as patient consent forms are best processed as paper documents for medico-legal reasons. Other forms, where they in particular data capture records such as an Anaesthetic Record, or other theatre forms, may be more appropriate for completion on paper.
- The data entry / display forms are dynamic
    - Sections of the form will expand or reveal themselves as appropriate
    - Data entered on one screen, once submitted to the database and validated, will automatically update any corresponding or derived fields on all other eRDS screens.
- The input and display process for eRDS can be either
    - Tablet PC or Micro PC. Offers portability, hand writing recognition as input, signature capture.
    - Networked PC Workstation. Allows conventional data input mechanisms and provides potential for larger displays and more data per screen.

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