

**Automating Healthcare Cash Posting
With the *CereSoft EOBAgent*[™] System**

**by Arthur Gingrande, Partner
IMERGE Consulting**

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Table Of Contents

Healthcare Industry Document Management.....	1
How Eob Statements Are Processed	2
Challenges In Automatic EOB Processing.....	3
The Ceresoft Solution.....	4
Ensuring Data Recognition And Location Accuracy	4
Perfecting Ocr Results	5
Integrated Workflow Management	6
Deploying The Ceresoft EOBAgent [™] System	6
Summary Of Ceresoft EOBAgent [™] Business Benefits.....	7

Healthcare Industry Document Management

Today the healthcare industry is in the midst of a profound transformation of both service delivery and payment systems. The traditional fee-for-services model of payment and reimbursement is being displaced by managed care. Mounting economic and competitive forces are pressuring healthcare providers from all sides: government and third-party payers demand containment of escalating costs; new payment plans force doctors to care for defined groups of people at fixed monthly rates; and patient advocacy groups and the general public insist on continually upgrading the quality of care.

As a result, the past decade has seen an escalation in the mergers of physician practices and hospitals into integrated healthcare delivery systems that are owned and run by medical corporations. The stand-alone medical practitioner and independent free-standing hospital are rapidly disappearing as the U.S. healthcare system reinvents itself to compete in the new environment of “managed care.” Fundamental changes are occurring in the structure of medical reimbursement.

These changes only serve to further burden an industry already buried under a mountain of paperwork. Indeed, the healthcare industry is probably the most document-intensive, paper-intensive industry in the world. There are countless patient records, insurance forms, lab reports, billing and payment statements, x-rays, charts, graphs, and nurses’ reports to track. Every conceivable type of medical encounter, including every patient, case, prescription, and operation, generates electronic and paper data to be modified, tracked, monitored, audited, updated, filed, and ultimately destroyed. Managing all this data and converting it into useful knowledge is an overwhelming task. The Internet has only served to heighten people’s expectations of instant communication, so that hospitals, insurance companies, HMOs and other healthcare organizations cannot get the information they need into their data management systems fast enough.

Although healthcare organizations have already made significant capital investments in applications such as database management, data warehousing, and hierarchical storage, they have invested relatively little in the area of information capture — particularly in the capture of information from paper documents. Due to the lack of automated data capture, many healthcare professionals are processing paperwork in a costly manner, with expensive knowledge workers performing inefficient, manual data entry from paper documents. Slow response times ultimately take their toll on the business of healthcare by severely diminishing productivity. The longer the information in paper documents remains uncaptured and unavailable to healthcare professionals for processing, the larger the knowledge gap in their patient care systems. As we move towards a knowledge-driven economy in the 21st century, this knowledge gap can become a severe competitive disadvantage.

Within this context, paper documents comprise one of the major bottlenecks in the process of collecting data and converting it into computer-usable format. Not only is the procedure slow and tedious, but also it is also expensive. Healthcare providers are welcoming any means to reduce these costs and more efficiently expedite paperwork.

In the past, it was believed that computer systems, through their sheer capacity to process and store data, would reduce the amount of paperwork produced by healthcare organizations. Computer technology has helped manage mammoth amounts of information by automating

certain input and data assembly processes. However, computers, by facilitating the creation of reports and copies, have also contributed significantly toward accelerating the growth of paper documents. For example, experts estimate that a mind-boggling *75 million pages of medical claims are processed every day* in the United States. The processing of these claims will in turn generate an even larger volume of related documents such as explanation of benefits (EOB) reports.

Electronic information technologies, such as bar coding and electronic data interface (EDI), have done their share to reduce the number of paper transactions required of high-volume business relationships. Electronic document imaging systems, particularly when combined with automated forms processing technology, have also done much to eliminate the paperwork in healthcare to date. Unfortunately, electronic imaging and forms automation have not succeeded in fulfilling initial expectations, due to intrinsic limitations in their capacity to perform content extraction.

However, new developments in machine intelligence are beginning to dramatically broaden the spectrum of machine capabilities in data capture, particularly when it comes to extracting content from *unstructured* or *dynamic* healthcare documents. Along these lines, CereSoft, an innovative data capture software development company, has made remarkable progress. Powered by break-through artificial intelligence, CereSoft software products are changing the world of automated content extraction in the healthcare industry — particularly when it comes to extracting data from unstructured healthcare documents such as invoices and EOB statements.

How EOB Statements Are Processed

An explanation of benefits (EOB) or remittance advice (RA) is a statement that spells out in detail the medical benefits paid for by an insurance company on behalf of a patient. Whenever a covered patient receives health care services from a doctor, specialist, hospital or other facility, the insurance company creates an EOB with complete information about the charges paid for the services provided, including:

- *Service Information* – Identifies the provider (hospital or other facility, doctor, specialist or clinic), dates of service and charges from the provider
- *Coverage Determination* – Summarizes the total deductions, charges not covered by the plan, and the amount the patient may owe the provider.
- *Benefit Payment Information* – Indicates who was paid, how much and when.
- *Other information* – Can include multiple claims finalized within a certain time frame, for both the insured and his/her dependents, which helps consolidate information from two or more provider services and helps track medical services for family members.

An explanation of benefits statement will also contain customer service contact information, in case there are questions about any of the data that it contains. Note that an EOB is not a bill in itself; rather, it delineates the parts of the bill that the insurance company that has already paid directly to the healthcare provider, and what part (if any) of the bill the patient is responsible for paying. It will also list adjustments, co-payments, disallowed charges and a number of other items. Later, when the doctor or hospital sends the actual bill, that bill can be compared with the EOB to make sure the amounts in question agree. In other words, it provides a means for the

patient to check the healthcare provider's bill to confirm the amount due before sending any payments.

Healthcare providers, like hospitals and physicians' practice groups, receive EOBs and RAs from insurance companies every day. Many of these documents contain information covering multiple patients, and can be more than 100 pages in length. This creates a laborious manual posting procedure, which is error-prone, and can also delay secondary billing by days, thus negatively affecting the healthcare provider's cash flow position.

To deal with the volumes of EOB documents often received by a single hospital, cashiers or clerks may be specially trained to manually post data directly into the organization's accounting system from EOBs using key-from-paper or key-from-image (KFI) procedures. If an image archiving system is used by the hospital, the EOBs are often scanned separately and manually indexed by personnel from another department. These manual procedures are extremely tedious and time consuming.

An experienced cashier or clerk must first read each document and locate the correct information for capture. While that person will eventually become knowledgeable about the document layout from each payer, human intelligence limitations make it very difficult for a knowledge worker to process any more than twenty pages of multi-patient information per hour. This page-per-hour limit is much lower than it would be than if the data were printed uniformly and consistently on each page using a predefined template. Multiple-formatted EOBs require a staff worker to be experienced with the specific format of each EOB form from each insurance company, and even then the format will vary from page to page, thus requiring the cashier to meticulously search each page for the necessary information. Hence, the differing page layouts of multiple-format, EOB documents are referred to as being *dynamic* or *unstructured*, as opposed to the *static*, highly *structured* layouts that result when all forms in a given batch are identically formatted.

Challenges in Automatic EOB Processing

Clearly, healthcare organizations could save an extraordinary amount of labor if the EOB data extraction process could be fully or even partially automated. Traditionally, OCR technology has been successful only when used within the context of a relatively small subset of business documents: forms *that are specifically designed to be recognized by a machine*. Character recognition performance on these documents is successful because the OCR software can be programmed in advance to extract the data from preformatted templates that help locate the data fields on the form document.

For this reason, an OCR software engine typically cannot extract data from *unstructured* or *dynamic* documents with arbitrary layouts that cannot be defined in advance through the use of a geometric overlays, or "templates." Since OCR and forms automation technology has come into general use, the need to overcome this limitation has caused users and vendors alike to dream about software technology that would enable end users to accurately extract content from documents, both structured and unstructured, without foreknowledge of the layout of the documents or the type of data they contain. Ideally, this *document understanding technology* would correctly identify and sort batches of both structured and unstructured documents on the fly, locate data fields in both kinds of documents, and then extract the desired content from those data fields.

An EOB statement is no ordinary document. Essentially, it is a big table with multiple columns of data that frequently span many pages. The number of data items within each column is indefinite; their vertical positions on a page are unpredictable. There may also be intrusions of summary data items sandwiched between consecutive patient accounts. Moreover, within a single column, several different data items may or may not be staggered vertically. In other words, it is highly unstructured. The statement's dynamic formatting makes it extremely difficult for an OCR system to correctly find the critical data elements on a given EOB statement that are needed for cash flow management and patient information processing.

The CereSoft Solution

Until recently it has not been possible to use traditional, template-based forms automation software to process dynamic EOB documents with consistent success. However, CereSoft has recently introduced EOBAgent™, an intelligent software system that uses unique *document understanding technology* to accurately locate and extract data from virtually any scanned EOB document. Now healthcare organizations can process virtually any EOB or RA statement received from insurance payers, regardless of the document layout. The CereSoft EOBAgent system will recognize EOB documents and extract the appropriate data items for further use, such as applying cash to patient accounts, entering data into denied claim systems, or preparing secondary billing statements. The validated information can be formatted as an EDI file and then automatically posted to the proper patient account using the organization's existing EDI, or cash posting process.

The CereSoft EOBAgent processing system is designed to provide a total processing solution. Functionality includes: sorting, batching, reading, editing, indexing, balancing and exporting the captured data so that the provider can eliminate the tedious task of data entry. The system is designed to extract specified data elements and integrate that data into the secondary billing and accounting systems. Implementing this system will dramatically reduce labor costs, increase accuracy, and provide an immediate return on investment.

Ensuring Data Recognition And Location Accuracy

The EOBAgent processing system possesses several unique software capabilities that enable it to accurately process EOB statements. The first involves locating and accurately recognizing the required data fields. For this, EOBAgent uses a proprietary OCR engine that is tightly integrated with intelligent document understanding technology to scan the page, discover the desired data fields, and then correctly recognize the characters in those data fields.

The second capability involves balancing the data to be posted. Because the data extracted from EOBs is often critical to the functioning and processing of other financial systems, any EOB processing system must have controls to validate data quality. The CereSoft EOBAgent system is equipped with numerous methods for checking and validating data while it is being captured, and uses various mathematical routines to balance the data. The system may be customized to fit the unique requirements of any installation.

Document recognition and data balancing is accomplished with the following features:

- *Intelligent scripting* - The system uses a preprogrammed, *intelligent script* to instruct the software to find, read and export the required data. The instructions contained in the

script are derived from both the geometrical layout and the content of the document. The recognition engine will scan the entire document, search for particular data patterns and locate the correct items on the page. Correlations between different data fields and/or cross-validation between fields enables the successful location of a particular item. The system is also equipped with a proprietary word finding and validation algorithms that together ensure an extremely high recognition rate.

- *Internal data validation* – Because an EOB statement is a financial document, it is possible to use arithmetic crosschecking to internally validate the recognized data before posting it for use in other applications and systems. For example, the payment amount may be required to equal the amount billed after the co-payment. The total payment could be equal to the sum of payments from every line item within each account. Deductible, co-insurance, and disallowed items might have to be subtracted out from the sum total. Retrieving the data created at the time the billing was performed, as well as accessing the patient account database and other items, can be used to perform other data validation routines.
- *External data validation* - In addition to the internal arithmetic crosschecking and balancing, external data validation from external databases can be employed. In most cases, the information on an EOB also exists in some other document within the healthcare organization, such as a medical claim or a patient billing record database. The CereSoft EOB Processing System is designed to easily interface with external databases in a real-time environment and to validate predesignated fields at the time of recognition — two features that dramatically raise OCR accuracy.

Using both internal and external validation modes reduce the need for operator intervention, hence reducing labor costs, reducing turnaround time, and speeding up the posting process.

Perfecting OCR results

Once the recognition process is completed, the captured data is written into a *result file*. *Result files* can be opened with a *Review & Balancing* module to view the images and character recognition results. The system supervisor can then release the batch to the person(s) who will review the errors or the ambiguous characters.

The statistics and history of each batch of work are maintained by the system on a user, batch and field analyses basis and are recorded in the result file. This record includes the name of the operators who accessed the file, the time of checking in and checking out, the number of changes made, and the name of the workstation used.

A cash posting operation may have any number of people assigned to the verification task, depending on the volume of the receipts or the time constraints for posting. The EOBAgent system is designed to be scalable, so there is no limit to the number of edit and correction personnel that may be assigned to perform the work. As part of the edit and correction process, the system *checks for missing data*, ignores *non-critical* fields, and attempts to reconstruct data from fields designated as *critical*. Finally, at the end of the edit and correction process, a batch balancing process is carried out.

After EOB data is edited, corrected and balanced, the next and final step in EOB processing is to export the extracted data and images that have been indexed. In most cases the information extracted from the form is used in another system such as secondary billing or denied claim system. If the provider is using an image management system as an archive, indexed information from the document can be supplied to the image database so the documents may be retrieved electronically.

Integrated Workflow Management

At the core of any large-scale document and data processing system is the workflow module that enables an administrator to monitor and manage those images, extracted data, participating hardware units, software modules, and working personnel that comprise the EOB work process. The **CereSoft Manager™** workflow module, that is part of the CereSoft EOBAgent processing system, rigorously audits and tightly controls the document imaging and data capture process. Every single or multi-page document entered into the system is closely tracked by the CereSoft Manager module, which records the document's current status, whether it has been through the recognition, verification, or data export process, or whether it is being treated as a reject and needs exception handling. Every data element is tracked, so you know whether it has been read by a recognition engine, validated with database tables, or has been book marked and needs operator intervention. Every recognition station's status is monitored to check if it is running, out of service, or is experiencing internal or network problems. Every key entry activity is tracked, authorization is checked along with the worker's role and associated rights, as well as productivity, workload, and other relevant data.

In short, the CereSoft Manager workflow module allows administrative personnel total management and control over all steps in the EOB work process. All documents are traceable even if there is a system failure. A Microsoft Transaction Server and database are utilized to implement and record all transactions in order to guarantee 100% data integrity.

In a large volume situation, processing is conducted on multiple workstations over a LAN. The CereSoft Manager module can coordinate the workload on every station on the network. The Microsoft Transaction Server serves as the communication center that links the recognition and verification stations with the database that will record all transactions that have taken place during EOB processing. A supervisor can monitor the process by observing the status report of all workstations and files and modify the work process accordingly.

Deploying the CereSoft EOBAgent™ System

CereSoft provides all necessary installation and training assistance that is required to successfully deploy the CereSoft EOBAgent™ processing system. Experienced CereSoft engineers build and install the document script that employs the sophisticated CereSoft recognition technology. After an extensive survey by one of CereSoft's field engineers, the customer will develop and test each script thoroughly. Additionally, CereSoft will install the system and train your staff on location.

Telephone and Web support is available on all regular business days. In order to enable remote, rapid response to any problems that arise, CereSoft's customer support department

requires that the system at the customer site be equipped with a modem and the Norton software program, *PC Anywhere*.

Summary Of CereSoft EOBAgent™ Business Benefits

By improving the speed and efficiency at which a company captures and processes patient benefit information, CereSoft EOBAgent can produce measurable benefits at every level of the healthcare organization: departmental, line of business, and enterprise. The benefits resulting from EOBAgent encompass additional revenues as well as savings from reduced costs.

Hard-dollar benefits from EOBAgent bring immediate savings to an organization's bottom line. They include:

- *Labor savings* – reduced need for data entry operators; document prep workers, sorters, etc., through increased accuracy of data extraction from EOBs and less labor spent on error correction.
- *Reduced operating costs* – fewer workstations, less office space, less coffee consumed, less water used in rest rooms, etc., due to staff reduction.
- *Improved cash management* – faster, more accurate generation of critical payment data and outgoing invoices makes money available faster to insurance companies and healthcare organizations, with fewer delays due to fewer errors.
- *Rapid return on investment* — on high volume systems, payback on CereSoft EOBAgent is less than a year due to savings from above.

Soft-dollar benefits from CereSoft EOBAgent are measurable but become visible only when EOBAgent™ changes the work process. Thus, they must be measured on a departmental level and beyond. Soft-dollar benefits include:

- *Increased worker productivity* - more EOBs are processed in a shorter time.
- *Truncated business cycles from increased throughput* - Other healthcare management process dependent on content extraction from EOB documents are shortened. This in turn, positively affects other processes that are dependent on it.
- *Improved customer service* – faster and more accurate EOB processing means that more customers get served more rapidly, with fewer payment errors.
- *Better records control* - EOBAgent has quality controls that improve accuracy and enable precise, rapid access to stored data that is extracted from EOBs.
- *Improved employee morale* – typically, retained workers are used in a higher skill capacity in the EOB process, which increases their self-esteem and leads to higher quality work.
- *Fewer Employee physical health hazards* – reduced data entry labor requirements mean fewer incidents of carpal tunnel syndrome, repetitive stress syndrome, and arthritis.

Strategic benefits originate from EOB work process improvement; therefore they are measured on an enterprise-wide basis. These benefits are long-term rather than short-term, and are measured yearly rather than quarterly. Their effects become rapidly apparent because they transform the nature of the business itself. Strategic benefits can include:

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- *Preserve/increase market share* – Improved productivity, business processes, and customer service allows healthcare organizations and insurance companies to react faster to changing market dynamics and more effectively maintain or grow market share.
- *Better budget management* – faster access to more accurate payment data means increased control over billing and accounting processes, which leads to better overall budget management.
- *More efficient allocation and management of healthcare resources* – Reduced business cycle time, plus improvements in business processes and knowledge acquisition, enable management to better track, audit, allocate and manage healthcare resources.

EOBAgent's robust OCR and document understanding capabilities enable it to automate the data entry, data validation, and post-processing of EOB statements. Automating EOB processing not only frees employees from routine work such as sorting, document prep and data entry, it also increases the speed and accuracy of information accessed by knowledge workers. This in turn, lets staff members spend more time on value-added activities, like providing better patient care and improving customer service.

By automating EOB document processing, *CereSoft* raises the bar on extracting data from unstructured or dynamic documents and introduces a new standard of content management to the healthcare industry. The *CereSoft EOBAgent* solution enables an insurance company or healthcare organization to serve customers with unprecedented quality, while also improving the organization's cash position.

About the Author



Arthur Gingrande is a founding partner of IMERGE Consulting (www.imergeconsult.com) in Lexington, Massachusetts, an independently owned consulting firm dedicated specializing in document management, imaging, workflow, OCR/OCR and COLD technologies. From a national perspective, he is considered one of a handful of qualified experts in image-based, intelligent character recognition (OCR), electronic forms and forms automation.

He was one of the original founders in 1988 of Symbus Technology, one of the first neural network-based, OCR development firms. He is also the former director of marketing and business development for Nestor (Providence, RI), one of America's most prominent neural network software development companies. Over the course of various consulting assignments, Mr. Gingrande has written the marketing and/or business plans for four of the leading software development firms in image capture and automated forms processing, which collectively make up 80% of the market. He has also assisted in writing four patents in the areas of intelligent check recognition, ATM-based direct payment systems, and smart cards.

Since 1991, over 200 of Mr. Gingrande's articles have been published in various trade periodicals such as *KM World*, *e-Doc*, *Business Solutions*, *Integrated Solutions*, *Imaging Business*, *Imaging and Document Solutions*, *VAR Business*, *Service Bureau News*, *Transform and Imaging World*. The topics of these articles have included workflow, document management, electronic imaging, COLD/ERM, OCR/ OCR, e-forms, e-business, CRM, relationship management, smart card technology, wireless communications, content management, and fiber optics technology. He has also written numerous white papers on those subjects, including research reports for Dataquest, Advanced Technology Group, and BIS CAP (now known as GIGA Information Group).

Mr. Gingrande is the editor and publisher of *Contemplor*, a newsletter dedicated to document management and forms automation technology. Over his career, he has participated in scores of industry conventions and business conferences as a coordinator, guest speaker, panelist, and industry commentator, given by trade organizations such as TAWPI, AIIM, and ARMA (the American Records Management Association).

He wrote the AIIM-published, definitive work on forms processing entitled *Forms Automation: from OCR to e-Forms to the Internet*. Other works of his include the AIIM book, *Technology Convergence, e-Commerce, and Document Management*, and the AIIM white papers, *Enterprise Application Integration: Connecting the new frontier with the Old*, and *Using Collaboration Software to Enable and Add Value to Group Business Interactions*. He also wrote the TAWPI handbook, *Cost-Justifying an OCR Solution*.

Mr. Gingrande can be contacted by email at arthur@imergeconsult.com, by business telephone at 781-258-8181, or by fax at 208-246-5830.