Paving the Way for a Smooth and Successful Integration of Your EDI and SAP Systems

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(complete bio appears on page 97)

SAP professionals would have to have their heads buried in the sand to miss the recurring e-commerce messages that dominate current headlines, driving home the notion that e-commerce is absolutely essential to an organization's competitive standing, delivery of enhanced services, reduced costs, and its ability to operate in a global marketplace. And for many of you, e-commerce is not just a headline. It is an initiative that you are, or will soon be, asked to support.

Because EDI factors in to so many e-commerce scenarios, understanding the basic tenets of this technology, what capabilities an in-house EDI subsystem needs to provide and how best to implement it in order to achieve a smooth and successful integration with your SAP system is critical. These are the topics that I will cover in this article.

EDI Sensitivity Training

More often than not, I find that an organization's EDI and SAP teams do not have occasion to work together. The result is that SAP teams do not have a working knowledge of the in-house EDI subsystem, and the EDI folks do not have a working knowledge of the organization's SAP system. If your organization fits this profile, I urge you to read this overview, particularly in light of the fact that tight integration between these two worlds is fundamental to many e-commerce applications.

EDI defines a standard format for data exchange that is readable by

both sender and receiver. Today it is widely used for the automated exchange of business documents (such as purchase orders and invoices) between enterprises.

Figure 1 represents a very simple, traditional EDI scenario where:

1. Company A generates a purchase order from its SAP R/3 system, and the order IDoc is sent to the EDI translation system.

2. The EDI translation software converts the IDoc to an EDI document.[1]

3. Communication services send the resulting EDI document via a network service to the target trading partner, Company B.

4. Using a communication service is similar to having a post office box. When data is sent from Company A to its trading partner, Company B, the file is delivered to Company B's mailbox. Depending on the network and communication service provider, the mailbox can be configured to automatically forward the EDI document to Company B's EDI subsystem, where it will trigger EDI translation.

5. The EDI document is converted into an application file format that is compatible with Company B's internal application system. Upon receipt of that file, Company B's system may generate an invoice to be translated and sent back across the network service to Company A.

Of course network services are not the only way for trading partners to exchange data. It is common for partners to exchange EDI documents over direct connections, proprietary communications, FTP, TCP/IP, etc. It is important to recognize that EDI translation (conversion) is one process, and the communications piece is another. All participants require both the EDI translation software and a communication service[2] (i.e., a file transfer method). You do not have to establish these processes in-house. You can contract with an EDI service provider to perform these activities on your behalf.

What is the role of the SAP professional in all this? For starters, an SAP professional (typically a developer) is often the one who is responsible for getting the R/3 IDoc file to the EDI subsystem, and for getting the IDoc status files into the R/3 system. I will spend a lot more time discussing the SAP team's involvement once we get past this basic EDI overview.

Standards

EDI is comprised of public and industry-specific standards. The public-approved standard formats are:

- American National Standards Institute (ANSI) Accredited Standards Committee (ASC) — ANSI ASC X12 for American standards. Industry subsets of the ASC X12 Standard include AIAG, UCS, WINS, VICS, EIDX, CIDX, and PIDX.

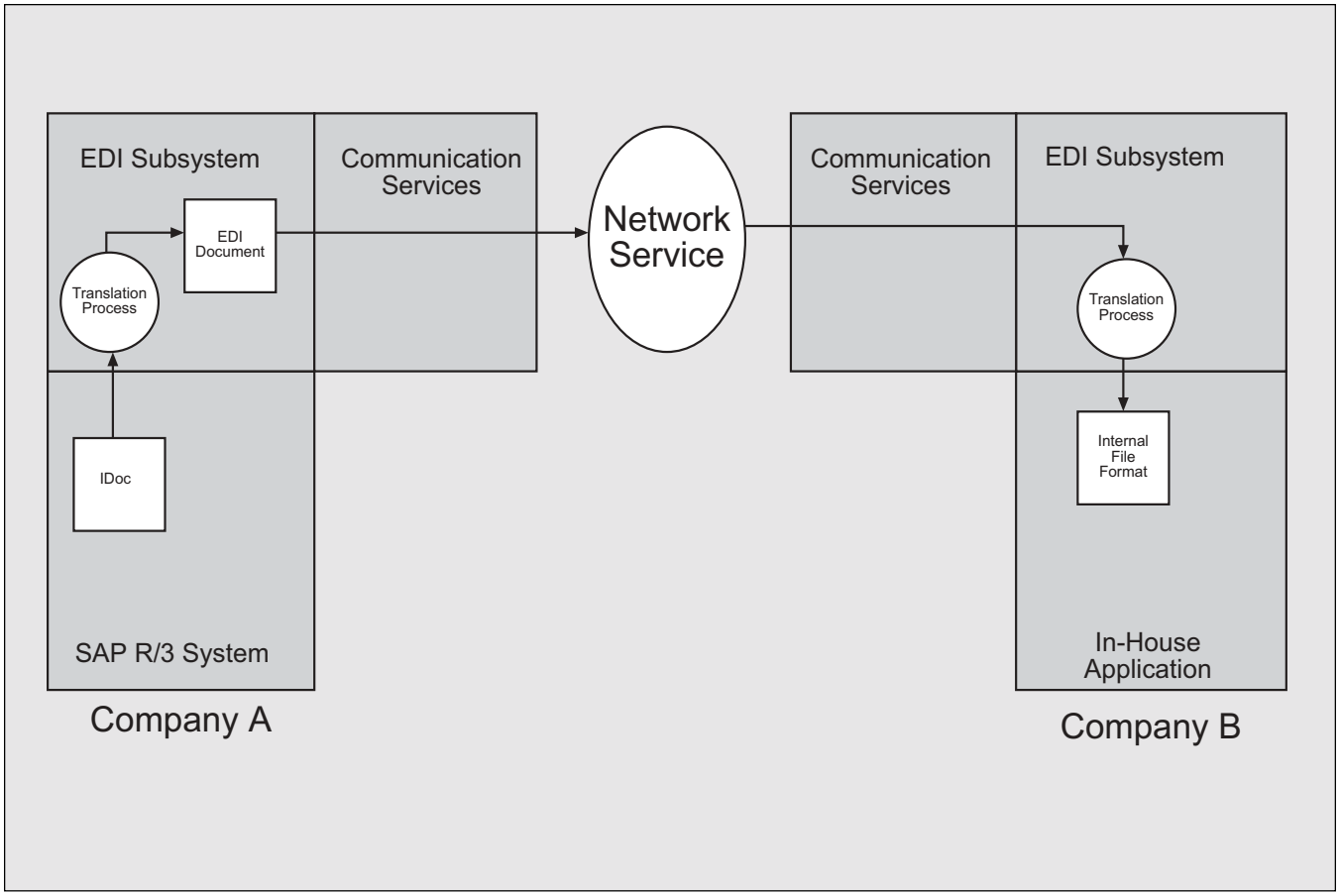
- United Nations/Electronic Data Interchange for Administration, Commerce and Transport — UN/EDIFACT for International standards, which are developed under the auspices of the United Nations. Industry subsets of the UN/EDIFACT Standard include ODETTE, EDIFICE, EIAJ, and EDICON.

Just to give you a feel for the depth and breadth of these standards, the current version of ASC X12 is version 4, release 2, subrelease 2, and it defines 306 documents. The current version of UN/EDIFACT is 99A, and it defines 170 documents.

[1] When the EDI subsystem is triggered by a script, program, or job scheduler, it will read the IDoc file and begin the conversion from IDoc to EDI format.

[2] Companies offering communication services usually require communication software packages that link to their network service. Most major network service providers link or interconnect to other network services. This network service interconnection allows you and your trading partner to select the communication service of choice. Some network service providers also provide Internet solutions that utilize translation software. (IBM offers Forms Exchange and in-network translation services.)

Figure 1 *A Simple, Traditional EDI Scenario*



Embedded within EDI standards are acknowledgments that enable the tracking of an EDI document from the time it is generated up until the point where the document is actually being used by the trading partner. These acknowledgments include **X12 transaction set 997** and **UN/EDIFACT message CONTRL**.

The terms "transaction set" and "message" are EDI terms used to reference an EDI document. For example, a purchase order in SAP may be "ORDERS01 IDOC," which has an EDI document "850 transaction set" in X12, and an "ORDERS message" in UN/EDIFACT.

The **Application Advice transaction set 820**, and **Purchase Order acknowledgment transaction set 855** used in ASC X12 standards are additional EDI documents that you are likely to encounter.

These acknowledgments indicate receipt of an EDI document, and ensure the document is compliant based on the standard syntax.

SAP provides an interface for the EDI subsystem to report the status of the IDoc, starting with its conversion to an EDI document on up to its receipt by your trading partner. IBM, along with other vendors who offer SAP-certified translation software, leverages this interface to produce SAP status records for the outbound EDI process and the 997 acknowledgment reconciliation.

The SAP status records complete the workflow

and serve as an audit trail that links the SAP workflow with the EDI process. The status codes (listed in **Figure 2**) that are generated by this interface include the types of functional acknowledgments described above.

Figure 2 Status Codes Generated by the SAP Interface to the EDI Subsystem

```
04 Error within control information of EDI
   subsystem
05 Error during translation process
06 Translation successful
09 Error during interchange handling
10 Interchange handling successful
11 Error during dispatch
12 Dispatch successful
16 Functional Acknowledgment positive
17 Functional Acknowledgment negative
22 Dispatch successful, acknowledgment still
   due
```

A quick visit back to our friends at Company A will give you a sense of how these controls support an EDI scenario. Company A generates a purchase order from its SAP R/3 system. The purchase order is translated by the EDI subsystem to a standard format or EDI document X12 850 transaction set. The resulting EDI document is sent to the trading partner, Company B.

When Company B receives the EDI document, its EDI translation process translates the document to Company B's internal application file layout. The translation process automatically generates an acknowledgment X12 997 transaction set, which is immediately sent back to Company A. Company B sends the application file to its application for processing — this may generate application data to be translated to an X12 855 transaction set, for purchase order acknowledgment, and to be sent back to Company A.

If Company A is using the SAP status codes that are produced by its EDI subsystem, the status of the SAP IDoc through the translation process is updated — first **code 6** (translated sucessfully); then **code 10** (interchange handling successful); followed by **code 22** (dispatched sucessfully, acknowledgment still due).

After the EDI document 850 has been successfully sent to the trading partner, the SAP status code is **code 22**. When the EDI document 997 is sent by the trading partner to Company A, the SAP status is updated either to **code 16** (functional acknowledgment positive), indicating the EDI document passed standard compliance rules in the trading partner's EDI subsystem, or **code 17** (functional acknowledgment negative), indicating the EDI document did not pass standard compliance rules).

The SAP status records generated by Company A's EDI subsystem are processed by the SAP R/3 system and placed in the workflow for the IDoc. The SAP user can display the original purchase order IDoc with the SAP status records that identify where the document is in the EDI process.

What is the role of the SAP professional in this scenario? The SAP team and EDI team must work together with the trading partner(s) to determine which acknowledgments should be used. Far too many organizations do not take advantage of these acknowledgments because they are not well understood.

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At a minimum, I think every SAP/EDI scenario should track the document through the translation process. When evaluating an EDI subsystem, it is important to determine what type of acknowledgments are available, because the feedback they deliver can significantly reduce the time it takes to integrate your SAP and EDI systems, and will enable you to enhance your system design with less programming effort.

Another critical element to look for when evaluating an EDI subsystem is security. ASC X12 also has a detailed and comprehensive standardization of security measures for encryption, authentication, and digital signatures. These standards are supported at multiple levels (both document and functional group) and are interoperable between vendor solutions. As defined, they can coexist with other technologies such as e-mail and HTTP. (I will provide more detail about EDI subsystem evaluation criteria in the next section.)

Let me wrap up this standards discussion by offering you a look at an excerpt from an EDI document. Most of you know what an IDoc file looks like. **Figure 3** shows you an ORDERS01 IDoc and its EDI equivalent.

The EDI document shown here is the result of a translation from an SAP R/3 IDoc ORDERS01 to the UN/EDIFACT message ORDERS. As you can see, the EDI document is completely reformatted in a specific syntax. Comparing the two files, you can find the IDoc data in the EDI data. For example, the order number in the IDoc record E2EDK02 maps to the RFF segment in the EDI data. These recognizable IDoc fields are highlighted so that you can spot them easily.

Figure 3 "ORDERS01" IDoc and Its EDI Equivalent

```
ORDERS01 Idoc:
EDI_DC40  5000000000000015633940A 3013  ORDERS01
E2EDK01003          500000000000015633900000100000001    DEM   1.00000
E2EDK14             500000000000015633900000200000000020141000
E2EDK14             500000000000015633900000300000002009001
E2EDK14             500000000000015633900000400000002013NB
E2EDK14             500000000000015633900000500000000020111000
E2EDK03             500000000000015633900000600000000201219980618
E2EDK03             500000000000015633900000700000000201119980618
E2EDKA1002          500000000000015633900000800000002AG  IDOC-KU-01
E2EDKA1002          500000000000015633900000900000002LF  IDOC-LI-01
E2EDKA1002          500000000000015633900001000000002WE
E2EDK02             500000000000015633900001100000000200145000005029
E2EDK17             500000000000015633900001200000002001CIFGterbahnho
E2EDK18             500000000000015633900001300000000200114      3.000
E2EDK18             500000000000015633900001400000000200230      2.000
E2EDK18             500000000000015633900001500000000200345
E2EDP01003          500000000000015633900001600000000200010    0 17.000
E2EDP20             500000000000015633900001700001603l7.000         17
E2EDP19001          500000000000015633900001800001603002IDOC-MAT
E2EDP19001          500000000000015633900001900001603001IDOC-MAT
E2EDP19001          500000000000015633900002000001603004
E2EDP17001          500000000000015633900002100001603001CFRBahnhof  Gvt
E2EDS01             500000000000015633900002200000000020022268.65
```

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Figure 3 (continued)

```
EDI Data:
UNA:+.? '
UNB+UNOA:4+IDOC-KU-01TEST:ZZ+IDOC-LI-01:ZZ+19990930:1
UNG+ORDERS+SAPMAT+SUBSYSTEM+19990930:1723+146+UN+1:0'
UNH+168+ORDERS: : : : '
BGM+NB+4500005029'
DTM+012:19980618:102'
DTM+011:19980618:102'
RFF+001:4500005029'
DTM+179:19980618:102'
NAD+BY+IDOC-KU-01'
CTA+PD+:Dietl,B.'
COM+069/5511:TE'
CTA+OC+1000:IDES Germany'
CTA+ZZ+001'
NAD+ST+++Werk Berlin++Berlin++13156+DE'
CUX+DEM:::1'
TOD+6++CIF:::Gterbahnhof Gvttingen'
LIN+10'
PIA+5+IDOC-MAT:002'
MEA+AAI++KGM:25.5'
QTY+21:17:PCE'
MOA+146:133.45'
TOD+001++CFR:::Bahnhof Gvttingen'
MOA+002:2268.65::DEM'
UNT+42+168'
UNE+1+146'
UNZ+1+147'
```

Evaluating an EDI Subsystem

First and foremost, EDI translation software has to be able to read things like an SAP orders IDoc, convert the IDoc to a standard format, and then address the resulting EDI document. Yes, addressing the EDI document is a function of the EDI translation software! It works like mailing a letter. There is a sender and receiver address in the EDI document. Most communication services open the file and perform validations on the data to ensure the file is complete and to determine where the file should be delivered. Obviously, the translation software needs to be able to function in the reverse direction too, reading inbound EDI data and converting that data to an SAP-comprehensible format. But this represents the *minimal* functionality you should expect from an EDI subsystem.

Translation software that is rich in functionality can do a lot more than just convert data to or from the EDI subsystem. It can also:

- Provide data that is required by the trading partner, but which is not present in the application data, and/or vice versa. This is usually something that is constant and is not in the SAP IDoc data — for example, system date and time, a mailing address, or an identification number.

- Provide sophisticated processing capabilities. This can reduce additional programming at

the application level. Examples of this include: field validation, rounding of dollar amounts, multi-threaded processing, and IDoc file generation by IDoc type and trading partner.

- Provide security-rich features such as database security that restrict authorization to change the EDI setup.
- Track the status of an SAP document through the EDI translation processing steps, and generate SAP status records to be sent back to the SAP system to make appropriate updates to the SAP workflow. My strong recommendation here is that you go with a solution that has been certified by SAP, and makes use of the interface SAP devised for the R/3 system to enable an EDI subsystem to report status information for the EDI process back to R/3.
- Provide the necessary functions to map a particular SAP IDoc record and field to a particular segment and data element in the standard. Many functions are available to make this process easier — for example, date conversions, splitting one SAP IDoc file to create two fields in the standard, rounding, programming logic, etc.
- Provide error processing. For instance: Can the data file be corrected and reprocessed? What kinds of errors are reported? Does the SAP status reflect errors?
- Provide audit reports for EDI document tracking, SAP status tracking, reporting, and statistics. Oftentimes, audit reports can be customized and even consolidated with SAP reports.

I cannot determine which of these features will be required to support your organization's particular e-commerce activites.

I suggest that you form an EDI team,[3] drawing upon the following pool of expertise for this purpose:

- **EDI coordinator:** Coordinates all EDI initiatives, software evaluation, trading partner agreements/ contacts, and implementation status. This individual should have people and project management skills, know the EDI implementation process, and have knowledge of EDI standards.
- **EDI mapper:** Understands standards and compliance issues. This individual should understand the EDI translation and/or communication software setup. SAP knowledge is a plus. Note that the EDI mapper will work with programmers and the SAP team to test mapping functions and the overall integration process.
- **Programmers:** Need to write the necessary programs, scripts, etc. to automate the processing.
- **SAP technical contact:** Needs knowledge of SAP interfaces to automate the processing.
- **SAP application contact:** Needs knowledge of SAP IDoc record and field layouts, and the data contained within.

Once the team has identified the features you require of an EDI solution, the next step is to elicit product details from EDI systems vendors so that you can evaluate their offerings relative to your requirements. This requires both application and EDI knowledge, and is a joint effort for both the SAP and EDI teams. (If you are re-evaluating your current solution, information should be available in-house.) The best way to garner product and services details is with a comprehensive questionnaire, like the one shown in **Figure 4**. These are the types of questions customers bring to us at IBM when they evaluate our EDI offerings. Note that I have highlighted and annotated the questions that represent the areas that are most likely to impact your SAP/EDI integration efforts. These are areas where an SAP team should exercise its influence to help ensure a smooth and successful integration of an organization's SAP and EDI systems.

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[3] An outside EDI consultant can be extremely helpful to a newly formed EDI team, and can assist in EDI education, as well as all other areas of your EDI integration.

Figure 4 Questionnaire for Evaluating an EDI Translation System

Product Overview:

- Provide release history.
- Specify major enhancements planned for next year. – – – – *Look for SAP-specific enhancements.*
- Who developed this product originally?

Product Advantages*:

- List any other information that could differentiate you from your competitors. – – – – *Need to look for things like the SAP interface, system performance, etc.*

Architecture:

- Does the product run entirely on one platform?
- What operating system(s) does the software run under?
- What are the minimum hardware and software requirements? – – – – *May require more programming effort on both SAP and EDI teams or new skills.*
- What are the product DASD requirements?
- In what environment does the interactive component run (e.g., CICS, IMS)?
- Are all variable parameters (e.g., partner profiles, message standard tables, mapping specifications) stored in tables?
- How are partner profiles, standards tables, data mapping, etc. maintained?
- Where are these tables stored?
- What database/access method is used for table files?
- What limits exist on the number of entries in each table?
- How does the system handle empty input files? – – – – *May require more programming to handle empty files.*
- What standard guidelines are used for product development?
- Under what circumstances is additional programming required? – – – – *The SAP team could have the programming skills.*
- Does the system provide a facility for on-line data entry of transaction data?
- How are test and production environments established?

EDI Standards Support:

- What is your involvement in the national, international, and industry-specific standards committees?
- What standards and releases are supported?
- In what form are new standards supplied to the customer?
- Does the user get all transactions in each standard?
- Can the user specify which transactions are to be installed for a particular release?
- If so, how is this done?
- How does the user install new standards?
- How soon after publication are new standards tables supplied to the customer?
- Which industry implementation guidelines are supported (e.g., AIAG, VICS), and how are they supported?
- How many standards versions can be used in the system at one time?
- Are draft standards supported (e.g., versions from X12 working meetings)?
- Are proprietary standards using X12 syntax supported?
- Are proprietary standards using a proprietary syntax supported?
- Can the user build and maintain proprietary transactions?
- Can the user display standards tables?
- Can the user modify standards supplied by the vendor?
- Will the vendor provide modified standards on request?

** Performance and platform should be considered during the evaluation if you are expecting large volumes of processing. IBM recently announced the forthcoming availability of the S/390 Parallel Enterprise Server. This is particularly significant for companies seeking higher throughput and performance with a simplified R/3 implementation. The powerful new hardware platform can be used to create an R/3 critical application server.*

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Figure 4 (continued)

Processing Options:

- What are the details of the network service interface? — *The SAP team may need to know how the network service interface works.*
- What processing options are available?
- What concurrent processing options are available?
- Is processing ongoing and triggered by presence of a transaction in a real-time environment? — *The SAP team may be responsible for triggering the EDI subsystem.*
- How does the software provide the ability to specify the processing of any transaction?
- Can translation, enveloping, and transmission be executed in separate steps?

Translation Capability:

- What compliance checking is done on inbound EDI data?
- What version/release validations are performed?
- How are errors in the envelopes handled?
- How are multiple documents supported in a single ISA (e.g., an ISA contains 856, 810, and 820 transaction sets for a single trading partner)? — *Since an ISA can contain multiple EDI document types (e.g., purchase orders, purchase order acknowledgments, invoices, etc.), the SAP team will need to provide information on how the different SAP IDocs are handled in SAP to ensure the EDI subsystem processing works with the SAP system.*
- What control does the user have in grouping transactions for a specified trading partner?
- How are errors in the EDI data handled?
- Does the product have the ability to retranslate sent and received data without retransmission? — *These could affect the system design and implementation on both SAP and EDI teams.*
- How is this accomplished?
- Which of the following X12 envelope contents are checked against trading partner profiles?
- Are variable interchange envelopes available by trading partner?
- Are delimiters in inbound EDI transmissions dynamically determined from the incoming data?
- What type of EDI transmission files can the system receive/produce?
- Can a transaction be loaded manually rather than loaded electronically?
- Can the system split outbound EDI data into separate files? How?
- Can the system split inbound application data into separate files? How? — *This could be a requirement for SAP processing.*
- How does the system determine whether an outbound transaction is test or production? — *This could affect SAP and EDI processing.*
- How does the system determine whether an inbound transaction is test or production?
- Does splitting take place in separate runs or can all split files be produced in one run?
- What interfaces are supplied for specific network services?
- Does the system create all control segments automatically for outbound EDI data?
- Is this done at the trading partner level?
- Does the system get all the data for control segments from tables (rather than user applications)? — *SAP does not supply this information, so this needs to be a function of the EDI system.*
- How does the user application identify the partner to the translation software in the interface file? — *The SAP identification is not necessarily the EDI identification for the trading partner.*
- Can the system use this value to look up who the EDI partner is?
- Can the translation software map multiple application values to one EDI partner?
- Can the system separate transactions with errors into a suspense file?
- If so, does the system provide a means of reprocessing the data?

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Figure 4 (continued)

Trading Partner Information:

- List processing options that may be specified for each combination of partner and transaction.
- Can the user interactively query the partner profile?
- Can the user print trading partner information?
- Can the user control which profiles appear on the report and in which sequence they appear?
- Can new partner profiles be created from existing or model profiles?
- Can the user specify, by partner, which transactions are to be rejected/accepted?
- Can the user specify, by partner, which transactions are to be sent?
- How are trading partners defined to use multiple versions/releases of the standard or releases of the same document?
- How does the system route documents internally?

Mapping Functions:

- Does the system provide interactive maintenance for:
  - User application file definitions?
  - Data mapping?
  - Code validation tables?
  - EDI message standards tables?
  - Code conversion tables?
- How is the EDI code conversion to/from the SAP qualifier code values accomplished?
- Can the list of code values be defined based on a user-defined condition?
- Can multiple code conversion and validation tables be used based on a user-specified condition?

SAP qualifier codes are not used in the EDI data and must be converted to EDI codes.

- What are the capabilities for mapping one specific application file definition to EDI transaction sets?
- Does the system provide the ability to map a specific EDI transaction to a specific user application file definition?
- Are these mapping specifications stored separately from the EDI message standards tables?
- Can the user implement one map to be used by three partners and then implement a modified map for the same transaction with two other partners?
- Can the user copy an existing map and use it as the basis for creating a new map?
- Can the user copy an existing map to a new version/release of the standard, and map new segments/data elements in the new standard transaction?
- What types of user application files does the system support?

The EDI subsystem produces application data as required by the SAP system.

- Can the user map a single user application file to multiple transaction types?
- Can the user map a single user application file to multiple versions of the same transaction?
- What restrictions or requirements are there on the order, sequence, or structure of data in the user application file for mapping?
- How is hierarchical data handled (e.g., mapping to 856, 811, etc.)?
- Does the system provide the ability to map application data for translation without any (COBOL) programming required?
- Can envelope (interchange/group) information be mapped? What fields?
- Can data mapping construct one output field/element from multiple input fields/elements?
- Can data mapping construct multiple output fields/elements from one input field/element?

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Figure 4 (continued)

- Can these functions be used in combinations?
- Can calls to user exits be called based on a user-defined condition?
- Is there a user exit facility in the mapping process?
- At what level can this be called (e.g., segment, element, transaction)?
- What functions must a user do in an exit program, and what typical uses would there be for user exits?
- Can calls to user exits be called based on a user-defined condition?
- What languages are supported for the user exits?

The SAP team may be doing the "user exit" programming.

Error Processing:

- How many different error messages can the system produce?
- How many of these are documented with recommended actions to be taken?
- Are transactions with errors passed through the system or rejected?
- If transactions are rejected can they be written to a suspense file?
- Can transactions be reprocessed from the suspense file?
- Can transactions in the suspense file be viewed on-line?
- How are errors in transactions reported to the user?
- Can a user set the level of acceptable errors by a trading partner?
- Can a user set an error condition based on conditions defined in the mapping?
- Can a user customize an error message based on a condition defined in the mapping?
- Can the user specify error rejection rules by:
  - Global basis?
  - Individual partner?
  - Individual transaction?
- Does the system include backup procedures?
- Does the system provide a built-in recovery system that ensures the integrity of system data sets in the event of a processing interruption?

This could affect SAP processing. Need to keep both systems in synch.

Audit functions:

- How is audit information stored in the system?
- What pieces of the audit information are optional?
- How is the audit information maintained?

The SAP team may be doing the integration, and this could affect system design and integration.

- Does the audit system log date, time, and status for transactions:
  - Received from application system?
  - Translated by system?
  - Sent to network service?
  - Delivered to partner mailbox by network service?
  - Picked up from mailbox by partner from network service?
  - Received from third party?
  - Translated by system?
  - Sent to application system?
- Does the system log which processes were executed and the return codes from the processes?
- Can the audit system be queried interactively?
- Does the system provide batch reporting from the audit system?
- How much flexibility does the user have in querying the audit system?
- How long is data kept in the audit system?
- How is data purged from the audit system?
- What options are available?
- What are the sequencing algorithms for interchange, group, and transaction control segments being sent?
- Are the sequencing algorithms selectable by trading partner?
- How does the system check for duplicate control numbers?
- Does the system check for duplicate transactions based on a user-defined control field?
- Is the product SAP-certified for EDI?

To ensure the SAP interface works correctly, SAP provides the certification for the EDI subsystem.

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Figure 4 (continued)

Acknowledgment Processing:

- Does the system track functional groups sent and which functional acknowledgments are expected?
- Can the user specify on a partner basis how long to wait for a functional acknowledgment before considering the functional acknowledgment overdue?
- Does the system match up received functional acknowledgments with functional groups previously sent?
- Is SAP status updated?
- What kind of reporting is provided?
- How are mismatches handled?
- Does the system update the status of previously sent documents to reflect their having been acknowledged?
- Does the system automatically create functional acknowledgments for received functional groups?
- Is the envelope information automatically generated from the inbound envelope?
- How is the type of functional acknowledgment to be created determined?
- How does the system respond in the functional acknowledgment to errors in received EDI data?
- How can this be overridden by the user?
- Can functional acknowledgments be turned off?

The SAP status can be updated to indicate whether functional acknowledgments have been received, and if so, whether they are positive or negative.

Security:

- Explain security-rich features provided for the software.
- What support is provided for encryption, authentication, and compression?

Communications Features:

- If the system includes communications, is it optional?
- What varieties of communications solutions can be used with the system?
- What is the interface between the software and the communications software?

This could affect SAP integration design for moving files in and out of SAP, and could be a solution to reduce programming effort.

Reporting:

- Is there formatted reporting of:
  - User application file definitions?
  - Message standards tables?
  - Data mapping?
  - Partner profiles?
  - Audit data?
  - Functional acknowledgments?
  - Pending functional acknowledgments?
  - Transaction images?
  - Transaction details?
  - Error processing?
- Can the user customize the selection of data for system reports?
- Does each report identify the date, time, and program that produced it?
- Can the user control the level of detail on processing reports?

Education*:

- What type of education do you provide?

Support Services:

- Describe your support services.
- Is outsourcing available?
- What type of installation support is available?
- What type of hot line support is available?
- What are the costs for this hot line support?

**After selecting and installing translation software and communication services, it is critical to get education on the software.*

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Figure 4 (continued)

- Where is the hot line support located?
- What is the availability of the hot line support?
- How are upgrades released/installed?
- How does installation of upgrades affect storage tables used by the EDI system?

Documentation:

- What documentation is provided with the software?
- How many copies of the documentation are provided?
- In what form(s) is the documentation available?
- Is help available in the interactive part of the system?
- Is help provided on the screen by pressing a "help key"?
- Is the help provided context-sensitive?
- Is the help specific to the field on the screen where you are located?
- Is there an interactive tutorial for the system?

Cost/Licensing:

- Can software be licensed?
- What is the term of the license?
- What use restrictions exist on the product?
- What type of warranty will the vendor provide?
- Is leasing available as an option?
- Is onsite software evaluation available?
- Will you train our staff during the evaluation period?
- Are there any costs associated with an evaluation?
- What are the costs to license the software?
- Is first-year maintenance included in these costs?
- What are costs for maintenance services?
- Are there costs for additional standards? If so, what are they?
- What other options and costs might the user incur?

Armed with answers to these questions, you can determine whether a vendor's solution (or your existing solution) is up to the e-commerce challenges that your organization will be tackling. If you are going to evaluate new systems, narrow the field down to just three or four qualified vendors, then ask the vendors to demonstrate their software. Ask for references. Ask questions. If a trial installation is offered by the vendor, take the time to install and evaluate the software firsthand.[4]

Implementing an EDI Subsystem with an Eye Toward SAP Integration

To begin the implementation process, the EDI and SAP teams need to determine which business processes are to be enabled with EDI. The steps are as follows:

1. The EDI team identifies the EDI documents, standard versions, acknowledgments, etc. that will be used for these processes. The SAP team should be involved in decisions on using acknowledgments as well as SAP status tracking. Say, for example, that my company purchases widgets from Widgets Inc., located in the US. I want to send my purchase orders and receive a purchase order acknowledgment via EDI. Since this is a US company, we would most likely use the X12 standard and document 850 for purchase orders, and document 855 for the purchase order acknowledgment.

[4] I have seen evaluation periods take as little as three months, while others, bogged down in corporate politics, have taken as long as 18 months!

2. The EDI team should notify internal personnel (like the SAP team and programmers) of their plans/timeline for the EDI implementation. From the SAP side of things, for example, there will be some programming involved to link the systems together.

   For instance, the SAP IDoc needs to be retrieved and placed where the EDI subsystem can process it, and the EDI subsystem must be triggered to read and process the SAP IDoc. Planning for these tasks affects all personnel involved, so you want to give all impacted people ample time to prepare for their specific tasks.

3. The EDI team should also be contacting trading partners and assessing which ones are already EDI-capable. For those that are EDI-capable, the EDI team should document the partners' standard versions and EDI documents, and also their communication service and contact information for the individuals who will play a role in the EDI implementation. The SAP team does not typically play a role in this step.

4. It is customary to have a trading partner agreement to identify and agree on the EDI project rollout. Here, the parties agree to such things as:

   - Standard documents, version, and release
   - How the EDI addressing will work
   - What communication or network service provider will be used, etc.
   - Document response times — for example, functional acknowledgments must be returned within one hour of receipt of a purchase order
   - Which standard segments, data elements, and qualifiers[5] will be used

   The best way to document standard segments, data elements, and qualifiers — the nuts and bolts that define how the sender and receiver communicate with one another — is with an *implementation guide*. An implementation guide basically sets the specifications for the EDI documents that each company will be sending. It describes where information is located in the EDI document. It may also describe where information is located in the SAP IDoc. If it does not, there should be a similar document to describe this.

   Figure 5 shows you a portion of a sample implementation guide for an outbound SAP purchase order's IDoc-to-EDI document data mapping. The first five lines serve as an introductory statement of principal points, such as the type of business document, the type of EDI document and IDoc, the trading partner SAP and EDI IDs, and the EDI delimiter information that is used in the EDI document to separate the EDI data (the EDI translation software uses these delimiters to parse through the EDI data). The actual data mapping for this implementation guide fragment is specified in four segments (**Beginning Segment**, **Currency**, **Reference Identification**, and **Name**), and is organized in seven columns, specifying how the IDoc segment records and fields map to the EDI segment data, as defined in the EDI standard:

   - **Position** — since a particular segment may appear in different sections of an EDI document, the position identifies segment position within the EDI document
   - **Segment ID** — the EDI segment identification
   - **Data Element ID** — the EDI field identification
   - **IDoc Data Element** — the SAP IDoc field identification
   - **IDoc Segment** — the SAP IDoc record identification
   - **EDI Qual or Description** — an EDI qualifier value, or a field description, for a particular EDI field
   - **SAP Qual or Comment** — an SAP qualifier value, or miscellaneous comment, for a particular SAP IDoc record or field

[5] A *qualifier* is a code that identifies the meaning of a particular value (like a PO number, invoice number, or customer number).

Figure 5 First Page of a Sample Implementation Guide

My Company's - Purchase Order
ASC X12 850: VERSION 4010 IDoc Type: ORDERS03, outbound

SAP Trading Partner ID: Record = EDI_DC, Field = RCVPRN, Value = 9990001014
EDI Trading Partner ID: Value = 0000001014

Delimeters: Segment Hex=5A=!, Data Element Hex=5C=*, Sub-element Hex=7A=:

Header:

Position	Segment ID	Data Element ID	IDoc Data Element	IDoc Segment	EDI Qual or Description	SAP Qual or Comment
Beginning Segment:						
20	BEG			E2EDK01		
	1	353	ACTIONK01		Transaction Set Purpose Code	DEFAULT VALUE 00
	2	92	BSARTK01		Purchase Order Type Code	DEFAULT VALUE NB
	3	324	BELNRK01		Purchase Order Number	
	5	373	CREDATDC	EDI_DC	Date	
	6	367	KZAZUK01	E2EDK01	Order Combination Ind	
Currency:						
40	CUR			E2EDK01		
	1	98			Entity Identifier Code	BY Buying Partner - Purchaser
	2	100	CURCYK01		Currency Code	DEFAULT VALUE USD
	3	280	WKURSK01		Exchange Rate	
Reference Identification: (LOOP to 9999)						
50	REF			E2EDK14		
	1	128	QUALFK14		Qualifier	
					YD Buyer Identification	009 purch. grp
					8M Originating Company	011 comp. code (Ship From)
					8X Transaction Category	013 purch. ord. type
					AB Acceptable Source Purch	014 purch org
	2	127	ORGIDK14		IDOC Organization	
Name:						
310	N1			E2EDKA1		
	1	98	PARVWKA1		Qualifier	
					SO Sold to party	AG Sold to party
					VN Vendor	LF Vendor
					ST Ship to party	WE Ship to party
					SF Ship from party	ZS Ship from party
					Z7 Mark-for party	ZZ Mark-for party
					CA Carrier	TF Carrier
	2	93	NAME1KA1		Partner Name 1	

The last two columns provide values (or explanations) for the SAP and EDI qualifiers as needed. Since a single SAP IDoc record can contain multiple types of data, to interpret the meaning of a given IDoc record value, qualifer code values are used. The SAP qualifiers are predefined (they are stored in the SAP R/3 system and are output in the SAP IDoc data file), and can be modified (changed or added) by the SAP team. Similarly, a single EDI segment can contain qualifying data elements, and to identify the meaning of a given data element, qualifier codes values (which are predefined in the EDI standard) are used. Since the SAP and EDI qualifier codes with equivalent meanings have different values, the SAP qualifier codes are converted to EDI qualifier codes by the EDI qualifier translation process.

As you see in the Name segment of the implementation guide fragment (in Figure 5), the E2EDKA1 record contains a set of SAP qualifier values, which are converted to the equivalent EDI standard qualifier values: AG to SO (Sold to party); LF to VN (Vendor); WE to ST (Ship to party); ZS to SF (Ship from party); ZZ to Z7 (Mark-for party); and TF to CA (Carrier).

Since the trading partner identification and qualifiers are different in SAP and EDI standard formats, developing these specifications requires extensive communication between the SAP and EDI teams. It is the job of the SAP and EDI teams to make sure that when the qualifier translation software sees an SAP qualifier code, it converts that code to the equivalent EDI qualifier code. So, if the SAP team modifies any qualifiers, it must communicate these modifications to the EDI team. Otherwise, the SAP qualifier code modification(s) will fail to convert to EDI code(s), causing an error in the qualifier translation process.

With these controls and security features, an implementation guide can specify concrete responsibility for the receipt and processing of the information contained within the EDI transactions. For example, "receipt" can be defined upon the generation of a positive acknowledgment such as X12 functional acknowledgment translation set 997, and "failure of receipt" can be defined by a negative acknowledgment 997 or lack of an acknowledgment. This removes the ambiguity of when or if a trading partner has received information, and imposes responsibility to act on that information.

I was involved in an implementation where I did not receive a complete list of the SAP qualifier values, which resulted in a failed translation because there was not a standard code setup for the missing qualifiers. This situation affected the translation setup and the implementation guide. It also affected the trading partner, who would receive a qualifier in the standard *not* found in the implementation guide. In the same implementation, there was a test and production SAP system with different partner IDs for the same partner. This too was not communicated and was only identified when the implementation reached the production cut-over, at which time translation failed again.

Having learned the hard way, let me offer the following advice:

✔ To members of the EDI team, I suggest that you follow standard defined rules such as mandatory segments, data elements, and standard-defined qualifiers.

✔ To members of the SAP team, I suggest that you provide correct and complete information to the EDI team. Remember that EDI is not a "turn-key" implementation.

✔ Both teams should review the partner agreement information and implementation guides to ensure that all information for the business process is provided in the EDI document. Do not lose sight of the fact that this can be a legally binding document.

✔ Both teams should expect modifications to the implementation guide!

5. Once a partner agreement and implementation guide are in place, you are ready to set up the EDI translation software and communication service. The SAP team will play an active role in this step. The R/3 IDoc and the standard document must be set up or mapped for the translation process. This involves defining the SAP IDoc record and field layout.

6. Both teams should test the implementation internally before you send any documents to a trading partner. You need to ensure that the translation software is set up correctly, based on the implementation guide, and you can provide test data for your trading partner to use at their end for internal testing.[6]

7. External testing follows. Both teams (the SAP team also needs to be involved in this step since there may be adjustments to the data needed for the trading partner) should allow plenty of time for testing. Specify precise start and end dates for the testing. Be prepared to make changes to your implementation guide and translation setup. Above all, make sure there are communication channels in place so that the trading partner(s) and the SAP and EDI teams can talk!

✔ Tip

Frequent and open *communication* is key to a successful test. One of my implementations made extensive use of e-mail for this purpose. When the document was sent from the SAP system, I received an e-mail. I checked for successful translation and communication and sent an e-mail to the trading partner and their EDI translation service provider contact.

When the EDI translation service provider received the EDI data, he sent an e-mail to the trading partner and myself. When the trading partner received and processed the document, he sent an e-mail to the translation service provider and myself, and I forwarded this e-mail to the SAP contact. We conducted weekly status meetings, both internal and external, with the trading partner to discuss problems and requirements concerning the SAP application and EDI data.

8. Production cut-over! Be sure to set up a production monitoring process for problem resolution such as communication and translation failure. The SAP team should be on hand for the problem resolution or SAP status monitoring.

Changes in SAP Require Changes to the EDI Setup!

Changes in SAP most likely will result in changes to the EDI setup, which may or may not affect your trading partners. For example, a change in SAP for trading partner identification will affect the EDI setup, but may not affect the trading partner identification in the EDI document, and does not affect the trading partner. In a production SAP system, it is possible to change the SAP trading partner ID, but not the EDI trading partner ID.[7] In this case, the trading partner will continue to receive the same data and does not need to be made aware of the change.

On the other hand, a new qualifier, record, or field may be added in SAP. If the new information is also added to the EDI document, this will affect the trading partner (who will be receiving new data) and

[6] Depending on your selected communication service, it may also be possible to send and receive the EDI data using your mailboxes to test the communication software.

[7] To change the EDI trading partner ID would require changing the EDI subsystem setup for the trading partner ID.

Figure 6 SAP/EDI Change Request Form

SAP/EDI Change Request Form

Change description: _____
_____
_____

Test date: _____ Production date: _____

Affected Components	Reviewed By	Approved (Y/N)
1.		
2.		
3.		
.		
.		
.		

must be communicated. Implementation guides should also reflect these types of changes — so be sure to set up a process to alert the EDI team of any changes being made to your SAP system. You can devise a form, like the one shown in **Figure 6**, which describes the change and when the change takes effect.

Alternatives to In-House Integration

Because of its cost and complexity, you do not find widespread use of in-house EDI translation systems among small to medium enterprises. This makes it difficult for large companies to achieve 100 percent EDI participation among trading partners, as well as one of the driving forces behind the current thrust to extend traditional EDI to the Internet, where it becomes universally accessible.

Web-based EDI is the exchange of business documents in a standard format using Internet technologies. It is usually implemented by a third-party hub or service provider. For small and medium enterprises, outsourcing EDI services provides a low-cost way to satisfy their large trading partners with no changes to their current way of doing business, and it is a flexible solution for further EDI integration. There are few or no EDI skills required and no capital investment, and it features fast startup.

Considering the challenges of EDI implementation, large companies are also pursuing outsourcing and EDI services as alternatives. Through outsourcing, many traditional EDI project tasks can be eliminated, such as trading partner selection and agreements, implementation guide development, and testing with your trading partner.

But be advised that using Web-based EDI requires a different network and security approach. You are working with a public/open network, not a closed, proprietary one. With third-party participation, the need for trading partner registration,

and additional functions that need to be present on the Web server for connection, concurrency, and so forth, comes increased risk for a security breach.

Conclusion

Whether you are overseeing or participating in the implementation, support, or the development of SAP-based e-commerce applications, you should have a basic understanding of components, available solutions, acronyms, and buzzwords that have been presented in this article. Electronic commerce is here to stay. It is not a passing trend. Leveraging electronic commerce and EDI will extend your marketplace beyond its existing boundaries, allowing your enterprise to grow on a global scale.

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IBM offers a complete suite of products and services to meet the challenges of implementing electronic commerce and a successful EDI strategy through IBM Global Services. These include communication services, translation software and in-network translation services, EDI and Web EDI services, SAP and EDI consulting, and EDI outsourcing services.

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