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http://idocs.de

The SAP R/3 Guide to EDI, IDocs and Interfaces

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- OSCo GmbH, Mannheim, Germany: SAP R/3 implementation partner
- UNILAN Corp., Texas: ORACLE implementation competence

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email us 📠 info@logosworld.de
or visit http://idocs.de

For Doris, Paul, Mini

Danke, Thank You, Graçias, Tack så mycket, Merci, Bedankt, Grazie, Danjawad, Nandri, Se-Se

I due special thanks to a variety of people, clients, partners and friends. Their insistence in finding a solution and their way to ask the right questions made this book only possible.

I want especially honour *Francis Bettendorf,* who has been exactly that genre of knowledgeable and experienced IT professionals I had in mind, when writing this book. A man who understands an algorithm when he sees it and without being too proud to ask precise and well-prepared questions. He used to see me every day with the same phrase on the lips: "Every day one question." He heavily influenced my writing style, when I tried to write down the answers to his questions. He also often gave the pulse to write down the answers at all. At the age of 52, he joyfully left work the evening of Tuesday the 23rd March 1999 after I had another fruitful discussion with him. He entered immortality the following Wednesday morning. We will all keep his memory in our heart.

Thanks to *Detlef* and *Ingolf Streit* for doing the great cartoons.

Thanks also to Pete Kellogg of UNILAN Corp., Texas, Juergen Olbricht, Wolfgang Seehaus and his team of OSCo, Mannheim for continuously forming such perfect project teams. It is joy working with them.

Plans are fundamentally ineffective because the "circumstances of our actions are never fully anticipated and are continuously changing around us". Suchman does not deny the existence or use of plans but implies that deciding what to do next in the pursuit of some goal is a far more dynamic and context-dependent activity than the traditional notion of planning might suggest.

Wendy Suchman, Xerox PARC http://innovate.bt.com/showcase/wearables/

Who Would Read This Book?

This book was written for the experienced R/3 consultants, who wants to know more about interface programming and data migration. It is mainly a compilation of scripts and answers who arose during my daily work as an R/3 coach.

Quid – What is that book about?

The R/3 Guide is a *Frequently Given Answers* book. It is a collection of answers, I have given to questions regarding EDI over and over again, both from developers, consultants and client's technical staff. It is focussed on the technical aspect of SAP R/3 IDoc technology. It is not a tutorial, but a supplement to the R/3 documentation and training courses.

Quis – Who should read the book?

The R/3 Guide has been written with the experienced consultant or ABAP developer in mind. It does not expect any special knowledge about EDI, however, you should be familiar with ABAP IV and the R/3 repository.

Quo modo – how do you benefit from the book?

Well, this book is a "How to" book, or a "Know-how"-book. ***The R/3 Guide*** has its value as a compendium. It is not a novel to read at a stretch but a book, where you search the answer when you have a question.

Quo (Ubi) – Where would you use the book?

You would most likely use the book when being in a project involved in data interfaces, not necessarily a clean EDI project. IDocs are also helpful in data migration.

Quando – when should you read the book

The R/3 Guide is not a tutorial. You should be familiar with the general concept of IDocs and it is meant to be used after you have attended an R/3 course on IDocs, ALE or similar. Instead of attending the course you may alternatively read one of the R/3 IDoc tutorial on the market.

Cur – Why should you read the book

Because you always wanted to know the technical aspects of IDoc development, which you cannot find in any of the publicly accessible R/3 documentation.

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3.1 Get A Feeling For IDocs ..... Fehler! Textmarke nicht definiert.

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Preface

Proper Know-How Saves Costs

We always believed, what has been confirmed over and over again in manifold projects: The main source to cutting project costs, is a proper education of the team. Giving the team members the same book to read homogenizes the knowledge and sharpens a common sense within the group.

A Frequently Given Answers Book

This book is the result of thousands of hours of discussion and work with R/3 consultants, developer and clients about interface development from and to R/3. When we started a new big project in autumn 1998 at the Polar Circle, which involved a big number of interfaces, I observed curiously, that my developers were ordering numerous books, all being related to EDI.
Well, those books did not say any word about R/3 and it was obvious that they were not very helpful for our team. I consequently search the directories for books on R/3 IDocs, but there was nothing. So I started to compile my material on IDocs and ALE with the intent to publish it in the WWW. Since I submit the site http://idocs.de to some search engines I got an astonishing amount of hits. Emails asked for a written version of the stuff on the web. So – here it is.

Mystery EDI Unveiled

EDI and e-commerce are miracle words in today's IT world. Like any other mystery it draws its magic from the ignorance of the potential users. It is true that there are many fortune making companies in the IT world who specialize on EDI. The sell software and know-how for giant sums of money. Looking behind the scenes reveals, that the whole EDI business can simply be reduced to writing some conversion programs. This is not too easy, but the secret of EDI companies is, that the so-called standards are sold for a lot of money. As soon as you get hold of the documentation, things turn out to be easy.

IDocs, A Universal Tool for Interface Programming

Although R/3 IDocs had been introduced as a tool to implement EDI solution for R/3, it is now accepted as a helpful tool for any kind of interface programming. While this is not taught clearly in SAP's learning courses, we put our focus on writing an interface quickly and easily.

http://idocs.de

We praise cutting edge technology. So this book takes advantage of the modern multimedia hype. Latest updates, corrections and more sophisticated and detailed examples are found on our web site.

Axel Angeli in December 1999
Logos! Informatik GmbH

Where Has the Money Gone?

EDI projects can soon become very expensive. However, when analysing the reasons for high costs, one finds quickly that it is not the technical implementation of the EDI project that lets explode the total costs.

Summary

- Most of the implementation time and costs get lost in agreeing common standards and establishing formalism between the sender and the receiver
- A successful EDI project requires the developers on both ends sitting together face to face
- Sticking to a phantom "SAP standard" for IDocs, which does not actually exist in R/3, lets the costs of the project soar

Just make a plan,	*Mach nur einen Plan,*
And let your spirit hail.	*Sei ein großes Licht,*
Then you make another plan,	*Dann mach noch einen zweiten Plan*
And both will fail.	*Gehen tun sie beide nicht.*

Bertold Brecht and Kurt Weill, Three Penny Opera

1.1 Communication

More than 80% of the time of an EDI project is lost in waiting for answers, trying to understand proposals and retrieving data nobody actually needs.

A common language

EDI means to exchange information between a sender and a receiver. Both communication partners need to speak the same language to understand each other.

The language for EDI are the file formats and description languages used in the EDI data files. In the simple case of exchanging plain data files, the partners need to agree on a common file format.

Finding the common agreement, that is it, where most of the money gets lost. See a common scenario:

The receiving party defines a file structure in which it likes to receive the data. This is usually an image of the data structure of the receiving computer installation.

This is a good approach for the beginning, because you have to start somewhere. But now the disaster takes course.

The proposal is sent to the other end via email. The developer of the sender system takes a look on it and remains quiet. Then he starts programming and tries to squeeze his own data into the structure.

Waiting for a response

If it becomes too tedious, a first humble approach takes place to convince the other party to change the initial file format. Again it is sent via email and the answer comes some days later. Dead time, but the consultant is paid.

Badly described meaning of a field

It can be even worse: one party proposes a format and the other party does not understand the meaning of some fields.

Echoing

Another field cannot be filled, because the sender does not have the information. Looking closer you find out, that the information originates from the receiving partner anyway. The programmer who proposed the format wanted it filled just for his personal ease. This is known as **Echoing** and it is always a nice to have feature.

Using the same term for different objects

A real disaster happens if both parties use the same expression for different items. A classy case is the term "delivery": many legacy systems call a delivery what is known as an SD transport in R/3.

There are many other situation where always one thing happens: time is spoiled. And time is money.

Face to face

The solution is more than easy: bring the people together. Developers of both parties need to sit together, physically face to face. If they can see what the other person does, they understand each other.

1.2 Psychology of Communication

Bringing developers together accelerates every project. Especially when both parties are so much dependent on each other as in an EDI project, the partners need to communicate without pause.

There is a psychological aspect in the communication process, if the parties on both ends do not know each other or reduce communication with each other to the absolute minimum,

Sporadic communication leads to latent aggression on both sides, while spending time together builds up mutual tolerance. Communicating directly and regularly, rises pretty certainly the mutual respect. Once the parties accept the competence of each other they accept the other's requirements more easily.

Send them over the ocean.

Why, will you say, what if people sit on two ends of the world, one in America the other in Europe? The answer is strict and clear: get them a business class flight and send them over the ocean.

Travel cost will be refunded by the saved time

The time you will save when the people sit together will even up a multitude of the travel costs. So do not think twice.

Sitting together also rises the comprehension of the total system. An EDI communication forms a logical entity. But if your left hand does not know what your right hand does, you will never handle things firm and secure.

See the business on both ends

Another effect is thus a mutual learning. It means to learn how the business is executed on both sides. Seeing the commons and the differences allows flexibility. And it allows to make correct decisions without needing to ask the communication partner.

1.3 Phantom SAP Standards and a Calculation

It is reported that SAP R/3 delivers standard EDI programs and that they should not be manipulated and no circumstances. Because this is not true, much project is lost in chasing the phantom.

Predefined not standard

SAP R/3 is delivered with a serious of predefined IDoc types and corresponding handler function modules.

Some of the handler programs had been designed with user-exits where a developer could implemented some data post-processing or add additional information to an IDoc.

You must always see those programs as examples for IDoc handling. If the programs do already what you want, it is just fine. But you should never stick too long to those programs, if you need different data to send.

R/3 IDocs were primarily designed for the automotive industry

The R/3 standard IDoc programs had been designed with the German association of automobile manufacturers (VDA) in mind. The VDA is a committee which defines EDI standards for their members, e.g. Volkwagen, BMW, Daimler-Benz-Chrysler. Not every car manufacturer, e.g. FORD uses these recommendations. Other industries define their own standards which are not present in R/3.

If there already exists a file exchange format for your company or your industry, you may want to use this one. This means to type in the file format, writing the program that fills the structure and customize the new IDoc and message types.

A simple calculation:

Calculation

Discussing the solutions	5 days
Typing in the file formats	1/2 day
Writing the program to fill the segments	1 days
Adjust the customizing	1/2 day
Testing and correcting everything	3 days
Travel time	2 days
Total	12 days

This is not an optimistic calculation. You will mind that eight out of the twelve days are accounting for non IT related tasks like discussing solutions, educating each other and testing.

If a project takes longer than that, it always adds to the account of discussion and adapting solutions, because things have changed or turned out to be different as initially planned.

1.4 Strategy

Do not loose your time in plans. Have prototypes developed and take them as a basis.

You cannot predict all eventualities

Do not stick to the illusion, that a proper design in the beginning will lead to a good result. It is the age old error in trusting the theorem of Laplace:

Laplace

"Tell me all the facts of the world about the presence and I will predict the future for you."

Heisenberg and uncertainty

Let aside the fact, that modern physics since Heisenberg and his uncertainty theorem has proven, that even knowing everything about now, does not allow to predict the future deterministically.

You do not know the premises before

If you want to know all the eventualities of a project, you have to be gone through similar projects. It is only your experience that allows you to make a good plan. However, you usually do a project only once, unless you are a consultant.

The question is: If you have never been through an EDI project, how will you obtain the necessary experience?

Prototypes

The answer is: make a prototype, a little project. Do not loose your time in writing plans and detailed development requests. Rather start writing a tiny prototype. Introduce this prototype and maintain your solution. Listen to the arguments and improve the prototype steadily.

This is how you learn.

This is how you succeed.

1.5 Who Is on Duty?

Writing interface programs is much like translating languages. The same rule apply.

Writing interface programs is like translating a language. You have information distributed by one system and you have to translate this information into a format that the other system understands it.

A translation should always be done by a native speaker of the target language. This applies to interface programs as well.

If data needs to be converted, do this always in the target system. If in doubt let the source system send everything it can. If the target does not need the information it can ignore it.

1.6 Marcus T. Cicero

Some may have learned it in school: the basic rules of rhetoric according to Cicero. You will know the answers, when your program is at its end. Why don't you ask the questions in the beginning? Ask the right question, then you will know.

When starting a new task, you have always to answer the magic "Q" s of rhetoric. It is a systematic way to get the answer you need to know anyway.

Quid – What What is the subject you are dealing with? Make clear the context you are in and that all parties talk about the same.

Quis – Who Who is involved in the business? Get the names and make sure, that they know each other before the project enters the hot phase.

Quo modo – how How do you want to achieve your goal? Be sure all participants choose the same methods. And how do you name the things? Agree on a common terminology!

Quo (Ubi) – where Where do things take place? Decide for a common place to work. Decide the platform, where elements of the programs should run.

Quando - when When do you expect a result? Define milestones and discuss the why when the milestones were missed. You should always check why your initial estimate was wrong, also if you are faster than planned.

Cur – Why Why do you want to install a certain solution? Isn't there a better alternative?

What Are SAP R/3 IDocs?

IDocs are SAP's file format to exchange data with a foreign system. This chapter is intended as an introduction to the concept.

Summary

- IDocs are an ASCII file format to exchange data between computers; the format is chosen arbitrarily
- IDocs are similar to segmented files; they are not a description language like ANSI X.12, EDIFACT or XML
- The IDoc contents are processed by function modules, which can be assigned in customizing

2.1 What are IDocs?

IDocs are structured ASCII files (or a virtual equivalent). They are the file format used by SAP R/3 to exchange data with foreign systems.

IDocs Are SAP's implementation of structured text files

IDocs are simple **ASCII data streams**. When they are stored to a disk file, the IDocs are simple flat files with lines of text, where the lines are structured into data fields. The typical structured file has records, where each record starts with a leading string, which identifies the record type. Their specification is stored in the data dictionary.

Electronic Interchange Document

IDocs is the acronym for **Interchange Document**. This indicates a set of (electronic) information which build a logical entity. An IDoc is e.g. all the data of a single customer in your customer master data file. Or the IDoc is all the data of a single invoice.

Data Is transmitted in ASCII format, i.e. human readable form

IDoc data is usually exchanged between systems and partners who are completely independent. Therefore the data should be transmitted in a format, that can easily be corrected by the humans who operate the computers. It is therefore mandatory to post the data in a human readable form.

Nowadays, this means that data is coded in **ASCII** format, including number, which are sent as string of figures 0 to 9. Such data can easily be read with any text editor on any computer, be it a PC, Macintosh, UNIX System, S/390 or any internet browser.

IDocs exchange messages

The information which is exchanged by IDocs is called a message and the IDoc is the physical representation of such a message. The name "messages" for the information sent via IDocs is used in the same ways as other EDI standards do.

IDocs are used like classical interface files

Everybody who ever dealt with interface programming, will find IDocs very much like the hierarchical data files used in traditional data exchange.

International standards like the ODETTE or VDA formats are designed in the same way as IDocs are.

XML, ANSI X:12 or EDIFACT use a description language

Other EDI standards like XML, ANSI X.12 or EDIFACT/UN are based on a data description language. They differ principally from the IDocs concept, because they use a programming language syntax (e.g. like Postscript or HTML) to embed the data.

2.2 Exploring a Typical Scenario

The IDoc process is a straight forward communication scenario. A communication is requested, then data is retrieved, wrapped and sent to the destination in a predefined format and envelope.

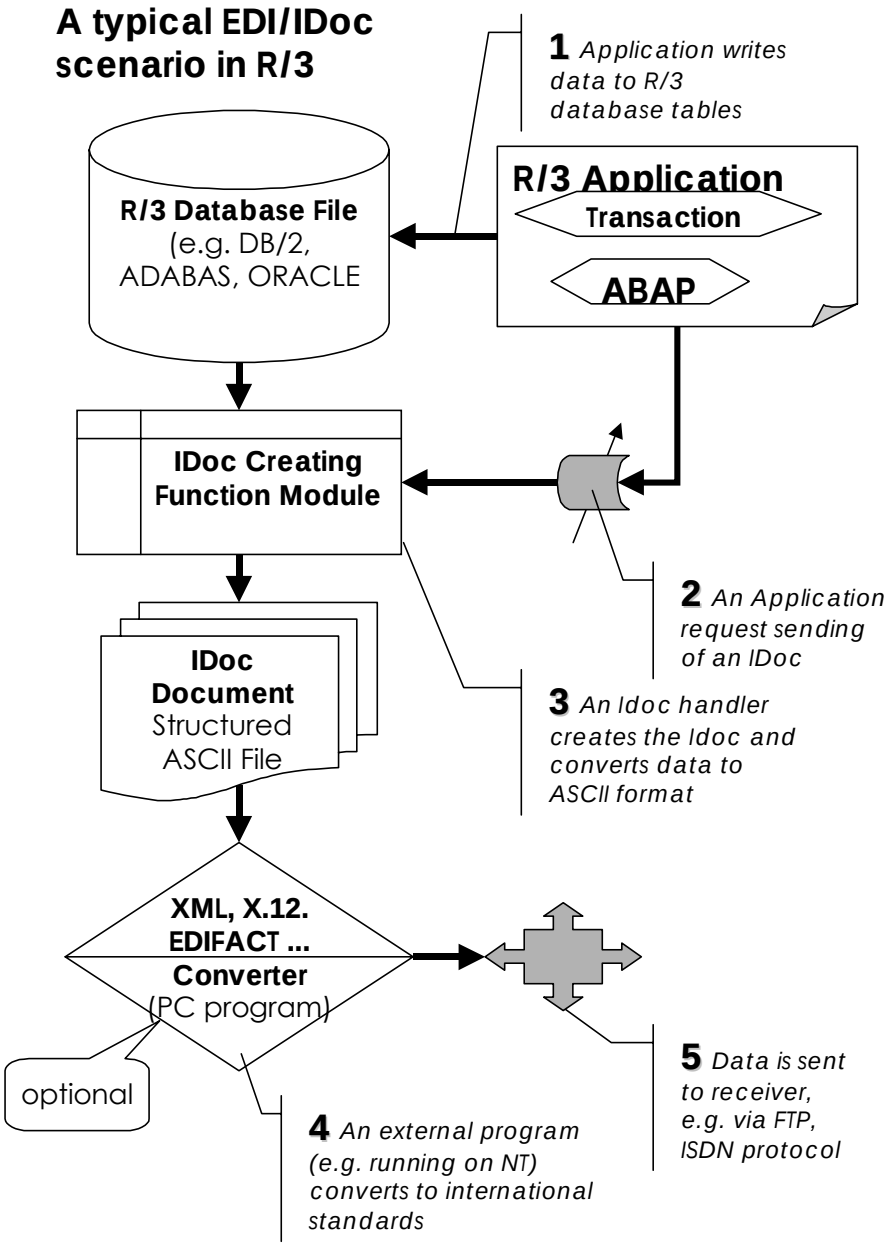


Illustration 1: A typical EDI scenario from the viewpoint of R/3

The illustration above displays a sketch for a typical IDoc communication scenario. The steps are just the same as with every communication scenario. There is a requesting application, a request handler and a target.

The sketch shows the communication outbound R/3. Data is leaving the R/3 system.

R/3 application creates data

An R/3 application creates data and updates the database appropriately. An application can be a transaction, a stand-alone ABAP Report or any tool that can update a database within R/3.

IDoc engine picks up the request

If the application thinks that data needs to be distributed to a foreign system, it triggers the IDoc mechanism, usually by leaving a descriptive message record in the message table **NAST**.

The application then either calls directly the IDoc engine or a collector job eventually picks up all due IDoc messages and determines what to do with them.

IDoc engine determines a handler function from customizing

If the engine believes that data is fine to be sent to a partner system, then it determines the function module which can collect and wrap the required IDoc data into an IDoc.

In IDoc customizing, you specify the name of the function module to use. This can either be one which is predefined by R/3 standard or a user-written one.

IDoc is backup up in R/3 and sent out

When the IDoc is created it is stored in an R/3 table and from there it is sent to the foreign system.

Conversion to standards is done by external program

If the foreign system requires a special conversion, e.g. to XML, EDIFACT or X.12 then this job needs to be done by an external converter, like the *Seeburger ELKE*™ system. These converters are not part of R/3.

If you have to decide for a converter solution, we strongly recommend to use a plain PC based solution. Conversion requires usually a lot of fine tuning which stands and falls with the quality of the provided tools.

Get a Feeling for IDocs

IDocs are relatively simple to understand. But, like most simple things they are difficult to explain. In this chapter we want to look on some IDoc and describe its elements, so that you can get a feeling for them.

Summary

- The first record in an IDoc is a control record describing the content of the data
- All but the first record are data records with the same formal record structure
- Every record is tagged with the segment type and followed by the segment data
- The interpretation of the segment is done by the IDoc application
- Both sent and received IDocs are logged in R/3 tables for further reference and archiving purposes

3.1 Get A Feeling For IDocs

For the beginning we want to give you a feeling of what IDocs are and how they may look like, when you receive it as a plain text file.

IDocs are plain ASCII files (resp. a virtual equivalent)

IDocs are basically a small number of records in ASCII format, building a logical entity. It makes sense to see an IDoc as a plain and simple ASCII text file, even if it might be transported via other means.

Control record plus many data records = 1 IDoc

Any IDoc consists of two sections

- The **control record**

which is always the first line of the file and provides the administrative information.
The rest of the file is made up by

- the **data record**

which contain the application dependent data, in our example below the material master data.

For an example, we will discuss the exchange of the material master IDoc **MATMAS** in the paragraphs below.

IDocs are defined in WE31

The definition of the IDoc structure **MATMAS01** is deposited in the data dictionary and can be viewed with **WE30** .

IDOC Number	Sender	Receiver	Port	Message Type	IDoc Type
0000123456	R3PARIS	R3MUENCHEN	FILE	ORDERS	ORDERS01

Illustration 2: Simplified Example of an IDoc control record for sales orders

SegmentType	Sold-To	Ship-To	Value	Deldate	User
ORDERHEADER	1088	1089	12500,50	24121998	Micky Maus

Illustration 3: Simplified Example of an IDoc data record for sales orders

```
EDI_DC40  04300000000000001234540B 3012  MATMAS03    MATMAS   DEVCLNT100  PROCLNT100
E2MARAM001                    043000000000000012345000001000000002005TESTMAT1          19980303ANGELI       19981027SAPOSS
E2MAKTM001                    043000000000000012345000003000000103005EEnglish Name for TEST Material 1        EN
E2MAKTM001                    043000000000000012345000004000000103005FFrench Name for TEST Material 1         FR
E2MARCM001                    0430000000000000123450000050000001030050100DEAVB              901        PD9010  0   0.00 EXX  0.000
E2MARDM001                    043000000000000012345000006000005040051000D                   0.000         0.000
E2MARDM001                    043000000000000012345000007000005040051200D                   0.000         0.000
E2MARMM                       043000000000000012345000009000000103005KGM1    1                        0.000         0.000
```

Illustration 1: **Part of the content of an IDoc file for IDoc type MATMAS02**

```
      0000000000012345 DEVCLNT100 PROCLNT100 19991103 210102
          E1MARAM                      005 TESTMAT1           19980303 ANGELI      19981027SAPOSS       KDEAVCB
               E1MAKTM                      005 D German  Name for TEST Material 1          DE
               E1MAKTM                      005 E English Name for TEST Material 1          EN
               E1MAKTM                      005 F French  Name for TEST Material 1          FR
               E1MARCM                      005 0100 DEAVB                 901
               E1MARCM                      005 0150 DEAVB                 901
                  E1MARDM                      005 1000 D                    0.000          0.000
                  E1MARDM                      005 1200 D                    0.000          0.000
               E1MARMM                      005 KGM 1     1                          0.000          0.000          0.000
               E1MARMM                      005 PCE 1     1                          0.000          0.000          0.000
```

Illustration 2: **The same IDoc in a formatted representation**

3.2 The IDoc Control Record

The very first record of an IDoc package is always a control record. The structure of this control record is the DDic structure EDIDC and describes the contents of the data contained in the package.

Control record serves as cover slip for the transport

The control record carries all the administrative information of the IDoc, such as its origin and its destination and a categorical description of the contents and context of the attached IDoc data. This is very much like the envelope or cover sheet that would accompany any paper document sent via postal mail.

Control record is used by the receiver to determine the processing algorithm

For R/3 inbound processing, the control record is used by the standard IDoc processing mechanism, to determine the method how to process the IDoc. This method is usually a function module, but may be a business object as well. The processing method can be fully customized.

Control record not necessary to process the IDoc Data

Once the IDoc data is handed over to a processing function module, you will no longer need the control record information. The function modules are aware of the individual structure of the IDoc type and the meaning of the data. In other words: for every context and syntax of an IDoc, you would write an individual function module or business object (note: a business object is also a function module in R/3) to deal with.

Control Record structure is defined as EDIDC in DDic

The control record has a fixed pre-defined structure, which is defined in the data dictionary as **EDIDC** and can viewed with **SE11** in the R/3 data dictionary. The header of our example will tell us, that the IDoc has been received from a sender with the name **PROCLNT100** and sent to the system with the name **DEVCLNT100** . It further tells us that the IDoc is to be interpreted according to the IDoc definition called MATMAS01 .

```
    MATMAS01 ... DEVCLNT100 PROCLNT100 ...
```

Illustration 4: Schematic example of an IDoc control record

Sender

The sender's identification **PROCLNT100** tells the receiver who sent the IDoc. This serves the purpose of filtering unwanted data and gives also the opportunity to process IDocs differently with respect to the sender.

Receiver

The receiver's identification **DEVCLNT100** should be included in the IDoc header to make sure, that the data has reached the intended recipient.

IDoc Type

The name of the IDoc type **MATMAS01** is the key information for the IDoc processor. It is used to interpret the data in the IDoc records, which otherwise would be nothing more than a sequence of meaningless characters.

3.3 The IDoc Data

All records in the IDoc, which come after the control record are the IDoc data. They are all structured alike, with a segment information part and a data part which is 1000 character in length, filling the rest of the line.

All IDoc data record have a segment info part and 1000 characters for data

All records of an IDoc are structured the same way, regardless of their actual content. They are records with a fixed length segment info part to the left, which is followed by the segment data, which is always 1000 characters long.

IDoc type definition can be edited with WE30

We will have a look on an IDoc of type **MATMAS01** . The IDoc type **MATMAS01** is used for transferring material master data via ALE. You can view the definition of any IDoc data structure directly within R/3 with transaction WE30.

Segment Info	*Segment Data-→*	
...E1MARAM	....00000001234567…	Material base segment
...E1MARCM	....PL01…	Plant Segment
...E1MARDM	....SL01	Storage location data
...E1MARDM	....SL02	Another storage location
...E1MARCM	....PL02	Another plant

Illustration 5: Example of an IDoc with one segment per line, an info tag to the left of each segment and the IDoc data to the right

Data and segment info is stored in EDID4

Regardless of the used IDoc type all IDocs are stored in the same database tables **EDID4** for release 4.x and **EDID3** for release 2.x and 3.x. Both release formats are slightly different with respect to the lengths of some fields. Please read the chapter on port types for details.

Depending on the R/3 release the IDoc data records are formatted either according the DDic structure **EDID3** or **EDID3**. The difference between the two structure reflect mainly the changes in the R/3 repository, which allow longer names staring from release 4.x.

3.4 Interpreting An IDoc Segment Info

All IDoc data records are exchanged in a fixed format, regardless of the segment type. The segment's true structure is stored in R/3's repository as a DDic structure of the same name.

R/3 is only interested in the segment name

The segment info tells the IDoc processor how the current segment data is structure and should be interpreted. The information, which is usually of only interest is the name of the segment **EDID4-SEGNAM**.

Segment name tells the data structure

The segment name corresponds to a data dictionary structure with the same name, which has been created automatically when defining the IDoc segment definition with transaction WE31 .

Remaining information is only for foreign systems

For most applications, the remaining information in the segment info can be ignored as being redundant. Some older, non-SAP-compliant partners may require it. E.g. the IDoc segment info will also store the unique segment number for systems, which require numeric segment identification.

To have the segment made up for processing in an ABAP, it is usually wise to move the segment data into a structure, which matches the segment definition.

For a segment of type **e1maram** the following coding is commonly used:

Data in EDID4-SDATA

```
TABLES: e1maram.
   . . .
MOVE edidd-sdata TO e1maram.
```

Then you can access the fields of the IDoc segment **EDIDD-SDATA** as fields of the structure **e1maram** .

Data in EDID4-SDATA

```
WRITE: e1maram-matnr.
```

Sample coding

The following coding sample, shows how you may read a **MATMAS** IDoc and extract the data for the **MARA** and MARC segments to some internal variables and tables.

```
DATA: xmara LIKE e1maram.
DATA: tmarc AS STANDARD TABLE OF e1marcm
            WITH HEADER LINE.
LOOP AT edidd.
   CASE edidd-segnam.
      WHEN 'E1MARAM'.
          MOVE edidd-sdata TO xmara.
      WHEN 'E1MARCM'.
        MOVE edidd-sdata TO tmarc.
          APPEND tmarc.
   ENDCASE.
ENDLOOP.
now do something with xmara and tmarc.
```

3.5 IDoc Base - Database Tables Used to Store IDocs

When R/3 processes an IDoc via the standard inbound or outbound mechanism, the IDoc is stored in the tables. The control record goes to table EDIDC and the data goes to table EDID4.

All inbound and outbound Docs are stored in EDID4

All IDoc, whether sent or received are stored in the table **EDID4**. The corresponding control file header go into **EDIDC**.

There are standard programs who read and write the data to and from the IDoc base. These programs and transaction are heavily dependent on the customizing, where rules are defined which tell how the IDocs are to be processed.

Avoid reinventing the wheel

Of course, as IDocs are nothing than structured ASCII data, you could always process them directly with an ABAP. This is certainly the quick and dirty solution, bypassing all the internal check and processing mechanism. We will not reinvent the wheel here.

Customizing is done from the central menu WEDI

To do this customizing setting, check with transaction WEDI and see the points, dealing with ports, partner profiles, and all under IDoc development.

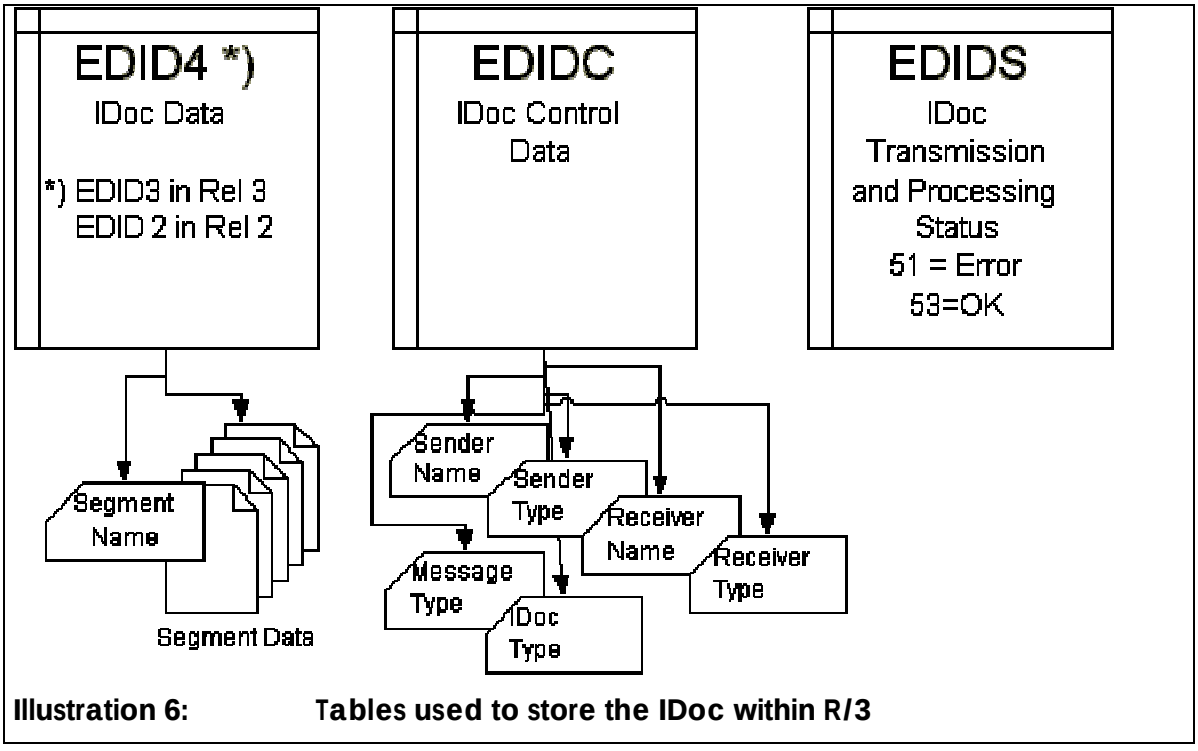


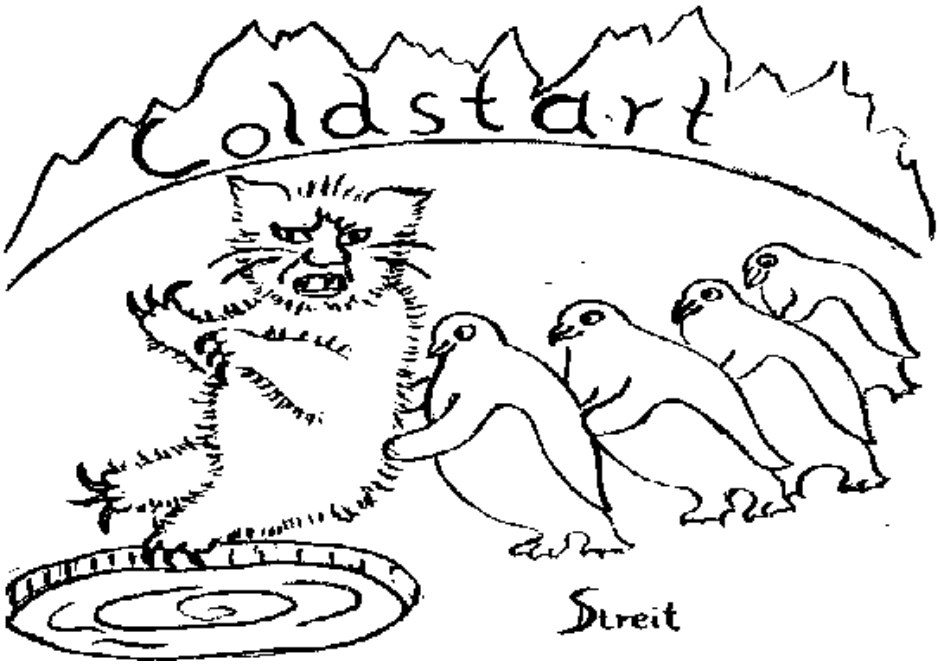
Illustration 6: Tables used to store the IDoc within R/3

Exercise: Setting Up IDocs

The best way of learning is doing it. This chapter tells you how to set up your R/3 system that it can send IDocs to itself. When sending IDocs to your own system you can test the procedures without the need for a second client or installation.

Summary

- Define a new internal RFC destination INTERNAL
- Explore both the transactions WEDI and SALE and adjust the settings as necessary
- Use transaction BALE to generate an arbitrary IDoc



4.1 Quickly Setting up an Example

If you have a naked system, you cannot send IDocs immediately. This chapter will guide you through the minimum steps to see how the IDoc engine works.

You can access most of the transactions used in the example below in the menu WEDI and SALE.

Check EDID4 with SE16

We will assume, that we want to send material master data from the current system to a remote system. To simulate this scenario we do not need to have a second system. With a little trick, we can set up the system to send an IDoc back to sending client.

We will set up the system to use an RFC call to itself. Therefore we need to define an RFC remote destination, which points back to our own client. There is a virtual RFC destination called **NONE** which always refers to the calling client.

1. **Declare the RFC destination to receive the IDoc**

   RFC destinations are installed with the transaction SM59. Create a new R/3 destination of type "L" (Logical destination) with the name **INTERNAL** and the destination **NONE**.

   Note: Do not use RFC type internal. Although you could create them manually, they are reserved for being automatically generated. However, there is the internal connection "NONE" or "BACK" which would do the same job as the destination we are creating now.

2. **Define a data port for** INTERNAL

   The next step is defining a data port, which is referenced by the IDoc sending mechanism to send the IDoc through. Declaring the port is done by transaction WE21.

3. **Declare a new ALE model with** SALE **.**

   We will now declare an ALE connection from our client to the partner **INTERNAL**. ALE uses IDocs to send data to a remote system. There is a convenient transaction to send material master as IDocs via the ALE.

4. **Declare** MATMAS01 **as a valid ALE object to be sent to** INTERNAL

   The set up is done in transaction SALE. You first create a new ALE model, to avoid interfering with eventual existing definitions. Then you simply add the IDoc message **MATMAS** as a valid path from your client to **INTERNAL**.

5. **Send the IDoc with transaction** BALE**.**

   In order to send the IDoc, you call the transaction BALE and choose the distribution of material master data (BD10). Choose a material, enter **INTERNAL** as receiver and go.

6. **Display IDocs with** WE05

   To see, which IDocs have been sent, you can use the transaction WE05. If you did everything as described above, you will find the IDocs with an error status of **29**, meaning that there is no valid partner profile. This is true, because we have not defined one yet.

4.2 Example: The IDoc Type MATMAS01

To sharpen your understanding, we will show you an example of an IDoc of type MATMAS01, which contains material master data.

Note: You can check with transaction WE05 , if there are already any IDocs in your system.

IDoc structure can be seen with WE30

You can call transaction WE30 to display the structure of the IDoc type of the found IDoc.
Here is the display of an IDoc of type **MATMAS01**.

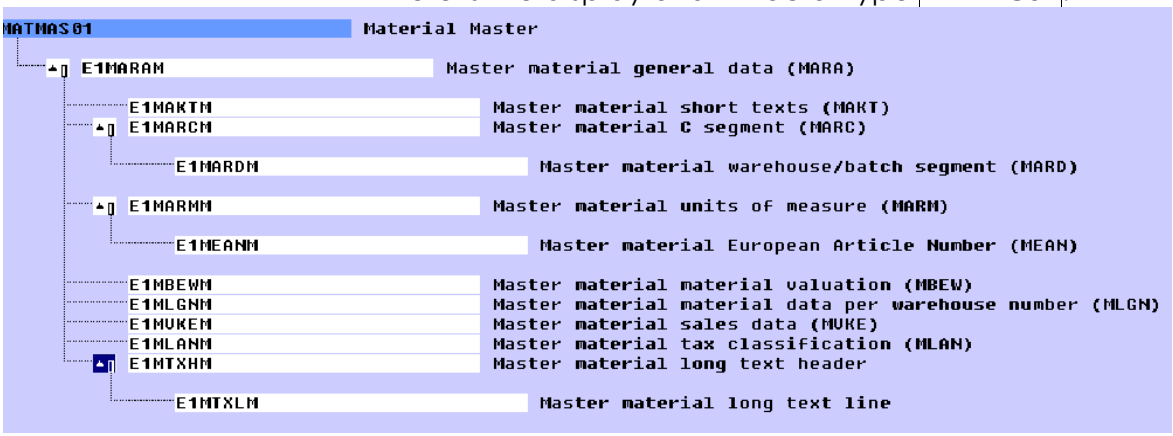


Illustration 1: Structure of the MATMAS01 IDoc type

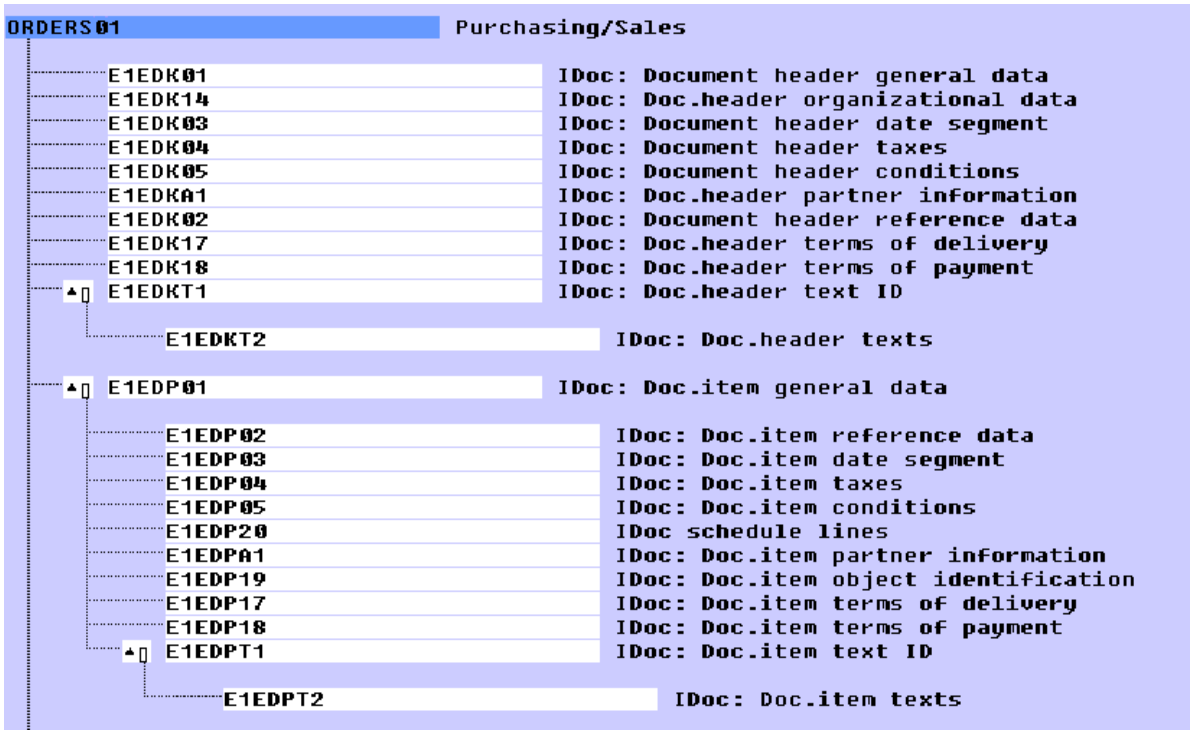
MATMAS01 mirrors widely the structure of R/3's material master entity.

Content of IDoc file

If this IDoc would have been written to a file, the file content would have looked similar to that:

```
...MATMAS01 DEVCLNT100 INTERNAL...
...E1MARAM ...and here the data
...E1MARCM ...and here the data
...E1MARDM ...and here the data
```

4.3 Example: The IDoc Type ORDERS01



To allow an interference, here is a sample of IDoc type ORDERS01 which is used for purchase orders and sales orders.

ORDERS01 is used for purchasing and sales order data

Purchasing and sales share naturally the same IDoc type, because what is a purchase order on sender side will become a sales order on the receiver side.

Other than **MATMAS01**, the IDoc type **ORDERS01** does not reflect the structure of the underlying RDB entity, neither the one of SD (VA01) nor the one of MM (ME21). The structure is rather derived from the EDI standards used in the automobile industry. Unfortunately, this does not make it easier to read.

Note: With transaction WE05 you can check, if there are already any IDocs in your system.

IDoc structure can be seen with WE30

You can call transaction WE30 to display the structure of the IDoc type of the found IDoc

Content of IDoc file

If this IDoc would have been written to a file, the file content would have looked similar to that:

```
...ORDERS01 DEVCLNT100 INTERNAL...
...E1EDKA1 ....and here the data
...E1EDKA2 ....and here the data
...E1EDP19 ....and here the data
```

Illustration 2: Structure of the ORDERS01 IDoc type

```
EDI_DC40  04300000000000001234540B 3012  MATMAS03    MATMAS   DEVCLNT100  PROCLNT100
E2MARAM001                    0430000000000001234500000100000002005TESTMAT1          19980303ANGELI      19981027SAPOSS
E2MAKTM001                    0430000000000001234500000300000103005EEnglish Name for TEST Material 1        EN
E2MAKTM001                    0430000000000001234500000400000103005FFrench Name for TEST Material 1         FR
E2MARCM001                    04300000000000012345000005000001030050100DEAVB             901       PD9010  0   0.00 EXX  0.000
E2MARDM001                    04300000000000012345000006000005040051000D                 0.000         0.000
E2MARDM001                    04300000000000012345000007000005040051200D                 0.000         0.000
E2MARMM                       0430000000000001234500000900000103005KGM1    1                       0.000         0.000
```

Illustration 3: **Part of the content of an IDoc file for IDoc type MATMAS02**

```
      0000000000012345 DEVCLNT100 PROCLNT100 19991103 210102
          E1MARAM                     005 TESTMAT1          19980303 ANGELI      19981027SAPOSS       KDEAVCB
               E1MAKTM                     005 D German  Name for TEST Material 1          DE
               E1MAKTM                     005 E English Name for TEST Material 1          EN
               E1MAKTM                     005 F French  Name for TEST Material 1          FR
               E1MARCM                     005 0100 DEAVB                 901
               E1MARCM                     005 0150 DEAVB                 901
                  E1MARDM                     005 1000 D                  0.000          0.000
                  E1MARDM                     005 1200 D                  0.000          0.000
               E1MARMM                     005 KGM 1     1                           0.000          0.000          0.000
               E1MARMM                     005 PCE 1     1                           0.000          0.000          0.000
```

Illustration 4: **The same IDoc in a formatted representation**

Monitoring IDocs

There are some utilities in R/3 that help monitoring all the IDocs in the system. They allow viewing them, analysing eventual cause of error and retrying IDoc processing in case of failure.

Summary

- The IDoc monitoring tools can all be accessed from menu WEDI
- Transaction WE05 and WE02 display IDocs, which are found in the system; they allow to check if IDocs have been treated successfully or why they have failed
- BD87 allows to process inbound IDocs again, if they have failed for some reason
- BD88 allows dispatching outbound IDocs if they are stopped for some reason

Sample Processing Routines

This chapter demonstrates on an example how an IDoc is prepared in R/3 for outbound and how a receiving R/3 system processes the IDoc.

Keep
I t
Simple and
Smart

6.1 Sample Processing Routines

Creating and processing IDocs are a widely mechanical task, as it is true for all interface programming. We will show a short example that packs SAP R/3 SAPscript standard text elements into IDocs and stores them back.

Outbound function

Outbound IDocs from R/3 are usually created by a function module. This function module is called by the IDoc engine. A sophisticated customizing lets define the conditions and parameters to find the correct function module.

The interface parameters of the processing function need to be compatible with a well defined standard, because the function module will be called from within another program.

Inbound function

IDoc inbound functions are function modules with a standard interface, which will interpret the received IDoc data and prepare them for processing.

The received IDoc data is processed record by record and interpreted according the segment information provided with each record. The prepared data can then be processed by an application, a function module or a self-written program.

The example programs in the following chapters will show you how texts from the text pool can be converted into an IDoc and processed by an inbound routine to be stored into another system.

The following will give you the basics to understand the example:

Text from READ_TEXT

SAP R/3 allows the creation of text elements, e.g. with transaction SO10. Each standard text elements has a control record which is stored in table STXH. The text lines itself are stored in a special cluster table. To retrieve the text from the cluster, you will use the standard function module `function READ_TEXT` . We will read such a text and pack it into an IDoc. That is what the following simple function module does.

If there is no convenient routine to process data, the easiest way to hand over the data to an application is to record a transaction with transaction SHDB and create a simple processing function module from that recording.

Outbound is triggered by the application

Outbound routines are called by the triggering application, e.g. the RSNAST00 program.

Inbound is triggered by an external event

Inbound processing is triggered by the central IDoc inbound handler, which is usually the function module **`IDOC_INPUT`** . This function is usually activated by the gatekeeper, who receives the IDoc.

6.2 Sample Outbound Routines

The most difficult work when creating outbound IDocs is the retrieval of the application data which needs sending. Once the data is well retrieved, the data needs to be converted to IDoc format, only.

```
FUNCTION
*"----------------------------------------------------------------------
*"*"Lokale Schnittstelle:
*"       IMPORTING
*"             VALUE(I_TDOBJECT) LIKE  THEAD-TDOBJECT DEFAULT 'TEXT'
*"             VALUE(I_TDID) LIKE  THEAD-TDID DEFAULT 'ST'
*"             VALUE(I_TDNAME) LIKE  THEAD-TDNAME
*"             VALUE(I_TDSPRAS) LIKE  THEAD-TDSPRAS DEFAULT SY-LANGU
*"       EXPORTING
*"             VALUE(E_THEAD) LIKE  THEAD STRUCTURE  THEAD
*"       TABLES
*"              IDOC_DATA STRUCTURE  EDIDD OPTIONAL
*"              IDOC_CONTRL STRUCTURE  EDIDC OPTIONAL
*"              TLINES STRUCTURE  TLINE OPTIONAL
*"----------------------------------------------------------------------
* *** --- Reading the application Data --- ****
  CALL FUNCTION 'READ_TEXT'
       EXPORTING
            ID                      = T_HEAD-TDID
            LANGUAGE                = T_HEAD-TDSPRAS
            NAME                    = T_HEAD-TDNAME
            OBJECT                  = T_HEAD-TDOBJECT
       IMPORTING
            HEADER                  = E_THEAD
       TABLES
            LINES                   = TLINES.
* *** --- Packing the application data into IDoc
     MOVE E_THEAD TO IDOC_DATA-SDATA.
     MOVE 'YAXX_THEAD' TO IDOC_DATA-SEGNAM.
     APPEND IDOC_DATA.

     LOOP AT TLINES.
      MOVE E_THEAD TO IDOC_DATA-SDATA.
* *** -- we still need to fill more segment info
      MOVE 'YAXX_TLINE' TO IDOC_DATA-SEGNAM.
        APPEND IDOC_DATA.
     ENDLOOP.

* *** --- Packing the IDoc control record --- ****
  CLEAR IDOC_CONTRL.
  IDOC_CONTRL-IDOCTP = 'YAXX_TEXT'.
* *** -- we still should fill more control record info
  APPEND IDOC_CONTRL.

ENDFUNCTION.
```

Program 1: Sample IDoc outbound function module

We will show a short example that packs SAP R/3 SAPscript standard text elements into IDocs and stores them back to texts in a second routine. The text elements can be edited with SO10.

Text from READ_TEXT

Each R/3 standard text elements has a header record which is stored in table STXH. The text lines itself are stored in a special cluster table. To retrieve the text from the cluster, you will use the standard function module `function READ_TEXT`.

Outbound processing

The program below will retrieve a text document from the text pool, convert the text lines into IDoc format and create the necessary control information.

Reading data

The first step is reading the data from the application database by calling the function module READ_TEXT.

```
* *** --- Reading the application Data --- ****
  CALL FUNCTION 'READ_TEXT'
       EXPORTING
            ID                      = T_HEAD-TDID
            LANGUAGE                = T_HEAD-TDSPRAS
            NAME                    = T_HEAD-TDNAME
            OBJECT                  = T_HEAD-TDOBJECT
       IMPORTING
            HEADER                  = E_THEAD
       TABLES
            LINES                   = TLINES.
```

Converting application data into IDoc format

Our next duty is to pack the data into the IDoc record. This means moving the application data to the data part of the IDoc record structure EDIDD and fill the corresponding segment information.

```
* *** --- Packing the application data into IDoc
     MOVE E_THEAD TO IDOC_DATA-SDATA.
*     the receiver needs the segment name
      in order to interpret the segment
     MOVE 'YAXX_THEAD' TO IDOC_DATA-SEGNAM.
     APPEND IDOC_DATA.

     LOOP AT TLINES.
      MOVE E_THEAD TO IDOC_DATA-SDATA.
* *** -- we still need to fill more segment info
      MOVE 'YAXX_TLINE' TO IDOC_DATA-SEGNAM.
        APPEND IDOC_DATA.
     ENDLOOP.
```

Filling control record information

Finally we have to provide a correctly filled control record for this IDoc. If the IDoc routine is used in a standard automated environment, it is usually sufficient to fill the field EDIDC-IDOCTP with the IDoc type, EDIDC-MESTYP with the context message type and the receiver name. The remaining fields are automatically filled by the standard processing routines if applicable.

```
* *** --- Packing the IDoc control record --- ****
  CLEAR IDOC_CONTRL.
  IDOC_CONTRL-IDOCTP = 'YAXX_TEXT'.
* *** -- we still need to fill more control rec info
  APPEND IDOC_CONTRL.
```

6.3 Sample Inbound Routines

Inbound processing is widely the reverse process of an outbound.. The received IDoc has to be unpacked, interpreted and transferred to an application for further processing.

```
FUNCTION
*"----------------------------------------------------------------------
*"*"Lokale Schnittstelle:
*"       IMPORTING
*"             VALUE(INPUT_METHOD) LIKE  BDWFAP_PAR-INPUTMETHD
*"             VALUE(MASS_PROCESSING) LIKE  BDWFAP_PAR-MASS_PROC
*"       EXPORTING
*"             VALUE(WORKFLOW_RESULT) LIKE  BDWFAP_PAR-RESULT
*"             VALUE(APPLICATION_VARIABLE) LIKE  BDWFAP_PAR-APPL_VAR
*"             VALUE(IN_UPDATE_TASK) LIKE  BDWFAP_PAR-UPDATETASK
*"             VALUE(CALL_TRANSACTION_DONE) LIKE  BDWFAP_PAR-CALLTRANS
*"       TABLES
*"              IDOC_CONTRL STRUCTURE  EDIDC
*"              IDOC_DATA STRUCTURE  EDIDD
*"              IDOC_STATUS STRUCTURE  BDIDOCSTAT
*"              RETURN_VARIABLES STRUCTURE  BDWFRETVAR
*"              SERIALIZATION_INFO STRUCTURE  BDI_SER
*"----------------------------------------------------------------------
  DATA: XTHEAD   LIKE THEAD  .
  DATA: TLINES LIKE TLINE    OCCURS 0 WITH HEADER LINE.

  CLEAR XTHEAD.
  REFRESH TLINES.

* *** --- Unpacking the IDoc --- ***
  LOOP AT IDOC_DATA.
     CASE IDOC_DATA-SEGNAM.
       WHEN 'YAXX_THEAD'.
            MOVE IDOC_DATA-SDATA TO XTHEAD.
       WHEN 'YAXX_TLINE'.
            MOVE IDOC_DATA-SDATA TO TLINES.
     ENDCASE.
  ENDLOOP.

* *** --- Calling the application to process the received data --- ***
  CALL FUNCTION 'SAVE_TEXT'
       EXPORTING
            HEADER          = XTHEAD
            SAVEMODE_DIRECT = 'X'
       TABLES
            LINES           = TLINES.

    ADD SY-SUBRC TO OK.
* füllen IDOC_Status
* fill IDOC_Status
    IDOC_STATUS-DOCNUM = IDOC_CONTRL-DOCNUM.
    IDOC_STATUS-MSGV1  = IDOC_CONTRL-IDOCTP.
    IDOC_STATUS-MSGV2  = XTHEAD.
    IDOC_STATUS-MSGID  = '38'.
```

```
    IDOC_STATUS-MSGNO  = '000'.
    IF OK NE 0.
      IDOC_STATUS-STATUS = '51'.
      IDOC_STATUS-MSGTY  = 'E'.
    ELSE.
      IDOC_STATUS-STATUS = '53'.
      IDOC_STATUS-MSGTY  = 'S'.
      CALL_TRANSACTION_DONE = 'X'.
    ENDIF.
    APPEND IDOC_STATUS.
ENDFUNCTION.
```

Program 2: Sample IDoc outbound function module

Inbound processing function module

This example of a simple inbound function module expects an IDoc with rows of plain text as created in the outbound example above. The procedure will extract the text name and the text line from the IDoc and hand over the text data to the function module SAVE_TEXT which will store the text in the text pool.

Unpacking the IDoc data

The received IDoc data is processed record by record and data is sorted out according the segment type.

```
* *** --- Unpacking the IDoc --- ***
  LOOP AT IDOC_DATA.bb
     CASE IDOC_DATA-SEGNAM.
      WHEN 'YAXX_THEAD'.
            PERFORM UNPACK_IDOC TABLES IDOC_DATA USING XTHEAD.
      WHEN 'YAXX_TLINE'.
            PERFORM UNPACK_TAB  TABLES IDOC_DATA TLINES.
       ENDCASE.
  ENDLOOP.
```

Storing data

When the IDoc is unpacked data is passed to the application.

```
* *** --- Calling the application to process the received data --- ***
  CALL FUNCTION 'SAVE_TEXT'
       EXPORTING
            HEADER          = XTHEAD
       TABLES
            LINES           = TLINES.
```

Writing a status log

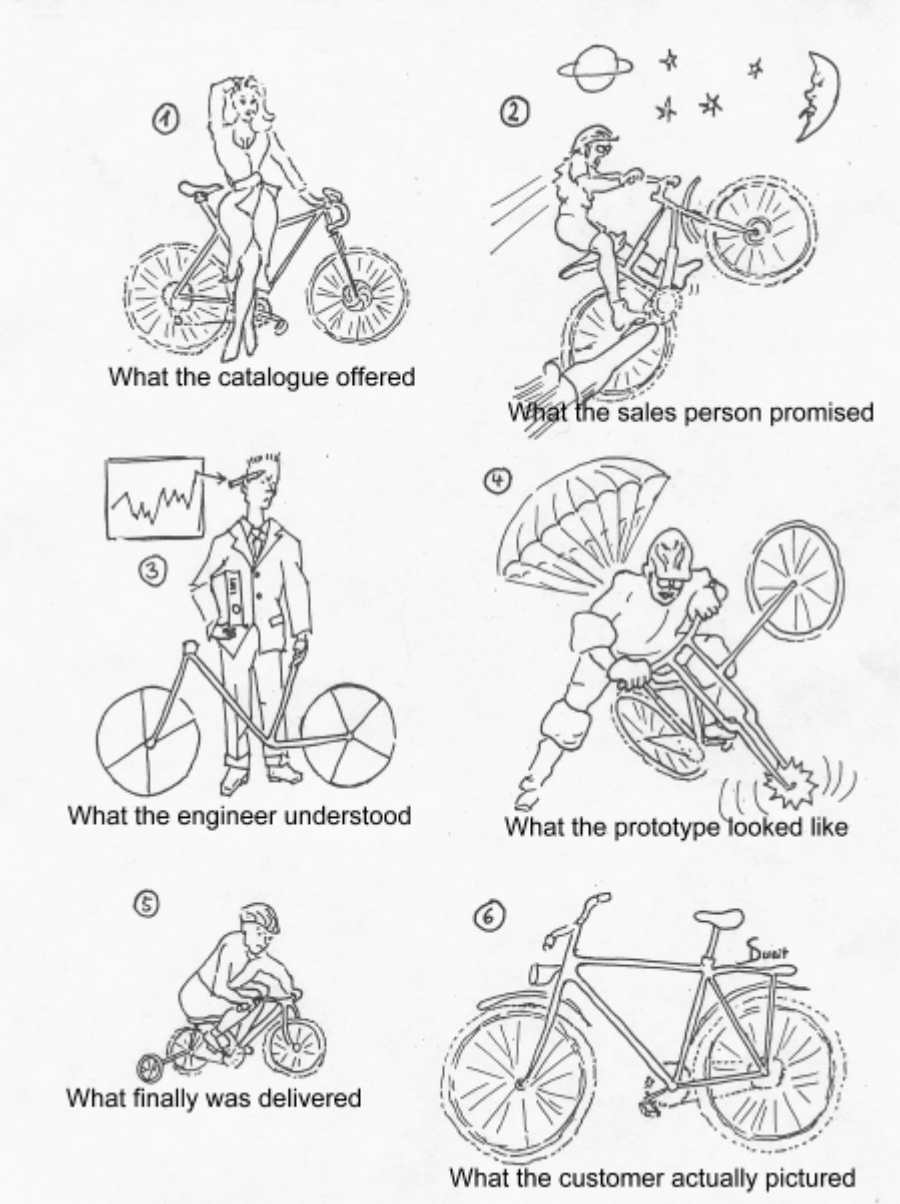
Finally the processing routine needs to pass a status record to the IDoc processor. This status indicates successful or unsuccessful processing and will be added as a log entry to the table EDIDS.

```
* fill IDOC_Status
    IF OK NE 0.
      IDOC_STATUS-STATUS = '51'.
*      IDOC_STATUS-.. = . fill the other fields to log information
    ELSE.
      IDOC_STATUS-STATUS = '53'.
    ENDIF.
    APPEND IDOC_STATUS.
```

The status value '51' indicates a general error during application processing and the status '53' indicates everything is OK.

IDocs Terminology

This is a collection of expressions used in context with IDocs. You should be familiar with them. Some are also used in non-IDoc context with a completely different meaning, e.g. the term *message*, so avoid misunderstandings. Many fights in project teams arise from different interpretations of the same expression.



7.1 Basic Terms

There are a couple of expressions and methods that you need to know, when dealing with IDoc.

Message Type The message type defines the semantic context of an IDoc. The message type tells the processing routines, how the message has to be interpreted.
The same IDoc data can be sent under different message types. E.g. can the same IDoc structure which is used for a purchase order also be used for transmitting sales order. Imagine the situation that you receive sales order either from your clients and also copies of sales orders for information purposes sent by a subsidiary

IDoc Type An IDoc type defines the syntax of the IDoc data. It tells which segments are found in an IDoc and what fields the segments are made of.

Processing Code The processing code is a logical name that determines the processing routine. This points usually to a function module, but the processing routine can also be a workflow or an event.
The use of a logical processing code makes it easy to modify the processing routine for a series of partner profiles at once.

Partner profile Every sender-receiver relationship needs a profile defined. This one determines

- the processing code
- the processing times and conditions
- and in the case of outbound IDocs also
- the media port used to send the IDoc and
- the triggers used to send the IDoc

Partner Type The IDoc partners are classified in logical groups. Up to release 4.5 they were the following standard partner types defined.

LS - Logical Systems The logical system is meant to be a different computer and was primarily introduced for use with the ALE functionality. You would use a partner type of LS, when linking with a different computer system, e.g. a legacy or subsystem.

KU - Customer *[ger.: Kunde]* The partner type customer is used in classical EDI transmission to designate a partner, that requires a service from your company or is in the role of a debtor with respect to your company, e.g. the payer, sold-to-party, ship-to-party.

LI - Supplier *[Ger.: Lieferant]* The partner type supplier is used in classical EDI transmission to designate a partner, that delivers a service to your company. This is typically the supplier in a purchase order. In SD orders you also find LI type partners, e.g. the shipping agent.

7.2 Terminology

7.2.1 Message Type – How to Know What the Data Means

Data exchanged by an IDoc and EDI is known as messages. Message of the same kind belong to the same message type.

Define the semantic context

The message type defines the semantic context of an IDoc. The message type tells the receiver, how the message has to be interpreted.

Messages is information aimed for communicating with a foreign partner

The term message is commonly used in communication, be it EDI or telecommunication. Any stream of data sent to a receiver with a well-defined information in it, is known as a message. EDIFACT, ANSI/X.12, XML and others use message the same way.

The term message is also used for R/3's internal communication between applications

Unfortunately, the term message is used in many contexts other than EDI as well. Even R/3 uses the word message for the internal communication between applications. While this is totally OK from the abstract point of view of data modelling, it may sometimes cause confusion, if it is unclear whether we talk about IDoc messages or internal messages.

The specification of the message type along with the sent IDoc package is especially important, when the physical IDoc type (the data structure of the IDoc file) is used for different purposes.

A classical ambiguity arises in communication with customs via EDI. The usually set up a universal file format for any kind of declarations, e.g. Intrastat, Extrastat, Export declarations, monthly reports etc. Depending on the message type, only applicable fields are field with valid data. The message type tells the receiver, which fields are of interest at all.

7.2.2 Partner Profiles – How to Know the Format of the Partner

Different partners may speak different languages. While the information remains the same, different receivers may require completely different file formats and communication protocols. This information is stored in a partner profile.

Partner Profiles are the catalogue of active EDI connection from and to R/3

In a partner profile you will specify the names of the partners which are allowed to exchange IDocs to your system. For each partner you have to list the message types which the partner may send.

Partner profiles stores the IDoc type to use

For any such message type, the profile tells the IDoc type, the partner expects for that kind of message.

Outbound customizing agrees how data is electronically exchanged

For outbound processing, the partner profile also sets the media to transport the data to its receiver, e.g.

- an operating system file
- automated FTP
- XML or EDIFACT transmission via a broker/converter
- internet
- direct remote function call

The mean of transport depends on the receiving partner, the IDoc type and message type (context).

Different partners, different profiles

So you may determine to send the same data as a file to your vendor and via FTP to your remote plant.
Also you may decide to exchange purchase data with a vendor via FTP but send payment notes to the same vendor in a file.

Inbound customizing determines the processing routine

For inbound processing, the partner profile customizing will also determine a processing code, which can handle the received data.
The partner profile may tell you the following:

- Supplier ..... **MAK_CO**
  sends the message..... **SHIPPING_ADVISE**
  via the port named..... **INTERNET**
  using IDoc type..... **SHPADV01**
  processed with code..... **SHIPMENTLEFT**
- Sales agent..... **LOWSELL**
  sends the message..... **SALESORDERS**
  via the port named..... **RFCLINK**
  using IDoc type..... **ORDERS01**
  processed with code..... **CUSTOMERORDER**
- Sales agent..... **SUPERSELL**
  sends the message..... **SALESORDERS**
  via the port named..... **RFCLINK**
  using IDoc type..... **ORDERS01**
  processed with code..... **AGENTORDER**

7.2.3 IDoc Type – The Structure of The IDoc File

The IDoc type is the name of the data structure used to describe the file format of a specific IDoc.

IDoc type defines the structure of the segments

An IDoc is a segmented data file. It has typically several segments. The segments are usually structured into fields, however different segments use different fields.
The IDoc type is defined with transaction WE30, the respective segments are defined with transaction WE31.

7.2.4 Processing Codes

The processing code is a pointer to an algorithm to process an IDoc. It is used to allow more flexibility in assigning the processing function to an IDoc message.

The logical processing code determines the algorithm in R/3 used to process the IDoc

The processing code is a logical name for the algorithm used to process the IDoc. The processing code points itself to a method or function, which is capable of processing the IDoc data.

A processing code can point to an SAP predefined or a self-written business object or function module as long as they comply with certain interface standards.

Allow to easily change the algorithm

The processing codes allow to easily change the processing algorithm. Because the process code can be used more than one partner profile, the algorithm will be easily changed for every concerned IDoc.

The processing code defines a method or function to process an IDoc

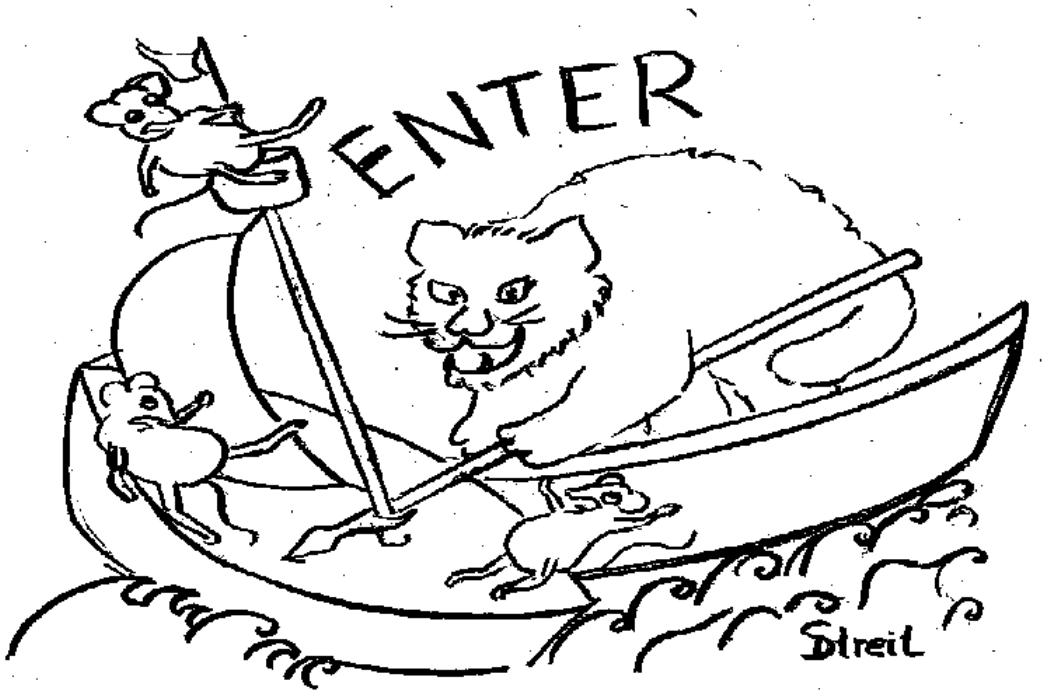
The IDoc engine will call a function module or a business object which is expected to perform the application processing for the received IDoc data. The function module must provide exactly the interface parameters which are needed to call it from the IDoc engine.

IDocs Customizing

Let aside the writing of the processing function modules, IDoc development requires the definition of the segment structures and a series customizing settings to control the flow of the IDoc engine.

Summary

- Customize basic installation parameters
- Define segment structures
- Define message types, processing codes



8.1 Basic Customizing Settings

Segments define the structure of the records in an IDoc. They are defined with transaction WE31.

Check first, whether the client you are working in, has already a logical system name assigned.

T000 – name of own logical system

The logical system name is stored in table **T000** as **T000-LOGSYS**. This is the table of installed clients.

TBDLS – list of known logical destinations

If there is no name defined, yet, you need to create a logical system name before. This means simply adding a line to table **TBDLS**. You can edit the table directly or access the table from transaction **SALE**.

Naming conventions like:
DEVCLNT100
PROCLNT123
TSTCLNT999

The recommended naming convention is

```
sysid + "CLNT" + client
```

If your system is **DEV** and client **100**, then the logical system name should be: **DEVCLNT100**.

System **PRO** with client **123** would be **PROCLNT123** etc.

SM59 – define physical destination and characteristics of a logical system

The logical system needs also be defined as a target within the R/3 network. Those definitions are done with transaction SM59 and are usually part of the work of the R/3 basis team.

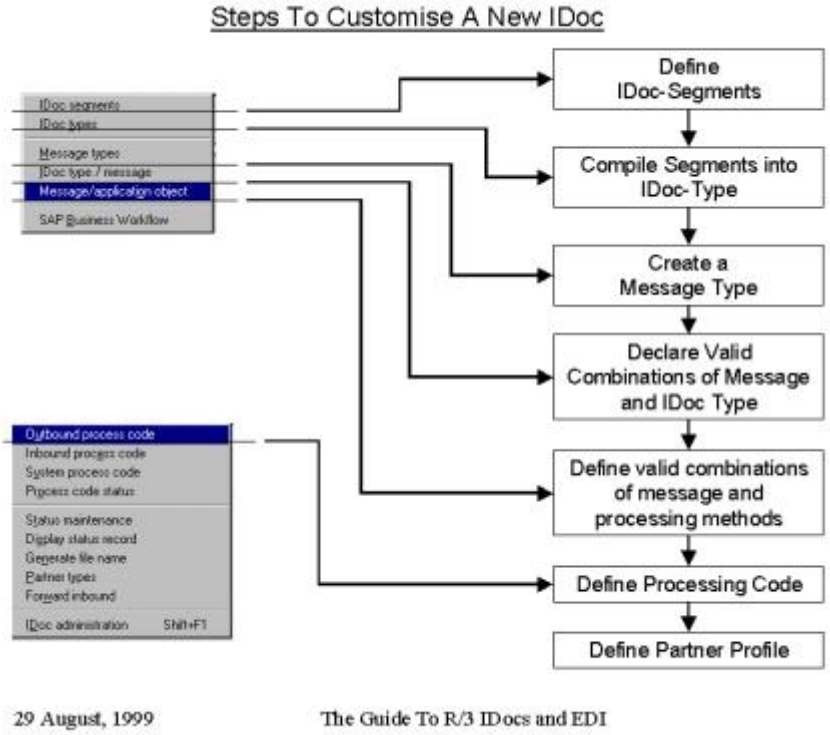


Illustration 7: Step to customize outbound IDoc processing

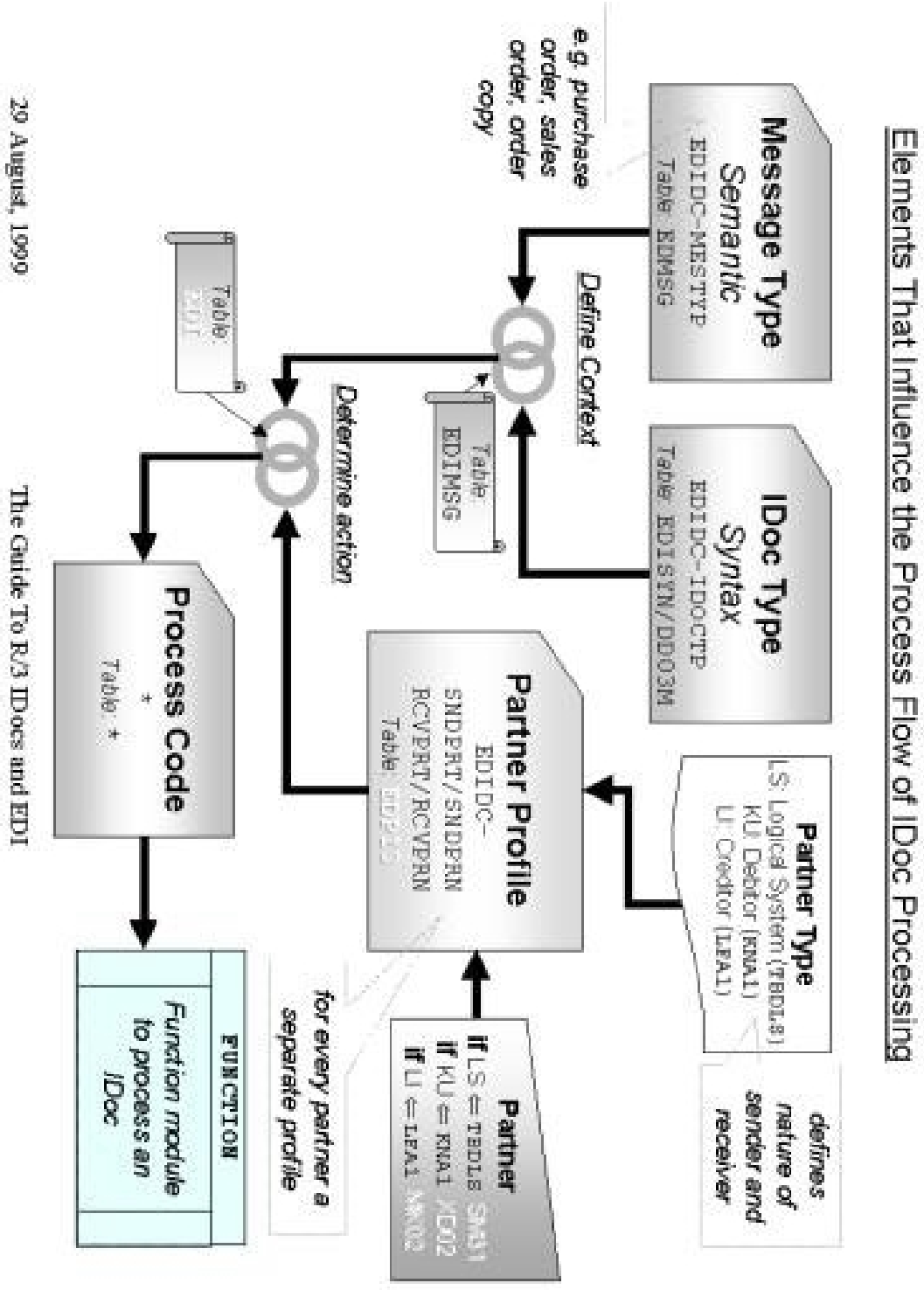


Illustration 8: Elements that influence IDoc processing

8.2 Creating An IDoc Segment WE31

The segment defines the structure of the records in an IDoc. They are defined with transaction WE31. We will define a structure to send a text from the text database.

Define a DDic structure with WE31

Transaction WE31 calls the IDoc segment editor. The editor defines the fields of a single segment structure. The thus defined IDoc segment is then created as a data dictionary structure. You can view the created structure with SE11 and use it in an ABAP as any TABLES declaration.

Example:

To demonstrate the use of the IDoc segment editor we will set up an example, which allows to send a single text from the text pool (tables **STXH** and **STXL**) as an IDoc. These are the texts that you can see with SO10 or edit from within many applications.

We will show the steps to define an IDoc segment **YAXX_THEAD** with the DDic structure of **THEAD**.

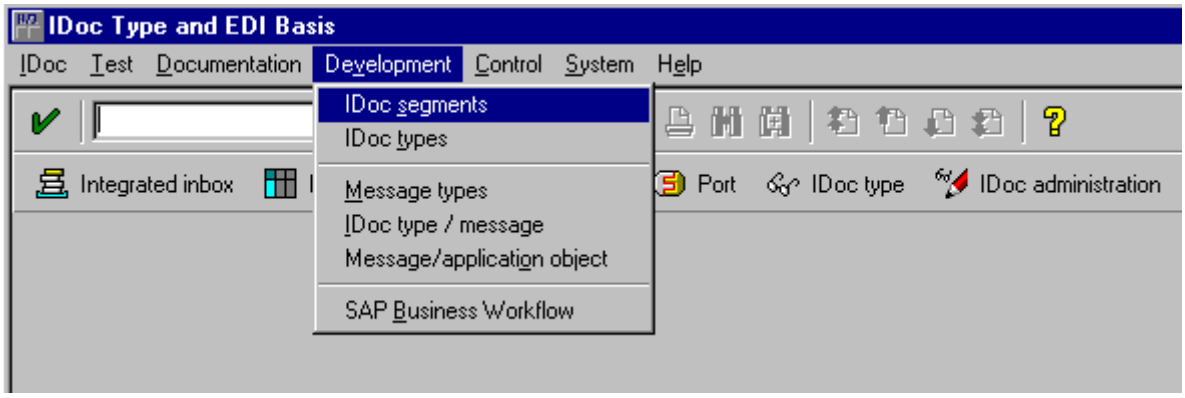


Illustration 3: WE31, define the IDoc segment

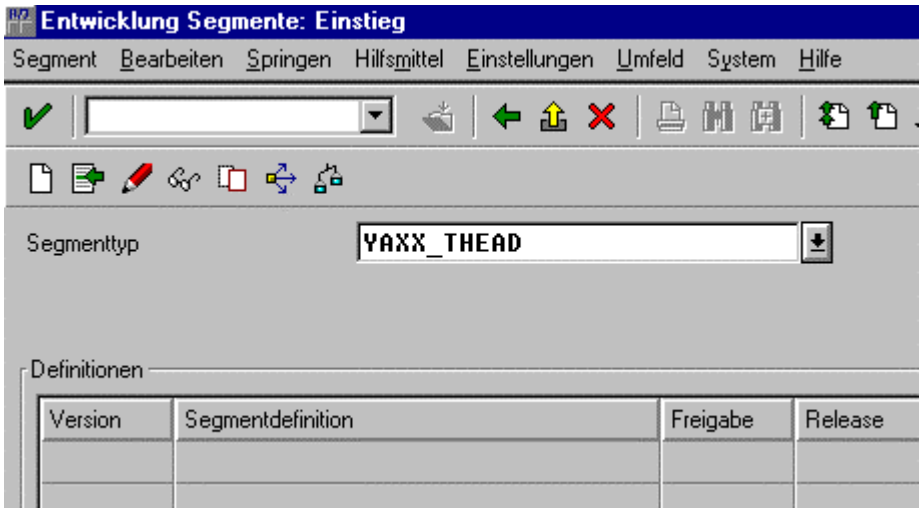


Illustration 4: Naming the segment

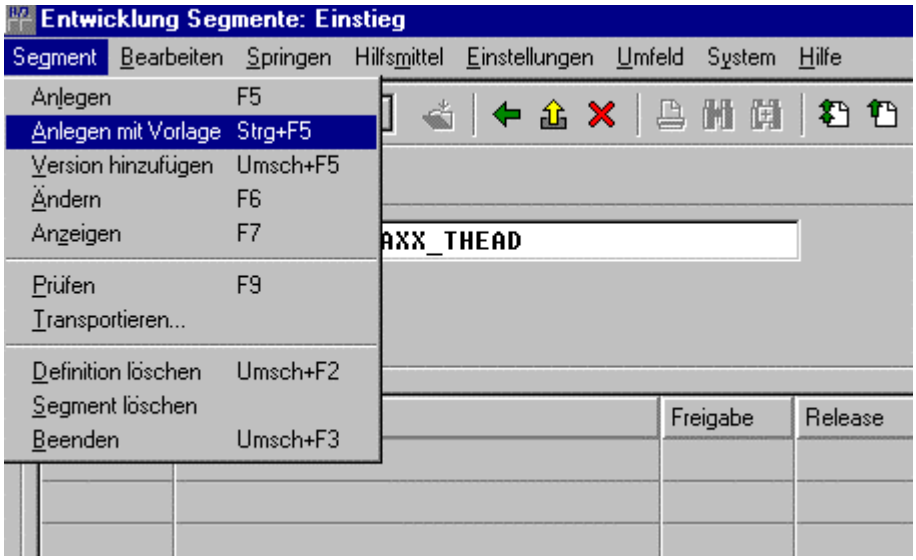


Illustration 5: Selecting a template

Copy the segment structure from a DDic object

To facilitate our work, we will use the "copy-from-template-tool", which reads the definition of a DDIC structure and inserts the field and the matching definitions as rows in the IDoc editor. You could of course define the structure completely manually, but using the template makes it easier.

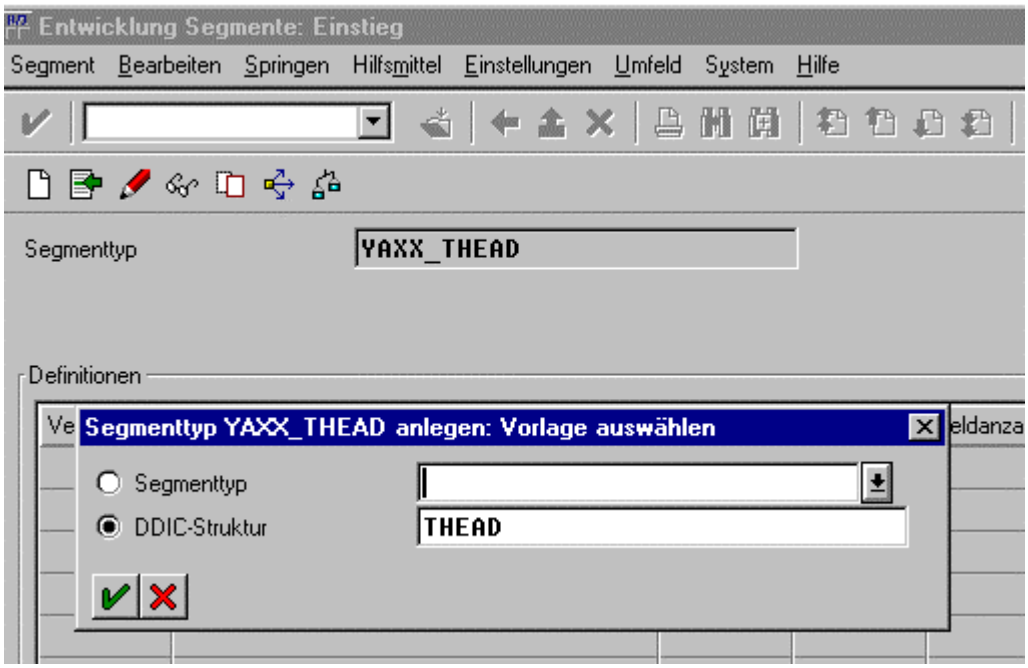
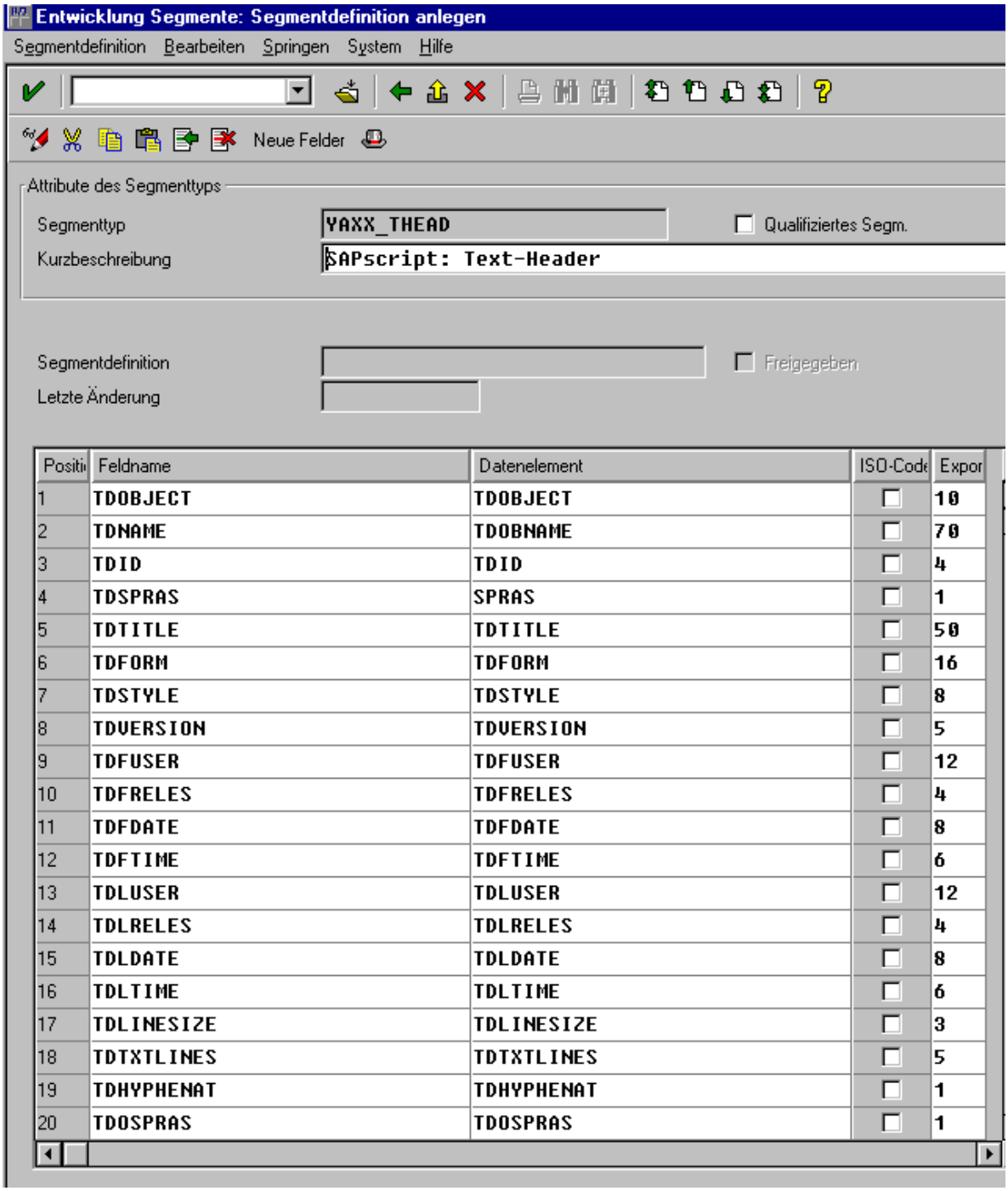


Illustration 6: Now select it really

The tool in release 4.0b lets you to use both DDIC structures or another IDoc segment definition as a template.



Positi	Feldname	Datenelement	ISO-Code	Expor
1	TDOBJECT	TDOBJECT	☐	10
2	TDNAME	TDOBNAME	☐	70
3	TDID	TDID	☐	4
4	TDSPRAS	SPRAS	☐	1
5	TDTITLE	TDTITLE	☐	50
6	TDFORM	TDFORM	☐	16
7	TDSTYLE	TDSTYLE	☐	8
8	TDVERSION	TDVERSION	☐	5
9	TDFUSER	TDFUSER	☐	12
10	TDFRELES	TDFRELES	☐	4
11	TDFDATE	TDFDATE	☐	8
12	TDFTIME	TDFTIME	☐	6
13	TDLUSER	TDLUSER	☐	12
14	TDLRELES	TDLRELES	☐	4
15	TDLDATE	TDLDATE	☐	8
16	TDLTIME	TDLTIME	☐	6
17	TDLINESIZE	TDLINESIZE	☐	3
18	TDTXTLINES	TDTXTLINES	☐	5
19	TDHYPHENAT	TDHYPHENAT	☐	1
20	TDOSPRAS	TDOSPRAS	☐	1

Illustration 7: Created structure

The definition creates automatically a corresponding DDic structure

The thus created structure can be edited any time. When saving, it will create a data dictionary structure based on the definition in WE31. The DDIC structure will retain the same name. You can view the structure as a table definition with **SE11** and use it in an ABAP the same way.

8.3 Defining The Message Type (EDMSG)

The message type defines the context under which an IDoc is transferred to its destination. It allows to use the same IDoc file format to use for several different applications.

Sales order becomes purchase order for receiver

Imagine the situation of sending a purchase order to a supplier. When the IDoc with the purchase order reaches the supplier, it will be interpreted as a sales order received from a customer, namely you.

Sales order can be forwarded and remains a sales order

Simultaneously you want to send the IDoc data to the suppliers warehouse to inform it, that a purchase order has been issued and is on the way.

Both IDoc receivers will receive the same IDoc format, however the IDoc will be tagged with a different message type. While the IDoc to the supplier will be flagged as a purchase order (in SAP R/3 standard: message type = ORDERS), the same IDoc sent to the warehouse should be flagged differently, so that the warehouse can recognize the order as a mere informational copy and process them differently than a true purchase order.

Message type plus IDoc type determine processing algorithm

The message type together with the IDoc type determine the processing function.

EDMSG

The message types are stored in table EDMSG.

WEDI

Defining the message type can be done from the transaction WEDI

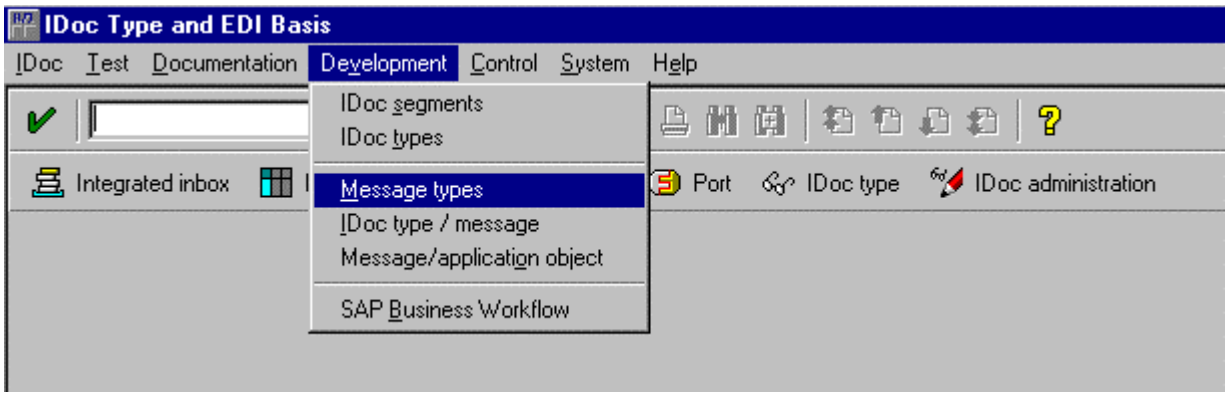


Illustration 8: EDMSG: Defining The Message Type (1)

EDMSG used as check table

The entry is only a base entry which tells the system, that the message type is allowed. Other transactions will use that table as a check table to validate the entry.

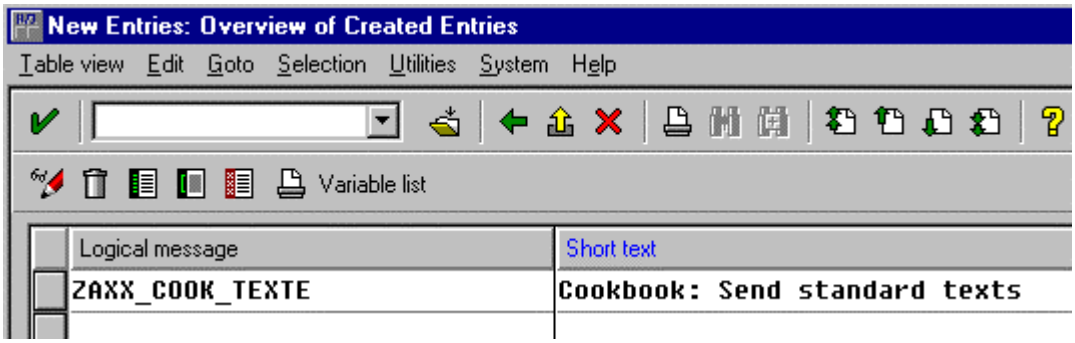


Illustration 9: EDMSG: Defining The Message Type (2)

8.4 Define Valid Combination Of Message and IDoc Types

The valid combinations of message type and IDoc type are stored in table EDIMSG.

Used for validation The declaration of valid combinations is done to allow validation, if the system can handle a certain combination.

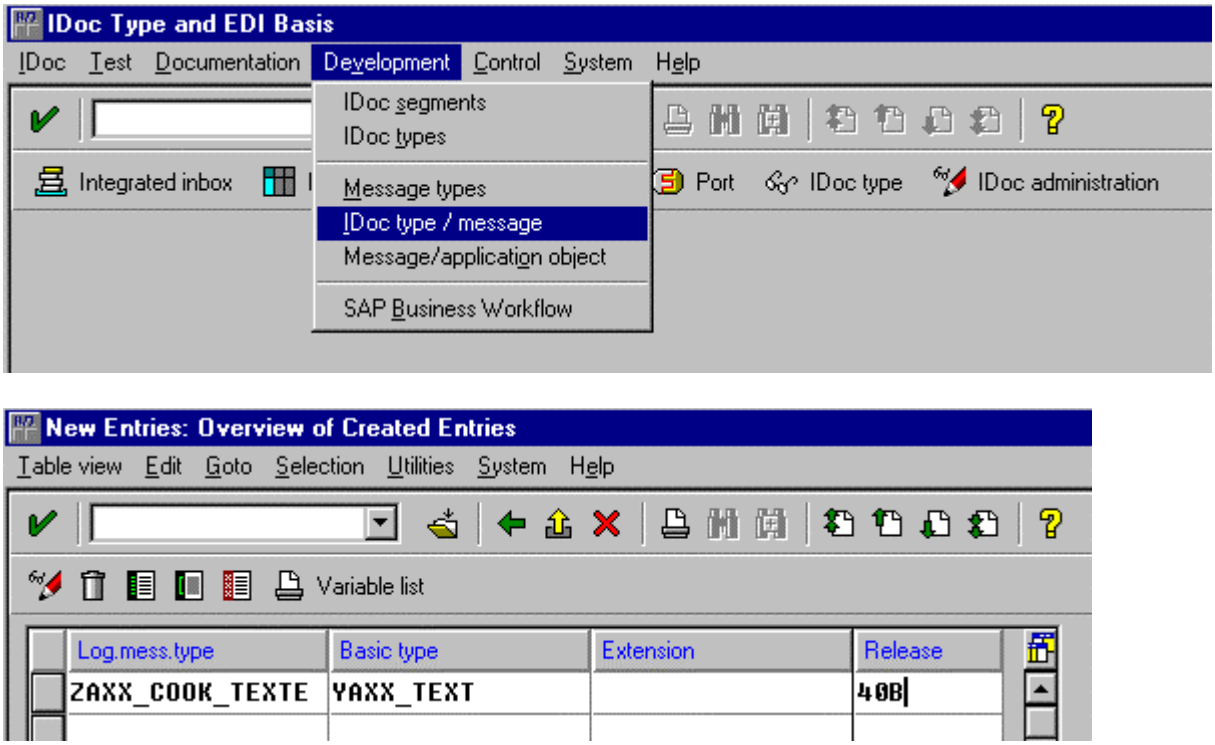


Illustration 10: EDIMSG: Define Valid Combination Of Message and IDoc Types

8.5 Assigning a processing function (Table EDIFCT)

The combination of message type and IDoc type determine the processing algorithm. This is usually a function module with a well defined interface or a SAP business object and is set up in table EDIFCT.

The entry made her points to a function module, which will be called when the IDoc is to be processed.

The entries for message code and message function are usually left blank. They can be used to derive sub types of messages together with the partner profile used.

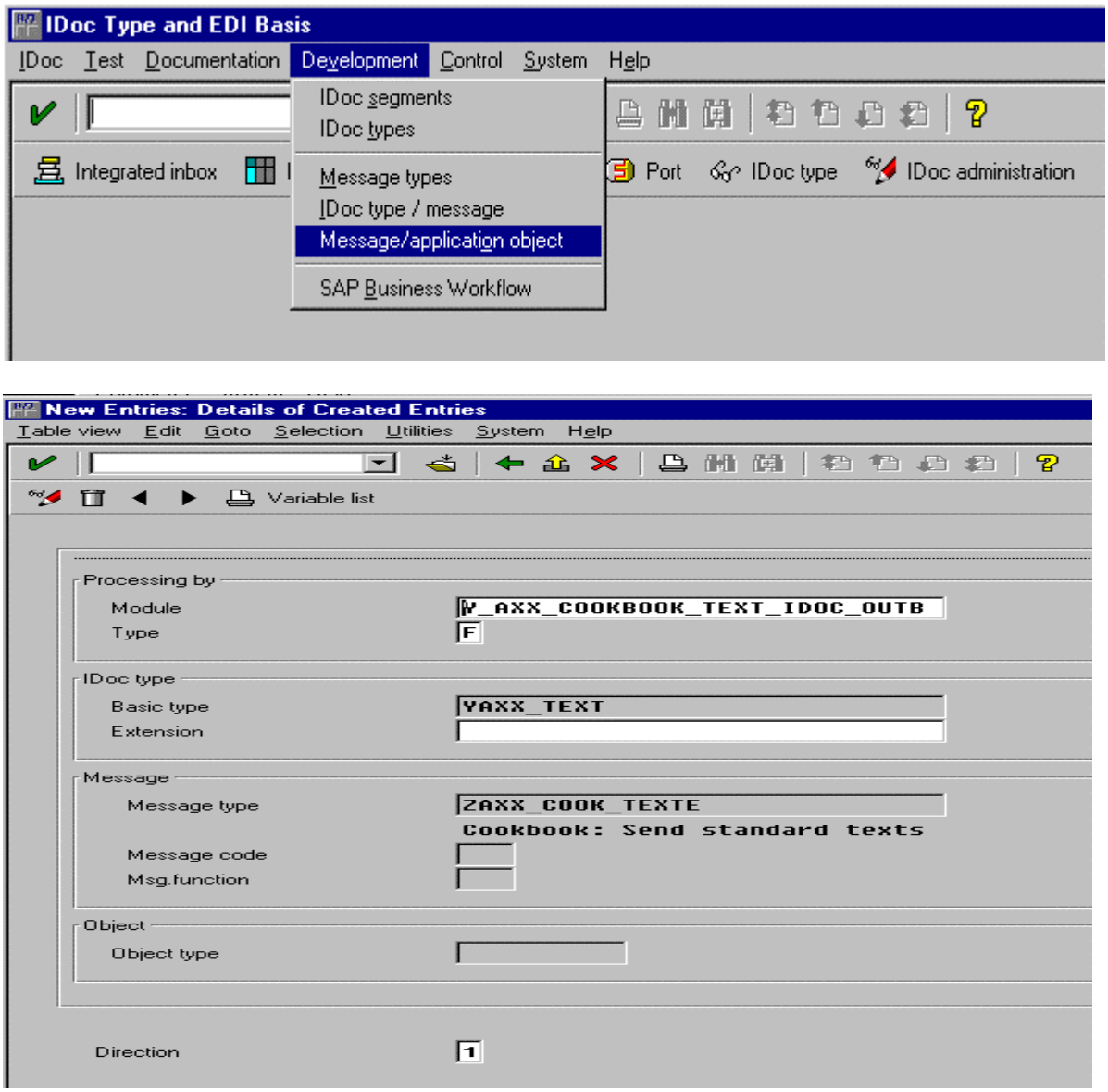


Illustration 11: Assign a handler function to a message/message type

The definition for inbound and outbound IDocs is analogous. Of course, the function module will be different.

8.6 Processing Codes

R/3 uses the method of logical process codes to detach the IDoc processing and the processing function module. They assign a logical name to function instead of specifying the physical function name.

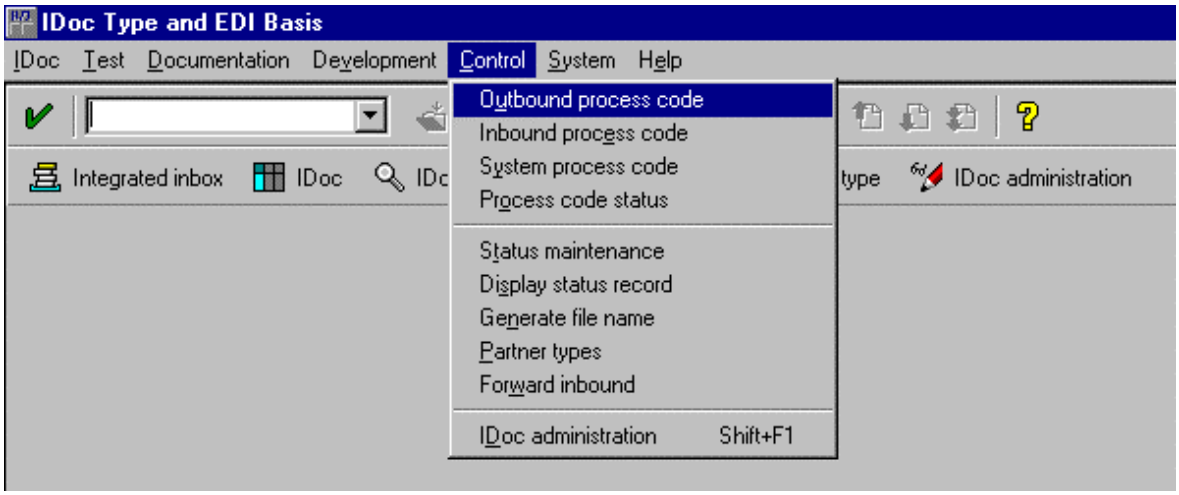
Logical pointer to a processing method

The IDoc functions are often used for a serious of message type/IDoc type combination. It happens that you need to replace the processing function by a different one. E.g. when you make a copy of a standard function to avoid modifying the standard.

Easy replacing of the processing method

The combination message type/IDoc will determine the logical processing code, which itself points to a function. If the function changes, only the definition of the processing codes will be changed and the new function will be immediately effective for all IDocs associated with the process code.

For inbound processing codes you have to specify the method to use for the determination of the inbound function.



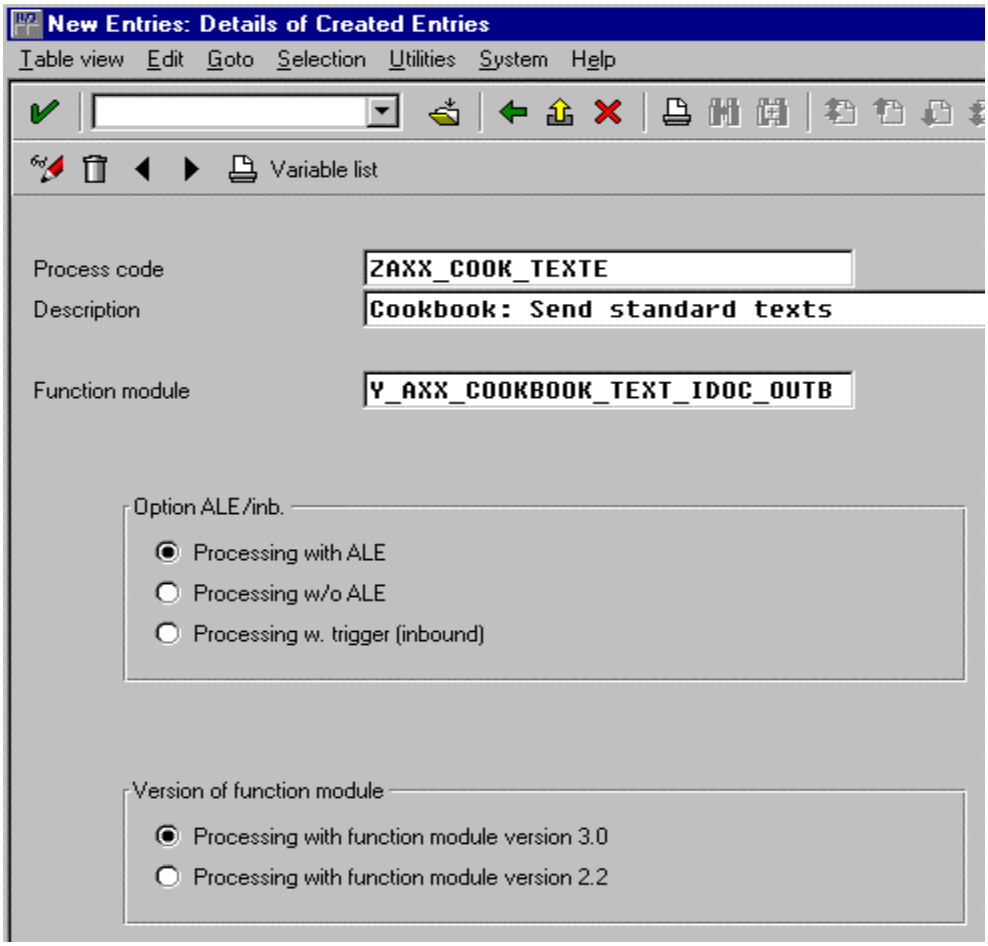


Illustration 12: Assign an outbound processing code (Step 1)

Processing with ALE This is the option you would usually choose. It allows processing via the ALE scenarios.

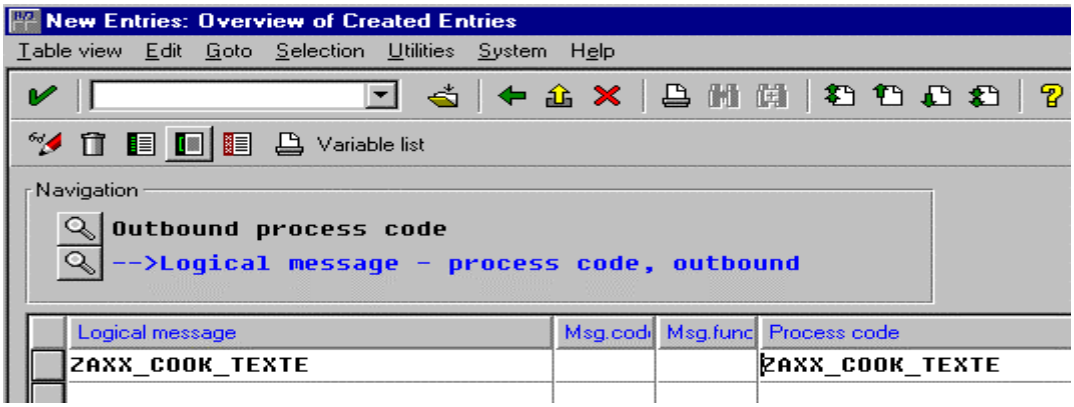


Illustration 13: Associate a processing code with a message type

Validate allowed message types After defining the processing code you have to assign it to one or several logical message types. This declaration is used to validate, if a message can be handled by the receiving system.

8.7 Inbound Processing Code

The inbound processing code is assigned analogously. The processing code is a pointer to a function module which can handle the inbound request for the specified IDoc and message type.

The definition of the processing code is telling the handler routine and assigning a serious of processing options.

Processing with ALE

You need to tick, if your function can be used via the ALE engine. This is the option you would usually choose. It allows processing via the ALE scenarios.

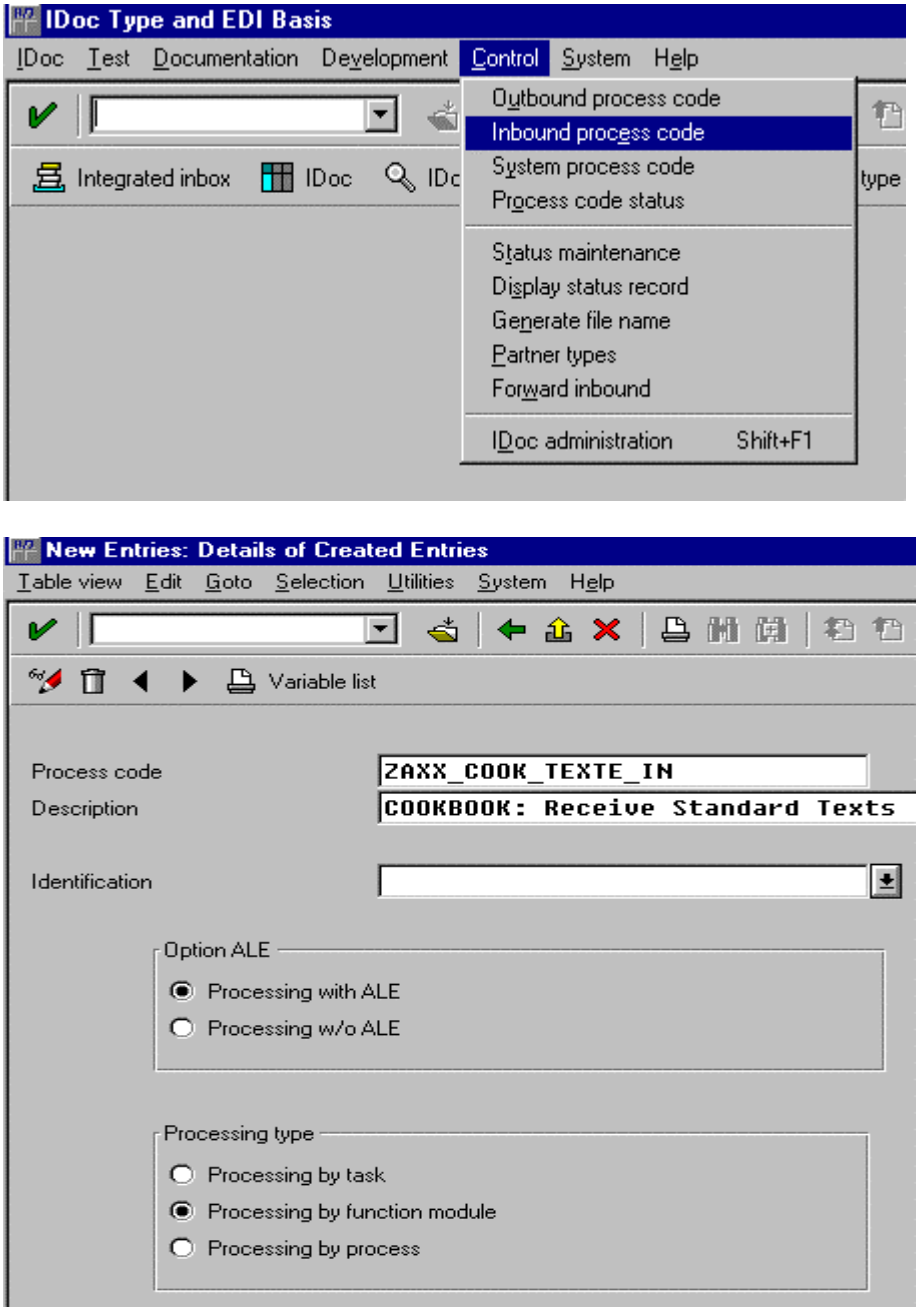


Illustration 14: Associate a function module with a process code

Table TBD51 to define if visible BTCI is allowed

For inbound processing you need to tell. whether the function will be capable of dialog processing. This is meant for those functions, which process the inbound data via call transaction. Those functions can be replayed in visible batch input mode to check why the processing might have failed.

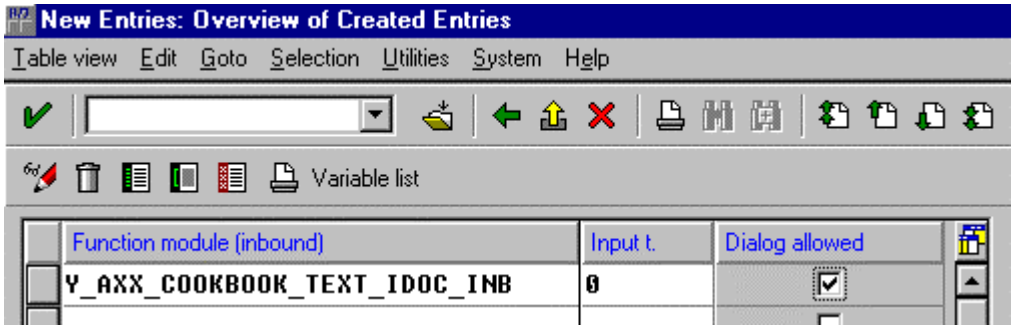


Illustration 15: Define if the processing can be done in dialog via call transaction

Validate allowed message types

After defining the processing code you have to assign it to one or several logical message types. This declaration is used to validate, if a message can be handled by the receiving system.

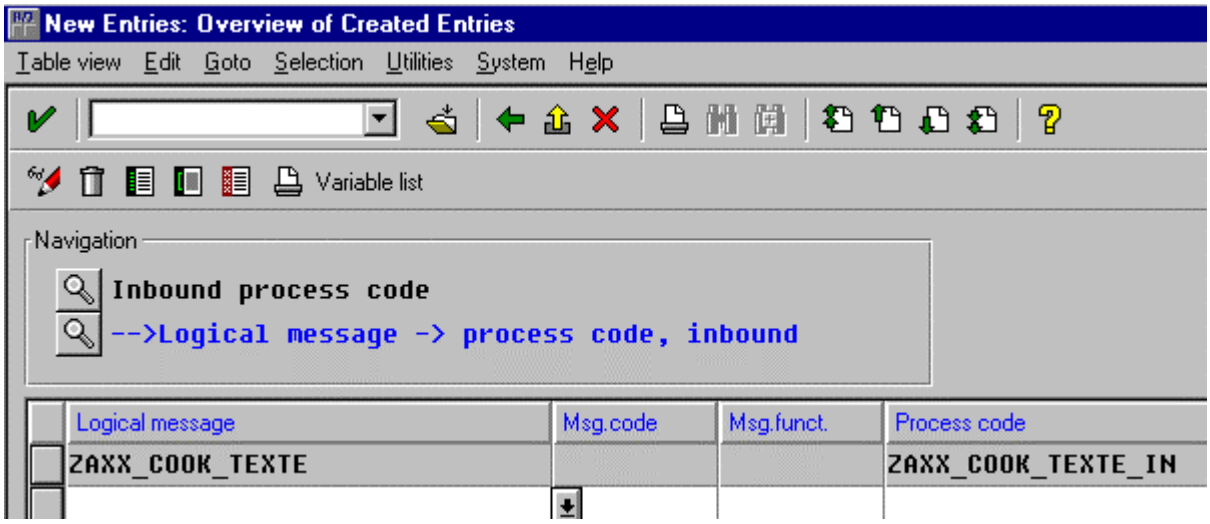
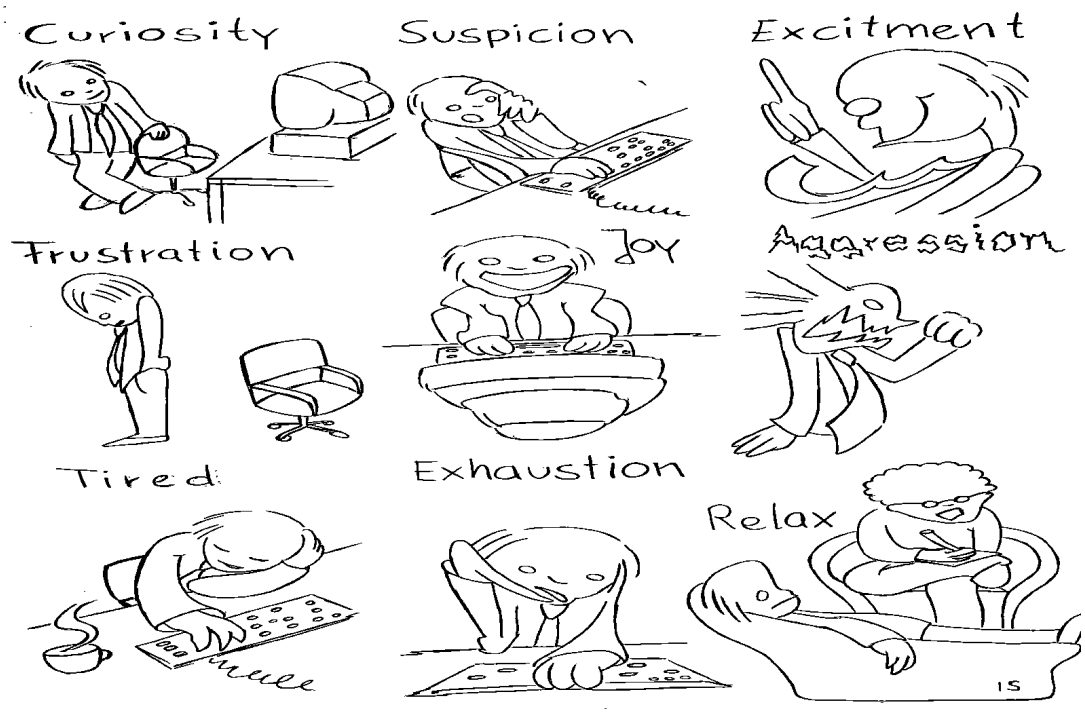


Illustration 16: Associate a processing code with a message type

The examples above showed only the association with a function module. You can also define business objects with transaction SWO1 and define them as a handler. For those familiar with the object model of R/3 it may be a design decision. In this book, we will deal with the function modules only.

IDoc Outbound Triggers

IDocs should be sent out at certain events. Therefore you have to define a trigger. A lot of consideration is required to determine the correct moment when to send out the IDoc. The IDoc can be triggered at a certain time or when an event is raised. R/3 uses several completely different methods to determine the trigger point. There are messages to tell the system that there is an IDoc waiting for dispatching, there are log files which may be evaluated to see if IDocs are due to send and there can be a workflow chain triggered, which includes the sending of the IDoc.



9.1 Individual ABAP

The simplest way to create IDocs, is to write an ABAP which simply does it.

The individual ABAP can either be a triggering ABAP which runs at certain events, e.g. every night, or it can be an ABAP which does the compete IDoc creation from scratch.

Triggering ABAP

A triggering ABAP would simply try to determine which IDocs need sending and call the appropriate IDoc creation routines.

ABAP creates the whole IDoc

You may also imagine the ABAP to do all the job. As this is mostly reinventing the wheel, it is not really recommended and should be reserved to situation, where the other solution do not provide an appropriate mean.

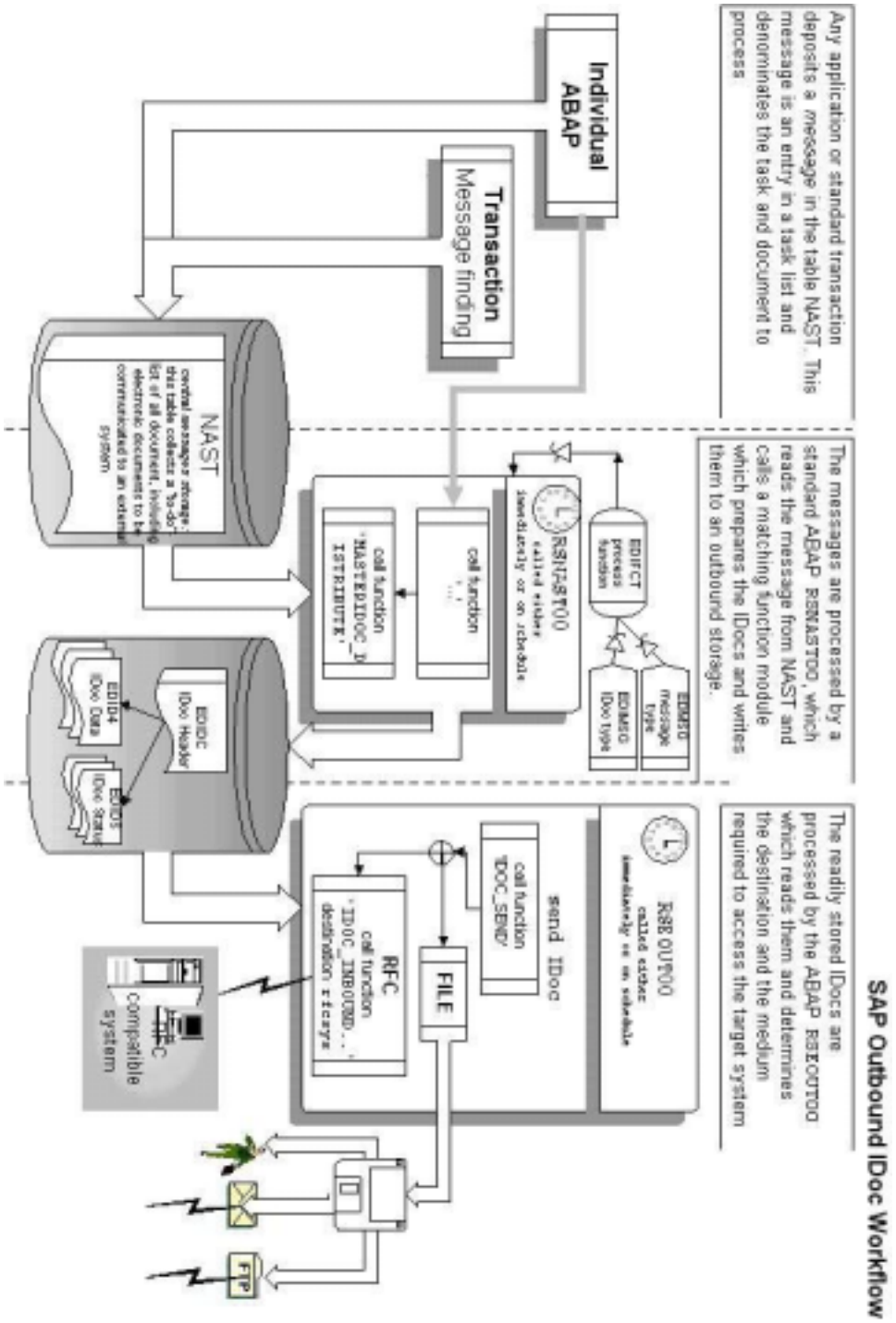


Illustration 9: General Process logic of IDoc outbound

9.2 NAST Messages Based Outbound IDocs

You can use the R/3 message concept to trigger IDocs the same way as you trigger SapScript printing.

One of the key tables in R/3 is the table **NAST**. This table records reminders written by applications. Those reminders are called messages.

Applications write messages to NAST, which will be processed by a message handler

Every time when an applications sees the necessity to pass information to a third party. a message is written to **NAST**. A message handler will eventually check the entries in the table and cause an appropriate action.

EDI uses the same mechanism as printing

The concept of NAST messages has originally been designed for triggering SapScript printing. The very same mechanism is used for IDocs, where the IDoc processor replaces the print task, as an IDoc is only the paperless form of a printed document.

Condition technique can mostly be used

The messages are usually be created using the condition technique, a mechanism available to all major R/3 applications.

Printing, EDI and ALE use the same trigger

The conditions are set up the same way for any output media. So you may define a condition for printing a document and then just change the output media from printer to IDoc/EDI or ALE.

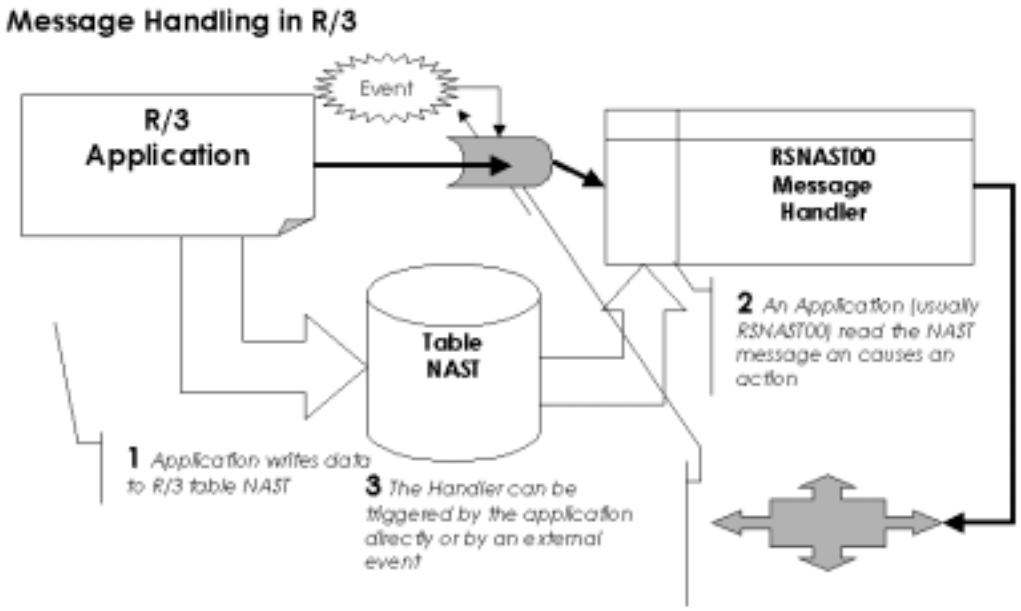


Illustration 10: Communicating with message via table NAST

NAST messages are created by application by calling function module MESSAGING

Creating NAST messages is a standard functionality in most of the SAP core applications. Those applications - e.g. **VA01**, **ME21** - perform calls to the central function module **MESSAGING** of group **V61B**. The function module uses customizing entries, mainly those of the tables T681* to T685*.

NAST contains object key, sender and receiver

A NAST output message is stored as a single record in the table NAST. The record stores all information that is necessary to create an IDoc. This includes mainly an object key to identify the processed object and application to the message handler and the sender and receiver information.

Programs RSNAST00 and RSNASTED provide versatile subroutines for NAST processing

The messages are typically processed by

```
FORM ENTRY in PROGRAM RSNAST00.
```

If we are dealing with printing or faxing and

```
FORM EDI_PROCESSING in PROGRAM RSNASTED.
```

If we are dealing with IDocs

```
FORM ALE_PROCESSING in PROGRAM RSNASTED.
```

If we are dealing with ALE.

The following piece of code does principally the same thing as RSNAST00 does and makes full use of all customizing settings for message handling.

FORM einzelnachricht IN PROGRAM RSNAST00

```
TABLES: NAST.
SELECT * FROM NAST ...
PERFORM einzelnachricht IN PROGRAM RSNAST00
```

Programs are customized in table TNAPR

The processing routine for the respective media and message is customized in the table **TNAPR**. This table records the name of a FORM routine, which processes the message for the chosen media and the name of an ABAP where this FORM is found.

9.3 The RSNAST00 ABAP

The ABAP RSNAST00 is the standard ABAP, which is used to collect unprocessed NAST message and to execute the assigned action.

RSNAST00 is the standard batch collector for messages

`RSNAST00` can be executed as a collector batch run, that eventually looks for unprocessed IDocs. The usual way of doing that is to define a batch-run job with transaction `SM37`. This job has to be set for periodic processing and start a program that triggers the IDoc re-sending.

RSNAST00 processes only messages of a certain status

Cave! `RSNAST00` will only look for IDocs which are set to `NAST-VSZTP = '1'` or `'2'` (Time of processing). `VSZPT = '3'` or `'4'` is ignored by `RSNAST00`.

For batch execution a selection variant is required

Start `RSNAST00` in the foreground first and find the parameters that match your required selection criteria. Save them as a VARIANT and then define the periodic batch job using the variant.

If `RSNAST00` does not meet 100% your needs you can create an own program similar to `RSNAST00`. The only requirement for this program are two steps:

```
* Read the NAST entry to process into structure
NAST
tables nast.
data: subrc like sy-subrc.....
select from NAST where .......
* then call FORM einzelnachricht(rsnast00) to
process the record
PERFORM einzelnachricht(rsnast00) USING subrc.
```

For special purposes copy RSNAST00 and modify

If RSNAST00 does not meet 100% your needs you can create an own program similar to RSNAST00. The only requirement for this program are two steps:

9.4 Sending IDocs Via RSNASTED

Standard R/3 provides you with powerful routines, to trigger, prepare and send out IDocs in a controlled way. There is only a few rare cases, where you do not want to send IDocs the standard way.

The ABAP RSNAST00 is the standard routine to send IDocs from entries in the message control. This program can be called directly, from a batch routine with variant or you can call the FORM einzelnachricht_screen(RSNAST00) from any other program, while having the structure NAST correctly filled with all necessary information.

RSNAST00 determines if it is IDoc or SapScript etc.

If there is an entry in table NAST, RSNAST00 looks up the associated processing routine in table TNAPR. If it is to send an IDoc with standard means, this will usually be the routine RSNASTED(EDI_PROCESSING) or RSNASTED(ALE_PROCESSING) in the case of ALE distribution.

RSNASTED processes IDocs

RSNASTED itself determines the associated IDoc outbound function module, executes it to fill the EDIDx tables and passes the prepared IDoc to the port.

You can call the standard processing routines from any ABAP, by executing the following call to the routine. You only have to make sure that the structure NAST is declared with the tables statement in the calling routine and that you fill the at least the key part and the routing information before.

```
TABLES NAST.
NAST-MANDT = SY-MANDT.
NAST-KSCHL = 'ZEDIK'.
NAST-KAPPL = 'V1'.
NAST-OBJKY = '0012345678'.
NAST-PARNR = 'D012345678'.
PERFORM einzelnachricht_screen(RSNAST00).
```

Calling einzelnachricht_screen determines how the message is processed. If you want to force the IDoc-processing you can call it directly:

```
TNAPR-PROGN = ''.
TNAPR-ROUTN = 'ENTRY'.
PERFORM edi_processing(RSNASTED).
```

9.5 Sending IDocs Via RSNAST00

Here is the principle flow how RSNAST00 processes messages for IDocs.

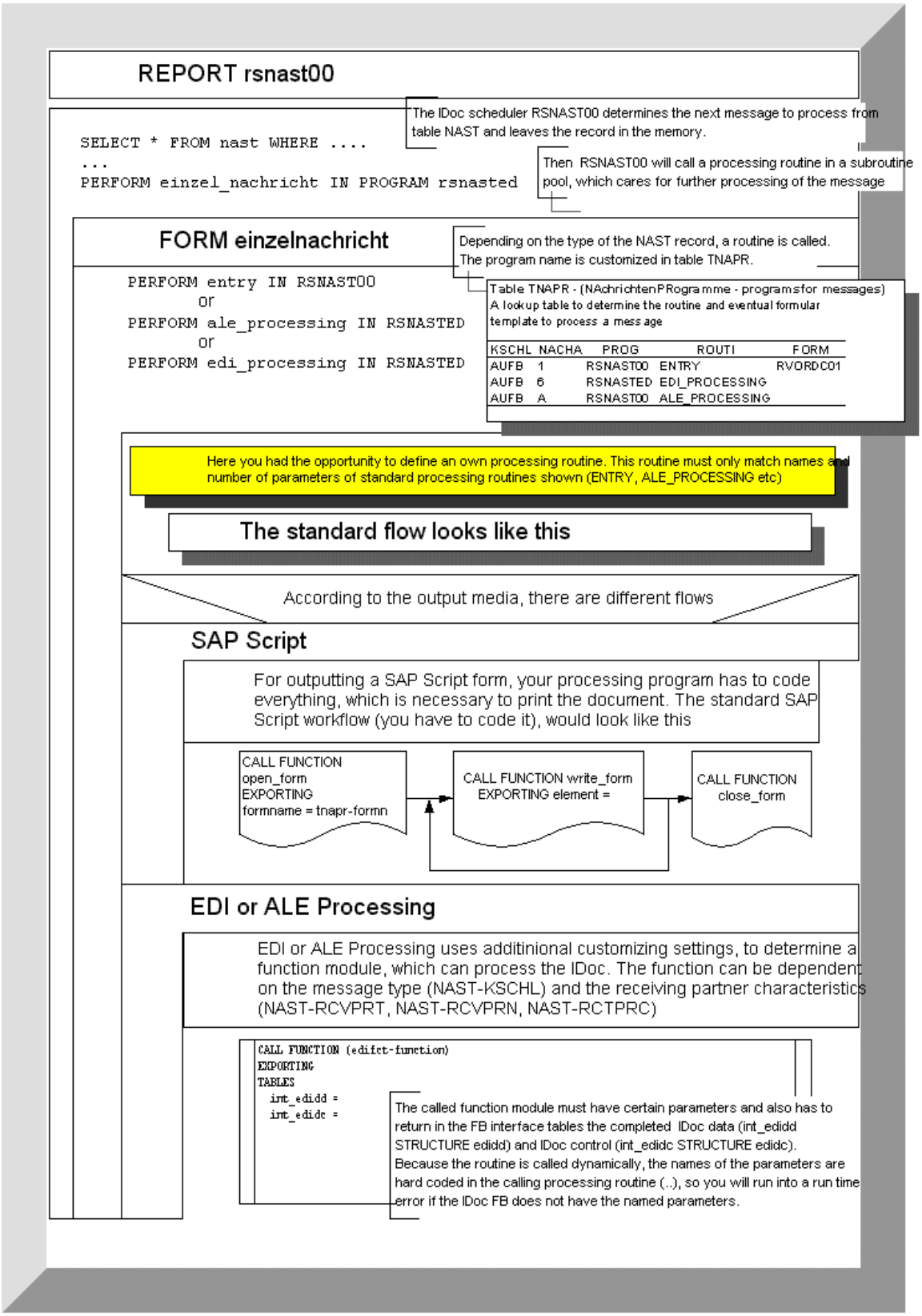


Illustration 11: Process logic of RSNAST00 ABAP

9.6 Workflow Based Outbound IDocs

Unfortunately, there are application that do not create messages. This is especially true for master data applications. However, most applications fire a workflow event during update, which can easily be used to trigger the IDoc distribution.

SWE_EVENT_CREATE

Many SAP R/3 applications issue a call to the function SWE_EVENT_CREATE during update. This function module ignites a simple workflow event.

Workflow is a call to a function module

Technically a workflow event is a timed call to a function module, which takes the issuing event as the key to process a subsequent action.

Applications with change documents always trigger workflow events

If an application writes regular change documents (*ger.: Änderungsbelege*) to the database, it will issue automatically a workflow event. This event is triggered from within the function CHANGEDOCUMENT_CLOSE. The change document workflow event is always triggered, independent of the case whether a change document is actually written.

Workflow coupling can be done by utility functions

In order to make use of the workflow for IDoc processing, you do not have to go through the cumbersome workflow design procedure as it is described in the workflow documentation. For the mentioned purpose, you can register the workflow handler from the menu, which says Event Coupling from the BALD transaction.

Workflow cannot easily be restarted

Triggering the IDoc from a workflow event has a disadvantage: if the IDoc has to be repeated for some reason, the event cannot be repeated easily. This is due to the nature of a workflow event, which is triggered usually from a precedent action. Therefore you have to find an own way how to make sure that the IDoc is actually generated, even in the case of an error. Practically this is not a very big problem for IDocs. In most cases the creation of the IDoc will always take place. If there is a problem, then the IDoc would be stored in the IDoc base with a respective status, so it will show in transaction WE05 and can be resend from there.

9.7 Workflow Event From Change Document

Instead of waiting for a polling job to create IDocs, they can also be created immediately after a transaction finishes. This can be done by assigning an action to an workflow event.

Workflow events are usually fired from an update routine

Most application fire a workflow event from the update routine by calling the function

```
FUNCTION swe_event_create
```

SWLD lets install and log workflows

You can check if an application fires events by activating the event log from transaction SWLD. Calling and saving a transaction will write the event's name and circumstances into the log file.

If an application does not fire workflow events directly, there is still another chance that a workflow may be used without touching the R/3 original programs.

Workflow Events are also fired from change document

Every application that writes change documents triggers a workflow event from within the function module CHANGEDOCUMENT_CLOSE, which is called form the update processing upon writing the change document. This will call the workflow processor

```
FUNCTION swe_event_create_changedocument
```

Both workflow types are not compatible with each other with respect to the function modules used to handle the event.

The workflow types are incompatible but work according the same principal

Both will call a function module whose name they find in the workflow linkage tables. `swe_event_create` will look in table **SWETYPECOU** while `swe_event_create_changedocument` would look in **SWECDOBJ** for the name of the function module.

The workflow handler will be called dynamically

If a name is found, the function module will then be called dynamically. This is all to say about the linkage of the workflow.

The dynamic call looks like the following.

```
CALL FUNCTION swecdobj-objtypefb
EXPORTING
changedocument_header = changedocument_header
objecttype = swecdobj-objtype
IMPORTING
objecttype = swecdobj-objtype
TABLES
changedocument_position =
changedocument_position.
```

9.8 ALE Change Pointers

Applications which write change documents will also try to write change pointers for ALE operations. These are log entries to remember all modified data records relevant for ALE.

Most applications write change documents. These are primarily log entries in the tables **CDHDR** and **CDPOS**.

Change docs remember changes in transaction

Change documents remember the modified fields made to the database by an application. They also remember the user name and the time when the modification took place.

Data elements are marked to be relevant for change documents

The decision whether a field modification is relevant for a change document is triggered by a flag of the modified field's data element. You can set the flag with SE11 by modifying the data element.

ALE may need other triggers

For the purpose of distributing data via ALE to other systems, you may want to choose other fields, which shall be regarded relevant for triggering a distribution.

Therefore R/3 introduced the concept of change pointers, which are nothing else than a second log file specially designed for writing the change pointers which are meant to trigger IDoc distribution via ALE.

Change pointers remember key of the document

So the change pointers will remember the key of the document every time when a relevant field has changed.

An ABAP creates the IDocs

Change pointers are then evaluated by an ABAP which calls the IDoc creation, for every modified document found in the change pointers.

Change pointers are when change documents have been written

The Change pointers are written from the routine `CHANGEDOCUMENT_CLOSE` when saving the generated change document. So change pointers are automatically written when a relevant document changes.

The following function is called from within `CHANGEDOCUMENT_CLOSE` in order to write the change pointers.

```
CALL FUNCTION 'CHANGE_POINTERS_CREATE'
EXPORTING
change_document_header = cdhdr
TABLES
change_document_position = ins_cdpos.
```

9.9 Activation of change pointer update

Change pointers are log entries to table BDCP which are written every time a transaction modifies certain fields. The change pointers are designed for ALE distribution and written by the function CHANGE_DOCUMENT_CLOSE.

Change pointers are written for use with ALE. There are ABAPs like RBDMIDOC which can read the change pointers and trigger an IDoc for ALE distribution.

The change pointers are mainly the same as change documents. They however can be set up differently, so fields which trigger change documents are not necessarily the same that cause change pointers to be written.

In order to work with change pointers there are two steps to be performed

1. Turn on change pointer update generally
2. Decide which message types shall be included for change pointer update

Activate Change Pointer Generally

R3 allows to activate or deactivate the change pointer update. For this purpose it maintains a table **TBDA1**. The decision whether the change pointer update is active is done with a

```
Function Ale_Component_Check
```

Currently (release 40B) this check does nothing else than to check, if this table has an entry or not. If there is an entry in **TBDA1**, the ALE change pointers are generally active. If this table is empty, change pointers are turned off for everybody and everything, regardless of the other settings.

The two points read like you had the choice between turning it on generally or selectively. This is not the case: you always turn them on selectively. The switch to turn on generally is meant to activate or deactivate the whole mechanism.

reading the change pointers which are not yet processed

The change pointers which have not been processed yet, can be read with a function module.

```
Call Function 'CHANGE_POINTERS_READ'
```

RBDMIDOC

The ABAP RBDMIDOC will process all open change pointers and distribute the matching IDocs.

Use Change Documents Instead Of Change Pointers

When you want to send out an IDoc unconditionally every time a transaction updates, you better use the workflow from the change documents.

9.10 Dispatching ALE IDocs for Change Pointers

Change pointers must be processed by an ABAP, e.g. RBDMIDOC.

RBDMIDOC processes change pointers and sends the IDocs

The actual distribution of documents from change pointers must be done by an ABAP, which reads the change pointers and processes them. The standard ABAP for that is `RBDMIDOC`. For recurring execution it can be submitted in a scheduled job using `SM35` .

Function module defined in table TBDME

It then calls dynamically a function module whose name is stored in table **`TBDME`** for each message type.

```
Call Function Tbdme-Idocfbname
   Exporting
      Message_Type = Mestyp
      Creation_Date_High = Date
      Creation_Time_High = Time
   Exceptions
      Error_Code_1.
```

Example

A complex example for a function module, which collects the change pointers, can be examined in: `MASTERIDOC_CREATE_SMD_DEBMAS` .
This one reads change pointers for debtors (customer masters). During the processing, it calls the actual IDoc creating module `MASTERIDOC_CREATE_DEBMAS` .

To summarize the change pointer concept

- Change pointers record relevant updates of transaction data
- Change pointers are written separate from the change documents, while at the same time
- Change pointers are evaluated by a collector run

BDCPS	Change pointer: Status
BDCP	Change pointer
BDCPV	A view with **BDCP** and **BDCPS** combined: Change pointer with status
TBDA2	Declare activate message types for change pointers with view **V_TBDA2**.or transaction BD50 or . SALE -> Activate change pointers for message types
TBD62	The view **V_TBD62** defines those fields which are relevant for change pointer creation. The table is evaluated by the CHANGE_DOCUMENT_CLOSE function. The object is the same used by the change document. To find out the object name, look for CHANGE_DOCUMENT_CLOSE in the transaction you are inspecting or see table **CDHDR** for traces.

Illustration 12: Tables involved in change pointers processing

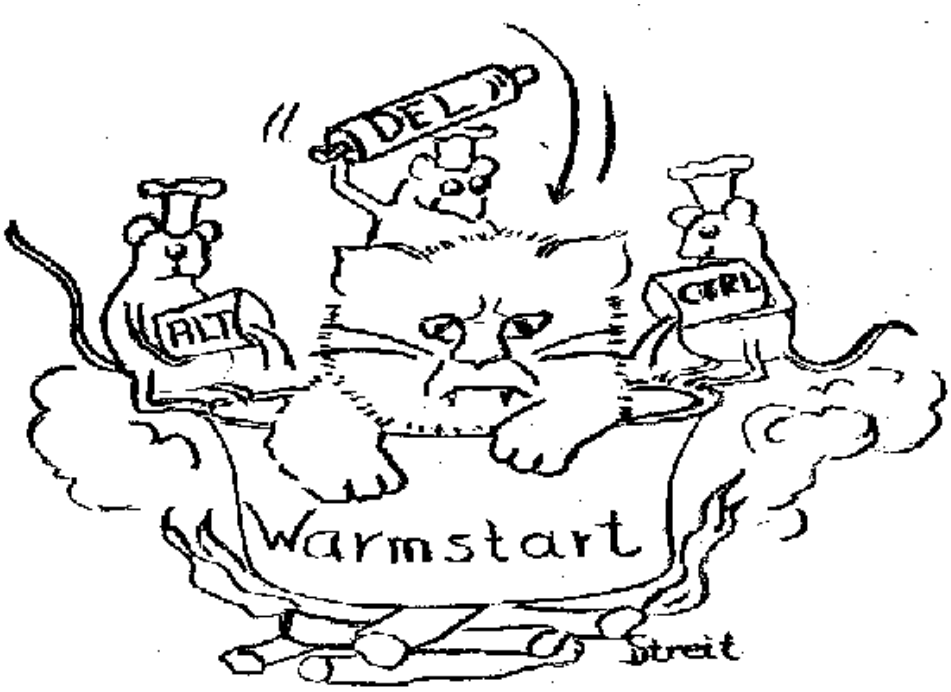
Sample content of view V_TBD62

Object	Table name	Field
DEBI	KNA1	NAME3
DEBI	Kann1	ORT01
DEBI	Kann1	REGIO

Illustration 13: Sample content of view V_TBD62

IDoc Recipes

The chapter shall show you how an IDoc function is principally designed and how R/3 processes the IDocs.



10.1 How the IDoc Engine Works

IDocs are usually created in a four step process. These steps are: retrieving the data, converting them to IDoc format, add a control record and delivering the IDoc to a port.

Collect data from R/3 database

This is the most individual task in outbound processing. You have to identify the database tables and data dependencies, which are needed in the IDoc to be sent. The smartest way is usually to select the data from database into an internal table using `SELECT * FROM dbtable INTO itab ... WHERE ...`

Wrap data in IDoc format

The collected data must be transformed into ASCII data and filled into the predefined IDoc segment structures. The segment definitions are done with transaction WE31 and the segments allowed in an IDoc type are set up in transaction WE30. Segment once defined with WE31 are automatically created as SAP DDIC structures. They can be viewed with SE11, however they cannot be edited

Create the IDoc control record

Every IDoc must be accompanied by a control record. This record must contain at least the IDoc type to identify the syntactical structure of the data and it must contain the name and role of the sender and the receiver. This header information is checked against the partner definitions for outbound. Only if a matching partner definition exists, the IDoc can be sent. Partner definitions are set up with transaction WE20.

Send data to port

When the partner profile check passes, the IDoc is forwarded to a logical port, which is also assigned in the partner profile. This port is set up with transaction WE21 and defines the medium to transport the IDoc, e.g. file or RFC. The RFC destinations are set up with transaction SM57 and must also be entered in table TBDLS with an SM31 view. Directories for outbound locations of files are set up with transaction FILE and directly in WE21. It also allows to use a function module which generate file names. Standard functions for that purpose begin like EDI_FILE*.

10.2 How SAP Standard Processes Inbound IDocs

When you receive an IDoc the standard way, the data is stored in the IDoc base and a function module is called, which decides how to process the received information.

EDID4 - Data Data is stored in table EDID4 (EDID3 up to release 3.xx, EDIDD up to release 2.xx)

EDIDC - Control Record An accompanying control record with important context and administrative information is stored in table EDIDC.

Event signals readiness After the data is stored in the IDoc base tables, an event is fired to signal that there is an IDoc waiting for processing. This event is consumed by the IDoc handler, which decides, whether to process the IDoc immediately, postpone processing or decline activity for whatever reason.

EDIFCT - Processing function When the IDoc processor thinks it is time to process the IDoc it will have a look into table EDIFCT , where it should find the name of a function module, which will be called to process the IDoc data.

This function module is the heart of all inbound processing. The IDoc processor will call this routine and pass the IDoc data from EDID4 and the control record from EDIDC for the respective IDoc.

Function has a fixed interface Because this routine is called dynamically it must adhere to some conventions, where the most important ones are: the interface parameters of the function must match the following call:

EDIDS - Status log The processing steps and their respective status results are stored in table EDIDS.

Status must be logged properly In addition the routine has to determine properly the next status of the IDoc in table EDIDS, usually it will be EDIDS-STATU = 53 for OK or 51 for error.

10.3 How To Create the IDoc Data

R/3 provides a sophisticated IDoc processing framework. This framework determines a function module, which is responsible for creating or processing the IDoc.

Function Module to generate the IDoc

The kernel of the IDoc processing is always a distinct function module. For the outbound processing the function module creates the IDoc and leaves it in an internal table, which is passed as interface parameter.

During inbound processing the function module receives the IDoc via an interface parameter table. It would interpret the IDoc data and typically update the database either directly or via a call transaction.

Function are called dynamically

The function modules are called dynamically from a standard routine. Therefore the function must adhere to a well defined interface.

Function group `EDIN` with useful routines

You may want to investigate the function group **`EDIN`**, which contains a number of IDoc handler routines and would call the customized function.

Copy and modify existing routines

The easiest way, to start the development of an Outbound IDoc function module, is to copy an existing one. There are many samples in the standard R/3 repository, most are named IDOC_OUTBOUND* or IDOC_OUTPUT*

Outbound sample functions are named like `IDOC_OUTPUT*`

```
FUNCTION IDOC_OUTPUT_ORDERS01
```

Inbound sample functions are named like `IDOC_INPUT*`

```
FUNCTION IDOC_INPUT_ORDERS01
```

Outbound sample functions for master data are named like `MASTERIDOC_INPUT*`

```
FUNCTION MASTERIDOC_CREATE_MATMAS
```

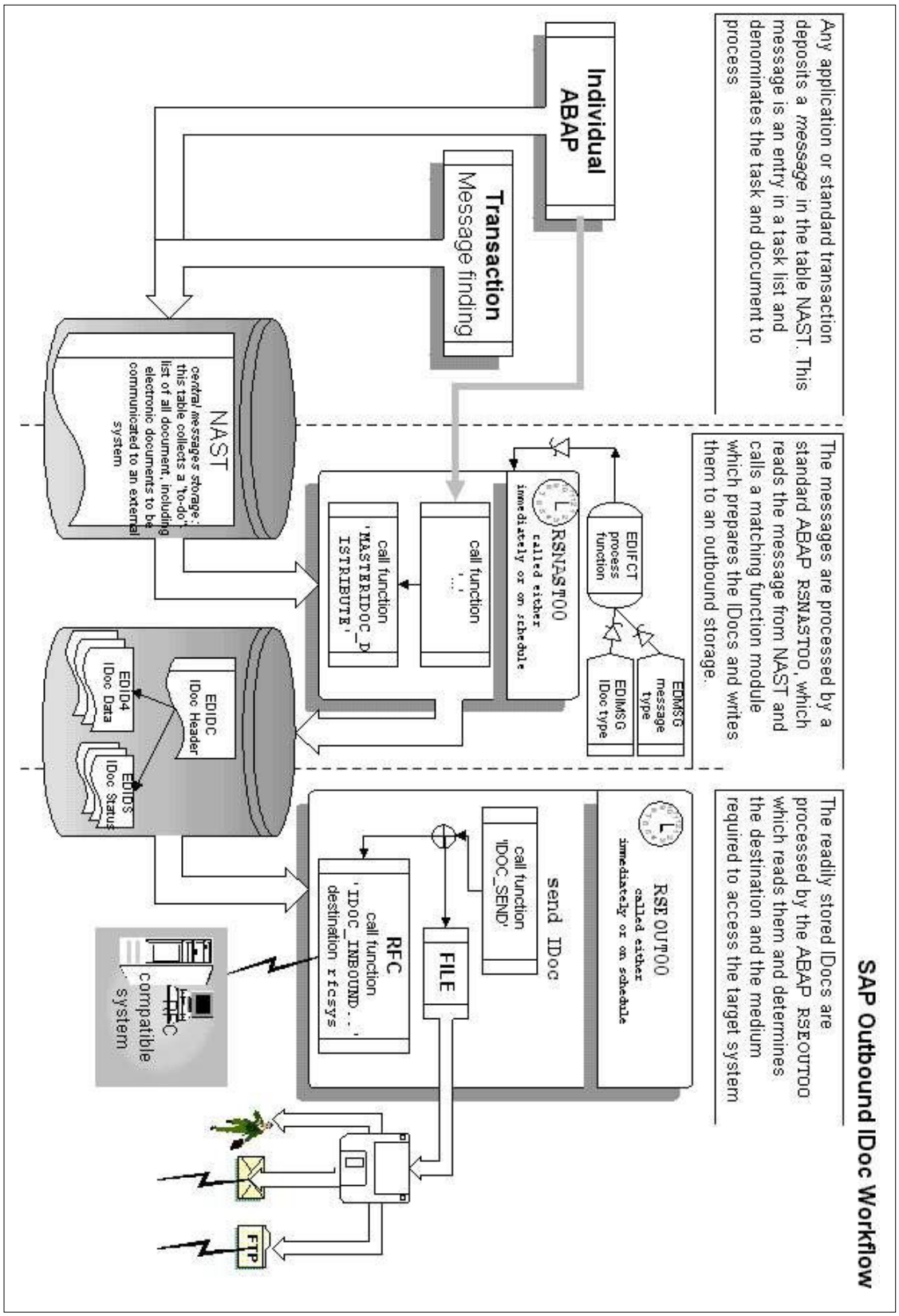


Illustration 14: Schematic of an IDoc Outbound Process

10.4 Interface Structure of IDoc Processing Functions

To use the standard IDoc processing mechanism the processing function module must have certain interface parameters, because the function is called dynamically from a standard routine.

The automated IDoc processor will call your function module from within the program `RSNASTED`, usually either from the `FORM ALE_PROCESSING` or `EDI_PROCESSING`.

In order to be compatible with this automated call, the interface of the function module must be compliant.

```
FUNCTION Z_IDOC_OUTBOUND_SAMPLE.
*"       IMPORTING
*"             VALUE(FL_TEST) LIKE  RS38L-OPTIONAL DEFAULT 'X'
*"             VALUE(FL_COMMIT) LIKE  RS38L-OPTIONAL DEFAULT SPACE
*"       EXPORTING
*"             VALUE(F_IDOC_HEADER) LIKE  EDIDC STRUCTURE  EDIDC
*"       TABLES
*"              T_IDOC_CONTRL STRUCTURE  EDIDC
*"              T_IDOC_DATA STRUCTURE  EDIDD
*"       CHANGING
*"             VALUE(CONTROL_RECORD_IN) LIKE  EDIDC STRUCTURE  EDIDC
*"             VALUE(OBJECT) LIKE  NAST STRUCTURE  NAST
*"       EXCEPTIONS
*"              ERROR_IN_IDOC_CONTROL
*"              ERROR_WRITING_IDOC_STATUS
*"              ERROR_IN_IDOC_DATA
*"              SENDING_LOGICAL_SYSTEM_UNKNOWN
*"              UNKNOWN_ERROR
```

Program 3: Interface structure of an NAST compatible function module

Inbound functions are also called via a standard mechanism.

```
FUNCTION IDOC_INPUT_SOMETHING.
*"       IMPORTING
*"             VALUE(INPUT_METHOD) LIKE  BDWFAP_PAR-INPUTMETHD
*"             VALUE(MASS_PROCESSING) LIKE  BDWFAP_PAR-MASS_PROC
*"       EXPORTING
*"             VALUE(WORKFLOW_RESULT) LIKE  BDWFAP_PAR-RESULT
*"             VALUE(APPLICATION_VARIABLE) LIKE  BDWFAP_PAR-APPL_VAR
*"             VALUE(IN_UPDATE_TASK) LIKE  BDWFAP_PAR-UPDATETASK
*"             VALUE(CALL_TRANSACTION_DONE) LIKE  BDWFAP_PAR-CALLTRANS
*"       TABLES
*"              IDOC_CONTRL STRUCTURE  EDIDC
*"              IDOC_DATA STRUCTURE  EDIDD
*"              IDOC_STATUS STRUCTURE  BDIDOCSTAT
*"              RETURN_VARIABLES STRUCTURE  BDWFRETVAR
*"              SERIALIZATION_INFO STRUCTURE  BDI_SER
```

Program 4: Interface structure of an IDoc inbound function

10.5 Recipe To Develop An Outbound IDoc Function

This is an individual coding part where you need to retrieve the information from the database and prepare it in the form the recipient of the IDoc will expect the data

Read data to send The first step is reading the data from the database, the one you want to send.

```
FUNCTION Y_AXX_COOKBOOK_TEXT_IDOC_OUTB.
*"----------------------------------------------------------------------
*"*"Lokale Schnittstelle:
*"       IMPORTING
*"             VALUE(I_TDOBJECT) LIKE  THEAD-TDOBJECT DEFAULT 'TEXT'
*"             VALUE(I_TDID) LIKE  THEAD-TDID DEFAULT 'ST'
*"             VALUE(I_TDNAME) LIKE  THEAD-TDNAME
*"             VALUE(I_TDSPRAS) LIKE  THEAD-TDSPRAS DEFAULT SY-LANGU
*"       EXPORTING
*"             VALUE(E_THEAD) LIKE  THEAD STRUCTURE  THEAD
*"       TABLES
*"              IDOC_DATA STRUCTURE  EDIDD OPTIONAL
*"              IDOC_CONTRL STRUCTURE  EDIDC OPTIONAL
*"              TLINES STRUCTURE  TLINE OPTIONAL
*"       EXCEPTIONS
*"              FUNCTION_NOT_EXIST
*"              VERSION_NOT_FOUND
*"----------------------------------------------------------------------
  CALL FUNCTION 'READ_TEXT'
       EXPORTING
            ID                      = ID
            LANGUAGE                = LANGUAGE
            NAME                    = NAME
            OBJECT                  = OBJECT
       TABLES
            LINES                   = LINES.
* now stuff the data into the Idoc record format
  PERFORM PACK_LINE TABLES IDOC_DATA USING 'THEAD' E_THEAD.
  LOOP AT LINES.
    PERFORM PACK_LINE TABLES IDOC_DATA USING 'THEAD' LINES.
  ENDLOOP.
ENDFUNCTION.
```

10.6 Converting Data Into IDoc Segment Format

The physical format of the IDocs records is always the same. Therefore the application data must be converted into a 1000 character string.

Fill the data segments which make up the IDoc

An IDocs is a file with a rigid formal structure. This allows the correspondents to correctly interpret the IDoc information. Were it for data exchange between SAP-systems only, the IDoc segments could be simply structured like the correspondent DDIC structure of the tables whose data is sent.

However, IDocs are usually transported to a variety of legacy systems which do not run SAP. Both correspondents therefore would agree an IDoc structure which is known to the sending and the receiving processes.

Transfer the whole IDoc to an internal table, having the structure of EDIDD

All data needs to be compiled in an internal table with the structure of the standard SAP table EDIDD. The records for EDIDD are principally made up of a header string describing the segment and a variable length character field (called SDATA) which will contain the actual segment data.

```
FORM PACK_LINE TABLES IDOC_DATA USING 'THEAD' E_THEAD.
  TABLES: THEAD.
  MOVE-CORRESPONDING E:THEAD to Z1THEAD.
  MOVE ,Z1THEAD' TO IDOC_DATA-SEGNAM.
  MOVE Z1THEAD TO IDOC_DATA-SDATA.
  APPEND IDOC_DATA.
ENDFORM.“
```

Program 5: Routine to move the translate to IDoc data

Fill control record

Finally the control record has to be filled with meaningful data, especially telling the IDoc type and message type.

```
    IF    IDOC_CONTRL-SNDPRN IS INITIAL.
      SELECT SINGLE * FROM T000 WHERE MANDT EQ SY-MANDT.
      MOVE T000-LOGSYS TO IDOC_CONTRL-SNDPRN.
    ENDIF.
    IDOC_CONTRL-SNDPRT = 'LS'.
* Trans we20 -> Outbound Controls muss entsprechend gesetzt werden.
* 2  = Transfer IDoc immediately
* 4  = Collect IDocs
  IDOC_CONTRL-OUTMOD = '2'.     "1=imediately, subsystem
  CLEAR IDOC_CONTRL.
  IDOC_CONTRL-IDOCTP = 'YAXX_TEXT'.
  APPEND IDOC_CONTRL.
```

Program 6: Fill the essential information of an IDoc control record

Partner Profiles and Ports

R/3 defines partner profiles for every EDI partner. The profiles are used to declare the communication channels, schedule and conditions of processing.

Summary

- Partner profiles declare the communication medium to be used with a partner
- Ports define the physical characteristics of a communication channel
- If you define an ALE scenario for your IDoc partners, you can use the ALE automated partner profile generation (→ ALE)

11.1 IDoc Type and Message Type

An IDoc file requires a minimum of accompanying information to give sense to it. These are the message type and the IDoc type. While the IDoc type tells you about the fields and segments of the IDoc file, the message type flags the context under which the IDoc was sent.

IDoc Type signals Syntactical Structure

A receiver of an IDoc must exactly know the syntactical structure of the data package received. Naturally, the receiver only sees a text file with lines of characters. In order to interpret it, it is necessary to know, which segment types the file may content and how a segment is structured into fields. SAP sends the name of the IDoc type in the communication header.

IDoc type (WE30)

The IDoc type describes the file structure. The IDoc type is defined and viewable with transaction WE30.

Examples:

- Examples of IDoc types are: **MATMAS01**, **ORDERS01**, **COND_A01** or **CLSMAS01**.

Message Type signal the semantic context

The message type is an identifier that tags the IDoc to tell the receiver, how the IDoc is meant to be interpreted. It is therefore the tag for the semantic content of the IDoc.

Examples

- Examples of IDoc types are: **MATMAS**, **ORDERS**, **COND_A** or **CLSMAS**.

For any combination of message type and receiving partner, a profile is maintained

The combination of IDoc type and message type gives the IDoc the full meaning. Theoretically you could define only a single IDoc type for every IDoc you send. Then, all IDocs would have the same segments and the segments would have always the same field structure. According to the context some of the record fields are filled, others are simply void. Many ancient interfaces are still working that way.

Typical combinations of IDoc and message types are the following:

	Message Type	IDoc Type
Sales order, older format	ORDERS	ORDERS01
Sales order, newer format	ORDERS	ORDERS02
Purchase Requisition	PURREQ	ORDERS01

The example shows you, that sales orders can be exchanged in different file formats. There may be some customers who accept the latest IDoc format **ORDERS02**, while others still insist in receiving the old format **ORDERS01**.

The IDoc format for sales orders would also be used to transfer a purchase requisition. While the format remains the same, the different message type signals, that this is not an actual order but a request.

11.2 Partner Profiles

Partner profiles play an important role in EDI communications. They are parameter files which store the EDI partner dependent information.

Partner profile define the type of data and communication paths of data to be exchanged between partner

When data is exchanged between partners it is important that sender and receiver agree about the exact syntax and semantics of the data to be exchanged. This agreement is called a *partner profile* and tells the receiver the structure of the sent file and how its content is to be interpreted.

The information defined with the partner profile are:

For any combination of message type and receiving partner, a profile is maintained

IDoc type and message type as key identifier of the partner profile

Names of sender and receiver to exchange the IDoc information for the respective IDoc and message type and

Logical port name via which the sender and receiver, resp. will communicate

The communication media is assigned by the profile

If you exchange e.g. sales orders with partners, you may do this via different media with different customers. There may be one customer to communicate with you via TCP/IP (the Internet) while the other still insists in receiving diskette files.

Profiles cannot be transported

They must be defined for every R/3 client individually. They cannot be transported using the R/3 transport management system. This is because the profile contain the name of the sending system, which are naturally different for consolidation and production systems.

Profiles define the allowed EDI connections

The profiles allow you to open and close EDI connection with individual partners and specify in detail which IDocs are to be exchanged via the interface.

Profiles can also used to block an EDI communication

The profile is also the place to lock permanently or temporarily an IDoc communication with an EDI partner. So you shut the gate for external communication with the profile.

11.3 Defining the partner profile (WE20)

The transaction WE20 is used to set up the partner profile.

WE20

The profiles are defined with transaction WE20, which is also found in the EDI master menu WEDI. From there you need to specify partner and partner type and whether you define a profile for inbound or outbound. Additionally you may assign the profile to a NAST message type.

Partner type, e.g.
LI=Supplier
CU=Customer
LS=Logical system

The partner type defines from which master data set, the partner number originates. The partner types are the ones which are used in the standard applications for SD, MM or FI. The most important types for EDI are LI (=Lieferant, supplier), CU (Customer) or LS (Logical system). The logical system is of special interest, when you exchange data with computer subsystems via ALE or other RFC means.

Inbound and Outbound definitions

For every partner and every direction of communication, whether you receive or send IDocs, a different profile is maintained. The inbound profile defines the processing routine. The outbound profile defines mainly the target, where to send the data to.

Link message type to outbound profile

If you send IDocs out of an application's messaging, i.e. a communication via the NAST table, then you have to link the message type with an IDoc profile. This is also done in transaction WE20..

Inbound profiles determine the processing logic

The processing code is a logical name for the processing function module or object method. The processing code is used to uniquely determine a function module that will process the received IDoc data. The inbound profile will point to a processing code.

11.4 Data Ports (WE21)

IDoc data can be sent and received through a multitude of different media. In order to decouple the definition of the media characteristics from the application using it, the media is accessed via ports.

A port is a logical name to access a physical input/output device

A port is a logical name for an input/output device. A program talks to a port which is presented to it with a common standard interface. The port takes care of the translation between the standard interface format and the device dependent format.

Communication media is defined via a port definition

Instead of defining the communication path directly in the partner profile, a port number is assigned rather. The port number then designates the actual medium. This allows to define the characteristics of a port individually and use that port in multiple profiles. Changes in the port will than reflect automatically to all profiles without touching them.

Typical ports for data exchange are:

Communication Media

- Disk file with a fixed name
- Disk file with dynamic names
- Disk file with trigger of a batch routine
- Standard RFC connection via TCP/IP
- A network channel
- TCP/IP FTP destination (The Internet)
- Call to a individual program e.g. EDI converter

Every program should communicate with other computers via the ports only

Every application should send or receive its data via the logical ports only. This allows to easily change the hardware and software used to make the physical I/O connection without interfering with the programs itself.

The transactions used to define the ports are

WE21 defines the port; SM59 sets up media

WE21	to create the port and assign a logical name
SM59	to define the physical characteristics of the I/O device used

There are different port versions for the respective R/3 releases as shown in the matrix below:

Port Type	DDic Format	Release
1	not used	not used
2	EDID3	2.x, 3.x
3	EDID4	4.x

Illustration 15: R/3 port types by release

Port versions differ in length of fields

The difference between the port types are mainly the length of some fields. E.g. does port type 3 allow segment names up to 30 characters in length, while port type 3 is constraint to a maximum segment name of 8 characters.

RFC Remote Function Call

A remote function call RFC enables a computer to execute a program an a different computer within the same LAN, WAN or Internet network. RFC is a common UNIX feature, which is found also in other object-oriented operating systems. R/3 provides special DLLs for WINDOWS, NT and UNIX to allow RFC calls from and to R/3.

Summary

- RFC can link two systems together
- RFC function modules are like standard function with only a few limitations
- RFC can also call program on a non R/3 system

There's a story about some frogs that teaches us all a valuable lesson about life.

The story goes like this :

A group of frogs were travelling through the woods. Two of them fell into a deep pit. All the other frogs gathered around the pit. When they saw how deep the pit was they told the two frogs that they were as good as dead. The two frogs ignored the comments and tried to jump up out of the pit with all of their might. The other frogs kept telling them to stop, saying that they were as good as dead. Finally, one of the frogs took heed of what the other frogs were saying and gave up. He fell down and died.

The other frog continued to jump as hard as he could. Once again, the crowd of frogs yelled at him to stop the pain and just die. He jumped even harder and finally made it out. When he got out, the other frogs said, "Did not you hear us?" The frog explained to them that he was deaf. He thought they were encouraging him the entire time.

This story teaches us two lessons. There is power of life and death in the tongue. An encouraging word to someone who is down can lift them up and help them make it through difficult times. A destructive word to someone who is down, can be what it takes to kill them.

So let's be careful what we say. Let us speak life to those who cross our path. Words are so powerful, its sometime hard to understand that an encouraging word can go such a long way. Keeping this in mind, let's always be careful and think about what we have to say.

Received as a SPAM ("send phenomenal amount of mail") e-mail from unknown

12.1 What Is Remote Function Call RFC?

A Remote Function Call enables a computer to execute a program an another computer. The called program is executed locally on the remote computer using the remote computer's environment, CPU and data storage.

RFC allows execute subroutines on a remote computer

Remote function call is one of the great achievements of TCP/IP networks. Every computer within the network can accept an RFC-call and decides whether it wants to execute the request. Every modern FTP server implementation includes the RFC calling feature.

Classical networking loads the program to the client computer

A classical network server stores the program code in a central location. When the program is called, the code will be transported via the network to the calling computer workstation and executed on the calling computer, consuming the caller's resources of CPU, memory and disk.

RFC executes the program on the server

An RFC calls the program on the remote computer. It is just like stepping over to the remote computer, typing in the program command line with all parameters and waiting for the result to be reported back to the calling computer. The calling computer does not provide any resources other than the parameters specified with the call.

Here is again what an RFC does

- Call the program on a remote computer and specify parameters if and as necessary
- The remote computer decides whether to fulfil the request and execute the program
- Every manipulation done by the called program is effective in the same way as if the program would have been started on the remote system
- The calling program task waits meanwhile for the called program to terminate
- When the RFC program terminates it returns result values if applicable
- The called program needs not to be present on the calling computer
- The called program can be run under a completely different operation system, so you can call a WINDOWS program from UNIX and vice versa

The internet is a typical RFC application

A typical RFC example is the internet with a web browser as the RFC client and the web server as the RFC server. Executing a server applet e.g. via CGI or a JAVA or JAVASCRIPT server side applet is actually a remote function call from the web browser to the HTTP server.

If R/3 is doing RFC calls into another system, then it does exactly what a browser does when performing a request on the HTTP or FTP server.

12.2 RFC in R/3

RFC provides interface shims for different operating systems and platforms, which provide the communication APIs for doing RFC from and to R/3.

SAP R/3 is designed as a multi server architecture. Therefore R/3 is equipped with a communication architecture that allows data exchange and communication between individual R/3 application and database servers. This communication channel also enables R/3 to execute programs running on a remotely connected server using RFC technology.

SAP R/3 provides special routines to enable RFC from and to R/3 for several operation systems. For NT and WINDOWS the DLLs are delivered with the SAPGUI

Non SAP R/3 programs can access function modules in R/3, which is done by calling an SAP provided interface stem. Interfaces exist for UNIX, Windows and IBM S/390 platforms.

R/3 systems which are tied together via TCP/IP are always RFC capable. One R/3 system can call function modules in a remote RFC system, just as if the function where part of the own calling system.

A function module can be called via RFC if the function has RFC enabled. This is a simple flag on the interface screen of the function.

Enabling RFC for a function does not change the function. The only difference between RFC-enabled and standard functions is, that RFC functions have some restriction, especially they cannot have untyped parameters.

12.3 Teleport Text Documents With RFC

This example demonstrates the use of RFC functions to send data from one SAP system to a remote destination. The example is a simple demonstration, how to efficiently and quickly use RFC in your installation.

A text in SAP is an ordinary document, not a customizing or development object. Therefore texts are never automatically transported from development system to a production system. This example helps to copy text into a remote system.

Step 1: Reading the text documents in the sending system

The ABAP Z_RFC_COPYTEXT selects texts from the text databases STXH and STXL. The ABAP reads the STXH database only to retrieve the names of the text documents that match the selection screen. The text itself is read using the standard SAP function module READ_TEXT.

Step 2: Sending the text and saving it in the destination system

Then the ABAP calls the function module Y_RFC_SAVE_TEXT remotely in the destination system. The function runs completely on the other computer. The function needs not to exist in the calling system.

```
FUNCTION Z_RFC_SAVE_TEXT.
*"----------------------------------------------------------------------
*"*"Lokale Schnittstelle:
*"       IMPORTING
*"             VALUE(CLIENT) LIKE  SY-MANDT DEFAULT SY-MANDT
*"             VALUE(HEADER) LIKE  THEAD STRUCTURE  THEAD
*"       EXPORTING
*"             VALUE(NEWHEADER) LIKE  THEAD STRUCTURE  THEAD
*"       TABLES
*"              LINES STRUCTURE  TLINE
*"       EXCEPTIONS
*"              ID
*"              LANGUAGE
*"              NAME
*"              OBJECT
*"----------------------------------------------------------------------
  CALL FUNCTION 'SAVE_TEXT'
       EXPORTING
*           CLIENT          = SY-MANDT
            HEADER          = HEADER
*           INSERT          = ' '
            SAVEMODE_DIRECT = 'X'
*           OWNER_SPECIFIED = ' '
       IMPORTING
*           FUNCTION        =
            NEWHEADER       = NEWHEADER
       TABLES
            LINES           = LINES.
ENDFUNCTION.
```

Program 7: Z_READ_TEXT, a copy of function READ_TEXT with RFC enabled

```
REPORT Z_RFC_COPYTEXT.
TABLES: THEAD, STXH, RSSCE.

SELECT-OPTIONS: TDNAME   FOR RSSCE-TDNAME   MEMORY ID TNA OBLIGATORY.
SELECT-OPTIONS: TDOBJECT FOR RSSCE-TDOBJECT MEMORY ID TOB.
SELECT-OPTIONS: TDID     FOR RSSCE-TDID     MEMORY ID TID.
PARAMETERS:     RCVSYS  LIKE T000-LOGSYS    MEMORY ID LOG OBLIGATORY.

DATA: THEADS LIKE STXH  OCCURS 0 WITH HEADER LINE.
DATA: TLINES LIKE TLINE OCCURS 0 WITH HEADER LINE.
DATA: XTEST LIKE TEST VALUE 'X'.

START-OF-SELECTION.
*---------------------------------------------------------------------*
* Get all the matching text modules                                   *
*---------------------------------------------------------------------*
SELECT * FROM STXH INTO TABLE THEADS
                   WHERE TDOBJECT IN TDOBJECT
                     AND TDID     IN TDID
                     AND TDNAME   IN TDNAME.
*---------------------------------------------------------------------*
* Process all found text modules                                      *
*---------------------------------------------------------------------*
LOOP AT THEADS.
*---------------------------------------------------------------------*
* Read the text from pool                                             *
*---------------------------------------------------------------------*
  CALL FUNCTION 'READ_TEXT'
       EXPORTING
            ID                      = THEADS-TDID
            LANGUAGE                = THEADS-TDSPRAS
            NAME                    = THEADS-TDNAME
            OBJECT                  = THEADS-TDOBJECT
       IMPORTING
            HEADER                  = THEAD
       TABLES
            LINES                   = TLINES
       EXCEPTIONS
            OTHERS                  = 8.
*---------------------------------------------------------------------*
* RFC call to function in partner system that stores the text there   *
*---------------------------------------------------------------------*
  CALL FUNCTION 'Z_RFC_SAVE_TEXT'
       DESTINATION 'PROCLNT100'
       EXPORTING
            HEADER          = THEAD
       TABLES
            LINES           = TLINES.
       EXCEPTIONS
            OTHERS          = 5.
```

Program 8: Program to copy text modules into a remote system via RFC

12.4 Calling A Command Line Via RFC ?

R/3 RFC is not limited to communication between R/3 systems. Every computer providing supporting the RFC protocol can be called from R/3 via RFC. SAP provides necessary API libraries for all operating systems which support R/3 and many major programming languages e.g. C++, Visual Basic or Delphi.

RFC does not now the physics of the remote system

Calling a program via RFC on a PC or a UNIX system is very much like calling it in another R/3 system. Indeed, the calling system will not even be able to recognize whether the called program runs on another R/3 or on a PC.

RFC server must be active on remote computer

To make a system RFC compliant, you have to run an RFC server program on the remote computer. This program has to have a calling interface which is well defined by SAP. In order to create such a server program, SAP delivers an RFC development kit along with the SAPGUI.

The RFC call to Windows follows the OLE/ACTIVE-X standard, while UNIX is connected via TCP/IP RFC which is a standard in all TCP-compliant systems.

For most purposes you might be satisfied to execute a command line program and catch the program result in a table. For that purpose you can use the program RFCEXEC which comes with the examples of the RFC development kit both for UNIX and WINDOWS. Search for it in the SAPGUI directory. This program will call the operating systems command line interpreter along with an arbitrary string that you may pass as parameter.

RFCEXEC must be defined as RFC destination with SM59

In order to call `rfcexec` it has to be defined as a TCP/IP destination in SM59. R/3 comes with two destinations predefined which will call `rfcexec` either on the R/3 application server SERVER_EXEC or on the front end LOCAL_EXEC. By specifying another computer name you can redirect the call for RFCEXEC to the named computer. Of course, the target computer needs to be accessible from the R/3 application server (not from the workstation) and have `rfcexec` installed.

The object interface of `rfcexec` supports two methods only, which are called as remote function call from R/3.

`rfc_remote_exec`

`rfc_remote_exec` will call RFCEXEC and execute the command interpreter with the parameter string. No results will be returned besides an eventual error code.

```
CALL FUNCTION 'RFC_REMOTE_EXEC'
   DESTINATION 'RFC_EXEC'
   EXPORTING  COMMAND = 'dir c:\sapgui >input'
```

The example call above would execute the following when run on a DOS system.

```
command.com /c copy c:\config.sys c:\temp
```

rfc_remote_pipe

rfc_remote_pipe will call RFCEXEC, execute the command line interpreter with the parameter string and catch the output into an internal table.

```
CALL FUNCTION 'RFC_REMOTE_PIPE'
   DESTINATION 'RFC_EXEC'
   EXPORTING  COMMAND = 'dir c:\sapgui >input'
```

The example call above would execute the following when run on a DOS system.

```
command.com /c dir c:\sapgui >input
```

while the file input is caught by rfc_remote_pipe and returned to the calling system.

A common application is to process incoming files

A common application for the use of rfc_remote_pipe is to automatically check a file system for newly arrived files and process them. For that purpose, you would create three directories, e.g. the following.

```
x:\incoming
x:\work
x:\processed
```

The statement retrieves the file list with rfc_remote_pipe into an R/3 internal table.

```
dir x:\incoming /b
```

Then the files are move into a working directory.

```
move x:\incoming\file x:\work
```

Finally the files are processed and moved into an archive directory.

```
move x:\work x:\processed
```

Calling R/3 Via OLE/JavaScript

Using the OLE/Active-X functionality of R/3 you can call R/3 from any object aware language. Actually it must be able to do DLL calls to the RFC libraries of R/3. SAP R/3 scatters the documentation for these facilities in several subdirectories of the SAPGUI installation. For details you have to look for the SAPGUI Automation Server and the SDK (RFC software development kit).

Summary

- R/3 can exchange its IDoc by calling a program that resides on the server
- The programs can be written in any language that supports OLE-2/Active-X technology
- Programming skills are mainly required on the PC side, e.g. you need to know Delphi, JavaScript or Visual Basic well

13.1 R/3 RFC from MS Office Via Visual Basic

The Microsoft Office suite incorporates with Visual Basic for Applications (VBA) a fully object oriented language. JavaScript and JAVA are naturally object oriented. Therefore you can easily connect from JavaScript, JAVA, WORD, EXCEL and all the other VBA compliant software to R/3 via the CORBA compatible object library (in WINDOWS known also DLLs or ACTIVE-X (=OLE/2) components).

Visual Basic is a DCOM compliant programming language

Visual Basic is finally designed as an object oriented language compliant to DCOM standard.

JavaScript or JAVA are naturally object languages

JavaScript is a typical object oriented language which is compliant to basic CORBA, DCOM and other popular object standards.

SAP R/3 provides a set of object libraries, which can be registered with Visual Basic. The library adds object types to VBA which allow RFC calls to R/3.

DLLs installed with SAPGUI

The libraries are installed to the workstation with the SAPGUI installation. They are technically public linkable objects, in WINDOWS these are DLLs or ACTIVE-X controls (which are DLLs themselves).

Object library SAP provides a method CALL which will call a function module with all interface parameters

The object library SAP contains among others the object type FUNCTIONS whose basic method CALL performs an RFC call to a specified R/3 function module. With the call you can pass object properties which will be interpreted as the interface parameters of the called function module.

If the RFC call appear not to be working, you should first try out to call one of the standard R/3 RFC function like RFC_CALL_TRANSACTION_USING (calls a specified transaction or RFC_GET_TABLE (returns the content of a specified R/3 database table).

SAP R/3 provides a set of object libraries, which can be registered with JavaScript to allow RFC calls to R/3.

The object library SAP contains among others the object type FUNCTIONS whose basic method CALL performs an RFC call to a specified R/3 function module.

Try to call standard routines for testing

If the RFC call appears to be not working, you should first try out to call one of the standard R/3 RFC functions like RFC_CALL_TRANSACTION_USING (calls a specified transaction) or RFC_GET_TABLE (returns the content of a specified R/3 database table).

13.2 Call Transaction From Visual Basic for WORD 97

This is a little WORD 97 macro, that demonstrates how R/3 can be called with a mouse click directly from within WORD 97.

The shown macro calls the function module `RFC_CALL_TRANSACTIION_USING` . This function executes a dynamic call transaction using the transaction code specified as the parameter.

You can call the macro from within word, by attaching it to a pseudo-hyperlink. This is done by adding a MACROBUTTON field to the WORD text. The `macrobutton` statement must call the VBA macro R3CallTransaction and have as the one and only parameter the name of the requested transaction

```
MACROBUTTON R3CallTransaction VA02
```

This will call transaction VA02 when you click on the `macrobutton` in the text document. You can replace VA02 with the code of your transaction.

For more information see the Microsoft Office help for `MACROBUTTON` and Visual Basic.

Calling SAP R/3 from within WORD 97 with a mouse click

Word 97 Macro by Axel Angeli Logos! Informatik GmbH D-68782 Bruehl
From website http://www.logosworld.com

This WORD 97 document contains a Visual Basic Project which allows to call SAP R/3 transaction using the SAP automation GUI. The call is done via the WORD field insertion MACROBUTTON. You must have the SAP Automation GUI or SAP RFC Development Kit installed on your workstation to give SAP the required OLE functionality.

Example:
Click to start transaction { MACROBUTTON R3CallTransaction VA02 }
and another call to { MACROBUTTON R3CallTransaction VA02 } .

To show the coding of the MACROBUTTON statement, right-mouse-click on the transaction code link and choose "Toggle Field Codes".

Illustration 16: WORD 97 text with MACROBUTTON field inserted

```
Dim fns As Object
Dim conn As Object
Dim SAP_logon As Boolean
Sub R3CallTransaction()
' get the TCODE from the WORD text, MACROBUTTON does not allow parameters
  tcode = Selection.Text & ActiveDocument.Fields(1).Code
  ll = Len("MACROBUTTON R3CallTransaction ") + 3
  tcode = Mid$(tcode, ll)
  R3CallTransactionExecute (tcode)
End Sub
Sub R3CallTransactionExecute(tcode)
On Error GoTo ErrCallTransaction
  R3Logon_If_Necessary
  Result = fns.RFC_CALL_TRANSACTION(Exception, tcode:=tcode)
  the_exception = Exception
  ErrCallTransaction: ' Error Handler General
      Debug.Print Err
      If Err = 438 Then
          MsgBox "Function module not found or RFC disabled"
          R3Logoff  ' Logoff to release the connection !!!
          Exit Sub
      Else
          MsgBox Err.Description
      End If
End Sub
Sub R3Logon_If_Necessary()
  If SAP_logon <> 1 Then R3Logon
End Sub
Sub R3Logon()
      SAP_logon = False
      Set fns = CreateObject("SAP.Functions") '  Create functions object
      fns.logfilename = "wdtflog.txt"
      fns.loglevel = 1
      Set conn = fns.connection
      conn.ApplicationServer = "r3"
      conn.System = "DEV"
      conn.user = "userid"
      conn.Client = "001"
      conn.Language = "E"
      conn.tracelevel = 6
      conn.RFCWithDialog = True
      If conn.logon(0, False) <> True Then
          MsgBox "Cannot logon!."
          Exit Sub
      Else
        SAP_logon = conn.IsConnected
      End If
End Sub
Sub R3Logoff()
    conn.logoff
    SAP_logon = False
End Sub
```

Illustration 17: Visual Basic code with macros to call R/3 from WORD 97

13.3 R/3 RFC from JavaScript

JavaScript is a fully object oriented language. Therefore you can easily connect from JavaScript to R/3 via the CORBA compatible object library (in WINDOWS known also DLLs or ACTIVE-X (=OLE/2) components).

JavaScript is a typical object oriented language which is compliant to basic CORBA, DCOM and other popular object standards.

SAP R/3 provides a set of object libraries, which can be registered with JavaScript to allow RFC calls to R/3.

DLLs installed with SAPGUI

The libraries are installed to the workstation with the SAPGUI installation.

The object library SAP contains among others the object type FUNCTIONS whose basic method CALL performs an RFC call to a specified R/3 function module.

Try to call standard routines for testing

If the RFC call appears to be not working, you should first try out to call one of the standard R/3 RFC functions like RFC_CALL_TRANSACTION_USING (calls a specified transaction) or RFC_GET_TABLE (returns the content of a specified R/3 database table).

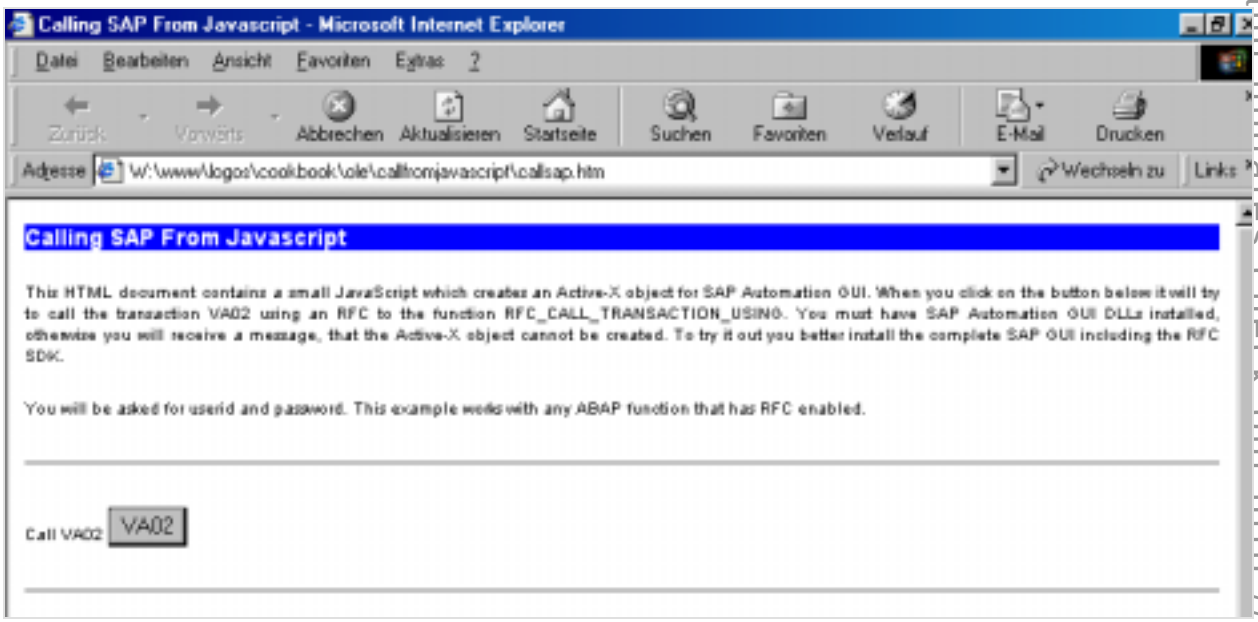


Illustration 17: HTML Page with a button to call a transaction via RFC

```
<script language="JavaScript">
<!--
retcd = 0;
exceptions = 0;
// ***      SAPLogon() creates an object that has the methods to
//    execute a call to an SAP function module
function SAPlogon()
   {  fns               = new ActiveXObject("SAP.Functions");
      trans             = fns.Transactions;
      conn              = fns.connection;   /* get a new connection
object */
      conn.System       = "DEV";    /* Set the system ID (see: SY-SYSID)
*/
      conn.user   = "userid"; /* set userid (blank for dialog) */
      conn.password     = ""; /* set password (blank for dialog) */
      conn.Client       = "100";    /* set password (blank for dialog) */
      conn.Language     = "E";      /* set language (blank for default)
*/
      conn.tracelevel    = 6;    /* set password (blank for dialog) */
      conn.RFCWithDialog = 1;    /* true: opens visible session window */
      exceptions = 0;
      conn.logon(0, 0);       /* *** this call creates the object *** */
   };
function SAPlogoff()
   {  conn.logoff(0, 0);
      exceptions = 0;
   };
// ***  execute the SAP function MODULE "RFC_CALL_TRANSACTION_USING"
//      as a method execution of object type SAP.functions
function SAPcallTransaction(tcode)
   {  exceptions              = 0;
      callta                  = fns.add("RFC_CALL_TRANSACTION_USING");
      callta.exports("TCODE") = "VA02";
      callta.exports("MODE")  = "E";
      retcd                   = callta.call;
      conn.logoff();
      alert(retcd);
      SAPcallTransaction      = retcd;
   };
// --></script>
<body>
<!—Create an HTML button with a JavaScript call attached -->
Call VA02
<input TYPE    = "submit"
       VALUE   = "VA02"
       OnClick = "SAPlogon();
                  SAPcallTransaction(&amp;quot;VA02&amp;quot;);
                  SAPlogoff()"
>
</body>
```

Program 9: JavaScript example to call an R/3 function module via OLE/RFC

13.4 R/3 RFC/OLE Troubleshooting

Problems connecting via RFC can usually be solved by reinstalling the full SAPGUI and/or checking your network connection with R/3.

Reinstall the full SAPGUI

If you have problems to connect to R/3 via the RFC DLLs then you should check your network installation. It would be out of the reach of this publication to detail the causes and solutions when an RFC connection does not work.

I may say, that in most cases a full install of the SAPGUI on the computer which runs the calling program will secure a reliable connection, provided that you can login to R/3 problem-free with this very same SAPGUI installation.

Another trivial but often cause are simple network problems. So impossible it may appear, you should always go by the book and first check the network connection by pinging the R/3 system with the PING utility and checking the proper access authorities.

Check spelling

However, if you successfully passed the SAPlogon method, then the problem is mostly a misspelling of object or method names or an incompatibility of the called function.

Make certain that the function module in R/3 is marked as "RFC allowed"

If you are quite sure that you spelled everything right and correct, and still get an error executing the SAP.FUNCTIONS.CALL method then you should investigate the function module in R/3.

Check for syntax errors

Generate the function group to see if there is an syntax error
Make sure that the function is tagged as RFC allowed

ALE - Application Link Enabling

ALE is an R/3 technology for distribution of data between independent R/3 installations. ALE is an application which is built on top of the IDoc engine. It simply adds some structured way to give R/3 a methodical mean to find sender, receiver and triggering events for distribution data.

Make Use of ALE for Your Developments

- Transfer master data for material, customer, supplier and more to a different client or system with BALE
- Copy your settings for the R/3 classification and variant configurator to another system, also in BALE
- Copy pricing conditions with ALE from the conditions overview screen (e.g. VV12)

14.1 A Distribution Scenario Based On IDocs

ALE has become very famous in business circles. While it sounds mysterious and like a genial solution, it is simply a mean to automate data exchange between SAP systems. It is mainly meant to distribute data from one SAP system to the next. ALE is a mere enhancement of SAP-EDI and SAP-RFC technology.

ALE is an SAP designed concept to automatically distribute and replicate data between webbed and mutually trusting systems

Imagine your company has several sister companies in different countries. Each company uses its own local SAP installation. When one company creates master data eg. material or customer master it is much likely that these data should be known to all associates. ALE allows to immediately trigger an IDoc sent to all associates as soon as the master record is created in one system.

Another common scenario is, that a company uses different installations for company accounting and production and sales. In that case ALE allows you to copy the invoices created in SD immediately to the accounting installation.

ALE defines the logic and the triggering events who describe how and when IDocs are exchanged between the systems

ALE defines a set of database entries, which are called the ALE scenario. These tables contain the information which IDocs shall be automatically replicated to one or more connected R/3-compatible data systems.

ALE is an application put upon the IDoc and RFC mechanisms of SAP

To be clear: ALE is not a new technology. It is only a handful of customizing settings and background routines that allow timed and triggered distribution of data to and from SAP or RFC-compliant systems. ALE is thus a mere enhancement of SAP-EDI and SAP-RFC technology.

14.2 Example ALE Distribution Scenario

To better understand let us model a small example ALE scenario for distribution of master data between several offices.

Let as assume that we want to distribute three types of master data objects, the material master, the creditor master and the debtor master.

Let us assume that we have four offices. This graphic scenario shows the type of data exchanged between the offices. Any of these offices operates an own stand alone R/3 system. Data is exchanged as IDocs which are sent from the sending office and received from the receiving office.

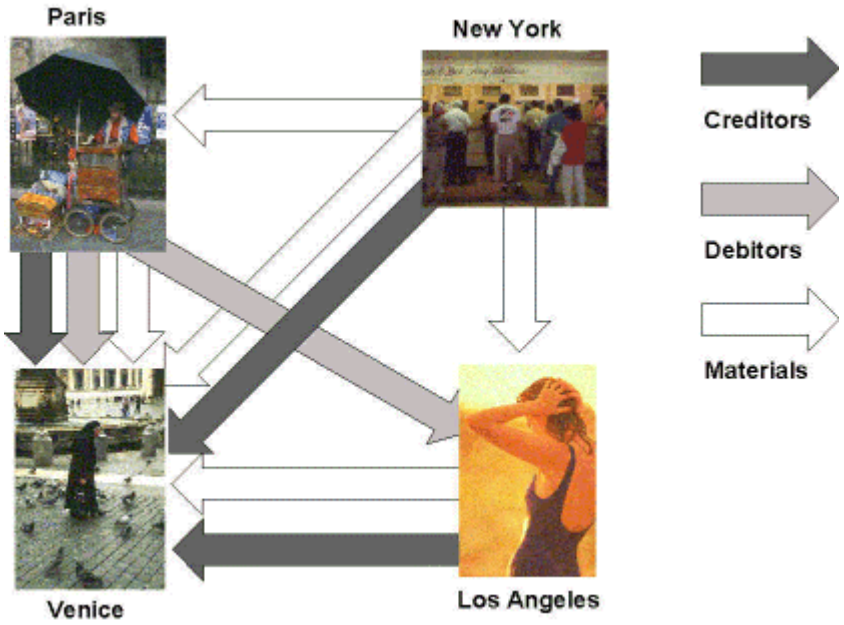


Illustration 18: ALE distribution scenario

Data Object		Sender		Receiver	
MATMAS	Material Master	R3NYX	New York Office	R3VEN	Venice Office
MATMAS	Material Master	R3NYX	New York Office	R3PAR	Paris Office
MATMAS	Material Master	R3NYX	New York Office	R3LAX	Los Angeles
MATMAS	Material Master	R3PAR	Paris Office	R3VEN	Venice Office
MATMAS	Material Master	R3LAX	Los Angeles	R3VEN	Venice Office
DEBMAS	Debitor Master	R3PAR	Paris Office	R3VEN	Venice Office
DEBMAS	Debitor Master	R3PAR	Paris Office	R3LAX	Los Angeles
CREMAS	Creditor Master	R3NYX	New York Office	R3VEN	Venice Office
CREMAS	Creditor Master	R3PAR	Paris Office	R3VEN	Venice Office
CREMAS	Creditor Master	R3LAX	Los Angeles	R3VEN	Venice Office

Illustration 19: Scenario in tabular form

14.3 ALE Distribution Scenario

ALE is a simple add-on application propped upon the IDoc concept of SAP R/3. It consists on a couple of predefined ABAPs which rely on the customisable distribution scenario. These scenarios simple define the IDoc types and the pairs of partners which exchange data.

ALE defines the logic and the triggering events which describe how and when IDocs are exchanged between the systems. If the ALEE engine has determined which data to distribute, it will call an appropriate routine to create an IDoc. The actual distribution is then performed by the IDoc layer.

The predefined distribution ABAPs can be used as templates for own development

ALE is of course not restricted to the data types which are already predefined in the BALE transaction. You can write your ALE distribution handlers, which should only comply with some formal standards, e.g. not bypassing the ALE scenarios.

ALE uses IDocs to transmit data between systems

All ALE distribution uses IDocs to replicate the data to the target system. The ALE applications check with the distribution scenario and do nothing more than calling the matching IDoc function module, which is alone responsible for gathering the requested data and bringing them to the required data port. You need to thoroughly understand the IDoc concept of SAP beforehand, in order to understand ALE

The process is extremely simple: Every time a data object, which is mentioned in an ALE scenario, changes an IDoc is triggered form one of the defined triggering mechanisms. These are usually an ABAP or a technical workflow event.

ABAPs can be used in batch routine

Distribution ABAPs are started manually or can be set up as a triggered or timed batch job. Sample ABAPs for ALE distribution are those used for master data distribution in transaction BALE, like the ones behind the transaction BD10, BD12 etc.

Workflow is triggered from change document

The workflow for ALE is based on change pointers. Change pointers are entries in a special database entity, which record the creation or modification of a database object. These change pointers are very much like the SAP change documents. They are also written from within a change document, i.e. from the function CHANGEDOCUMENT_CLOSE. The workflow is also triggered from within this function.

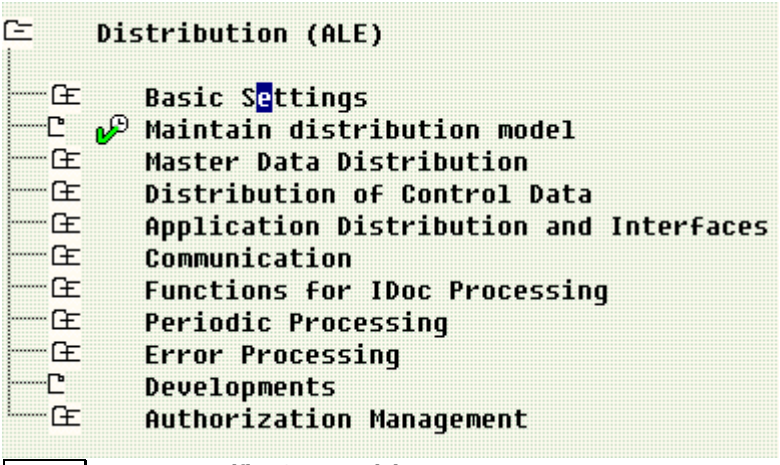
Relevance for change pointers is defined in IMG

SAP writes those ALE change pointers to circumvent a major draw back of the change documents. Change documents are and only are written, if a value of a table column changes, if this column is associated with a data element which is marked as relevant for change documents (see SE11). ALE change pointers use a customized table, which contains the names of those table fields, which are relevant for change pointers.

14.4 Useful ALE Transaction Codes

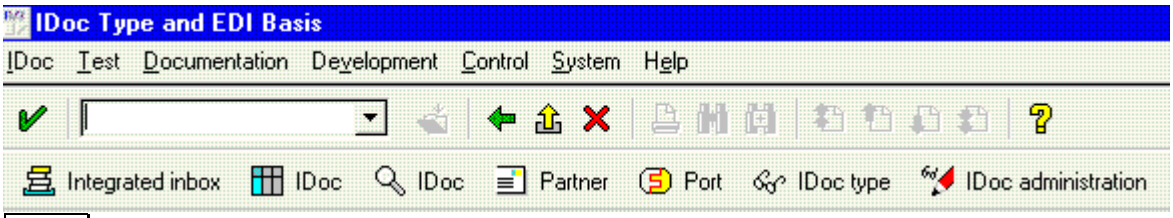
ALE is customized via three main transaction. These are SALE, WEDI and BALE.

This is the core transaction for SALE customizing. Here you find everything ALE related, which is not already covered by the other customizing transactions.



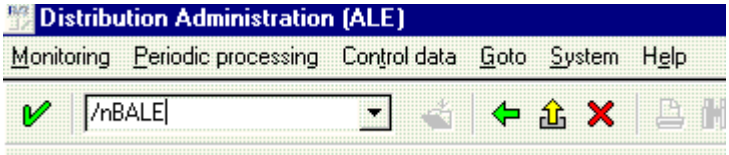
SALE - ALE Specific Customizing

WEDI - IDoc Administration Here you define all the IDoc related parts, which make up most of the work related to ALE.



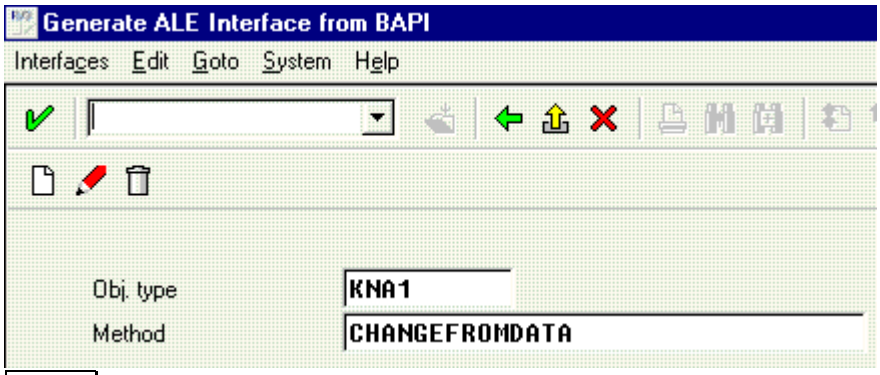
WEDI menu

BALE – Central menu This is a menu, which combines most function necessary for ALE distribution, especially the triggering of manual distribution of master data or variant configuration or classification.



BALE menu

BDBG - Automatically Generate IDocs From A BAPI Good stuff for power developers. It allows to generate all IDoc definitions including segments and IDoc types from the DDIC entries for a BAPI definition.



BDBG **create IDoc outbound function from BAPI**

14.5 ALE Customizing SALE

ALE customizing is relatively staright forward. The only mandatory task is the definition of the ALE distribution scenario. The other elements did not prove as being very helpful in practical applications.

SALE

All ALE special customizing is done from within the transaction SALE, which links you to a subset of the SAP IMG.

Distribution Scenarios

The scenario defines the IDoc types and the pairs of IDoc partners which participate in the ALE distribution. The distribution scenario is the reference for all ABAPs and functionality to determine, which data is to be replicated and who could be the receiving candidates. This step is of course mandatory.

Change Pointers

The change pointers can be used to trigger the ALE distribution. This is only necessary if you really want to use that mechanism. You can however always send out IDocs every time an application changes data. This does not require the set-up of the change pointers.

Filters

SAP allows the definition of rules, which allow a filtering of data, before they are stored in the IDoc base. This allows you to selective accept or decline individual IDoc segments.

Conversion

ALE allows the definition of conversion rules. These rules allow the transition of individual field data according mapping tables. Unfortunately the use of a function module to convert the data is not realized in the current R/3 release.

Conversion

The filter and conversion functionality is only attractive on a first glance. Form practical experience we can state, that they are not really helpful. It takes long time to set up the rules and rules usually are not powerful enough to avoid modifications in an individual scenario. Conversion rules tend to remain stable, after they have once been defined. Thus it is usually easier to call am individual IDoc processing function module, which performs your desired task more flexible and easier.

14.6 Basic Settings SALE

Basic settings have do be adjusted before you can start working with ALE.

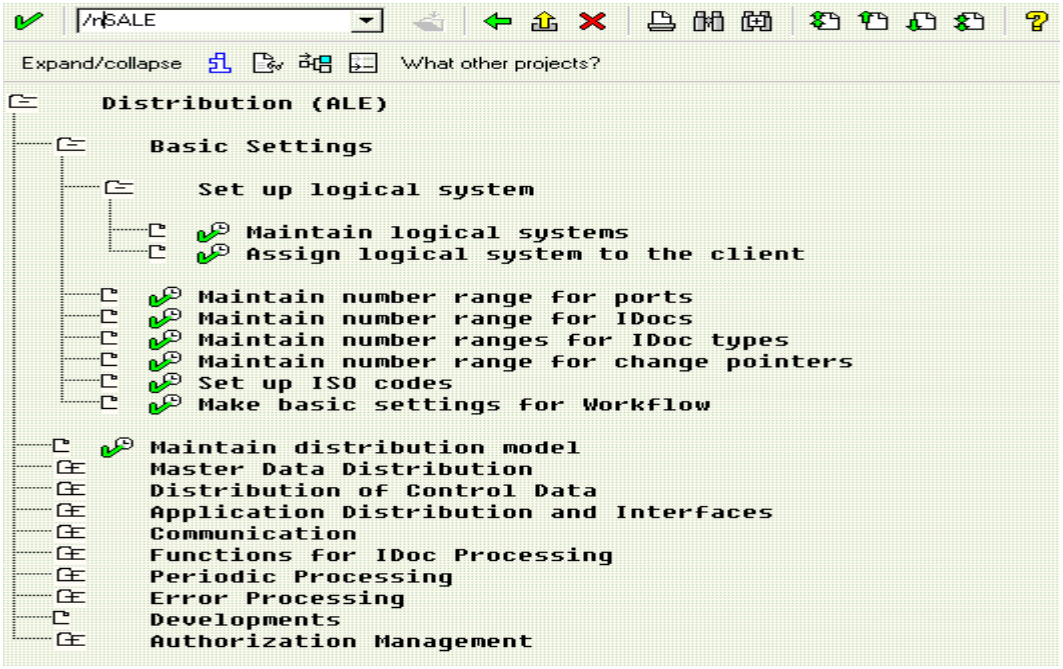


Illustration 18: Customizing transaction SALE

Logical System

Before we start we need to maintain some logical systems. This a names for the RFC destinations which are used as communication partners. An entry for the logical system is created in the table TBDLS.

LogSystem	Bezeichnung
TESTSENDER	ALE-Test: Logical System Sender
TESTTARGET	ALE-Test: Logical System Receiver

Illustration 19: SM31 - View Maintenance TBDLS

Assign logical system to a client

You will finally have to assign a logical system to the clients involved in ALE or IDoc distribution. This is done in table T000, which can be edited via SM31 or via the respective SALE tree element.

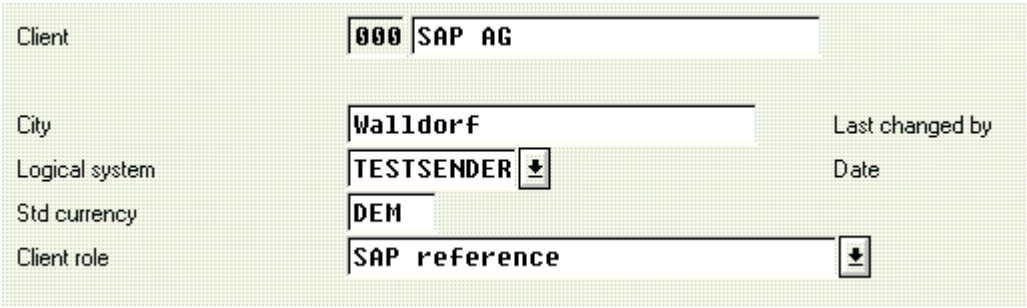


Illustration 20: SM31 - View Maintenance T000

14.7 Define The Distribution Model (The "Scenario") BD64

The distribution model (also referred to as ALE-Scenario) is a more or less graphical approach to define the relationship between the participating senders and receivers.

Model can only be maintained by leading system

The distribution model is shared between all participating partners. It can therefore only be maintained in one of the systems, which we shall call the *leading system*. Only one system can be the leading system, but you can set the leading system to any of the partners at any time, even if the scenario is already active.

BD64

This will be the name under which you will address the scenario. It serves as a container in which you put all the from-to relations.

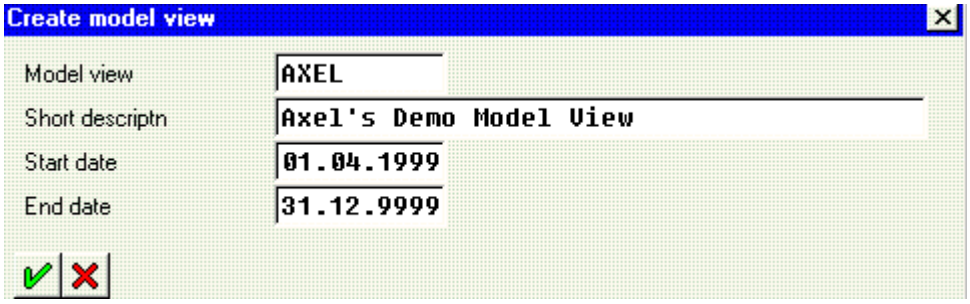


Illustration 21: Create a model view

Suggestion: One scenario per administration area

You can have many scenarios for eventual different purposes. You may also want to put everything in a single scenario. As a rule of thumb it proved as successful, that you create one scenario per administrator. If you have only one ALE administrator, there is no use of having more than one scenario. If you have several departments with different requirements, that it might be helpful to create one scenario per department.

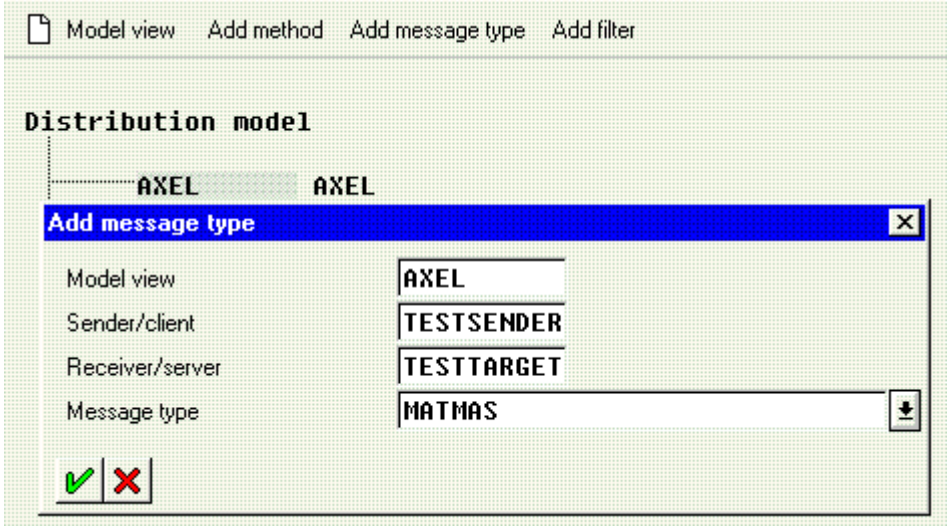


Illustration 22: Add a message type to the scenario

Illustration 23: Model View After Adding MATMAS

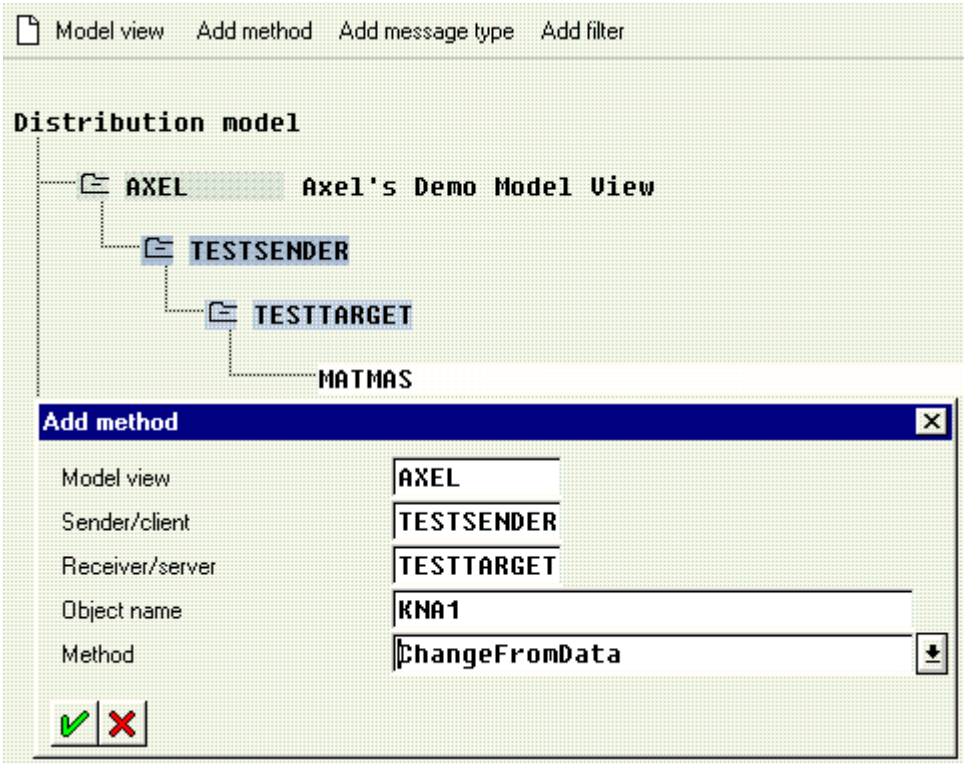


Illustration 24: Add an OOP object method the scenario

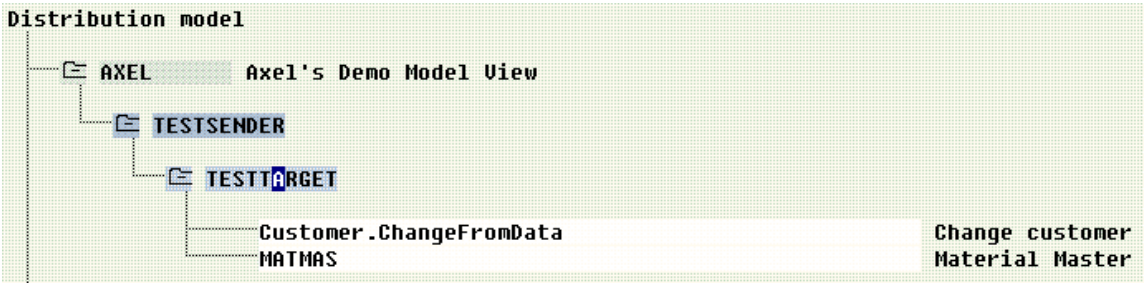


Illustration 25: Model View After Adding Customer.ChangeFromData

Now go on defining partner profiles

The model view display graphically the fro-to relations between logical systems. You now have to generate the partner profiles which are used to identify the physical means of data transportation between the partners.

14.8 Generating Partner Profiles WE20

A very useful utility is the automatic generation of partner profiles out of the ALE scenario. Even if you do not use ALE in your installation, it could be only helpful to define the EDI partners as ALE scenario partners and generate the partner profiles.

WE20

If you define the first profile for a partner, you have to create the profile header first. Click an the blank paper sheet.

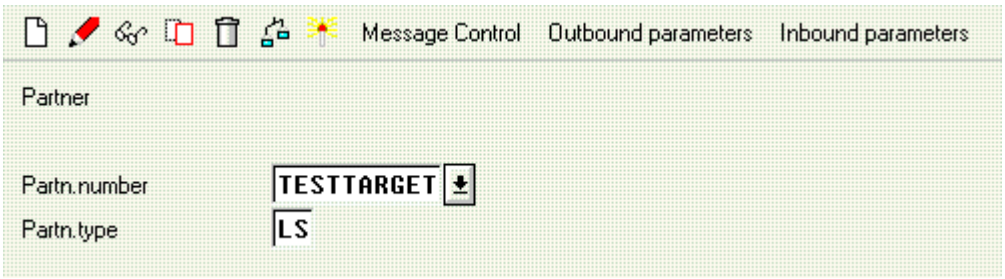


Illustration 26: Create a partner

The values give here are not really important. The partner class is only a classification value. You can give an arbitrary name in order to group the type of partners, e.g. EDI for external ones, ALE for internal ones and IBM for connection with IBM OS/390 systems.

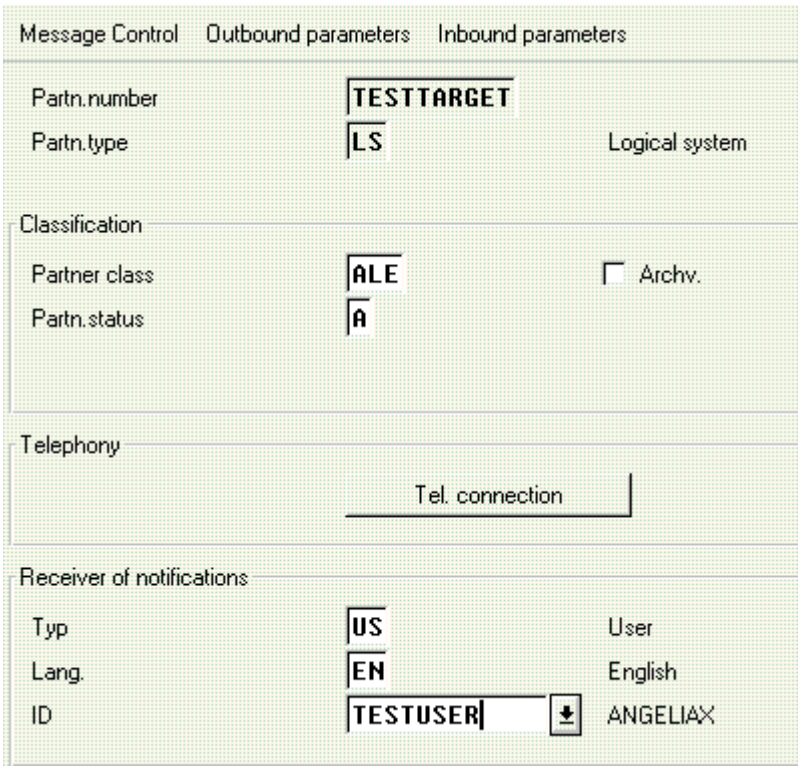


Illustration 27: Specify partner details

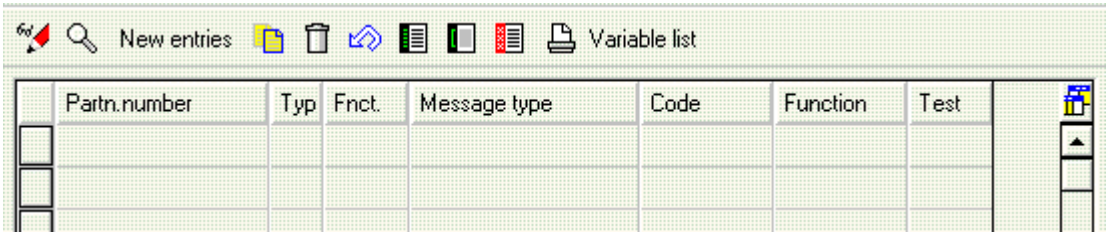


Illustration 28: Outbound partner profile before generation

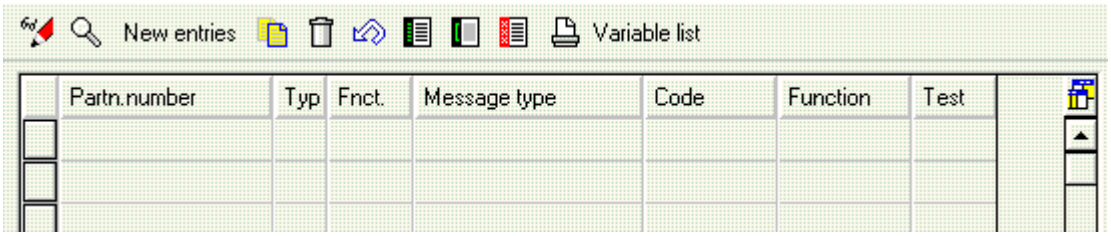


Illustration 29: Inbound partner profile before generation

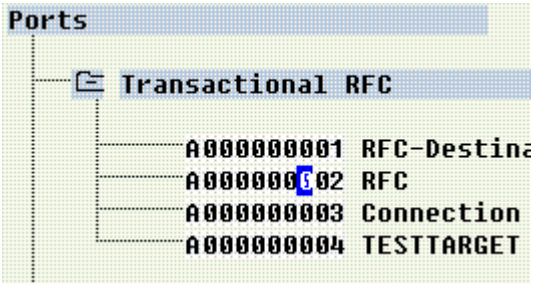


Illustration 30: Ports defined with SM59

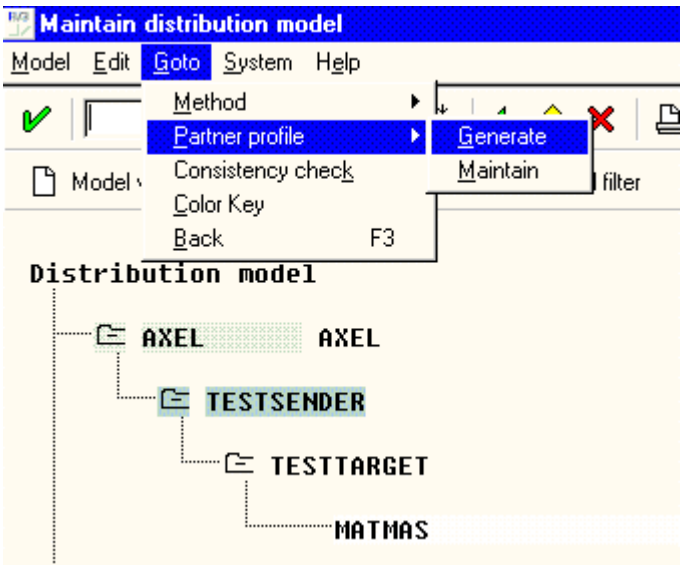


Illustration 31: Generate Partner Profiles Form SALE menu

Protocol for generating partner profile	
Partner	
System TESTSENDER	System TESTSENDER as a partner type already exists
System TESTTARGET	System TESTTARGET as a partner type already exists
Port	
System TESTTARGET	Port A000000004 with RFC destination TESTTARGET has been created
Outbound parameter	
System TESTTARGET	Outbound parameter for message type MATMAS successfully created Outbound parameter for message type SYNCH successfully created

Illustration 32: Automatically created partner profile

There have been two profiles generated. The one is for **MATMAS**, which we explicitly assigned in the distribution scenario. The second one is a mandatory IDoc type with the name **SYNCH** which is used for RFC control information and synchronisation. This one is only created if it does not yet exist.

	Partn.number	Typ	Fnct.	Message type	Code	Function	Test
	TESTTARGET	LS		MATMAS			☐
	TESTTARGET	LS		SYNCH			☐

Illustration 33: Outbound partner profile after generation

Here is a detail view of the parameters generated. The receiver port is the RFC destination, that had been created for **TESTTARGET** with SM59.
Data goes to table **EDP13**.

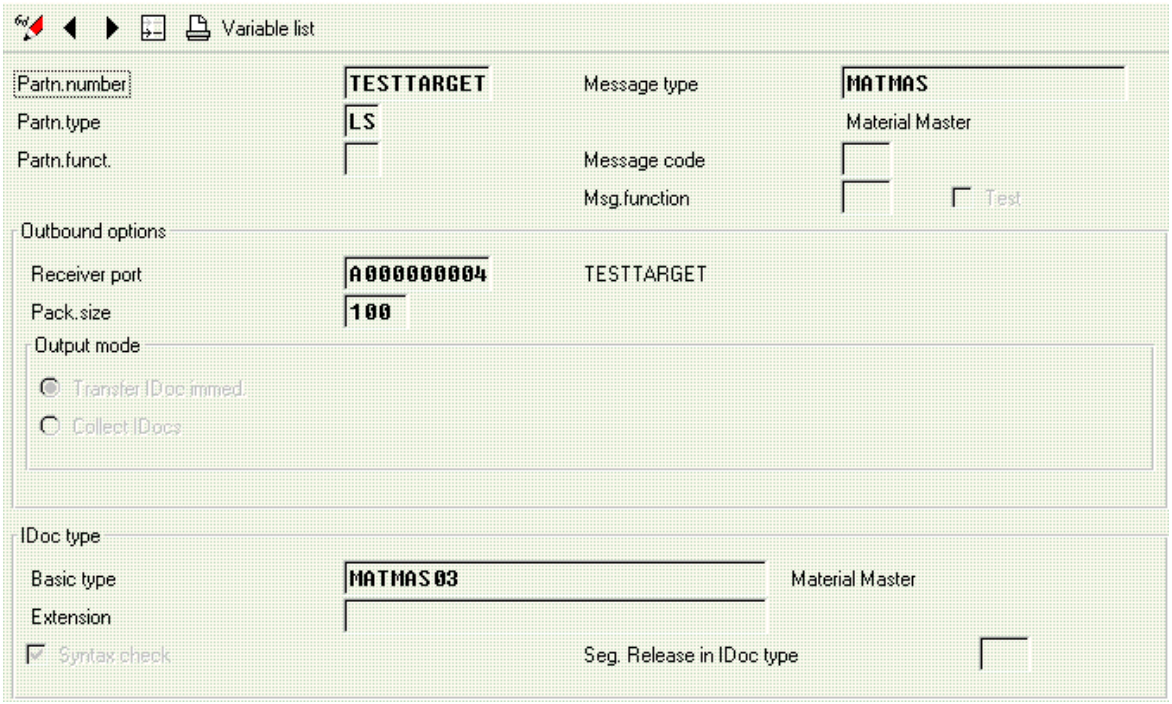


Illustration 34: Assigning the port to partner link

14.9 Creating IDocs and ALE Interface From BAPI SDBG

There is a very powerful utility which allows to generate most IDoc and ALE interface objects directly from a BAPI's method interface.

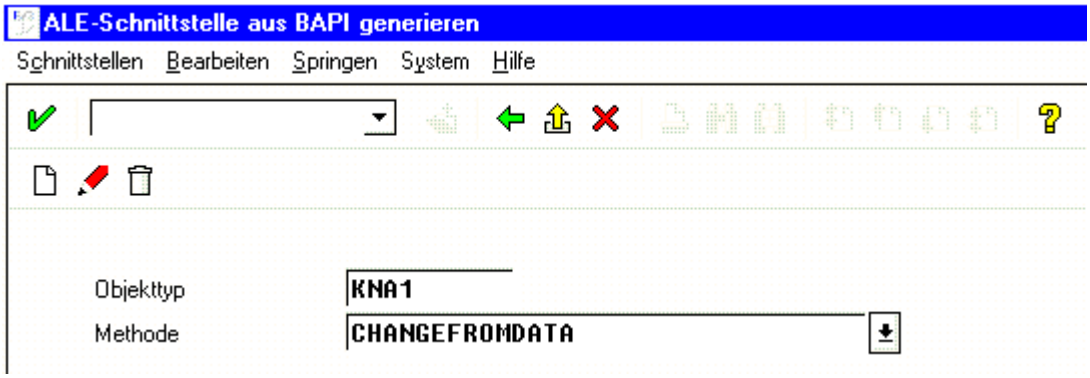
BDBG

The transaction requires a valid BAPI object and method as it is defined with SWO1. You will also have to specify a development class and a function to store the generated IDoc processing function.

Every time BAPI is executed, the ALE distribution is checked

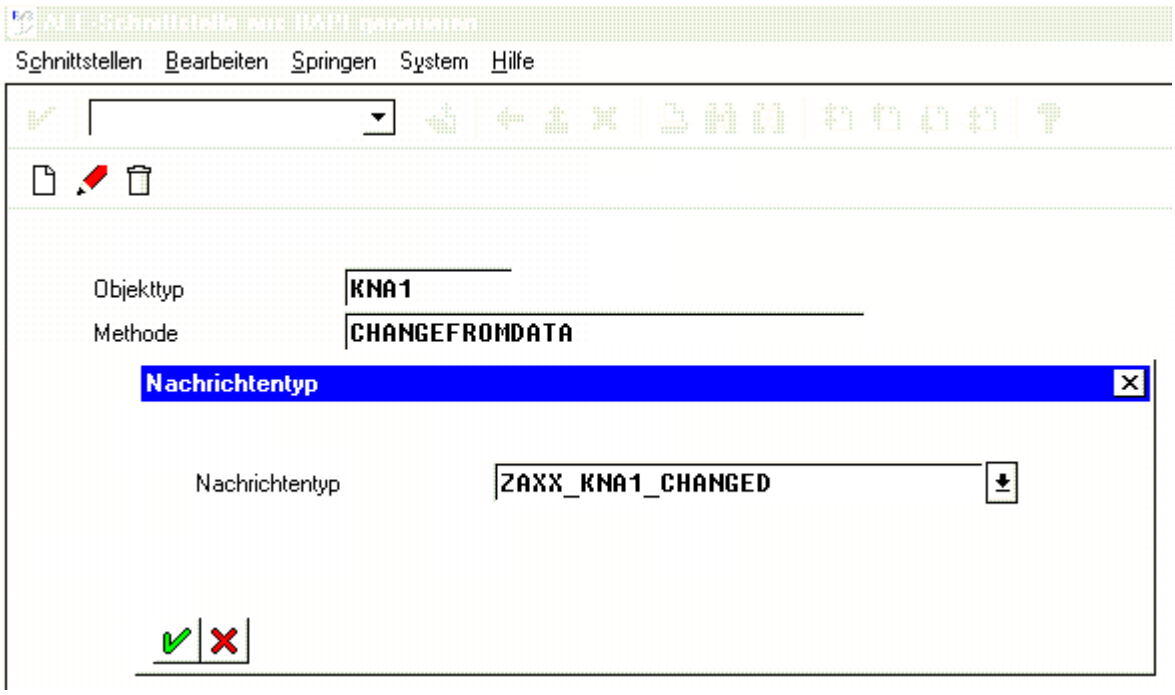
I will demonstrate the use with the object KNA1 and method CHANGEFROMDATA. This object is executed every time when the data of a customer (table KNA1) is modified, eg. via transactions XD01 or XD02. This object will automatically trigger a workflow event after its own execution, which can be used for the ALE triggering. BDBG will generate an ALE interface with all IDoc definitions necessary.This ALE introduced can be introduced in a scenario. Hence, every time the customer data is modified, the data is going to be distributed as an IDoc according the ALE scenario setup.

Enter the object and the method

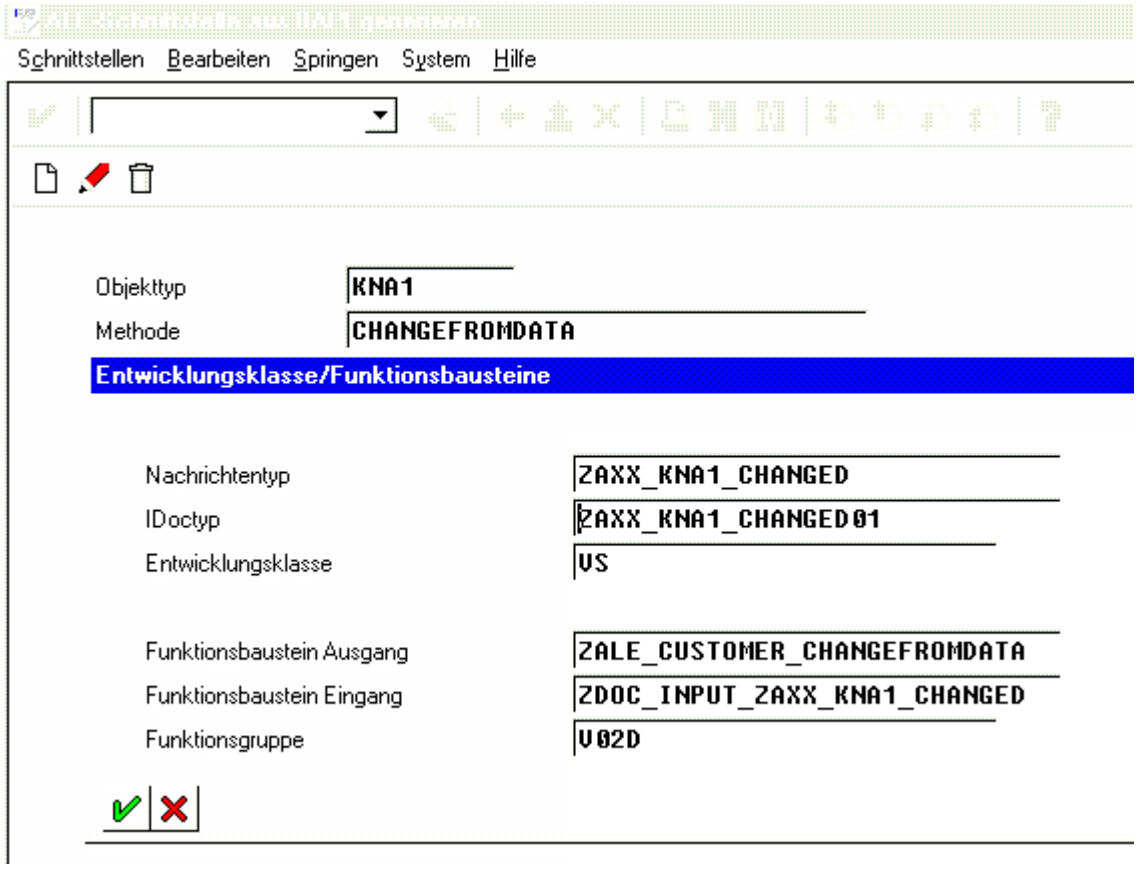


Specify a name for the created message type

The message type will be created in table **EDMSG** .



Define the names of the processing function modules and the associated IDoc types



Now you can specify the required IDoc types and the names of the function module and function group for the processing routines. Note, that the development class (Entwicklungsklasse) and the function group (Funktionsgruppe) need to be in your customer name space, i.e. should begin with Y or Z. The values proposed on this screen are usually inappropriate.

Result report Click on generated objects to see what was generated in detail

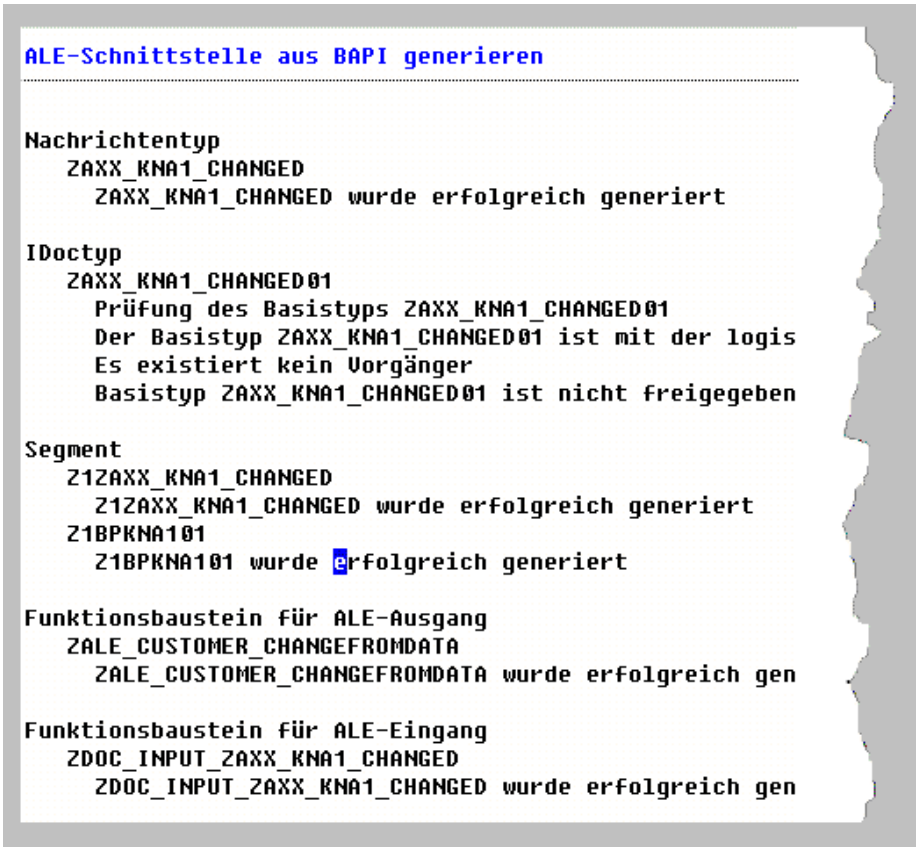


Illustration 35: Generation protocol

A detailed report is shown. The report is clickable so that you can directly view the generated objects. The hotspot will appear when you move over a clickable object.

The transaction has generated an IDoc type

The IDoc type is generated with a header section containing the interface values of the object, and a data section with the remaining fields of the object data structure.

The BAPIs interface definition looks like that.

```
FUNCTION bapi_customer_changefromdata.
*"----------------------------------------------------------------------
*"*"Lokale Schnittstelle:
*" IMPORTING
*"           VALUE(PI_ADDRESS)     LIKE BAPIKNA101 STRUCTURE BAPIKNA101
*"           VALUE(PI_SALESORG)    LIKE BAPIKNA102-SALESORG
*"           VALUE(PI_DISTR_CHAN) LIKE BAPIKNA102-DISTR_CHAN OPTIONAL
*"           VALUE(PI_DIVISION)    LIKE BAPIKNA102-DIVISION OPTIONAL
*"           VALUE(CUSTOMERNO)     LIKE BAPIKNA103-CUSTOMER
*" EXPORTING
*"           VALUE(PE_ADDRESS)     LIKE BAPIKNA101 STRUCTURE BAPIKNA101
*"           VALUE(RETURN)         LIKE BAPIRETURN STRUCTURE BAPIRETURN
*"----------------------------------------------------------------------
```

Illustration 36: Function interface of the BAPI

Generated segment structure from BAPI function interface parameter

For each of the parameters in the BAPIs interface, the generator created a segment for the IDoc type. Some segments are used for IDoc inbound only, others for IDoc outbound instead. Parameter fields that are not structured will be combined in a single segment which is placed as first segment of the IDoc type and contains all these fields. This collection segment receives the name of the IDoc type. In our example this is the generated segment `Z1ZAXX_KNA1_CHANGED`.

The segment below has been created as a header level segment and combines all function module parameters, which do not have a structure, i.e. which are single fields. E.g. if the BAPI has parameters a parameter i_material LIKE mara-matnr then it will be placed in the control segment. However if it is declared i_material STRUCTURE mara then it will create an own IDoc segment.

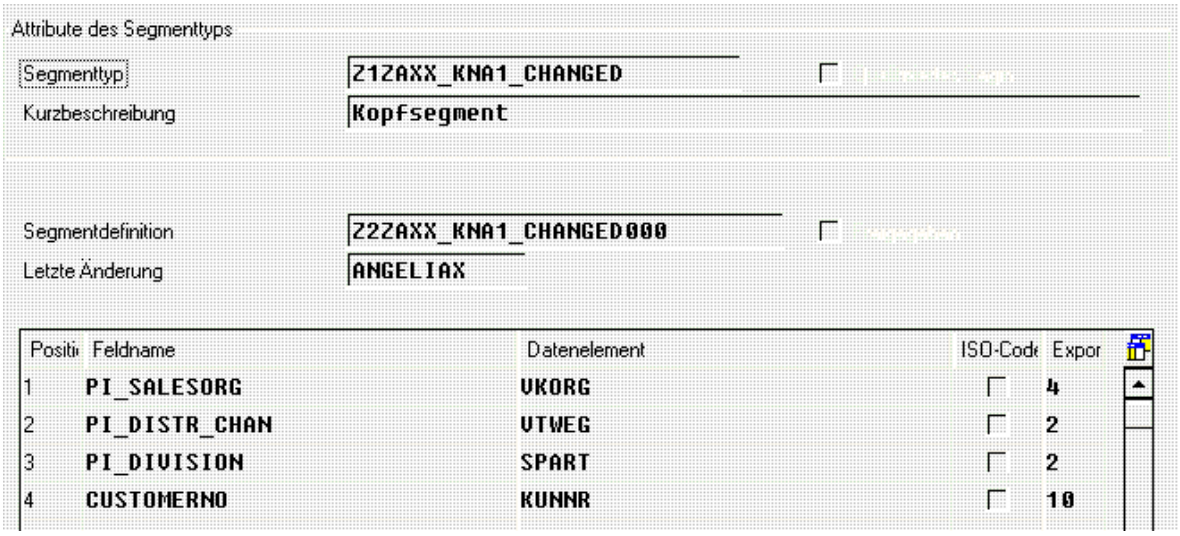


Illustration 37: Segment Z1ZAXX_KNA1_CHANGED

14.10 Defining Filter Rules

ALE allows to define simple filter and transformation rules. These are table entries, which are processed every time the IDoc is handed over to the port. Depending on the assigned path this happens either on inbound or outbound.

SALE Rules are defined with the SALE transaction.

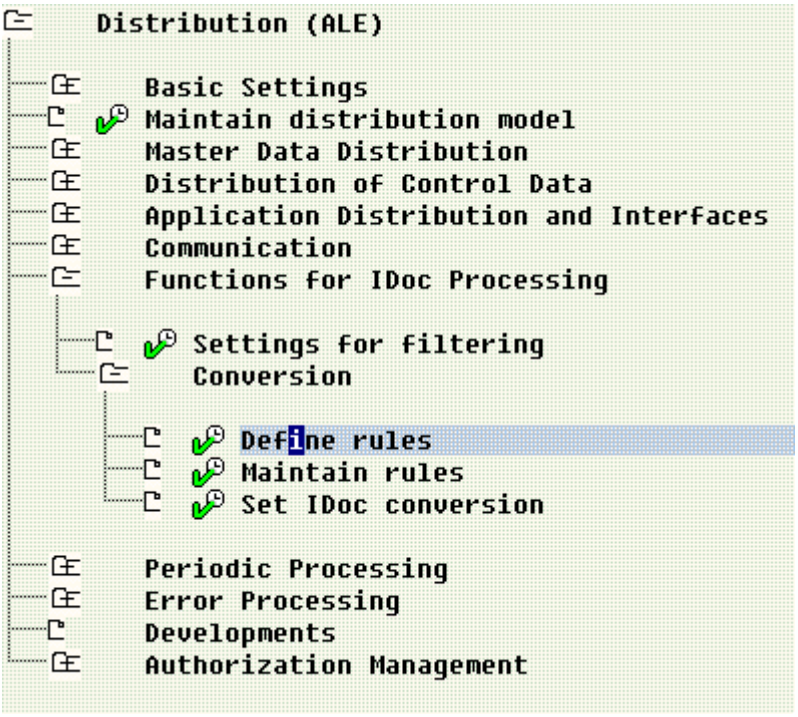


Illustration 38: SALE

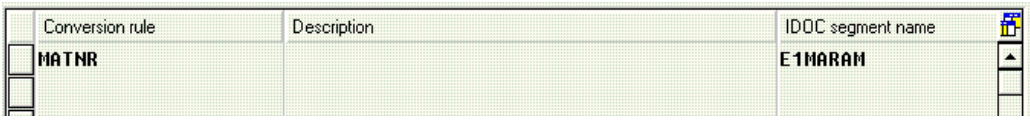


Illustration 39: Assigning the conversion rule to an IDoc segment

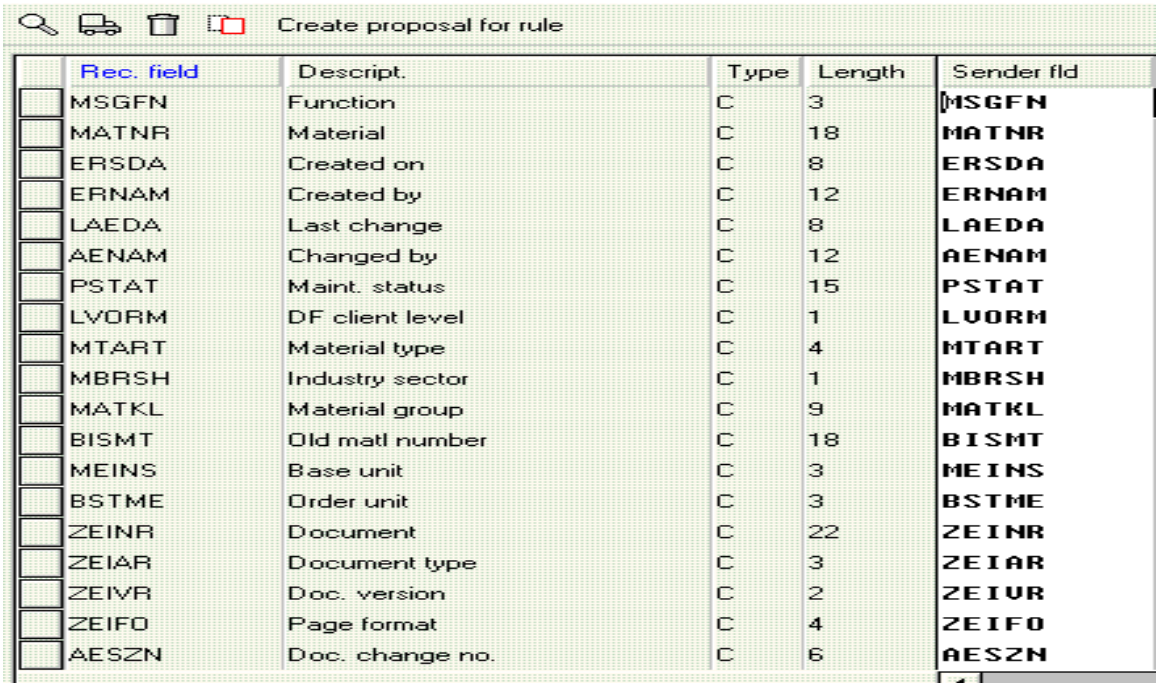


Illustration 40: Tell, where the value for a field should come fromt

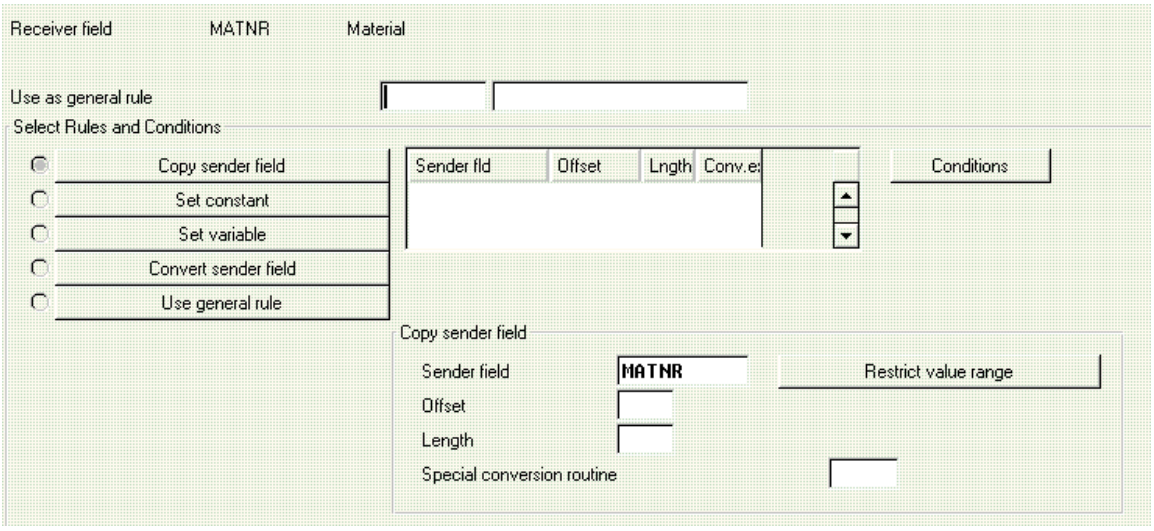


Illustration 41: Define a rule

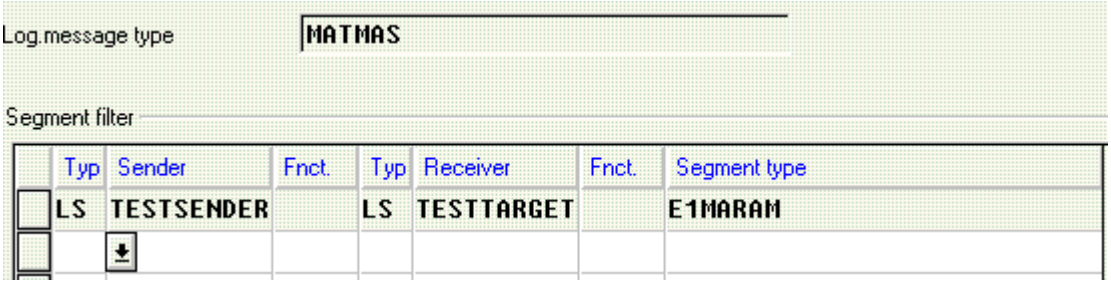


Illustration 42: Assigning the filter to a partner link

Workflow Technology

There are two faces of workflow in R/3. There is once the business oriented workflow design as it is taught in universities. This is implemented by the SAP Business Workflow™. However, the workflow is also a tool to link transactions easily. It can be used to easily define execution chains of transactions or to trigger user actions without the need to modify the SAP standard code. This can even be achieved without laboriously customizing the HR related workflow settings.

Summary

- Workflow event linkage allows the execution of another program when a transaction finishes
- The workflow event linkage mechanism can be easily used without customizing the full workflow scenarios
- This way we use the workflow engine to chain the execution of transaction and circumvent the setup of the *SAP Business Workflow™*
- There are several independent ways to trigger the workflow event linkage

Americans work hard because they are optimists.
Germans work hard because they fear the future.

15.1 Workflow in R/3 and Its Use For Development

SAP R/3 provides a mechanism, called Workflow, that allows conditional and unconditional triggering of subsequent transactions from another transaction. This allows to build up automatic processing sequences without having the need to modify the SAP standard transactions.

Workflow as business method

The SAP business workflow was originally designed to model business workflows according to scientific theories with the same name Business Workflow. This is mainly a modelling tool, that uses graphical means, egg. flow charting, to sketch the flow of events in a system to achieve the required result. SAP allows to transcript these event modelling into customizing entries, which are then executed by the SAP Workflow mechanism.

Transaction SWO1

The transaction to enter the graphical model, to define the events and objects and to develop necessary triggering and processing objects, is SWO1 (it is an O not a zero).

SAP approach unnecessary complex and formal

I will not even try to describe, how to design workflows in SAP. I believe, that the way how workflows are realized in SAP is far to complicated and unnecessarily complex and will fill a separate book.

Workflow events can be used for own developments

Fortunately the underlying mechanism for workflows is less complex as the formal overhead. Most major transactions will trigger the workflow via `SWE_EVENT_CREATE` . This will make a call to a workflow handler routine, whose name can usually be customized dynamically and implemented as a function module.

15.2 Event Coupling (Event Linkage)

Contrary to what you mostly hear about R/3 workflow, it is relatively easy and mechanical to define a function module as a consecutive action after another routine raised a workflow event. This can e.g. be used to call the execution of a transaction after another one has finished.

Every workflow enabled transaction will call SWE_EVENT_CREATE

The whole workflow mechanism is based on a very simple principle. Every workflow enabled transaction will call directly or indirectly the function module during SWE_EVENT_CREATE update.

SWE_EVENT_CREATE will look in a table, e.g. SWETYPECOU to get the name of the following action

The function module SWE_EVENT_CREATE will then consult a customizing table. For a simple workflow coupling, the information is found in the table **SWETYPECOU** . The table will tell the name of the subsequent program to call, either a function module or an object method.

This way of defining the subsequent action is called type coupling because the action depends on the object type of the calling event.

The call to the following event is done with a dynamic function call. This requires, that the called function module has a well-defined interface definition. Here you see the call as it is found in SWE_EVENT_CREATE .

```
CALL FUNCTION typecou-recgetfb " call receiver_type_get_fb
      EXPORTING
            objtype = typecou-objtype
            objkey = objkey
            event = event
            generic_rectype = typecou-rectype
      IMPORTING
            rectype = typecou-rectype
      TABLES
            event_container = event_container
      EXCEPTIONS
      OTHERS = 1.
```

Program 10: This is the call of the type coupled event in release 40B

reading the change pointers which are not yet processed

```
Call Function 'CHANGE_POINTERS_READ'
```

RBDMIDOC

The ABAP RBDMIDOC will process all open change pointers and distribute the matching IDocs.

15.3 Workflow from Change Documents

Every time a change document is written a workflow event for the change document object is triggered. This can be used to chain unconditionally an action from a transaction.

CHANGEDOCUMENT_CLOSE

The most interesting chaining point for workflow events is the creation of the change document. Nearly every transaction writes change documents to the database. This document is committed to the database with the function module CHANGEDOCUMENT_CLOSE. This function will also trigger a workflow event.

The workflow handler triggered by an event which is fired from change documents is defined in table SWECDOBJ . For every change document type a different event handler can be assigned. This is usually a function module and the call for it is the following

```
CALL FUNCTION swecdobj-objtypefb
    EXPORTING
       changedocument_header = changedocument_header
       objecttype = swecdobj-objtype
    IMPORTING
       objecttype = swecdobj-objtype
    TABLES
       changedocument_position = changedocument_position.
```

Program 11: This is the call of the change doc event in release 40B

In addition change pointers for ALE are written

Change pointers are created by calling FUNCTION CHANGEDOCUMENT_CLOSE , which writes the usual change documents into table **CDHDR** and **CDPOS**. This function calls then the routine CHANGE_POINTERS_CREATE which create the change pointers.

```
CALL FUNCTION 'CHANGE_POINTERS_CREATE'
     EXPORTING
        change_document_header = cdhdr
     TABLES
        change_document_position = ins_cdpos.
```

Program 12: This is the call of the type coupled event in release 40B

15.4 Trigger a Workflow from Messaging

The third common way to trigger a workflow is doing it from messaging.

Define a message for condition technique

When the R/3 messaging creates a message and processes it immediately, then it actually triggers a workflow. You can use this to set up conditional workflow triggers, by defining a message with the message finding and link the message to a workflow.

Assign media W or 8

You define the message the usual way for your application as you would do it for defining a message for SAPscript etc. As a processing media you can assign either the type **W** for workflow or **8** for special processing.

The media type **W** for workflow would require defining an object in the object repository. We will only show how you can trigger the workflow with a standard ABAP using the media type **8**.

Form routine requires two parameters

You need to assign a program and a form routine to the message in table **TNAPR**. The form routine you specify needs exactly two USING-parameters as in the example below.

```
REPORT ZSNASTWF.
TABLES: NAST.

FORM ENTRY USING RETURN_CODE US_SCREEN.
*    Here you gonna call your workflow action
  RETURN_CODE = 0.
  SY-MSGID = '38'.
  SY-MSGNO = '000'.
  SY-MSGNO = 'I'.
  SY-MSGV1 = 'Workflow called via NAST'.
  CALL FUNCTION 'NAST_PROTOCOL_UPDATE'
       EXPORTING
            MSG_ARBGB = SYST-MSGID
            MSG_NR    = SYST-MSGNO
            MSG_TY    = SYST-MSGTY
            MSG_V1    = SYST-MSGV1
            MSG_V2    = SYST-MSGV2
            MSG_V3    = SYST-MSGV3
            MSG_V4    = SYST-MSGV4
       EXCEPTIONS
            OTHERS    = 1.
ENDFORM.
```

NAST must be declared public in the called program

In addition, you need to declare the table **NAST** with a tables statement public in the ABAP where the form routine resides. When the form is called the variable **NAST** is filled with the values of the calling **NAST** message.

15.5 Example, How To Create A Sample Workflow Handler

Let us show you a function module which is suitable to serve as a function module and define the linkage.

Create a function module that will be triggered by a workflow event

We want to create a very simple function module that will be triggered upon a workflow event. This function is called from within function SWE_EVENT_CREATE. The parameters must comply the calling standard as shown below.

This is the call of the type coupled event in release 40B

```
CALL FUNCTION typecou-recgetfb
      EXPORTING
            objtype = typecou-objtype
            objkey = objkey
            event = event
            generic_rectype = typecou-rectype
      IMPORTING
            rectype = typecou-rectype
      TABLES
            event_container = event_container
      EXCEPTIONS
      OTHERS = 1.
```

Template for workflow handler

Release 40B provides the function module WF_EQUI_CHANGE_AFTER_ASSET which could be used as template for the interface. So we will copy it and put our coding in instead..

```
FUNCTION Z_WORKFLOW_HANDLER.
*"*"Lokale Schnittstelle:
*"       IMPORTING
*"             VALUE(OBJKEY) LIKE  SWEINSTCOU-OBJKEY
*"             VALUE(EVENT) LIKE  SWETYPECOU-EVENT
*"             VALUE(RECTYPE) LIKE  SWETYPECOU-RECTYPE
*"             VALUE(OBJTYPE) LIKE  SWETYPECOU-OBJTYPE
*"       TABLES
*"              EVENT_CONTAINER STRUCTURE  SWCONT
*"       EXCEPTIONS
*"              NO_WORKFLOW
  RECEIVERS-EXPRESS  = ' '.
  RECEIVERS-RECEIVER = SY-SUBRC.
  APPEND RECEIVERS.
  DOCUMENT_DATA-OBJ_DESCR
 = OBJ_KEY.
  CONTENT = OBJ_KEY.
  APPEND CONTENT.
  CALL FUNCTION 'SO_NEW_DOCUMENT_SEND_API1'
       EXPORTING  DOCUMENT_DATA              = DOCUMENT_DATA
       TABLES     OBJECT_CONTENT             = CONTENT
                  RECEIVERS                  = RECEIVERS.
ENDFUNCTION.
```

Program 13: A workflow handler that sends an Sap Office mail

Link handler to

The function can be registered as a handler for an event. This is

caller done with transaction SWLD.

Event logging If you do not know the object type, that will trigger the event, you can use the event log. You have to activate it from SWLD and then execute the event firing transaction. When the event has been fired it will a trace in the event log.

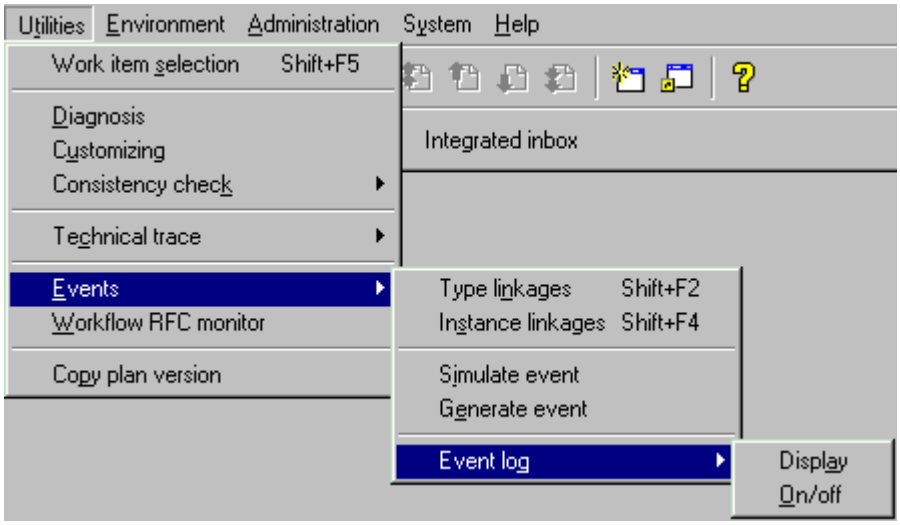


Illustration 43: Transaction SWLD to define event linkage and see event log

All workflow handlers are called via RFC to a dummy destination **WORKFLOW_LOCAL_000** where 000 is to be replaced by the client number.

Most errors are caused by following reasons

Hit list of common errors

- You forgot to set the RFC flag in the interface definition of your event handling function module
- There is a syntax error in your function module (check with generate function group)
- You mistyped something when defining the coupling
- The internal workflow destination **WORKFLOW_LOCAL_000** is not defined

SM58 to display what happened to your event If you think your handler did not execute at all, you can check the list of pending background tasks with transaction SM58. If you event is not there it has either neither been triggered (so your tables **SWETYPEENA** and **SSWETYPEOBJ** may have the wrong entries) or your event handler executed indeed and may probably have done something else than you expected. Ergo: your mistake.

Read carefully the help for CALL FUNCTION .. IN BACKGROUND TASK Your event handler function is called `IN BACKGROUND TASK`. You may want to read carefully the help on this topic in the SAP help. (help for "call function" from the editor command line)

```
FUNCTION YAXXWF_MAIL_ON_EVENT.
*"       IMPORTING
*"             VALUE(OBJKEY) LIKE  SWEINSTCOU-OBJKEY
*"             VALUE(EVENT) LIKE  SWETYPECOU-EVENT
*"             VALUE(RECTYPE) LIKE  SWETYPECOU-RECTYPE
*"             VALUE(OBJTYPE) LIKE  SWETYPECOU-OBJTYPE
*"       TABLES
*"              EVENT_CONTAINER STRUCTURE  SWCONT
*"----------------------------------------------------------------------
*  This example sends a mail to the calling user and tells
*  about the circumstances when the event was fired.
*  Just for fun, it lists also all current enqueue locks
*"----------------------------------------------------------------------
  DATA: ENQ    LIKE SEQG3  OCCURS 0 WITH HEADER LINE.
  DATA: DOC_DATA LIKE SODOCCHGI1.
  DATA: MAIL LIKE STANDARD TABLE OF SOLISTI1 WITH HEADER LINE.
  DATA: RECLIST LIKE STANDARD TABLE OF SOMLRECI1 WITH HEADER LINE.
  MAIL-LINE   = 'Event fired by user: &'.
  REPLACE '&' WITH SY-UNAME INTO MAIL-LINE.
  APPEND MAIL.
*-----------------------------------------------------------------------*
  MAIL-LINE   = 'Object Key: &'.
  REPLACE '&' WITH OBJKEY INTO MAIL-LINE.
  APPEND MAIL.
*-----------------------------------------------------------------------*
  MAIL-LINE   = 'Event Name: &'.
  REPLACE '&' WITH EVENT  INTO MAIL-LINE.
  APPEND MAIL.
*-----------------------------------------------------------------------*
  MAIL-LINE   = 'Rectype: &'.
  REPLACE '&' WITH RECTYPE INTO MAIL-LINE.
  APPEND MAIL.
*-----------------------------------------------------------------------*
  MAIL-LINE   = 'Object Type: &'.
  REPLACE '&' WITH OBJTYPE INTO MAIL-LINE.
  APPEND MAIL.
*-----------------------------------------------------------------------*
  MAIL-LINE   = 'Container contents:'.
  APPEND MAIL.
*-----------------------------------------------------------------------*
  LOOP AT EVENT_CONTAINER.
    CONCATENATE EVENT_CONTAINER-ELEMENT EVENT_CONTAINER-VALUE
           INTO MAIL-LINE SEPARATED BY SPACE.
    APPEND MAIL.
  ENDLOOP.
*----- write the current enqueues into the message -(for demo)---------*
  MAIL-LINE   = 'Active enqueue locks when event was triggered:'.
  APPEND MAIL.
  CALL FUNCTION 'ENQUEUE_READ' TABLES ENQ = ENQ.
  LOOP AT ENQ.
    CONCATENATE ENQ-GNAME ENQ-GARG    ENQ-GMODE  ENQ-GUSR  ENQ-GUSRVB
                ENQ-GOBJ  ENQ-GCLIENT ENQ-GUNAME ENQ-GTARG ENQ-GTCODE
     INTO MAIL-LINE SEPARATED BY '/'.
    APPEND MAIL.
  ENDLOOP.
```

```
  IF ENQ[] IS INITIAL.
    MAIL-LINE = '*** NONE ***'.
    APPEND MAIL.
  ENDIF.
*---------------------------------------------------------------------*
* fill the receiver list
  REFRESH RECLIST.
  RECLIST-RECEIVER = 'USERXYZ'.
  RECLIST-REC_TYPE = 'B'.
  RECLIST-EXPRESS  = ' '.
* reclist-express  = 'X'. "will pop up a notification on receiver screen
  APPEND RECLIST.
*---------------------------------------------------------------------*
  CLEAR DOC_DATA.
  DOC_DATA-OBJ_NAME    = 'WF-EVENT'.
  DOC_DATA-OBJ_DESCR   = 'Event triggered by workflow type coupling'.
  DOC_DATA-OBJ_SORT    = 'WORKFLOW'.
* doc_data-obj_expdat
* doc_data-sensitivty
* doc_data-obj_prio
* doc_data-no_change
*---------------------------------------------------------------------*
  CALL FUNCTION 'SO_NEW_DOCUMENT_SEND_API1'
       EXPORTING
            DOCUMENT_DATA              = DOC_DATA
*           DOCUMENT_TYPE              = 'RAW'
*           PUT_IN_OUTBOX              = ' '
*      IMPORTING
*           SENT_TO_ALL                =
*           NEW_OBJECT_ID              =
       TABLES
*           OBJECT_HEADER              =
            OBJECT_CONTENT             = MAIL
*           OBJECT_PARA                =
*           OBJECT_PARB                =
            RECEIVERS                  = RECLIST
       EXCEPTIONS
            TOO_MANY_RECEIVERS         = 1
            DOCUMENT_NOT_SENT          = 2
            DOCUMENT_TYPE_NOT_EXIST    = 3
            OPERATION_NO_AUTHORIZATION = 4
            PARAMETER_ERROR            = 5
            X_ERROR                    = 6
            ENQUEUE_ERROR              = 7
            OTHERS                     = 8.
*---------------------------------------------------------------------*
ENDFUNCTION.
```

Program 14: Send a SAPoffice mail triggered by a workflow event (full example)

Batch Input Recording

The batch input (BTCI) recorder (SHDB) is a precious tool to develop inbound IDocs. It records any transaction like a macro recorder. From the recording an ABAP fragment can be created. This lets you easily create data input programs, without coding new transactions.

16.1 Recording a Transaction With SHDB

The BTCI recorder lets you record the screen sequences and values entered during a transaction. It is one of the most precious tools in R/3 since release 3.1. It allows a fruitful cooperation between programmer and application consultant.

The section below will show you an example of, how the transaction SHDB works. With the recording you can easily create an ABAP, which is able to create BTCI files.

Record a session with transaction SHDB

You will be asked for a session name and the name of the transaction to record. Then you can enter the data into the transaction as usual.

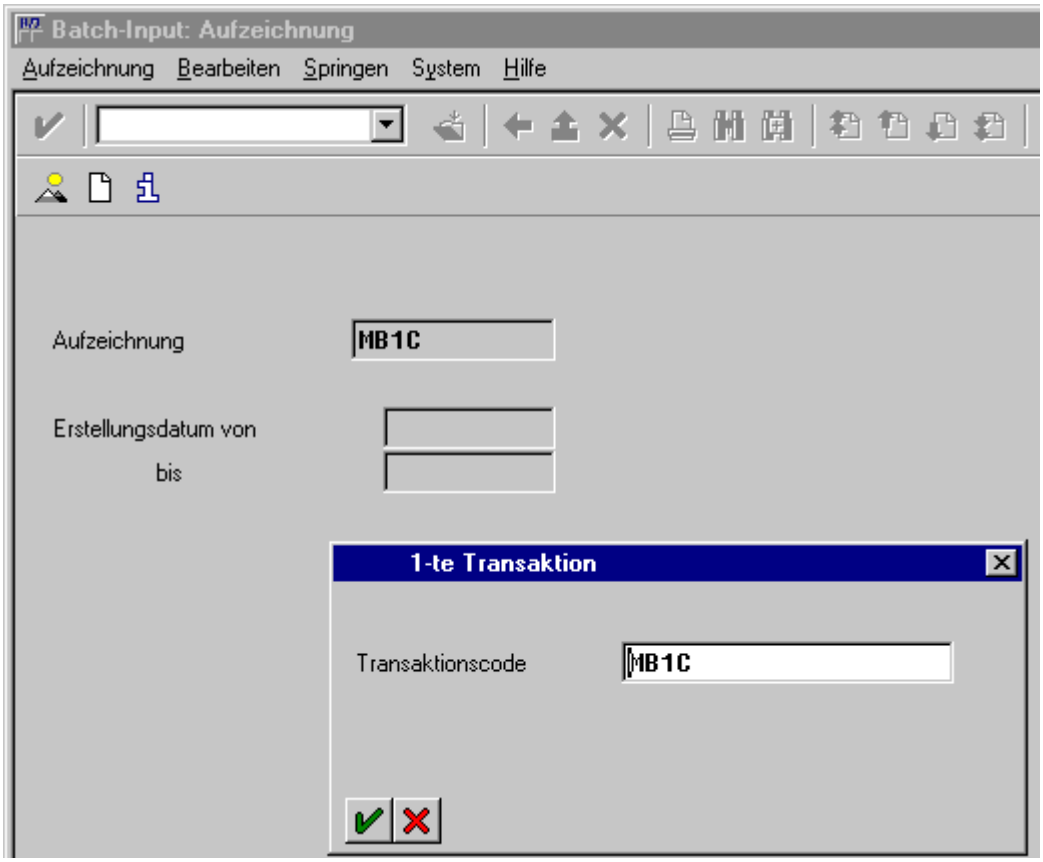


Illustration 44: Starting a new recording with SHDB

Now the transaction is played and all entries recorded

The following screens will show the usual transaction screens. All entries that you make are recorded together with the screen name and eventual cursor positions.

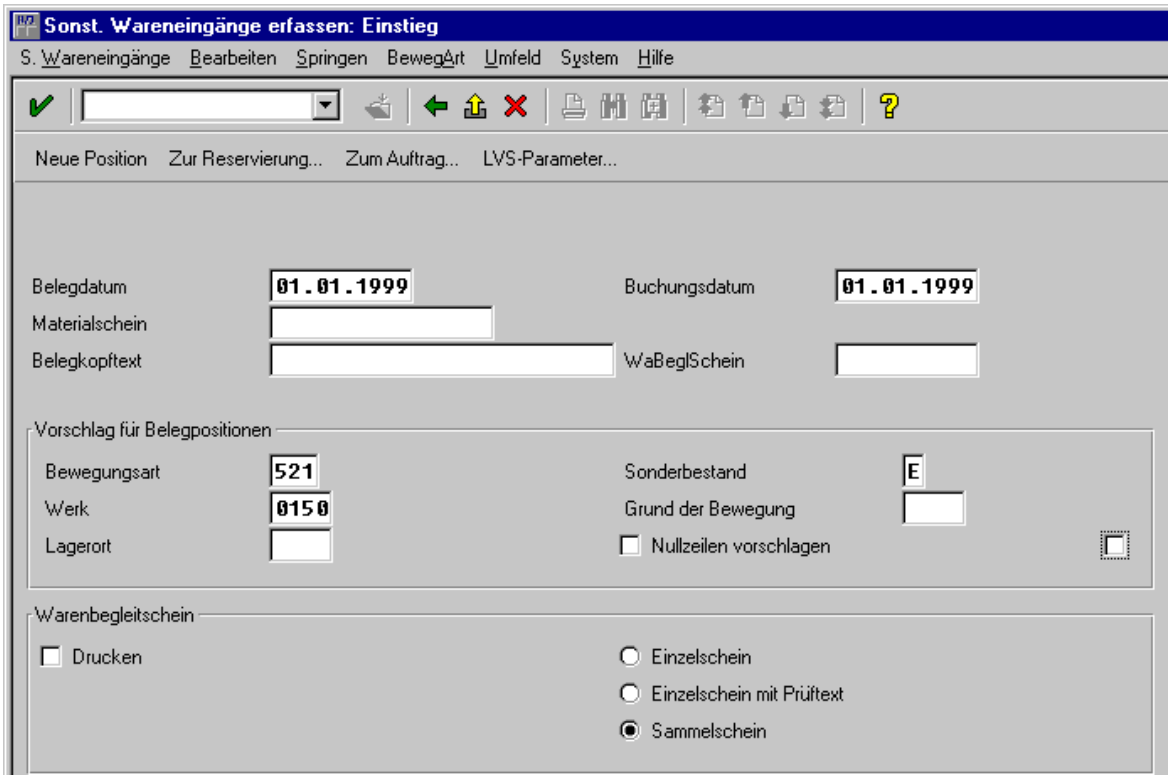


Illustration 45: First screen of MB1C (goods entry)

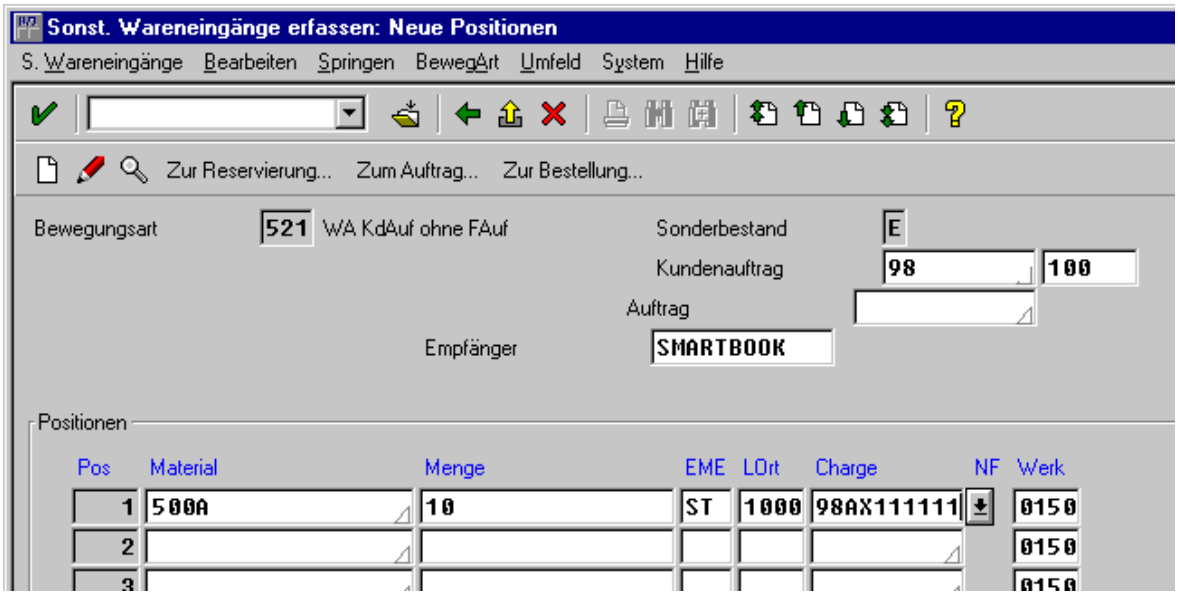


Illustration 46: Recorded list screen for goods entry

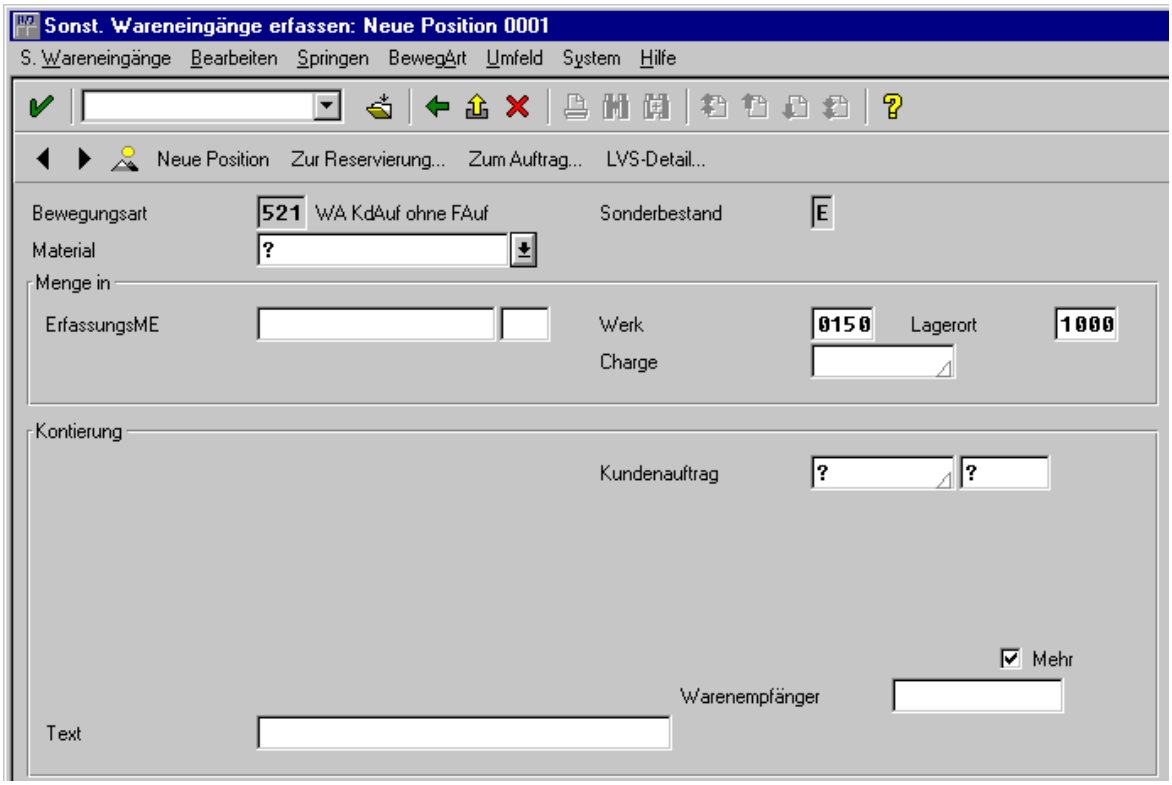


Illustration 47: Recorded Detail Screen for goods entry

From the recorded session, you can generate an ABAP

After you finished the recording you have the possibility to generate ABAP coding from it. This will be a sequence of statements which can generate a batch input session, which is an exact replay of the recorded one.

The generated program contains an include BDCRECXX which contains all the FORM routines referenced.

Put the coding into a function module

To make the recorded code usable for other program, you should make a function module out of it. Start9ing with release 4.5A the recorded provides a feature to automatically generate such a function module. For earlier release we give the coding of a program which fulfils this task further down.

16.2 How to Use the Recorder Efficiently

This routine replaces BDCRECXX to allow executing the program generated by SHDB via a call transaction instead of generating a BTCI file.

From the recorded session, you can generate an ABAP

The SHDB transaction creates an ABAP from the recording. When you run this ABAP, it will generate a BTCI group file, with exactly the same data as in the recording.

The recorder is able to generate an ABAP. Releases before 4.5A include a routine BDCRECXX. This include contains FORM routines which fill the BDCDATA table and execute the routines BDC_OPEN_GROUP and BDC_CLOSE_GROUP. These are the routines which create batch input files.

Replace the include with modified FORM routines to allow CALL TRANSACTION

If we modified this FORM routines a little bit, we can make the ABAP replay the recording online via a `CALL TRANSACTION`, which is much more suitable for our development and testing purposes. If you replace the standard include `BDCRECXX` with the shown one `ZZBDCRECXX`, you can replay the recording online.

Starting with release 4.5A you can create a function module from the recording. This function modules replace the recorded constants with parameters and give you the option to choose between a batch input file or a direct call transaction.

Scrolling areas with table controls require to modify the recording and to add a loop.

A remark on screen processing, if there are table controls (scroll areas). If you enter many lines or try to extend a list, where you do cannot tell before, how many lines the list contains, you will not know, where to place the cursor. Therefore most transactions provide a menu option, that positions the list in a calculable manner. If you choose a new item, most transaction will either pop up a detail screen or will position the list, so that the next free line is always line 2. If this feature is not provided in a transaction, it is regarded as a malfunction by SAP and can be reported to SAPNET/OSS.

16.3 Include ZZBDCRECXX to Replace BDCRECXX

This routine replaces BDCRECXX to allow executing the program generated by SHDB via a call transaction instead of generating a BTCI file.

```
*---------------------------------------------------------------------*
*   INCLUDE ZZBDCRECXX                                                *
*---------------------------------------------------------------------*
FORM OPEN_GROUP.
  REFRESH BDCDATA.
ENDFORM.
*---------------------------------------------------------------------*
FORM CLOSE_GROUP.
ENDFORM.
*---------------------------------------------------------------------*
FORM BDC_TRANSACTION USING TCODE.
  CALL TRANSACTION TCODE USING BDCDATA MODE 'A' MESSAGES INTO BDCMESS.
ENDFORM.
*---------------------------------------------------------------------*
FORM BDC_TRANSACTION_MODE  USING TCODE AMODE.
  CALL TRANSACTION TCODE USING BDCDATA UPDATE 'S'
       MODE AMODE MESSAGES INTO BDCMESS.
ENDFORM.
*---------------------------------------------------------------------*
FORM BDC_DYNPRO USING PROGRAM DYNPRO.
  CLEAR BDCDATA.
  BDCDATA-PROGRAM  = PROGRAM.
  BDCDATA-DYNPRO   = DYNPRO.
  BDCDATA-DYNBEGIN = 'X'.
  APPEND BDCDATA.
ENDFORM.
*---------------------------------------------------------------------*
FORM BDC_FIELD USING  FNAM FVAL.
  FIELD-SYMBOLS: <FLD>.
  ASSIGN (FNAM) TO <FLD>.
  CLEAR BDCDATA.
  DESCRIBE FIELD FVAL TYPE SY-FTYPE.
  CASE SY-FTYPE.
    WHEN 'C'.
       WRITE FVAL TO BDCDATA-FVAL.
    WHEN OTHERS.
       CONDENSE FVAL.
       WRITE FVAL TO BDCDATA-FVAL LEFT-JUSTIFIED.
  ENDCASE.
  BDCDATA-FNAM = FNAM.
  APPEND BDCDATA.
ENDFORM.                              " BDC_FIELD
```

```
*---------------------------------------------------------------------*
FORM GET_MESSAGES TABLES   P_MESSTAB STRUCTURE BDCMSGCOLL.
  P_MESSTAB[] = BDCMESS[].
  LOOP AT P_MESSTAB.
    AT LAST.
      READ TABLE P_MESSTAB INDEX SY-TABIX.
      MOVE-CORRESPONDING P_MESSTAB TO SYST.
    ENDAT.
  ENDLOOP.
ENDFORM.                               " GET_MESSAGES
*---------------------------------------------------------------------*
FORM GET_RESULTS TABLES  MESSTAB STRUCTURE BDCMSGCOLL
                         RETURN_VARIABLES STRUCTURE BDWFRETVAR
                 CHANGING WORKFLOW_RESULT LIKE BDWF_PARAM-RESULT.
  PERFORM GET_MESSAGES TABLES MESSTAB.
  DESCRIBE TABLE MESSTAB LINES SY-TFILL.
  REFRESH: RETURN_VARIABLES.
  CLEAR: WORKFLOW_RESULT, RETURN_VARIABLES.
  WORKFLOW_RESULT = 99999.
  IF SY-TFILL GT 0.
     READ TABLE MESSTAB INDEX SY-TFILL.
     IF MESSTAB-MSGTYP CA 'S'.
         WORKFLOW_RESULT = 0.
         RETURN_VARIABLES-DOC_NUMBER = MESSTAB-MSGV1.
         APPEND RETURN_VARIABLES.
     ENDIF.
  ENDIF.
ENDFORM.                      " GET_RESULTS
```

Program 15: Program ZZBDCRECXX (find at http://www.idocs.de)

16.4 ZZBRCRECXX_FB_GEN: Generate a Function from Recording

The shown routine ZZBDCRECXX_FB_GEN replaces BDCRECXX in a recorded ABAP. Upon executing, it will generate a function module from the recording with all variables as parameters.

The ABAP generated by SHDB is a very useful tool for developers. However, it does not replace the recorded constants by variables.

The following routine generates a function module from the recording. All you have to do is, to put the coding below in an include.

ZZBDCRECXX_FBGEN Give it the name ZZBDCRECXX_FBGEN.

Replace BDCRECXX Then replace the include BDCRECXX in the recording with ZZBDCRECXX_FBGEN.

Execute the ABAP once When you execute the ABAP, a function module in an existing function group will be created. The created function will contain the recording with all the constants replaced by variables, which show in the function module interface.

The following useful routine is written for releases up to 4.0B. In release 4.5B a similar functionality is provided. You can generate a function module from the recording transaction directly.

Before you generate the function, a function group must exist. This you have to do manually. The function group must also contain the include ZZBDCRECXX shown before, to have the declarations of the referenced FORM routines.

```
*---------------------------------------------------------------------*
PARAMETERS: FUNCNAME LIKE RS38L-NAME DEFAULT 'Z_TESTING_BTCI_$1'.
PARAMETERS: FUGR     LIKE RS38L-AREA DEFAULT 'Z_BTCI_TESTING'.
*---------------------------------------------------------------------*
DATA: TABAP LIKE ABAPTEXT OCCURS 0 WITH HEADER LINE.
DATA: BEGIN OF XCONST OCCURS 0,
  NAM LIKE DD03L-FIELDNAME, FREF LIKE DD03L-FIELDNAME,
  FVAL LIKE BDCDATA-FVAL,   FIDX(6),
        END OF XCONST.
DATA: STRL1 LIKE SY-FDPOS.
DATA: STRL2 LIKE STRL1.
DATA: IMPORT_PARAMETER     LIKE RSIMP     OCCURS 0 WITH HEADER LINE.
DATA: EXPORT_PARAMETER     LIKE RSEXP     OCCURS 0 WITH HEADER LINE.
DATA: TABLES_PARAMETER     LIKE RSTBL     OCCURS 0 WITH HEADER LINE.
DATA: CHANGING_PARAMETER   LIKE RSCHA     OCCURS 0 WITH HEADER LINE.
DATA: EXCEPTION_LIST       LIKE RSEXC     OCCURS 0 WITH HEADER LINE.
DATA: PARAMETER_DOCU       LIKE RSFDO     OCCURS 0 WITH HEADER LINE.
DATA: SHORT_TEXT LIKE TFTIT-STEXT
                VALUE 'Generated BTCI for transaction ##'.
DATA: XTCODE    LIKE SY-TCODE.
DATA: STR255(255).
TABLES: TLIBG, TFDIR.
*---------------------------------------------------------------------*
FORM OPEN_GROUP.
```

```
  FORMAT COLOR COL_TOTAL.
  WRITE: / 'Trying to generate function ', FUNCNAME.
  FORMAT RESET.
  ULINE.
  SELECT SINGLE * FROM TLIBG WHERE AREA EQ FUGR.
  IF SY-SUBRC NE 0.
    MESSAGE I000(38) WITH 'Function Pool' FUGR 'does not exit'.
    EXIT.
  ENDIF.
  MOVE 'PERFORM OPEN_GROUP.' TO TABAP.
  APPEND TABAP.
*---------------------------------------------------------------------*
  XCONST-FNAM = 'INPUT_METHOD'.
  XCONST-FREF = 'BDWFAP_PAR-INPUTMETHD'.
  XCONST-FVAL = 'A'.
  APPEND XCONST.
ENDFORM.
*---------------------------------------------------------------------*
FORM CLOSE_GROUP.
  LOOP AT XCONST.
    IMPORT_PARAMETER-PARAMETER  = XCONST-FNAM.
    IMPORT_PARAMETER-DBFIELD    = XCONST-FREF.
    CONCATENATE '''' XCONST-FVAL '''' INTO
        IMPORT_PARAMETER-DEFAULT.
    IMPORT_PARAMETER-OPTIONAL   = 'X'.

    CASE XCONST-FIDX.
      WHEN 'E'.
        MOVE-CORRESPONDING IMPORT_PARAMETER TO EXPORT_PARAMETER.
        APPEND EXPORT_PARAMETER.
      WHEN '*'.
      WHEN OTHERS.
        APPEND IMPORT_PARAMETER.
    ENDCASE.

* --make table parameters for obvious loop fields (fields with index)
    IF XCONST-FIDX CA ')*'.
      MOVE-CORRESPONDING IMPORT_PARAMETER TO TABLES_PARAMETER.
      TABLES_PARAMETER-DBSTRUCT = IMPORT_PARAMETER-DBFIELD.
      IF XCONST-FIDX NE '*'.
        TABLES_PARAMETER-PARAMETER(1) = 'T'.
      ENDIF.
      IF XCONST-FIDX CA '*'.
        APPEND TABLES_PARAMETER.
      ENDIF.
      FORMAT COLOR COL_POSITIVE.
    ENDIF.
    WRITE: / XCONST-FNAM COLOR COL_TOTAL, (60) XCONST-FVAL.

  ENDLOOP.
* SORT import_parameter BY parameter.
* DELETE ADJACENT DUPLICATES FROM import_parameter COMPARING parameter.
* SORT tables_parameter BY parameter.
* DELETE ADJACENT DUPLICATES FROM tables_parameter COMPARING parameter.
*---------------------------------------------------------------------*
  LOOP AT TABAP.
```

```
    WRITE: / TABAP COLOR COL_KEY.
  ENDLOOP.
*---------------------------------------------------------------------*
  REPLACE '##' WITH XTCODE INTO SHORT_TEXT.
  WRITE: / FUNCNAME COLOR COL_NEGATIVE.
  WRITE: / SHORT_TEXT.
  SELECT SINGLE * FROM TFDIR WHERE FUNCNAME EQ FUNCNAME.
  IF SY-SUBRC EQ 0.
    MESSAGE I000(38) WITH 'Function' FUNCNAME 'already exists'.
    PERFORM SUCCESS_MESSAGE
            USING 'Function' FUNCNAME 'already exists' SPACE ' '.
    EXIT.
  ENDIF.
    CALL FUNCTION 'RPY_FUNCTIONMODULE_INSERT'
         EXPORTING
              FUNCNAME                = FUNCNAME
              FUNCTION_POOL           = FUGR
              SHORT_TEXT              = SHORT_TEXT
         TABLES
              IMPORT_PARAMETER        = IMPORT_PARAMETER
              EXPORT_PARAMETER        = EXPORT_PARAMETER
              TABLES_PARAMETER        = TABLES_PARAMETER
              CHANGING_PARAMETER      = CHANGING_PARAMETER
              EXCEPTION_LIST          = EXCEPTION_LIST
              PARAMETER_DOCU          = PARAMETER_DOCU
              SOURCE                  = TABAP
         EXCEPTIONS
              OTHERS                  = 7.
    IF SY-SUBRC NE 0.
        MESSAGE I000(38) WITH 'Error creating' 'Function ' FUNCNAME.
    ENDIF.
ENDFORM.
*---------------------------------------------------------------------*
FORM BDC_TRANSACTION USING TCODE.
  APPEND '*'   TO TABAP.
  MOVE 'PERFORM BDC_TRANSACTION_MODE USING I_TCODE INPUT_METHOD.'
                    TO TABAP.
  APPEND TABAP.
*---------------------------------------------------------------------*
  XTCODE = TCODE.
  STR255 = FUNCNAME.
  REPLACE '$1' WITH XTCODE INTO STR255.
  CONDENSE STR255 NO-GAPS.
  FUNCNAME = STR255.
*---------------------------------------------------------------------*
  XCONST-FNAM = 'I_TCODE'.
  XCONST-FREF = 'SYST-TCODE'.
  XCONST-FVAL = TCODE.
  XCONST-FIDX = SPACE.
  INSERT XCONST INDEX 1.
*---------------------------------------------------------------------*
  MOVE 'PERFORM GET_RESULTS TABLES TMESSTAB' TO TABAP.
  APPEND TABAP.
  MOVE '                             RETURN_VARIABLES' TO TABAP.
  APPEND TABAP.
  MOVE '                       USING ''1''           ' TO TABAP.
```

```
  APPEND TABAP.
  MOVE '                    CHANGING WORKFLOW_RESULT .' TO TABAP.
  APPEND TABAP.
  MOVE ' READ TABLE RETURN_VARIABLES INDEX 1.' TO TABAP.
  APPEND TABAP.
  MOVE ' DOC_NUMBER = RETURN_VARIABLES-DOC_NUMBER.' TO TABAP.
  APPEND TABAP.
*---------------------------------------------------------------------*
  XCONST-FNAM = 'TMESSTAB'.
  XCONST-FREF = 'BDCMSGCOLL'.
  XCONST-FVAL = SPACE.
  XCONST-FIDX = '*'.
  INSERT XCONST INDEX 1.
*---------------------------------------------------------------------*
  XCONST-FNAM = 'RETURN_VARIABLES'.
  XCONST-FREF = 'BDWFRETVAR'.
  XCONST-FVAL = SPACE.
  XCONST-FIDX = '*'.
  INSERT XCONST INDEX 1.
*---------------------------------------------------------------------*
  XCONST-FNAM = 'WORKFLOW_RESULT'.
  XCONST-FREF = 'BDWF_PARAM-RESULT'.
  XCONST-FVAL = SPACE.
  XCONST-FIDX = 'E'.
  INSERT XCONST INDEX 1.
*---------------------------------------------------------------------*
  XCONST-FNAM = 'APPLICATION_VARIABLE'.
  XCONST-FREF = 'BDWF_PARAM-APPL_VAR'.
  XCONST-FIDX = 'E'.
  INSERT XCONST INDEX 1.
*---------------------------------------------------------------------*
  XCONST-FNAM = 'DOC_NUMBER'.
  XCONST-FREF = SPACE.
  XCONST-FIDX = 'E'.
  INSERT XCONST INDEX 1.
ENDFORM.
*---------------------------------------------------------------------*
FORM BDC_DYNPRO USING PROGRAM DYNPRO.
  TABAP = '*'.
  APPEND TABAP.
  CONCATENATE
     'PERFORM BDC_DYNPRO USING ''' PROGRAM '''' ' ''' DYNPRO '''.'
                            INTO TABAP.
  APPEND TABAP.
ENDFORM.
*---------------------------------------------------------------------*
FORM BDC_FIELD USING  FNAM FVAL.
  DATA: XFVAL LIKE BDCDATA-FVAL.
  CLEAR XCONST.
  CASE FNAM.
    WHEN 'BDC_OKCODE' OR 'BDC_CURSOR' OR 'BDC_SUBSCR'.
      CONCATENATE '''' FVAL '''' INTO XFVAL.
      PERFORM ADD_BDCFIELD USING FNAM XFVAL.
    WHEN OTHERS.
      SPLIT FNAM AT '(' INTO XCONST-FREF XCONST-FIDX.
      CONCATENATE 'I_' FNAM INTO XCONST-FNAM.
```

```
      TRANSLATE XCONST-FNAM USING '-_(_) '." No dashes allowed
      MOVE FVAL TO XCONST-FVAL.
      TRANSLATE XCONST-FVAL TO UPPER CASE.
      APPEND XCONST.
      PERFORM ADD_BDCFIELD USING FNAM XCONST-FNAM.
  ENDCASE.
ENDFORM.                               " BDC_FIELD
*---------------------------------------------------------------------*
FORM ADD_BDCFIELD USING FNAM XFNAM.
  CONCATENATE
     'PERFORM BDC_FIELD USING ''' FNAM ''' ' INTO TABAP.
  STRL1 = STRLEN( TABAP ) + STRLEN( XFNAM ).
  IF STRL1 GT 76.
    APPEND TABAP.
    CLEAR TABAP.
  ENDIF.
  CONCATENATE TABAP XFNAM '.' INTO TABAP SEPARATED BY SPACE.
  APPEND TABAP.
ENDFORM.                               " add_bdcfield usinf fnam fval.
*---------------------------------------------------------------------*
FORM SUCCESS_MESSAGE USING V1 V2 V3 V4 OK.
  CONCATENATE V1 V2 V3 V4 INTO SY-LISEL SEPARATED BY SPACE.
  REPLACE '##' WITH FUNCNAME INTO SY-LISEL.
  MODIFY LINE 1.
  IF OK EQ SPACE.
    MODIFY LINE 1 LINE FORMAT COLOR COL_NEGATIVE.
  ELSE.
    MODIFY LINE 1 LINE FORMAT COLOR COL_POSITIVE.
  ENDIF.
ENDFORM. "ccess_message USING v1 v2 v3 v4 ok.
```

Program 16: Program ZZBDCRECXX_FBGEN found on http://www.idocs.de

Test the function module with the test tool and add eventual loops for detail processing.

The created function module should work without modification for testing at least. However, you probably will need to modify it, e.g. by adding a loop for processing multiple entries in a table control (scroll area).

EDI and International Standards

With the growing importance of EDI the fight for international standards heats up. While there are many business sectors like the automotive industry and book distribution who use EDI for a long time and want to continue their investment, there are others who insist in a new modern standard for everybody.

The battle is still to reach its climax, but I shall estimate that the foray of the W3C for XML will succeed and make XML the EDI standard of the future

17.1 EDI and International Standards

Electronic Data Interchange (EDI) as a tool for paperless inter-company communication and basic instrument for e-commerce is heavily regulated by several international standards.

Unfortunately it is true for many areas in the industry, that an international standard does not mean, that everybody uses the same conventions.

Manifold standards result in a Babylon

Too many organizations play their own game and define standards more or less compatible with those set by competing organizations.

National organizations versus ANSI/ISO

The main contenders are the national standards organizations and private companies versus the big international organizations ISO and ANSI.

Private companies want well established standards

The private companies being backed up by their country organizations usually fight for maintaining conventions, which have been often established for many years with satisfaction.

All inclusive standards by the big ones ANSI and ISO

The big *American National Standards Organisation* ANSI and the international partner *International Standards Organization* ISO would usually fight for a solid open standard to cover the requirements of everybody.

Pragmatism beats completeness

This generally leads to a more or less foul trade-off between pragmatism and completeness . Tragically the big organizations put themselves in question. Their publications are not free of charge. The standards are publications which cost a lot of money. So the mostly remain unread.

Standards need to be accessible and published free of charge

Nowadays computing standards have mostly been published and established by private organizations who made their knowledge accessible free of charge to everybody. Examples are manifold like PostScript by Adobe, HTML and JavaScript by Netscape, Java by SUN, SCSI by APPLE, ZIP by PK Systems or MP3 by – who cares, XML by W3C and EDIFACT by the United Nations Organization UNESCO.

17.2 Characteristics of the Standards

The well-known standards EDIFACT, X.12 and XML have similar characteristics and are designed like a document description language. Other standards and R/3 IDocs are based on segmented files.

ANSI X.12

ANSI X.12 is the US standard for EDI and e-commerce. Why, still it is. There are chances that X.12 will be soon replaced by the more flexible XML, especially with the upcoming boost of e-commerce. ANSI X.12 is a document description language.

An ANSI X.12 message is made up of segments with fields. The segments have a segment identifier and the fields are separated by a special separator character, e.g. an asterisk.

```
BEG*00*NE*123456789**991125**AC~
```

EDIFACT/UN

EDIFACT has originally been a European standard. It became popular when being chosen by the UNO for their EDI transactions. EDIFACT is a document description language. EDIFACT is very similar to ANSI X.12 and differs merely in syntactical details and the meaning of tags.

XML

XML and the internet page description language HTML are both subsets derived from the super standard SGML...

The patent and trademark holder of XML (W3C, http://w3c.org) describes the advantages of XML very precisely as follows.

1. XML is a method for putting structured data in a text file
2. XML looks a bit like HTML but isn't HTML
3. XML is text, but isn't meant to be read
4. XML is verbose, but that is not a problem
5. XML is license-free and platform-independent

And XML is fully integrated in the world wide web. It can be said briefly: XML sends the form just as the customer entered the data.

17.3 ANSI X.12

This is an example of how an ANSI X.12 EDI message for a sales order looks like. The examples do not show the control record (the "*envelope*"). EDIFACT looks very much the same.

The example describes a sales order from customer 0111213 for 250 KGM. The fields of a segment are separated by an asterisk (*).

We start with a header record describing the type of message (850). IDocs would store this information in the control record.	
`ST*850*000000101~`	
`ST01` `ST02`	Transaction 850 = Purchase Order Set control number 453
Signal begin of transaction and identifies sender	
`BEG*00*NE*123456789**991125**AC~`	
BEG01 *BEG02* *BEG03* *BEG04* *BEG05* *BEG07*	00 - Original transaction, not a resend NE - New Order PO Number 123456789 VOID PO Date 25/NOV/1999 Client requests an acknowledgment with details and changes
Bill-to party and Ship-to party	
`N1*BT***0111213~`	
N101 *N104*	Bill to (VBPA-PARVW) 0111213 number of bill-to-party (VBPA-PARNR)
`N1*ST***5566789~`	
N101 *N104*	Ship to (VBPA-PARVW) 5566789 (VBPA-PARNR)
The item segments for item 01 – 250 kg of material MY1001 for $15.3 per kg	
`PO1*1*250*KGM*15.3*SR*EAN*MY1001~`	
PO101 *PO102* *PO103* *PO104* *PO106* *PO107*	Line item 1 – VBAP-POSNR Quantity 250 - VBAP-KWMENG Units Kilogram VBAP-MEINS $15.30 - VBAP-PREIS EAN – Material number MY1001 (VBAP-MATNR)
Summary information to verify completeness	
`CTT*1*2~`	
CTT01 *CTT02*	1 PO1 segments 2 some of quantities (ignore unit)
`SE*7*000000101~`	
SE01 *SE02*	7 segments altogether Control number 453. This is the same as ST02

17.4 XML

This is an excerpt of an XML EDI message. The difference to all other EDI standards is, that the message information is tagged in a way, that it can be displayed in human readable form by a browser.

XML differs from the other standards. It is a document markup language like its sister and subset HTML.

XML defines additional tags to HTML, which are specially designed to mark up formatted data information.

The advantage is, that the XML message has the same information as an EDIFACT or X.12 message. In addition it can be displayed in an XML capable web browser

```
<!DOCTYPE Sales-Order PUBLIC>
<Purchase Order Customer="123456789" Send-
to="http://www.idocs.de/order.in">
<title>IDOC.de Order Form</title>
<Order-No>1234567</Order-No>
<Message-Date>19991128</Message-Date>
<Buyer-EAN>12345000</Buyer-EAN>
<Order-Line Reference-No="0121314">
<Quantity>250</Quantity>
</Order-Line>
<input type="checkbox" name="partial" value="allowed"/>
<text>Tick here if a delayed/partial supply of order is acceptable
</text>
<input type="checkbox" name="confirmation" value="requested"/>
<text>Tick here if Confirmation of Acceptance of Order is to be returned
by e-mail
</text>
<input type="checkbox" name="DeliveryNote" value="required"/>
<text>Tick here if e-mail Delivery Note is required to confirm details of
delivery
</text>
</Book-Order>
```

Program 17: XML Sales Order data

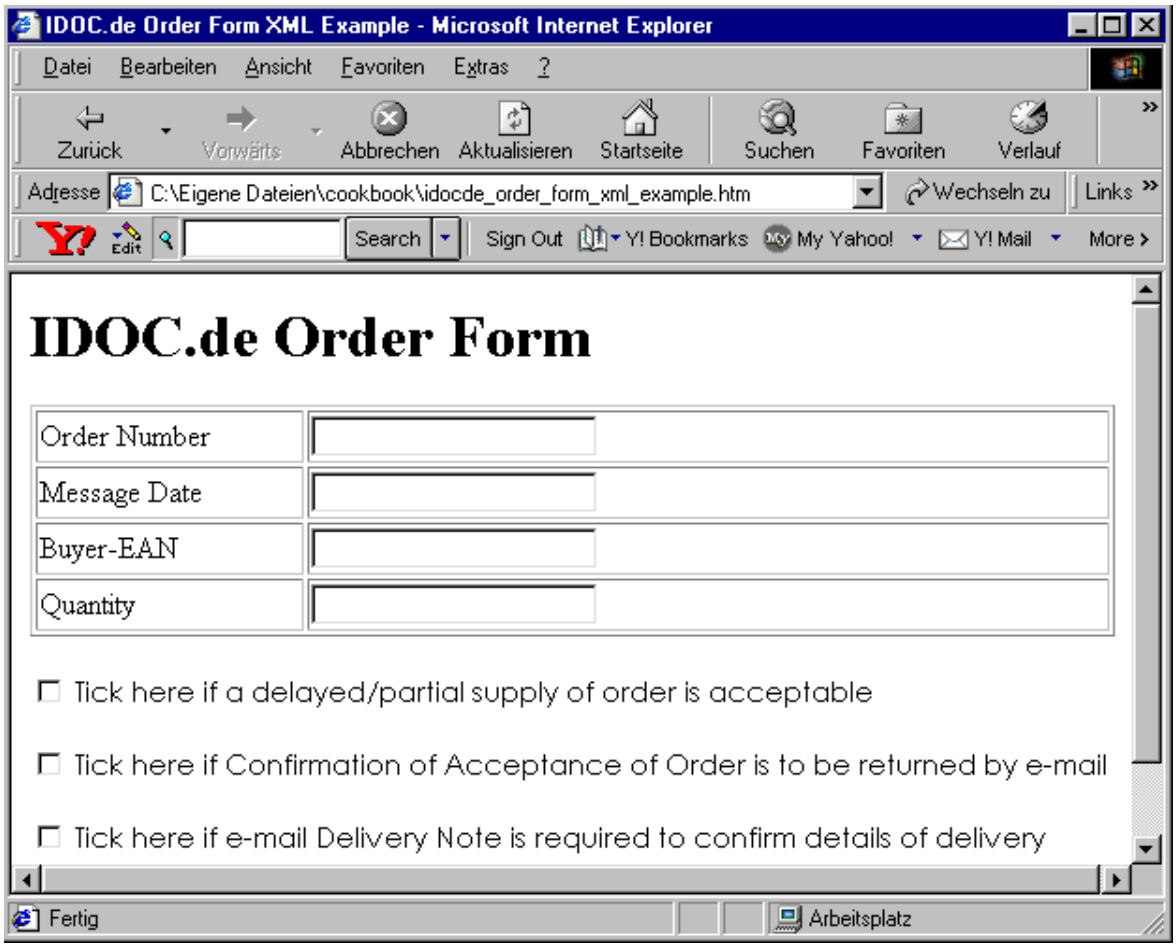


Illustration 48: XML Order form as displayed in a browser after interpretation by a JAVA applet

XML plug-ins exist often as JAVA applets for standard browsers

The example shows some XML sales order. In order to be displayed with a standard browser like Internet Explorer 5, there exist plug-ins and JAVA applets that interpret the XML and translate the XML specific data tags into HTML form.

EDI Converter

R/3 does not provide any tool to convert IDocs into international EDI format like ANSI X.12, EDIFACT or XML. This conversion needs to be done by an external add-on product which is provided by a variety of companies who specialized in general EDI and e-commerce solutions.

Summary

- R/3 does not provide conversion to EDI standard formats like X.12, EDIFACT or XML
- Converters exist on UNIX and PC platforms
- Many converters are simple PC programs
- R/3 certification does only guarantee that the converter complies to RFC technology and works fine with standard IDoc scenarios
- Real life situations require a flexible and easily adaptable converter program

18.1 Converter

SAP R/3 has foregone to implement routines to convert IDocs into international EDI standard formats and forwards those requests to the numerous third party companies who specialize in commercial EDI and e-commerce solutions..

Numerous EDI standards

Nearly every standard organization defined an own EDI standard for their members. So there is X.12 by ANSI for the US, EDIFACT/UN adopted by the United Nations Organization UNO or XML as proposed by the internet research gurus of W3C.

Big companies define their own standards or dialects

But there is still more about it. Every major industry company defines an additional file format standard for their EDI partners. Even if they adhere officially to one of the big standards, they yet issue interpretation guidelines with own modifications according to their needs.

If a company does not play in the premier league of industry or banking companies, it will have to comply with the demands of the large corporations.

A converter needs to be open and flexible

As this leads to the insight, that there are as many different EDI formats as companies, it is evident that an EDI converter needs to have at least one major feature, which is *flexibility* in the sense of openness towards modification of the conversion rules.

There are hundreds of converter solutions on the market not counting the individual in-house programming solutions done by many companies.

EDI is a market on its own. There are numerous companies who specialized in providing EDI solutions and services. The majority of those companies do also provide converters.

Many of the converters are certified by SAP to be used with R/3. However, this does not tell anything about the usability or suitability to task of the products.

18.2 A Converter from Germany

In the forest of EDI converters there is only a very limited number of companies who have actual experience with R/3. We have chosen one very popular product for demonstration here.

Certification does not guarantee usability

Many of the converters are certified by SAP to be used with R/3. However, this does not tell anything about the usability or suitability to task of the products. The R/3 certificate is not a recommendation by SAP, hence it is only a prove of compliance to technology requirements.

Flexibility

Many of the converters have major deficiencies. It is e.g. important that the conversion rules can easily be changed by the permanent service staff of the client.

Graphical monitor

A graphical monitor that can handle both the converter and the R/3 is more than desirable.

Import IDoc definitions via RFC into the converter

In big EDI projects you also appreciate a tool that allows to import R/3 IDoc definitions into the converter. Using RFC the import should be possible without downloading a file from R/3.

Converter developed with R/3 in mind

The solution which made as smile is provided by the German company Seeburger GmbH http://ww.seeburger.de ..The company is different from most EDI service providers as it has its roots in R/3 consulting, so the folks have the viewpoint from R/3, while others see R/3 only as a data supplier.

EDI monitor

The product is made of several modules, among them you find a sophisticated EDI monitor to survey timely sending and reception of data.

Graphically map data structures

While monitors are common to most EDI converter solutions, our interest as developer focuses on the EDWIN editor. It allows to graphically map one data structure to a standard, to assign rules etc.

The illustration gives an idea of the editor. The tool can read the IDoc segment definitions from the R/3 repository via RFC and store back modifications if this should be necessary.

Easy to use

All in all we have chosen EDWIN as a stare-of-the art product for converter design with respect to versatility and ease-of-use.

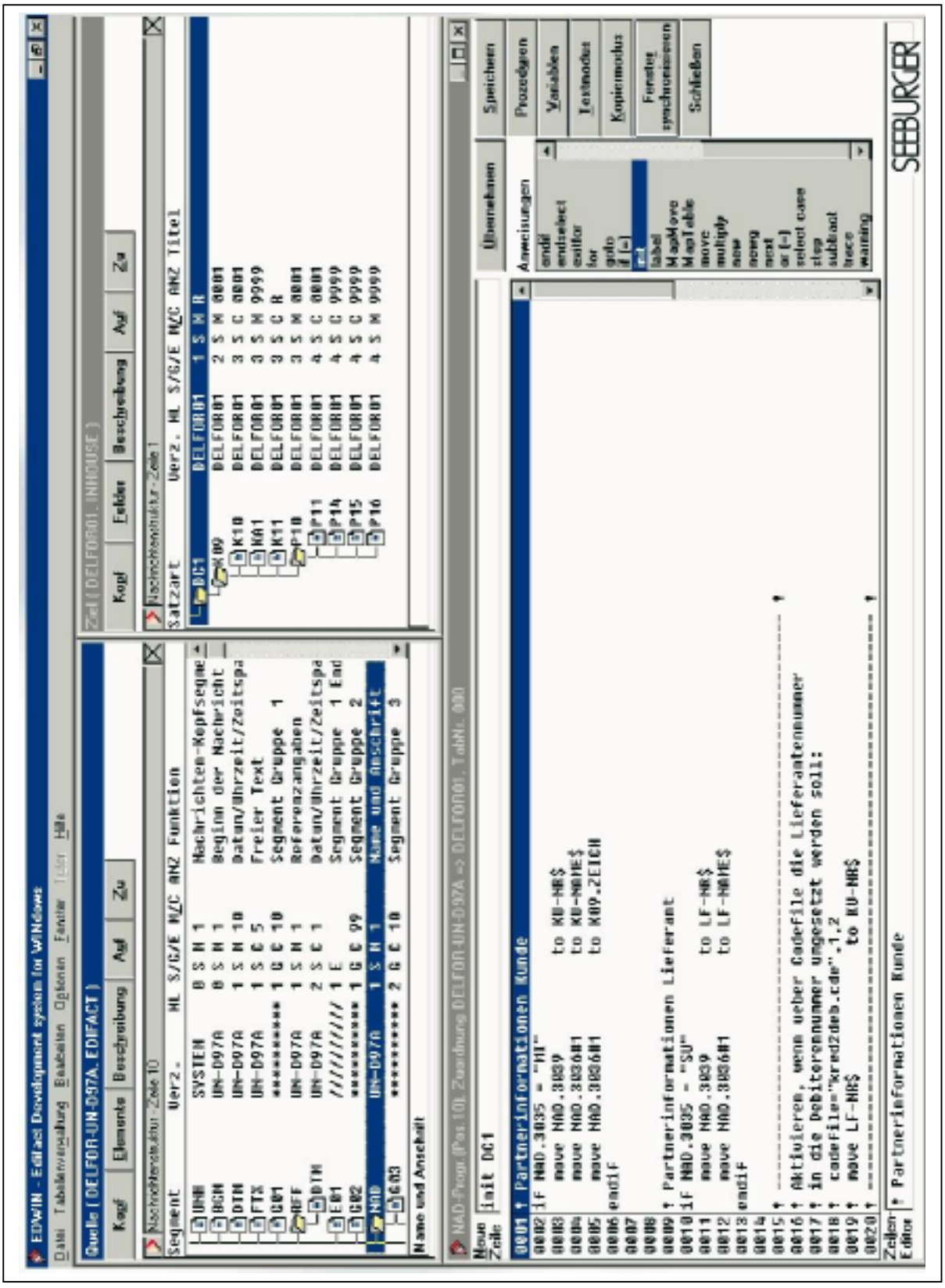


Illustration 20: Seeburger™ graphical EDI converter editor with R/3 linkage

Appendix

19.1 Overview of Relevant Transactions

There is a couple of transactions which you should know when working with IDocs in any form. I suggest to call each transaction at least once to see, what is really behind.

SALE – **ALE and EDI Customizing**	Originally the main menu for ALE operations. However, you find here some activities which would belong to **WEDI** as well.
WEDI – **Main EDI Menu**	This is the central menu, where you can find most of the EDI and IDoc relevant transactions.
BALE – **Main ALE Menu**	Originally the main menu for ALE operations. However, you find here some activities which would belong to **WEDI** as well.
BALM – **Distribute master data**	This is the menu for all the transactions which distribute master data.
WE05 – **Show IDocs**	List of all IDocs in the database, both processed, and unprocessed ones and those signalled as erroneous.
WE30 – **Edit IDoc type**	The IDoc type is the syntax of an IDoc, i.e. is structuring into segments.
WE31 – **Edit Segment type**	Edit the structure of the IDoc segments. Segments are the records in an IDoc file.
BD88 – **Dispatch IDocs**	If IDocs have not been sent to a partner for whatever reason, the IDocs remain in a certain blocked status. You may also have checked in the partner profile not to send IDocs immediately after creation. **BD88** selects IDoc which are not yet sent and dispatches them.
BD87 – **Process received IDocs**	If IDocs have not been processed after reception, you have to treat them manually. This may have happened because the IDoc signalled an error during initial processing or you set up the partner profile, to manual processing. **BD87** selects all IDocs which have not been treated yet and processes them.

19.2 Useful Routines for IDoc Handling

These are some very useful routines, that can be used in IDoc processing.

	`Function IDOC_CTRL_INBOUND_CONVERT`
Convert an IDoc control record into internal format	Convert an IDoc control record with structure **EDIDD** into the version dependent format **EDI_DC** or **EDI DC40**.
	`Function IDOC_DATA_INBOUND_CONVERT`
Convert an IDoc control record into internal format	Convert an IDoc control record from the version dependent format **EDI_DC** or **EDI_DC40** into the version independent format with structure **EDIDD**.
	`Function IDOC_INBOUND_FROM_FILE`
Read a file and treat it as an IDoc	This function reads a specified file and handles it as an IDoc package. It stores the IDoc to the IDoc base and processes it according the preset customizing.
	`Function EDI_DATA_INCOMING`
Read a file and treat it as an IDoc	Same as Function IDOC_INBOUND_FROM_FILE . This one has additional parameters, especially it allows using logical names instead of a physical filename
Read a file and treat it as an IDoc	This function reads a specified file and handles it as an IDoc package. It stores the IDoc to the IDoc base and processes it according the preset customizing.
	`Function IDOC_INBOUND_SINGLE`
Central IDoc processing routine	This is an RFC capable function module, which takes an IDoc and its control record as a parameter, stores the IDoc to the IDoc base and processes it according the preset customizing.
	`Function IDOC_INBOUND_SYNCHRONOUS`
	Predecessor of IDOC_INBOUND_SINGLE for version 3.x.
	`Function OWN_LOGICAL_SYSTEM_GET`
	The routine reads the name of the logical system, on which the program is running. This is currently the entry found in table **T000-LOGSYS.** .
	`Function MASTERIDOC_DISTRIBUTE`
	Sends an IDoc immediately to the port according while making use of the appropriate customizing settings.

19.3 ALE Master Data Distribution

The ALE functionality comes with a set of transaction which allow the distribution of important master data between systems. The busiest argument for installing ALE might be the distribution of the classification from development to production and back.

R/3 comes with many predefined ALE scenarios for master data

ALE is only a mean to distribute IDocs in a controlled and event based manner. Here is a collection of the transaction which come already with R/3 and can be used to distribute data via ALE.

You can always create own ALE IDoc routines

If your master data is not with the standard functionality you can of course create your own function module to add on to the ALE mechanism.

MATMAS – material master

The easiest way to exchange material master data between systems or clients. The program is insensitive for the complex material views and screen sequence controls due to using the function `MATERIAL_MAINTAIN_DARK` .

DEBMAS - debtors

Debtor master data, tables **KNA1** etc.

CREMAS – creditors

Creditor master data, tables **LFA1** etc.

Classification

ALE is perfect to distribute the classification system to another system or client. The provided routines distribute nearly everything from the class definitions (tables **KLAH**) up to the characteristic assignment (**KSML**) and dependencies for variant configurator.

The dependency knowledge function modules you might have written are not distributed via ALE, because they are part of development.

The class 036 for dependency characteristics, the classification is refused from being distributed explicitly. Refer to http://idoc.de for a modification which allows you to send class 036.

19.4 WWW Links

These is a random listing of interesting web sites dealing with the EDI topic. They are accurate as of November 1999.

http://idocs.de	The home page associated with this publication; updated program codes and FAQ related to EDI and SAP.
Data Interchange Standards Organisation	http://polaris.disa.org/; A page that reads about the multiple e-commerce standards with excellent links.
ANSI X12	http://www.x12.org/; Home page of ANSI X.12 standard with good glossaries and reference section
UN/EDIFACT	http://www.unece.org/trade/untdid/: the UN reference page on EDIFACT; just as chaotic as the whole standard
XML reference from W3C	http://www.w3.org/; the only reference to XML
XML/EDI	http://www.geocities.com/WallStreet/Floor/5815/ ; a good site on XML for use with EDI
More on XML and e-commerce	http://www.commerce.net/; deals with EDI for e-commerce
BISAC X12 EDI Cookbook	http://lbbc.lb.com/bisac/ ; gives you an idea of what X.12 is
IMA Links page	http://mlarchive.ima.com/ ; many links to related issues and a discussion forum

19.5 Questionnaire for Starting an IDoc Project

This is a sample questionnaire with important questions that need to be cleared before any development can be started.

To let me better estimate the actual amount of work to be done
please answer the following questing carefully
If you do not know the answer, say so; no guesses, please, unless explicitely marked as such.
Development can only be efficient if the subsequent questions can be answered.

http://logosworld.de
http://idocs.de

SAP R/3 release

Direction of EDI Solution

❒ Inbound
❒ Outbound

Describe the partner system

❒ R/3 Release: _____
❒ R/2 Release: _____
if others
❒ Is data sent in SAP Idoc format?
❒ Is data sent in EDIFACT/XML/X.12 etc.? (-> we will need an EDI converter)
❒ Is data sent as a structured file?

Can standard Idocs be used?

❒ Yes
❒ No
❒ Do not know

If Inbound: Can data be Inbound manually via a transaction only using provided Idoc data?

❒ Yes
❒ No (-> then you have a customising problem to be solved beforehand)
❒ Do not know (-> try it out!)

If Outbound: can you see all the data to be sent somewhere on an SAP screen?

❒ Yes
❒ No
❒ Do not know (-> try it out! Can only sent, what is displayed)

How many different Idocs will be sent (eg. No of files with different structure)

SAP Application area involved	*If you transactions involved, please list*
❒ SD customer orders create	❒ VA01 ❒ other: _____
❒ SD customer orders change	❒ VA02 ❒ other: _____
❒ SD delivery create/change	❒ VL01/VL02 ❒ other: _____
❒ SD picking confirmation	❒ VL01/VL02 ❒ other: _____
❒ Purchase orders send	❒ ME21 ❒ other: _____
❒ Customer Master	❒ VD01 ❒ other: _____
❒ Creditor Master	❒ KD01 ❒ other: _____
❒ Product catalogue	❒ MM01 ❒ other: _____
❒ Others, please describe	❒ other: _____

If Inbound: Do you have sample Idoc data already in a file

❒ Yes
❒ No (go and get them! The first thing we would need)
❒ Do not know (-> sorry?!?, are you serious?)

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