A Practical Perspective on the Design and Implementation of Enterprise Integration Solution to improve QoS using SAP NetWeaver Platform

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ABSTRACT

Most of the enterprise operations require information from several systems within and outside the enterprise(s). The past few years have seen explosive growth in direct program to program interaction for application integration, removing manual steps yielding tremendous improvements in reliability and efficiency.

This paper addresses the practical approach for the design and implementation of Enterprise Application Integration in a heterogeneous environment with SAP NetWeaver Platform (i.e. Exchange Infrastructure (XI)/Process Integration (PI)) using a Customizable Tool named TEmplate based Functional Requirements for Integration Design (TEFRID) developed by the author(s) to improve the Quality of Service (QoS) and reduce the development time and cost with the end-to-end scenario development.

Key Words: Enterprise Application Integration (EAI), Adapters, Automation, Implementation, SAP NetWeaver Platform

1. INTRODUCTION

Providing integration solution between both SAP [1] and non-SAP systems with heterogeneity in the landscape is a big challenge to an organization. Different challenges to overcome, such as maintaining interfaces, reusability, productivity, quality of service, scalability and throughput have to be met. Towards this end, usage of SAP XI as a middleware is proposed. When the operating model of an organization has several departments/systems such as sales, purchase, orders etc., some of these systems together can be converted to a single SAP system. Suppose there are 200 systems in an organization on the whole and the organization wants to integrate their systems. Then, the 'to-be' landscape will obviously have less number of systems than the 'as-is' landscape (reduces to around 75 systems).

2. RELATED WORK

There are several technologies that are used for both internal and external integration. Hub-and-spoke archi- tecture [2], often referred to as message broker or message- oriented middleware (MOM), provides a more elegant ap- proach to enterprise application integration than a point to point integration model. Hub-and-spoke architectures consist of a centralized hub, which accepts requests from multiple applications that are connected to the centralized hub as spokes. Artix [3, 4], developed by IONA Technologies, enables designers to develop web service adapters for legacy systems and integrate them using a hub-and-spoke [5] approach. It claims to provide flexible and incremental integration approaches (which may be considered as an integration strategy) but does not provide support to develop conversation policies.

3. SAP NETWEAVER EXCHANGE INFRASTRUCTURE (XI) / PROCESS INTEGRATION (PI)

AP NetWeaver offers Exchange Infrastructure (XI) for integration. XI as shown in Fig. 1 has the collection of components to implement the seamless integration between A2A, B2B, SAP and Non-SAP applications, etc.

The components include ***System Landscape Directory*** – a central repository of information about software and systems, ***Integration Builder*** – containing ***Integration Repository*** (IR) and ***Integration Directory*** (ID). IR is used for the design and development of the interfaces and ID is used for the configuration based on the customer landscape. The other components are Integration ***Server*** – a central processing engine, ***Adapter Engine*** – an JCA compliant engine to connect to back- end systems, ***Central Monitoring Engine*** – to have a concrete understanding of the runtime behavior of the processes.

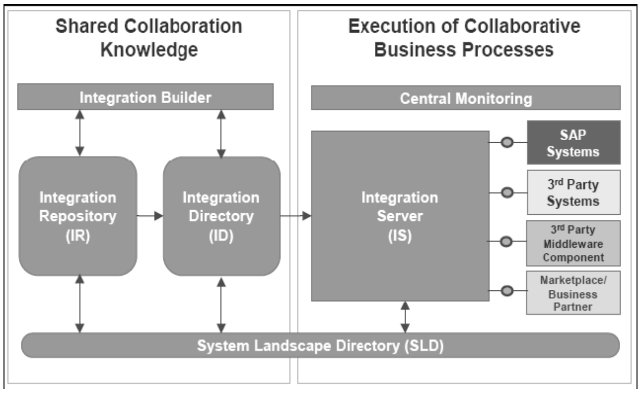

Shared Collaboration Knowledge
Execution of Collaborative Business Processes
Integration Builder
Central Monitoring
SAP Systems
3rd Party Systems
Integration Repository (IR)
Integration Directory (ID)
Integration Server (IS)
3rd Party Middleware Component
Marketplace/ Business Partner
System Landscape Directory (SLD)

Fig. 1 SAP Net Weaver Exchange Infrastructure (XI) / Process Integration (PI) (Source: SAP AG 2004)

4. DESIGN AND CONFIGURATION WITH SAP XI

This section describes the design and configuration steps for the scenario implementation. Scenario design will be done in Integration Repository (IR) and the configuration will be done at Integration Directory (ID).

Steps in Integration Repository (IR)

The following steps are followed in IR:

1) Create a software component and its version in System Landscape Directory (SLD) and add a namespace to it.
2) Create data types for sending and receiving messages.
3) Create message types for the above data types
4) Create interfaces based on the message types (inbound and outbound)
5) Create message mapping between the message types.
6) Create interface mapping between the two message interfaces.

Steps in Integration Directory (ID)

The following steps are followed in ID:

1) Create a configuration scenario.
2) Create a business service inside the configuration scenario.
3) Develop communication channels for sender and receiver.
4) Create the sender agreement.
5) Create the receiver determination.
6) Create the interface determination.
7) Create the receiver agreement.

5. TEFRID TOOL

All the steps involved in the traditional design use SAP XI's Integration Directory (ID), and Integration Repository (IR) are being repeated for all the scenarios depicted in the paper.

By using the TEFRID Tool, we can generate a mapping guide (extra sheet will be added to the FS spread sheet after running the tool) which is very useful in developing mapping logic between sender and receiver, and XML Schema Definition (XSD) and content conversion (cc) parameters as shown in Fig 2. We just need to import them into our integration builder (IB).

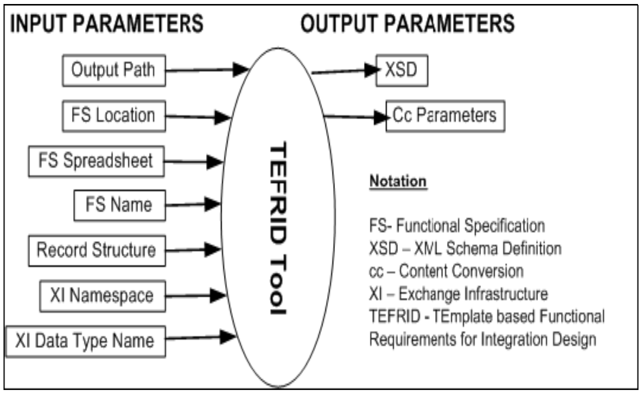
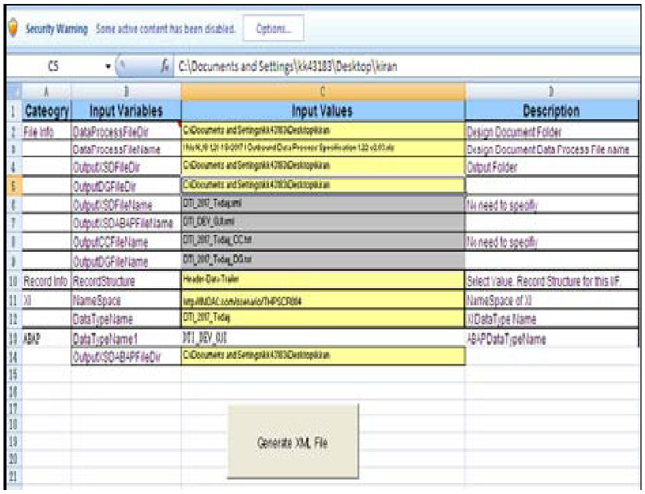


Fig. 2 Tool with input – output parameters

This TEFRID tool reduces time for creating the XSD and CC parameters shown in Fig 4. For example, in general it takes around 10 minutes to create a Data Type; using this tool we can create it within 3 minutes. This not only reduces the creation time, but also the manual intervention so that we can produce seamless results.

We directly import XSD into IR and use it as data type for the interface. This is more useful when we are supposed to create a data type with more number of fields. Since the values are taken from the FS spreadsheet shown in Fig.3 there is no possibility of error from the developer's perspective.



C:\Documents and Settings\kk43183\Desktop\kiran

	A	B	C	D
1	Cateogry	Input Variables	Input Values	Description
2	File Info	DataProcessFileDir	C:\Documents and Settings\kk43183\Desktop\kiran	Design Document Folder
3		DataProcessFileName	[illegible]	Design Document Data Process File name
4		OutputXSDFileDir	C:\Documents and Settings\kk43183\Desktop\kiran	Output Folder
5		OutputDGFileDir	C:\Documents and Settings\kk43183\Desktop\kiran	
6		OutputXSDFileName	DT1_2017_Today.xml	No need to specify
7		OutputXSDABAPFileName	DT1_DEV_0.xml	
8		OutputCCFileName	DT1_2017_Today_CC.txt	No need to specify
9		OutputDGFileName	DT1_2017_Today_DG.txt	
10	Record Info	RecordStructure	Header-Data-Trailer	Select Value. Record Structure for this I/F.
11	XI	NameSpace	http://NDAC.com/xi/sales/TMPSCR004	NameSpace of XI
12		DataTypeName	DT1_2017_Today	XIDataType Name
13	ABAP	DataTypeName1	DT1_DEV_0.01	ABAPDataTypeName
14		OutputXSDABAPFileDir	C:\Documents and Settings\kk43183\Desktop\kiran	
15				
16				
17				
18				
19				
20				
21				

Fig. 3 Functional Specification (FS) template

The mapping guide that was generated from this tool is the most useful when we do a complex mapping. There is every chance for errors in recognizing the mapping logic out of the FS since there are number of other columns in between. This mapping guide contains Field Number, Field Length, Field Format, SAP Field Number, SAP Field Length, Mapping Logic and Padding Description (i.e., padding required or not).

These scenarios are developed /implemented based on the functional specification document and the excel sheet should be macros enabled (MS Office 2007).

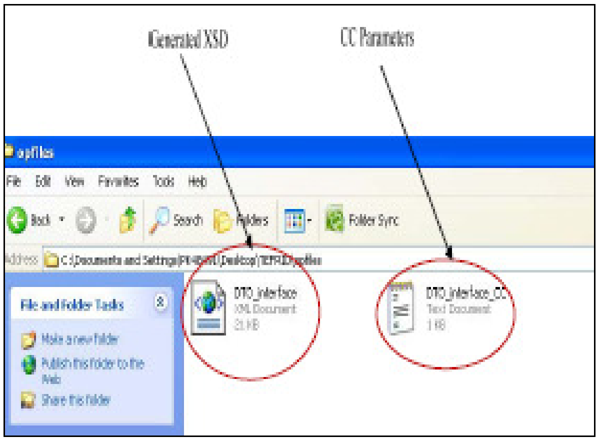

Generated XSD
CC Parameters
apfiles
File Edit View Favorites Tools Help
Back Search Folders Folder Sync
Address C:\Documents and Settings\P[illegible]\Desktop\TEFRID\apfiles
File and Folder Tasks
Make a new folder
Publish this folder to the Web
Share this folder
DTO_interface
XML Document
21 KB
DTO_interface_CC
Text Document
1 KB

Fig. 4 Template creating XSD and CC parameters

6. DIFFERENCE BETWEEN TRADITIONAL AND TEFRID METHODS

The flow charts in Figs. 5 & 6 give a pictorial representation of the traditional method and the method using TEFRID tool, respectively, depicting the difference between the two methods, which was earlier discussed in the previous sections 4 & 5.

The following are advantages of using TEFRID tool:

- Reduces time for the development of a scenario by a ratio 1:10 when compared to the conventional method.
  (Suppose creation of a data type takes 10 minutes manually, the same data type can be generated within 1 minute by using this tool.)
- It supports both inbound and outbound scenarios.
- Mechanization of data types creation.
- Automatically generates FCC (File content conversion) parameters for file adapter.
- Automatically generates a developer guide, which is very useful while mapping.
- Reduces in the errors.

7. CASE STUDY

Problem Statement

Based on previous consulting engagements with fortune 500 customers, the authors have decided to present one of the case studies, which is a sample representation of problems faced during enterprise integration. One of the largest Asia Pacific manufacturing companies has a vast heterogeneous landscape in its operating model. Providing optimal interoperability between these heterogeneous systems is a big challenge for such a company. For such problems, we chose SAP NetWeaver as its landscape and SAP XI as an integration tool to provide an optimal solution.

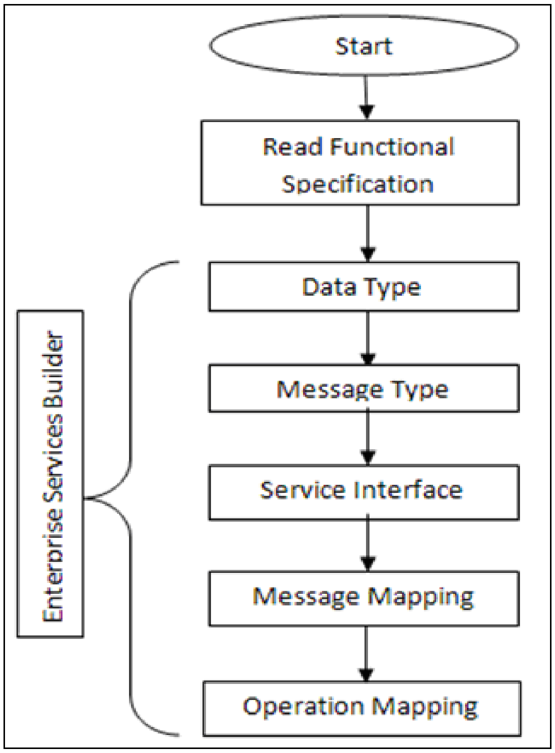


Fig. 5 Traditional method

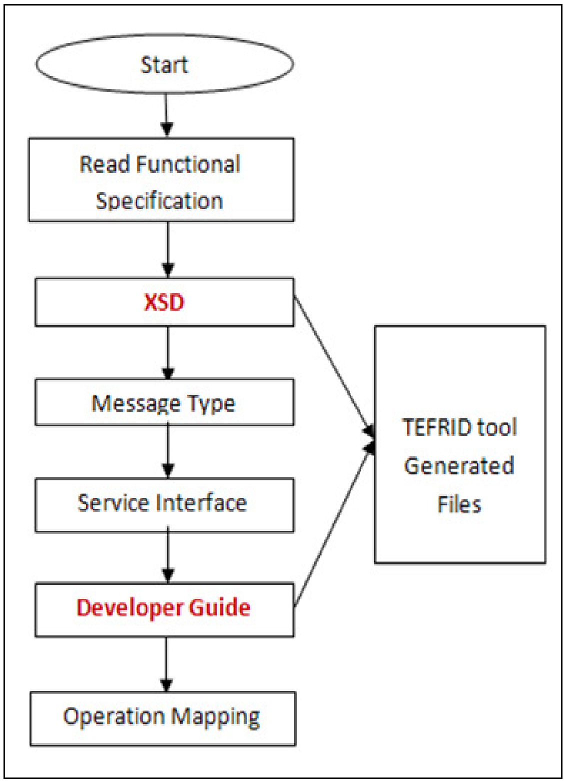
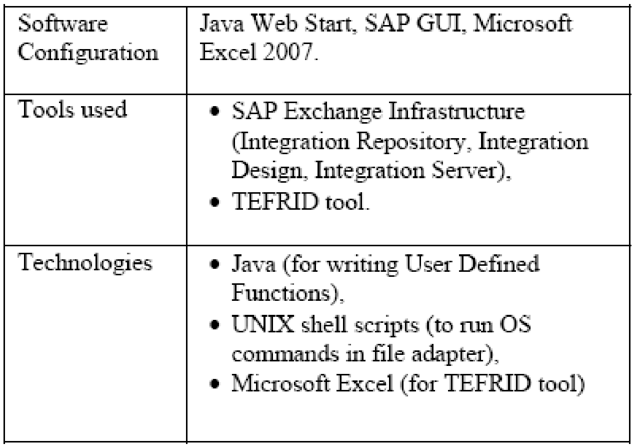


Fig.6 TEFRID Tool

Design and Implementation

The following Table 1 gives environment details of the experimental setup.

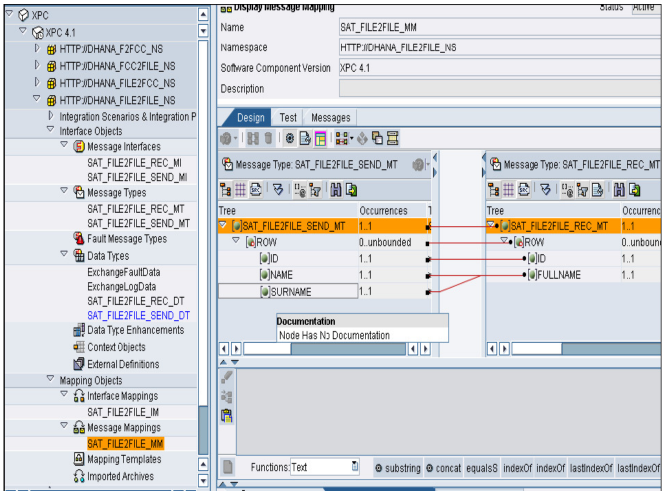
Table 1 Environment details



Software Configuration	Java Web Start, SAP GUI, Microsoft Excel 2007.
Tools used	• SAP Exchange Infrastructure (Integration Repository, Integration Design, Integration Server), • TEFRID tool.
Technologies	• Java (for writing User Defined Functions), • UNIX shell scripts (to run OS commands in file adapter), • Microsoft Excel (for TEFRID tool)

Design Procedure

Integration Repository Objects: The snapshot shown in Fig. 7 is the depiction of various steps involved in the creation of design objects in IR



Name: SAT_FILE2FILE_MM
Namespace: HTTP://DHANA_FILE2FILE_NS
Software Component Version: XPC 4.1
Description:

Message Type: SAT_FILE2FILE_SEND_MT

Tree	Occurrences
SAT_FILE2FILE_SEND_MT	1..1
ROW	0..unbounded
ID	1..1
NAME	1..1
SURNAME	1..1

Message Type: SAT_FILE2FILE_REC_MT

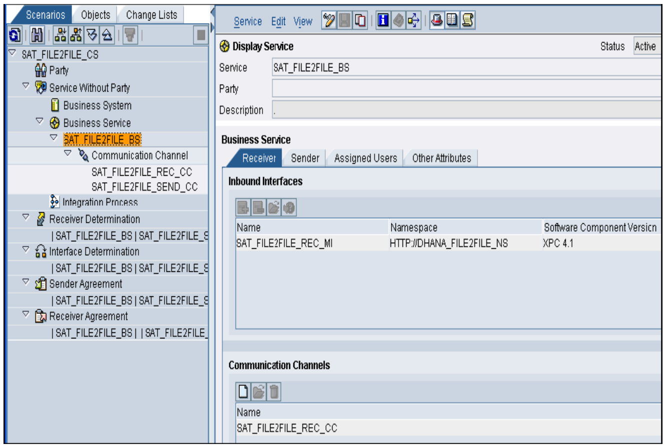
Tree	Occurrenc
SAT_FILE2FILE_REC_MT	1..1
ROW	0..unboun
ID	1..1
FULLNAME	1..1

Fig. 7 Integration Repository snapshot

Integration Directory Objects: The snapshot shown in Fig. 8 is the depiction of various steps involved in the creation of each configuration objects in ID.

Using TEFRID Tool:

Before proceeding to the IR part, TEFRID tool is used, which generates XSD and CC parameters.



Status: Active
Service: SAT_FILE2FILE_BS
Party:
Description: .

Inbound Interfaces

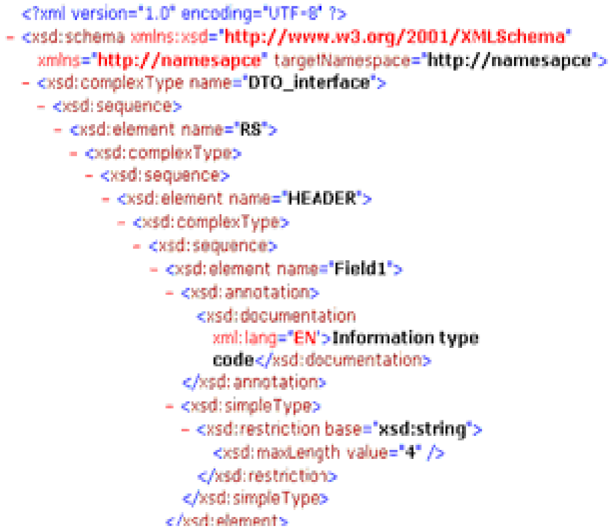
Name	Namespace	Software Component Versicn
SAT_FILE2FILE_REC_MI	HTTP://DHANA_FILE2FILE_NS	XPC 4.1

Communication Channels

Name
SAT_FILE2FILE_REC_CC

Fig. 8 Integration Directory snapshot

The functional specifications are obtained from the client and all the details are entered in the TEFRID tool as mentioned in the section 4. Subsequently, it generates XSD at the output path specified as shown in the following XML schema.



```
  <?xml version="1.0" encoding="UTF-8" ?>
- <xsd:schema xmlns:xsd="http://www.w3.org/2001/XMLSchema"
    xmlns="http://namesapce" targetNamespace="http://namesapce">
  - <xsd:complexType name="DTO_interface">
    - <xsd:sequence>
      - <xsd:element name="RS">
        - <xsd:complexType>
          - <xsd:sequence>
            - <xsd:element name="HEADER">
              - <xsd:complexType>
                - <xsd:sequence>
                  - <xsd:element name="Field1">
                    - <xsd:annotation>
                        <xsd:documentation
                          xml:lang="EN">Information type
                          code</xsd:documentation>
                      </xsd:annotation>
                    - <xsd:simpleType>
                      - <xsd:restriction base="xsd:string">
                          <xsd:maxLength value="4" />
                        </xsd:restriction>
                      </xsd:simpleType>
                    </xsd:element>
```

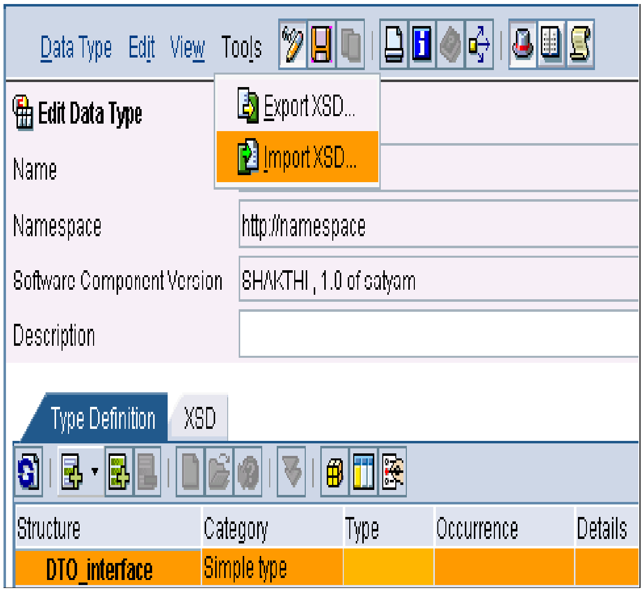
Tool generated XML schema output

This XSD needs to be imported into Integration Repository.

Steps to be followed to import XSD:

1. Create Namespace and Data type (DT) which have the same format as that of generated XSD to avoid naming conflicts while importing.
2. Import the generated XSD into DT as follows:

Open Tools menu and select Import XSD as shown in Fig. 9. Then the complete DT will appear just as the one we create manually as shown in Fig. 10.

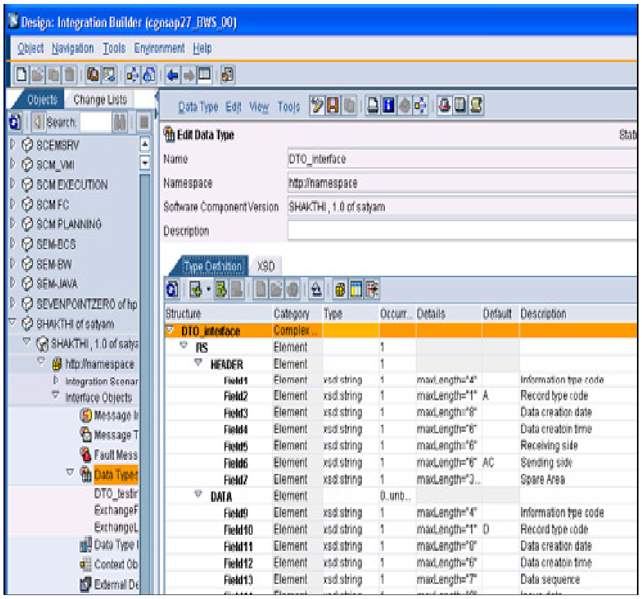


Name	
Namespace	http://namespace
Software Component Version	SHAKTHI , 1.0 of satyam
Description	

Structure	Category	Type	Occurrence	Details
DTO_interface	Simple type			

Fig. 9 Open tool menu of export and import XSD

When DT has huge number of fields, there is every chance for errors with manual creation.If we use this tool, errors can be reduced extensively and time for creation will also be reduced considerably.

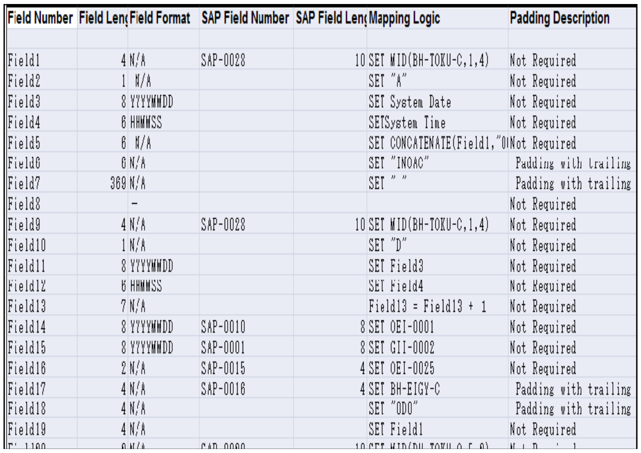


Name	DTO_interface
Namespace	http://namespace
Software Component Version	SHAKTHI , 1.0 of satyam
Description	

Structure	Category	Type	Occurr...	Details	Default	Description
DTO_interface	Complex ...					
RS	Element		1			
HEADER	Element		1			
Field1	Element	xsd:string	1	maxLength="4"		Information type code
Field2	Element	xsd:string	1	maxLength="1"	A	Record type code
Field3	Element	xsd:string	1	maxLength="8"		Data creation date
Field4	Element	xsd:string	1	maxLength="6"		Data creatoin time
Field5	Element	xsd:string	1	maxLength="6"		Receiving side
Field6	Element	xsd:string	1	maxLength="6"	AC	Sending side
Field7	Element	xsd:string	1	maxLength="3...		Spare Area
DATA	Element		0..unb...			
Field9	Element	xsd:string	1	maxLength="4"		Information type code
Field10	Element	xsd:string	1	maxLength="1"	D	Record type code
Field11	Element	xsd:string	1	maxLength="8"		Data creation date
Field12	Element	xsd:string	1	maxLength="6"		Data creatoin time
Field13	Element	xsd:string	1	maxLength="7"		Data sequence

Fig. 10 XSD input for design

Mapping Guide generated: This mapping logic is generated for an outbound scenario (i.e., legacy system to SAP system scenario) as shown in Fig. 11.



Field Number	Field Leng	Field Format	SAP Field Number	SAP Field Leng	Mapping Logic	Padding Description
Field1	4	N/A	SAP-0028	10	SET MID(BH-TOKU-C,1,4)	Not Required
Field2	1	N/A			SET "A"	Not Required
Field3	8	YYYYMMDD			SET System Date	Not Required
Field4	6	HHMMSS			SETSystem Time	Not Required
Field5	6	N/A			SET CONCATENATE(Field1,"0	Not Required
Field6	6	N/A			SET "INOAC"	Padding with trailing
Field7	369	N/A			SET " "	Padding with trailing
Field8		-				Not Required
Field9	4	N/A	SAP-0028	10	SET MID(BH-TOKU-C,1,4)	Not Required
Field10	1	N/A			SET "D"	Not Required
Field11	8	YYYYMMDD			SET Field3	Not Required
Field12	6	HHMMSS			SET Field4	Not Required
Field13	7	N/A			Field13 = Field13 + 1	Not Required
Field14	8	YYYYMMDD	SAP-0010	8	SET OEI-0001	Not Required
Field15	8	YYYYMMDD	SAP-0001	8	SET GII-0002	Not Required
Field16	2	N/A	SAP-0015	4	SET OEI-0025	Not Required
Field17	4	N/A	SAP-0016	4	SET BH-EIGY-C	Padding with trailing
Field18	4	N/A			SET "ODO"	Padding with trailing
Field19	4	N/A			SET Field1	Not Required

Fig.11 Mapping logic of legacy system to SAP system

Implementation Procedure

After completing the above design procedure steps, we get the file from sender legacy system and copy the same into the source path that is mentioned in the sender communication channel. Then, SAP XI generates the receiver file(s) depending upon the configuration chosen.

8. RESULTS AND REALIZED BENEFITS

The measure of benefits has different factors depending on the type of scenario we chose. In our case study (file to file scenario), the performance of the scenario depends upon the input file size, load on server and number of scenarios running at that particular time on

the server. Table 2 and Fig. 12 show the performance (increasing file size / processing time) of file to file scenario.

Table 2 Performance scenarios of file transfer

Size of the input File	Process start time	Process end time	Process Time	Success / failure
1 KB	07:16:49	07:16:50	1 sec	success
14 KB	10:58:54	10:58:55	1 sec	Success
1684 KB	11:00:14	11:00:15	1 sec	Success
5050 KB	11:05:04	11:05:19	15 sec	Success
6705 KB	11:10:30	11:11:11	41 sec	Success
7956 KB	07:24:26	07:30:26	6 min	Success
13030 KB	07:57:52	07:59:46	~2 min	Success
15555 KB	09:03:49	09:06:23	1min 34 sec	success
16280 KB	11:37:35	11:39:46	2min 11 sec	Success
20138 KB				Failed
24470 KB				Failed
16855 KB				Failed
17244 KB				Failed

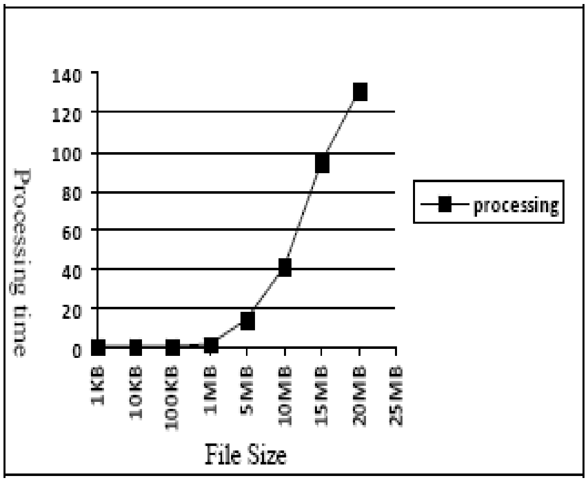
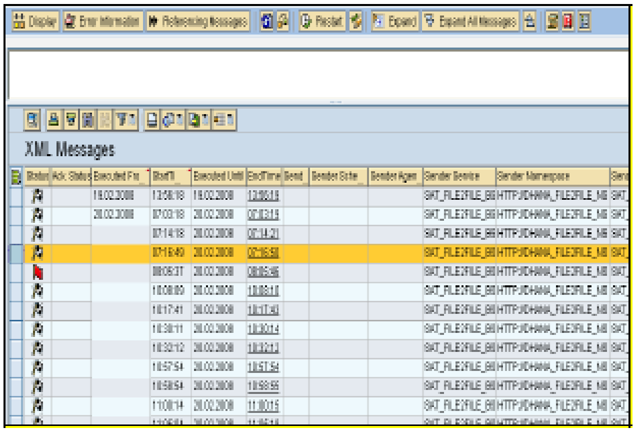


Fig. 12 Graphical representation Performance scenarios of file transfer

The following screen shots from figs. 13 through 15 give the success/ failure monitoring output as the file size is increased.

SXMB_MONI output:

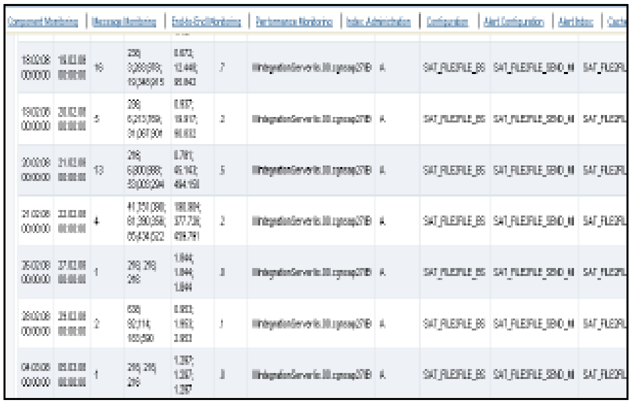


XML Messages

Status	Ack. Status	Executed Fro	StartTi	Executed Until	EndTime	Send	Sender Softw	Sender Agen	Sender Service	Sender Namespace	Send
🏁		18.02.2008	12:58:18	18.02.2008	12:58:19				SAT_FILE2FILE_BS	HTTP://DHANA_FILE2FILE_MS	SAT_
🏁		20.02.2008	07:03:18	20.02.2008	07:03:19				SAT_FILE2FILE_BS	HTTP://DHANA_FILE2FILE_MS	SAT_
🏁			07:14:18	20.02.2008	07:14:21				SAT_FILE2FILE_BS	HTTP://DHANA_FILE2FILE_MS	SAT_
🏁			07:16:49	20.02.2008	07:16:58				SAT_FILE2FILE_BS	HTTP://DHANA_FILE2FILE_MS	SAT_
🚩			08:05:37	20.02.2008	08:05:46				SAT_FILE2FILE_BS	HTTP://DHANA_FILE2FILE_MS	SAT_
🏁			10:08:09	20.02.2008	10:08:10				SAT_FILE2FILE_BS	HTTP://DHANA_FILE2FILE_MS	SAT_
🏁			10:17:41	20.02.2008	10:17:43				SAT_FILE2FILE_BS	HTTP://DHANA_FILE2FILE_MS	SAT_
🏁			10:30:11	20.02.2008	10:30:14				SAT_FILE2FILE_BS	HTTP://DHANA_FILE2FILE_MS	SAT_
🏁			10:32:12	20.02.2008	10:32:13				SAT_FILE2FILE_BS	HTTP://DHANA_FILE2FILE_MS	SAT_
🏁			10:57:54	20.02.2008	10:57:54				SAT_FILE2FILE_BS	HTTP://DHANA_FILE2FILE_MS	SAT_
🏁			10:58:54	20.02.2008	10:58:55				SAT_FILE2FILE_BS	HTTP://DHANA_FILE2FILE_MS	SAT_
🏁			11:00:14	20.02.2008	11:00:15				SAT_FILE2FILE_BS	HTTP://DHANA_FILE2FILE_MS	SAT_

Fig. 13 Screen shots SXMB_MONI output

Performance monitoring:



Component Monitoring | Message Monitoring | End-to-End Monitoring | Performance Monitoring | Index Administration | Configuration | Alert Configuration | Alert Inbox | Cache

19.02.08 00:00:00	19.02.08 00:00:00	16	238;
			3,289,919;
			19,346,915
				0.873;
				12.448;
				95.843
					7	IntegrationServer_is.00.cpnsap37IB	A	SAT_FILEFILE_BS	SAT_FILEFILE_SEND_MI	SAT_FILEFIL

19.02.08 00:00:00	20.02.08 00:00:00	5	298;
			6,213,789;
			31,067,906
				0.837;
				18.817;
				90.832
					2	IntegrationServer_is.00.cpnsap37IB	A	SAT_FILEFILE_BS	SAT_FILEFILE_SEND_MI	SAT_FILEFIL

20.02.08 00:00:00	21.02.08 00:00:00	13	298;
			6,800,888;
			53,003,244
				0.781;
				45.142;
				494.158
					5	IntegrationServer_is.00.cpnsap37IB	A	SAT_FILEFILE_BS	SAT_FILEFILE_SEND_MI	SAT_FILEFIL

21.02.08 00:00:00	22.02.08 00:00:00	4	41,351,090;
			81,280,358;
			105,434,522
				188.884;
				377.736;
				498.791
					2	IntegrationServer_is.00.cpnsap37IB	A	SAT_FILEFILE_BS	SAT_FILEFILE_SEND_MI	SAT_FILEFIL

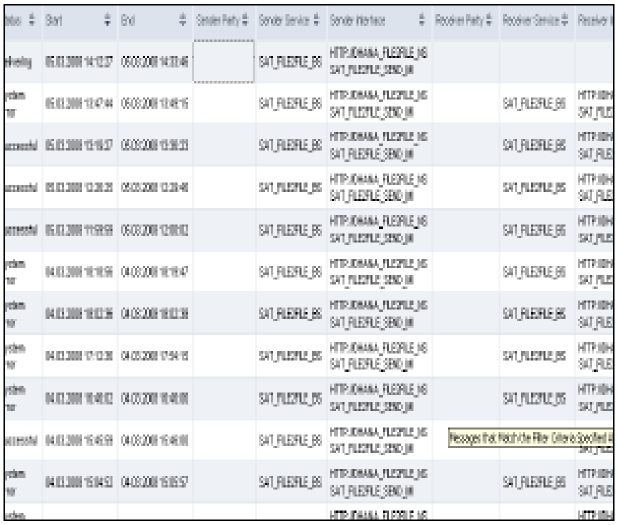
26.02.08 00:00:00	27.02.08 00:00:00	1	298; 298; 298	1.844; 1.844; 1.844	1	IntegrationServer_is.00.cpnsap37IB	A	SAT_FILEFILE_BS	SAT_FILEFILE_SEND_MI	SAT_FILEFIL

28.02.08 00:00:00	29.02.08 00:00:00	2	638;
			92,114;
			183,590
				0.833;
				1.853;
				2.833
					1	IntegrationServer_is.00.cpnsap37IB	A	SAT_FILEFILE_BS	SAT_FILEFILE_SEND_MI	SAT_FILEFIL

04.03.08 00:00:00	05.03.08 00:00:00	1	298; 298; 298	1.387; 1.387; 1.387	1	IntegrationServer_is.00.cpnsap37IB	A	SAT_FILEFILE_BS	SAT_FILEFILE_SEND_MI	SAT_FILEFIL

Fig. 14 Screen shots Performance monitoring output

End to End Monitoring:



Status	Start	End	Sender Party	Sender Service	Sender Interface	Receiver Party	Receiver Service	Receiver I
[illegible]	05.03.2008 14:12:37	05.03.2008 14:33:46		SAT_FILE2FILE_BS	HTTP://DHANA_FILE2FILE_MS SAT_FILE2FILE_SEND_MI			
ystem rror	05.03.2008 13:47:44	05.03.2008 13:48:16		SAT_FILE2FILE_BS	HTTP://DHANA_FILE2FILE_MS SAT_FILE2FILE_SEND_MI		SAT_FILE2FILE_BS	HTTP://DH SAT_FILE
uccessful	05.03.2008 13:18:37	05.03.2008 13:36:23		SAT_FILE2FILE_BS	HTTP://DHANA_FILE2FILE_MS SAT_FILE2FILE_SEND_MI		SAT_FILE2FILE_BS	HTTP://DH SAT_FILE
uccessful	05.03.2008 12:28:25	05.03.2008 12:28:48		SAT_FILE2FILE_BS	HTTP://DHANA_FILE2FILE_MS SAT_FILE2FILE_SEND_MI		SAT_FILE2FILE_BS	HTTP://DH SAT_FILE
uccessful	05.03.2008 11:59:59	05.03.2008 12:00:02		SAT_FILE2FILE_BS	HTTP://DHANA_FILE2FILE_MS SAT_FILE2FILE_SEND_MI		SAT_FILE2FILE_BS	HTTP://DH SAT_FILE
ystem rror	04.03.2008 18:18:56	04.03.2008 18:19:47		SAT_FILE2FILE_BS	HTTP://DHANA_FILE2FILE_MS SAT_FILE2FILE_SEND_MI		SAT_FILE2FILE_BS	HTTP://DH SAT_FILE
ystem rror	04.03.2008 18:02:36	04.03.2008 18:02:38		SAT_FILE2FILE_BS	HTTP://DHANA_FILE2FILE_MS SAT_FILE2FILE_SEND_MI		SAT_FILE2FILE_BS	HTTP://DH SAT_FILE
ystem rror	04.03.2008 17:12:36	04.03.2008 17:54:15		SAT_FILE2FILE_BS	HTTP://DHANA_FILE2FILE_MS SAT_FILE2FILE_SEND_MI		SAT_FILE2FILE_BS	HTTP://DH SAT_FILE
ystem rror	04.03.2008 16:48:02	04.03.2008 16:48:08		SAT_FILE2FILE_BS	HTTP://DHANA_FILE2FILE_MS SAT_FILE2FILE_SEND_MI		SAT_FILE2FILE_BS	HTTP://DH SAT_FILE
uccessful	04.03.2008 15:45:59	04.03.2008 15:46:00		SAT_FILE2FILE_BS	HTTP://DHANA_FILE2FILE_MS SAT_FILE2FILE_SEND_MI	Messages that Match the Filter Criteria Specified A		SAT_FILE
ystem rror	04.03.2008 15:04:52	04.03.2008 15:05:57		SAT_FILE2FILE_BS	HTTP://DHANA_FILE2FILE_MS SAT_FILE2FILE_SEND_MI		SAT_FILE2FILE_BS	HTTP://DH SAT_FILE

Fig. 15 Screen shots End to End Monitoring output

Different parameters to measure performance:

a) Time: As mentioned in section 4, creation time for data type, mapping logic and content conversion parameters for an interface get reduced drastically, as depicted in the graph in Fig 16.

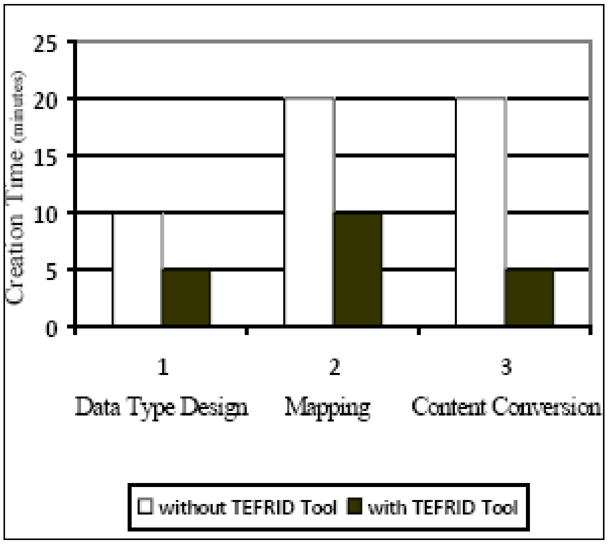


Fig. 16 Performance measure

b) Production: We can have greater productivity using TEFRID tool. Fig.17 indicates the number of objects produced with and without using TEFRID tool per 30 minutes. Suppose in 30 minutes we are able to produce 3 data types, 2 message mappings and 3 content conversion parameters without TEFRID tool. We can produce 8 data types, 4 message mappings and 7 content conversion parameters with TEFRID tool in same time period.

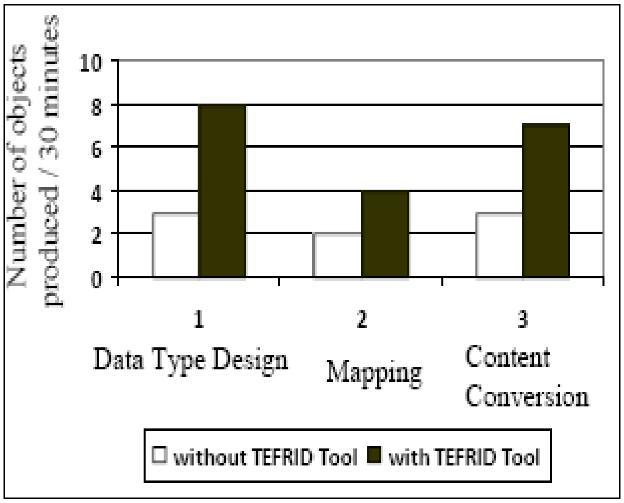


Fig. 17 Productivity measure

c) Error Reduction: The main advantage using the TEFRID tool is the reduction in manual errors. If we create data type, message mapping and content conversion manually, chances of manual errors are more as the complexity of the data type increases. But with TEFRID tool, we are able to reduce the errors to a maximum extent, which will be ~0% errors for data type. Fig. 18 gives a comparison of the possible errors with and without usage of the TEFRID tool.

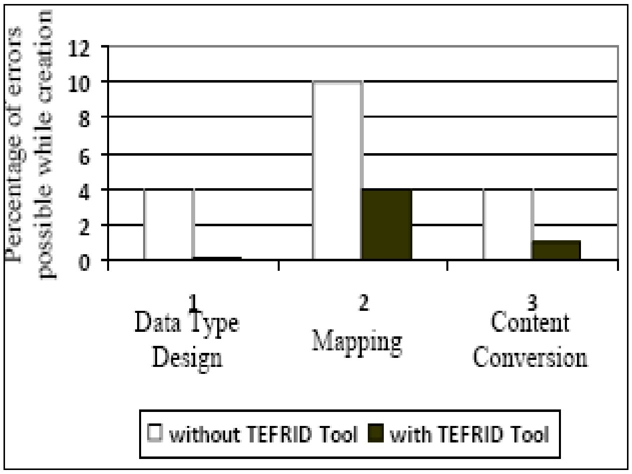


Fig. 18 Errors estimation

d) Cost & Effort: Suppose a project takes 5 months, 5 units of man power and Rs.5 lakhs to complete a phase. By using this tool, we can produce the same results or even more seamless results with only one unit of man power, with Rs. 1 lakh in one month. The following graph in Fig. 19 gives the cost and effort estimation.

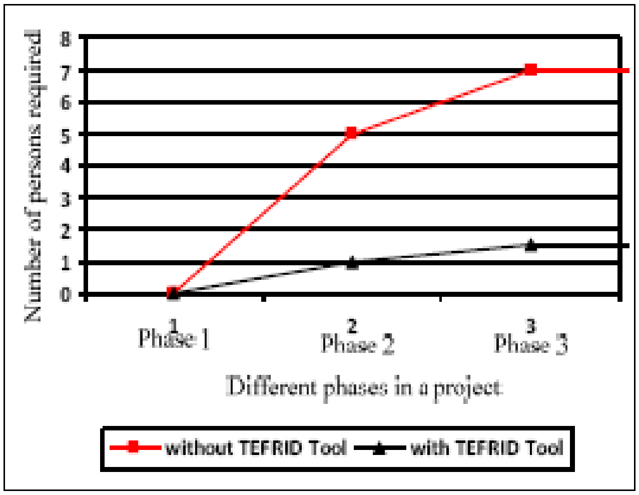


Fig. 19 Cost and effort estimations.

9. CONCLUSIONS

SAP NetWeaver offers some significant advantages in the overall visibility at enterprise level. Depending on the need for integration and the complexity of landscape, an organization can choose SAP XI for implementing and adapting their integration strategies using functionalities and tools described in this paper.

10. REFERENCES

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