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Release Management Tool - A Software Application for Release and Deployment Management

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Abstract. The paper deals with software Enterprise Resource Planning type application concerning the RMT (Release Management Tool). The application consists of a release deployment and transport management, inside in a large Oil and Gas Company. The software application has been developed using ABAP (Advanced Business Application Programming) a high level programming language integrated in SAP (System and Applications, Products) environment ABAP (Advanced Business Application Programming). Details regarding the analysis, implementation and testing of the software application are presented.

Introduction

Enterprise change is continuous. The term ”Enterprise Resource Planning” has been introduced in 1990 by the Gartner Group in order to define a new generation of manufacturing resource planning (MRPII) software. Manufacturing resource planning (MRP II) ([4]) is a planning method involving all the regular resources of a manufacturing company.

This concept includes, but is not limited to, software applications, people skills and abilities, design of specific databases, and any other computer resources. The overall purpose is to manage the resources of the company in order to increase the general performance and especially productivity ([1]), ([6]). Gartner Group is a company that assists its clients in making better decisions regarding IT solutions.

The ERP’s final target is to integrate all software applications dealing with the management of a business. Software applications include those regarding planning, manufacturing, sales, and marketing.

In recent years ERP software has been the subject of numerous improvements. Such changes include [14, 15]:

- the focus on complying with existing Enterprise Architectures such as TOGAF or Zachman Framework, including the focus on adapting applications to existing Business Processes
- adopting new software architecture such as Service Oriented Architecture (SOA) or Representational State Transfer (REST) which allow for the development of flexible business applications that have the ability to adapt to changes in less time and with less cost.
- the integration of mobile technologies in order to allow quick and location independent access to data and business analytics.
- integration of data acquired from sensors form larger Wireless Sensor Networks.

The short list, containing the more well-known ERP software developers, includes Oracle, PeopleSoft, and SAP. Oracle Corporation is an American multinational IT firm whose main field of activity is business software systems, development and marketing computer hardware systems.

From this paper's point of view, the interesting point is that they produce enterprise resource planning software (ERP), customer relationship management software (CRM) and supply chain management (SCM) software.

PeopleSoft, Inc. is a company specialized in software solutions for firm's performance management, manufacturing, and student administration management at large bodies, governments or organization.

This is also the case for an oil or gas company, using SAP – SAP Solution Manager. It is provided with important opportunities like solving change management problems in connection to market trends, correctly managing the development process, incident management, project management, service desk management, system administration, solution monitoring, downtime management, issue management, job scheduling management, planning and delivery of SAP Services, end-to-end root cause analysis, solution reporting, increasing the company's chances to automate internal and business processes in an advanced technology world ([9]).

A Release Deployment Management Application

The importance of developing a release management system (RMT) has a major impact on two important aspects:

- In the foreground, the organization, the streamline of the main internal process (release management process) and those which support the activity of the technology department – which is a direct beneficiary of the Release Deployment Management tool.
- In the background, the organization and improvement of processes for release and deployment activity, intended for the general technology domain. The indirect beneficiaries are the business and the consultants from sap competence center.

Inside companies, in order to automate existing processes, changes are part of daily activity. To have an accurate visibility of their development / innovations and to adapt several changes shortly and with better results, the integrated tools are needed. To achieve this, many companies create development teams dedicated to solve the problems of each specific activity. This team (development team) is dedicated to developing and providing best practices for internal processes in order to help the daily activity of their colleagues in other departments as part of entire group.

In this case, in order to have an accurate development process inside the company, we categorize development models as following: dispatcher model, body-leasing model, development given outside (fixed price) and development done by functional team.

Each model has got separate details, concerning the functionalities which will be taken into consideration:

- Dispatcher model: it is the widest used model, developments are achieved by means of internal and external consultants, and extended service time can be requested (go-lives, month-end-closing).
- Body-leasing model: developers leased to projects, but all rules and QA will be achieved by a development center developers and architects.
- Development given outside (fixed price) model: an external company will be hired in order to provide developers for a fixed price and all rules are provided by the development center developers, QA internally.
- Development achieved by internal functional consultants' model: it could be done by functional consultants who know ABAP programming, QA will be provided by the development center team.

On the other hand, changes should be moved from development system to quality system and at the end to productive environment. The importance of these movements is essential for an integrated SAP system. Entire processes of these movements were collected, in order to create a

release management tool, which help us to manage the planning, scheduling and controlling the build, to test and deploy a release, to deliver new functionalities for business. Nevertheless this is done protecting the integrity of existing services.

A release is a collection of authorized changes to an IT service (in our case SAP), so we have to manage this process (which combines a lot of approved IT changes) in a proper way in order to not disturb daily business activities. The contents of each release are managed, tested and deployed as a single entity.

The leading principles are: management centralized of releases according with projects/legal modifications/development requests (Release management tool – inside Solution manager), Using a standardized approach and workflow to release deployment, management / monitoring of all SAP ABAP modification / developments, providing and maintaining release planning, resource optimization, resource optimization, cost efficiency, support significantly project success.

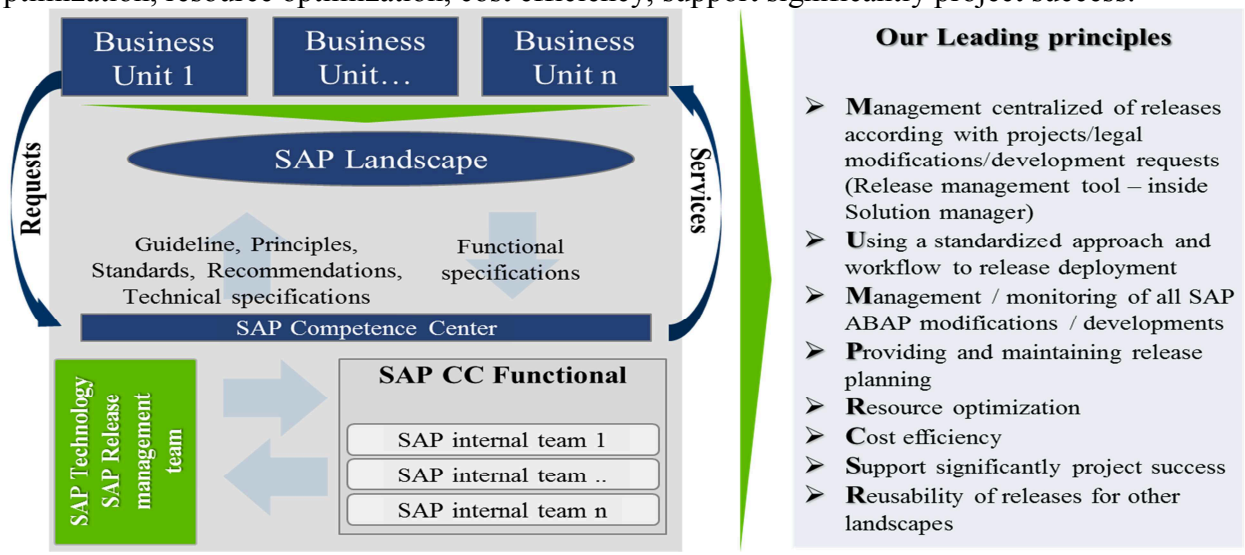

Fig.1 SAP Release management tool – leading principles

As illustrated in Fig. 1 SAP Technology works according with guidelines, principles, standards, recommendations and technical specifications for each business unit via SAP functional consultants, meaning that all requirements come from the business are analyzed by our functional team, developed by our development team and moved to productive environment by our release management team (using release management tool), according with our technology rules [13].

All developments are stored in Development Center tool (inside SAP Solution Manager) and based on Release management tool, these developments are collected in a package and we manage to move this to productive environment (Dev, QAS, PRD), according with deadlines and specifications[13]. Nevertheless, using Release management tool we can plan, schedule and control the build, test and deploy the planned release to the productive environment base on business approval.

Informatics Application

SAP (System and Applications, Products) is the largest ERP (Enterprise resource Planning) in the world ([9]). SAP is based on client/server architecture and it is used for developing integrated systems. SAP focuses on existing integrated processes in the company, from the planning process, development/production tracking and to the purpose of managing the relationships with customers, suppliers or other business partners [13].

The benefits for the company, when choosing to use SAP, are as following:

- An integrated system (there is a single database, all components are interdependent).
- An easy to integrate operation into one software in order to meet corporate needs for standardization and control

- A real-time system (tools and information provided by the system are based on data analysis from operational flow).
- An open system (independent from the hardware platform and database used, allows correlation with other software; modification including new functions created by the user).
- A comprehensive system (from an economic perspective, it can cover any sector activities).
- A lower cost for company based on automated tools and preconfigured functionality
- An integrated industry-specific solutions inside business processes
- An integrated system (there is a single database, all components are interdependent).

Other benefits:

- SAP allows the auditors to check all operations (time of the data recording, user name, etc.) – see Fig. 2.

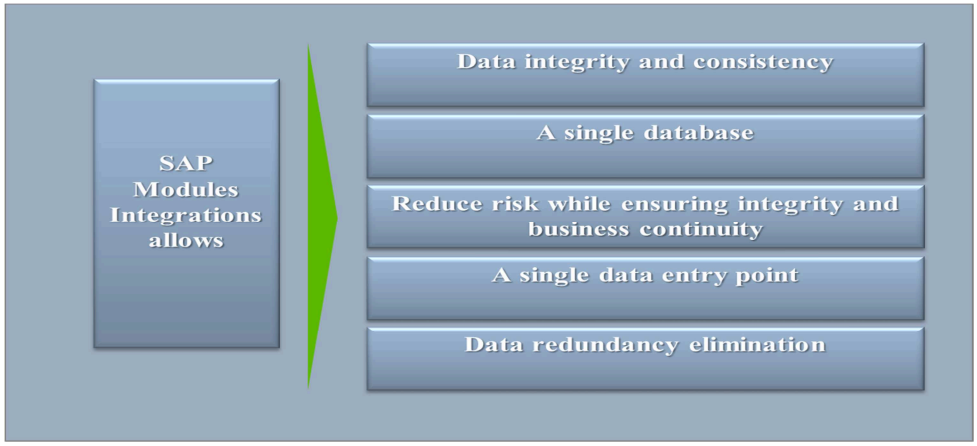

Fig. 2 Advantages of SAP Module integration

The subsidiary of company divisions can access current information anywhere in the country (considering geographic location). System module integration components of the integrated system can be highlighted as seen in the figure below Fig. 3.

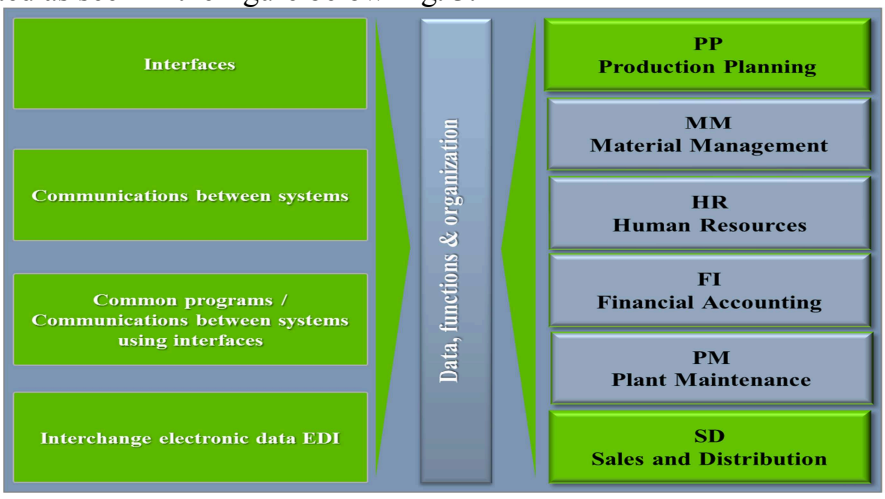

Fig.3 SAP Integration / SAP and non-SAP application interfacing

SAP architecture used by the oil and gas company, use an IBM DB6 database, combined with the ECC 6.0 installed SAP version on Linux operating system. All technical staff is done via a big division, named SAP Competence center, which has an internal development team in the technology information department. This team has created an application inside SAP which controls all developments and release management (starting from business and finishing with the installation in a productive environment).

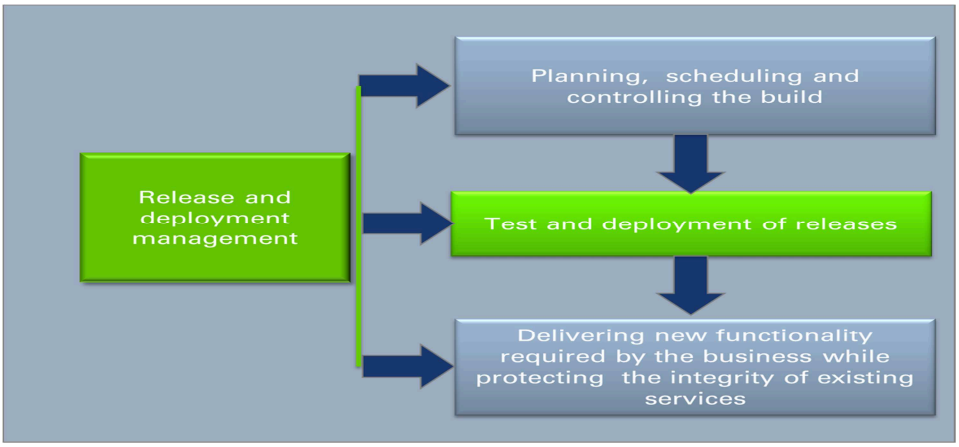

Fig.4 Release and deployment management phases

An SAP methodology development activity is used for each lifecycle of needed development, meaning that it is mandatory to use the development processes according to the SDLC (System Development Life Cycle). The same methodology is used for release and deployment management in order to have a controlled life cycle changes.

This is a framework describing all the activities which are performed at each stage of a software development project and all steps necessary for improving existing software (release strategy). In this case, it represents all the activities performed and required in order to make a release, which is a collection of authorized changes on a software product transit through its life cycle phases. The following picture (Fig.4) describes the phases of release & deployment management (part of IT Service management framework ITSM):

Application Implementation

When was considered efficient to develop a tool inside SAP Solution Manager (in-house Z-application), was after many years of experience with what means SAP for our company and how to cover two parts: changes (developments) in systems and release and deployment management. Changes are done internally, so we need to observe and to manage each of these changes to be applied in our systems (Dev, QAS and PRD). Release management is the process of planning, building, transporting, testing, and deploying software. The key objectives of release management are presented in figure 5.

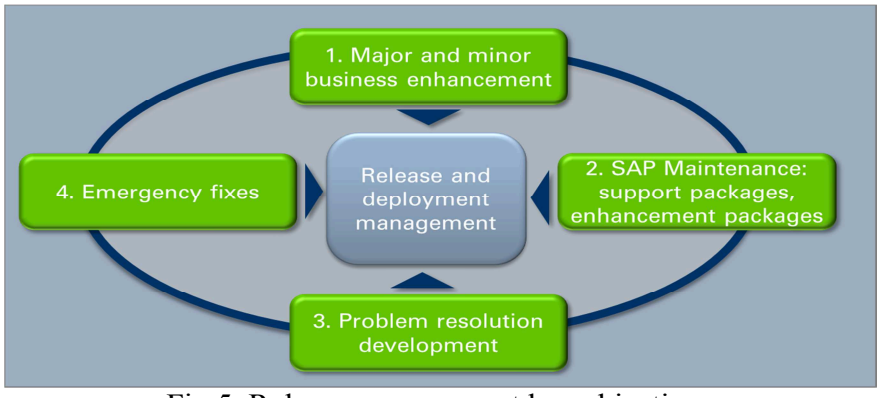

Fig.5. Release management key objectives

Fig. 6 presents one of our development processes and the implication of release management in entire software change management strategy in our organization:

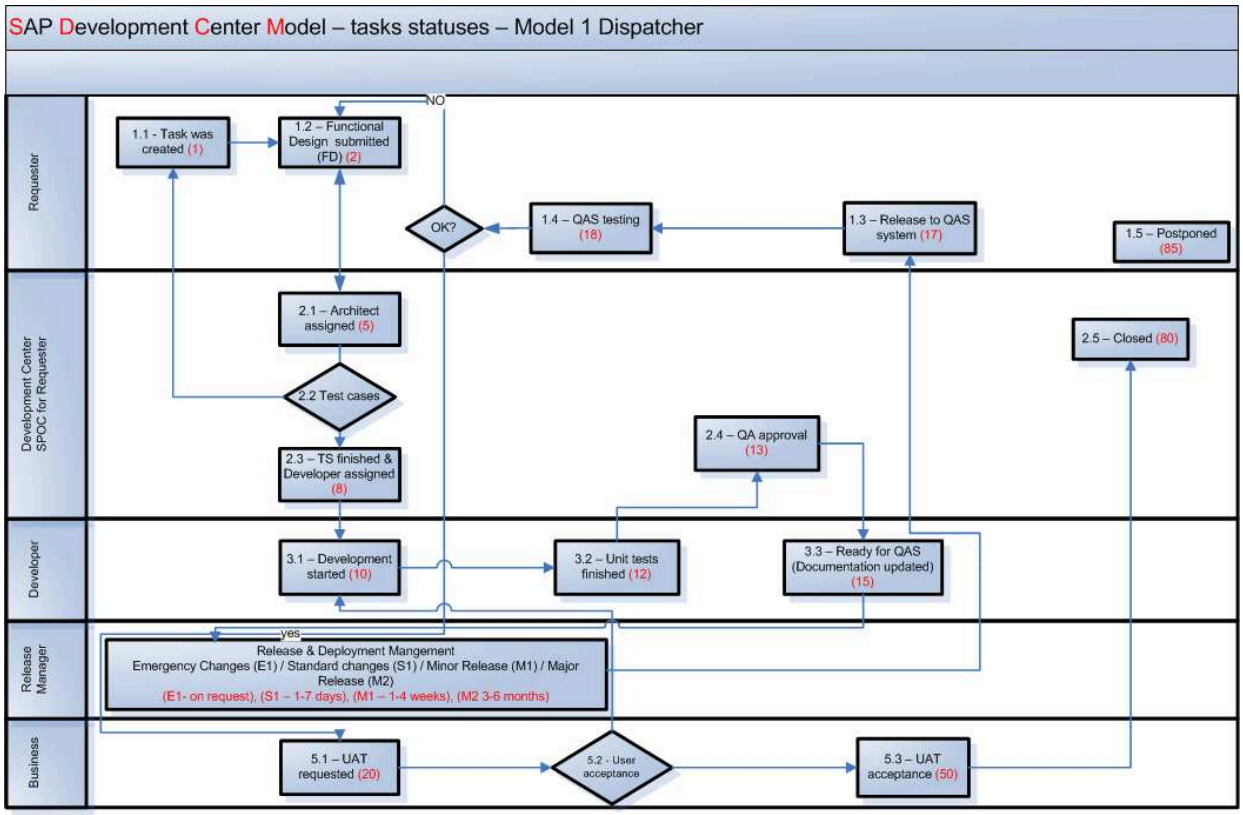

Fig.6. Release management process implication

Fig. 7 presents the DCT (Development Center Tool) change management/development application/release and deployment management structure. Programming has been done using the ABAP (Advanced Business Application Programming) programming language. This programming environment has been produced by the SAP German company ([2]), ([3], [13]). It is a 4GL programming language, developed since 1980. ABAP was one of the first programming languages that included the concept of Logical Databases (LDBs), which provided a high level of abstraction in the database. The latest version of ABAP includes object oriented programming.

In SAP Solution Manager Software, a tool was developed for maintaining the entire development area used in the group, nevertheless release and deployment management part was included in DCT. It includes the relation with all SAP development system using RFC (Remote Function Call – interface for communication between SAP Systems all over the world and other SAP systems or other compatible system over TCP/IP or CPI-C connections). Remote call function will be used (employing ABAP programming) in order to provide a way for the external program (which can be written in languages like PHP, ASP, C, C++ or Java) to get the data from server. In RFC call, the SAP can act either as a Client or as a Server. As a technical overview, a RFC represents the execution of remote function module in an external system.

In SAP Competence Center, SAP Technology department in particular, DCT implementation has been considered an internal method for analysis of activities which will be supported by development team in relation to business environment in all divisions; taking into account all requirements from business which act in oil and gas companies. The release management part was included in change management tool in order to full fill all requirements comes from auditors and to move the development in proper way from development system to productive system.

In fact, all requirements for development activity (forms, reports, extended functionalities of standard SAP functions) received from business side, will be monitored, classified, designed, developed, tested and implemented through Development Center Tool. After that, will be created a release (all developments are concatenated in one release) inside DCT. In release management part we will have two separated scenarios: one for minor releases and other for major releases. Minor release will be twice per month and major releases will be quarterly. Projects are part of major

releases and will be managed (list of all SAP transport request) by project manager together with corresponding service manager of SAP system.
SAP functional team will contact the correspondent key user from the specific firm in order to collect more data about daily activities and steps in order to create a complete functional specification which will be, finally, discussed with an architect from the Development Center team.

The application menu from Fig. 7 lists step by step, the solution for all change management/development requirements in order to provide to the business divisions, application/ reports/exports in a good condition. More than this a plan of releases can be done via development center tool, so modifications will be moved, step by step, according with procedures, to productive environment. Initially a ticket was raised to Global Ticketing applications in order to create a request for that which will be delivered. After that, the ticket will be categorized and will be attached to SAP Dispatcher team which in its turn will analyze the impact and the team to whom the request (SAP Functional team) should be addressed [13].

Making an "in-house Z-application" in SAP using ABAP code, (which can solve the release strategy process) can be done using the following steps: after a functional and a technical study are being achieved and the application structure is designed (functional consultant from SAP CC), the development center manager assigns a development "architect", which, together with programmers, will perform the technical specification (the entire logical stuff), where, for the entire configuration, they'll set: the tables that have to be created, which existing tables will be used and the relationship between standard and Z-tables, which forms will be created, which views, etc. [13].

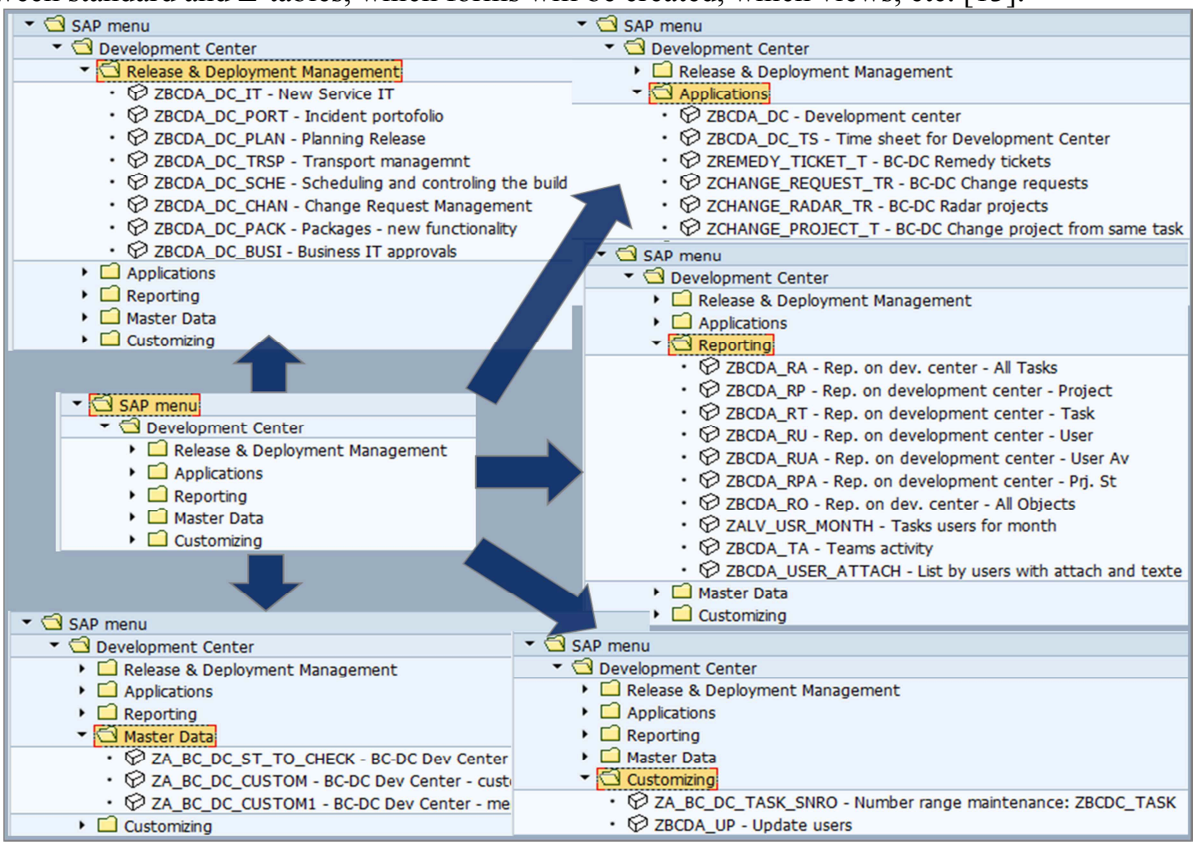

Fig.7 Release and Deployment Management Application menu – Development Center tool

A development guideline and a release strategy established by the company will be used, thus, none of the developers will named an object inside the application without using the Development Guideline name convention, these objects are included in SAP transport request which will be moved to productive environment according with minor or major releases. Having agreed, more or less, which objects will be created, we will continue by writing the ABAP code (for creating programs we'll use the se38 transaction) according with previous specifications. The se93 transaction will be used in order to create a z-transaction which will part of this tool, use the z-

program previously created. The new z-transaction will be added to a z-menu (se43 transaction will be used for a menu creation). This z-menu will be assigned to a z-role and this z-role will be added to an end-user [13].

All names of internals programs (ABAP code) will start with Z or Y (these two words are not included in SAP standard programs – which means that when applying the new modifications of standard programs, legal requirements or improving existing standard SAP programs, included in frequently patches – these Z or Y programs will not be altered). Apart from this, a z-role will be changed and a fine tuning operation will be performed from the SAP security team, which will add or delete some authorization (it's possible to hide/unhide some functionality (buttons) inside the transaction) [13]. Each year, these patches are applied via major releases and in concordance with business activities, meaning that they'll be added in a PRD (2) system which is a copy of PRD system, after that in DEV (development system) – nevertheless the entire tests session will be performed. The release and deployment management tool was created for our internal purposes, in order to help us to identify, categorize, manage, the complicated areas of modifications (patches or other change requests, tickets). The consultants from SAP Competence Center will perform a DEV tests. After that, tests will be performed in the QAS (quality system) together with business users and finally, the patches will be applied in the PRD (productive system). Our tool, DCT (release management part), will store/manage all tasks performed in the SAP landscape and will be the SPOC for functional consultants and business [13].

The ZBCDA_DC_PLAN transaction (in front of the SAPMZBCD_DC program) is an example of "in house" z-application (all these SAP objects are included in one application package called ZBC_DC). This package contains all objects used in the SAP z-application developed by the development team: Embedded Programs, Dictionary Objects, Class Library, Programs, Function groups, Includes, Transactions, SET / GET Parameters, Message Classes, Area Menus, Test Objects, Authorization Objects, Enhancements ([5]), ([8], [13]).

The SAP Module pool (see Fig.8) for Development Center / Release Management processing is a collection of screens, fields, menu bars, GUI status, GUI title, transactions, includes, flow logic - all used for change management processing inside the DC application. Two types of tables were used: first - the SAP standard tables (DD07T - DD: Texts for Domain Fixed Values (Language-Dependent), and second the z-tables (zbc_dc_proj: BC-DC Projects, zbc_dc_proj_screen: BC-DC Projects - screen structure, zbc_dc_task_user: BC-DC Task - assigned users, zbc_dc_tasks: BC-DC Task, zbc_dc_roles: BC-DC Roles, zbc_dc_task_hist: BC-DC Task History, zbc_dc_tr_hist: BC-DC TR History, zbc_dcrolm: BC-DC Menu maintenance for role, zbc_dc_menu: BC-DC Possible menu fcode) [13]. All these tables are connected and are used for change management processing. All used transactions refer to this module pool and to the initial screen number. As a consequence, if it is needed to enter / change a development center task, display tasks, corrections of a DC task or to maintain statuses inside the Development Center tool, than the module pool SAPMZBCD_DC must be used. Several screens are used: 0100 - screen for selection initial projects, 0200 – screen which detailed all tasks assigned to the selected project, 0210 – filter tasks, 0300 – assign users to tasks, 0500 – Release manager a.o.

In order to add / maintain / display data into system the screens is needed for helping the user. Each screen has a logic flow referring to the process before output (in order to execute the action related to this screen it is compulsory that the correspondent include to be correct), the process after input (here all existing fields containing recorded data are connected) or to the process values on request (a validation process must be performed: checking if the values entered are not out of the normal ranges and giving warnings when it is the case) [13].

All programs are written using ABAP methodology and according with the company guideline and rules using Development Center tool, and, as a particular knowhow, the created code can be moved to other development systems using Transport Organizer (se10 transaction) where we will create an big transport (transport of copies – because we have to add the corresponding target system) and we will include all created transports for dedicated development (report, form…etc.).

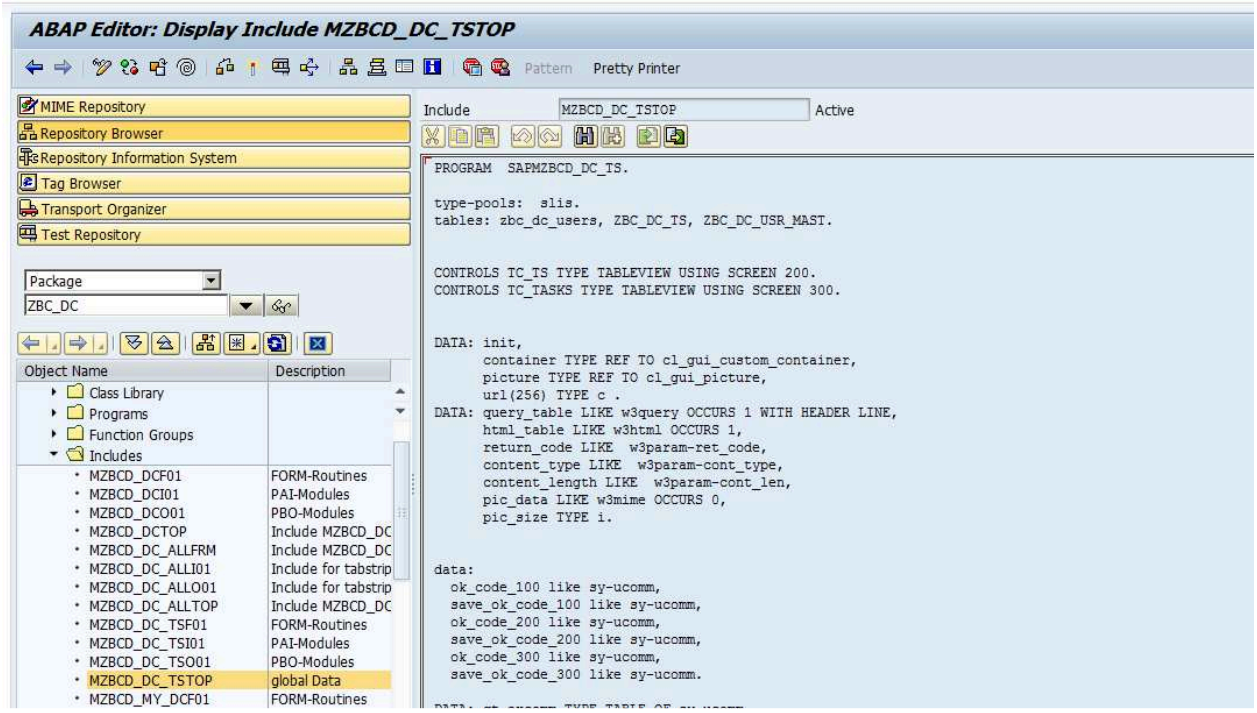

Fig. 8 SAP Module pool for Development Center / Release Management

The transport request will be added afterwards to the correspondent transport directory in order to be included to the queue of target SAP system, then, SAP Basis team will imported in system in order to be visible for all SAP users. In SAP the following type of transports is used: workbench request (it's used for ABAP coding), customizing request, transport of copies, relocation. In this case, a separate function was created for helping/merging SAP request in order to be moved to other systems in the group. In order to create a transport request in the target system (SAP Development system located in other region in the world) we use a remote call function (if we need to call a RFC inside ABAP programs – then you should use CALL FUNCTION…DESTINATION. The parameter DESTINATION informs the SAP system that the called function module runs in a different system from the calling system. When we talk about the communication part, this will be part of CALL FUNCTION from the Development Center tool and after that we can start the development for the received request. Another module developed inside Development Center tool is Release Management, which combines two essential components of development: - ABAP coding and relation between DEV, QAS and PRD SAP Systems. This module covers all necessity used for creating, testing and moving the development components to final destination SAP Production System. All created interfaces for Development Center Tool are used for the release management module, the reusability of development code is reached, time consuming reduced, software quality done – all interfaces are tested – using trusted relations between systems, TMS trusted services are activated.

Conclusion

The conclusion can be resumed in the following assertions:

-The authors focused on flexible and fully auditable software tool for monitoring and reporting the release and deployment management process that need to be done in Enterprise Resource Planning.

-The application was developed in SAP (System and Applications, Products) environment, one of the largest integrated systems used in many major companies. Programming was done in the ABAP (Advanced Business Application Programming) programming language.

-The real application is the release & deployment management / programming done inside a large oil & gas company. The paper started by presenting the steps used in release & deployment management in R/3 SAP systems (SAP DEV, QAS and PRD systems) and identifies some useful features in in order to make software application used in release & deployment management.

-Details regarding the analysis, implementation and testing of the software application are presented.

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