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Digitalization of Business Functions using SAP S/4 Hana ERP

Case Study: Algerian Qatari Steel – Human Resource Management

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Abstract

With the help of ERPs (Enterprise Resource Planning) companies can consolidate their data within one central database and build all their applications around it. This ensures coherent and non-redundant data; however, this requires a considerable amount of work to configure such complex solutions and adapt them to the current strategies of the companies.

This master dissertation deals with a case study of implementing SAP ERP system in a selected company called Algerian Qatari Steel. In this project, we were particularity involved with the human resources solutions provided by SAP, cloud and on-premise based, which are respectively SAP SuccessFactors and SAP Human Capital Management. Therefore, an analysis of the proposed Hybrid integration solution is given; in addition we discuss the definition of technical configuration and enhancement methodologies and implementation of the custom HR information system that suits the company's needs.

The primary objective is the development of the HR information system. The partial goals are the description of the HR process along with an analysis of the current HRIS followed by a criticism. Finally, we will present the result of this work which is the execution of processes, putting our two solutions SF and HCM in their live version and to confirm the well functioning of the systems then presenting the future development and enhancement.

Keywords

ERP, SAP, HRIS, Hybrid integration solution, SuccessFactors, Human Capital Management

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Eng. Abdelghani BOURIHANE and Eng. Hichem BRAHIMI, head of SAP HR stream, with their participation and contribution, our understanding of the system has extremely grown, and the questionnaires and interviews has been conducted successfully. Under their responsibility, our participation in work both as a team and independently on subjects with complex technical - and sometimes human - constraints allowed us to acquire in a way accelerated knowledge that is now a key for our professional career.

Loads of thanks and appreciation goes to all the people involved in every step of the going through the whole process of gathering resources and knowledge.

Dedication

I dedicate this work

To the soul of my grandfather and grandmother,

To my dear parents who always supported me since the beginning of my studies,

To my adorable sisters whose love is never uttered but shown,

To whom I call friends and those I call home

To my teachers who guided me,

Finally, to everyone who believed in me, to everyone I dearly love and call family.

Aymene LABRECHE

Dedication

I dedicate my dissertation work to my family and many friends. A special feeling of gratitude to my parents whose words of encouragement and push for tenacity ring in my ears. My sister Malek, and My brother Mounir have never left my side and are very special.

I also dedicate this dissertation to all my friends, my second family whom have supported me throughout all the process.

Oussama BOUDJERDA

List of Abbreviations

ABAP	Advanced Business Application Programming
AMOA	Assistance à la mitrise d ouvrage
API	Application Programming Interface
AQS	Algerian Qatari Steel
BAdI	Business Add-Ins
BBP	Business Blue PRINT
BI	Business Intelligent
BIB	Business Integration Builder
BPO	Business Project Owner
CDS	Core Data Services
EC	Employee Central
Dep	Department
ERP	Enterprise Resource Planning
FNI	National Investment Fund
GUI	Graphical User Interface
HCM	Human Capital Management
HRIS	Human Resources Information System
HRM	Human Resource Management
HRMS	Human Resource Management System
HTML	Hypertext Markup Language
HTTPS	HyperText Transfer Protocol Secure
ID	Identification
IMG	Implementation Guide
IT	Information Technology
JSON	JavaScript Object Notation

MDF	MetaData Framework
MOA	Memorandum of Association
MRPII	Manufacturing resource planning
OLAP	Online Analytical Processing
OLTP	Online Transaction Processing
OM	Organizational Management
OSS	Online SAP Service
PA	Personal Administration
PD	Personal Development
PS	Project System
PT	Personal Time Management
PY	Payroll
RDBMS	Relational Database Management System
S4/Hana	Business Suite for SAP HANA
SCPI	SAP Cloud Platform Integration
SF	SuccessFactors
SFTP	Secure File Transport Protocol
SOA	Service Oriented Architecture
SOAP	Simple Object Access Protocol
SQL	Structured Query Language
SSCR	SAP Software Change Registration
SSH	Secure Shell
SSL	Secure Sockets Layer
SaaS	Software as a Service
TLS	Transport Layer Security
UI	User Interface
URI	Uniform Resource Identifier
URL	Uniform Resource Locator
XML	Extensible Markup Language

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Introduction

Today, we live in a constantly changing world. The world's labor market is constantly evolving. However, all businesses of different classes, small, medium, and even big ones face the same challenges nowadays. Thereby, each organization that tries to keep its competitive advantage, both today and tomorrow, is obligated to foresee future patterns of consumer behavior and predict changes in the economic environment; likewise, be able to develop effective management and watch the performance of business key processes. Depending on the market and industry the company runs in, the management of the organization needs to be familiar with local regulation and compliance, as well as be able to deal with ever-accelerating technological innovation and an increasing amount of data[1]. Moreover, every single organization needs highly qualified human resources fully equipped with the latest practices and technologies to get business genuinely ready for changes and upcoming challenges of the new millennium [2]. Thus, there are lots of challenges organizations face nowadays, the most crucial concern to any organization is their human resource management. Here is how Zorlu Senyucel sees the importance of people in any organization: *"Organizations depend on people. We can even be more direct and say, there can be no organizations without people. Organizations do what people do. An organization behaves the way its employees behave, the way its managers direct it. What is an organization if there are no people in it? It is just a collection of building, car parks and some furniture"* [3]. Indeed, people are the most important asset of any organization, and there should be a strategy and obviously, information technology to manage this limited asset most efficiently. To fulfil these requirements companies, turn to the IT market to look for better solutions that help improve their HR management to keep their company running their business successfully and setting aside high-cost bureaucracy. To solve all these needs, companies have looked for software solutions and they end up finding the answer which is called ERP systems. ERPs is an integrated software system solution that can cover all business processes, allowing the company to obtain a holistic view of its business, by integrating different business areas in terms of information exchange, namely, finance, accounting, human resources, production, sales, marketing, and logistic. In this way, the company is better able to respond quickly to external pressures and market opportunities, achieving greater flexibility in product configurations, reduced inventory, and increased supply chain relationships. Algerian Qatari Steel (AQS) where we performed the internship is a Group in JIJEL active in steel production. In a few years, the company has dominated the national market and due to the company's management success, its business scope continued to expand and they started to export their various products to the international market. For this reason, AQS started to imply SAP ERP system at the beginning of the year 2020.

Company Overview

Definition of AQS

A company is an economic and social structure that brings together human, material, immaterial and financial resources, which are combined in an organized way to provide goods or services to customers in a competitive (market) or non-competitive (monopoly) environment.) with a profit aim. It is 49% owned by Qatar Steel International (QSI), 46% by the SIDER Industrial Group and 05% by the National Investment Fund (FNI). Due to its production volume, operational reliability and technical progress, as it mentioned in the officiel website *"the Algerian Qatari Steel occupies a major place in the map of the national and regional steel industry. The company is managed by a board of directors forming nine (9) members, appointed by regulations by the general meeting of shareholders. The capital of the company is represented by 586,100 shares of 100,000 DA each subscribed as follows:*

- *IMETAL industrial group: 269,606 shares.*
- *National investment fund: 29,305 shares.*
- *Qatar Steel International: 287,189 shares."[4]*

AQS has a significant importance to human capital as a real engine to economic growth as well as social progress. By creating a productive working atmosphere AQS will encourage innovation to help 2300 employees to obtain difference qualifications.

History

The Algerian Qatari Steel Company (AQS) was created in December 2013 as result of an investment partnership between the Algerian Republic and the State of Qatar. The company "ALGERIAN QATARI STEEL" is considered as one of the largest steel producer in Africa, a joint venture in the form of a joint stock company under Algerian law. It was legally constituted according to the others of 21/01/2014. Its share capital is 58,610,000,000 DA. [4]

Geographic location

AQS exercises its activities within the Bellara industrial zone. It is based in El-Milia, (wilaya of Jijel), which is situated 400 km (about 248.55 mi) far from the capital Algiers. AQS steel complex is implementing along surface of 216 hectares with a total area of 216 hectares. [4]

Challenges

Algerian Qatari Steel contributes to wealth creation and support the national industry network. In doing so, AQS will have the ability to respond to local market needs as well as exporting

its products to overseas markets. AQS started producing and selling steel products at the end of 2017. The initial mill's production capacity is 2 million tons, both in rebar and wire rod. The second phase of the investment efforts will be devoted to producing a variety of iron, steel products range to reach 4 million tons in total production capacity.[4]

Company Structure

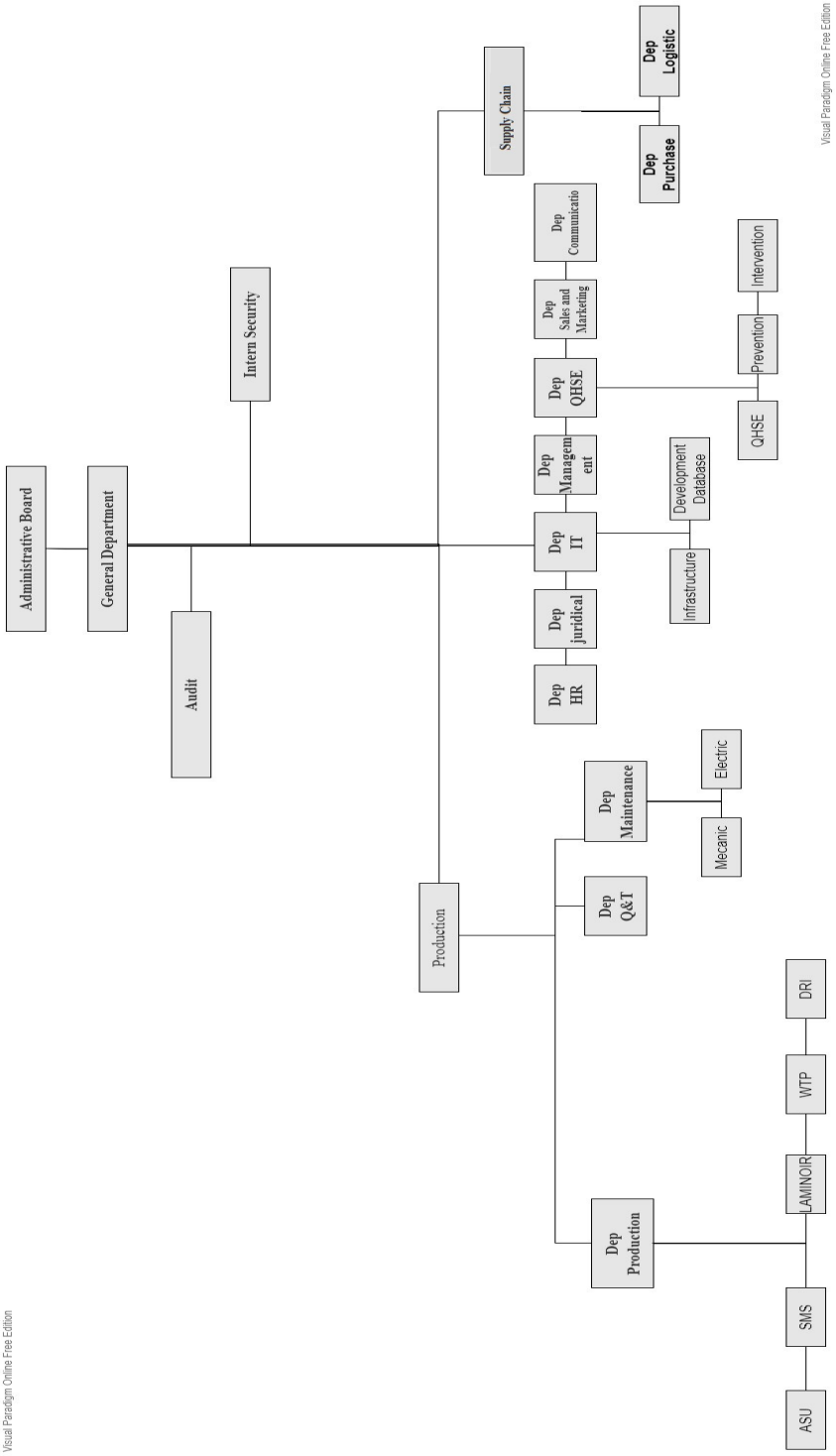
Complex Structure Bellara Mill endowed an innovative technology and has nine production units, which are environmentally friendly. The mill installation can guarantee a maximum production output, in concordance with world-class quality standards. [4]
The units can be divided as follows:
Principal Units

- DRI production unit: 2,5 million of production capacity per year.
- Two melting shops: 2,2 million tons of total capacity per year.
- Three rolling mills: 2 million tons of total production. capacity per year for both rebar and wire rod.

Secondary Installations

- Industrial Gaz Mill.
- Lime Production Unit.
- Station Reception and Transport of Raw Materials.
- Water treatment Mill.
- Electric Station.

Organization Chart



Algerian Qatari Steel Organizational Diagram

Project Aim

The realities of the modern world demand a new approach for the management of a business in general and human resources in particular. The use of information technology has become a vital practice for any organization despite the size, industry, or market in which the company acts. In these conditions, the company Algerian Qatari Steel has decided to bring the cloud-based SAP SuccessFactors solution.
The aim of this thesis is to analyze the current functionalities and features of the SAP modules and compare it with legacy systems used by the company and investigate its contribution and impact on the HR management processes and its adaptability to company's size, needs, types of staff members. Furthermore, the testing and deployment of the SAP HRMS using a combination of SAP SF Cloud-Based and SAP On-premise HCM.
This thesis is going to focus on finding the problems that faced us during the implementation need to be solved urgently and using the existing SAP management theory in combination with the actual situation of the company to ensure the successful implementation of SAP.
In the other hand, our thesis may provide a certain reference for the companies which are about to implement the SAP and the consultants who are specialized in implementing it.

The following are objectives to be obtained throughout the dissertation:

- To provide a comprehensive review of the SAP modules selected by the company.
- Analysis of the SAP SuccessFactors HR information system and HCM in the company and compare between its different functionalities.
- Implementing SF depending on the company needs and ensure cloud on-premise connectivity and replicating master data for effecting payroll.
- To analyze and examine the faults and imperfections of the system.
- To outline the possible points of improvements based on the data analysis process and the conducted field research.

Thesis Structure

This dissertation is structured to provide the reader with a level of knowledge and detail proportional to their advance in the document, which means high level concepts will be presented first and full solution details later.

This first chapter presents the subject of this dissertation, Human Resources Management Systems including a brief description of the problem at hand, its value, and the approach to solve it.

In the second chapter, we have discussed the legacy systems of the company, and we did an analysis of the different solutions and the concept of ERPs then the choice of SAP systems and its latest ERP SAP S/4 Hana as well as the state of the art in equivalent technologies.

The third chapter, we have provided a solution Analysis, which contains details on the process of finding solutions to HR process digitalization, including the methods used to design the preconized solution, with the use of high-level diagrams to explain the business behind each functionality then we look through the implementation processes, including all objects that were built and how they combine to produce the solution.

The fourth chapter we have showed in details the experiences and tests that were held by us and by the key user of the company to assure the functioning of this solution. Then we discussed the different obstacles we faced in our internship and during the implementation of the solution inside the company and the future work of the project, also some future enhancements.

Chapter 1

Human Resources Management Technologies

Until recently, HR was an undervalued part of any organization, despite the fact that HR is a strategic tool of the business, through which the most valuable asset is managed; people.
Human resource management can be defined as *"a strategic and logical approach to managing the most valuable asset that organizations have "The people who work in the organization and who individually and collectively contribute to the achievement of the organization's goals"*[5].
According to another definition, human resource management is *"a new concept of personnel work that took shape abroad during the 1950s and 1960s. Human resource management is becoming the core of organizational management and its most key component and the most key role of managers This new position of HRM expresses the importance of people, the human workforce as the most important production input and the engine of organizational activity. It completes the evolution of HR work from an administrative activity to a conceptual, truly managerial activity."*[6]

1.1 Human Resources: Technical Approach

Once the information and communication revolution swept the world, organizations in the world began to introduce various information and communication technologies, and establish and develop information systems and other advanced information systems to improve performance, productivity, and organizational success. This occurs especially in those organizations that are facing serious environmental challenges such as globalization, competition, and large markets. We find that many other organizations lag behind this cultural curve and giant revolution and for many reasons continue to neglect to give importance to investment and the use of information technology, machinery information and information systems. This has led to a large gap in knowledge management work that has further led to the lack of systematic success required.[7]

1.1.1 Human Resources Information System

The term HRIS refers to a Human Resources personnel information system. Originally, it was a system with basic functionality of employee records. Today, HRIS provides many additional functions, which often makes it confused with other types. Most often in practice, HRIS is almost interchangeable with HRMS. HRIS meets the basic needs of HR work. It is therefore a platform with an employee database at its core. This database is then connected to additional functionality that extends the possibilities of working with employees. The main functionalities that define HRIS: [8]

- Recruiting / ATS (Applicant Tracking System)
- Core Human Resources
- Benefit Administration /Open Enrollment
- Absence Management
- Compensation Management
- Training Development
- Workflow
- Self-Service (Candidate / Employee / Manager)
- Reporting

1.1.2 Human Capital Management

HCM, or human capital management, includes a comprehensive solution for the entire employee life cycle. It also covers Talent Management and, in contrast to HRIS, which is primarily an administrative functionality, HCM allows you to work with human resources from the perspective of a business asset that needs to be invested in and further developed [9]. HCM is a comprehensive tool and can therefore include all the components of an HRIS. [8].

- On-boarding
- Performance and Goal Management
- Position Control / Budgeting
- Succession Planning
- Salary Planning
- Analytics

1.1.3 Human Resource Management System

HRMS can be translated as Human Resource Management System. It is the most comprehensive system, covering elements from both HRIS and HCM. HRMS is extended to include Payroll and Time Labor Management, but it does not necessarily cover the entire Talent Management as is the case with HCM. Therefore, some HRMS providers offer a HRIS + (Payroll + TLM) solution, and when using Talent Management there is a variant of combining HCM + (Payroll + TLM).[8]

1.2 HRIS vs HCM vs HRMS

In essence, HRIS, HCM, and HRMS systems are remarkably similar. The most important difference is that they all deal with the human resources department, the workforce or employees, and all related issues and concerns such as employment, recruitment, orientation, training and development, payroll and benefits, performance analysis, and other work-related services to employees. HRIS and HRMS are the most similar because they both use software with similar features, though one has more complex features than the other. HCM is the most diverse of these, referring to a comprehensive HR software suite. The following figure summarizes all of these software's features.

HRIS	HCM	HRMS
Recruiting / ATS	HRIS	HCM
Core HR	Onboarding	Payroll
Benefit Admin / OE	Performance	Time & Labor
Absence Management	Position Control	
Compensation	Succession	
Training	Salary Planning	
Workflow	Global	
Self-Service	Analytics	
Reporting		

Table 1.1 HRIS vs. HRMS vs. HCM[8]

As noted in the online article *"the borders between HRIS, HRMS, and HCM systems are weak, as many times people use these names as each other's synonyms. So going through the features and benefits of software before investing in it is essential. The system chosen totally depends on your organization's needs, size, and goals. Each software helps us to be more efficient and productive."*[10]

Conclusion

Human Capital Management is one of the most crucial procedures in businesses of all sizes. The broad concept of HR is limited to recruiting. However, HR involves much more than just recruitment.

HR not only employs workers, but also separates them based on characteristics such as department level, payment days, payment details, designations, and more. HR also handles a variety of additional activities like promotions, employee engagement, and team motivation. These tasks may appear to be straightforward; yet, carrying them out for the entire firm is a difficult task. Our goal is to digitalize all such HR processes in one system.

Chapter 2

Legacy systems and SAP ERP

All businesses start with an idea. After putting the idea into action and forming the business, measuring the performance of the business is a crucial next step for the business owners. As the business begins operations, it is easy for the Company's managers to measure performance because they are heavily involved in the daily activities and decisions of the business. As the business grows through increased sales volume, more products and locations, and more employees, however, it becomes more complicated to measure the performance of the organization. Owners and managers must design organizational systems that allow for operational efficiency, performance measurement, and the achievement of organizational goals.[11]

When applying the term of organizational systems in IT, there exist two major concepts; centralized and decentralized systems. We must be more specific and analyze some different alternatives, If the different systems have a common database, we must still consider it as a centralized approach, as each system is directly dependent of the common database, and a change in this database affects many systems. Also distributed systems with a centrally controlled data storage have a limited freedom of action in each local system.[12]
For that purpose, in our case Algerian Qatari Steel have implemented some separate software solutions and systems to hold and manage its different departments, commercial, managerial activities. These types of systems are called Legacy Systems.

In this chapter, we will have a look at the selection of these outdated programs and software bought and used so far at AQS in its different departments. Then we will talk about its limitation; By this, we mean the lack of features and capabilities that should be expected in today's growing business environment so the company needs to replace or upgrade their system to a centralized one which are called ERPs.

2.1 Company Legacy systems

A legacy system is an outdated computing software and that is still in use. The system still meets the needs it was originally designed for, but does not allow for growth. Our case company AQS has a wide selection of software systems, it is composed of Functional Modules that can be purchased separately, based on individual business needs. It has been introduced to the company since its first installation and start. These systems are used in different department of AQS: human resources department, accounting department, production department, purchasing department, warehousing department, technical department. Since we are involved with the HR department we will introduce its different legacy software.

2.1.1 ZK-RH Software

It is an application made in EMBORACADERO DELPHI EX7 With SQL server allows to Process, display, print and export AQS employees' time management scores and extract them in several types of reports which are mainly the following:

- Employee/month
- Department /Month

The software receives the data from Attendance management Devices implemented in different departments in the company then processes and performs automatic calculation of:

- Hours worked per month
- Basket bonus
- Overtime 50%
- Overtime 100%
- Holidays

In the figure below we will see the main components of RH-ZK and the data path beginning from the attendance management devices to executing reports.

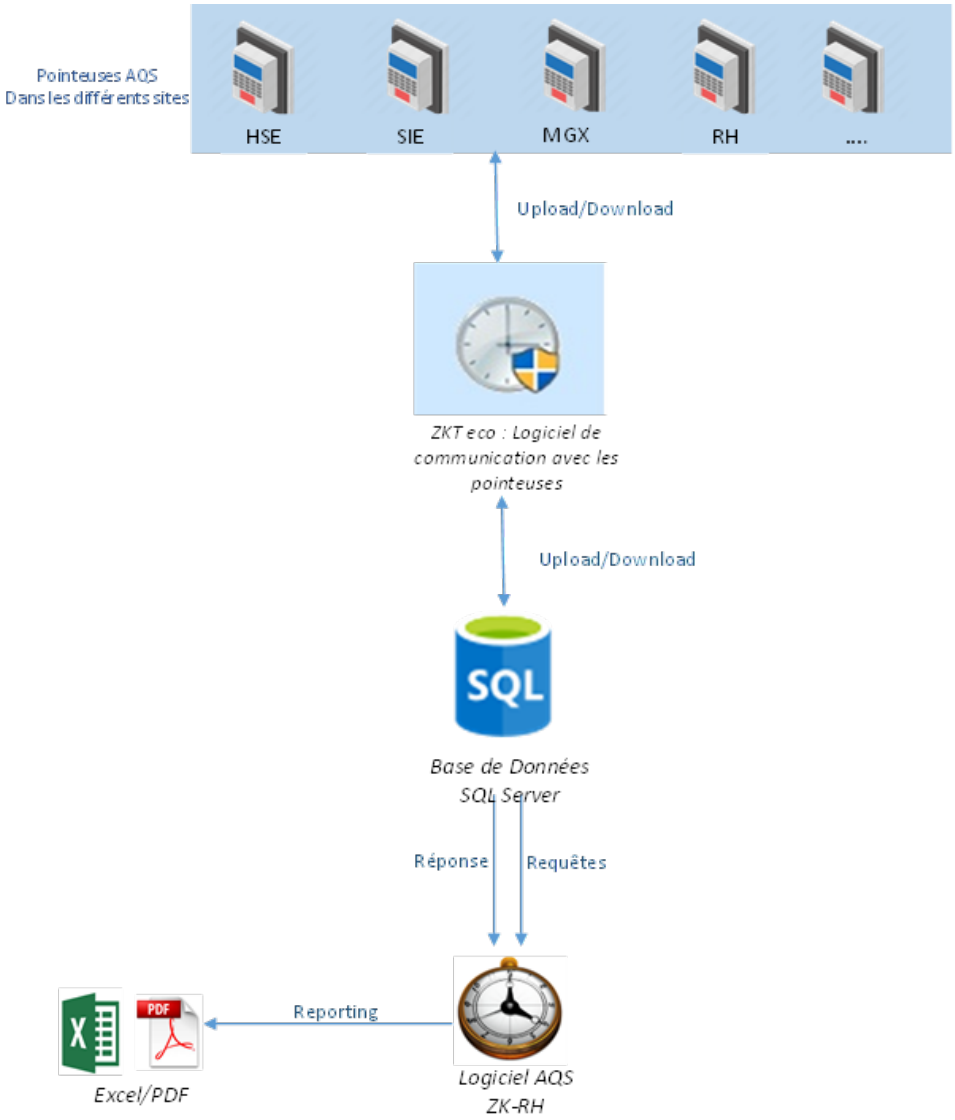


FIGURE 2.1 OPERATING DIAGRAM of RH-ZK

FEATURES

The ZK-RH has three main functions that we can describe as follows:

- **Import Attendance Data:** The employees' global attendance data in the site is being imported via ZK-RH connected to Attendance Management devices (Hardware) through the connection to the middle-ware ZKT-ECO; the software introduced by AM devices manufacturer, in order to manage and configure these devices.
- **Exploitation of the Attendance Score:** This feature allows us to view the score and attendance times of company staff, manage the staff members' list, manage days off and holidays and generate different reports using some search filters by employee name and by department name. All these functions are being handled by the software ZK-Reports.

- **Data Export to the PC-Paie software:** The .DTA database of PC-Paie software is encrypted so it is not possible to migrate data automatically, the following steps should be taken. Starting by editing the .DTA file and saving it as an Excel workbook then convert the Excel file to a .DBF file using Transfer. After that, replace the .DBF extension with. DTA in Windows Explorer. Finally, copy the .DTA file to the appropriate folder in the PC-Paie software.

2.1.2 PC-Paie Software

PC-PAIE is a payroll software, multi-folder, the volume of data is limited only by the size of the hard disk.
Each business is unique. There are many payroll profiles. They vary from one sector of activity to another (see within the same branch of activity, from one company to another). Therefore, payroll software must first correspond to your daily reality. PCPAIE is specially designed and developed to best manage all these activities, whatever it may be. Its powerful configuration possibilities allow it to adapt to the most complex situations. [13]

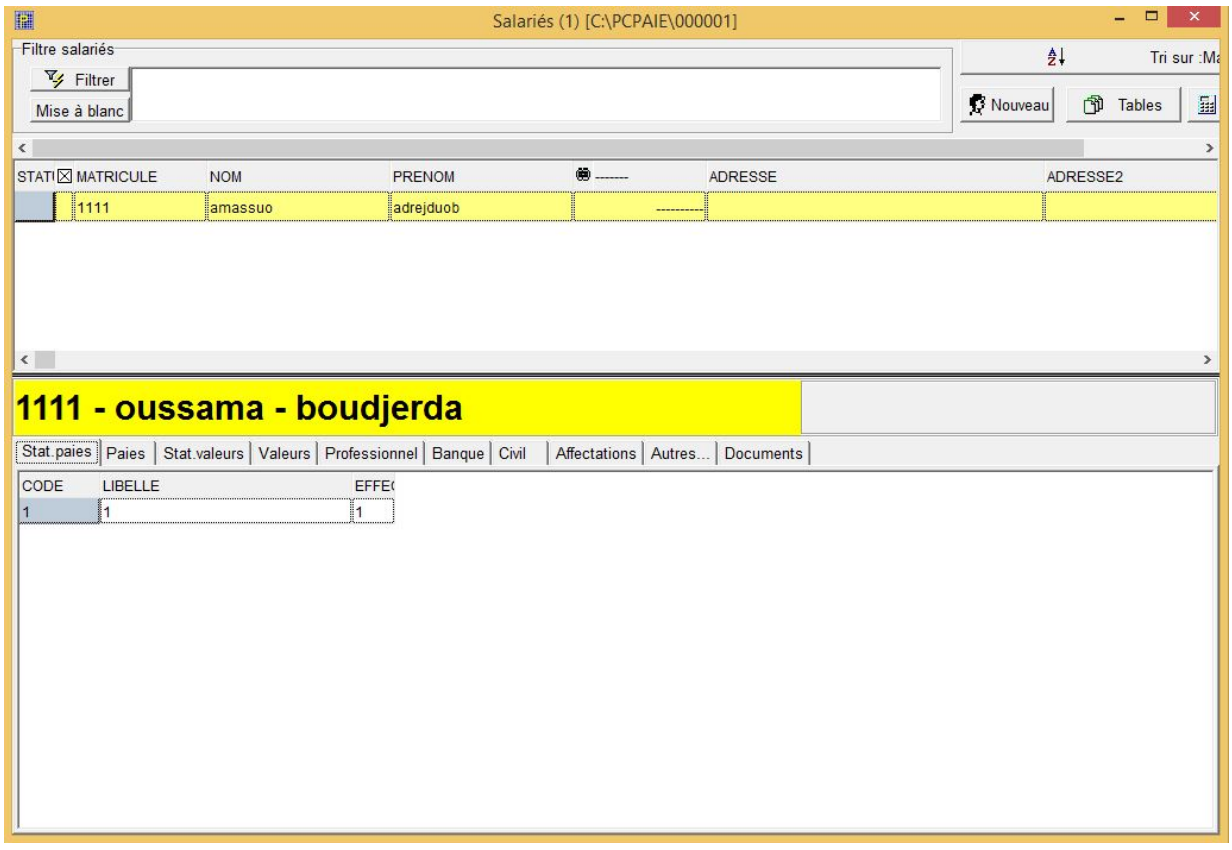


FIGURE 2.2 PCPAIE Software Home Panel

It is a legacy desktop software which has different tables and functions features, we can describe the main ones as follows:

TABLES

- Table Of Headings
- Table Of Functions
- Table Of Sections
- Table Of Cnas Centers
- Eight Additional Tables
- Table Of Banks
- Salary Schedule

FILES

- Employee File
- Payroll File

PROCESSING

The principle is that for the first payroll of an employee, the user assigns the basic salary, the fixed information, the wage types, etc. Thereafter, for each payroll preparation for this employee, PCPAIE will propose the same information as the previous month, and the user will be able to make modifications if necessary. The software includes other features:

- Indication of overtime, absence hours, down payments, etc.
- Entry of values per item for several employees, or per employee for all his items
- The possibility to launch global and automatic preparation for payrolls without changes.
- Automatic preview of the pay slip on the screen during data entry.
- The Possibility of calculating a new payroll by cumulating the payrolls of other months.
- Automatic calculation of regularization: Specify the months concerned, the value or values of the items to be regularized. PCPAIE then takes the history of the old months and generates a regular payroll.
- Multi-criteria search: all processing and editing can be done for a part of the employees, selected by a multi-criteria filter.
- The Possibility to restore all the elements with which any payroll has been calculated, the calculation of the reminders is based on this functionality.

REPORTING

- Classic reports, list of employees, banks...etc.
- Blank or pre-printed pay slip.
- Payroll book in two forms: multi-column report (one employee per line) or standard (one employee per column).
- Statements of payments by bank, cash, or cheque.
- For CCP transfers: CH.50 report and CH.102 report.
- Recap. Transfers by bank.
- Summary reports, general or by section.
- Summary report of employees selected by a multi-criteria filter.
- Employee position sheet (all payrolls of the year).
- Quarterly/annual declaration of employees, VF CACOBATPH report.
- Configurable reports, multi-column (unlimited number)

2.1.3 Limitations of Legacy Systems

Criticizing the existing solution is a crucial step that should not be ignored, it allows to see the limitations of the current system, discuss the flow of information as well as the diagram of circulation of information which leads to the detection of insufficiencies and shortages encountered during the study with a view to proposing a more reliable system.
Legacy software is software that has been around a long time and still meets the needs it was originally designed for, but does not allow for growth.
In our case, the software systems used by the company so far cover limited and small activities compared to the entire process of HR functions, by way of this study of the processes, we must say that they present several shortcomings due to the following anomalies:

- **Anomaly 1:** Poor personnel information treatment
  There is no tool to store the employees' master data and, so the HR staff have several difficulties in gathering all this information and tracking the changeset of each employee personnel status.
- **Anomaly 2:** Poor coordination and collaboration between employees
  Loss of time, due to travel between structures to make a request or receive a document due to decentralization of the databases and employees use fax and telephone to communicate, printing and paper support for the exchange of information.

- **Anomaly 3:** Poor assignment of tasks
  Random distribution of tasks to employees even if they were off work, there is no tool to follow time-off.

- **Anomaly 4:** Poor personnel work management
  There is no tracking of employees' work automatically. HR staff must do all the work manually such as collecting personnel work data, analyzing it, and reporting it manually.

All these anomalies are causing wasting of effort and time of all the HR department especially when it comes to manage a large number of employees (for our case 2300 Employee). For that purpose, we should suggest such an information system that could cover all the HR processes, even more a vast system that could automate all the collection of data and digitalize the whole work of employees. In the following section we will discuss the suggested solution which is included in the term of ERP (Enterprise Resource Planning).

2.2 Enterprise Resource Planning

2.2.1 The Concept of ERP

ERP stands for Enterprise Resource Planning program, as defined in oracle article it is signed around a single, defined data structure (schema) that typically has a common database [14]. This helps ensure that the information used across the enterprise is normalized and based on common definitions and user experiences. These core constructs are then interconnected with business processes driven by workflows across business departments (e.g., finance, HR, engineering, marketing), connecting systems and people using them.

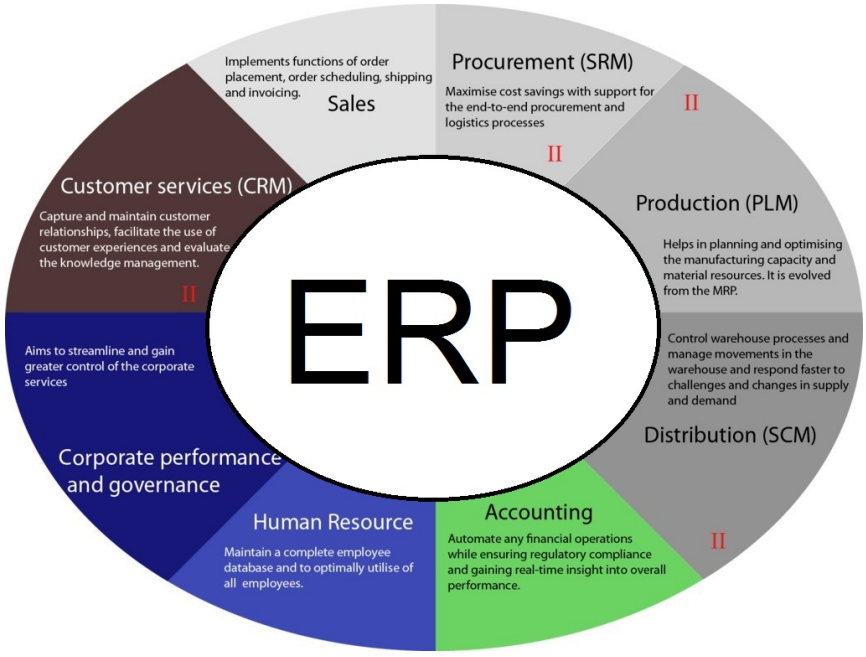


FIGURE 2.3 DIAGRAM SHOWING SOME TYPICAL ERP MODULES

”Simply put, ERP is the vehicle for integrating people, processes, and technologies across a modern enterprise.”[14]
These systems are the main assets of an organization. They provide benefits but on the other hand, there are high costs associated with information systems. Therefore, investing in information systems is a long-term investment. The main tasks of information systems professionals are to customize applications for the employer's needs and to integrate applications to form a coherent system architecture for the company. It is critical to remember that ERP refers to any application that automates and integrates company business processes or shares critical business information and allows for its real-time representation. An ERP application, for example, is one that is used to manage customer relationships. As a result, an extended ERP, or ERP system, is simply a contiguous collection of various ERP applications that share a common database. These various ERP applications are referred to as modules in the context of an ERP system.

2.2.2 ERP System Architecture

Although ERP systems are developed to meet the needs of an increasingly wider array of companies and company processes, more than simple service design is required for an ERP system to perform its designated functionalities at an acceptable level. A robust system architecture must be developed to accommodate the extensive processing and memory requirements of such a system. A system architecture can be defined as a structure of a system that comprises software elements, their external visible characteristics, and the relationships between them [15].
An ERP system architecture must, among others, satisfy the following goals:

- Support all relevant business processes.
- Present the user with information relevant only to his business activities.
- Maximize performance while minimizing down-times.
- Support any future customization.

Most corporate ERP systems (including Oracle, Microsoft and SAP which comprise more than 60% of the international ERP market) use a three-tiered client/server architecture. Although individual companies providing ERP solutions tend to use their own nomenclature, the general idea behind a three-tiered architecture is as follows:

- Presentation layer: Contains the user interface through which a user can access the system, view relevant data and the results of performed business processes and enter new data. The presentation layer is usually represented by a small application (a GUI) installed on the user's machine.
- Application layer: Consists of an application server for processing the commands incoming from the presentation layer and a messaging server responsible for diverting messages between various applications and the other two layers.

- Database layer: Houses a company's transactional, operational and metadata managed by relational database management system. Industry standards typically include RDBMS (relational database management system) used in conjunction with structured query language (SQL) provisions.

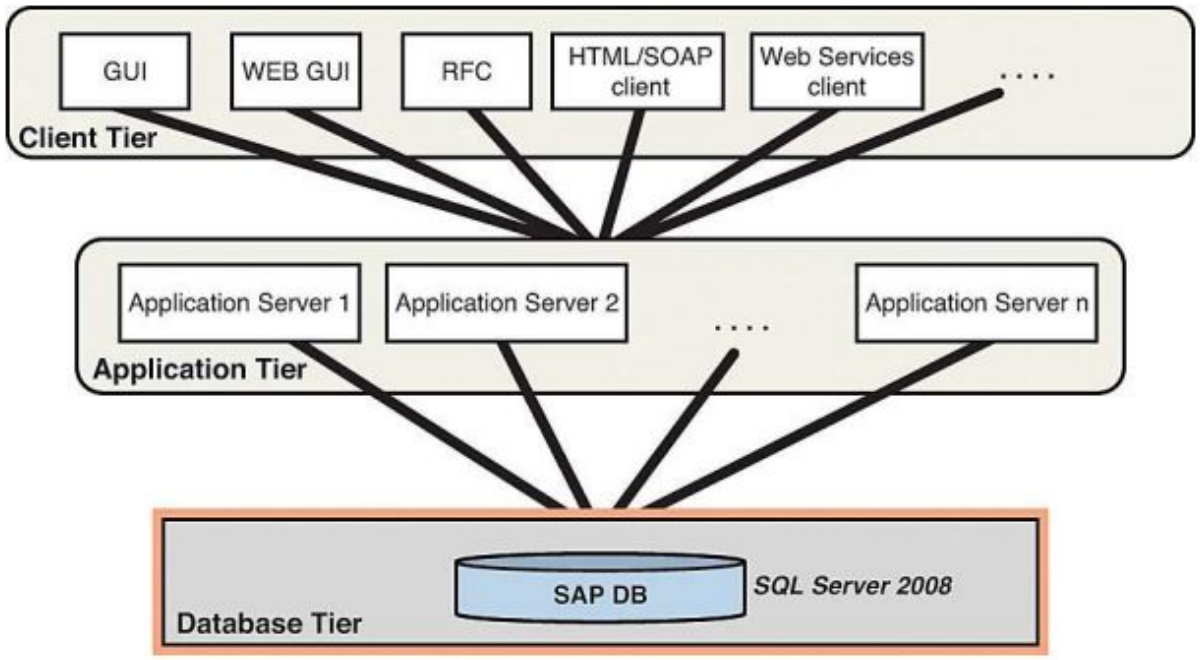


FIGURE 2.4 Representation of a three-layered ERP system architecture[16]

2.2.3 ERP Categorization

Implementing an ERP system into a company's environment represents a major decision which deeply impacts the traditional structures of any company.
ERP systems can be categorized by various parameters, be it parameters of a technical nature or otherwise, the three of the more distinct factors by which ERP systems can be effectively categorized beyond the price, namely categorization by company size, by industry sector and by implementation type.

The price

The price of a system depends on a multitude of factors, among them is the supported number of business processes , the scale of the system (usually measured by the total number of system users) etc...

Company Size

Company size plays a critical role when implementing an ERP system, as it has a direct impact on several key factors such as number of employees (and subsequently the number of system

users), company business processes or available resources.

Industry Sector

Another factor impacting the choice of an ERP system is the targeted industry sector of the company in question. A common notion is that ERP systems find use solely in the manufacturing sector. As we have find it on Wikipedia "ERP systems have been developed in conjunction with the business method MRPII which emphasizes coordination between the various elements involved in production, such as materials, finances, and human relations" [17]. This coordination is achieved using a common database system which is exactly what ERP advocates.

Implementation Type

The term implementation type refers to the actual manner of how the resulting system is going to be physically implemented from a technical point of view and the way the functionalities of the system will be hosted. Although there are several types of implementations available and indeed a separate categorization of ERP systems could be constructed based on this information alone, two types will always stand out: Cloud ERP systems and On-Premise ERP systems.
An ERP system installed on the premises of the client company is considered the classic solution, as this type of implementation has been used well over the past 30 years now. In this type of implementation, the system is installed and maintained locally. Thus, the company has full control over the system.
Although Cloud-based ERP systems have been around for a shorter amount of time, they are gaining popularity, especially with small and medium sized enterprises. The principal idea behind this type of system is that the system is hosted on the servers of the ERP system provider. The client accesses the various modules of the ERP systems over a pre-defined channel, usually via an internet browser. Cloud ERP systems are good examples of the application of SaaS (Software as a Service), as customers do not have to pay for the system itself only for its usage.
Both implementation types have their respective advantages and disadvantages, we did a comparison between both of them in the following table

Property	On premise	Cloud
Cost	- Initial hardware - Initial license - Annual costs	- Annual costs
Security	- Requires security plan from customer - Additional costs related to security hardware/software	- Security plan guaranteed by system provider
Customization	- Fully customizable	- Limited customization
Implementation	- Lengthy implementation time	- Reduced implementation time

Table 2.1 Implementation types comparison

When speaking about cloud ERP systems, the main advantage which is usually brought up are the significantly lower initial costs which are related to the cloud's independence from localized hardware. In addition to the initial and yearly maintenance costs which are introduced when utilizing own servers.
However, in terms of system customization, it is the on-premise ERP system which wins out over the cloud ones, as the client owns the software product in its entirety, including all the software code which can be customized. The cloud does not offer this advantage, as the system is still owned by the system provider and offers customization only in limited and pre-defined functionalities.

2.2.4 List of ERPs on the Market

This section will briefly detail the most representative solutions known on the market.

SAP ERP

FIGURE 2.5 SAP Business Software Solution[18]

SAP, the world leader in ERPs, offers two solutions for businesses. Business One is an integrated and affordable tool, focused specifically on small businesses. For large companies, SAP's solution is S/4 Hana, the evolution of the three-tier architecture it offered with its R3

solution. Both allow the integration and coordination of all business processes to facilitate the monitoring of systems. In addition, both tools can be deployed in the cloud. SAP was the pioneer in ERPs, so it offers the peace of mind that there are specific versions for all types of industries and businesses.

NetSuite

FIGURE 2.6 ORACLE Business Software Solution[19]

This tool was designed for any size of company, but is currently used in medium-sized companies (up to 1,000 employees) and is present all over the world. The program is scalable and allows you to execute commercial, financial and productive processes on cloud. In addition, it offers a great management capacity in its different modules.

Odoo

FIGURE 2.7 Odoo Open-Source Software Solution[20]

Odoo is a solution designed for all types of companies with a wide range of modules. In its favor is that being an open-source tool, it is more accessible to the public, so it has more than three million users. It should be noted that it integrates an e-commerce module with marketing tools, CMS, and CRM; so, it integrates perfectly.

Navision

FIGURE 2.8 Microsoft Dynamics NAV Business Software Solution[21]

Microsoft Dynamics NAV is Microsoft's response to the need to incorporate an ERP to the market. This system offers a wide range for business management, as well as the possibility of monitoring systems in real time. It can be deployed both in the clouds and on-premises and is focused on medium-sized companies.

Sage Business Cloud

FIGURE 2.9 Sage Business Software Solution[22]

Sage Business Cloud is the evolution of Sage X3 and, like its predecessor, is a versatile tool that unifies in a single package all functions, from financial management to BI functions. It is an ERP system designed to be deployed on cloud but can be deployed locally as a SaaS. It is designed to support global organizations, in various locations, languages, laws and monetary systems.

2.2.5 Chosen ERP

The company has chosen SAP S/4 Hana ERP, and this is based on its needs.

SAP HR Module enables the organization of a structured HR process system at a workstation. Many jobs may be automated, resulting in less manual labor and more production. SAP HCM design enables firms to maximize the recruiting process by hiring permanent, contractual, part-time, and daily wager employees.

Furthermore, deploying the SAP HR module does not necessitate the redesign of the entire process. SAP HR User is adaptable software that helps users to integrate new SAP innovations into current processes. SAP provides several models for various HR management processes. For example, every employee has a name, employee ID, classification, and so on, which must be documented by the organization's HR division. These data may be generated and saved automatically with the use of SAP HCM tools and methods. Data may also be captured depending on time management, salary information, work schedules, and so on.

2.3 SAP ERP Solutions

SAP ERP is the primary product of German company SAP SE [18]. This ERP is a proven, trusted foundation built to support companies of all sizes across all industries. Leverage role-based access to critical data, applications, and analytical tools and streamline your processes across procurement, manufacturing, service, sales, finance, and HR.
17SAP is the market leader in enterprise application software, helping companies of all sizes and in all industries run at their best 77% of the world's transaction revenue touches an SAP system. Our machine learning, Internet of Things (IoT), and advanced analytic technologies help turn customers' businesses into intelligent enterprises [17].
SAP ERP consists of several modules, each one valid for a specific area of specialization in a company. The figure below schematized how the modules are organized within the SAP system.

FIGURE 2.10 SAP ERP MODULES [23]

- CO – Controlling
  Controlling represents a company's cost and revenue stream and provides all the supporting information needed for planning, reporting and decision-making purposes. Decision-making can be achieved with an elevated level of information that drastically reduces risk. It is an instrument for managers to assist them in organizational decisions.

- FI – Finance
  Financial accounting is an important core module designed to meet all the accounting and financial needs of an organization. Within this module, CFOs, as well as other directors in the company, can look at the financial position of the company in real time.

- HR – Human Resources
  Human Resources deals with the various activities carried out in the HR department of an organization. These are personnel administration, personnel development, training and event management, payroll, etc. This module allows customers to efficiently manage information about the people in their organization and integrate this information with other SAP modules and external systems.

- MM – Material Management
  Material Management is the module for material management. This module is used for order handling and inventory management. Material Management is integrated with other modules such as SD, PP and QM.

- PM – Plant Maintenance
  Plant maintenance focuses on all maintenance activities that support planning, with an emphasis on equipment availability, labor costs and reliability. Plant maintenance consists of activities such as: inspection and determination of the actual condition of the technical system, preventive maintenance for the ideal condition of the technical system, repair, and restoration of the ideal condition of the technical system and other actions to be taken by the maintenance organization.

- PP – Production Planning
  The purpose of the production planning module is to ensure that production runs efficiently, effectively and produces products as required by customers. Module Production planning takes care of the necessary master data, such as piece lines, technological processes, and work centers, and stores them in one specific component.

- PS – Project System
  Project systems are designed to support the planning, control, and monitoring of long and complex projects with defined objectives. Projects are in general part of a company's internal processes.

- QM – Quality Management
  Quality management is a method for ensuring that all activities required to design, develop, and implement a product or service are effective and efficient in relation to the system and its operation. QM is an integrated solution that supports the company through the product life cycle.

- SD – Sales Distribution
  Sales and distribution are part of the logistics module that supports its customers, from quotation, sales order to invoice. The SD module is intricately linked to the MM and PP modules. It allows companies to enter the customer's selling price, check open orders, forecasts, etc.

SAP uses a set of methodologies and tools designed to deliver fast and reliable results, helping customers get the most out of their solutions. Implementing SAP systems requires a great deal of effort on the part of consultants in planning the project, re-engineering the organization's processes, and managing both change and expectations. Implementing an ERP solution is a strategic business decision, not a software installation project. The success of a project is largely determined by how it is conducted [24].
Project management seeks to achieve a result previously defined by a schedule, budgets, and with a certain quality [25]. Within this definition, SAP project management provides implementation methodologies that adapt system functionality to organizations and their business processes. Several implementation methodologies have been developed over the years by SAP, by consulting companies called the "Big 4" and by other SAP business partners.
As said before, SAP has its own methodologies that over time have become effective in conducting its projects. The best-known method is SAP Activate; SAP latest agile method adapted to companies. Next, we will present the key points of this methodology for implementing SAP systems.

2.4 SAP ERP Implementation

2.4.1 Implementation Considerations

There are many things to consider when planning to undertake any system implementation, and these considerations are no different if you plan to implement a cloud solution or an on-premise solution. It is an opportunity to review the applicable business processes, taking care to revisit why things are being done the way they are and evaluate how it can be improved. Understand whether the processes exist because they are best practices, because they supported the legacy system, or because that is simply the way business has always been done. It is a chance to prepare the organization for the change that is coming. When implementing our HCM suite, this change may have the biggest impact on the business process owners in HR, rather than on the employee end users.
Before embarking on an implementation, it is recommended to spend some time reviewing the business processes involved. Although business process review should be included during the implementation, understanding the weaknesses or limitations of existing processes helps for a more robust kickoff meeting and speeds up the system configuration decisions post-kickoff. Because SAP ERP solutions can be configured but not developed, it is possible that not all system requirements are met by existing system functionality and configuration possibilities. Preparation to use a combination of system configuration and business process change to address outstanding system requirements. A good understanding of the as-is processes and any legal or corporate requirements becomes key in these situations.

2.4.2 Project Structure

Although the project structure of a SuccessFactors implementation varies depending on the number of modules undertaken at one time, you can expect to see some baselines. Implementation can be as varied as the Partners in the ecosphere; however, you should ensure that your consultants have product ability in the implemented module(s), coupled with process and best practice expertise. The project team can comprise the following types of resources:

- Implementation consultant(s).
- Project manager.
- Project sponsor.
- Technical resources.
- Functional/business resource.
- Stakeholder group representatives.
- Training/communication resource.

2.4.3 Project Methodology

SAP Activate is a new method for implementing SAP software. Designed for the new SAP S/4HANA business solution, SAP Activate helps with new implementations (greenfield), conversions of existing SAP Business Suite systems (lift shift), and transformations of system landscapes. The SAP Activate approach includes best practices for business processes, guided configuration, and implementation methodology. The SAP Activate framework follows the classic waterfall model, i.e., phases are carried out in succession. The innovation of SAP Activate is its continuous lifecycle management, which enables you to execute individual phases again when running an update.
The methodology of SAP Activate is based on the best practices for both on-premise and cloud implementations of SAP S/4HANA. In this context, we would like to notify that SAP Activate is the first solution to show a common methodology for implementing cloud, hybrid, and on-premise systems. Moreover, SAP partners and experienced customers can use the SAP Activate methodology without having to utilize SAP consulting services.

SAP Activate PHASES

Since our scenario is for a new implementation, in this section we introduce the individual phases of the SAP Activate methodology. We will take a closer look at the phases of SAP S/4HANA project. The individual SAP Activate phases cover simple cloud implementations as well as complex installations of on-premise systems.
1. Prepare: In this phase, initiation and planning SAP S/4HANA project, including quality gates

and risk plans. Also, set up the system landscape and determine the best practices for predefined business processes.
The Prepare phase lays the groundwork for a successful implementation. Tasks are focused on kicking off the project and developing the implementation project plan, as well as ensuring that the company is prepared for the implementation process. Key tasks in the Prepare phase include the following:

- Project team orientation.
- Kickoff meeting.
- Requirements-gathering workshops.
- Project plan development

Project team orientation includes orienting the team to the project framework, guidelines, and schedule. It may also include some project team tool training on the module(s) being implemented. The kickoff meeting focuses on the following:

- Project scope.
- Methodology.
- Key project business drivers.
- Initial timeline/project plan.
- Company resources, such as Company Community.
- Project team roles and responsibilities.

Requirements-gathering workshops are the focus of the Prepare phase. This is when the consulting team identifies the system requirements of the company and details the business processes impacted by the implementation. The entire project team, consultants, and business stakeholders work together to identify the system configuration required to meet the company's needs. Requirements-gathering is typically conducted as part of the kickoff meeting. While many decisions can be made during the configuration workshops, the workbooks should be completed over a span of days or a few weeks. The result is the completion of a detailed configuration workbook, which consultants then use to complete the system configuration. Data migration and technical workshops are centered on ancillary implementation work, such as migrating legacy data and implementing custom connectors or other third-party integrations. These are conducted on an as needed basis. Project plan development is also completed during this phase, outlining key tasks, deliverables, and milestones necessary for project success. As with any implementation, project planning is an ongoing task throughout the project.
2. Explore: In this phase, you will explore SAP S/4HANA's features and compare them to your requirements. In so-called fit-to-gap workshops (or fit-to-standard workshops for SAP S/4HANA

Cloud), you will meet with an SAP representative in person to define the target configuration and SAP Best Practices extensions.
3. Realize: Configuration and enhancement the SAP S/4HANA system according to the requirements prioritized in the previous phase. The configuration and subsequent adaptations are implemented in short cycles to allow for regular validations and to obtain feedback from business departments. This phase also includes structured system tests and migration activities. The company executes the testing plan developed during the Prepare phase to prove that the system is configured as designed and is ”fit for purpose”.
The types of testing included in the test plan are familiar as the same testing that occurs in most systems implementations. The company can determine which testing activities to conduct, but the following are typically included:

- Unit testing
  Confirms that each item identified in the configuration workbook has been configured and is working as expected. Unit testing is the responsibility of the implementation consultant.

- Application testing
  Confirms that the system configuration meets the company's functional requirements. It is critical to confirm that the system is ready for end-to-end testing. The company project team is responsible for application testing.

- Integration testing
  Required in our case since our systems will be integrated with SuccessFactors.

- User acceptance testing
  Confirms that the system is configured to meet the end-to-end business requirements and is the responsibility of the company validation team.

- Knowledge Transfer
  Sessions conducted at this phase from the integrator company where they define all the functional side of each process to the client company in order to transfer the knowledge to them.

4. Deploy: This phase is all about preparing for go-live, launching the system, and transitioning to the company Success for ongoing support. After all testing activities are completed, identified issues are addressed and retested, and final sign-off of testing is achieved, the implementation consultant begins cutting over configuration from the test instance to the company's production instance. The cutover checklist is a critical deliverable of this phase that is used to monitor progress of all cutover activities. responsibilities. and statuses. The implementation consultant prepares the cutover checklist, and tasks are determined by the modules implemented. At the completion of cutover, including data migration as applicable, the customer begins production validation. After that is complete, the final deliverable of the project is the production readiness sign-off document.
The following figure provided in SAP documentations summarize all the precedent phases

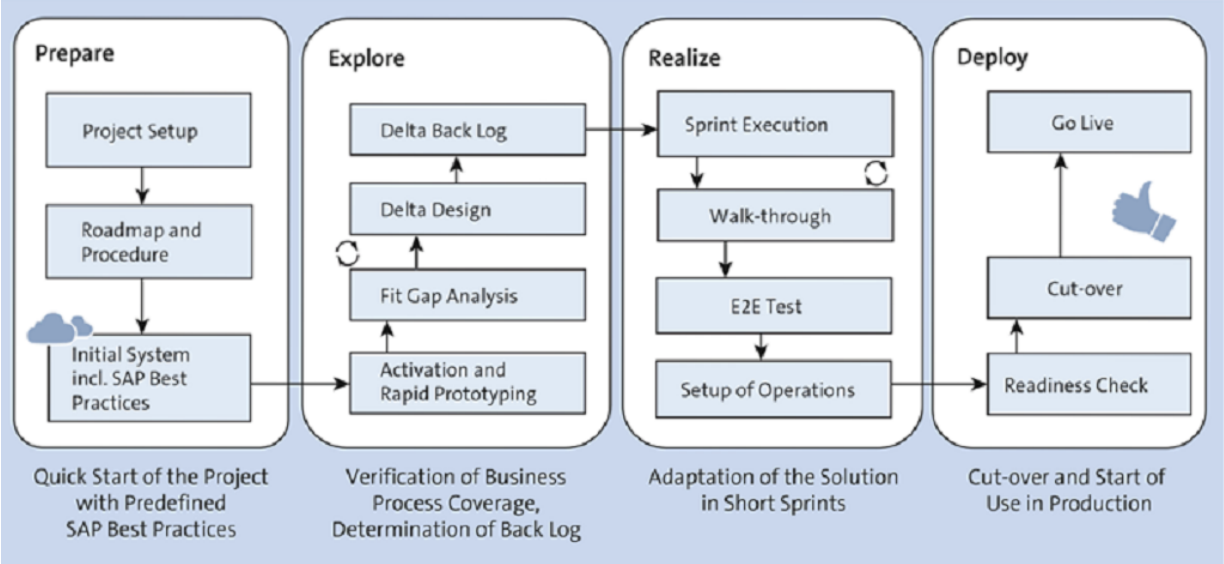


FIGURE 2.11 SAP Active Methodology Phases[18]

2.4.4 Project Team

On each side, capable, reliable, and proven people must be selected as the basis for a successful project. Competence and reliability come with the experience that team members accumulate over the years and with the number of projects. Each participation in a domestic or foreign project can bring a valuable piece to the overall mosaic of skills of the actors involved in the implementation of an IT system.
The team is made up of people with distinct roles: SAP consultants, business users, system administrators, developers or programmers, a manager, IT person, a key user, end users and managers. For such big projects, costumer companies seek the help of consulting and advisory firms.
In our case, AQS took the decision and signed for two project partners (firms) that are experts in implementing SAP, an IT consulting and advisory company, and an integrator company.
The next section provides small descriptions of all the roles and partners involved in this project, SAP implementation.
First, the project is named IMULIA, this team is comprised of individuals from separate groups both internal and external project stakeholders.
Internal stakeholders are AQS and the external ones are PwC and SEIDOR, consulting and integrator companies, respectively.

PwC (PricewaterhouseCoopers)

PwC is a multinational professional services network of organizations that provides consultancy, audit and assurance, and tax services. With global revenues of $45 billion in 2021; It is one of the Big Four accounting firms in the world, alongside KPMG, DELOITTE, and EY.
PwC is an SAP platinum partner and a recognized leader in SAP installation. As a result, AQS

relies on PwC to deliver comprehensive consulting, system integration, and implementation services across a wide range of SAP applications, products, and technology.
Algerian PwC has struck a subcontracting agreement with Best Is Solutions (Bi2S), which has an experienced and qualified SAP team, in order to achieve a better implementation.
AMOA consultants (*assistanceàlamaitrised'ouvrage*) is their primary job title. As the name implies, the AMOA aids the contracting authority (MOA). The business lines that will use the SAP software are represented by the MOA. In this sense, the AMOA consultant is accountable for the company's successful SAP deployment.
We can summarize their key role in the SAP Activate methodology in these points:

- Translate business needs into SAP capabilities. The expected deliverables are functional specifications.
- Analyze technical feasibility.
- Implementation of change management.
- User training.
- Writing test plans.
- Validate that the solution delivered by the MOE corresponds to what is expected.

SEIDOR

A multinational consulting firm focusing in technology services and solutions, such as SAP Business One and SAP Business ByDesign, reported a €606 million revenue for the fiscal year 2021.
It was picked as SAP project integrator by AQS; their position includes defining the standards, norms, and strategy for integration (interface) technologies and their application inside the firm. This function aids in the design of solutions and governance, as well as the resolution of standards non-compliance and exception cases. Aside from giving designs (Blueprint) and passing on information to the AQS side.

AQS

The team is divided into five parts, each part has its responsibilities as follows:

- **Project Manager:** He is the leader of the team, and at the same time he is the Director of the Informatin System Directory. His leading role is to resolve obstacles, listen, support, and reward the team for increasing the workload (current work and additional new work that needs to be stimulated).

- **Super Users:** They are the IT engineers of AQS; we held the same role during our internship in the company, they are getting special training so they can parameter, configure, enhance, and administrate the system.
  The project manager oriented each engineer to a specific SAP solution, this step is considered as one of the best practice needs to a better implementation of SAP.
  AQS took the decision to implement the SAP Standard and train its Super users to develop and enhance and make extensions for the system after the Go lives.
  So, their main responsibilities under the project implementation are to prepare master data for data migration, train key users, and test functionalities of the system.
  Collaboration with the consultant, BPO, key users and the project manager, gives the IT engineers an extensive knowledge and opportunity to become functional technical consultants in an accelerated time.

- **BPO:** Business Process Owner, as the name indicates, his main roles and responsibilities of a BPO, covers the overall Solutions, Process, Testing, Data and Training aspects of the SAP program, BPOs are the heads of department or directors.

- **KEY users:** They are people who have knowledge of company processes in the area where they are employed, their key role is to collaborate with super users and SAP consultants to express their functional needs and parameters on the system. They are considered as end users, the main objective is to perform the same or similar tasks, but on an SAP system.

- **END users:** They are the stuff working in department, the procedure is to select two to three key users from each department then those key users will train their colleagues (End users) when the project get implemented.

Conclusion

After defining the concept of ERPs, introducing different software solutions which could help the company to digitalize all the business processes especially our case human resource management. Then, description of the hole implementation project methodology, project phases, project implementation partners.
Now that the project's perspective is clear, we'll explain the solution presented and the technologies employed in the next chapter, as well as report on the work we did throughout our five-month internship, which was a complete team effort involving all project partners.

Chapter 3

Implementation of SAP SF and SAP HCM

HRMS typically falls under the umbrella of enterprise resource planning (ERP) software. HRMS software streamlines and automates most of the day-to-day record-keeping processes; it provides a framework for HR staff and managers. In the context of SAP, HRMS can be structured into different modules that are typically aligned with the functional areas within corporations to manage these employee data processes. From a technical standpoint, the HCM processes and data are very integrated, but, at the same time, the segregation of duties and roles within corporations can cause those processes to disintegrate. An example is the creation of salary information, which typically requires a division of the hiring process into two processes—the creation of non-sensitive basic employee data by one HR user, followed by the creation of supplementary salary information by another user. HRMS technology and data can be very heterogeneous and split across different HRMS systems and technical platforms. In this chapter we focus technically on the SAP HR solutions and select the best combination for our company.

3.1 SAP HCM for S/4 Hana On-Premise HRMS

SAP ERP HCM is considered as the traditional product for human resource management. It is one product of the wide ERP solution of SAP. This on-premise solution is considered as a small part of the SAP S/4 Hana ERP.
With SAP S/4HANA, on-premise, the system can be implemented either in any company data center or at a hosting partner or hosting provider (i.e., as IaaS system —infrastructure as a service), like Amazon AWS or Microsoft Azure.
SAP ERP HCM can be implemented as it is the main software to manage all HR processes as well as it can be implemented using a mixed bag of its components and other third-party HR systems. [26]

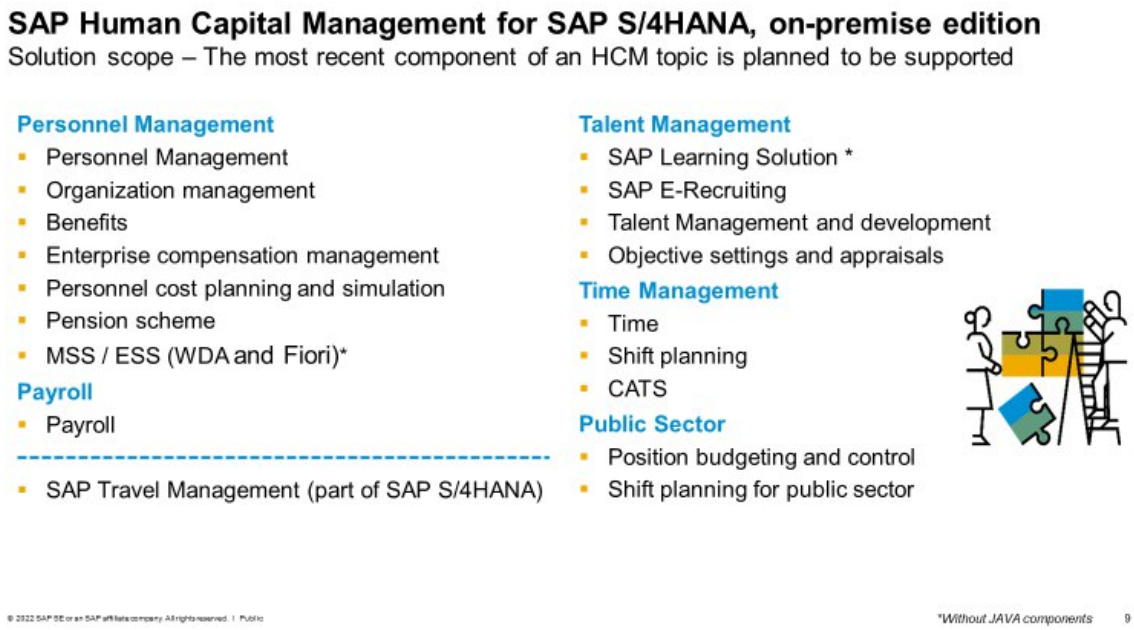


FIGURE 3.1 SAP HCM for S/4 Hana On-Premise Modules[26]

3.1.1 SAP HCM Key Features

The SAP HCM for S/4HANA On-premise edition avails the full spectrum and functionality of this suite along with the highly flexible customization. This edition works best for large organizations that have very well-established complex business processes that need simplification. Unlike the Cloud edition, the On-premise edition provides more opportunities for effective monitoring of business processes in large organizations. Its major features are:

- Infrastructure Maintenance
  Deployment and maintenance are incorporated and managed by the client and he has all the capabilities and can install it in any infrastructure he needs, also he is responsible for the maintenance of it.

- Innovation in software
  Planning, testing, controlling, upgrading, and changing within the system are the full responsibilities of a customer.

- Scope to customization
  The On-premise edition is highly compliant with individual business requirements and customization.

- Functional Scope
  On-premise edition supports full ERP Scope. Also, integration with SAP SuccessFactors, and many others systems whether they are in the same SAP S/4 Hana ERP or Other SAP or 3rd Party Systems

3.1.2 SAP HCM for S/4 Hana Modules

HRIS Modules

- **Core HR**
  It is composed of two main submodules Personnel Administration (PA) where he foundation of employee data management and entails typical human resources administration processes like employee hiring and termination, employee change of organizational assignment, and so on.
  Also, Organizational Management (OM) which Handle the definition of the corporate organizational structure and the assignment of employees within the organizational structure, defining roles and responsibilities within the corporation as well as reporting relationships. The organizational structure builds the foundation for workflow processing and delivers a framework for sophisticated yet flexible authorizations.

- **E-Recruiting**
  The main functionality of E-Recruiting is to support the end-to-end recruiting process from managing and posting job openings to tracking candidates to scheduling interviews and searching for skills and talent.

HCM Modules

All the above modules in addition to:

- **Performance Management**
  The main business processes supported by this component include the tracking of team or individual goals and the performance review and appraisal. Employee development tools allow users to manage career plans and succession planning.

- **Compensation Management**
  Allows managing competency-based pay, variable pay plans and incentive programs supported by Manager Self-Service functions. In addition, it allows comparative compensation package analysis based on external salary data.

- **E-Learning**
  This module supports both e-learning and classroom training as well as synchronous and asynchronous collaboration. It allows managing and tracking of learning material, learning sessions, trainees, competencies, and certifications and proficiencies. Enterprise Learning is integrated with other SAP applications such as OM and PA, where organizational units or employees can be booked as course attendees or employees can be scheduled as instructors.

HRMS Modules

It contains all HRIS and HCM modules in addition to:

- **Payroll and Benefits Administration (PY)**
  Payroll (PY) module in SAP ERP HCM is responsible for employee payment based on company policies and state and federal regulations. The foundation of this module lies in the administration of employee salary via the definition of basic pay/salary and pay scales. The payroll engine contains all the logic to calculate gross to net payments based on salary and recurring payments and deductions, such as employee bonuses, special payments, garnishments, pension contributions, and benefits deductions. Depending on the employee type, attendances and absences are taken into account.

- **Personnel Time Management (PT)**
  Covers all processes and data related to time capture and time data processing. Time entry, time approval, and time evaluation are the core processes within SAP ERP HCM's Time Management (PT) module.

3.1.3 SAP HCM for S/4 Hana Technology

SAP HCM is the human resource modular part of the SAP S/4 HANA ERP so discussing its technology leads us to talks about SAP S/4 HANA ERP and its different technologies and Layers. SAP S/4HANA's architecture is quite complicated and involves a lot of moving parts. There are books that are dedicated specifically to S/4HANA's architecture. We are not going to take a deep dive but let us take a quick look at each component and its purpose in this section.

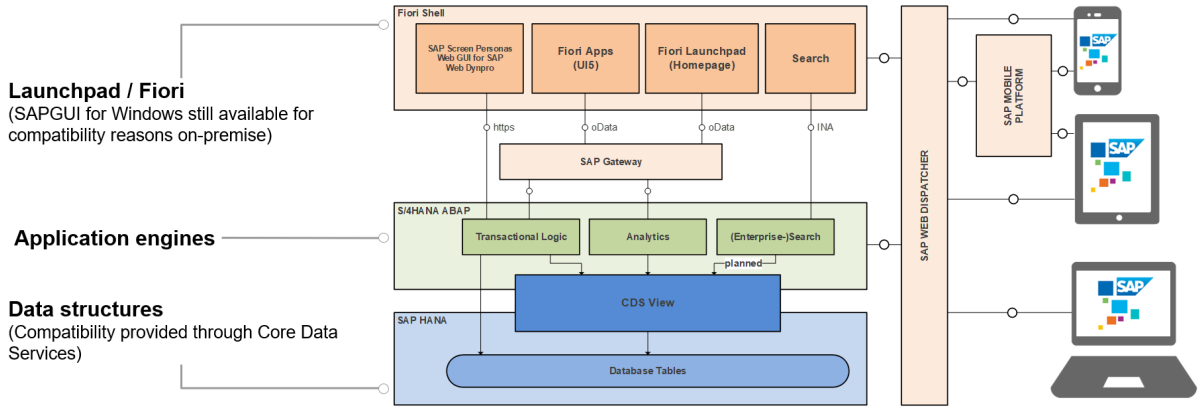


FIGURE 3.2 SAP HCM for S/4 Hana On-Premise Three Layer Architecture[26]

As it described in sap documentation it is composed of the following technologies

- SAP WebDispatcher
  WebDispatcher is the software switch that lies between the internet and your SAP system. When an end-user sends an HTTPS request, it first hits the WebDispatcher which then decides whether to accept or reject the request. When it accepts a connection, it balances the load to ensure an even distribution across the servers. SAP Web Dispatcher, therefore, contributes to security and balances the load in your SAP system.

- SAP FIORI
  FIORI is the presentation layer for S/4HANA. Users can still access the S/4HANA system using SAPGUI but it is mostly reserved for administration and compatibility reasons. Moreover, utilizing FIORI apps is necessary to take full advantage of S/4HANA functionalities such as embedded analytics and robotic process automation.

- SAP Gateway
  As the name implies, SAP Gateway lets us connect devices, environments, and platforms to SAP systems. It uses Open Data Protocol (OData) for communication which means you can use any programming language or model to connect to SAP and non-SAP applications using the Gateway. S/4HANA uses Gateway and OData services to translate business data from the database and present it using FIORI apps.

- Application engine
  S/4HANA's application engine contains a simplified data model. There are no more aggregates and indices required, as a result, the number of tables required to perform day-to-day business operations is reduced. As a result, the memory footprint is drastically reduced as well. S/4HANA can perform both OLAP and OLTP transactions and there is a clear separation of master data and transactional data.

- CDS views
  Stands for Core Data Services. It is also known as the code pushdown model. This means some of the resource-intensive calculations are pushed down to the database layer, which takes the load out of the application server thus providing the best possible performance. CDS also offers capabilities beyond the traditional data modelling tools, including support for conceptual modelling and relationship definitions, built-in functions, and extensions.

- SAP HANA
  S/4HANA only runs on the SAP HANA database. It is SAP's in-memory, column-oriented, relational database management system that combines OLTP (Online Transaction Processing) and OLAP (Online Analytical Processing) into a single system. OLTP is about capturing, storing, and processing data from transactions while OLAP is about analytics, processing complex queries to analyze aggregated historical data from OLTP systems. Storing data in main memory rather than on disk provides faster data access, faster querying, and processing, hence offering better performance than a non-in-memory database. [26]

Looking more specifically at the application engine and HCM module of the S/4 HANA we can get the data structure of its database tables which hold all the information of all employees and their job assignments.

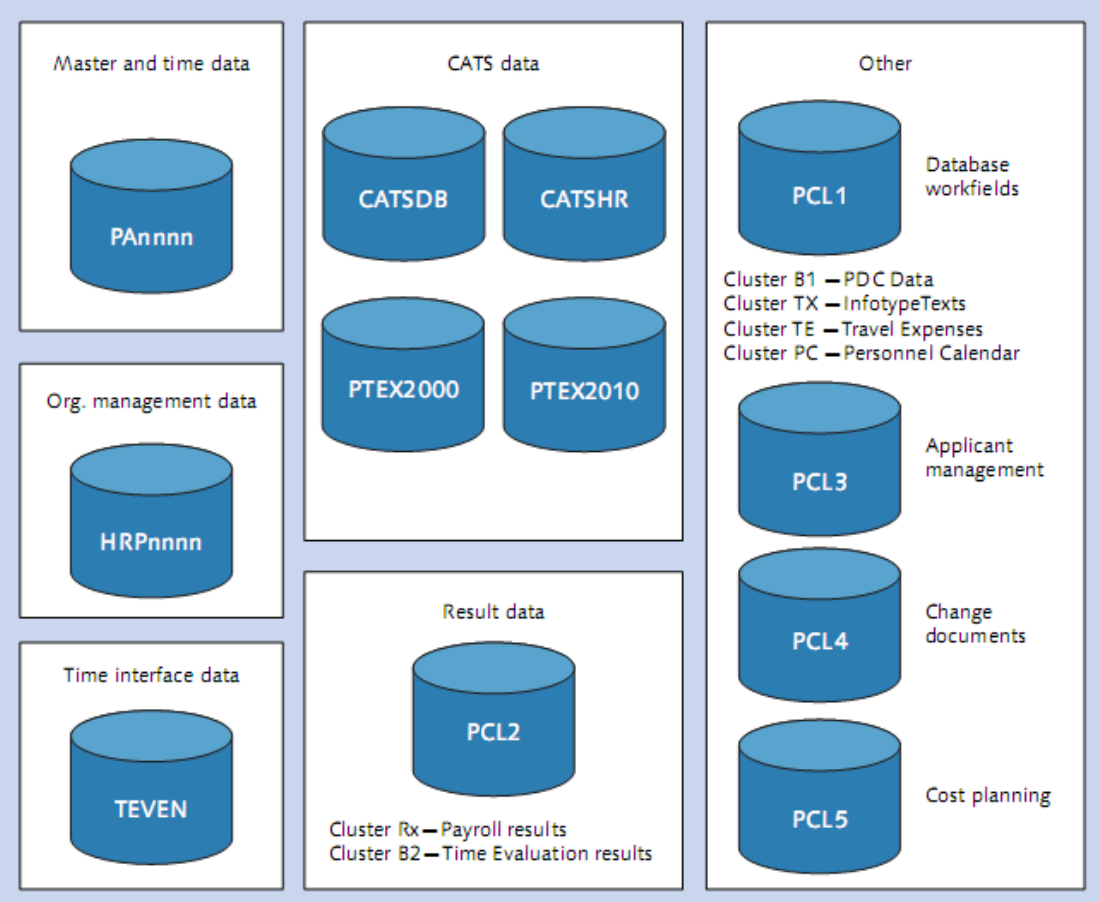


FIGURE 3.3 SAP HCM for S/4 Hana On-Premise Database Data Structure [26]

3.1.4 SAP HCM for S/4 Hana Configuration and Enhancement

The first configuration step in SAP HCM implementation is by using SAP Project Reference Object and then accessing the different module list via SAP IMG (Implementation guide); in our project we have used only this option yet, but most SAP HCM implementations require a certain degree of custom development due to unique customer specific requirements that cannot be solved via standard SAP configuration. We consider functionality that is not covered by standard SAP to be a functional gap; typically, all functional gaps are identified, and the exact requirements documented during the blueprint phase of the project where a fit-gap analysis is conducted. It is important during the fit-gap analysis to explore all feasible options and research all available information like OSS Notes, enhancement packs, and other materials before declaring a business requirement an SAP gap. The following are typical functional gaps:

- Custom reporting requirements that cannot be met via SAP reports.
- Custom fields that are required and that are not available in the existing suite of standard infotype tables.
- Entire new infotypes are required to store customer specific data, such as historical data that cannot be stored in any of the existing infotype tables.

- Custom interfaces are required to either import data into SAP HCM or to export data from SAP HCM to third-party systems.
- Custom business process logic requirements that do not match the SAP standard business logic or do not exist in the standard SAP HCM transactions.

The degree of enhancement and the tools to implement an enhancement range from simple to complex. Here, we describe various enhancement techniques for SAP HCM.[26]

Customer Exits

The main objective during SAP implementations is to avoid changing SAP standard code. Customer exits are predefined entry points in standard SAP programs, most customer exits can be accessed via SAP IMG, which simply creates a link to Transaction SMOD (SAP Enhancements), it allows to create and activate customer exits specific to a functional area. Customer exits have some limitations based on where they are placed in the SAP standard code and what data elements are available within the customer exit. In those cases, other options are available, such as the use of enhancement points, which we will discuss later.[26]

BAdIs

Based on object-oriented programming techniques. BAdIs are unique, they do not have a two-tiered structure like customer exits. In customer exits, there is a definition view (where the programmer defines exit points in the SAP application) and an implementation view (where the users can customize the logic that drives the exiting of the application). BAdIs instead allow for a multi-level system that integrates the two tiers into one, which makes add-on development much easier and less time-consuming. BAdIs can be categorized as either filter-dependent BAdIs or multiple-use BAdIs.

- Filter-Dependent BAdI
  A BAdI can be defined with a filter value, such as a country filter (MOLGA), company code filter (BUKRS), and so on. In the enhancement definition, all the methods created in the enhancement's interface need to have a filter value as their importing parameter. The application program provides the filter values for the implementation method. A filter-dependent BAdI is called using one filter value only; it is possible to check active implementation for the filter value using the function module SXC-EXIT-CHECK-ACTIVE.
- Multiple-Use BAdI
  The concept behind multiple-use of the BAdI is that if it has been implemented once already, it can be implemented again. There is no sequence control for multiple-use implementations of BAdIs. Sequence control is technically impossible; at the time of the definition, the interface does not know which implementations parameters will be changed in the implementations.[26]

Enhancement Points

Represent the latest SAP enhancement concept to allow changing SAP code without the need for an access key—which is required for modifications (also known as repairs)—and without having to add code to a separate customer exit or BAdI. Unlike BAdIs, which are SAP enhancements using the object plug-in technique, enhancement points are enhancements that use the source code plug-in technique. This technique allows you to add custom code to existing standard SAP code in predefined program areas. The code can be easily added from within the ABAP Editor. The following enhancement option types are available in source code:

- ENHANCEMENT-POINT can either be static (for example, additional data declaration) or dynamic (for example, additional coding).
- ENHANCEMENT-SECTION can either be static (for example, replace an existing data declaration) or dynamic (for example, replace coding).

Enhancement options and sections are hooks to which it can be assigned an enhancement. The only disadvantage is that enhancement points exist only on special source code lines.[26]

Modifications

If no one of these enhancement options comply with the customer business requirements, modifications can be made to SAP standard programs from within the ABAP Editor using the Modification Assistant functionality. To facilitate modification changes, programs are organized into modularization units called modules, subroutines, and events. Each modification made is assigned to its corresponding unit and logged for both the modification overview and upgrade. The main difference compared to enhancements is that it is necessarily to register each object modified with SAP via the SSCR process through the SAP Support portal.[26]

3.2 SAP SuccessFactors: Cloud-Based HRMS

About SuccessFactors

SuccessFactors was founded in 2001 as a SaaS performance management software vendor. It quickly evolved its strategy to focus on providing ”Business Execution” software and, thus, expanding its offering to cover talent management and analytics. Headquartered in San Francisco, California, SuccessFactors also has offices in more than 35 locations around the world and more than 3,500 customers in 168 territories using 35 different languages. Among these customers are some highly recognizable companies and brands, including 20th Century Fox, Adobe, American Airlines, AstraZeneca, Bayer Corporation, Capital One, Comcast, Department of Homeland Security, Drug Enforcement Administration, McAfee, NASA, PepsiCo, Siemens, Starbucks, Timken, and VMware.

SAP announced its intention to acquire SuccessFactors on December 3, 2011, and the acquisition was formally completed in February 2012. SuccessFactors became ”SuccessFactors, an SAP company” shortly thereafter. The acquisition was significant for SAP in several ways: it provided SAP with access to genuine cloud expertise and enabled it to offer a full cloud-based HCM suite. It also gave both SAP and SuccessFactors significant exposure within and outside the SAP ERP HCM ecosystem.
SAP SuccessFactors is a cloud-based HR solution that helps organizations manage various HR operations with ease. It is based on the Software as a Service (SaaS) model. It is designed to meet the requirement of enterprise-class organizations. It is one of the most widely used cloud-based human capital management (HCM) systems. SAP SuccessFactors is a solution designed to improve people and talent management capabilities by providing any organization with analytical tools to manage their employee life cycle with a 360º view. As a cloud solution, it can be accessed on any device.[27]

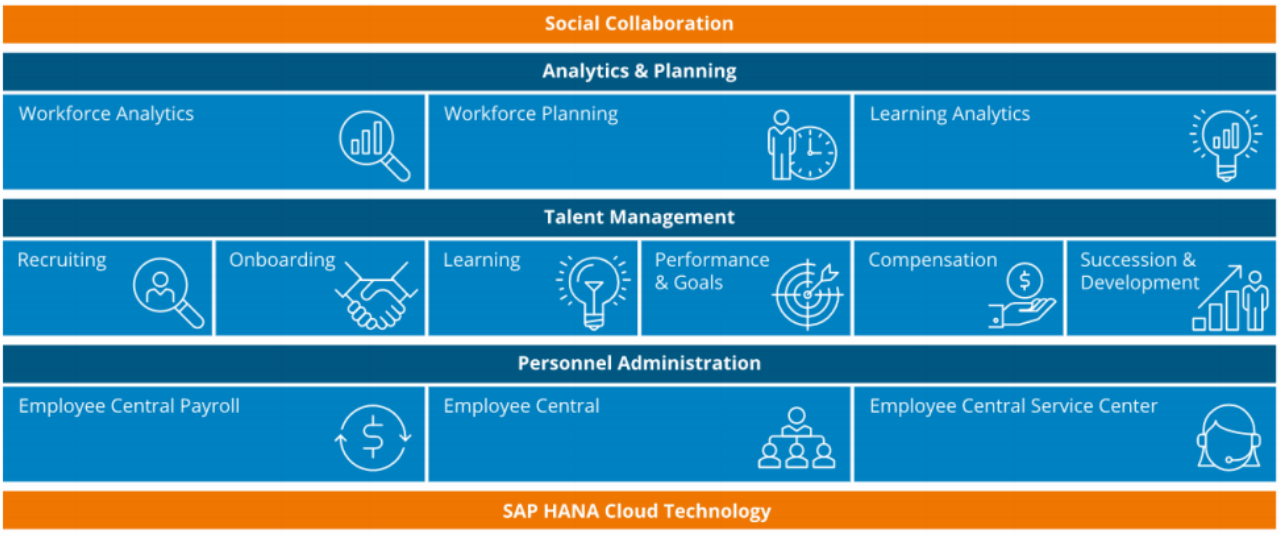


FIGURE 3.4 SAP SuccessFactors Modules[27]

3.2.1 SAP SF Key Features

SAP SuccessFactors is a SaaS solution, and the most important key feature of it is multi-tenant. Because of the multi-tenant architecture, all the users share the same core code base of the application, but they each have their own tenant of configuration. This differs from on-premise solutions, wherein each instance of the system requires different hardware, versions, and operating systems.
Having all users on the same code base has many advantages:

- Scheduled releases
  The SuccessFactors development team is constantly updating the software to improve performance and increase functionality. Users get regular, scheduled updates automatically (every quarter), instead of paying to upgrade their own on-premise software. Many of the

new features that are delivered must be proactively activated by the customer to be used (opt-in), so there are no ”nasty surprises” for customers.

- Latest version across all customers With the scheduled releases, all customers are up to date on the latest version all the time. This means that there are no more costly upgrades, creating different versions for different customers. It also means all customers get all bug fixes.

- No hardware, operating systems, or database licenses
  A single subscription licensing fee is paid to use SuccessFactors and includes all necessary costs for hardware, database, and support.

- Optimal hardware and software combination
  SuccessFactors resides on hardware that is optimized for its own software.

- Consistent performance and stability
  All customers use the same software and hardware, so the fast, stable, and secure experience is shared by all customers.

- More manageable and efficient support and maintenance
  SuccessFactors can easily support and maintain its software because it is standardized.

- Data mining and aggregation for analytical benchmarking
  Analytics can easily be pulled with maximum efficiency due to the standardization of software and hardware.

3.2.2 SAP SuccessFactors Modules

HRIS Modules

- **Employee Central**
  Responsible for master data administration and for mapping personnel administration, organizational management, absences; the basis for integration with an on-premise solution.

- **Recruiting**
  Supports a collaborative, objective and mobile selection process of hiring applications and easy the selection process.

HCM modules

All the above modules in addition to:

- **Performance and Goals**
  Controls target agreements and monitors target achievement for performance evaluation.

- **Compensation**
  Maps all compensation processes, the central element is a compensation profile including salary history and positioning.

- **Onboarding**
  Configurable onboarding process involving new employees, hiring managers and onboarding staff.

- **Learning**
  Learning platform that is linked to numerous other modules (e.g., goal management and onboarding).

- **Succession Development**
  Continuous performance management. It sustains a competitive advantage by developing an all-in workforce with strategy and goal alignment, performance improvement, and recognition of top talents.

- **Workforce Analytics** Integrate data from multiple systems (core HR, talent, engagement, financials, and so on) to see how investments in people impact business results. Then makes this workforce analytics simple and accessible for HR professionals, analysts, and business partners.

HRMS modules

It contains all HRIS and HCM modules in addition to:

- **Employee Central Payroll**
  Integrate the global payroll processes to help ensure that the workforce is paid accurately and on time. SAP SuccessFactors Employee Central Payroll solution helps automate and accelerate processing, reduce risk, and simplify payroll management.

- **Time Tracking**
  Modern self-service time and attendance tracking. It enables the employees to record their working time quickly and easily, knowing they will be paid correctly, and provide the managers with an overview of labor costs.

3.2.3 SAP SuccessFactors Technology

Database Layer

SAP SuccessFactors houses all the customer's data in SAP HANA database. Because it is a multi-tenant Software-as-a-Service (SaaS), customers share infrastructure, web servers, database instances, and the application itself. However, each customer has their own partition in the database, along with the customer-specific database schema. They also have their own configuration of the software ("tenant"). This allows for high flexibility and the export of any customer

data from the database at any time with no effect on any other customer. Because the database partition is separated from other customer data and linked specifically to the customer's tenant, data cannot be accessed from any place except the customer's instance of SAP SuccessFactors. This also means that configuration in one customer tenant does not affect any other customer tenant running on the same instance of the software. Of course, sharing database space with another customer's sensitive HR data raises some obvious security concerns to those not familiar with the technical architecture of the database landscape.[27]

Application layer

Now, let us take a closer look at the application architecture itself. Figure shows a more in-depth overview of the SuccessFactors components within the application engine.

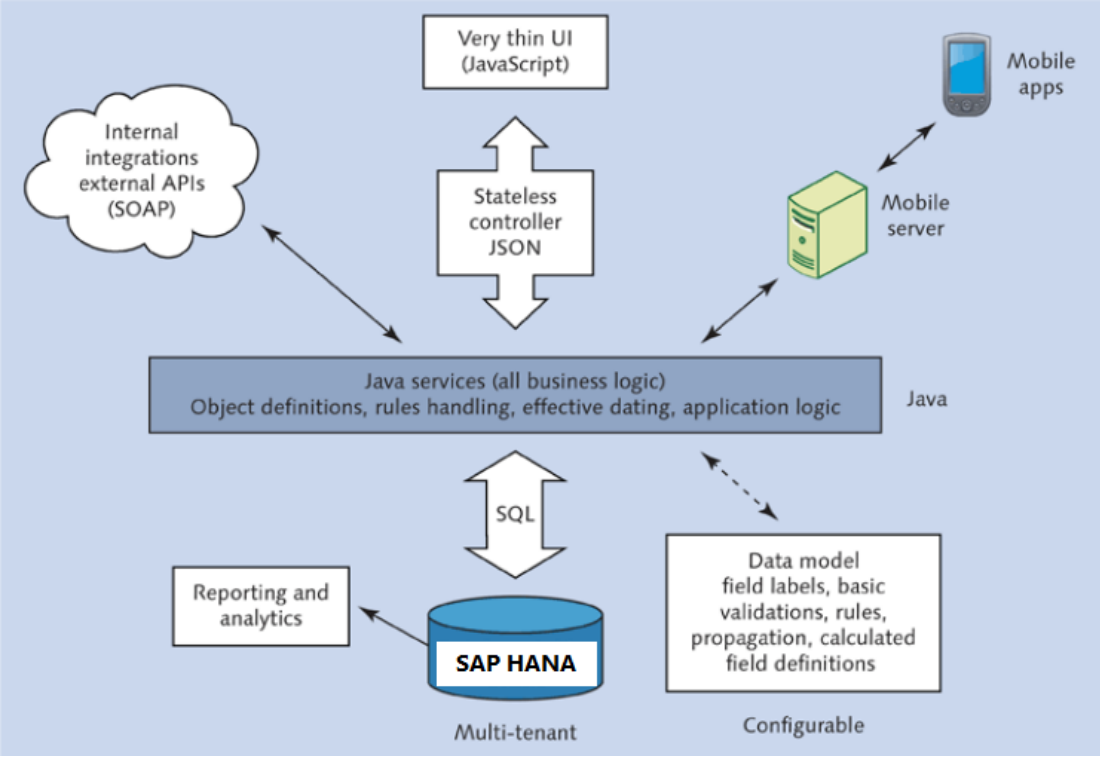


FIGURE 3.5 SAP SuccessFactors Application Layer Architecture [27]

The applications are written in the Java programming language using Java Platform Enterprise Edition (J2EE) specifications, so they conform to a standard set of programming logic. The Java application uses JavaScript Object Notation (JSON) to send the data to the client or end user. With JSON, the web page that the user sees are dynamically created and rendered using JavaScript. This makes it a very lightweight application on the client side and allows for a dynamic display of data. This also lets the application perform many of the user-friendly animations that appear and gives great flexibility within the design of the user interface (UI). Because the JSON interchange allows for an efficient and powerful exchange of data from the Java application to the end user, SuccessFactors applications are stateless. Stateless application

design means that there are no static HTML pages being called from the server. Each page is dynamically created and sent securely to the end user. This allows for complete flexibility and lightweight application design. Also, within this layer are the API's and connectors to other web services (e.g., Recruiting Management can connect to Job Boards), mobile application services, and all the logic that drives the entire application. [27]

Communication Layer

The communication layer transports the data for the application to the web browser for rendering and communications data calls to and from the Data Center. This is important from an architectural perspective because this layer is sending sensitive application and personal HR information across the Internet. As a result, SuccessFactors has implemented well-known standards for data transfer, including Secure Shell (SSH), VeriSign-certified Secure Sockets Layer (SSL)/Transport Layer Security (TLS), and Secure File Transfer Protocol (SFTP).[27]

3.2.4 SAP SuccessFactors Configuration and Enhancement

Metadata Framework (MDF)

The Metadata Framework (MDF) is a framework for creating, modifying, and maintaining objects, screens, and business rules within the SuccessFactors system. The MDF consists of a framework that uses metadata to allow easy creation and maintenance of objects using a generic set of components that are reused by all objects. Functionality such as Time Off, Job Profile Builder, and Position Management are built on MDF. The objects created in the MDF are called Generic Objects; they can be new objects, new screens for existing objects, new rules, or new fields-for example, a job classification or a work center. A screen and a set of rules could also be configured through the MDF-for example, to support administration of the company car plan. Generic Objects are easily configurable through the OneAdmin interface without programming or editing XML files. Each object within SAP SuccessFactors is made up of several components, including an API, Controller, UI, Workflow implementation, Database table, set of Java Services, and reporting integration. SuccessFactors is reduced significantly through this framework. The objects created in the MDF are also automatically exposed via the OData APIs, so they can be integrated with other systems, such as SAP ERP HCM. As a result, data can be transferred to or from Generic Objects. Import templates for new objects are automatically generated.
Generic Object definitions are created in OneAdmin, in CONFIGURE OBJECT DEFINITIONS under COMPANY SETTINGS by selecting OBJECT DEFINITION in the CREATE NEW dropdown. [27]

OData API

The Open Data Protocol (OData) is a standardized protocol for creating and consuming data APIs.OData builds on core protocols like HTTP, and commonly accepted methodologies like REST. The result is a uniform way to expose full-featured data APIs. OData provides both a

standard for how to represent your data and a metadata method to describe the structure of your data, and the operations available in your API. [27]

Extensible Markup Language (XML)

XML is used to represent data structured in separate ways. This makes it extremely useful for communications between different applications and for the integration of data from different applications.
XML data comprises metadata (markups) in the form of tags and the actual data in the form of elements. XML does not specify a fixed set of tags.
In XML 1.0 format, tags are wrapped in pointy brackets and always appear in pairs, with $< tag >$ marking the start of an element and $< tag >$ the end of an element.
$< tag >$
...
$< /tag >$

A short way of writing an empty element $< tag >< /tag >$ is $< tag/ >$
Elements can be nested inside other elements to any depth. A sub-element can be specified more than once within an element.

$< tag >$
$< tag1 >$
$< tag2 >$
...
$< /tag2 >$
$< /tag1 >$
$< tag1 >$
...
$< /tag1 >$
...
$< /tag >$
Valid XML data contains exactly one root element, in which all other elements are nested.
Alongside sub-elements, attributes are allowed. These are defined in the opening tag of an element:
$< tagattribute = "..." >$
The attributes of an element are specified as name-value pairs using the equals sign = before the closing bracket and do not themselves contain markups. Attributes can be delimited using double quotation marks, ", and single quotation marks, '. An attribute can only be specified once within an element. The order in which the attributes are specified is not important.
To stop naming conflicts occurring when XML data from various sources is processed, tags can be given namespaces. Special xmlns attributes are used to declare namespaces. A uniform resource identifier (URI) is attached to a namespace prefix ns.
$< ...xmlns : ns = "..." >$
Prefixing a tag or attribute with a namespace prefix "ns" separated by a colon: gives the tag or

element a qualified name:
$< tagxmlns : ns = "..." >$
$< ns : tagns : attribute = "..." >$
...
$< /ns : tag >$
...
$< /tag >$
A namespace prefix must be defined in the same document before it is used.
For SAP SuccessFactors we can configure different entities and data objects using XML. We can see the following example in the configuration of Employee Central.

```
<hris-element id="personInfo">
  <hris-field max-length="32" id="person-id-external" visibility="both">
    <label>Person Id</label>
    <label xml:lang="ko-KR">개인 ID</label>
    <label xml:lang="fr-CA">ID de personne</label>
    <label xml:lang="es-ES">ID de persona</label>
  </hris-field>
  <hris-field id="date-of-birth" visibility="both" required="true">
    <label>Date Of Birth</label>
    <label xml:lang="ko-KR">생년월일</label>
    <label xml:lang="fr-CA">Date de naissance</label>
    <label xml:lang="es-ES">Fecha de nacimiento</label>
  </hris-field>
  <hris-field max-length="128" id="birth-name" visibility="both">
    <label>Birth Name</label>
  </hris-field>
  <hris-field max-length="100" id="country-of-birth" visibility="both">
    <label>Country Of Birth</label>
    <label xml:lang="ko-KR">출생 국가</label>
    <label xml:lang="fr-CA">Pays de naissance</label>
    <label xml:lang="es-ES">País de nacimiento</label>
  </hris-field>
  <hris-field max-length="100" id="place-of-birth" visibility="both"
    <label>City Of Birth</label>
  </hris-field>
  <hris-field id="date-of-death" visibility="none">
    <label> Date of Death </label>
    <label xml:lang="ko-KR"> 사망일 </label>
    <label xml:lang="fr-CA"> Date du décès</label>
    <label xml:lang="es-ES"> Fecha de defunción</label>
  </hris-field>
</hris-element>
```

Succession Data Model

Personal Information Portlet

FIGURE 3.6 XML element representation in SAP SF Application

3.3 Core HYBRID Solution

The best software to be used so far regarding the pre-implementation and post-implementation cost and easiness of implementation is the Cloud-Based solution SAP SuccessFactors, but unfortunately the company cannot depend 100% on a cloud software for some legal and security constraint like the payroll information is legally forbidden to be on cloud. For that reason, we must keep the payroll modules and time management on premise.
SAP has a solution for such cases which is SAP SF Core Hybrid. The latest is an integration between SAP SF and SAP HCM. This integration is an interconnexion between the two solutions

using SAP Cloud Platform Integration. The core HRIS is the core module of SAP SF Employee Central (EC) where all the employee data and organizational data is registered and maintained at this level. SAP SF EC then is connected to all SAP SF modules and integrated with SAP HCM for the management of the Payroll and Time Attendance. We can show the diagram and the connection of all these modules all together .

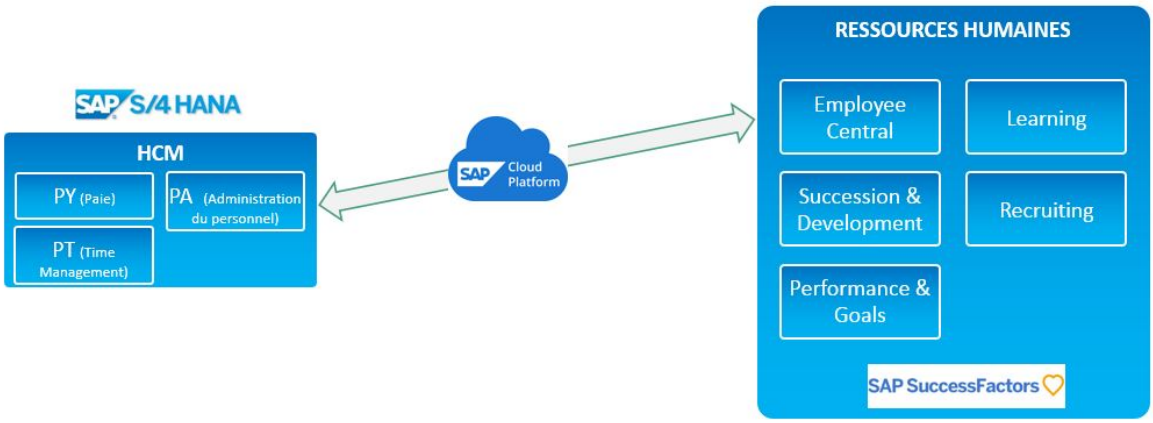


FIGURE 3.7 Selected Module for HR in AQS company

So, our HRMS is designed for the Employee Central to be the main HR Core where all the personnel information and organizational assignment are stored in it evermore SAP SF EC provides self-service for all the employees and their manager to manage the different old processes which were done manually and using the paperwork workflow. SAP SF EC is connected internally to other SAP SF modules to share all the employee data which are respectively Learning, Performance Goals, Recruiting, and Succession Development.
After defining all the software and their technologies it is time to start reporting our work for the implementation of this system. In this internship our role in the team was taking the technical part of the project. We have started working on the project in its Explore phase .
Designing the Process Diagram where we draw a chart which briefly describes the process of each HR function in order to configure it in the system. Also, our role was following the best configuration of the integration between SAP SF EC to our SAP S/4 Hana system to replicate all the employee and organizational data from Employee Central to SAP HCM. In The following section we will present the configuration required in the two systems and the middleware platform SAP Cloud Platform Integration.

3.4 Process Diagrams

Designing process diagrams is a key step in the implementation of any SAP modules to translate all the workbooks and business blue print (BBP) rules and functional process description. SAP has specified a way to design this diagram where all the processes defined by the business functional users are translated into schematic diagram including all the activities, actions, events.

First, we describe the package of symbols used in our design each one with its description and meaning in the diagram.

- Simple activity:

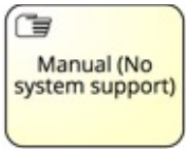
which is a task in the process

- Collapsed sub process:

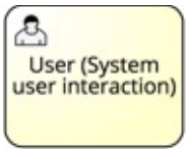
When an activity is modeled in a separate process diagram

- Activity with assigned type:

Manual and activities not supported by the system



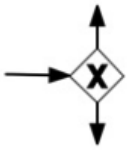
Activities that need user interaction



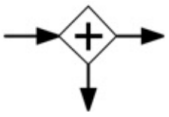
Fully Automated Activities and actions

- Gateways:

XOR Gateway executes only one condition to trigger output flow



OR Gateway activates all outgoing flows, and the junction awaits all incoming flows before the process flow can continue



- Events:

Start event

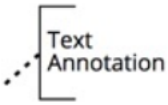
Intermediate event

End event 

Timer Event started or continued at a certain point in time or after a certain time span 

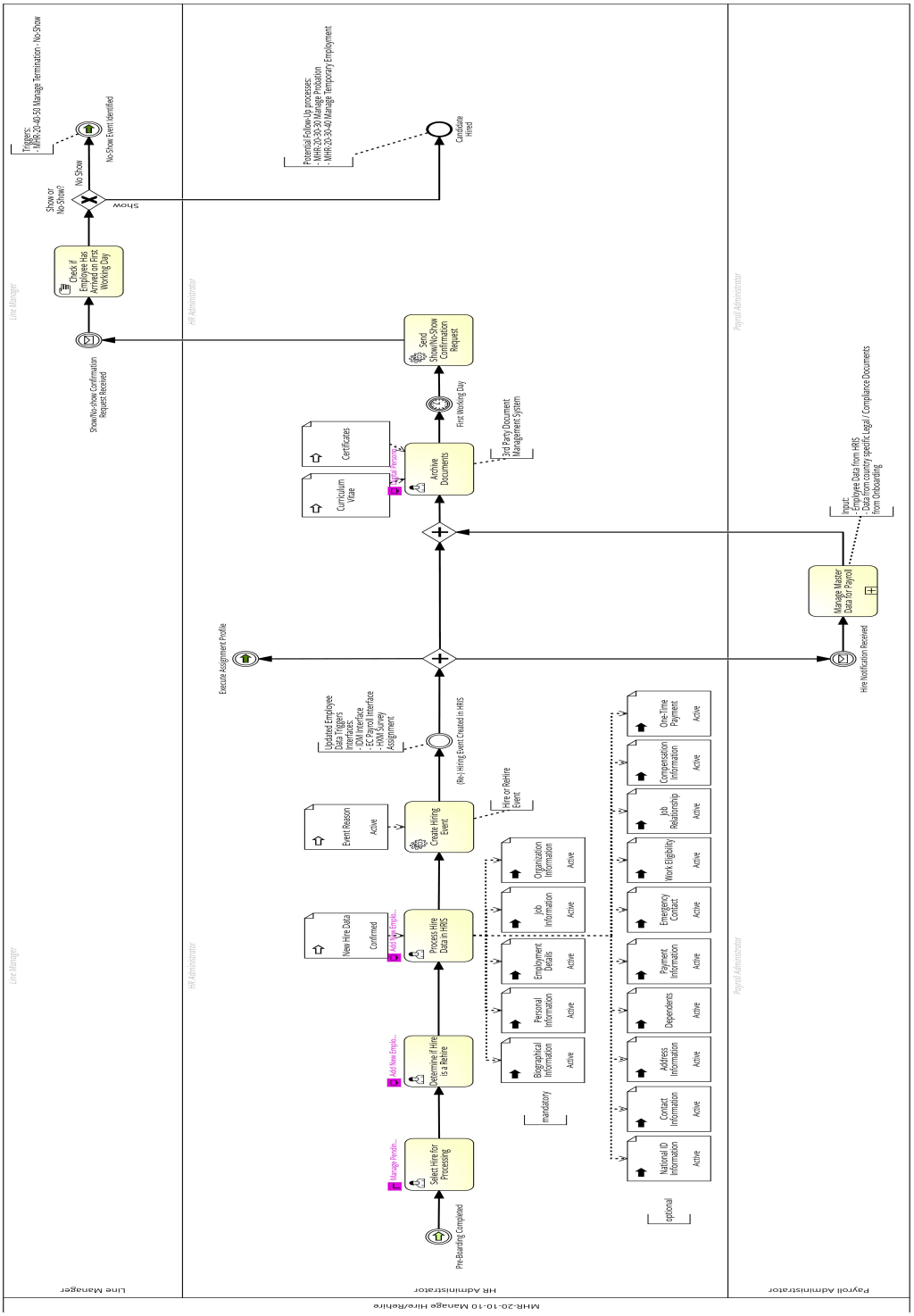
Message event started or continued when a message is received 

- Text Annotation:

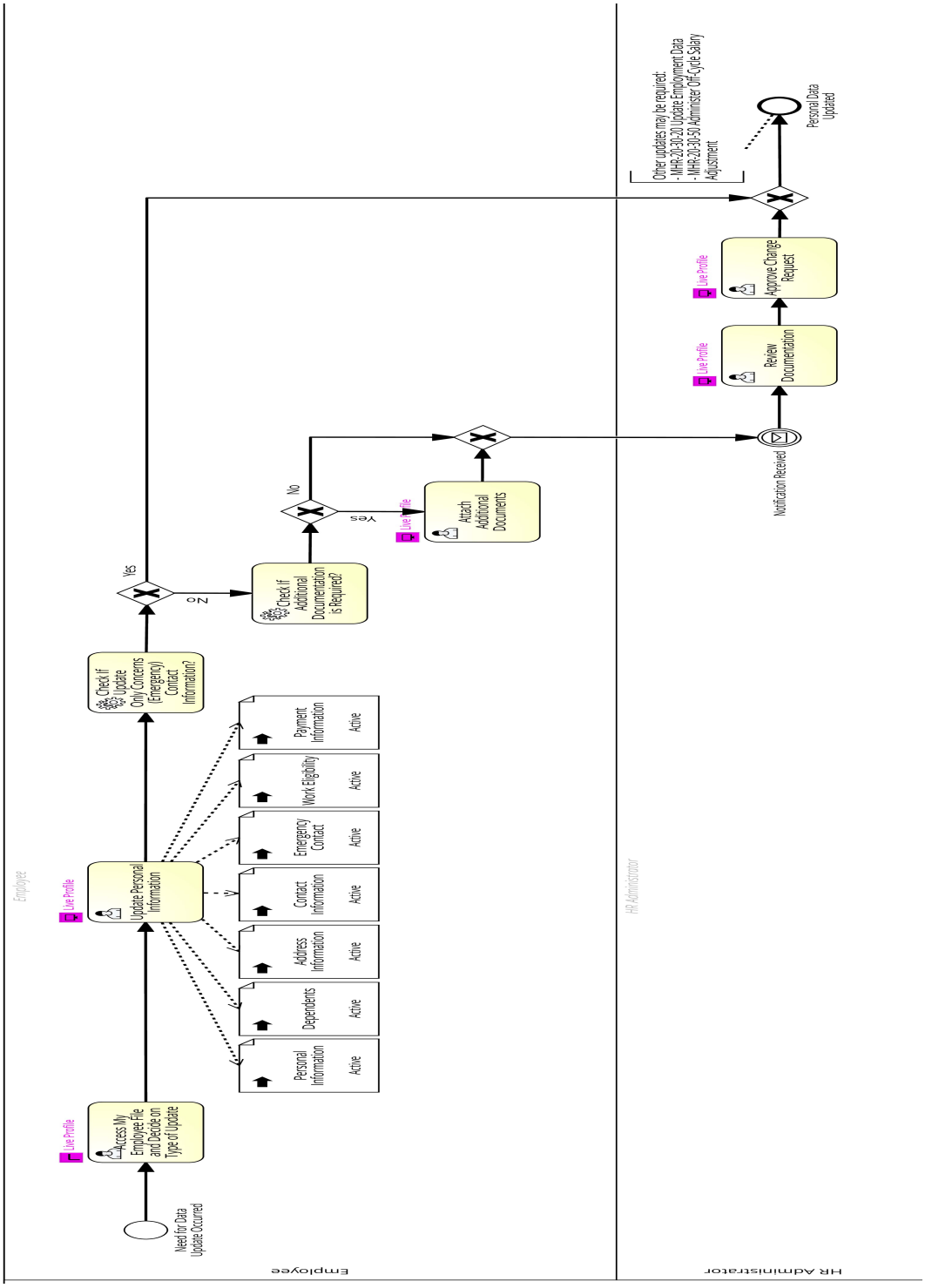
Used to provide additional context to an element in the process diagram 

Rather than introducing all the details, in the next section we are going to shed light on the most important processes that we have dealt with during our internship. That are Employee Central, Learning, Succession Development.

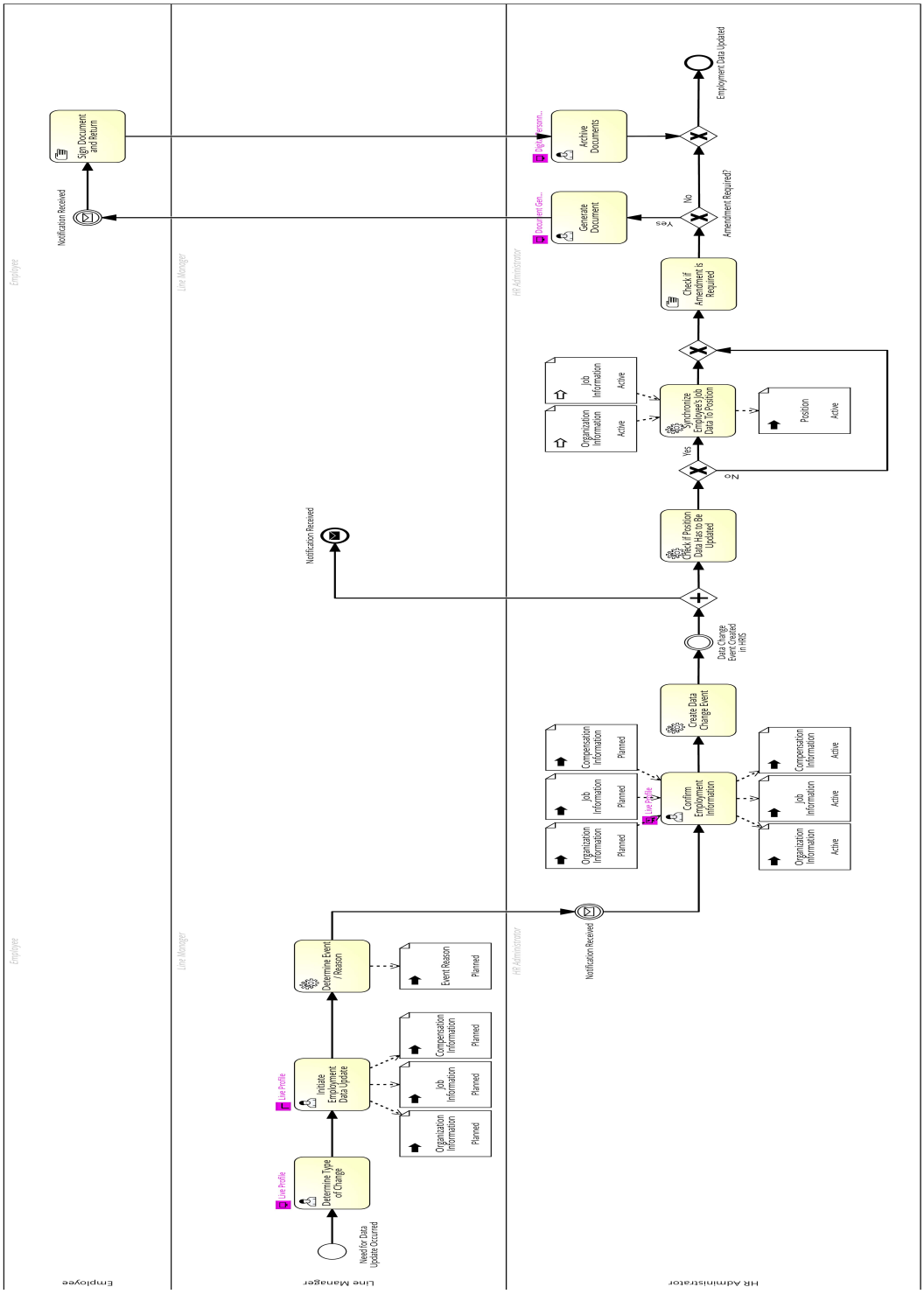
Employee Central



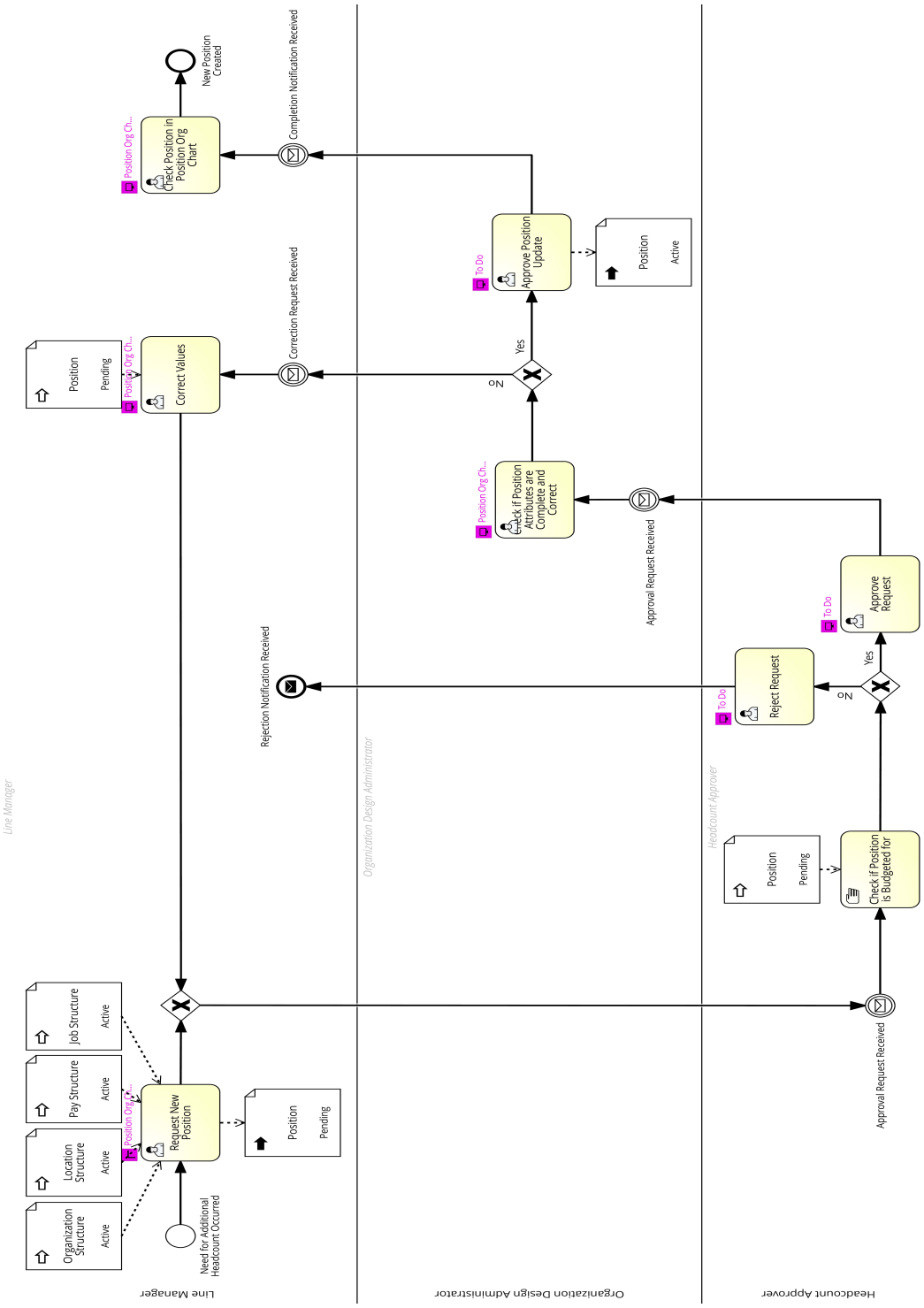
Hire and Rehire employee process



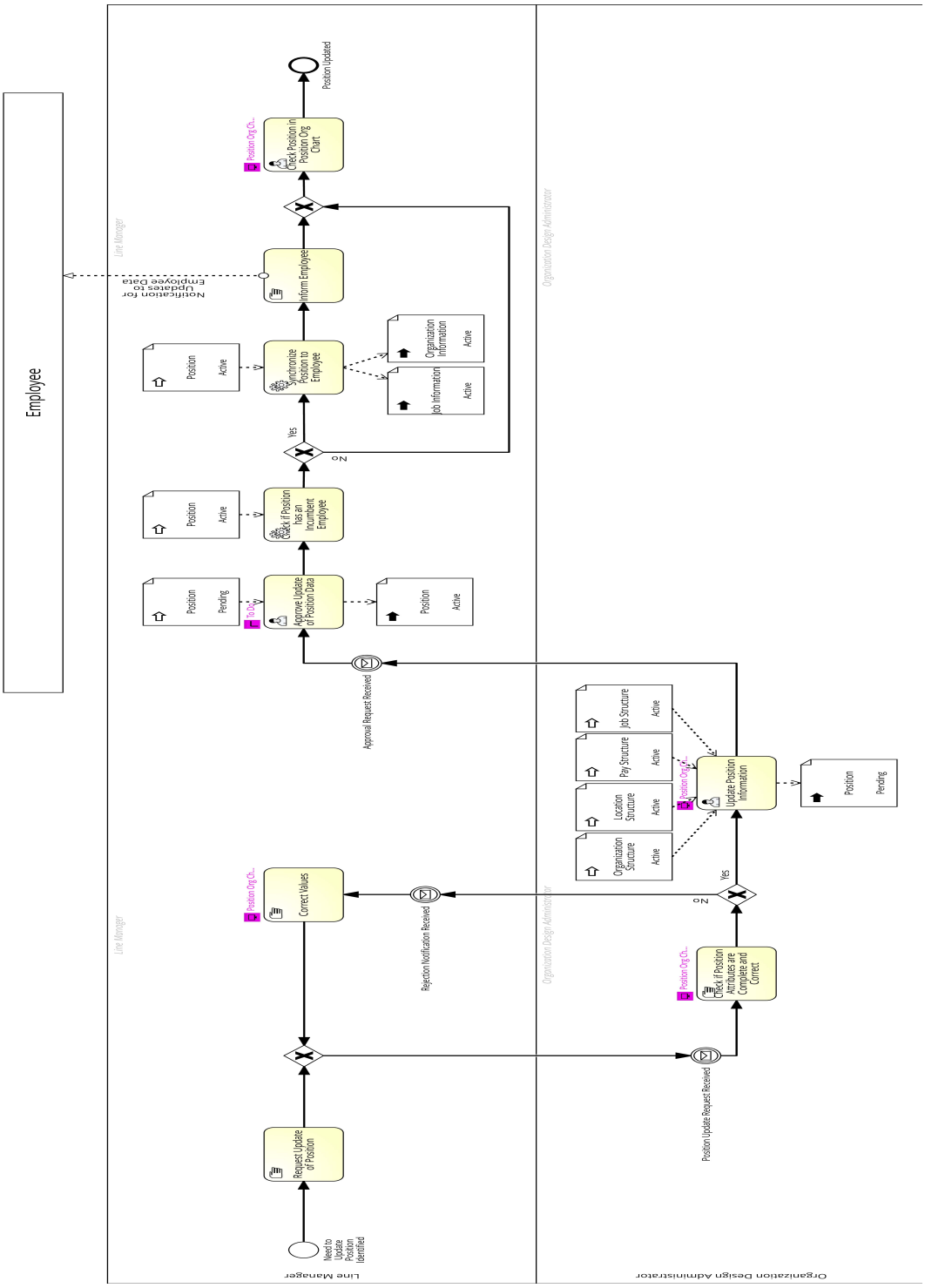
Update Employee Data



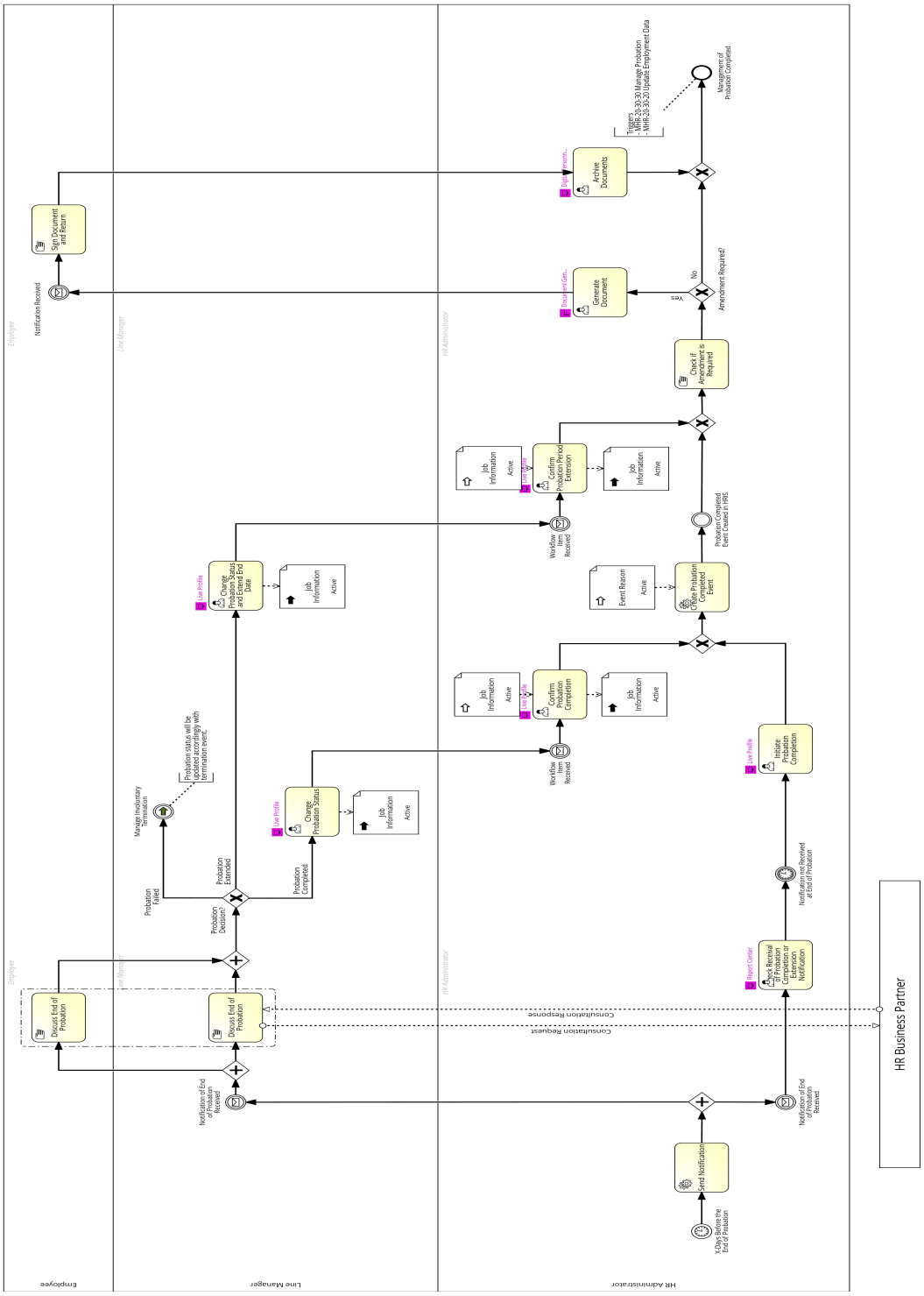
Update Employment Data



Create New Position

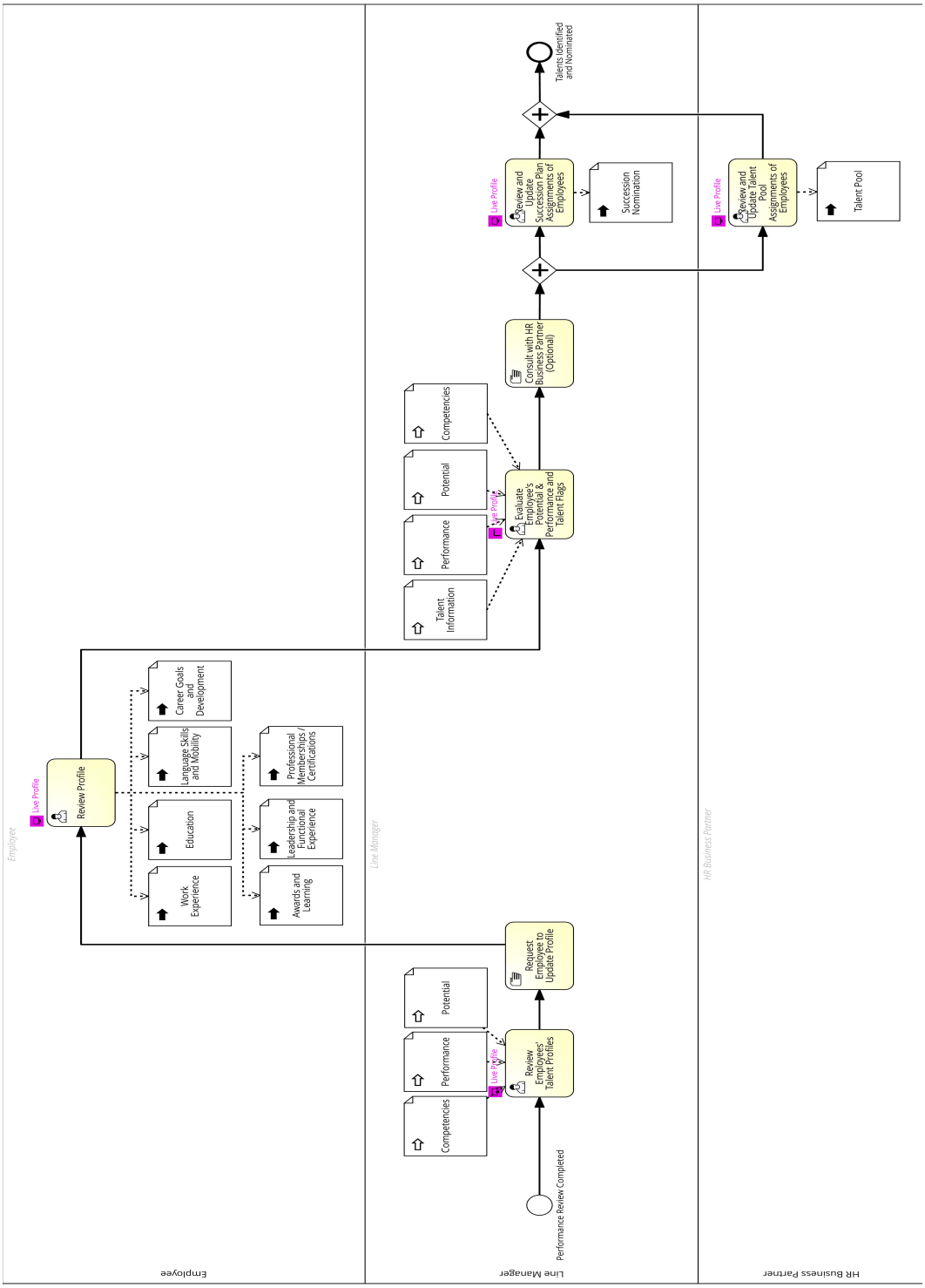


Update Position

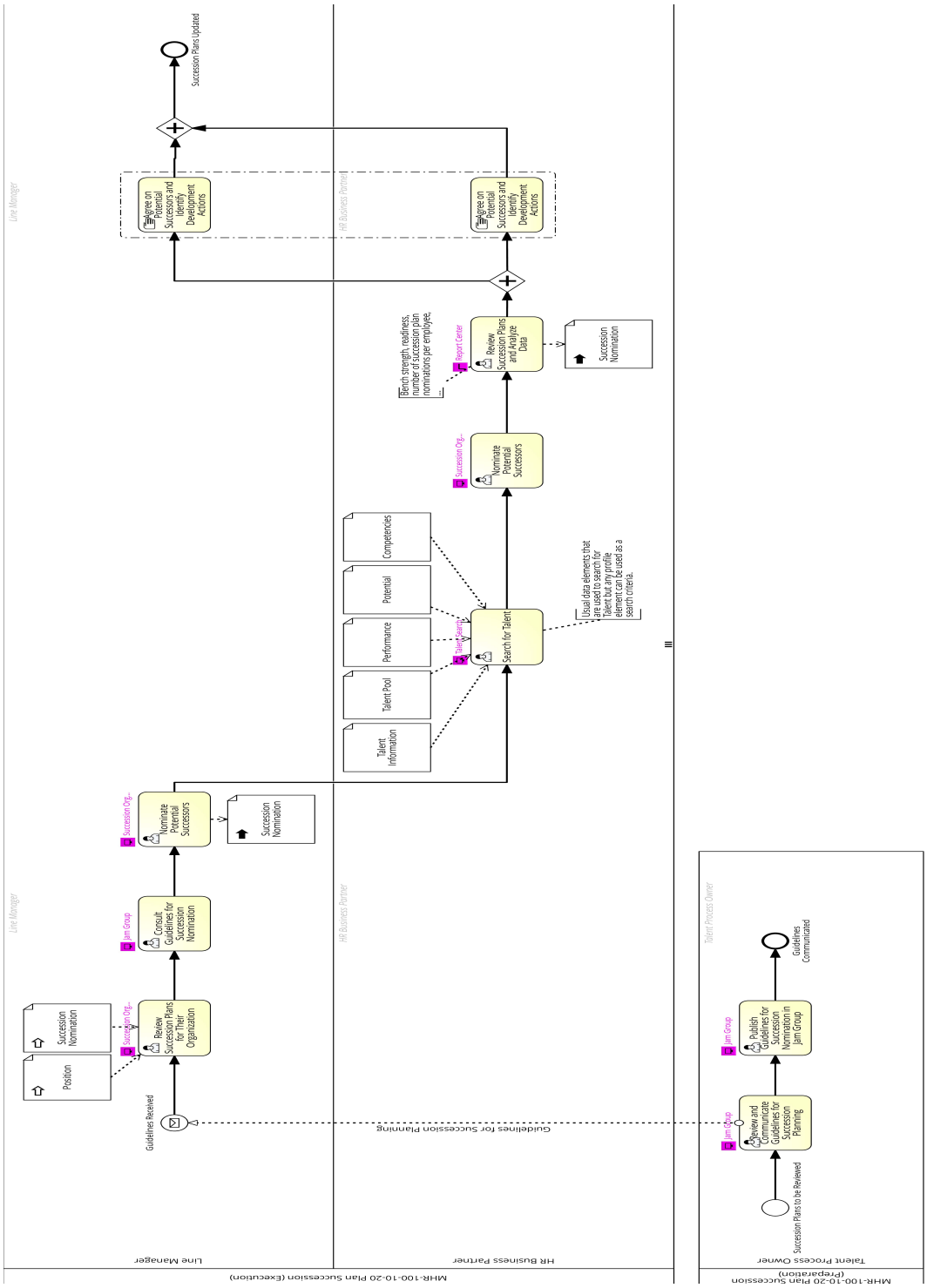


Manage Probation

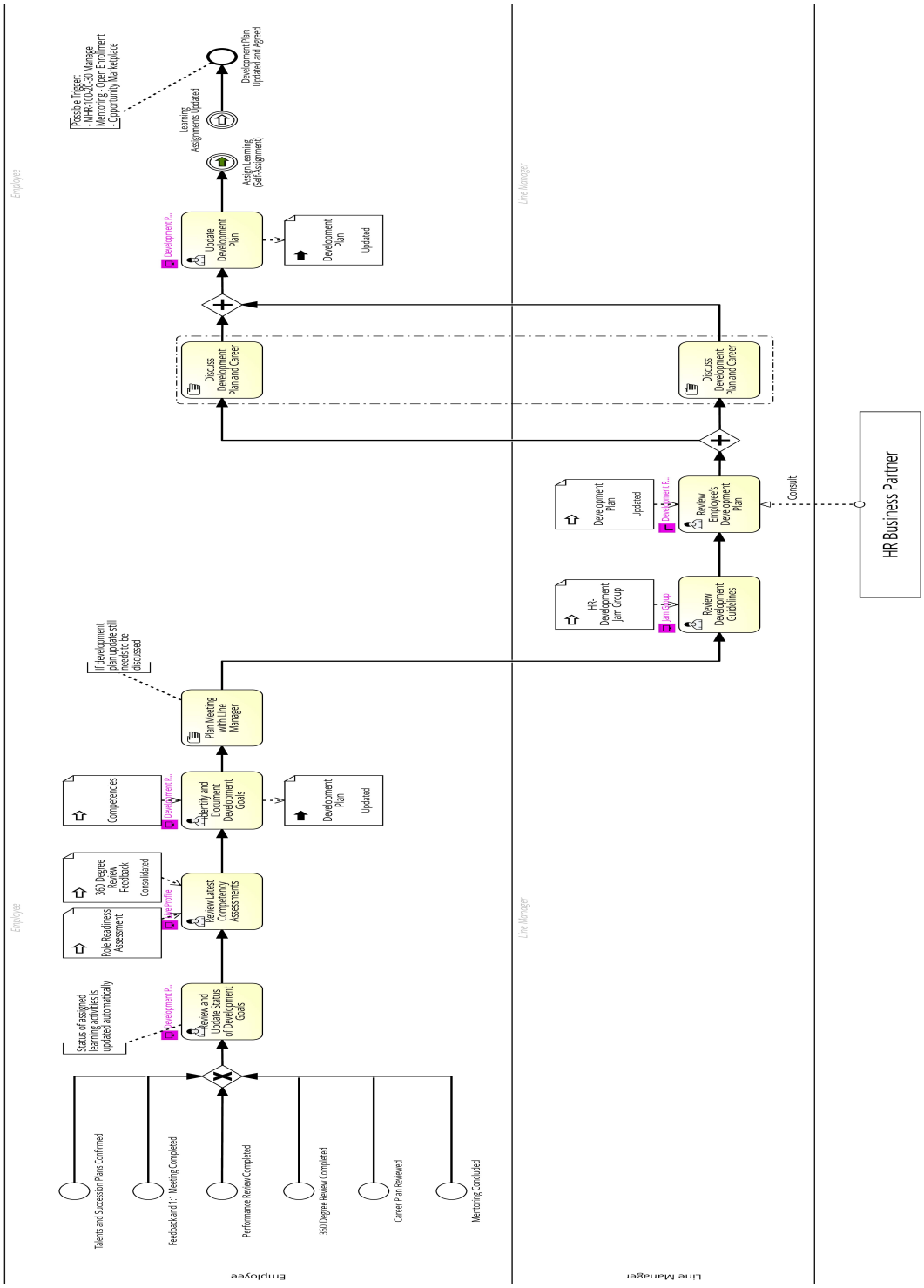
Succession & Development



Identify and nominate talents

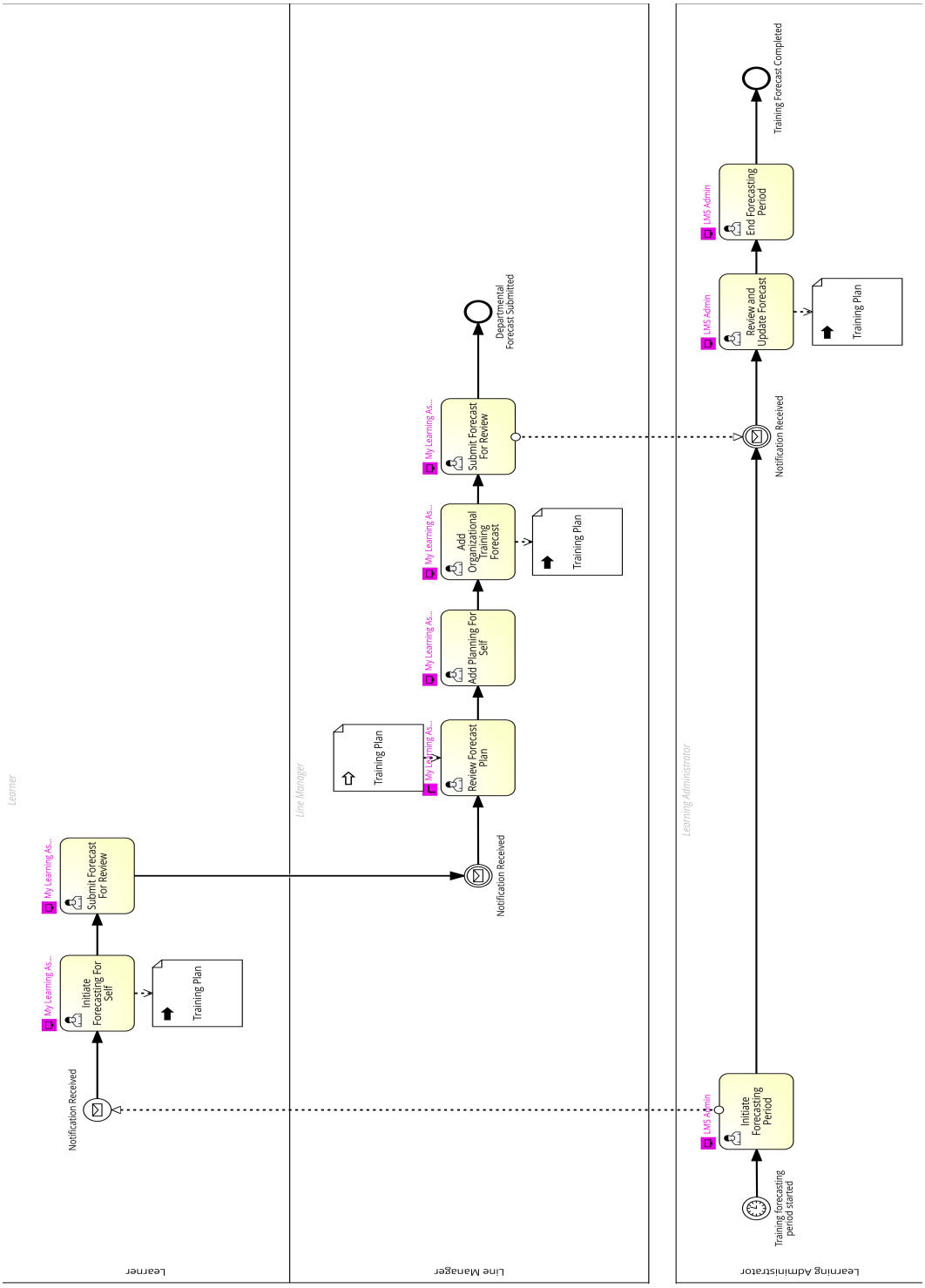


Plan succession

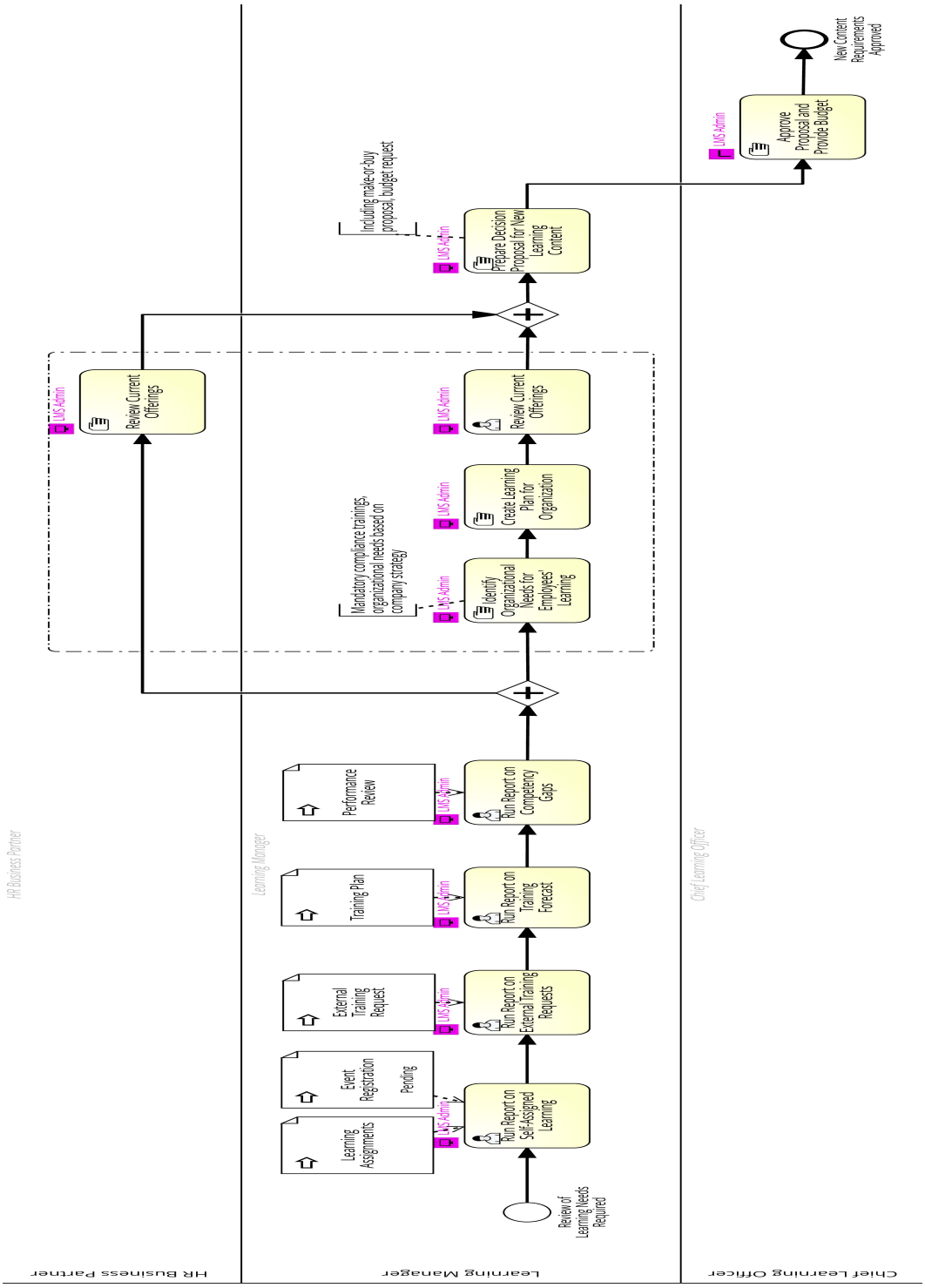


Plan Developpement

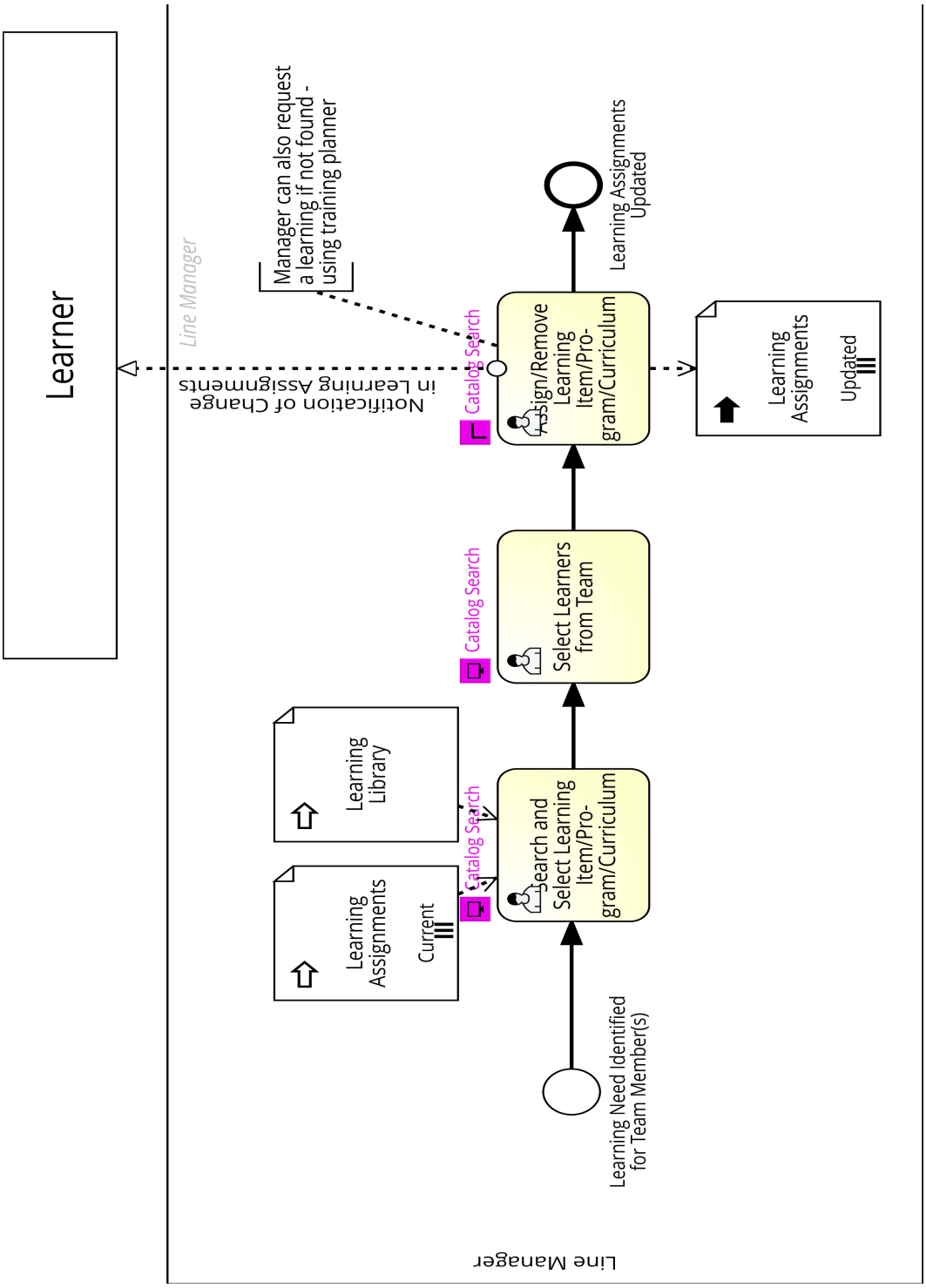
Learning



Managing Training Forecast



Analyze Training Needs



Manager Assign learning to his team members

3.5 Integration of SAP SF Employee Central with SAP ERP and SAP Cloud Platform Integration (SCPI)

The employee master data and employee organizational assignment synchronization process begins with the on-premise SAP HCM system triggering an employee data extraction request to EC to pull its employee data objects such as persons, personal information, employment information, job information, pay compensation, etc. This set of data is then transferred into our on-premise SAP HCM system's employee master data in Personnel Administration (PA) infotypes and employee organizational assignment data in Organizational Management (OM) infotypes if Personnel Administration (PA)-Personnel Development (PD) integration is enabled. This integration synchronizes OM data such as position, organizational unit, and cost center with employee data in PA. If Personnel Administration (PA)-Personnel Development (PD) integration is enabled. This integration synchronizes OM data such as position, organizational unit, and cost center with employee data in PA.
In the figure below in our on-premise SAP HCM system, the data replication process uses SOAP web services for employee and organizational assignment data extraction, while initiating a preconfigured employee data selection query to the EC Compound Employee API request via SCPI. Based on this, the Compound Employee API will send a response with Employee Central data records to our on-premise SAP HCM system. The extracted compound employee data is then processed by employee- and organizational assignment-relevant subprocesses. First, the employee data subprocess is processed immediately using the SAP Business Integration Builder (BIB) for updating personnel administration infotypes while the employee organizational assignment data is kept in a staging area. The subsequent process is triggered via events immediately and can be scheduled in the background to run periodically to post organizational assignment data from the staging area into the OM module.

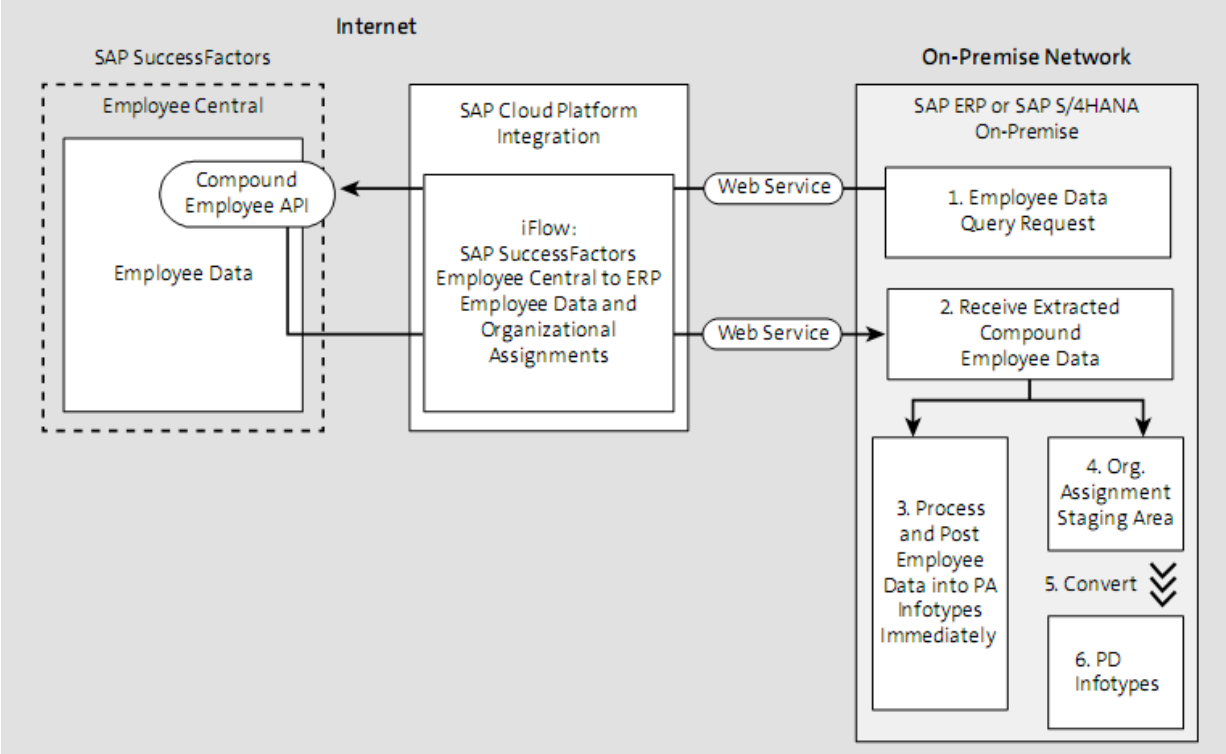


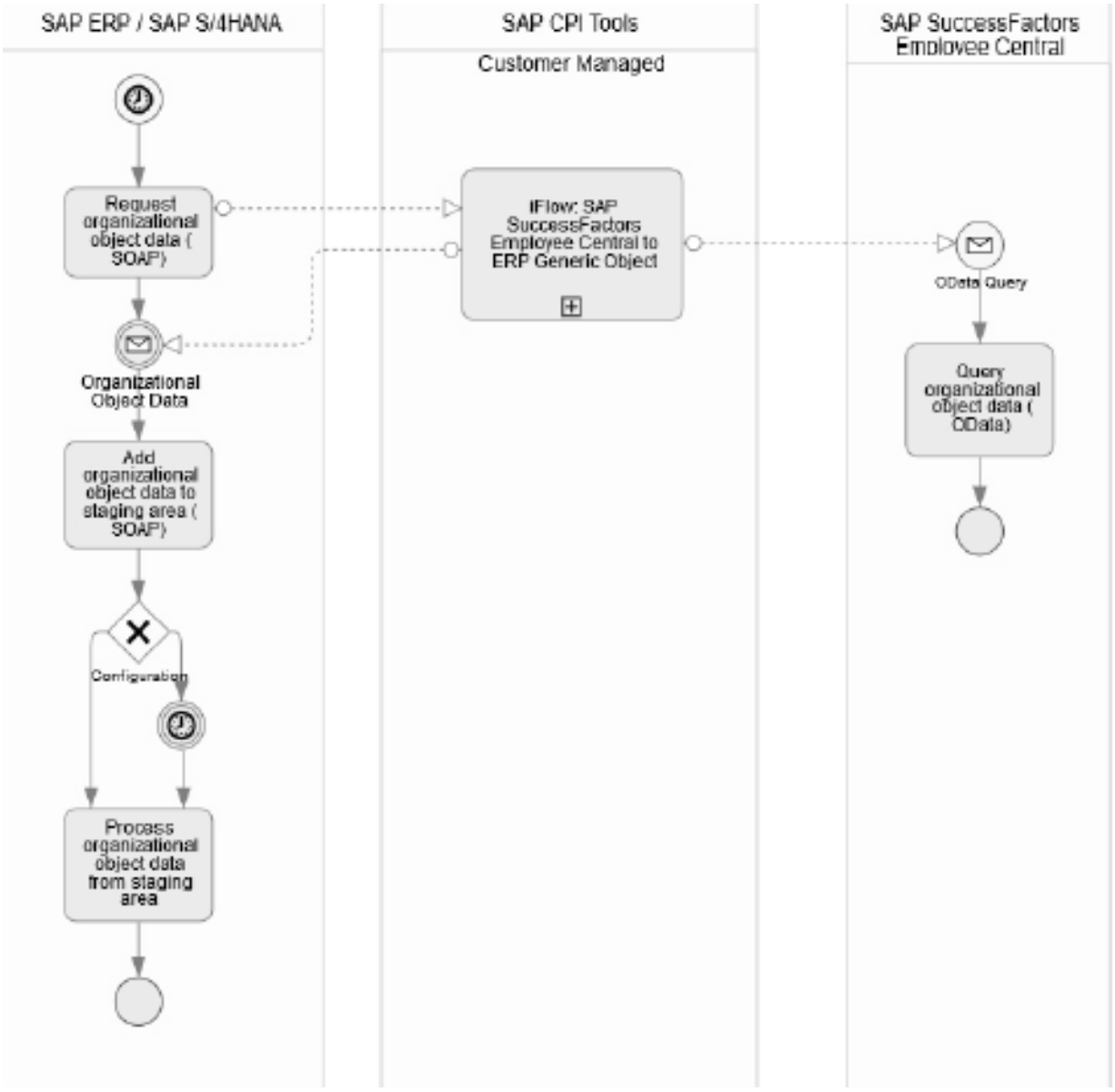
FIGURE 3.8 SAP SF and HCM for S/4 Hana On-Premise Integration Architecture

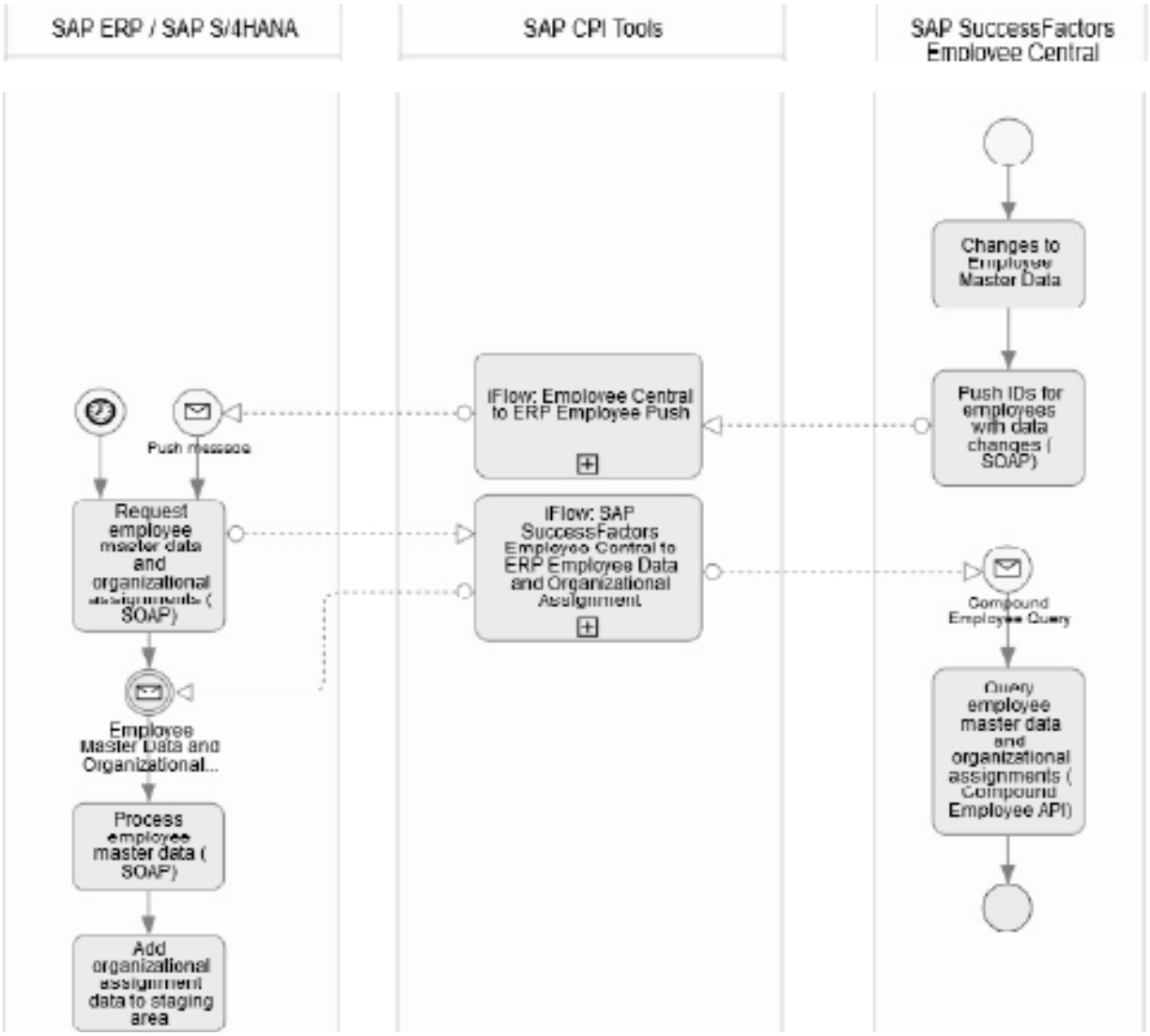
To get the employee data and organizational assignment integration up and running with minimal configuration effort, refer to the following high-level task list:

1. The configuration of Employee Central, such as enabling the OData API and configuring user with RBPs.

2. The configuration and deployment of the SAP Cloud Platform Integration prepackaged employee data and organizational assignment iFlow.

Other SAP S/4HANA configuration activities include activating SOA Manager-related web services, configuring the Employee Central to SAP S/4HANA infotype field mapping using the BIB, and configuring background jobs.
We can summarize the process with the following flow diagram


SAP ERP / SAP S/4HANA
SAP CPI Tools
Customer Managed
SAP SuccessFactors Employee Central
Request organizational object data (SOAP)
IFlow: SAP SuccessFactors Employee Central to ERP Generic Object
OData Query
Organizational Object Data
Query organizational object data (OData)
Add organizational object data to staging area (SOAP)
Configuration
Process organizational object data from staging area


SAP ERP / SAP S/4HANA
SAP CPI Tools
SAP SuccessFactors Employee Central
Changes to Employee Master Data
Push IDs for employees with data changes (SOAP)
IFlow: Employee Central to ERP Employee Push
IFlow: SAP SuccessFactors Employee Central to ERP Employee Data and Organizational Assignment
Request employee master data and organizational assignments (SOAP)
Compound Employee Query
Query employee master data and organizational assignments (Compound Employee API)
Employee Master Data and Organizational...
Process employee master data (SOAP)
Add organizational assignment data to staging area

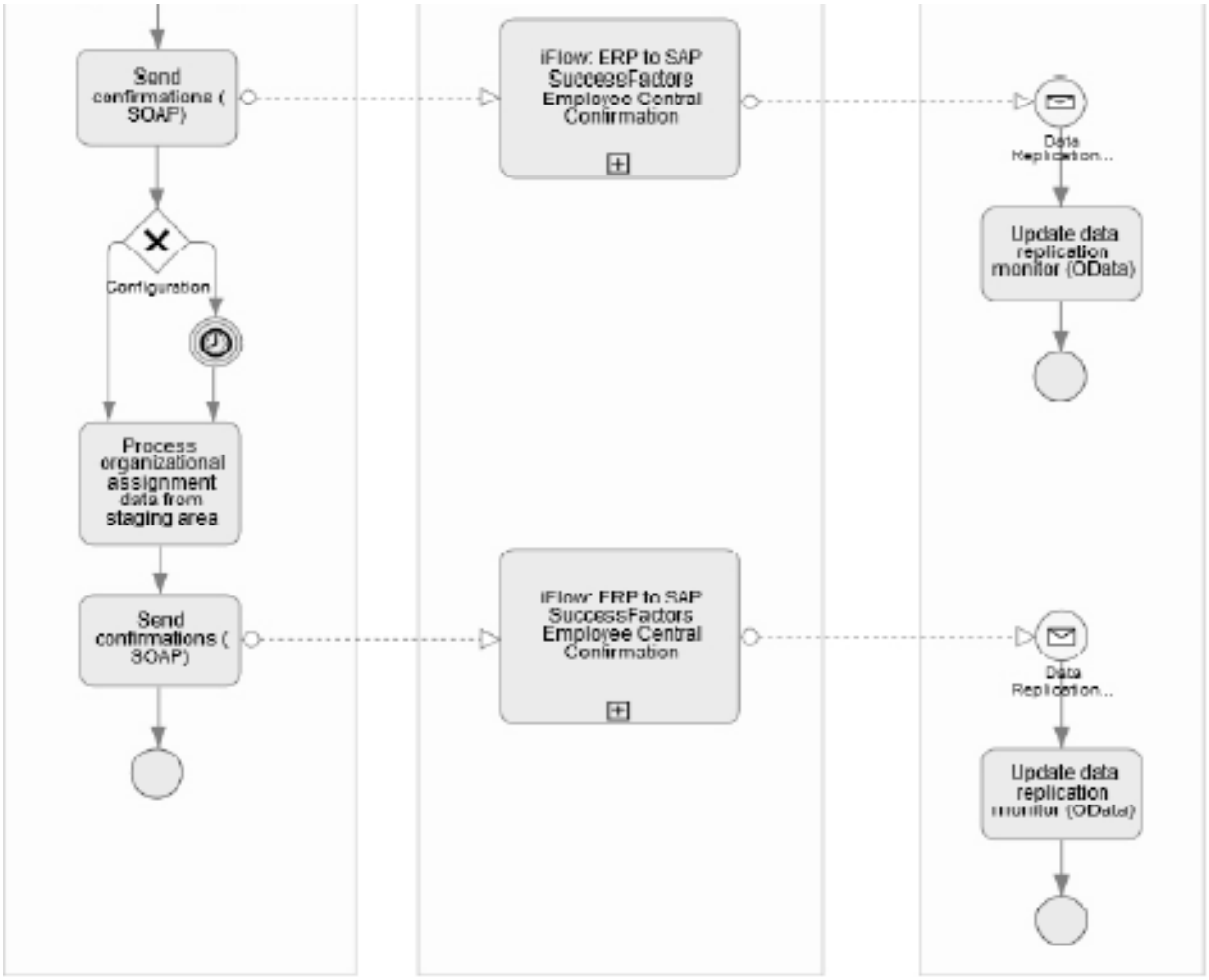


FIGURE 3.9 SAP SF and HCM for S/4 Hana On-Premise Integration Process Diagram

3.5.1 Configuring Employee Central

We start with the configuration and implementation of integration in Employee Central. We do the required configuration activities to prepare our Employee Central instance for integration with our on-premise SAP system via SAP Cloud Platform Integration. The integration activities primarily cover API-related tasks.
To allow an external party to integrate with an Employee Central system by consuming the built-in APIs, follow these steps:

1. Determine the correct SAP SuccessFactors API host name URL to be used by SAP Cloud Platform Integration. To get the correct SAP SuccessFactors API URLs that correspond to your Employee Central data center, refer to SAP Knowledge Base Article 2215682.

2. Set up the permission role for the API user. Log on to Employee Central and navigate to *AdminCenter* > *Tools* > *SetUserPermission* > *ManagePermissionRoles*. Click on *PermissionRole* SFAPI and click on the *Permission* button to change the Permission settings by selecting the checkbox for each permission, as shown in Figures below

Permission Group	Permission Category	Permissions
User permissions	General user permissions	■ SFAPI user login
Administrator permissions	Manage integration tools	■ Allow admin to access the OData API through basic authentication
Administrator permissions	Employee Central API	■ Employee Central Foundation SOAP API ■ Employee Central HRIS SOAP API ■ Employee Central Foundation OData API (read-only) ■ Employee Central HRIS OData API (read-only) ■ Employee Central Foundation OData API (editable) ■ Employee Central HRIS OData API (editable)

Table 3.1 Employee Central AdminCenter Managing PermissionRole

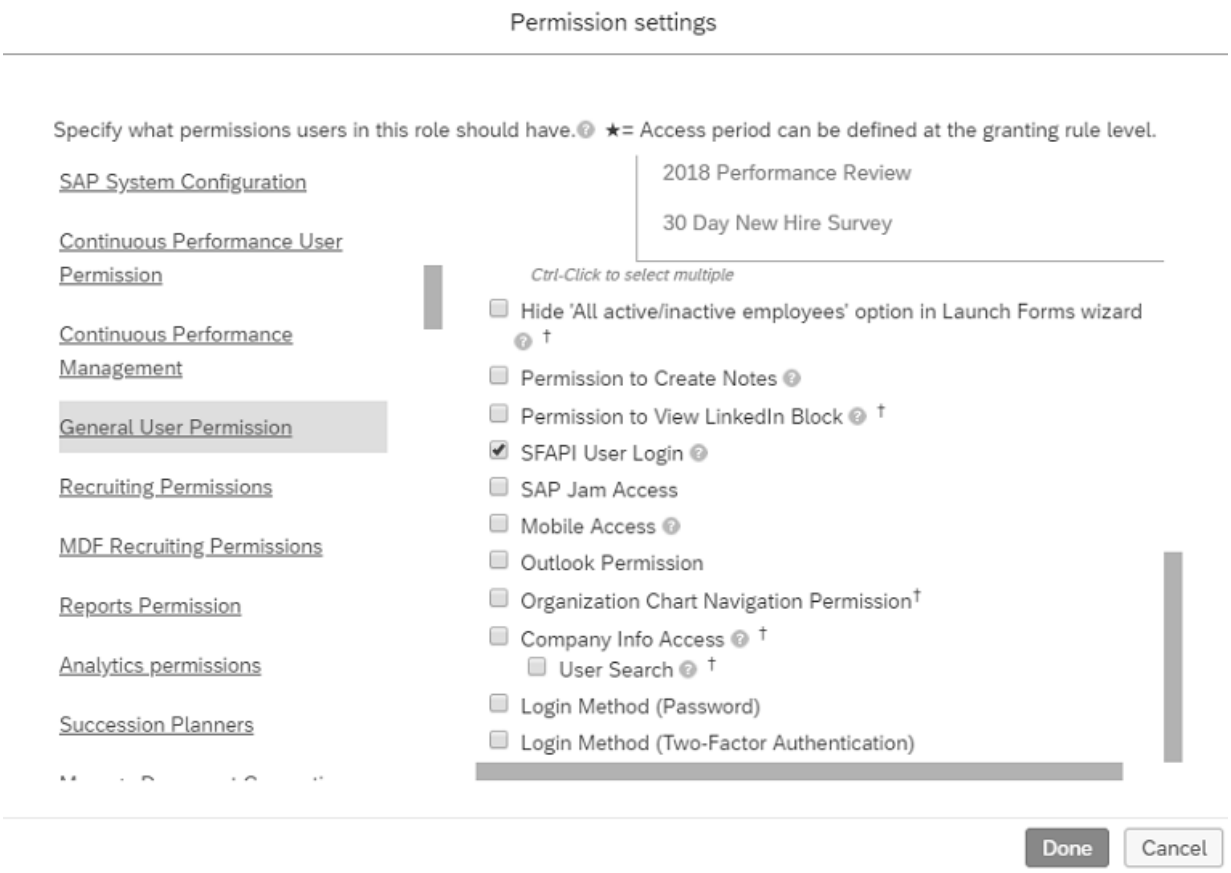


FIGURE 3.10 Employee Central AdminCenter General User Permission

Within the *PermissionGroup...* option of the *Grantthisroleto...* screen, assign the SFAPI user group and click the *Done* button to save your changes.

3.5.2 Configuring SAP Cloud Platform Integration

The required configuration steps in SAP Cloud Platform Integration for setting up integration of EC to our on-premise SAP HCM system. We will walk you through basic configuration activities.

Basic Configuration

We start using the standard, predelivery integration content in SAP Cloud Platform Integration. Once we find the required integration packages, we copy it to our Design workspace by clicking integration package tile and selecting Copy .

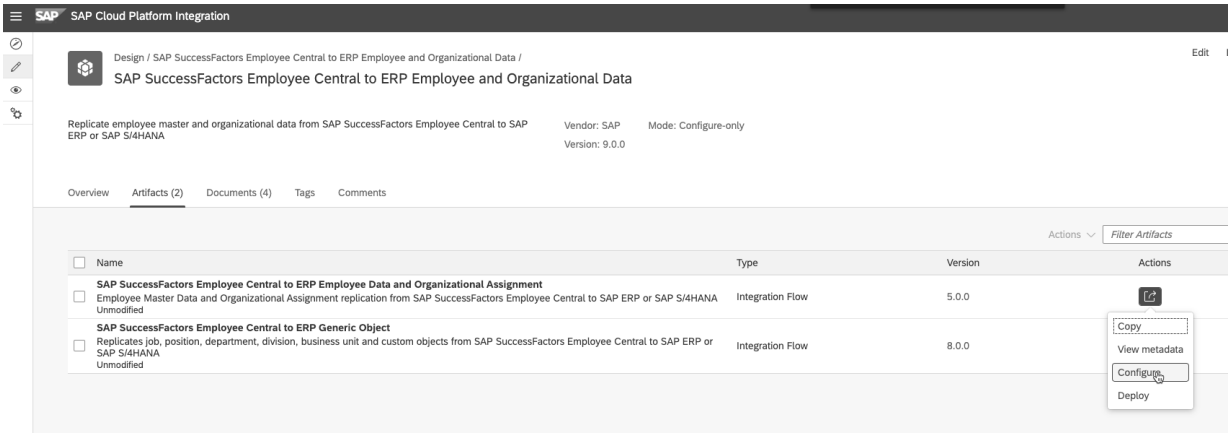


FIGURE 3.11 SCPI SAP SF EC To ERP Employee and Organizaional Data Package

After selecting and copying the right package to our case in the SCPI tenant specified to the company. Now, we should set up the connectivity authentications. There are two authentications that must be done, basic authentication and Client certificate authentication.
First, we configure basic authentication, from SAP Cloud Platform Integration to on-premise SAP system. To configure and deploy user credentials in SAP Cloud Platform Integration, it is necessary to use technical user credentials of our on-premise system. Navigate to the SAP Cloud Platform Integration Manage Security Material tool to configure and deploy user credentials, we go to the SAP Cloud Platform Integration Manage Security Material tool by navigating to $WebUI > Menu > Monitor > SecurityMaterial$. Click the Add button, select User Credentials, and set the following information in the Add User Credentials popup window, as shown in Figure:

- Name: Enter a name, for example, “ERP User”.
- Type: Select User Credentials.
- User: Enter user name.
- Password: Enter user password

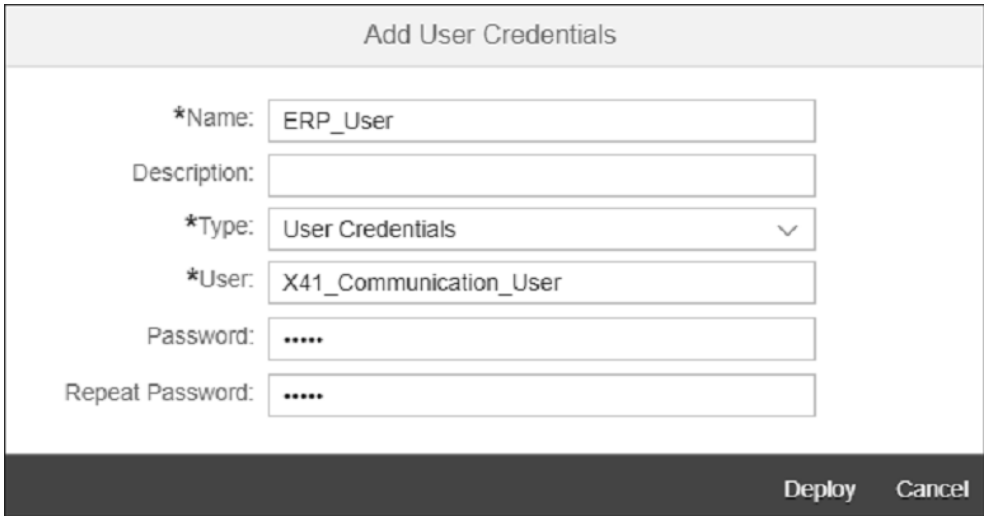


FIGURE 3.12 SCPI User Credential

Next, we configure our client certificate authentication from SCPI to our on-premise SAP system, import the SAP Cloud Platform Integration digital client certificate into Transaction STRUST in our on-premise SAP system. The digital client certificate can be obtained from SAP Cloud Platform Integration by following the menu path $WebUI > Menu > Monitor > SecurityMaterial > Keystore$. Click on the Action button of Alias sap cloud integration certificate and select Download Certificate

The last authentication to be done is to ensure communication between SCPI and SAP SF Employee Central .The SFAPI user must be configured before the SAP Cloud Platform Integration to Employee Central communication can be set up. When connecting to Employee Central with SAP Cloud Platform Integration, the basic authentication option is supported. Navigate to SAP Cloud Platform Integration's Manage Security Material tool to configure and install the Employee Central SFAPI user. $WebUI > Menu > Monitor > SecurityMaterial$. Click the Add button; select User Credentials, then set the following information, as shown in Figure

- Name: Enter a name, e.g., "SFAPI-USER."
- Type: Select SuccessFactors.
- User: Provide user name.
- Password: Provide user password.
- Company ID: Provide company ID.

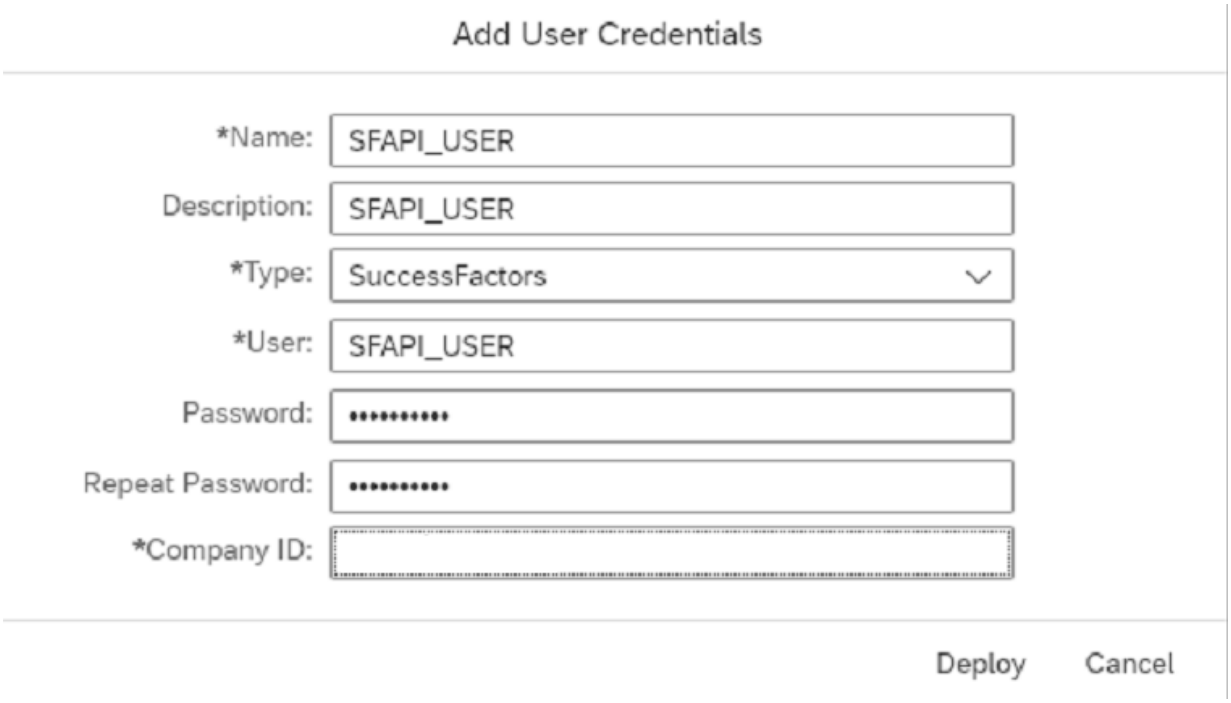


FIGURE 3.13 SCPI SAP SFAPI Credential

Employee Data and Organizational Data Integration

After completing the basic configuration. Now, the next step is to configure our scenario of connectivity which is Employee Data and Organizational Data integration scenario.
To begin the configuration, select SAP SF Employee Central to ERP Employee and Organizational Data from the integration package list. Two artifacts are found to support the integration:

- SAP SuccessFactors Employee Central to ERP Generic Object (Type: Integration Flow).
- SAP SuccessFactors Employee Central to ERP Employee Data and Organizational Assignment (Type: Integration Flow).

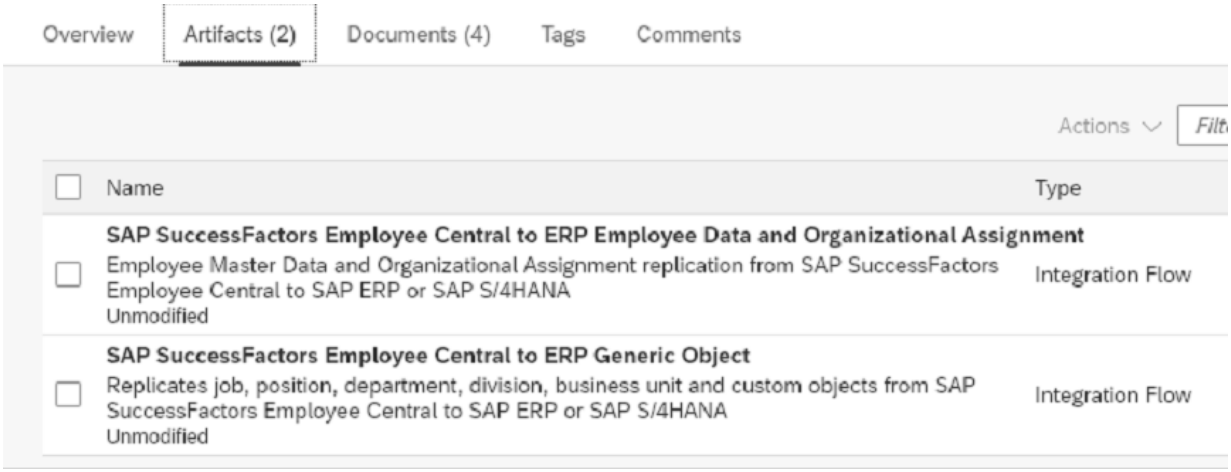


FIGURE 3.14 SCPI Employee Central Package Artifacts

We start with EC to ERP Generic Object with the parameter settings and configuration of a generic Employee Central to ERP object iFlow for enterprise structure job, position, department, division, business unit, and custom object replication processes. Select Configure from the Action dropdown menu to enter the iFlow configuration mode. Select Configure from the Action dropdown menu to enter the iFlow configuration mode. We arrive at the configuration screen shown in Figure

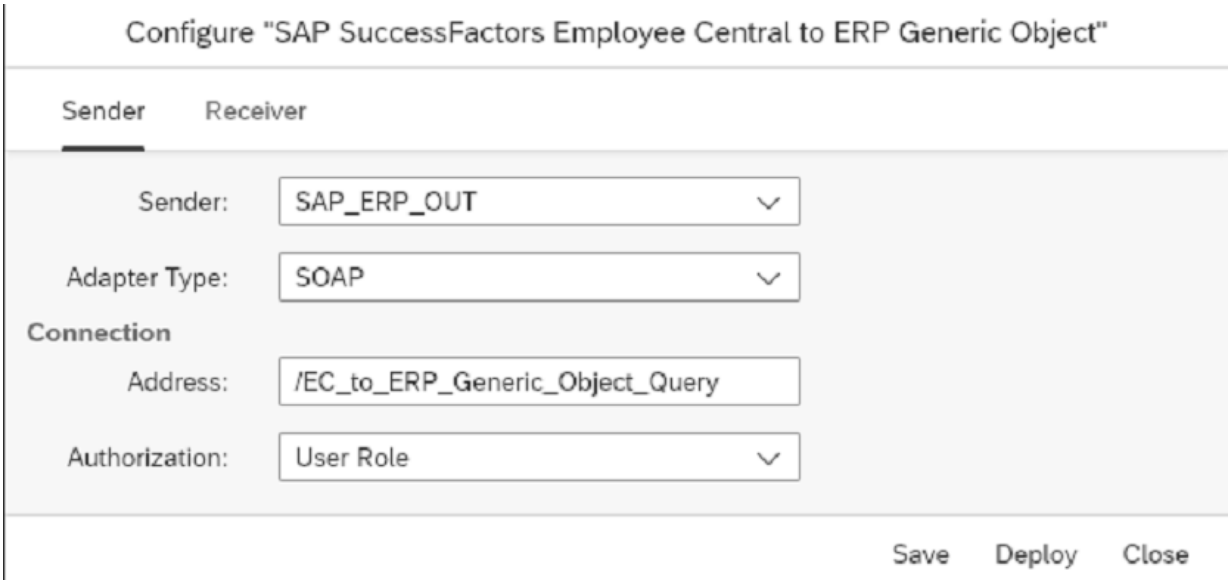


FIGURE 3.15 SCPI Employee Central To Generic Object Configuration

To set up the **Sender** settings, configure the following fields:

- Sender: Leave the default value`SAP_ERP_OUT`.
- Adapter Type: Leave the default value SOAP.
- Address: Leave the default value `/EC_to_ERP_Generic_Object_Query`.
- Authorization: Select User Role.
- Certificate Browse/Subject DN and Issuer DN: Import the client certificate from the sender system.

In the same way we configure the **Receiver** tab:

- Receiver: Select `SFSF_EC` from the dropdown list.
- Adapter Type: Leave the default value SuccessFactors.
- Address: Enter the Employee Central API base URL in this field, “https://apixxxxxx.successfactors.com.”
- Credential Name: Enter the name of the SAP SuccessFactors credential artifact deployed, “SFAPI.”

Next we configure our on-premise SAP system’s receiver details to notify the data replication status in our on-premise SAP system. To set up the receiver settings, we configure the following fields:

- Receiver: Select `SAP_ERP_Notification_IN` from the dropdown list.

- Adapter Type: Leave the default value SOAP.
- Address: Enter the on-premise SAP system notification API URL in this field.
- Allow Chunking: Selected by default.
- Proxy Type: Select Internet for connecting SAP Cloud Platform Integration to our on-premise SAP system through the SAP Web Dispatcher.
- Authentication: Select Basic authentication or Certificate-based authentication.
- Credential Name: Enter the name of our on-premise SAP system's credential artifact deployed.
- Private Key Alias: Enter the certificate private key alias in this field.

Finally, we must configure the receiver settings for organization object replication to our on-premise SAP system in order to replicate organizational objects from Employee Central to your on-premise SAP system, including jobs, positions, departments, divisions, and business units. Configure the areas below to set up the receiver settings:

- Receiver: Select `SAP_ERP_IN` from the dropdown list.
- Adapter Type: Leave the default value SOAP.
- Address: Enter the notification API URL from your on-premise SAP system in this field.
- Allow Chunking: Selected by default. .
- Proxy Type: Select Internet for connecting SAP Cloud Platform Integration to our on-premise SAP system through the SAP Web Dispatcher.
- Authentication: Select Basic authentication or Certificate-Based authentication.
- Credential Name: Enter the name of our on-premise SAP system's credential artifact deployed.
- Private Key Alias: Enter the certificate private key alias in this field.

Now, we can deploy the **Employee Central** to **ERP Generic** Object iFlow into the SAP Cloud Platform Integration runtime process by clicking the **Deploy** button.
The final step in configuring SCPI side is to configure the artifact **Employee Central** to ERP **Employee Data** and **Organizational Assignment**.
First, we select **Configure** from the **Action** dropdown to enter iFlow configuration mode. Similar to the first artifact we must configure Sender and Receiver tabs data filed. The parameters are as follows:
To set up the sender settings, we configure the following:

- Sender: Leave the default value `ERP_Query`.

- Adapter Type: Leave the default value SOAP.
- Address: Leave the default value `/EC_to_ERP_Master_Data_And_Org_Query`.
- Authorization: Select User Role or Client Certificate.
- Certificate Browse/Subject DN and Issuer DN: Import the client certificate from the sender system.

The Receiver tab, where we will first set up the query to Employee Central that extracts employee data from Employee Central. Configure the following fields,

- Receiver: Select value `Employee_Central` from the dropdown menu.
- Adapter Type: Leave the default value SuccessFactors.
- Address: Enter the Employee Central API base URL in this field, for example, "https://XXXXXX.successfactors.com".
- Credential Name: Enter the name of the SAP SuccessFactors credential artifact we deployed.

Next, we set up the receiver settings for employee data and organization assignment replication to our on-premise SAP system, which replicates this data from EC to SAP ERP HCM.

- Receiver: Select `ERP_Response` from the dropdown list. Adapter Type: Leave the default value SOAP.
- Address: Enter the notification API URL from on-premise SAP system.
- Allow Chunking: Selected by default.
- Proxy Type: Select Internet for connecting SCPI to our on-premise SAP system through the SAP Web Dispatcher.
- Authentication: Select Basic authentication or Certificate-Based authentication.
- Credential Name: Enter the name of on-premise SAP system's credential artifact deployed if using basic authentication.
- Private Key Alias: Enter the certificate private key alias in this field if using certificate-based authentication.

After completing all this configuration, we can successfully deploy the artifact EC to ERP Employee data and Organizational assignment.
The last step is to configure the integration of confirmation messages from our on-premise SAP system to our cloud-based SAP system. The processing status of employee data and employee information is updated by EC. Employee Central receives assignments from our on-premise SAP

system. The confirmation SOAP web service message is sent out as soon as the employee data or employee organization assignment processing is completed in our SAP system installed locally. To begin, choose an "ERP to SuccessFactors Employee Central Confirmation v2" from the list of integration packages. To support the confirmation integration, one artifact is given as standard. Select Configure from the Action dropdown menu to enter the iFlow configuration mode. To set up the receiver settings for sending employee data and organizational assignment data replication confirmations to Employee Central.

- Receiver: Leave the default value `SFSF_EC`.
- Adapter Type: Leave the default value SuccessFactors.
- Address: Enter the Employee Central API base URL in this field, "https://apiXXXX.successfactors.com."
- Authentication: Leave the default value Basic authentication.
- Credential Name: Enter the name of the SAP SF credential artifact deployed.

Now we deploy this artifact successfully.
Also, we need to go through each set of deployed integration content and take note of their web service endpoint URLs. We need these URLs when configuring the SOA Manager in our on-premise SAP system.

3.5.3 Configuring On-Premise SAP S/4 Hana System

Basic Configuration

We will show the basic technical configuration steps for activating the required web services, IDocs, and BIB integration framework that will be used in integrating SF EC to SAP S/4 Hana HCM System.
Both employee data and organizational data integration use SOAP web service technology for data transfers between on-premise SAP S/4 Hana system and SCPI. The following web services should be configured in the SOA Manager to enable both data replication.
For employee data and organizational assignment replication, as shown in figure, the corresponding iFlows of these web services are **SAP SuccessFactors Employee Central** to **SAP ERP Employee Data** and **Organizational Assignment and ERP** to **Employee Central Confirmation v2**.

Object Type	Object Name
Consumer proxy	getEmployeeMasterDataAndOrgAssignmentBundleReplication-Query_Out
Consumer proxy	EmployeeMasterDataReplicationConfirmationBOut
Provider proxy	EmployeeMasterDataAndOrgAssignmentBundleReplication Request_In

Table 3.2 objectCO_ECPAOX_EE_MD_ORGAS_BNDL_QRY Proxy list

The first iflow to be configured is **SAP SF EC TO SAP ERP Employee Data** and **organizational Assignment**.

We type in the search bar the objectCO_ECPAOX_EE_MD_ORGAS_BNDL_QRY

Both **Consumer proxy** and **Provider proxy** should be configured as follows, we start with consumer proxy:
We start by configuring Consumer proxy by creating manual configuration as shown in figure.

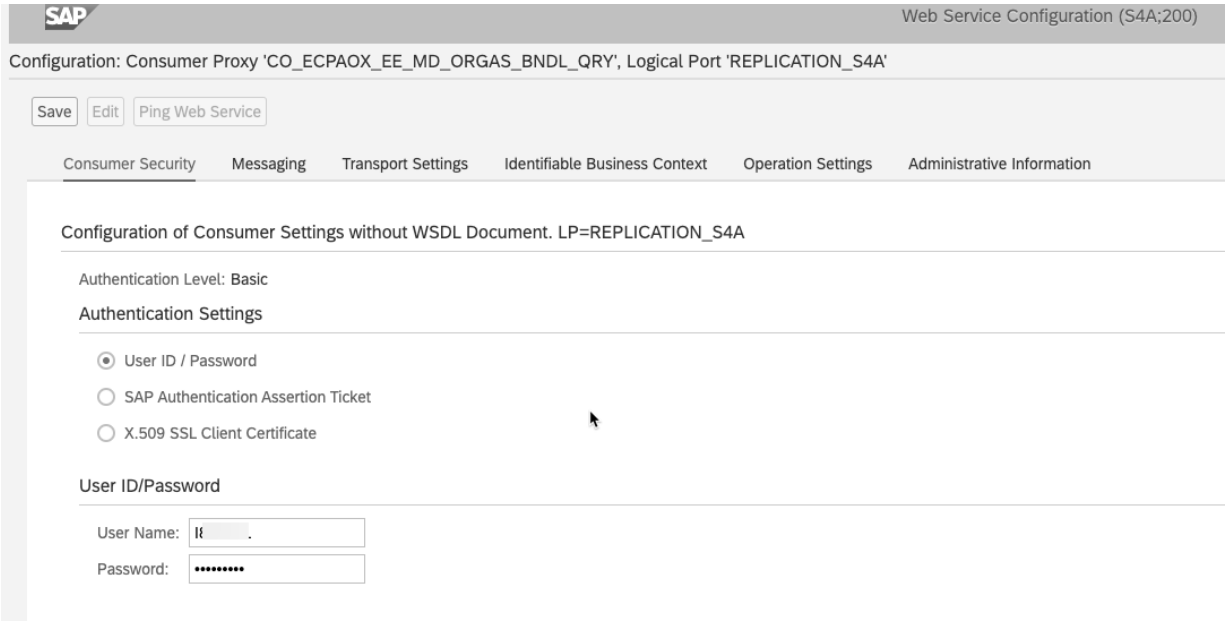


FIGURE 3.16 Consumer proxy Configuration, Primary tab

The user and password field are filled with our SCPI S-User. Then we move to the **messaging** tab and set up its fields as follows.

- RM Protocol = SAP RM
- Message ID Protocol = Suppress ID Transfer
- Data transfer scope = Enhanced Data Transfer

- Transfer protocol = Transfer via SOAP header

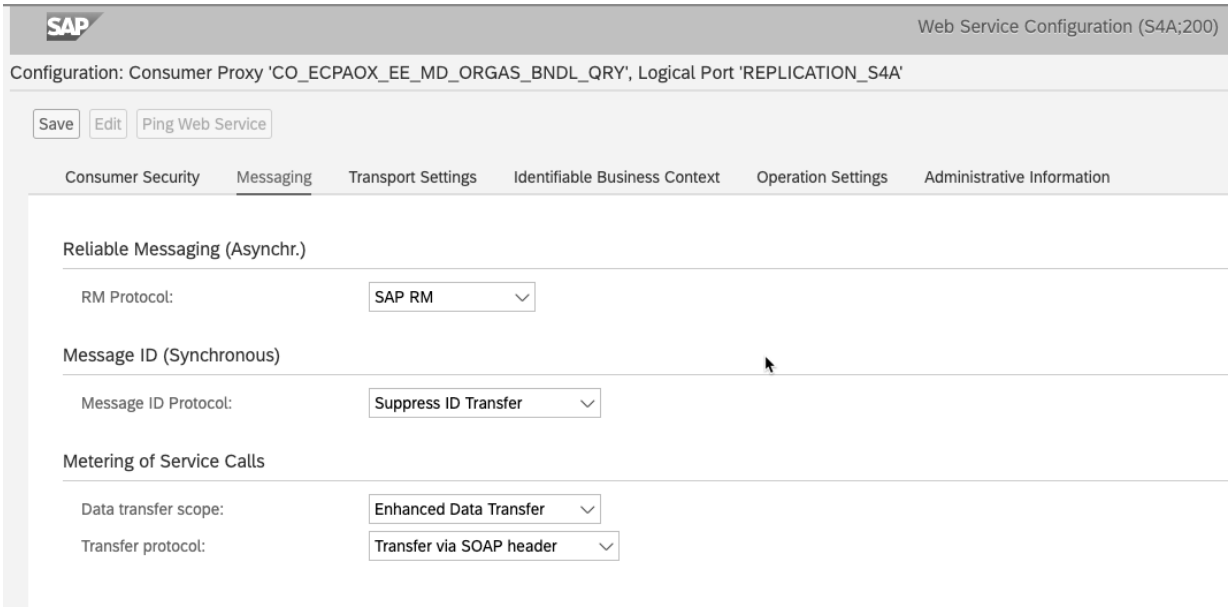


FIGURE 3.17 Consumer proxy Configuration, ”Messaging” tab tab

In the next tab **Transport Settings**, we put only the link that we have copied it before as shown in figure.

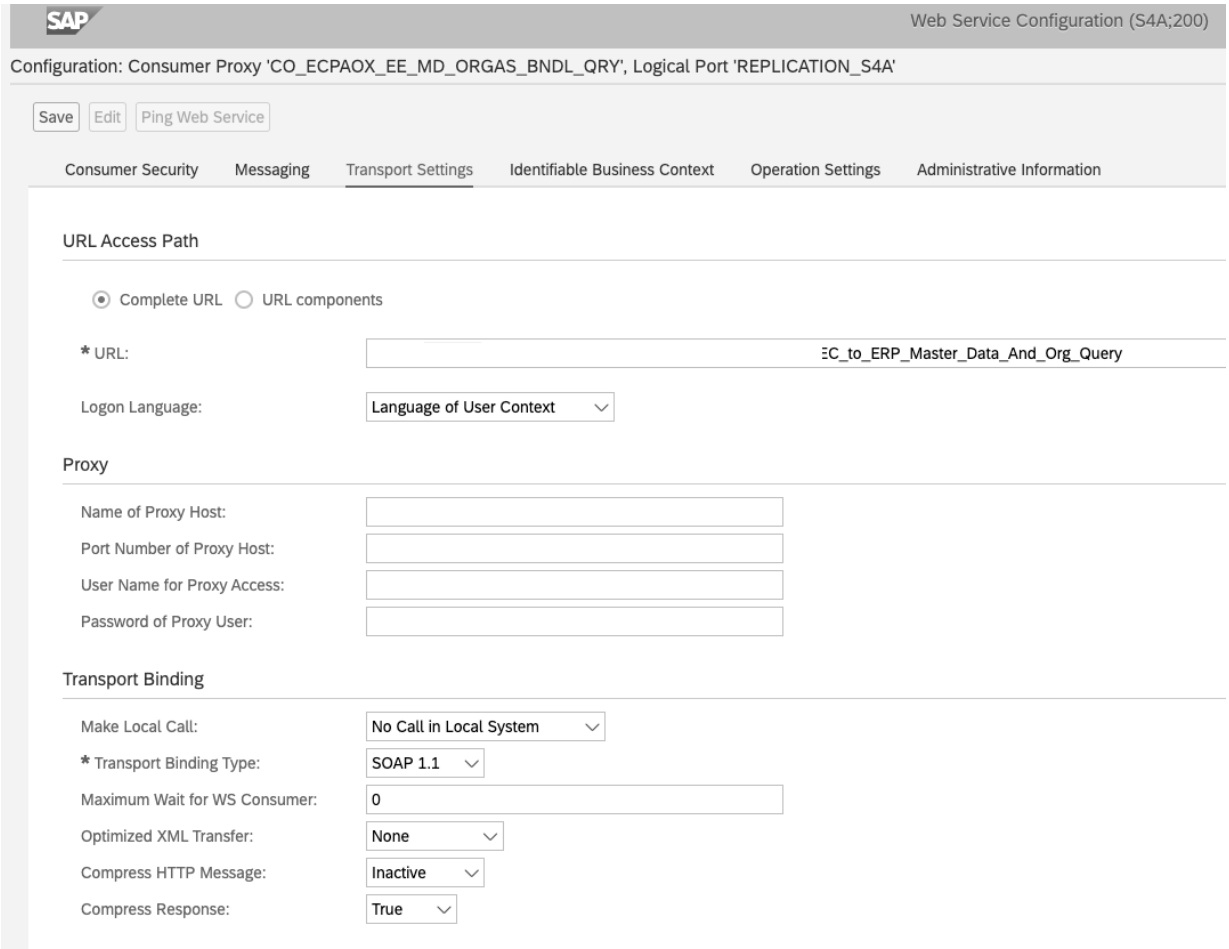


FIGURE 3.18 Consumer proxy Configuration, ”Transport Settings” tab

For the other tabs we keep the default values and we save the parameters. We can test pinging the web service to confirm the configuration and get a successful connection message.
Now we need to set up the Provider proxy. We access the SOAMANAGER and go to Simplified Web Service Configuration and type the Search Pattern “EEMASTERDATAANDORGASSB-NDLREQ” and then **Select** the checkbox of User Name/Password (Basic) and Saveas shown in the figure

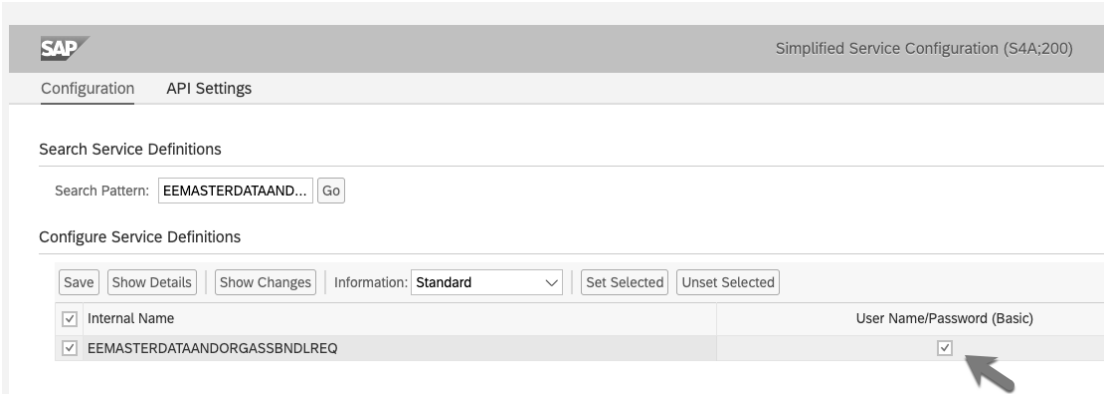


FIGURE 3.19 Provider proxy configuration in ”SOAMANAGER”

Business Integration Builder

Now we jump to enabling BIB set up, which is important in our case, where we can do the mapping of data fileds between SAP SF EC and our On-Premise SAP S/4 Hana HCM.

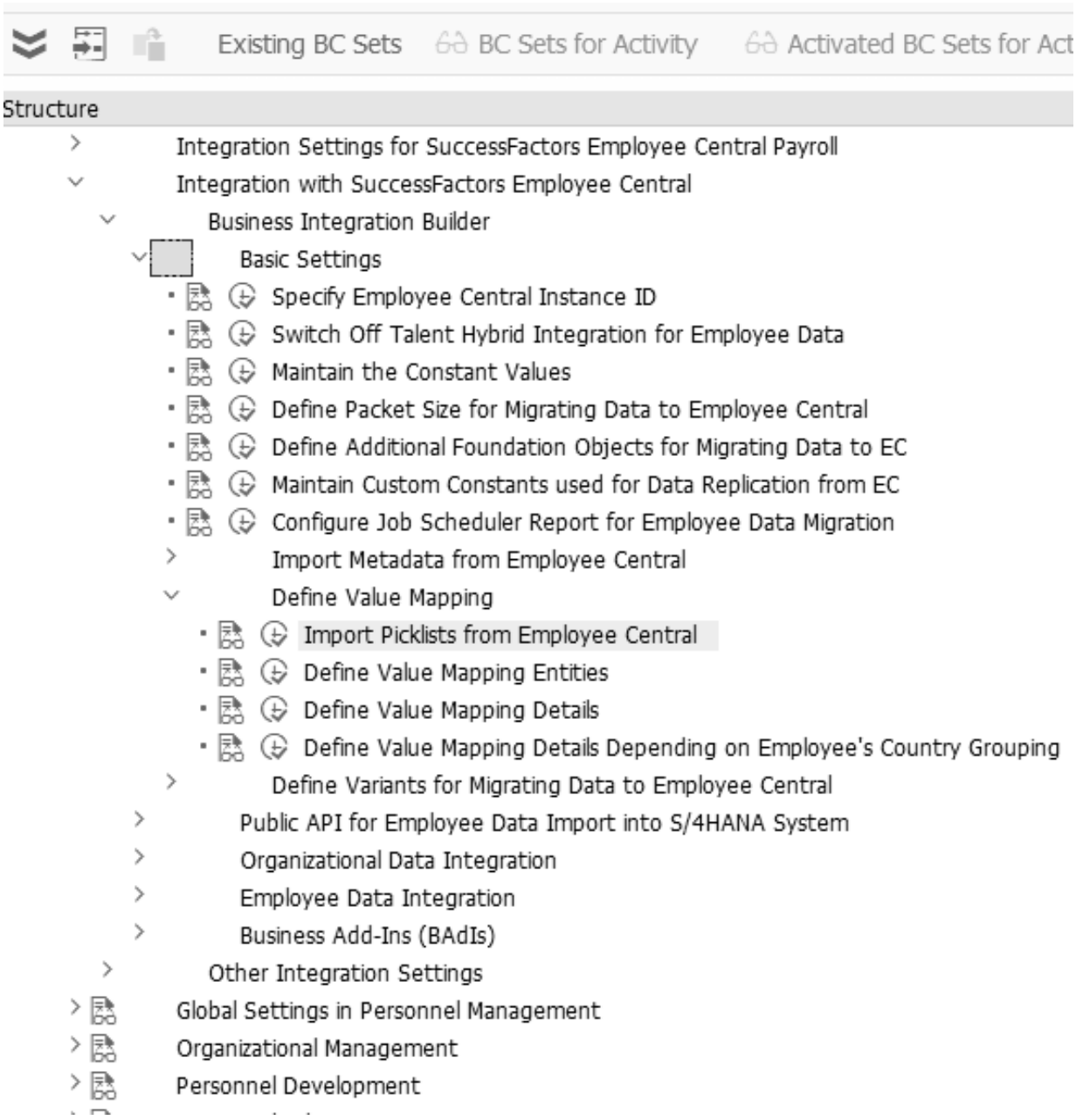


FIGURE 3.20 S/4 Hana Business Integration Builder Configuration Page

Before we can advance to more comprehensive field mapping configuration operations using the BIB framework, we must first complete certain fundamental activation and configuration processes. Let us start with the essential steps for a basic setup:
Enable the BIB integration framework by activating the BIB switch, in our On-premise System we go to **IMG** follow the path `Personnel Management > Integration with SuccessFactors`

`Employee Central > Business Integration Builder > Basic Settings > Maintain the Constant Value > New Entries.` We Select Activate BIB for EC to ERP Employee Replication in the Const field.

Next, we specify the EC instance ID by entering the company ID. We just enter in the same path `Basic Settings > Specify Employee Central Instance ID > New Entries.`

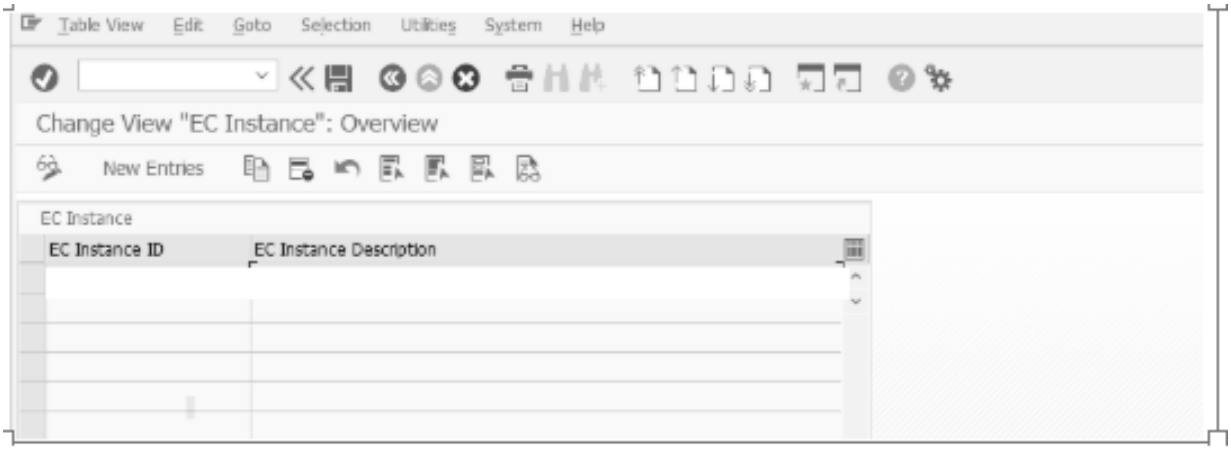


FIGURE 3.21 BIB Successfactors EC Instance Specification

Then we need to export our MDF from our SF EC instance and import it into our On-Premise system to form the Employee Central field mapping template in our on-premise SAP HCM system. After exporting the MDF we just import it simply in the **Import Metadata from Employee Central field**.

The next step now is to set up **"define value mapping"** first we import the picklists from SF EC then we can get the default values as seen below in figure.

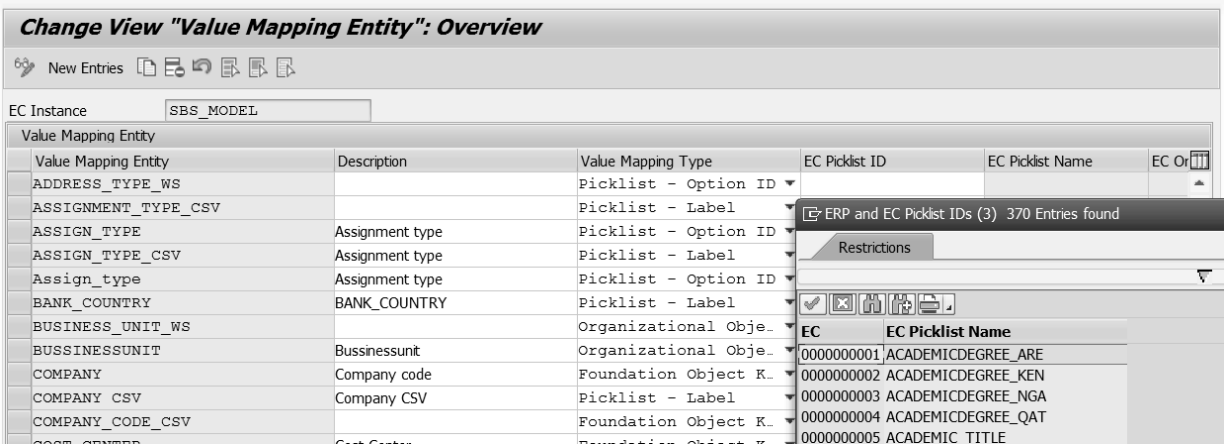


FIGURE 3.22 BIB Define Value Mapping

After defining the value mapping, we could now jump to create Transformation Templates in the option `Employee Data Integration > Define Field Mapping for Employee Data`. The required and mandatory Templates and infotypes to replicate Master Data successfully from EC to SAP S/4 Hana HCM which are as follows:

Employee Central Templates:

- `WS_2` (Biographical Info Template) related to EC Entity **"PerPerson"**.
- `WS_3` (Employment Info Template) related to EC Entity **"EmpEmployment"**.
- `WS_4` (Job Info Template) related to EC Entity **"EmpJob"**.
- `WS_5` (Personal Info Template) related to EC Entity **"PerPersonal"**.
- `WS_11`(Compensation Template) related to EC Entity **"EmpCompensation"**.

SAP S/4 Hana HCM Infotypes:

- IT0000(Events and Event reasons).
- IT0001(organizational assignments).
- IT0002(personal information).

We modify templates group and assign it correctly with the help of the data information given from functional consultant of both modules SAP SF and SAP S/4 Hana HCM to replicate data correctly. values as seen below in figure.

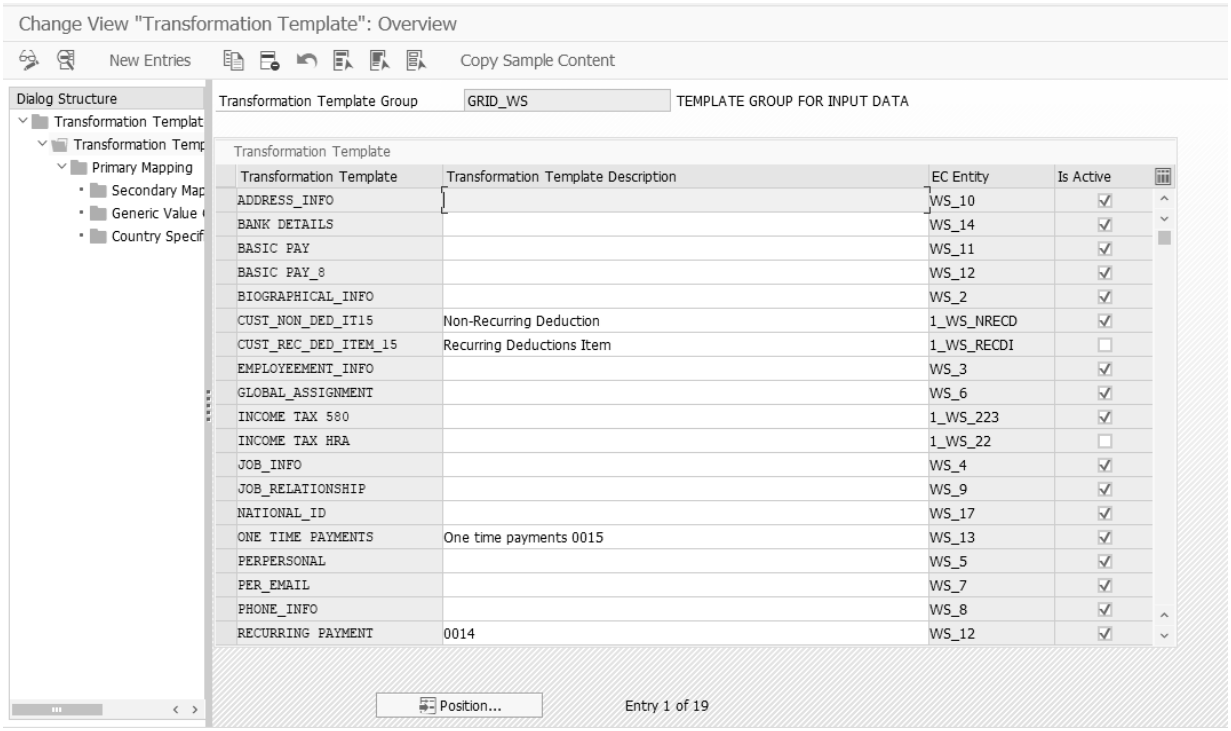


FIGURE 3.23 EC to S/4 Hana HCM Transformation Templates

After modifying each infotype with its Entity field in EC we jump we jump in the same option "Employee Data Integration" to the `sub-option Employee Data Integration > Define Parameters for Employee Data and Org`. Assignment Query, we set up the mandatory parameters of each field as follows, for optional settings we keep it as default:

- Transformation template group: Select your template group.
- Type Of Workforce: Assign which group of workforce data to be replicated.
- Target System: Enter the external code of the Replication Target System object that you created in Employee Central.
- Use External ID: To use OBJID (External Id) field while replicating cost centers mark this checkbox.
- Multiple Job Events: To Enable replication of multiple job events per day mark this checkbox.

Conclusion

We should have completed the implementation of both cloud-based and on-premise systems by this point, and we believe they are now operational. After completing each configuration, the solutions were tested to ensure that they were correct at each level of the project. We were unable to witness the go-live of the implemented system due to the brevity of our internship period, but we conducted testing at separate times and levels to ensure that both systems functioned properly. We will test certain target processes in the upcoming chapter and make sure they work in our deployed systems.

Chapter 4

Results and Discussion

Test scenarios are used to test and then evaluate whether the chosen configuration meets the specified requirements. These test scenarios describe the functionality of Position Management and the activities associated with it. For this reason, it is desirable that the system set up according to these test scenarios is tested by the end users who will use Position Management. This testing will then determine whether everything is also set up in accordance with the other HR standards that the end users use and therefore know best. This chapter sets out the activities to be carried out by the HR department after the implementation of Position Management. The test scenario includes a description of the activity, the source from which the activity originates, a description of the outcome of the activity, and the goal, i.e., where the outcome of the activity should be manifested.

4.1 SAP SF Employee Central

After the implementation and configuration of the SAP SuccessFactors Employee Central we deploy it and configure the different accounts of employees each employee with his role and upload the employees' files using the mass upload of all employee personnel and organizational data. In the figure below we can see the home panel of the DRH of the company who is the manager of human resource directory and has access to all the tools and functions in the system.

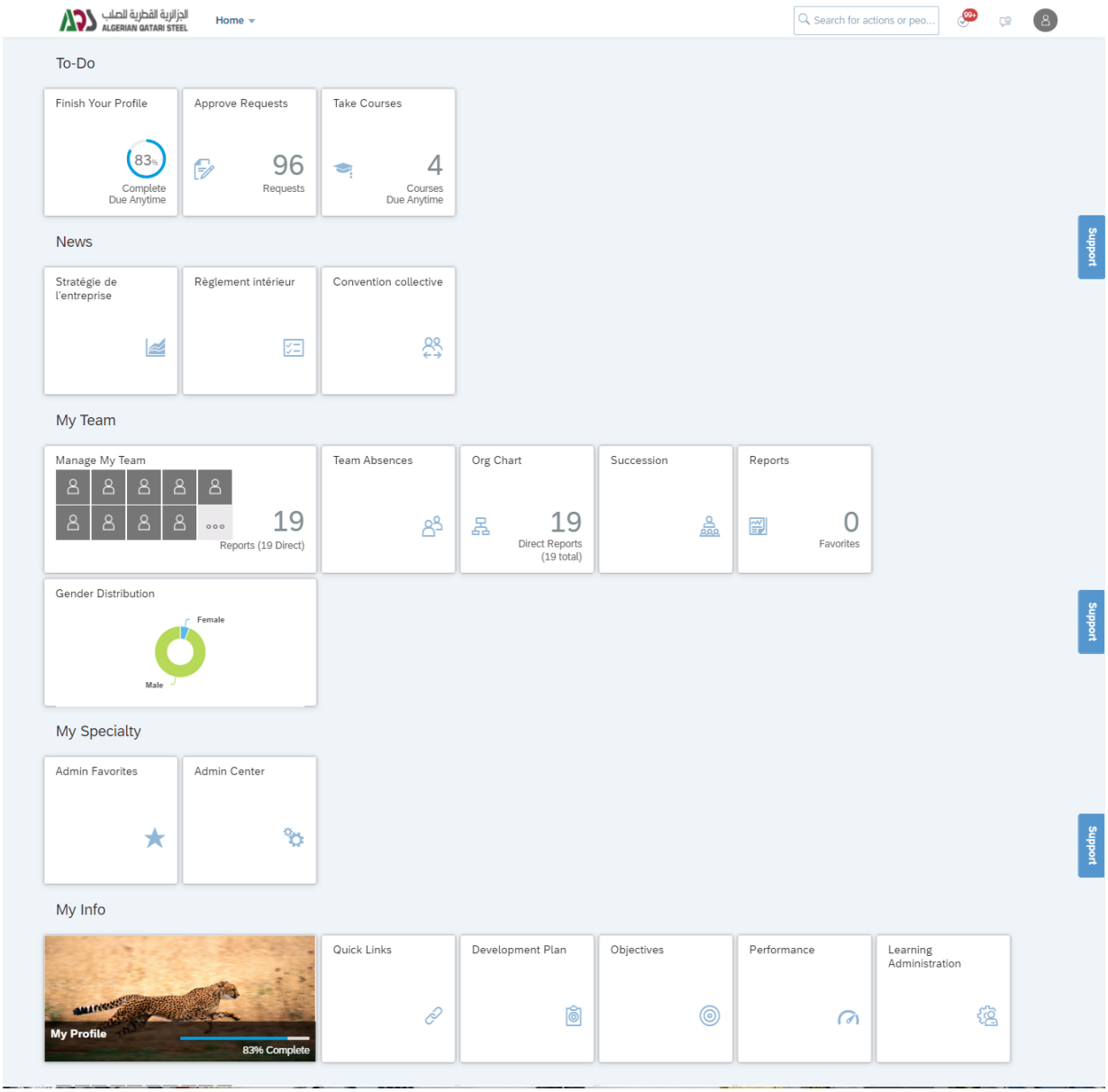


FIGURE 4.1 SAP SuccessFactors Home Panel

The different tools of our System tools

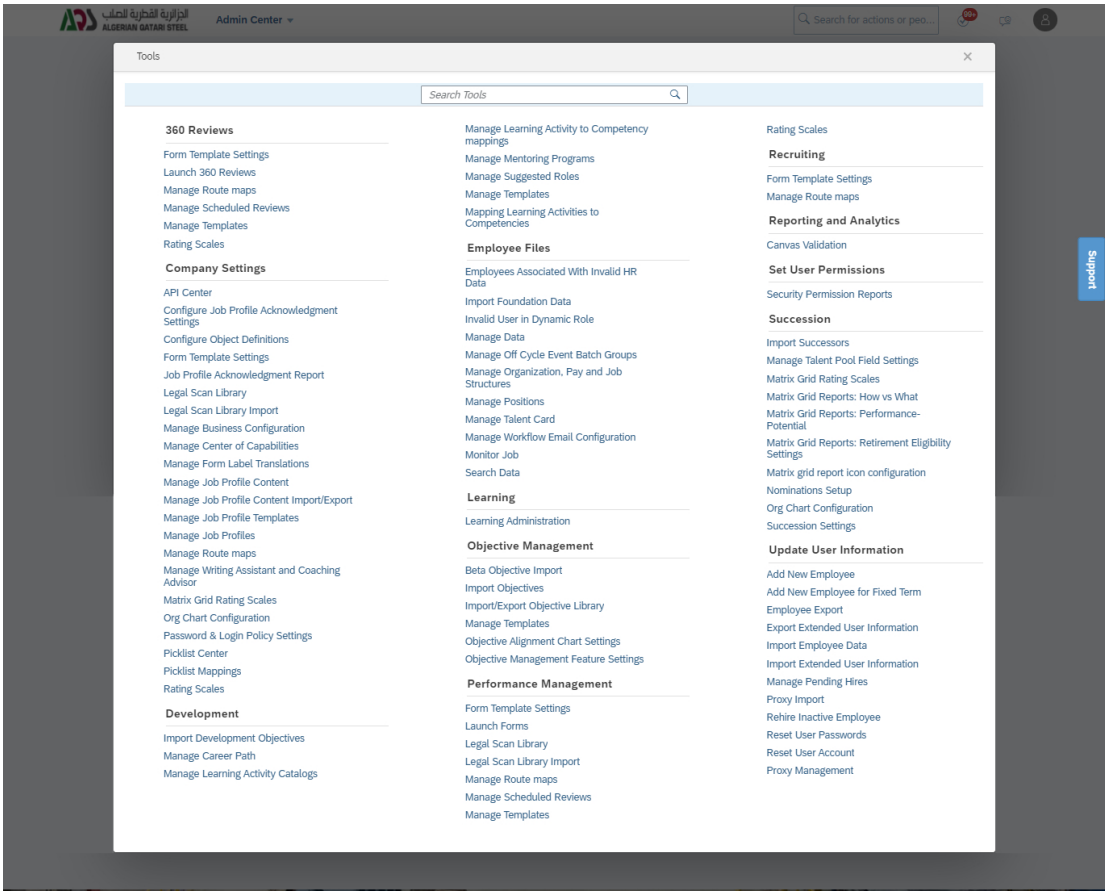


FIGURE 4.2 SAP SF List of Tools

Employee file

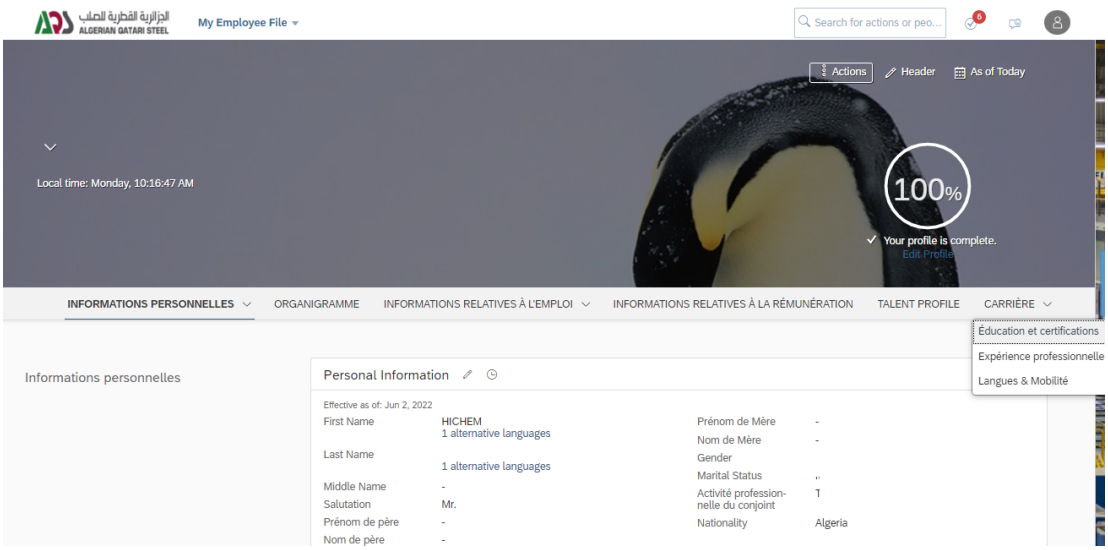


FIGURE 4.3 SAP SF EC Employee Profile Page

We have tested the following functions successfully in our system with key-users of HR directory.

First, we should define the Different roles in our Company:
DGA= Director general adjoint
DRH= Director of human resource directory
RH1/RH2= Human resource department staff

- Create New Position

DRH >> Go to" Manage Positions" by searching in the search bar" Click on create a position on the drop-down list" Fill in the necessary fields and click Save DGA >> Approve/ Deny the request

- Delete New Position

DRH >> Go to "Manage Positions" by searching in the search bar then Click on the drop-down list on the left, then select a post to delete" then Click on "Action" " then delete" DGA >> Approve/ Deny the request

- Hire a New Employee

RH 1 /RH2 >> Go to System−− > Search for "add employee" feature.

RH 1 /RH2 >> Complete the required fields in the Employee Information section and click Continue.

RH 1 /RH2 >> Fill in the required fields in the Biographical Information section and click Continue.

RH 1 /RH2 >> Fill in the fields to be completed in the Personal Information section and click on Continue.

RH 1 /RH2 >> Complete the required fields in the Job Information section and click Continue.

RH 1 /RH2 >> Fill in the required fields in the Payment Information section and click Submit.

DRH >> Approve/ Deny the request

- Terminate Employment

RH 1 /RH 2>> Access the employee's profile by searching for their name in the search bar at the top of the screen

RH 1 /RH2 >> Click "Perform action" on the icon at the top right of the screen and select "End contract".

RH 1 /RH2 >> Fill in the necessary fields. DRH >> Approve/ Deny the request.

- Re-Hire Employee

RH 1 /RH2>>From the Home drop-down menu, access the Administration Center. Afterwards, click on ”Update user information”, then on ”Rehire an inactive employee”
RH 1 /RH2 >> Select the employee to be rehired
RH 1 /RH2 >> Fill in the fields to be completed in the different sections and click on Send
DRH >> Approve/ Deny the request

- Event Sanction 1

RH 1 /RH2 >> Navigate to Employee Records−− > Scroll to ”Employment Information”
RH 1 /RH2 >> Click on the ”clock” in the header of the ”Job information”
RH 1 /RH2 >> Click on ”Insert a new record”
RH 1 /RH2 >> Select Event: ”First Degree Sanction”
RH 1 /RH2 >> Select Event reason: ”Written warning, Blame, Laid off for one to three days” Then Save
DRH >> Approve/ Deny the request

- Event Sanction 2

HR 1 /RH2 >> Navigate to Employee Records−− > Scroll to ”Employment Information”
RH 1 /RH2 >> Click on the ”clock” in the header of the ”Job information”
RH 1 /RH2 >> Click on ”Insert a new record”
RH 1 /RH2 >> Select Event: ”Second Degree Sanction”
RH 1 /RH2 >> Select Event Reason: ”Laid off four to ten days, Demotion to lower position”
RH1 /RH2 >> Save
DRH >> Approve/ Deny the request

- Event Sanction 3

HR 1 /RH2 >> Navigate to Employee Records−− > Scroll to ”Employment Information”
RH 1 /RH2 >> Click on the ”clock” in the header of the ”Job information”
RH 1 /RH2 >> Click on ”Insert a new record”
RH 1 /RH2 >> Select Event: ”Third Degree Sanction”
RH 1 /RH2 >> Select Event reason: ”Disciplinary dismissal”
RH1 /RH2 >> Save
DRH >> Approve/ Deny the request

- Event Suspension Employment

RH 1 /RH2 >> Navigate to Employee Records−− > Scroll to ”Employment Information”

RH 1 /RH2 >> Click on the ”clock” in the header of the ”Job information”

RH 1 /RH2 >> Click on ”Insert a new record”

RH 1 /RH2 >> Select Event: ”Suspension”

RH 1 /RH2 >> Select Event reason: ”Contract suspension”

RH1 /RH2 >> Save

DRH >> Approve/ Deny the request

- Event Retake Employment

RH 1 /RH2 >> Navigate to Employee Records−− > Scroll to ”Employment Information”

RH 1 /RH2 >> Click on the ”clock” in the header of the ”Job information”

RH 1 /RH2 >> Click on ”Insert a new record”

RH 1 /RH2 >> Select Event: ”Disaster recovery”

RH 1 /RH2 >> Select Event Reason: ”Disaster recovery”

RH1 /RH2 >> Save

DRH >> Approve/ Deny the request

4.2 SAP SF Learning

4.2.1 Administrator View

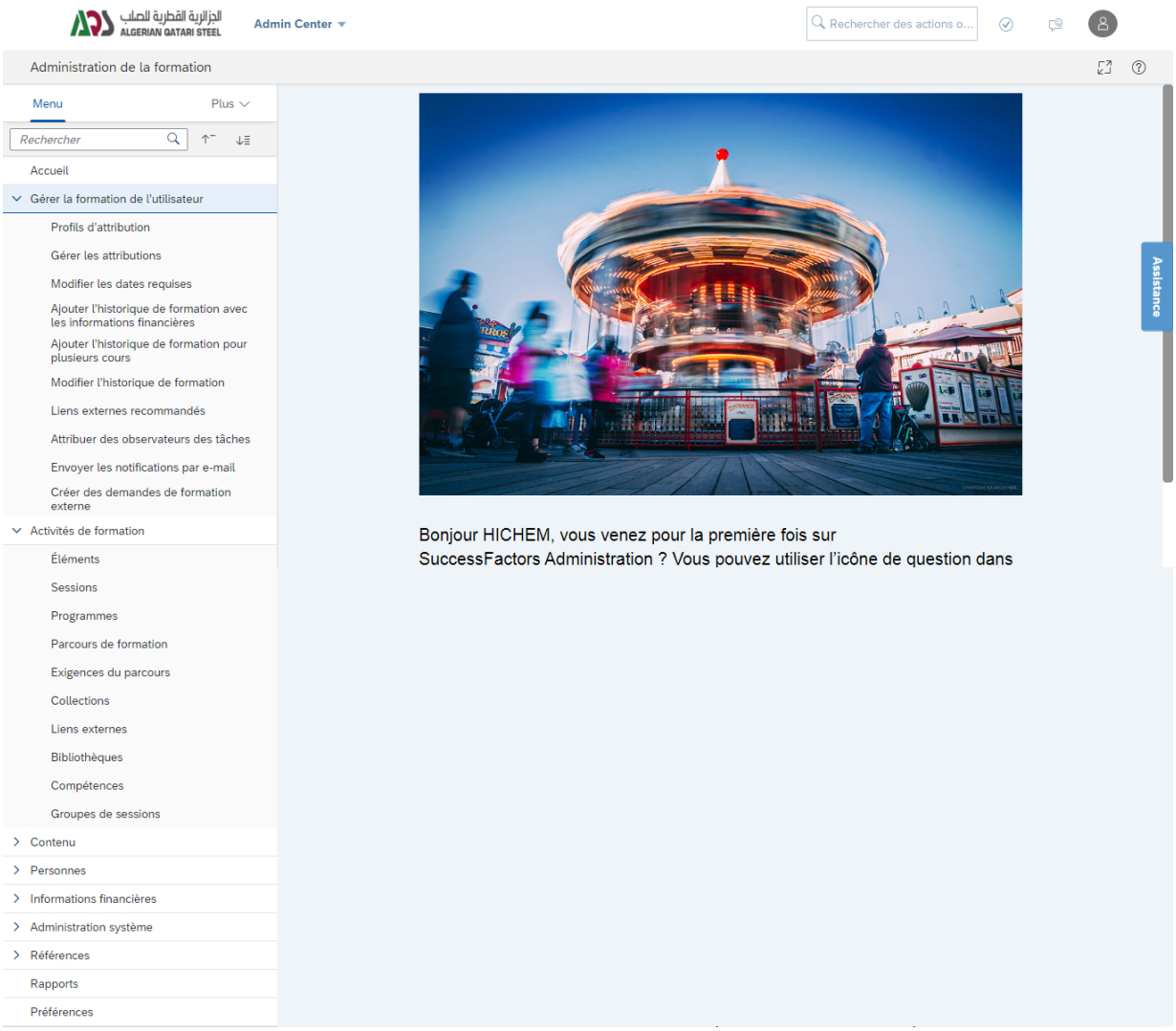


FIGURE 4.4 SAP SF Learning Administration Home Panel

- Search for a report Admin

Menu > Reports

- Run Report

Reports > choose a report > Run as CSV

- Execute a Report

Reports > choose a report > Run Training Needs

- Import online content (1/2)

Menu > Content > Import content > Add new content > Next > Import content

- Import online content (2/2)

Next > Server location (content) > Enter the field 'The identifier of the content set' > Import > Schedule the job

- Creation and animation of the training repository - Creation of the course

Training activities > Elements > Add new > Classification Online

- Creation and animation of the training repository - Adding content to the created course

Online content > add the object of the imported content

- Creation and animation of the training repository - Publication of content

Online content > Parameters > The content can be launched + Automatically launch the content when starting or resuming the course

- Creation and animation of the training repository - Allow the publication of finalized courses in the employee's training history

Admin Online Content > Settings > Completion > Add to history when all content is completed

- Creation and animation of a training catalog (1/2) - Creation of an Administrator catalog

Menu > Training activities > Libraries > Click on 'Add a new'

- Creation and animation of a catalog of training courses (2/2) - Supply of the catalog thanks to the contents Administrator

Once the Library > Add elements

- Creation and animation of a catalog of training courses and training organizations - Training organizations (1/2)

Menu > People > Trainers > Add new

- Creation and animation of a catalog of training courses and training organizations - Training Organizations (2/2)

Summary: Surname, First Name, Training Organization

- Training planning (1/4)

Training activities > Elements > Add new > 'Instructor-led' classification

- Training planning (2/4)

Item > Agenda template

- Training planning (3/4)

Actions > Program

- Training planning (4/4)

Session administrator > Registrations > Add users

- Assessing Training Effectiveness - Admin Rating Scales

Menu > References > System Administration > Rating Scales > Click "Add New"

- Evaluation of the effectiveness of trainings - application of the newly created Rating scale (1/2)

Menu > Content > Evaluation > Click "Add evaluation"

- Evaluation of the effectiveness of trainings - application of the newly created Rating scale (2/2)

Evaluation > Add a question > In Question type click "Rating scale"

- Evaluation of training effectiveness - add a questionnaire to an Admin item

Choose a course > Click on ”Questions” to add the evaluation created with the rating scale

- Creation of training plans - Program (1/3)

Menu > training activities > Programs > Add a new type based on duration

- Creation of training plans - Program (2/3)

Program > Agenda > Add created activities

- Creation of training plans - Program (3/3)

Program > Publication in progress > Library

- Creation of training plans - Administrator training course

Menu > training activities > Training course > click ”Add new”

- Creation of training plans - Training course - add a course

Contents -> Add a course (sign ’+’)

- Creation of training plans - Training path - Administrator job codes

Menu > References > People management > Job codes > Choose an example and see the ”Training path” tab

- Management of registrations (1/2)

Menu > Training activities > Sessions (choose a session) and click on ”Registrations” > select the button with 3 dots ’. . . ’ > check the registration status using the ”Status” column

- Registration management (2/2)

When the session is over (or ends) click ”Actions” > ”Add to training history”

- View the training schedule

Menu > ’Training activities’ > ’Sessions’ >Remove search filters by date > ’Search’ > Choose ’Calendar view’ >

- Identify people who have undergone training (1/2)

Menu > Reports

- Identify people who have taken training (2/2)

Reports > Click on the ’-’ sign to deploy the report options > Click on the ’Training history’ report – CSV

4.2.2 User View

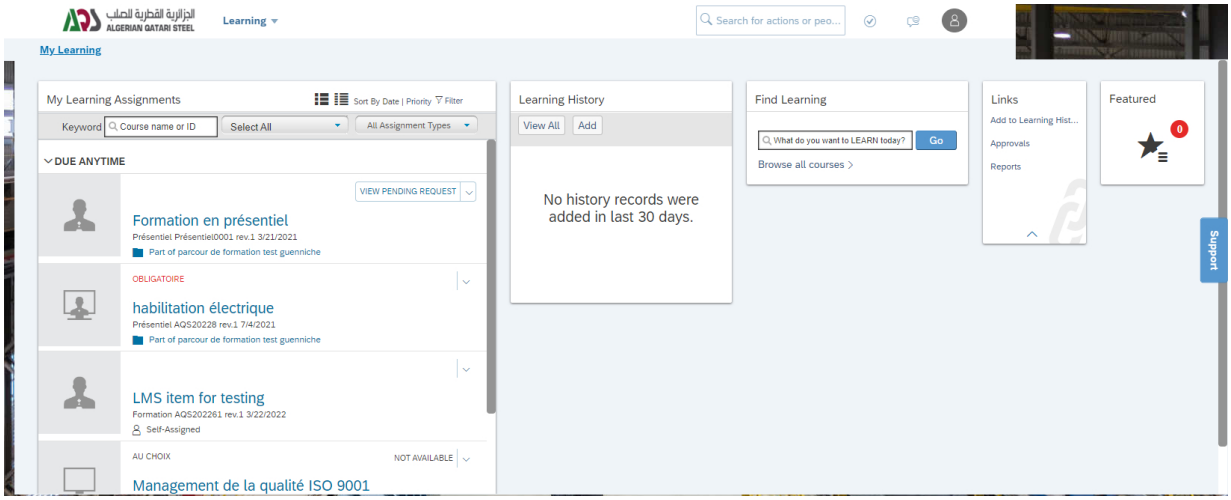


FIGURE 4.5 SAP SF Learning User Panel

Learner

- Access the learning module

Home drop-down menu > Training

- Search the catalog for the ”AGILE” course

In the find a Training Tile > click on Browse all trainings > Select the AGILE course > click on More > Assign it to me

- Start the self-assigned course from the My courses to follow tile

In the My courses to follow tile > Select the ”AGILE” course and click on the start course button

- Answer the quiz

In the ”AGILE” course > click on the quiz

- Fill in the on-the-spot evaluation form

In my training courses tile > click on the ”Launch the questionnaire” button
Once the course has been completed, the hot evaluation questionnaire will be displayed on the My courses to follow tile

- Print the Certificate

In the Training History Tile > Click on the Print button next to the ”AGILE” course

- Launch a training request

Training module > Click ”Browse all courses” > choose a course and click ”Assign it to me” > click on ”More” and click on ”Request a session”

Manager

- Access the learning module

Home drop-down menu > Training > My team

- See or search for people in my team

Just click on search Bar

- Add to History

Manager Links > Add to Training History

- Add Item

Manager Links > Assign/Remove Training (Training Items)

- Add Session

Manager Links > Enroll/Unenroll Employees (Training Ses/Class)

4.3 SAP SF Succession Development

The DRH has access to succession application where he can see the successor of each employee and the calculations made by the system to detect the company talents.

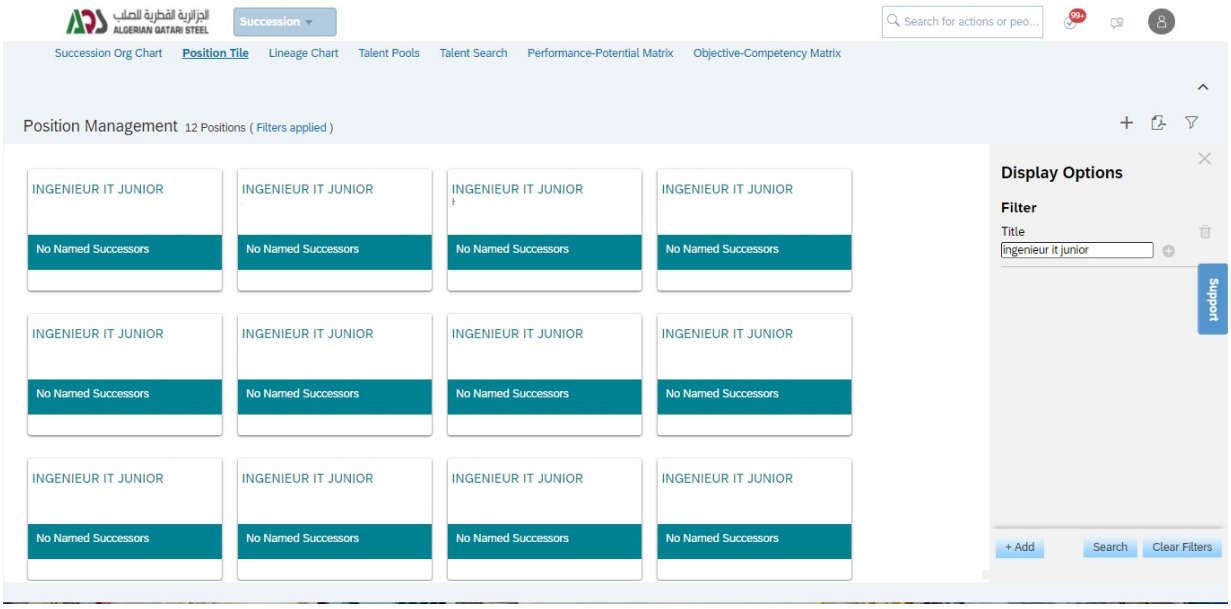


FIGURE 4.6 SAP SF Succession & Development Home Panel

- Talent Pool

Go to Home > Talent > Talent Pool Home drop-down menu > Succession

Click + to create talent pools Talent Pool

View Talent Pools Talent Pool

- Search Talent

Go to Home > Talent > Talent Search Home drop-down menu > Succession

Choose filters Click on Search Talent search

The development application is being held at three levels, employee on himself, manager over employee, and HR staff to manage all objectives and follow development of employee careers.

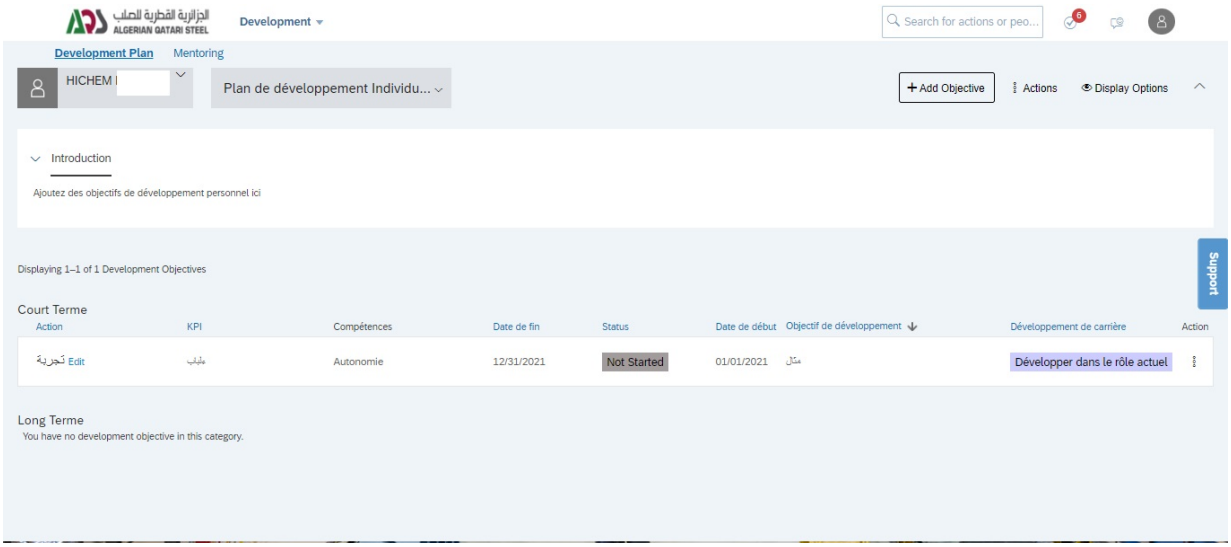


FIGURE 4.7 SAP SF Succession & Development Objectives Panel

- Development Plan (HR Staff)

Go to Home > Development Home drop-down menu > Development

To add development goals, click Development Plan

To Delete a development objective

- Development Plan (Manager)

Go to Home > Development Home drop-down menu > Development

To add development goals, click Development Plan

Delete a development objective

- Development Plan (Employee)

Go to Home > Development Home drop-down menu > Development

To add development goals, click Development Plan

Delete a development objective

- Career Map

Go to Home > Development Home drop-down menu > Career Map

To add roles, click Career Map Career Map, Scroll down and view skill gaps Career map

- Successor Organigram

Go to Home > Talent > Replacement Flowchart

To add a successor, click on the ”Successors” tab, click on ”+ Add a successor”

Go to “Successor Organigram” and click the “Display Options” icon, Choose a report type to adjust the hierarchy.

Choose what estate or talent information to display on each org chart node by clicking Show on Map.

To open the Talent Map table, click on the employee’s name in the org chart.

Scroll down to see more information such as: Performance & Potential, Performance History, Appointments.

CONCLUSION

Nowadays, not a single company can do without an HR information system, which is designed to streamline the work of HR specialists, provide up-to-date information on the state of the company, and speed up all processes.

This dissertation introduces the different limitations and issues existing in HR Department of AQS company and reports the implementation of an ERP project which is SAP S/4 Hana and its HRMS. In the first part, all elements and functions of HR were described within the context of information systems. Their contribution and their impact on the company was also included. In the practical part, an analysis of the different phases of the project implementation was presented and we define our role in the project during the four-month internship. The main objective of this dissertation is to define the technologies used to implement a modern automatized information system that digitize most business functions, with a special emphasis on the different HR processes. We present high level diagrams of these processes and report the different implementation steps of the most important parts. The company adopted a hybrid solution to ensure the correct replication of data between the Cloud-Based System and On-Premise System using respectively SAP SF and S/4 Hana HCM.

As a result of time constraints, not all the planned work is implemented. However, we will mention a few key points for future work. First, not all modules have been configured and implemented due to the long timeline of the project and our limited internship period. Some functions did not pass the test successfully and need to be re-configured because they were not well defined in the business blueprint. The collection of different data from old systems and databases was difficult to process because it was complex and too much data and needed extra time. Also, the need to use some ultra-tools to manage data and prepare XML files.

Finally, this project was implemented on a real environment using real data of AQS employees, for that reason the information provided in this dissertation was standard information of SAP software system to protect all sensitive information in our snapshots for security reasons. This solution will be used in the HR department after the end of the deployment of all modules. After passing all the end-users tests, the software will go-live, as scheduled, in January 2023.

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